

## 'Affect' in Binding and Coreference\*

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### 1. Background

It has been often asked how the 'locality constraints' as observed in (1) arise concerning the referential interpretation of 'pro-forms' such as anaphors and pronouns:

- (1) a. Mary was afraid that John<sub>1</sub> would blame **himself**<sub>1</sub> / **\*herself**.  
b. John<sub>1</sub> was afraid that Mary<sub>2</sub> would blame **him**<sub>1</sub> / **\*her**<sub>2</sub>.

It is much less frequently asked, however, why, in the first place, such pro-forms can or must depend upon external referential expressions for their interpretation. In this paper, I will attempt to provide a preliminary answer to this fundamental question, sketching out what I will refer to as the **Optimalist Approach** to the theory of binding and coreference.

To begin with, I will **selectively** adopt some of the leading ideas of the minimalist program (Chomsky (1992, 1994)) described in (2) without adopting much of their execution often entertained in the literature:

- (2) a. Grammar is designed to avoid ungrammaticality as much as possible.  
b. Illegitimacy (or potential ungrammaticality) may be remedied by the operation "Affect." (cf. Lasnik and Saito (1984))  
c. Linguistic representations and derivations are subject to the economy principles at the Interface levels (= LF and PF).

Without pretending to offer a new theoretical framework, I would like to label the adopted approach as the "Optimalist Hypothesis" (not to be confused with Prince and Smolensky's (1993) "Optimality Theory"), so that it can be detached from many other assumptions and the technical details associated with the minimalist program.<sup>[A1]</sup> Two economy conditions as described in (3) are adopted from Chomsky (1992):

- (3) a. The Principle of Full Interpretation (FI): A symbol in the final representation of LF and PF is legitimate only if it is fully interpreted.  
b. The Last Resort Principle (LRP): A derivational step is legitimate only if it is the last resort for convergence.

The Principle of Full Interpretation (henceforth FI) maximizes the application of "Affect," while the Last Resort Principle (henceforth LRP) minimizes it, and together they permit only the most economical, optimal linguistic representation and derivation for each linguistic expression.

### 2. Proposals

The Optimalist Approach to pro-forms that I would like to propose and argue for is summarized in (4):

- (4) a. Most pro-forms are **referentially underspecified**, and yet to be fully interpreted.  
b. Pro-forms therefore must undergo the operation "**Affect**" at **LF** in order to become "referentially saturated" and satisfy FI.  
c. UG makes available at least the following three operations of "Affect" for referential saturation:  
(i) Copy, (ii) Link, (iii) Move

The notion "referential saturation" is defined as in (5):

- (5)  $\alpha$  is referentially **saturated** iff:  
 (i)  $\alpha$  has full referential content, **or**  
 (ii)  $\alpha$  is referentially dependent upon an item with full referential content.

A name like *John* is referentially saturated by virtue of its own referential content, while an anaphor like *himself* becomes referentially saturated by becoming dependent upon another referentially saturated item in the course of syntactic derivation, as illustrated in (6)-b, where the referentially saturated status of an item is indicated by a subscripted sigma. (The sigma-marking here should be regarded merely as a mnemonic device to signal the referentially saturated status of an item rather than part of syntactic representation):

- (6) a. D-str: **John** <sub>$\sigma_1$</sub>  blamed **himself**.  
 b. LF: **John** <sub>$\sigma_1$</sub>  blamed **himself** <sub>$\sigma$</sub> .

Note here that a referential expression is analyzed as base-generated with its inherent referential index, while an anaphoric expression is analyzed as lacking such a base-generated index. The operation "Link" as a special case of "Affect" then is triggered at LF for referential identification of anaphoric expressions, as in (6)-b.

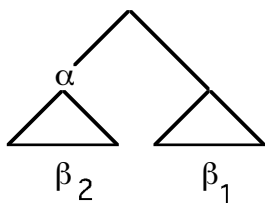
The notion "referential dependency" is defined as in (7) below, which in turn is based upon the notion "referential identity" as defined in (8):

- (7)  $\alpha$  is referentially **dependent** upon  $\beta$  iff:  
 (i)  $\alpha$  is referentially identified with  $\beta$ , **and**  
 (ii)  $\alpha$  is c-commanded by  $\beta$ .  
 (8)  $\alpha$  is referentially **identified** with  $\beta$  iff:  
 (i)  $\alpha$  is linked to  $\beta$ , **or**  
 (ii)  $\alpha$  is coindexed with  $\beta$ .

In (6)-b, the anaphor is linked to and c-commanded by the name *John*. It therefore is referentially identified with and dependent upon an independently saturated item, satisfying the second definition of referential saturation in (5). Note also that, according to (8), "referential identification" can be established either by a grammatical process "Link," as one option of "Affect," or by accidental matching of two base-generated referential indices. Crucially, however, coindexation as a grammatical process is not postulated. It should be also emphasized that indices merely establish referential identity, which is only one of the conditions that have to be met in order for referential saturation to take place.

The notion 'c-command' here is defined as in (9)-a below, which has been adopted from Reinhart (1983, 18):

- (9) C-command:  
 a. Node  $\alpha$  c-commands  $\beta$  iff the branching node immediately dominating  $\alpha$  also dominates  $\beta$ , where  $\alpha \neq \beta$ .  
 b.



Note that the definition (9)-a permits  $\alpha$  to c-command  $\beta$  even when the former dominates the latter. Therefore, in (9)-b for example,  $\alpha$  c-commands not only  $\beta_1$  but also  $\beta_2$ . The condition "where  $\alpha \neq \beta$ " in (9)-a, on the other hand, guarantees that  $\alpha$  does not c-command  $\alpha$  itself. These consequences of the definition in (9)-a play an important role in the discussion in 3.3-3.5 below.

While the referential saturation of anaphors is relatively straightforward, that of

pronouns is somewhat more complicated, since pronouns can be referentially saturated in three different ways, as illustrated in (10):

- (10) a. D-pronoun: **He**<sub>σ1</sub> shouldn't blame himself.  
 b. A-pronoun: Everyone<sub>eσ1</sub> / John<sub>σ1</sub> loves [ **his** mother ].  
 c. R-pronoun: [ The girl who brought John<sub>σ1</sub> ] loves **him**<sub>1</sub>.

First, as exemplified in (10)-a, a pronoun may function like a referentially contentful expression when it is used deictically (Lasnik (1976)), and may even function as the sole antecedent of a reflexive anaphor. We thus assume that pronouns in some cases are already referentially saturated at the time they are base-generated, and label them as D-pronouns (short for Deictic pronouns). As exemplified in (10)-b, a pronoun may also behave more or less like an anaphor, being totally dependent upon a c-commanding item, and eventually interpreted as a bound variable, as pointed out by Evans (1980) and Reinhart (1983). We therefore assume that pronouns in some cases are base-generated as **inherently unindexed anaphoric expressions**, which must undergo "Link" to be referentially dependent upon a c-commanding referentially saturated item. We will label them as A-pronouns (short for Anaphoric pronouns), and regard them as making up a single class of A(naphoric)-expressions together with anaphors.<sup>1</sup> Yet another possible use of pronouns is exemplified in (10)-c. Here, the pronoun should not be analyzed as D-pronoun, since it obviously acquires its referential content from the syntactic antecedent *John*. It, on the other hand, should not be analyzed as A-pronoun, either, since it cannot be referentially dependent upon its antecedent, without involving the required c-command relation as defined in (7)-(ii). The pronoun here, in other words, is base-generated as a **referentially unsaturated non-A-expression** (Kitagawa (1991)) We will label such pronouns as R-pronouns (short for Referential pronouns) and base-generate them with inherent indices but without  $\sigma$ -marking, as in (10)-c.[A2] The assumption that R-pronouns are inherently indexed will be motivated when we deal with VP Ellipsis in Section 3.2.

If an R-pronoun is not referentially saturated by way of referential dependency as defined in (5)-(ii), it must be saturated by its own referential content as defined in (5)-(i). I would like to claim that such a mode of referential saturation is made possible when the operation "Copy" is triggered by FI, and duplicates and superimposes the LF-features of the antecedent onto a pro-form when they share an index, as illustrated in (11)-b:

- (11) a. PF: [ The girl who brought John<sub>σ1</sub> ] loves **him**<sub>1</sub>.  
 b. LF: [ The girl who brought John<sub>σ1</sub> ] loves **John**<sub>σ1</sub>.

The operation "Copy," in effect, turns an R-pronoun into a name in the LF component, achieving the reversal effect of the Pronominalization transformation in the Standard Theory. That "Copy" may apply to R-pronouns but not to A-pronouns follows from the general aspects of grammar. Since "Copy" makes a pro-form legitimate by turning it into a name, it cannot apply to the pro-form that is c-commanded by its antecedent. Otherwise, a Condition D violation would arise. See 3.3 below.<sup>2</sup>

### 3. Motivation

The Optimalist Approach to pro-forms just sketched can be motivated in various ways both empirically and theoretically.

#### 3.1 Pronouns of Laziness

Let us start with the motivation for Copy. The first argument comes when we examine the so-called "pronouns of laziness", as exemplified in (12):

- (12) [ The man<sub>2</sub> who gave [<sub>1</sub> **his paycheck** ] to his wife ] is wiser than  
the man<sub>3</sub> who gave **it**<sub>1</sub> to his mistress. (Karttunen (1969))

The well-known mystery here is how the pronoun *it* can sloppily refer to the second man's (= *man*<sub>3</sub>) paycheck, while its antecedent *his paycheck* refers to the first man's (= *man*<sub>2</sub>) paycheck.

In our Optimalist Approach, the pronoun *it* in (12) lacks a c-commanding antecedent, and hence must be an instance of an R-pronoun, which carries an inherent index. When this R-pronoun is accidentally coindexed with the noun phrase *his paycheck* in the subject NP, therefore, it will undergo "Copy," as required by FI. Thus, after "Copy" superimposes the LF-features of *his paycheck* in the first clause in (12) onto the R-pronoun *it* in the second clause, we will obtain the LF representation as in (13)-a:<sup>3</sup>

- (13) a. LF<sub>1</sub>: [ The man who<sub>2</sub> t gave his paycheck ] to his wife ] is wiser  
than the man who gave [<sub>1</sub> **his paycheck** ] to his mistress.  
b. LF<sub>2</sub>: [ The man who<sub>2</sub> t gave [<sub>1</sub> **his** paycheck ] to his wife ] is wiser  
than the man who<sub>3</sub> t gave [<sub>1</sub> **his** paycheck ] to his mistress.

Notice that, unlike the 'de-pronominalized' R-pronoun *it*, both instances of the pronoun *his* in (13)-a can be A-pronouns, since there exists a trace created by *wh*-movement as a potential c-commanding antecedent in both clauses. Both the original and the copied instance of *his*, therefore, may undergo "Link" independently in each clause, as in (13)-b, yielding a sloppy identity interpretation in question. Thus, the well-known mystery of the sloppy identity made possible by the "pronouns of laziness" can be explained in a very natural way in our Optimalist Approach.

### 3.2 VP Ellipsis

It is well-known that the pronoun *his* in (14) exhibits ambiguous interpretation between strict and sloppy identity, while the pronoun in (15) permits only strict identity. This mysterious contrast also follows straightforwardly in our Optimalist Approach:

- (14) John loves **his** wife but Bill doesn't \_\_\_\_.  
(15) The woman standing next to John kissed **him** before Sam's sister did \_\_\_\_.

First, we adopt an interpretive approach to VP Ellipsis as proposed by Williams (1977) and supported by Kitagawa (1991), and assume that the LF-features of the antecedent VP is superimposed on the empty VP in the LF component in both these examples, as illustrated in (16) and (17): (henceforth D = D-structure, S = S-structure, L = LF)

- (16) a. D: John [<sub>VP</sub> loves his wife ] but Bill doesn't [<sub>VP</sub> e ].  
b. L: John [<sub>VP</sub> loves his wife ] but Bill doesn't [<sub>VP</sub> love his wife ].  
(17) a. D: The woman next to John [<sub>VP</sub> kissed him ] before Sam's sister did [<sub>VP</sub> e ].  
b. L: The woman next to John [<sub>VP</sub> kissed him ] before  
Sam's sister did [<sub>VP</sub> kiss him ].

The LF-copying of VP in this analysis can be regarded as yet another instance of the application of "Copy" to an R-pro-verb when it is accidentally coindexed with its non-c-commanding antecedent VP. The familiar anti-c-command condition on VP Ellipsis follows naturally from this analysis. The two examples, however, crucially differ from each other in that the copied pronoun was originally c-commanded by its antecedent *John* in (16)-a, while it was not c-commanded by *John* in (17)-a. The duplicated pronoun in (16)-b, in other words, is an A-pronoun, which does not carry an inherent index, and undergoes Link. The

duplicated pronoun in (17)-b, on the other hand, is an R-pronoun, which carries an inherent index, and hence undergoes "Copy." Therefore, as illustrated in (18)-a/b, (16) may result in an LF representation yielding strict identity or one yielding sloppy identity, depending on the relative order of the application of Link and Copy:

- (18) a.  $L_i$ :  $\underline{\text{John}}_{\sigma_1}$  loves  $\underline{\text{his}}_{\sigma}$  wife but Bill doesn't loves  $\underline{\text{his}}_{\sigma_1}$  wife. (Link < Copy)  
 b.  $L_j$ :  $\underline{\text{John}}_{\sigma_1}$  loves  $\underline{\text{his}}_{\sigma}$  wife but  $\underline{\text{Bill}}_{\sigma_2}$  doesn't loves  $\underline{\text{his}}_{\sigma}$  wife. (Copy < Link)

As illustrated in (19), on the other hand, (17)-a may result into an LF representation that yields only strict identity whether Copy applies to  $his_1$  before "VP-Copy," or after "VP-Copy":

- (19) L: [ The woman next to  $\text{John}_{\sigma_1}$  ] kissed  $\text{John}_{\sigma_1}$  before Sam's sister did kissed  $\text{John}_{\sigma_1}$ .

Thus, not only "Copy" and "Link" but also the dichotomy between A-pronouns and R-pronouns regarding their inherent indexation can be empirically motivated.[A3]

### 3.3. Reflexive Dependency

The Optimalist Approach to pro-forms also achieves theoretical simplification by permitting us to assimilate a variety of referential restrictions. Let us start with examining the referential restriction illustrated in (20), which is often assumed to be captured by the 'i-within -i' condition, which takes the form of a filter prohibiting coindexation as schematized in (21):

- (20) a.  $*[{}_1 \text{John}_1 \text{'s friend}]$   
 b.  $*[{}_1 \text{a friend of John}_1 \text{'s}]$   
 (21)  $*[{}_i \dots \alpha_i \dots]$

Since we have been attempting to advocate the analysis in which A-expressions are base-generated without inherent indices and undergo "Link" at LF, we should analyze and characterize a similar referential constraint observed in (22) as prohibition against an LF representation as in (23):

- (22) a.  $*[{}_1 \underline{\text{his}} \text{ friend}]$   
 b.  $*[{}_1 \underline{\text{each other}} \text{'s friends}]$   
 c.  $*[{}_1 \text{a friend of } \underline{\text{himself}}]$   
 (23)  $*[{}_1 \dots \alpha \dots]$

Another type of referential restriction, often referred to as 'referential circularity,' can be observed in (24), in which it cannot be the case that *his* refers to *her husband* and *her* refers to *his wife* simultaneously: (Brody (1981), Higginbotham and May (1981), et al.)

- (24) [ **His** wife ] kissed [ **her** husband ].

In order to capture this restriction, Higginbotham (1983, 404) makes a crucial appeal to linking as in (25) and identifies the source of the problem as the interpretation of an item being given in terms of that item itself due to the circular dependency established by linking:

- (25)  $\left[ \underline{\text{His}} \text{ wife } \right] \text{ kissed } \left[ \underline{\text{her}} \text{ husband } \right]$  (Higginbotham (1983, 404))
-

I find this characterization of referential circularity to have full intuitive content, and at the same time would like to point out that the same principle must underlie the 'i-within-i' violations observed above, whether the offending LF representations involve coindexation as in (21) or linking as in (23). In either case, the interpretation of a containing item obviously relies on that of a contained item (due to the relation of containment). The contained item, however, refers to the containing item, and hence forces the interpretation of the containing item to be given in terms of the containing item itself. Thus, if we succeed in formerly assimilating referential circularity to 'i-within-i' violation, and at the same time succeed in simplifying a formal constraint to capture the referential restriction in question, we will achieve quite desirable theoretical simplification. I believe that our Optimalist Approach incorporating "Copy" fulfills this task.

To begin with, as indicated in (26), the pronoun *her* under the intended circular interpretation has *his wife* as a c-commanding antecedent. It therefore is an A-pronoun. The pronoun *his* in (26), on the other hand, lacks a c-commanding antecedent, and hence is an R-pronoun, which is base-generated with an index:

(26) [<sub>2</sub> **His**<sub>1</sub> wife ] kissed [<sub>1</sub> her husband ]

Since the intended circular interpretation requires this R-pronoun *his* to be accidentally coindexed with the non-c-commanding NP *her husband*, it undergoes Copy in order to satisfy FI, and yield an LF representation as in (27):

(27) LF<sub>i</sub>: [<sub>2</sub> [<sub>1</sub> **her husband**] 's wife ] kissed [<sub>1</sub> her husband]

In this representation, the A-pronoun *her* further undergoes "Link," yielding an LF representation for the subject NP as in (28), which can be identified as a case of the 'i-within-i' representation in (23):

(28) LF<sub>i</sub>: [<sub>2</sub> [**her** husband ]'s wife ] kissed ...

This approach is further supported by the observation provided to me by Steven Franks (p.c.) that the crossing reference prohibited in (24) becomes available when we turn the R-pronoun *his* in this sentence into a D-pronoun by, for example, pointing its actual referent in uttering the sentence. This in fact is one of the expected results in the Optimalist Approach since the D-pronoun *his*, being inherently saturated, does not trigger "Copy," and yields the final LF representation as in (29), in which the A-pronoun *her* can be properly saturated without giving rise to an 'i-within-i' configuration:

(29) LF: [<sub>2</sub> **His**<sub>σ1</sub> wife ] kissed [<sub>1</sub> her husband ].

This also motivates the distinction between D-pronouns and R-pronouns proposed earlier. Thus, the "Copy" approach to R-pronouns permits us to completely assimilate the seemingly independent phenomena of 'referential circularity' and 'i-within-i' violation in their formal syntactic representations.

Having achieved this reduction, we can now offer an LF constraint on referential dependency as in (30) with quite a simple definition of the notion 'reflexive dependency' as in (31):

(30) Condition on Reflexive Dependency (CORD):

Referential dependency may not be reflexive.

(31) Reflexive Dependency:

If  $\alpha$  is referentially dependent on  $\beta$ , and  $\beta$  contains  $\alpha$ , the dependency is reflexive.

Recall here that 'referential dependency' is established when both referential identity and a c-command relation hold, and that 'referential identity' is established by either "Link" or accidental coindexation. Thus, the Condition on Reflexive Dependency (henceforth CORD) prohibits both reflexive dependency established by Link as in (23) and that established by coindexation as in (21), since in both cases,  $\alpha$  and  $\beta$  are referentially identified, and  $\beta$  c-commands  $\alpha$ .<sup>4</sup> CORD, in fact, can perhaps be regarded yet another specific realization of FI, since reflexive dependency obviously fails to yield full interpretation of the involved linguistic expressions.

CORD can be further motivated when we extend our investigation to yet another type of referential constraint as in (32) — a well-known case of non-coreference, which is sometimes referred to as the violation of Binding Theory Condition D (henceforth BT (D)):

(32) \*He<sub>1</sub> saw John<sub>1</sub>. (Lasnik (1976, 1989))

In our approach, not only the name *John* but also the pronoun *he* in (32) is analyzed as being inherently indexed since it lacks a c-commanding antecedent. Let us now label them with  $\alpha$  and  $\beta$ , respectively, together with their inherent indices, as in (33):

(33) [ $\beta_1$  **He** ] saw [ $\alpha_1$  John ]

Since the R-pronoun *he* is coindexed with a non-c-commanding antecedent *John*, it undergoes "Copy" and yields an LF representation as in (34):

(34) LF: [ $\beta_1 = \alpha_1$  **John** ] saw [ $\alpha_1$  John ]

Since "Copy" duplicates and superimposes non-overlapping features of the antecedent *John* onto those features of the R-pronoun *he*, it in effect, turns  $\beta$  into  $\alpha$ , as indicated in (34). The resulting LF representation, then, may be regarded as yet another case of CORD violation, when we assume, following Higginbotham (1993, 404), that the notion 'containment' can be reflexive:  $\beta$  contains  $\alpha$  when  $\beta = \alpha$ . In (34), due to the accidental coindexation and the c-command relation,  $\alpha$ , the **original** instance of *John*, is referentially dependent upon  $\beta$ , the original R-pronoun.<sup>[A4]</sup> Moreover,  $\beta$  now reflexively contains  $\alpha$ , the copied instance of *John*.  $\alpha$ , therefore, is reflexively dependent upon  $\beta$  according to the definition in (31). Roughly speaking, what went wrong with (33) is that, due to FI, the R-pronoun *he* had no other choice but to turn into its own antecedent *John*, which in turn provoked reflexive dependency, and hence violation of CORD.

Alternatively, as pointed out to me by Hajime Hoji (p.c.), we may be able to adopt the DP Hypothesis together with Postal's (1969) analysis of pronouns as in (35)-a, and assume that "Copy" duplicates and superimposes relevant features onto the empty NP portion of the R-pronoun. It then yields an LF representation in which  $\alpha$  comes to be non-reflexively contained in  $\beta$ , as in (35)-b:

(35) a. LF<sub>i</sub>: [<sub>DP</sub> =  $\beta_1$  [<sub>D</sub> He ] [<sub>NP</sub> e ] ] saw [ $\alpha_1$  John ] — Copy →  
 b. LF<sub>j</sub>: [<sub>DP</sub> =  $\beta_1$  [<sub>D</sub> He ] [<sub>NP</sub> =  $\alpha_1$  **John** ] ] saw [ $\alpha_1$  John ]

The result again will be reflexive dependency, and hence violation of CORD. Thus, CORD can be motivated as quite a general LF constraint, which further incorporates BT (D).<sup>[A5]</sup>

To sum up, the Optimalist Approach achieves non-trivial theoretical simplification by enabling us to formally assimilate all instances of 'i-within-i' violation, 'referential circularity,' and BT (D) violation at LF, which eventually will allow us to capture all these referential restrictions in terms of a single LF constraint possibly reducible to FI.

### 3.4. Bach-Peters' Paradox

One might consider here that the Optimalist Approach would incorrectly rule out a Bach-Peters' Paradox sentence as in (36):

(36) [2 The pilot who shot at **it**<sub>1</sub> ] hit [1 the MIG that chased **him** ].

Note that the sentence contains an R-pronoun *it* and an A-pronoun *him* in a way similar to the circularity case does, but the crossing of pronominal reference is still permitted.

A more careful examination of this type of sentence, however, will not only reveal that it is only an apparent counterexample but also provide us with further empirical motivation for the Optimalist Approach. First, "Copy" applies in (36) and de-pronominalizes the R-pronoun *it*, as illustrated in the LF representation (37)-a. Then, as illustrated in (37)-b, the A-pronoun *him* in this representation undergoes "Link":

(37) a. LF<sub>i</sub>: [2 The pilot who t shot at [1 **the MIG that chased him** ] ] hit ...  
 b. LF<sub>j</sub>: [2 The pilot who t shot at [1 the MIG that chased **him** ] ] hit ...

Note that, in (37)-b, the A-pronoun *him* is c-commanded by the trace of the *wh*-phrase moved within the relative clause. It therefore can be linked to this *wh*-trace rather than the matrix subject as a whole. The resulting LF representation thus does not violate *CORD*, and the sentence is grammatical. Since this account crucially makes an appeal to the presence of a *wh*-trace c-commanding the A-pronoun *him* in the LF-representation (37)-b, it also makes us predict that a similar sentence will violate *CORD* if such a c-commanding relation does not hold between the A-pronoun and the *wh*-trace. This prediction seems to be borne out in quite an interesting way. First, the intended crossing reference is somewhat awkward, though it might not be totally impossible, in the sentence like (38):

(38) ??[2 The planes which **it**<sub>1</sub> shot at t ] hit [1 the MIG that chased **them** ].

Note that the *wh*-word within the matrix subject in (38) is extracted from a position lower than the R-pronoun *it*. Application of "Copy" to this R-pronoun, therefore, will yield an LF representation (39), in which the A-pronoun *them* copied into the matrix subject fails to be c-commanded by the *wh*-trace:

(39) LF<sub>i</sub>: [2 The planes which [1 **the MIG that chased them** ] shot at t ] hit ...

The *wh*-trace, therefore, cannot be the antecedent of *them*. If the A-pronoun *them* is linked to the entire subject NP as illustrated in (40), reflexive dependency arises, and the sentence is ruled out by *CORD*:

(40) LF<sub>j</sub>: [2 The planes which [1 the MIG that chased **them** ] shot at t ] hit ...

The only plausible derivational step that can be further taken, then, will be for *them* to be linked directly to the c-commanding *wh*-phrase, as in (41):

(41) LF<sub>k</sub>: [2 The planes which [1 the MIG that chased **them** ] shot at t ] hit ...

The resulting LF representation, however, yields a typical weak cross-over configuration, which is known to give rise to certain amount of awkwardness rather than complete ungrammaticality in restrictive relative clauses (Lasnik and Stowell (1991)), as illustrated in (42):

(42) ??The man who [ **his** mother ] loves t.

A further interesting observation is that similar crossing reference seems to be much more readily available in a sentence like (43), whose subject contains an appositive rather than a restrictive relative clause:

(43) [2 Those two planes, which **it**<sub>1</sub> shot at t ] hit [1 the MIG that chased **them** ].



This sudden disappearance of the constraint on crossing reference at first sight appears to denounce the proposed analysis, since the sentence (43) should also yield the weak crossover configuration as in (44), after Copy and Link apply at LF:

- (44) LF: [2 Those two planes, **which** [1 the MIG that chased **them** ] shot at **t** ] hit ...

This state of affairs, however, is in fact predicted, and hence strengthens the Optimalist Approach, since weak crossover violation is known to be absent in appositive relative clauses in general (Lasnik and Stowell (1991, 698)), as illustrated in (45):

- (45) LF: Gerald, **who** [ **his** mother ] loves **t**, is a nice guy.

Thus the Optimalist Approach allows us to correctly and precisely predict the somewhat awkward status of the crossing reference in (38) as well as its disappearance in (44).

### 3.5 Expletives

I now would like to turn to the operation "Move," yet another option of "Affect" to fulfill referential saturation of pro-forms in the LF component. An argument comes when we examine the so-called expletive elements as in (46):

- (46) a. **It** is likely that he will win.  
b. **There** arose a storm in the South.

Expletives are usually identified as a special class of pro-forms that do not refer to anything. Accordingly, they can (in fact must) appear as a mere place-holder for the subject position of a sentence when this position would otherwise remain unfilled due to the lack of a  $\theta$ -role. Despite its popularity, however, such characterization of expletives is far from being satisfactory both on empirical and theoretical grounds. For instance, Hoekstra (1984, 295, footnote 65) provides an example in (47) and points out that the expletive "*it* must be regarded as a referential expression since it functions as the antecedent of a reflexive":

- (47) **It** suggested **itself** that this solution should be rejected.

This fact indeed makes us question the characterization of expletives as non-referential pro-forms. If expletives indeed are totally contentless entities at LF, it is not clear why they must be pro-forms. They must obviously be regarded as true exceptions, given that reference is the basic function of pro-forms in general. It also is not at all clear why only a similar subclass of pro-forms meaning *it* or *there* as in (46) function as expletives across languages. Thus, to say the least, we are yet to answer some fundamental questions concerning expletives as summarized in (48):

- (48) a. Why do expletives have to be pro-forms?  
b. Why and how do they differ from non-expletive pro-forms?  
c. Why do they have to be *it* and *there*, and not *he*, for example?

In the rest of this section, I will attempt to provide answers to the questions in (48), analyzing the expletives in accordance with our Optimalist Approach to binding and coreference, which in turn will lead us to motivate "Move" as a possible option of "Affect" for referential saturation.

Recall now that we claimed that "Affect" has three options, "Link," "Copy" and "Move," to remedy the potential ungrammaticality that may arise from the violation of FI. One obvious thing the grammar must guarantee, then, is that the right option among the three is taken at the right occasion. This task is carried out partly by the Last Resort Principle, which prescribes that a derivational step may be taken if and only if it is necessary for convergence. Application of "Link," therefore, can be correctly limited to the cases involving inherently unindexed A-expressions like anaphors and A-pronouns.

When exactly "Copy" should apply also follows from the general aspects of grammar. Given a sentence like (49)-a, in which an R-pronoun is accidentally coindexed with a non-c-commanding referential expression, one may legitimately ask why (49)-a must be mapped onto the LF representation (49)-b by the application of "Copy" instead of being mapped onto (49)-c by the application of "Move":

- (49) a. [ **His**<sub>1</sub> mother ] loves John<sub>σ1</sub>.  
 b. — Copy → LF: [ **John**<sub>σ1</sub>'s mother ] loves John<sub>σ1</sub>.  
 c. — Move → LF: \*[ **John**<sub>σ1</sub>'s mother ] loves **t**.

This question, however, can be immediately answered when we observe that, in (49)-a, both R-pronoun and the coindexed name are in a  $\theta$ -position. If "Move" applies as in (49)-c, in other words, the resulting LF representation will violate the  $\theta$ -Criterion as a subcase of FI. It, in fact, violates the proper binding condition on traces as well. If "Copy" applies as in (49)-b, on the other hand, no such violations arise. The grammar thus guarantees that "Copy" rather than "Move" applies to (49)-a to satisfy FI.

If this account is basically correct, we also predict that when an R-pronoun appears in a non- $\theta$ -position, the grammar requires "Move" rather than "Copy" to apply. I would like to claim here that this indeed seems to be what takes place when a sentence like (46)-a, for example, is interpreted in the LF component. First, the pronoun *it* in (46)-a is necessarily analyzed as an R-pronoun, since it lacks a c-commanding antecedent. Judging from the interpretation of this sentence, it also seems reasonable to assume that this R-pronoun is accidentally coindexed with the *that*-clause in the sentence, as in (50)-a:

- (50) a. D/S: **It**<sub>1</sub> is unlikely [<sub>1</sub> that he will win ].  
 b. — Copy → LF<sub>i</sub>: \*[<sub>1</sub> **that he will win** ] is unlikely [<sub>1</sub> that he will win ]  
 c. — Move → LF<sub>j</sub>: [<sub>1</sub> **that he will win** ] is likely **t**.

If "Copy" applies here to the R-pronoun *it* for its referential saturation, it would result into an LF representation as in (50)-b, in which BT (D) (now reduced to CORD) is violated with the c-command relation holding between the duplicated *that* clauses. "Move", on the other hand, is a possible option here, since the pronoun *it* is in a non- $\theta$ -position. Move, thus, transfers the LF-features of the antecedent onto a pro-form, and maps (50)-a onto the LF representation (50)-c, which now contains only legitimate entities.<sup>[A6]</sup>

A piece of motivation for this LF-movement analysis comes when we examine the anaphor-binding in a sentence containing an expletive element. First, as illustrated in (51), anaphor-binding in general observes a certain locality constraint even when the anaphor is in a genitive position:

- (51) \***They**<sub>1</sub> know [ that **I** believe [<sub>2</sub> that **each other**'s books will be best-sellers ]].

It is well-known, however, that, quite mysteriously, such a locality constraint need not be observed, as illustrated in (52), when an expletive element intervenes between the anaphor and its antecedent:

- (52) **They**<sub>1</sub> think [ that **it**<sub>2</sub> is unlikely [<sub>2</sub> that **each other**'s books will be best-sellers ]].

Under the Optimalist Approach, this mysterious behavior of an anaphor is predicted, since "Move" applies to the sentence in (52), and yield the LF representation (53), in which the anaphor-binding is in fact local:

- (53) **They**<sub>1</sub> think [ that [<sub>2</sub> that **each other**'s books will be best-sellers ] is unlikely **t** ]

One legitimate question to be asked here is why a plural expletive *they* as in (54)-a is not possible, despite the fact that conjoined *that* clauses can be treated as plural when they denote a plural eventuality as in (54)-b:

- (54) a. \***They**<sub>1</sub> are equally likely at this point [<sub>1</sub> [ that the president will be reelected ] and [ that he will be impeached ] ].  
 b. [ [ That the president will be reelected ] and [ that he will be impeached ] ] **are** equally likely at this point. (McCloskey (1991))

I do not have the ultimate answer to this question, but it can be observed that the ungrammaticality of (54)-a simply mirrors the illegitimacy of the purely referential use of *they*, as in (55):

- (55) No Republicans expect [[ that the president will be impeached ] and [ that he will be reelected at the same time ]]. In fact, no Democrats expect \***them**, either.

The ungrammaticality of (54)-a, then, can be regarded as a positive piece of evidence that the expletives function on a par with referential pro-forms.<sup>[A7]</sup>

One remaining question arises here with respect to the status of the expletive *there*. Chomsky (1988) claims that the presence of an expletive *there* as an LF-affix triggers the LF-movement of the post-verbal NP. In the sentence in (56)-a for example, it triggers the movement of *a storm*, as in (56)-b.

- (56) a. **There**<sub>1</sub> arose a storm<sub>1</sub> in the south.  
 b. LF: [ a storm<sub>1</sub> — there ] arose t in the south.

As den Dikken (1995) points out, however, this analysis will leave it unaccounted for why the anaphor in (57)-a cannot satisfy the Binding Condition A at its alleged LF in (57)-b:

- (57) a. \***There**<sub>2</sub> seem to **each other**<sub>1</sub> t<sub>2</sub> to be **some applicants**<sub>1</sub> eligible for the job.  
 b. LF: [ some applicants<sub>1</sub> — there ] seem to **each other**<sub>1</sub> t<sub>2</sub> to be t eligible for the job.

Note that, if Chomsky's analysis is correct, the LF-moved post-verbal NP *some applicants* in (57)-b must c-command its trace, which in turn means that it must also c-command the anaphor *each other*, thereby permitting proper anaphor binding just as in the sentence (58) below. This, however, is contrary to the fact:

- (58) **Some applicants**<sub>1</sub> seem to **each other**<sub>1</sub> to be eligible for the job.

The LF-movement of post-verbal NPs, in other words, does not seem to be a viable option. Note, moreover, that *there*, when it is used referentially, is a pro-form of a locative expression, which basically is adverbial in its function. It seems, then, to be more natural to assume in our approach that "Move" transfers those LF-features of the coindexed locative expression to *there* as in (59)-b:<sup>5</sup>

- (59) a. **There**<sub>1</sub> arrived a spy [<sub>1</sub> **in this city** ].  
 b. LF: [in this city ] arrived a spy t.

This LF locative movement analysis can be motivated by the contrast between (60) and (61):

- (60) \***They**<sub>σ1</sub> think [ that **expensive pictures** are hanging [<sub>2</sub> in **each other**'s rooms ] ]  
 (61) **They**<sub>σ1</sub> think [ that **there**<sub>2</sub> are expensive pictures (hanging) [<sub>2</sub> in **each other**'s rooms ] ]

Here again, the otherwise required locality of anaphor binding as in (60) mysteriously disappears when an expletive *there* intervenes between the anaphor in the locative phrase and its antecedent as in (61) (Lisa Travis (p.c.)). The anaphor binding in (61), however, is a

natural consequence of the LF-locative movement analysis, since the anaphor comes to be linked to its antecedent locally in its LF representation (62):

- (62) LF: They<sub>σ1</sub> think [ that [ 2 in each other's rooms ] are expensive pictures (hanging) t ]

Thus, in the Optimalist Approach, it is not necessary to treat expletives in any different way from non-expletive pro-forms. They are merely the pro-forms that happened to have been base-generated in a non-θ-position, and come to head a chain after undergoing "Move" at LF. Non-pro-forms cannot be generated in the same position, since they are not referentially underspecified, and hence cannot function as the landing site of "Move," which eventually yields the violation of FI. We thus can eliminate "expletives" as a special class of linguistic entities entirely from the grammar. The reason why *it* and *there* but not *he*, for example, may function as expletives is that only the former may refer to a CP and a Locative expression, respectively, which need not be Case saturated/checked. If, for instance, the pronoun *he* is base-generated in the non-θ-position in (63)-a and the coindexed name *John* is moved, the resulting chain in (63)-b would end up involving two Case positions. As a result, either "Move" cannot be triggered, or the derivation would involve an illegitimate step:<sup>6</sup>

- (63) a. \*He<sub>1</sub> is likely [ that John<sub>σ1</sub> will win ].  
 b. LF: \*John<sub>σ1</sub> is likely [ that t will win ].

Thus, our "Move" approach to expletives allows us to provide rather simple answers to all the questions posed in (48) above.

## Notes

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1. Anaphors and A-pronouns are distinguished from each other with respect to the locality conditions imposed on their licensing — anaphors must satisfy the Licensing Condition A (LC (A)) and A-pronouns must satisfy the Licensing Condition B (LC (B)) as described in (i):[A8]

- (i) Licensing Conditions for A(naphoric)-expressions: (cf. Reinhart (1983, 158-159))

LC (A): An **anaphor** is referentially saturated **within** its Binding Category.

LC (B): An **A-pronoun** is referentially saturated **from outside** of its Binding Category.

2. One thing I would like to emphasize here is that "Copy" applying in the LF component operates only on LF-features. I assume, moreover, that it applies in the minimalist fashion, duplicating only the non-overlapping LF-features of the antecedent, and superimposing them onto the pro-form, as illustrated in (i) for the example (11), where "J" indicates whatever LF-features of the name *John*, including its referential content, that distinguishes it from the pronoun *he*:

- (i) a. [ The girl who brought [<sub>σ1</sub> +N, -V, +3p, -Pl, -F, **J** ] ] loves [<sub>1</sub> +N, -V, +3p, -Pl, -F ]  
 — Copy →  
 b. [ The girl who brought [<sub>σ1</sub> +N, -V, +3p, -Pl, -F, **J** ] ] loves [<sub>σ1</sub> +N, -V, +3p, -Pl, -F, **J** ]

Note, in particular, that there will arise no conflict at LF between *him* and *John*, their PF-information not being visible in the LF component.

3. See Jacobson (1977) for an earlier proposal along this line.

4. Recall that we have adopted Reinhart's (1983) version of 'c-command' as in (9)-a,

which permits  $\alpha$  to c-command  $\beta$  even when the former dominates the latter.

5. I will assume that the associated locative does not necessarily have to be overt. The LF-locative movement, therefore, may involve an empty locative, as illustrated in (i):

- (i) a. **There**<sub>1</sub> arrived a spy [<sub>1</sub> e ].  
 b. LF: [<sub>1</sub> e ] arrived a spy t.

The insight behind the proposed analysis can be observed in Kuno's (1973) "Locative Postposing" transformation, which "will move locatives to the sentence-final position, leaving a trace in the form of *there* in their original position (p. 370)," as illustrated in (ii):

- (ii) a. D: On the table are two books.  
 b. S: There<sub>1</sub> are two books [<sub>1</sub> on the table ].

6. To be precise, then, why the temporal pro-form *then* may not function as an expletive is left unaccounted for.

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