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Edited by
Vida Samiian

Department of Linguistics
California State University, Fresno
Fresno, California, 93740-0092

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Types and Distribution of Anaphors

Elena Anagnostopoulou & Martin Everaert
Tilburg University & Utrecht University

1. Introduction

Within Binding Theory (BT) the non-existence of nominative anaphors (NAs) is a long-standing puzzle. This systematic gap has been sometimes viewed as a historical accident (Cole&Sung 1990) or, alternatively, as the result of either purely morphological principles (Maling 1984), or syntactic principles based on an interaction of BT with other modules of the Grammar (Kayne 1984). However, in recent work it has been shown that NAs do, in fact, exist in Albanian (cf. Williams 1988, Everaert 1990, a.o.) and Greek. The aim of this paper is to re-address the question of the distribution of NAs taking into account the findings from Greek. We will show that, given minimalist assumptions (Chomsky 1995), standard BT fails to accommodate the phenomenon under discussion. We will argue that a modified version of BT as developed in Reinhart & Reuland (1993) can capture the distribution of NAs. Within this analysis, the internal structure of anaphors (and the related anaphoric properties) proves to be crucial for our understanding of why languages do or do not have nominative anaphors.

2. Binding Theory and Nominative Anaphors

Standard BT (Chomsky 1981) allows us to give a straightforward explanation for the absence of NAs. All we need to add to the well-known condition A on anaphors (1a) is the restriction in (1b):

- (1) a. Anaphors must be c-commanded by an antecedent within a local domain.
- b. Structurally, nominative outranks all other cases (within a local domain).

If a nominative marked element is structurally higher than all other case-marked elements, then such an element can never be an anaphor because it will never be c-commanded by its antecedent. Under this account, it is predicted that, if a language does not obey either (1a) or (1b), this language will permit NAs. Chinese appears to verify this prediction. The Chinese reflexive *ziji* does not have to be locally bound, violating (1a), and consequently the restriction in (1b) becomes superfluous (cf. Cole&Sung 1990):

- (2) Zhangsan yiwei [Lisi zhidao [ziji mei kaoguo]]
Zhangsan_i thought Lisi_j knows self_i_j not pass
"Zhangsan thought that Lisi knows that self does not pass the examination"

On the other hand, restriction (1b) does not hold in Albanian. Certain prepositions assign nominative case (*te shtëpia* (at home_N); *nga fshati* (from the village_N). And, as expected, NAs occur (Everaert 1990):

- (3) Duhet të kesh më shumë besim te vetvetja
'You must have more confidence in yourself'

Since Greek has NAs (cf. 4), the question arises whether we can account for the Greek facts on the basis of a similar reasoning.

- (4) O eaftos tu ton provlimatizi ton Petro
The self his_N Cl_A puzzle-3sg the Peter_A
'Himself puzzles Peter'

The answer appears to be negative. First of all, the examples in (5) show that the Greek anaphor is like English *himself*: it has to be bound locally (5a,b) and it requires a c-commanding antecedent (5c).

- (5) a. *O Jannis nomizi oti i Maria agapai ton eafto tu
The John_N thinks that the Mary_N loves the self his_N
'John thinks that Mary loves himself'
b. *O Jannis theli na figi o eaftos tu
The John_N wants SUBJ goes the self his_N
'John wants that himself goes away'
c. *I mitera tu Janni agapai ton eafto tu
The mother_N the John_G loves the self his_A
'John's mother loves himself'

Furthermore, there is no immediate evidence that nominative can be assigned to non-subjects in Greek, an issue to which we return in section 4. Hence, we need something more than regular BT and assumption (1b) to account for the cross-linguistic distribution of NAs.

3. Differences between Greek and English/Dutch

In the preceding section, we saw that the verb *provlimatizo* (to puzzle) allows a nominative reflexive. In (6) we give one more well-formed example. However, there are numerous other verbs in Greek which do not allow reflexive anaphors in subject position (7).

- (6) O eaftos tu tu aresi tu Petru/ston Petro
The self his_N Cl_D likes the Peter_D/to-the Peter_{pp}
'Himself pleases Peter'

- (7) **O eaftos tu ton antipathi ton Janni*
 The self his_N Cl_A dislikes the John_A
 'Himself dislikes John'

In Anagnostopoulou (1995), it is argued that Experiencer-Object verbs as in (6) must be classified as unaccusative. Thus, the unergative/transitive-unaccusative distinction seems to be relevant for the distribution of NAs in Greek. Note, however, that the same distinction does not play a role in English and Dutch where NAs are uniformly excluded:

- (8) a. *Himself appeals to John
 b. *Himself hates John
- (9) a. *Zichzelf bevalt hem
 Himself_N like-3sg him_D
 "Himself pleases/appeals to him"
 b. *Zichzelf haat hem
 Himself_N hate-3sg him_A
 "Himself hates him"

An obvious asymmetry between Greek and English/Dutch has to do with the form of the reflexive. English and Dutch have a 'pronominal' reflexive consisting of a pronominal form and the morpheme *self/zelf*. The Greek anaphor is 'non-pronominal'. The Greek *o eaftos tu* consists of the definite determiner *o* 'the', the head noun *eaftos* 'self' and a possessive pronoun *tu* 'his'. Iatridou (1988) argues that *o eaftos tu* is, technically speaking, not an anaphor; only the possessor within the NP is coindexed with the antecedent. Anagnostopoulou & Everaert (1995) propose that *o eaftos tu*, unlike *himself/zichzelf*, has the structure of an inalienable possession NP:¹

- (10) a. [_{DP} [_{D'} [_D him]_D [_{NP} self]_{NP}]_{D'}]_{DP}
 zich zelf
 b. [_{DP} [_{D'} [_D o]_D [_{NP} eaftos]_{NP}]_{D'} [_{Spec} tu _{Spec}]_{DP}

Summarizing, we claim that the following generalizations hold:

- (11) a. If a language has a NA, the anaphor will be 'non-pronominal'. i.e. its form (structure, properties) is relevant.
 b. If a language has a NA, the unaccusative-unergative/transitive distinction is relevant.

¹ Structure (10b) is the simplified version of the structure proposed in Anagnostopoulou & Everaert (1995) which is in accordance with the LCA (Kayne 1994).

4. Potential Solutions

There are two potential explanations for the distribution of NAs in Greek, a BT account along the lines of Belletti&Rizzi (1988) or a Quirky Subject/Scrambling account as sketched by Anagnostopoulou (1995), Massey (1991). In this section, we will discuss and dismiss both of them.

4.1. A BT-account.

On the basis of examples as in (12a), Belletti&Rizzi (1988) claim that Condition A of the BT is an anywhere principle:

- (12) a. Questi pettegolezzi su di sé preoccupano Gianni
 ‘These gossips about himself worry Gianni’
 b. [e] preoccupano [questi pettegolezzi su di sé] Gianni

As is evident, the anaphor in (12a) is not overtly c-commanded by its antecedent. The assumption that Condition A is an anywhere principle, however, leaves the possibility open that the anaphor is bound either at D-structure or at LF assuming reconstruction (12b). A similar analysis could be proposed for the examples in (6), represented as in (13):

- (13) a. O eaftos tu tu aresi tu Petru/ston Petro
 b. [e] tu aresi [o eaftos tu] tu Petru/ston Petro

However, there are conceptual and empirical problems with such an approach. First of all, D-structure binding is untenable within the Minimalist Program where the binding conditions must be satisfied at LF. The viable alternative of reconstruction would be incompatible with the view that this option is not available for A-movement for both conceptual and empirical reasons (cf. Chomsky 1995). Furthermore, neither the D-structure binding analysis nor the reconstruction analysis may offer a principled explanation as to why generalization (11a) holds. Belletti&Rizzi treat (8a/9a) as a Condition C violation. Under such an account, (13) must be assumed to escape condition C, an assumption that can be argued to be plausible (cf. section 3). However, if we treat *o eaftos mu* as an R-expression in the standard BT-sense, we fail to capture the fact that the Greek anaphor behaves exactly like *himself* as far as the domain of binding is concerned (5). Moreover, the ungrammaticality of the examples in (14), where an object is bound by a subject at S-structure and a subject bound by an object at D-structure/LF, will be left unaccounted for, unless additional stipulations are made (Belletti&Rizzi 1988):

- (14) a. *Himself worries himself

- b. *Se stesso piace a se stesso

Finally, this account would imply that Condition B/C must be satisfied at S-structure/LF while Condition A is an anywhere principle, an undesirable dichotomy which is not independently motivated.

4.2. A Quirky Subject/Scrambling approach.

An important observation to make, at this point, is that in Greek, the orders [Exp V Th] and [Th V Exp] are equally neutral with inverse-linking psych verbs of Class 2 (the so called *frighten*-class) and Class 3 (Belletti & Rizzi's (1988) *piacere*-class). This raises the question whether the mechanism of D-structure binding/reconstruction is at all necessary. A straightforward account for the grammaticality of the Greek examples would be to assume that the NAs only apparently c-command their antecedents. If it can be shown that in cases like (13) the experiencer is higher than the theme, then the grammaticality of (13a) is not a surprise from a BT-perspective. There are two possible ways in which this analysis can be implemented further. (a) It can be claimed that the experiencer qualifies as a *quirky subject* while the nominative argument has the status of an *object*. (b) Alternatively, we could assume that starting from an underlying order V-EXP-TH, the order TH-V-EXP results from A's scrambling of the nominative. In what follows, we will briefly discuss both options.

(a) Anagnostopoulou (1995) argues that the experiencer in preverbal position does not behave like a topicalized object, implicating that it could be viewed as a quirky subject. Comparable arguments can be found in Belletti & Rizzi (1988) for Italian and Masullo (1993) for Spanish. However, the arguments presented are not conclusive. In addition, there is strong evidence that the nominative argument is a subject:

(i) (15a,b) show that subjects but not objects can be licensed under ellipsis.

- (15) a. I Maria agapai ton Petro ke misi ton Jianni
 The Mary_{VN} loves the Peter_A and e_i hates the John_A
 'Mary loves Peter and hates John'
 b. *I Katerina agapai ton Petro ke i Maria misi
 The Katerina_N loves the Peter_{VA} and the Mary_N hates e_i
 'Katerina loves Peter and Mary hates'

The nominative NP in inverse-linking psych verb constructions behaves as a subject with respect to ellipsis, irrespectively of its surface position:

- (16) a. I Maria tu aresi tu Petru ke ton eknevrizi ton Janni
 The Mary_{VN} Cl_D likes the Peter_D and e_i Cl_A irritates the John_A
 'Mary pleases/appeals to Peter and irritates John'

- b. Tu Petru tu aresi i Maria ke ton Janni ton eknevrizi e
 The Peter_D Cl_D likes the Mary_{iN} and the John_A Cl_A irritates e_i

(ii) Subject raising verbs as in (17) make clear that the nominative argument of psych predicates is a subject:

- (17) a. Ta vivlia arxizun/*arxizi na tu aresun/*aresi tu Petru
 The books_{N/pl} start-3pl/*start-3sg SUBJ Cl_D like-3pl/*like-3sg the Peter_{D/sg} 'The books start to appeal to Peter'
 b. Tu Petru arxizun/*arxizi na tu aresun/*aresi ta vivlia
 The Peter_D start-3pl/*start-3sg SUBJ Cl_D like-3pl/*like-3sg the books_{N/pl} 'The books start to appeal to Peter'

(iii) Nominative themes can occur as controlled PRO-subjects (18a), dative experiencers cannot (18b), unlike Icelandic. Moreover, it is possible to omit the experiencer (18b), but this yields an arbitrary reading which exclusively characterizes pro-objects (cf. Rizzi 1986):

- (18) a. I Maria theli na tu aresi e tu Janni
 The Mary_{iN} wants SUBJ Cl_D likes e_i (PRO/pro) the John_D
 'Mary wants to appeal to John'
 b. I Maria_i theli na aresi i Katerina e_{arb}
 The Mary_{iN} wants SUBJ likes the Katerina e_{arb/D}
 'Mary wants that Katerina appeals to people'

It thus seems clear that the nominative argument passes a number of subjecthood tests which the experiencer fails to pass. We conclude that the non-nominative argument is comparable to the German datives in (19):

- (19) Mir ist kalt
 Me_D is cold
 'I am freezing'

Although structures like (19) are similar to Icelandic quirky constructions, the datives do not qualify as subjects (cf. Zaenen, Maling and Thráinsson 1985).

(b) Massey (1991) has proposed for Albanian that experiencer-object predicates involve A'-scrambling of the nominative over the dative. This approach is compatible with the proposal put forward in Barbosa (1994) and Alexiadou & Anagnostopoulou (1995) that VSO is the basic order in Null Subject Languages like Greek, while SVO surface orders involve Clitic Left Dislocation (CLLD) with a resumptive pro-subject. CLLD is a construction that has many properties in common with scrambling, as Mahajan (1991) and others have shown. Most notably, the dislocated phrase has a mixed status, having A-properties according

to some criteria and A'-properties according to other. If it can be shown independently that in (13), repeated below as (20a), the nominative has an A'-status and it reconstructs to a position lower than the experiencer, then (13/20a) is not a problem for BT. For this purpose, we will test the status of the Nominative with respect to WCO-effects. The predictions are the following: (i) If the nominative occupies an A position, then it will not yield WCO-effects as in the well-formed English example "*Every woman seems to her son to t be intelligent*" (ii) If the nominative argument occupies an A'-position, and it reconstructs to a position *lower* than the experiencer, then WCO-effects will arise; in such a case, the nominative anaphor can be assumed to fall under BT-Principle A. (iii) If the nominative argument occupies an A'-position and it reconstructs to a position *higher* than the experiencer, then WCO-effects will not arise; in this case the nominative anaphor is predicted to be excluded by Principle A. The sentences in (20) show that predictions (ii) and (iii) are both borne out:

- (20) a. O eaftos tu tu aresi tu Petru/aresi ston Petro
The self his_N Cl_D appeals the Peter_D/appeals to-the Peter_{PP}
'Himself appeals to Peter'
- b. ?*Kathe gineka tu aresi tu antra tis
Every woman_N Cl_D appeals the husband her_D
"Every woman appeals to her husband"
- c. Kathe gineka aresi ston antra tis
Every woman_N appeals to-the husband her_{PP}
'Every woman appeals to her husband'

Examples (20b) and (20c) illustrate a very interesting split depending on whether the experiencer is a bare dative (20b) or a prepositional dative (20c).² WCO arises only in the former case, not in the latter. We believe that these data are conclusive: they show that the licensing of the nominative anaphor *o eaftos mu* cannot be reduced to BT Principle A. More specifically, even if the ill-formedness of (20b) is taken to indicate that the preverbal nominative has an A'-status, to account for the contrast between (20b) and (20c) we must assume that the nominative is interpreted in a position *lower* than the experiencer NP but *higher* than the experiencer PP at the stage where binding applies. In other words, we are

²Datives in Greek usually show an alternation: they can either be PPs or bare doubled NPs with morphological genitive case. There are reasons to propose that this alternation can be accounted for in terms of a 'dative shift' transformation, but this issue is beyond the scope of the present paper.

led to postulate the order DATIVE>NOMINATIVE>PP.³ Crucially, however, the nominative anaphor *o eaftos mu* is licensed irrespectively of the NP/PP status of the experiencer, as shown in (20a).

5. An Analysis

In section 3, we formulated a descriptive generalization capturing the distribution of NAs across languages and within a language, which is repeated here:

- (11) a. If a language has a NA, the anaphor will be 'non-pronominal'. i.e. its form (structure, properties) is relevant.
 b. If a language has a NA, the unaccusative-unergative/transitive distinction is relevant.

In this section, we will demonstrate that a principled explanation for (11) can be given within Reinhart and Reuland's (R&R 1993) 'Reflexivity'. We will argue that NAs can only be [+SELF,+R] elements which are able to escape Chain Formation due to their internal structure; this will account for (11a). We will furthermore propose that Abstract Noun-Incorporation(NI) is an alternative device made available by the Computational System for the satisfaction of Binding; (11b) will follow from general restrictions on NI.

5.1. Nominative Anaphors in Reflexivity

In 'Reflexivity' NAs are, in principle, permitted to exist. In this framework, the distribution of anaphors is regulated by the binding conditions, as they are formulated in (21). Conditions (21a,b) are not about the distribution of anaphors vs. pronominals but about reflexive predicates. The definitions of reflexive and reflexive-marked are given in (22):

- (21) a. A reflexive-marked syntactic predicate is reflexive
 b. A reflexive semantic predicate is reflexive-marked

³In double-object constructions, the NP/PP asymmetry w.r.t. WCO shows up in a strikingly similar form:

- (i) a. O Kostas sistise kathe gineka ston antra tis
 The Kostas(N) introduced every woman(A) to-the husband her(PP)
 "Kostas introduced every woman to her husband"
 b. ?*O Kostas tu-sistise kathe gineka tu antra tis
 The Kostas(N) Cl(D)-introduced every woman(A) the husband her(D)

These facts are identical to the experiencer facts showing that the dative is higher than the PP (DATIVE>ACCUSATIVE/THEME>PP).

- (22) a. A predicate is reflexive iff two of its arguments are coindexed
 b. A predicate (of P) is reflexive-marked iff either (i) P is lexically reflexive or (ii) one of P's arguments is a SELF-anaphor

Crucially, the binding conditions do not say anything about the configurational effects of BT. The configurational effects of BT are due to the movement module (i.e. chain formation), which interacts with the reflexivity conditions. In R&R's view, every lexical element, overt or empty, is subject to A-chain formation under the conditions set out in (23).

- (23) a. *Condition on A-chains:* A maximal A-chain ($\alpha_1, \dots, \alpha_n$) contains exactly one link - α_1 - which is +R.
 b. An NP is +R iff it carries full specification for phi-features and structural Case.

NAs are excluded by the Chain Condition (23a) under the assumption that anaphors are typically -R. To illustrate this, consider the examples in (24):

- (24) a. Jan haat zichzelf
 'John hates himself
 b. *Zichzelf haat Jan
 'Himself hates John'

In (24) the predicates are both reflexive and reflexive-marked satisfying (21a,b). The ungrammaticality of (24b) is due to a violation of the Condition on A-chains: in (24b) the head of the chain is -R since the Dutch anaphor *zich* is not fully specified for phi-features.

Given this system, if an anaphor is able to escape (23b) it will be predicted to be +R. We claim that this is the case in Greek. *O eaftos tu* crucially differs from *zichzelf* in that it is headed by a noun (*eaftos*) which acts as a SELF-element while, at the same time, it is fully specified for phi-features ([masc],[3-pers],[inflected for [numb/case]], thus having the structure of an inalienable possession NP (10). In terms of indexing, this translates as follows (cf. Iatridou 1988):

- (25) a. [O eaftos, tu]_i tu areti [tu Petru]_i
 b. [zich_i zelf]_i bevalt Jan_i

Chain formation in (25b) will result in a violation of (23b) since the chain is headed by the -R element *zich*. No such violation arises in (23a) because the two co-indexed elements *tu* and *tu Petru* do not form an A-chain. This accounts for the difference between languages like Dutch and languages like Greek, i.e. for generalization (11a).

Note, however, that the predicate in (25a) is reflexive-marked but not reflexive. A predicate is reflexive if two of its arguments are co-indexed, and this is not the case in (25a). As it stands, (25a) does not violate the condition on chain formation but it does violate condition A. This suggests that an additional step is needed, in order to make *o eaftos tu* conform with condition A: the possessor *tu* and the object *tu Petru* must become co-arguments.

5.2. [+R] SELF-anaphors and Noun Incorporation

R&R (1993) do not acknowledge the existence of [+SELF,+R] anaphors. They assume that NPs are partitioned into *three* classes according to the properties [\pm SELF], [\pm R]. The proposed typology is given in (26):

(26)	SELF	SE	Pronoun/R- expression
Reflexivizing function	+	-	-
R(eferential independence)	-	-	+

The reason why the [+SELF,+R] combination is missing is theory-internal. More specifically, in Reflexivity, the effect of [\pm SELF] marking is regulated by the Binding Conditions, while [\pm R] specification is relevant to chain formation. From the interaction of these two modules it follows that [+SELF,+R] anaphoric expressions cannot exist. A predicate taking a [+SELF] argument is reflexive-marked, and, therefore, it must be reflexive, i.e. two of its arguments must be coindexed. This, however, will inevitably lead to chain formation since the domain of coindexation is local. The [+R] property of the foot of the chain, on the other hand, will cause a violation of the Condition on Chain Formation. Thus, we will end up with a contradiction. This implies that the non-existence of [+SELF,+R]-elements could be taken to follow as a *theorem* from R&R's system, since specification of an expression as [+SELF] does not, in itself, guarantee that it will qualify as [-R], and vice versa. Nevertheless, we would like to explore an alternative possibility, namely that [+SELF,+R] anaphors exist, but they undergo NI instead of Chain Formation.

In R&R (1991) a SELF-element is viewed as an operator applying to the verb and identifying two of its arguments. They derive this by adjoining SELF to V at LF. In the spirit of this analysis we will assume that SELF-elements are subject to covert NI. This movement is triggered by the semantic defectiveness of the noun (cf. Anagnostopoulou&Everaert 1995). As a result of this incorporation the possessive is promoted, i.e. it becomes an argument of the verb:

- (27) a. [O Jannis]_i agapai [ton eafto_i tu_i]_x
 'John loves himself'
- b. [O Jannis]_i eafto_j-agapai [ton t_j tu_i]_i

As discussed in Fox (1993), evidence from NI-languages (Baker 1988) justifies such an analysis. Overt NI may strand determiners/possessors and in such cases, there is evidence that the possessor becomes an argument of the predicate. In Mohawk, NI with possessor stranding triggers agreement between the verb and the possessor (Baker 1988). The examples in (28) are particularly interesting because they show that coreference between the subject and the possessor is only allowed in the case of overt noun incorporation and simultaneous overt reflexive marking (28c), or without NI (28a); NI without reflexive marking leads to ungrammaticality (28b):

- (28) a. Iʔi k-ohres ne iʔi wak-**nuhs**-a?
I 1sS/3nO-wash DET I 1s-**house**-SUF
'I washed my house'
- b. *Iʔi k-**nuhs**-ohres ne [iʔi t] ?
I 1sS/3nO-**house**-wash DET I
'I washed my house'
- c. Iʔi k-**atat-nuhs**-ohres
I 1sS-REFL-house-wash
'I washed my own house'

A direct consequence of the analysis proposed in (27) is that we correctly predict the unergative/ transitive-unaccusative restriction on NAs (generalization 11b) as instantiated in (6,7). Overt NI is restricted to subjects of unaccusative verbs (Baker 1988), as the examples from Southern Tiwa show.

- (29) a. We-**fan-lur-mi**
C/NEG-**snow-fall**-PRES/NEG
'Snow isn't falling'
- b. *Ø**khwien**-teurawe-we
A-**dog**-run pres
'The dog is running'

It is therefore expected that covert NI will be likewise restricted.

- (30) a. *[O eaftos, tu,] ton antipathi [ton Janni],
b. *[O t, tu,] ton eaftos-antipathi [ton Janni],

5.3. Restricted Possessives, External Possessor constructions

Our analysis of the Greek anaphor *o eaftos tu* straightforwardly extends to restricted possessives (Helke 1979, Ingria 1982) as in (31), which are structurally parallel to *o eaftos tu* in that they occur with an obligatory possessive pronoun which must have an antecedent:

- (31) a. John bumped his head
 b. *John bumped her head
 c. John lost his way
 d. *John lost her way

In these cases as well, noun-incorporation is triggered by the semantic defectiveness of the noun. The (un)grammaticality of the examples suggests that in these cases, the predicate becomes reflexive-marked as a result of the incorporation process itself. Under this analysis, restricted possessives must be viewed as instances of *inherently reflexive predicates*, i.e. predicates which are marked in the lexicon as reflexive. This expresses correctly a major characteristic property of restricted possessives as opposed to reflexive anaphors, namely that the distribution of the former is *lexically governed*:

- (32) a. John *lost* his/*Bill's/*her *mind*
 b. Freud carefully probed his/man's/her *mind*
 (33) a. Jerry *expressed* his/*Dick's/*her *support* for the measure
 b. Ed appreciates his/Ann's/her *support*

As shown in (32) and (33), each noun which occurs as the head of a restricted possessive occurs in this usage only in the context of *a certain designated verb*, a context external to the noun phrase.

External possessor inalienable possession (IP) constructions in Romance (cf. 34) are similar to restricted possessives in English in that there are severe lexical restrictions on the verbs which permit their *subjects* to be interpreted as the possessors of the IP-phrases in object position (cf. Vergnaud and Zubizarreta 1992). It is therefore justified to propose that they form a natural class with restricted possessives and to analyse them in terms of NI (cf. Delfitto and D'Hulst 1995):

- (34) a. Jean leve la main
 b. Jean_i raises [_i HAND]

Interestingly enough, external possessor IPs are licensed in subject position of unaccusative verbs (cf. Vergnaud and Zubizarreta 1992:620):

- (35) La tete lui tourne
 the head to him spins
 'His head spins'

This provides further evidence in favor of our proposal to derive generalization (11b) from general restrictions on NI, as opposed to Chain Formation.

6. Nominative Anaphors as a Morphological Problem

Before concluding, we would like to point out that within the class of [-SELF,-R] anaphors, there is also a bifurcation between languages that permit nominative anaphors and languages which never do. More specifically, the Icelandic *sig* is not licensed as a nominative object in quirky subject constructions while it is licensed as an accusative or dative object (cf. Everaert 1992, Taraldsen 1994). Note that oblique subjects are licit antecedents for *sig*, as the grammaticality of (36c) shows:

- (36) a. *Maríu fannst sig vera gáfuð
 Mary_D thought-3sg sig_N be gifted_N
 'Mary thought she was gifted'
- b. María taldi sig vera gáfaða
 Mary_N believed-3sg sig_A be gifted_A
 'Mary believed herself to be gifted'
- c. Mariu fannst sér fara aftur i norsku
 Mary_D thought-3sg sig_D go backward in Norwegian
 'Mary thought her Norwegian was getting worse'

The fact that (36a) is ruled out cannot be due to a violation of the Chain condition: the tail of the chain is appropriately marked [-R] and, moreover, (36a), (36b) and (36c) are structurally identical. Hence, the ungrammaticality of (36a) must be either a Case problem, as Everaert (1990) and Taraldsen (1994) suggest, or an Agreement problem. We believe that the Chinese facts in (2) repeated below support the second option (cf. also Kitagawa 1986 for Japanese):

- (37) Zhangsan yiwei [Lisi zhidao [ziji mei kaoguo]]
 Zhangsan_i thought Lisi_j knows self_{i,j} not pass
 'Zhangsan thought that Lisi knows that self does not pass the examination'

The contrast between Icelandic and Chinese/Japanese seems to point towards a generalization according to which, [-R] *nominative anaphors can be licensed only in languages which have no predicative inflection for person, number (and gender)*. We would like to propose that this generalization can be subsumed under a broader implicational generalization recently discussed in Huybregts (1996): *If a language L has verbal inflection for person, number, gender, then L has nominal inflection for person, number gender*. Huybregts develops an account for this in terms of Chomsky's (1995) proposal, that there is an asymmetry in the interpretability of Agr-features of N vs. V. The Agr-features of V are [-interpretable] and must be checked against the [+interpretable] Agr-features of N in order to be eliminated. If N doesn't have Agr-features, the Agr-features of V remain unchecked, and the derivation crashes. Chinese-type languages, on the other hand, have no verbal inflection for person, number, gender, and for this

reason, the presence of Agr-features on the NPs is not necessary. Extending this analysis to anaphoric expressions, we propose that for the same reason, [-R] anaphoric expressions can be licensed in [Spec,IP] only in languages like Chinese with no verbal inflection for phi-features. In languages like Icelandic, [-R] anaphors cannot check the [-interpretable] features of V/A because they are defective for phi-features, and the derivation crashes. This line of analysis makes the prediction that [-R] anaphors will not be licensed in [Spec,AgrOP] in languages with object-verbal inflection. At this point, we don't know whether this prediction is borne out.

7. Conclusion

In this paper, we have looked at the distribution of NAs in Greek in comparison to Germanic and Romance languages. We have shown that standard BT fails to accommodate the phenomena under discussion. We have investigated the distribution and the structural properties of the local anaphor *o eaftos tu*, and we have argued that it qualifies as a [+SELF,+R] element according to the properties of anaphoric expressions proposed by R&R (1993). We proposed that [+SELF,+R] anaphors satisfy Binding not by *Chain Formation* but by *Abstract Incorporation*, and we linked the availability of NAs to the latter mechanism. We extended our analysis to *restricted possessives* in English and *external possessor IP constructions* in French pointing out that the latter can occur as subjects of unaccusative predicates similarly to *o eaftos tu*. Finally, we considered the distribution of [-SELF,-R] nominative anaphors and we suggested an account within Chomsky's (1995) system.

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The Imperfectivity-Genericity Correlation

Rajesh Bhatt
 University of Pennsylvania
bhatt@linc.cis.upenn.edu

1 Introduction

In this paper, I address the following question: what is it about imperfective aspect that in many languages it is ambiguous between a generic/habitual interpretation and a progressive interpretation? Is it the case that the progressive interpretation and the generic/habitual interpretation are specific instantiations of a more general imperfective interpretation in the relevant languages? I answer the first part of this question in the negative and the second part in the positive. Imperfective aspect *per se* does not license genericity. The crucial factor that regulates the availability of generic interpretations is compatibility with stativity. Genericity is permitted only in environments which permit stative readings. A good example is the English progressive which is incompatible with statives and also lacks a generic reading. The Imperfectivity-Genericity correlation is really a genericity-stativity correlation. Generic interpretation in imperfectives arises in a manner similar to the generic reading of the simple past tense in English and the generic and non-generic readings are also similarly connected by the application/ non-application of the genericity operator. Thus the progressive interpretation and the generic reading are specific instantiations of a more general imperfective interpretation.

In the first section, I define the terms *imperfective* and *perfective* as used in the literature on aspect. In section two, I lay out the patterns of interpretation associated with certain aspectual/morphological markings in Bulgarian, English, Hindi, Marathi and Modern Greek. In section three, I present my proposal. Since my proposal uses Carlson (1977)'s treatment of bare plurals as a point of departure, I provide a brief summary of that system. In section four, I apply my proposal to the cases discussed in section two and discuss some problems raised by the imperfective paradox. In section five, I propose a condition that restricts the availability of generic interpretations. Finally, in section six, I discuss the case of unambiguous habituals in Hindi and provide some historical perspective.

2 Imperfectives and Perfectives

Many languages morphologically mark viewpoint aspect¹ on the verb. There is often an imperfective versus perfective opposition on the verb. Thus every verb is either morphologically perfective or imperfective. This is seen most clearly in

languages such as Russian where even infinitival verbs are marked for the perfective/imperfective opposition.

This morphological opposition has a semantic opposition associated with it. Smith (1992) distinguishes three different kinds of viewpoint aspects based on the amount of the situation they make visible. *Perfective* viewpoints include both endpoints of a situation; *Imperfective* viewpoints focus on stages that are neither initial nor final, excluding endpoints; and *Neutral* viewpoints² include the initial point and at least one stage of a situation.

In English, the imperfective viewpoint is marked by the progressive *-ing* suffix. An example of the imperfective viewpoint can be seen in (1). It presents part of a situation with no information about its endpoints. It does not present *closed* situations although it allows inferences about beginnings and endings. (Smith (1992))

- (1) a. Mary was walking to school, (but she didn't actually get there).
 b. Mary was walking to school, (and she's still walking).
 c. Mary was walking to school, (and now she is there).

As the examples in (1) show, the imperfective viewpoint is compatible with the event not reaching its natural ending point, still continuing or actually reaching its natural ending point.

The perfective viewpoint aspect presents the situation as a single whole, as a point. The span of the perfective includes the initial and final endpoints of the situation. This makes inferences involving the endpoint of the situation either paradoxical as in ((2)a and b) or redundant as in (2c).

- (2) a. Mary walked to school, (# but she didn't actually get there).
 b. Mary walked to school, (#and she's still walking).
 c. Mary walked to school, (# and now she is there).

Imperfectives come in at least two varieties: general imperfectives and progressives. General imperfectives can apply to all situation types and are found in French, Russian, Bulgarian, Greek, Marathi, Gujarati etc. The French *Imparfait* in (3) is an example of the general imperfective.

- (3) La mer était calme
 the sea be.pst.impfv calm
 'The sea was calm (today).'
 'The sea used to be calm.'

As the two readings of (3) show, the general imperfective³ is ambiguous between a generic and a non-generic reading. In the case of non-statives, this contrast is sharper. The non-generic reading presents the event as being in progress while the generic reading presents the event as recurring. This can be seen in the Bulgarian example in (4).

- (4) Ivan jadeše jabálki
 Ivan ate-impfv apples
 'Ivan was eating apples.'
 'Ivan used to eat apples.'

Progressives apply only to non-stative situations.⁴ They are found in Chinese, English, Hindi, Navajo etc. An example of the English progressive can be seen in (5a). (5b) shows the incompatibility of the progressive with statives.

- (5) a. Bill was going home.
 b. * Bill was knowing the answer.

Progressive aspect is often marked periphrastically as in the English progressive which is marked by the auxiliary *be* and the suffix *-ing*. Another example of a periphrastically marked progressive is the Hindi progressive in (6) which is marked by the auxiliary *rah* which is homophonous with the verb 'to stay/live'.

- (6) a. Ram phal khaa rah-aa hai
 Ram.M fruit eat PROG-Pfv be.PRS.M
 'Ram is eating fruit.'
 b. # Ram angrezi jaan rah-aa hai
 Ram English know PROG-Pfv be.PRS.M
 '*Ram is knowing English/Ram is getting-to-know English.'

3 Aspectual patterns in some languages

In this section, I present the variation in the availability of certain kinds of interpretation (such as generic, past event, state holding, progressive etc.) in the presence of a particular aspect/verbal morphology (such as simple tenses in English, perfective morphology and imperfective morphology).

In Table (1), the relevant patterns for English are shown. Since English does not have a morphological perfective/imperfective opposition, I use the progressive/simple tense distinction. There is no tense based restriction on the availability of a certain morphological form. As noted earlier, the progressive is incompatible with states and only has an event-in-progress reading. The simple tenses are compatible with states. The simple past is ambiguous between a generic and a non-generic reading. The simple present, however, only produces generic readings with non-statives.⁵

Table (2) shows the distribution of interpretation with aspectual morphology for Bulgarian and Modern Greek. The perfective/imperfective opposition is available only in the past tense in these languages.⁶ However since the present tense form shares its interpretations with the past imperfective, it has been listed under imperfective. The imperfective is systematically ambiguous between a generic and a

	PROG	SIMPLE
PAST.event	Event In Progress	CompletedEvent, Generic
PAST.state	*	State Holds, Generic
PRS.event	Event In Progress	Generic
PRS.state	*	State Holds, Generic

Table 1: English

non-generic progressive like reading. The perfective produces a completed event reading with events and a reading that I call *Change Of State* with statives.

	IMPERFECTIVE	PERFECTIVE
PAST.event	Event In Progress, Generic	Completed Event
PAST.state	State Holds, Generic	Change Of State
PRS.event	Event In Progress, Generic	<i>Not Available</i>
PRS.state	State Holds, Generic	<i>Not Available</i>

Table 2: Bulgarian, Modern Greek

The table for Marathi (Table (3)) shows a pattern very similar to that of Bulgarian and Modern Greek. The only difference is that perfective aspect is not restricted to the past tense. The present perfective is similar to the present perfect in English and the past perfective is similar to the past perfect in English.⁷

	IMPERFECTIVE	PERFECTIVE
PAST.event	Event In Progress, Generic	Completed Event
PAST.state	State Holds, Generic	Change Of State
PRS.event	Event In Progress, Generic	Completed Event
PRS.state	State Holds, Generic	Change Of State

Table 3: Marathi

As opposed to Bulgarian, Marathi and Modern Greek, which have an imperfective/perfective opposition morphologically, Hindi has a perfective/habitual opposition on the verb stem (Cf. table (4)). It also has a periphrastic progressive which is formed by a progressive auxiliary *rah* which is in the perfective aspect (Cf. (6)).

	HABITUAL	PERFECTIVE	PROG
PAST.event	Generic	Completed Event	Event In Progress
PAST.state	Generic	Change Of State	Change Of State
PRS.event	Generic	Completed Event	Event In Progress
PRS.state	Generic	Change Of State	Change Of State

Table 4: Hindi

4 Proposal

I observe that the ambiguity in the imperfective (in Bulgarian, Marathi and Modern Greek) is similar to the ambiguity of the simple past tense in English. Carlson (1977)'s treatment of bare plurals provides an elegant treatment of the ambiguity of the simple past tense. In his system, the two readings emerge from the application/non-application of the *G* (Generic) operator. I extend Carlson (1977)'s analysis to account for the ambiguity of the imperfective in the relevant languages - the two readings arise by application/non-application of the *G* operator.

The past imperfective sentence in (7), from Modern Greek, is ambiguous between a habitual/generic reading and a non-generic reading in which the event of John eating a banana was ongoing at some past time. The generic reading ascribes an intensional property to John while the non-generic reading is extensional. Thus for the generic reading to be true, it is not necessary for John to have eaten a banana regularly at some specific time. For the progressive reading to be true, however, John has to be in the process of eating a banana at some point in the past.

- (7) O Yanis etroge mia banana
 Det John eat-impfv-pst a banana
 'John ate a banana (habitually).'
 'John was eating a banana.'

The ambiguity of (8a)⁸ which can be interpreted as either (8b) or (8c) is very similar to that of (7). The generic reading in (8b) like the generic reading of (7) is intensional - it permits exceptions, and is predicated of the kind 'boy' and not of specific boys. The reading in (8c) is not predicated of a kind and refers to 'some boys' where 'some' is interpreted as the weak quantifier 'sm'.

- (8) a. Boys smoked.
 b. (In those days) Boys used to smoke.
 c. Some boy smoked (in the yard yesterday).

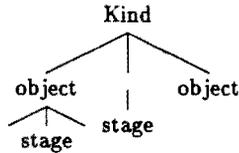
Since there are striking parallels between the ambiguity of the general imperfective and the English simple past tense, I propose that a similar formal device should

be used to capture both these cases. The two readings of (8a) are accounted for by Carlson (1977, 1980) by relating them to the presence (8b) or absence (8c) of a genericity operator. However, his account cannot be applied directly to the general imperfective. In the next section, I provide a brief description of Carlson (1977, 1980)'s system and then describe my amendments.

4.1 Carlson (1977, 1980)'s treatment of genericity

The universe of Carlson's system consists of objects, stages, and kinds. Individuals can be differentiated into kinds and objects. Objects are realized by stages while kinds could be realized either by stages or objects.⁹ The organisation of the elements in this universe can be seen in (9).

(9)



Bare plurals are treated as names of kinds and not as the plural of the corresponding NP/DP with the indefinite determiner. Consequently, the representation of *John* and *Dogs* is similar.

The subject is always the property set of some individual and never of a stage. Intransitive verbs are of type *IV* and take stages as arguments. To combine with the property set of some individual (the subject) as an argument, intransitive verbs which are of type *IV* have to be type-raised to *IV'* which takes the property set of some individual as an argument.

This type-raising can take place by application of a G(eneric) operator or by a *default* type-raising rule. Both these rules are restricted to apply only to verbal *IV*'s.

4.1.1 Some of the Rules

The rule in (10) introduces the *G* operator. The *G* operator applies on the type *IV* and yields the type *IV'*.

- (10) a. S21: If $\alpha \in P_{IV}$ and α is of the form $[[\beta]_v (\gamma)]$ then $F_{1g}(\alpha) = [\alpha]_{IV'}$
 b. T21: If α translates as α' and $\alpha \in P_{IV}$ then $F_{1g}(\alpha)$ translates as $G(\alpha')$

If the *G* operator does not apply to the VP, we still need to do default type raising to make the predicate compatible with the subject. This rule is given in (11).

- (11) a. S23: If $\alpha \in P_{IV}$ and α is of the form $[[\beta]_V(\gamma)]$ then $F_{21}(\alpha) = [\alpha]_{IV}$
 b. T23: If α translates as α' and $\alpha \in P_{IV}$ then $F_{21}(\alpha)$ translates as $\lambda x^i \exists z^s [R(z, x) \text{ and } \alpha'(z)]$

4.1.2 Two sample derivations

In this section, I show how the two readings of (8a), repeated here as (12), are derived.

- (12) Boys smoked.

Let us first consider the generic intensional reading. The derivation for this reading is given in (13).

- (13) a. $[[\text{smoke}'_V]]_{IV}$
 b. $G(\text{smoke}')$; T21
 c. $\lambda X. \downarrow X(b) (G(\text{smoke}'))$
 d. $G(\text{smoke}')(b)$

In the above derivation, the G operator applies to the verb phrase raising its type so that it can combine with the subject. The derivation for the existential event reading is given in (14).

- (14) a. $[[\text{smoke}'_V]]_{IV}$
 b. $\lambda x^i \exists z^s [R(z, x) \text{ and } \text{smoke}'(z)]$; T23
 c. $\lambda X. \downarrow X(b) \lambda x^i \exists z^s [R(z, x) \text{ and } \text{smoke}'(z)]$
 d. $\exists z^s [R(z, b) \text{ and } \text{smoke}'(z)]$

In this derivation, default type raising has to apply to the verb phrase to enable it to combine with the subject. The default-type raising rule contains a realization predicate R which is a relation between an individual and a stage of that individual. The verb phrase which is stage-level combines with a stage that realizes the subject and not the subject itself, thus avoiding a type mismatch. This gives us the existential reading of the bare plural.

4.1.3 Carlson (1980)'s analysis of the progressive

The rule in (15) is used to introduce *-ing*.

- (15) a. S11: If $\alpha \in P_{IV/IV}$ and $\beta \in P_{IV}$ β is of the form $[[\delta]_V(\gamma)]$ then $F_{10}(\alpha, \beta) = [[[\delta]_V \alpha]_{Adj}(\gamma)]_{IV}$

- b. T11: If β translates as β' and α as $Prog'$ then $F_{10}(\alpha, \beta)$ translates as $Prog'(\beta')$

The suffix *-ing* is taken to be of type IV/IV . The result of its application by semantic translation rule T11 does not change the semantic type but it does change the syntactic type as a result of the syntactic composition rule S11. It changes the syntactic type of the progressive participle from a verb to an adjective while the semantic type of the entire VP stays unchanged at IV .

The rule for introduction of be_2 is given in (16).

- (16) a. S13: If $\alpha \in P_{IV'/IV}$ and $\beta \in P_{IV}$ and β is not of the form $[[\delta]_V(\gamma)]$ then $F_{12}(\alpha, \beta) = [\alpha\beta]_{IV'}$
 b. T13: If α translates as α' and β as β' then $F_{12}(\alpha, \beta)$ translates as $\alpha'(\beta')$

The ' β is not of the form $[[\delta]_V(\gamma)]$ ' part of S13 restricts its application to progressive participles (or in general anything of type IV that is not headed by a verb).

The translation of be_2 is given in (17),

- (17) be_2 translates as $\lambda Q \lambda x^i \exists z^s [R(z, x) \text{ and } \downarrow Q(z)]$

For illustration, I will now derive the LF of a sentence like 'Boys were smoking':

- (18) a. $[[smoke'_V]]_{IV}$
 b. $[[[smoke'_V] - ing]_{Adj}]_{IV}, Prog'(smoke')$; T11
 c. $[be[[[smoke'_V] - ing]_{Adj}]_{IV}]_{IV'}, \lambda Q \lambda x^i \exists z^s [R(z, x) \text{ and } \downarrow Q(z)] (Prog'(smoke'))$; T13
 d. $\lambda x^i \exists z^s [R(z, x) \text{ and } Prog'(smoke')(z)]$; λ -conversion
 e. $\lambda X. \downarrow X(b) (\lambda x^i \exists z^s [R(z, x) \text{ and } Prog'(smoke')(z)])$
 f. $\exists z^s [R(z, b) \text{ and } Prog'(smoke')(z)]$; λ -conversion

Rule 11 given in (15) is crucial to this system since by converting the verb into an adjective, it blocks the application of the Generic Rule 21 (in (10)) and the default type raising rule 23 (in (11)). This is because both rule 21 and 23 contain the following clause: ' α is of the form $[[\beta]_V(\gamma)]$ '. The progressive participle is adjectival and hence Rules 21 and 23 cannot apply. Thus the fact that the progressive does not permit a generic reading is captured.

Changing the type of the progressive participle to an adjective is necessary to block a generic reading. In English, this is motivated since progressive participles can function as adjectives.¹⁰ However, this treatment of the progressive does not generalize to other languages failing for different reasons in different languages. Consider Hindi which has a periphrastic progressive which is likewise unambiguous having only the event-in-progress reading. However the progressive involves the use

of a progressive auxiliary without any morphology on the verb. This can be seen in (6).¹¹ It is possible to postulate a zero derivation which would convert the verb into an adjective. However this would be problematic since neither bare verbs nor bare verb - progressive auxiliary combination can function as adjectives in Hindi.

On the other hand, this treatment is also unable to account for the ambiguity of the Bulgarian, Kashmiri, MG and Marathi imperfective. Using Carlson (1977, 1980)'s system unaltered would exclude the generic reading. Keeping these factors in mind, I propose a modification which handles these problems.

5 Ambiguous Imperfectives

The general imperfective is ambiguous between an event-in-progress/ state-holding interpretation and a generic interpretation. This can be seen in (7), repeated here as (19).

- (19) O Yanis etroge mia banana
 Det John eat-impfv-pst a banana
 'John ate a banana (habitually).'
 'John was eating a banana.'

As discussed in the previous section, treating the imperfective morphology as similar to the *-ing* in English produces the wrong results as it blocks the generic reading by application of the rule in (10). Also as discussed in the previous section, the motivations for syntactic typeshifting the progressive participle to an adjective do not carry over to languages other than English. The rule in (20) introduces the progressive interpretation but does not result in a syntactic category change.

- (20) a. GS1: If $\alpha \in P_{IV/IV}$ and $\beta \in P_{IV}$ and β is of the form $[[\delta]_V(\gamma)]$ then $F_{10}(\alpha, \beta) = [[[\delta]_V \alpha]_V(\gamma)]_{IV}$
 b. GT1: If β translates as β' and α as $Impfv'$ then $F_{10}(\alpha, \beta)$ translates as $Impfv'(\beta')$

Since this rule does not convert the verb into an adjective, the rule in (10) and (11) can now apply. (21) and (22) are the LFs obtained for the generic and progressive readings respectively of (19).

- (21) $G(Impfv'(eat - a - banana'))(j)$
 (22) $\exists z^*[R(z, j) \text{ and } Impfv'(eat - a - banana')(z)]$

The rule introducing be_2 (given in (16)) is not employed in deriving either of the readings of (19). This is relevant since French, Bulgarian and Modern Greek do not use a *be* as part of the imperfective. The facts from the South Asian languages which

have a general imperfective are somewhat different. The imperfective obligatorily needs a tense auxiliary. In these languages only *be* can act as a tense auxiliary. Still, it is not clear whether the *be* is required for semantic type-shifting reasons as the be_2 in English, for tense-marking reasons or for syntactic reasons of nominative case assignment.

5.1 Interpretation of the habitual/generic reading

We get the fact that the progressive reading is also the existential reading. This fact is reflected in the LF of the progressive interpretation of (19) given in (22). The existential reading can be brought out more clearly by considering the following example which uses bare plurals. Since Modern Greek does not have bare plurals in subject position, I use an example from Marathi in (23).

- (23) mulge shaaret jaat hote (Marathi)
 boys school go-impfv be-impfv-pst
 ‘Boys used to go to school. (generic, intensional)OR’
 ‘(Some) Boys were going to school. (progressive, existential)’

In the generic reading, the subject is taken to refer to the kind ‘boy’ while in the progressive reading the subject refers to some boys. The interpretation of the subject as the kind ‘boy’ is distinctly missing under the progressive reading. Thus connecting genericity and imperfectivity in this manner enables us to use Carlson (1977)’s treatment of bare plurals without change. The similarity between the ambiguity of the simple past and the imperfective is also captured by this extension of Carlson’s analysis. The two readings: progressive and generic for imperfectives and existential event and generic for the simple past differ only in the non-application vs. application of the *G* operator.

5.2 A potential problem: the imperfective paradox

The account presented so far produces the LF in (24) for the generic reading of the sentence ‘John smoke-impfv-pst’ and the LF in (25) for the the generic reading of the English sentence ‘John smokes’.

- (24) $G(\text{Impfv}'(\text{smoke}'))(j)$
 (25) $G(\text{smoke}')(j)$

These two LFs look quite different but because *smoke* is atelic, the relationship in (26) holds.

- (26) $\text{Impfv}(\phi) \Rightarrow \phi$

Hence (24) entails (25). The reverse entailment also holds - if John smoked in the past, it follows that John was smoking at some point in the past. As a result (24) and (25) have the same truth conditions.

The entailment in (26) does not hold for telic predicates. So if Andrew was drawing a circle it does not follow that he actually drew a circle. This non-entailment was first noticed by Dowty (1977) who named it 'The Imperfective Paradox' and ever since it has been a topic of much work in the semantics literature. Consequently in the case of a telic predicate as in (27) the generic reading of the imperfective sentence is not truth-conditionally equivalent to the generic reading of the corresponding English sentence in the simple past.

- (27) mulge rasta olandit hote (Marathi)
 boys road cross-impfv be-impfv-pst
 'Boys used to cross/be-crossing the road. OR'
 '(Some) Boys were going to school.'

This can be seen in (28) which is the LF of the generic reading of (27) and (29b) which is the LF of (29a).

- (28) $G(\text{Impfv}'(\text{cross} - \text{the} - \text{road}'))(b)$
 (29) a. Boys crossed the road.
 b. $(G(\text{cross} - \text{the} - \text{road}'))(b)$

To see the non-equivalence between (28) and (29b) consider a world where boys start to cross the road each morning, never actually crossing it. A straightforward interpretation of the interaction of G and Impfv would predict that in the world described above (28) would be true while (29b) would be false. The proposition $\text{Impfv}'(\text{cross} - \text{the} - \text{road}')(b)$ would be true on a sufficiently large number of occasions for the generic version of this proposition (28) to be true.¹²

However, the generic reading of $\text{Impfv}'(\text{cross} - \text{the} - \text{road}')(b)$ has the same truth conditions as the generic reading of the English sentence 'John smoked'. Something is wrong then: either the treatment of the habitual reading of the imperfective assumed here is incorrect or our understanding of the interaction between genericity and imperfectivity (more precisely the G and the Impfv operator) is incomplete. There are reasons to suspect that it is the latter.

White (1994) notes that while the imperfective paradox distinguishes activity expressions (atelic) from accomplishment expressions (telic) in that $\text{Impfv}(\phi)$ does not entail ϕ , this negative judgement no longer holds if the progressive is interpreted iteratively. (White (1994) Pg. 54, fn. 62)

This can be seen with the English progressive in (30).

- (30) a. John was going to school \nrightarrow John went to school.
 b. John was going to school every day last year before he had an accident.
 \rightarrow John went to school every day last year before he had an accident.

Similarly¹³ in (28), the presence of the generic operator is sufficient to get us over the imperfective paradox. This is equivalent to saying that the entailment in (31) holds.

$$(31) G(\text{Impfv}(\phi)) \Rightarrow G(\phi)$$

A formal treatment of the interaction between the Imperfective operator and its behaviour under iteration/the Generic operator however, still remains to be given.

6 The Absence of Genericity

In the preceding sections, I have proposed a mechanism that enables us to derive generic readings of the general imperfective. However, I have not discussed why the G operator cannot apply in the presence of a perfective operator in Bulgarian, MG, Hindi and Marathi. A generic reading is never permitted with the perfective aspect in these languages.

A simple answer can be given to this question by postulating that the Perfective operator is of type IV'/IV unlike the imperfective operator which is of type IV/IV . As a result the G operator which is of type IV'/IV is no longer able to apply. This solution while it works is not insightful - it is not clear why the perfective differs from the imperfective in having a different type. Until the relevant distinctions between the perfective and imperfective in Bulgarian, Greek, Hindi and Marathi are explicated, it will lack explanatory adequacy.

Assuming that the notions *imperfective* and *perfective* are semantic notions (as defined earlier), we would not expect their denotation and hence their properties to vary from language to language. However this is exactly what we seem to observe.

According to the definitions in Section 2, English simple tenses are clearly perfective while the English periphrastic progressive is clearly imperfective. But unlike the Bulgarian, MG or Marathi perfectives which do not permit generic readings, English simple tenses which are definitionally perfective permit generic readings.

On the other hand while Bulgarian, MG and Marathi imperfectives permit generic readings the English periphrastic progressive which is definitionally imperfective does not. This suggests that the factors that are responsible for the presence or absence of genericity are in a sense orthogonal to the perfective/imperfective distinction as defined in Section 2.

6.1 Conditions on the G operator

What seems to stay constant with the tense/aspectual forms that permit genericity is that they are compatible with states. Alternatively stated, G is incompatible with operators which are themselves incompatible with states: two examples of this are: the periphrastic progressive in English and Hindi and the perfective in Bulgarian, Modern Greek and Hindi. Consider the following contrast from Greek:

- (32) a. o Kostas pisteve oti i gi ine epipedhi
 DET Kostas believe-imperf that the earth is flat
 'Kostas believes that the earth is flat.'
- b. O Kostas pistepse oti i gi ine epipedhi
 DET Kostas believe-PERF that the earth is flat
 'Kostas came to believe/ended up believing that the earth is flat.'

The perfective operator and a stative predicate together produce a reading which I call the *change of state* reading. The perfective in general needs a change of state to be felicitously used i.e. an action starts, goes on for some time and finally ends with a change of state taking place.¹⁴

To capture this regularity, I propose the following condition on the application of the G operator:

- (33) The G operator can only apply to predicates that are not themselves incompatible with states.

Taking the above assumption as an axiom of our system, we are able to derive the distribution of genericity across several languages. This axiom differs from standard subcategorization restrictions: the G operator predicates a condition of the complement of its own complement. This seems undesirable but unavoidable right now.

One implication of (33) is that it connects the availability of genericity to compatibility with stativity. In a sense, the fact that in the languages discussed here, the imperfective actually permits a generic reading is a side-effect of its compatibility with statives. From this point of view, the real correlation is a genericity-stativity correlation along with the fact that general imperfectives are compatible with states.

6.2 The English progressive

The English progressive does not have a generic reading. Thus 'John is eating an apple' does not mean that John has the property of eating an apple. The progressive is strictly about the here and now. The property that blocks the generic reading is not its imperfectivity since both the English progressive and the Greek imperfective

are semantically imperfective. The relevant property is its incompatibility with stativity. English progressives are incompatible with states, hence by the condition proposed in the previous section. the G operator cannot apply. Consequently the generic reading is ruled out.

7 Unambiguous Generics

According to my account, the existence of unambiguous generics is not to be expected. Genericity arises by the optional application of the *G* operator - so corresponding to the generic reading of the Greek imperfective, there is the progressive reading and corresponding to the generic reading of the English simple past, there is the single event in the past reading. But unambiguous generics exist. One case, the English simple present, has been mentioned earlier in the paper. Here I focus on another such case - the Hindi habitual aspect marker *-ta* which is not used for the progressive and is only a marker of genericity .

My explanation involves postulation of semantic blocking/bleaching effects - if a language has two forms, one of which exclusively conveys the progressive and another which conveys the progressive and a more general form which is used for both the progressive and the generic, the more specific form ends up being used for the progressive and the more general form ends up being used exclusively for the complement.

Historically the Hindi habitual aspect marker was an imperfective marker. When the language developed a periphrastic progressive, the scope of the imperfective was restricted to the habitual. This could have been due to effects of the kind discussed in the above paragraph.

This account is supported by the fact that there are still some instances in Hindi where the imperfective is used to convey the progressive and the progressive though grammatical is conventionally not used:(from Hook (1979,Pg.40))

- (34) a. mai ab chal-ta hoo
 I now go/walk-HAB.m be.PRS.1.sg.m
 'I am leaving now'
- b. voh abhi chai laa-ta ho-ga
 he now tea bring-HAB be-FUT
 'He must be bringing the tea now'

The above examples also have a habitual reading.

There is also some crosslinguistic evidence for this claim: the form corresponding to *-ta*, the habitual marker in Hindi is still ambiguous in several related South Asian languages such as Kashmiri, Gujarati and Marathi. (Peter Hook p.c.)

8 Conclusions

The progressive and the habitual reading of the imperfective in Bulgarian, Greek and Marathi differ only in the (non-)application of the G operator. The ambiguity is similar to the ambiguity of the English simple past tense. It is not imperfectivity per se that is responsible for genericity. The compatibility of imperfectives with stativity is what is relevant. Hence the actual correlation is a stativity-genericity correlation and not an imperfectivity-genericity correlation.

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¹Smith (1992) distinguishes between two different kinds of aspectual information: situation aspect (also known as *aktionsart*) is realized by constellations of lexical morphemes consisting of a verb and its arguments, including the subject. It refers to the idealized situation type (activity, state, etc.) that is associated with a sentence. Viewpoint aspect focusses on a part of an actual situation. In a sentence like 'Sam was drawing a circle', the situation aspect/type is accomplishment because 'Sam draw a circle' is a telic, durative event i.e. an accomplishment. The viewpoint aspect, realized by *-ing*, is imperfective. It focusses on an internal stage of the event, namely the stage in which Sam is drawing a circle.

² An alternate characterization of the neutral viewpoint is that it is the viewpoint that exists in the absence of an imperfective/ perfective opposition. An example is the French future tense which is not marked for aspect. Thus by default it has neutral viewpoint aspect.

³ The French *Imparfait* is not restricted to the verb 'be'. Cf. (i).

- (i) L'enfant pleurait
 the-child cry.pst.impfv
 'The child was crying.'
 'The child used to cry.'

⁴Verb constellations referring to positions and location provide systematic counterexamples to this claim. Consider sentences like 'The painting was hanging in the living room.'. Such sentences are semantically stative but morphologically identical to a progressive. I do not address these case any further.

⁵For an interesting discussion of this peculiarity of the present tense in English see Carlson (1977), pp. 270-274

⁶This is not completely accurate. The present perfective is morphologically available but only in embedded environments such as the complements of verbs like *want* and *desire* and in adjuncts such as if-clauses. It does not occur in matrix clauses.

⁷Tense in the Indo-Aryan languages (which include Marathi and Hindi) is marked periphrastically by a tense auxiliary which is a form of the copula. It is unclear if the presence of this copula in the present/past perfective makes these constructions parallel to the perfect in English.

⁸This ambiguity is not introduced by the bare plural. It exists in their absence too. Consider 'John smoked' which is ambiguous between an extensional reading where John smoked at some definite point in the past and an intensional, generic reading according to which John had the property of being a smoker in the past. Examples with bare plurals are used to bring out the intensional nature of genericity.

⁹ There are interesting and important differences between *kinds* and *objects*. For example, two realizations of a kind (for e.g. Dog) can be at different locations at the same time but two realizations of an object cannot be at two different locations at one instant of time. We will, however, not make use of this distinction. For further details, the reader is referred to Carlson (1980), Pg. 67-68.

¹⁰Consider 'the running boy', 'the dancing girl'. However this ability seems to be restricted to the progressive participles of intransitive verbs. Consider '*the eating a pizza boy' and '*the telling a story girl'. This asymmetry can be explained by the fact that the syntactic type-changing applies only to the progressive participle and not to the entire VP. In case of intransitives, there is no string difference between an adjectival progressive participle and a VP which consists of a progressive participle.

¹¹ Like other main verbs, the progressive auxiliary is marked for the habitual/perfective opposition. When the progressive auxiliary has perfective morphology, it produces the event-in-progress reading. This corresponds to the order 'V_{root} Prog-Pfv'. The other orders permitted are 'V-Hab Prog-Pfv' (continued V-ing on one occasion) and 'V-Hab Prog-Hab' (keeps V-ing on different occasions). I leave a proper compositional semantics of the interaction between the aspectual morphology and the progressive auxiliary for future work. I will discuss the interpretation associated

with 'V-hab Prog-Pfv' in the section on the Hindi habitual.

¹² The *Impfv* operator is taken to have semantics similar to the *PROG* operator discussed in Landman (1990) (except that it is compatible with statives).

¹³ The example in (30) is not completely parallel to the case in question i.e. *Impfv* under *G* because in (30) we are dealing with *Prog* under *Iteration*. The difference between *Prog* and *Impfv* is perhaps not very significant. The difference between *G* and *Iteration* is more crucial. Following Carlson (1989), we know that *G* and *Iteration* differ with respect to intensionality - *G* contributes intensionality while *Iteration* is extensional.

¹⁴ Change of state readings seem to be a by-product of the interaction of perfective aspect and stativity. They are found in several languages such as Bulgarian, Chinese, Hindi, Kashmiri, Marathi, and Modern Greek. I will not discuss them further here.

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Deriving Binding Domains: Feature Checking and Computational Accessibility*

Michael Gamon
University of Washington

1 Introduction

In this paper I argue for a Minimalist Binding Theory that is based on the following assumptions:

- (i) local binding relations (between an anaphor and its antecedent and between a pronominal and a local antecedent) are chain relations, and they are subject to the Minimal Link Condition
- (ii) binding relations are determined derivationally
- (iii) the formation of chains is an "everywhere" operation throughout the derivation, all copies of DPs are, in principle, relevant for the formation of chains
- (iv) once all the [-interpretable] features of an item have been checked, that item becomes inaccessible to computational operations in general and to the formation of chains in particular

I demonstrate that the facts about binding domains for local clausal binding relations follow from the above assumptions in conjunction with a clausal architecture as assumed in the Minimalist framework. Local binding domains become an automatic consequence of the design of the computational system; they cease to exist as independently defined notions. As a consequence, *government* can be eliminated from binding theory altogether.

I also show that this approach makes it possible to unify conditions on NP-traces and lexical anaphors, and it renders stipulations on the formation of multi-membered chains superfluous.

Let me first turn to the view of local binding relations as chain relations.

2 Local Binding Relations As Chain Relations

Assume that the algorithm in (1) is responsible for creating chains derivationally, that is it applies mandatorily at any point of the derivation where it is applicable¹: (1) can apply independently of movement, forming a chain-link between two lexical items.

(1) Chain Formation Algorithm

alpha forms a chain-link with beta (or with a chain headed by beta) iff

- (i) alpha c-commands beta and
- (ii) alpha and beta bear the same index and
- (iii) alpha and beta are in a local relation

Chain-links now have to be classified as either *movement-chain* links or *binding chain* links. This is necessary because there is an overlap of locality constraints for movement and binding but the two processes are not subject to identical locality conditions. For example, movement is sensitive to adjunct islands, the Coordinate Structure Constraint etc., while this is not the case for binding relations - a fact that has proven problematic for movement analyses of anaphors.

This makes it necessary, then, to allow for a distinction between movement and binding-links in a chain. Within the Minimalist framework this is easily possible under reference to the numeration:

(2) Movement -link:

A *movement link* is a chain $\langle \alpha_{\text{hi}}, \alpha_{\text{lo}} \rangle$ where α_{lo} is one element of the numeration.

(3) Binding-link:

A *binding link* is a chain $\langle \alpha_{\text{hi}}, \beta_{\text{lo}} \rangle$ where α_{hi} and β_{lo} are different elements of the numeration.

In other words, if one and the same element from the numeration is involved in a chain relation, a movement link is created. If, on the other hand, two coindexed elements that are separate items in the numeration are in a chain relation, a binding link is formed.

The basic locality constraint in the algorithm for chain formation can then be identified as the Minimal Link Condition:

(4) Minimal Link Condition:

Form Chain targets the closest potential chain-antecedent for α_{lo} .

I assume that the Minimal Link Condition in (4) is the core locality constraint which is applicable to all chain-links, that is, both movement and binding-links. I will put the difficult question as to what other sorts of barriers are responsible for the diverging locality properties of movement and binding aside here.

A refinement is necessary now, to relativize the notion of closest potential chain-antecedent for movement-links and binding-links:

(5) Closest possible chain antecedent:

The closest possible chain-antecedent is the closest possible

- (i) landing site for movement chains
- (ii) antecedent for binding chains

I also assume that equidistance, as defined in Chomsky (1993), applies to the determination of what counts as the closest possible antecedent of any sort.

As I will argue in section 5.2, the algorithm for chain formation seems to be a necessary ingredient of the Minimalist Theory any way: some mechanism in syntax has to be responsible for creating multi-membered chains - a fact acknowledged but not pursued in Chomsky (1995). There are two new aspects that chain formation as formulated in (1) introduces:

- (i) it is chain formation that is restricted by the MLC, not movement
- (ii) chain formation can apply independently of movement

For reasons of space I will not be able to explore the consequences of the first of these modifications. The second modification, however, will play a crucial role in the remainder of this paper.

Turning next to anaphors, pronominals and the equivalents of principles A and B in this approach, let us assume that the crucial distinction between anaphors and

pronominals is that anaphors have to enter a chain-relation with a c-commanding antecedent to be licensed, while pronominals don't need to enter such a relation:

(6) Anaphors have to enter a binding-link relation with a c-commanding antecedent to be licensed

It follows that anaphors will need to be in a local relation with a c-commanding antecedent, the equivalent of principle A of standard binding theory. It also follows that pronominals should not enter a binding-chain link with an antecedent: Under a reasonable interpretation of economy of representation, as few symbols as possible should be used in the output of a derivation (Zwart (1993)):

(7) Economy of Representation
Use as few symbols as possible in the output of a derivation

Once chain-links count as symbols in a derivation, it follows that any binding-chain link involving a pronominal in its tail-position has to be avoided: the pronominal does not need to be licensed in that way, consequently such a chain-link counts as a superfluous symbol of the representation, and leads to an economy violation. This is the equivalent of principle B of standard binding theory.

In other words, an anaphor has to be close enough to a coindexed antecedent in order to be licensed via formation of a chain-link. A pronominal, on the other hand, must not be too close to a coindexed antecedent: otherwise a superfluous binding-chain link is formed, resulting in a violation of economy of representation.

One technical remark is in order here: In the Minimalist Program economy filters serve to make a choice among alternative derivations that start from the same numeration. If binding-chain links involving pronominals are to be ruled out by economy, there has to be an alternative derivation that is more economical. For this reason I have to assume that indices are not part of the numeration but rather are assigned at some point in the derivation, for the sake of concreteness I will assume that this happens at the point when MERGE applies. Under this assumption a derivation with a locally bound pronominal and a resulting binding chain link is simply a less economical derivation than an alternative derivation where a different index is assigned to the pronominal or antecedent when they are merged into the structure.

3 Feature Checking and Computational Accessibility

Chomsky (1995) introduces a distinction between [-interpretable] and [+interpretable] features. Roughly speaking, [+interpretable] features such as phi-features of DPs and categorial features are not erased once they are checked; they survive until LF. It follows that multiple checking of agreement is possible. [-interpretable] features such as case, on the other hand, are erased as soon as they are checked, therefore there is no such thing as multiple case-checking.

I suggest that the following holds:

(8) Computational Accessibility

A term is accessible to the computational system only as long as it bears [-interpretable] features

To put it differently, once the case-feature of a DP is checked off, the DP becomes invisible for computational operations such as chain formation. (Note that here I restrict discussion to A-chain formation. If it is assumed that the wh-features on a Wh-DP are [-interpretable] as seems necessary to ensure covert raising of all Wh-phrases, this account would also work for wh-dependencies).

Again, this assumption is not a completely arbitrary one. Note that without an assumption like (8) movement of a DP would not necessarily terminate in a case-position, because it could continue from a case-position into a position with a strong categorial feature [+D]. To the extent that it is true that the head of an A-chain is always in a case-position, (8) makes the right prediction. The Computational Accessibility hypothesis rests crucially on the assumption that the position where the Case of the subject is checked is SpecAgrS, and not SpecTP. In what follows I will assume that the functional head T has to raise to Agr in order to check the Case of a DP in SpecAgrS.

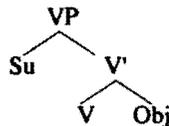
I will now turn to an illustration of how this combination of assumptions makes it possible to derive local clausal binding domains without any independent domain definition.

4 Deriving Clausal Binding Domains

4.1 Simple Transitive Clauses

Consider the derivation of a simple transitive clause in English as in (9) and the point in the derivation of (9) when the VP of the sentence is completely merged as illustrated in (9').

- (9) John_i saw *him_i/himself_i
 (9') Merging of the VP:



A reflexive in object position has to enter a binding chain relation with a c-commanding antecedent in order to be licensed according to the licensing requirement for anaphors in (6). The first chance to do so occurs at point (9') in the derivation when the VP is completely merged: if the subject is coindexed with the reflexive, the necessary binding-link relation can be established at this stage, and the reflexive is licensed. If the subject is not coindexed with the reflexive, the only chance for licensing is missed, and the structure fails to meet the licensing condition for anaphors in (6).

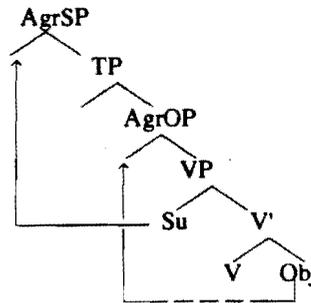
The pronominal in object position, on the other hand, must not be coindexed with the subject. If it is coindexed with the subject, a binding-link is established as

soon as the VP is merged at stage (9') of the derivation. This binding-link is a superfluous element of the representation, hence an alternative derivation - one without coindexing of the pronominal and the subject - is preferred by economy of representation.

Further merge and move-operations are illustrated in (9'') below, but note that none of these operations and the configurations they create alter the binding relations established at (9').

(9'') subsequent Merger and Move before and after SPELLOUT:

— denotes covert movement (post-SPELLOUT)
 — denotes overt movement (pre-SPELLOUT)



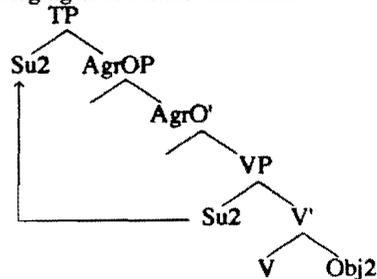
4.2 ECM Constructions

Turning now to ECM constructions where the binding domain of the ECM subject is extended into the matrix clause, the crucial point is that the subject of the embedded clause in Chomsky's analysis raises to SpecAgrOP of the matrix clause - but not until after SPELLOUT. In other words, the [-interpretable] case-features of the ECM-subject are still present at the stage of the derivation when the subject of the matrix clause is merged.

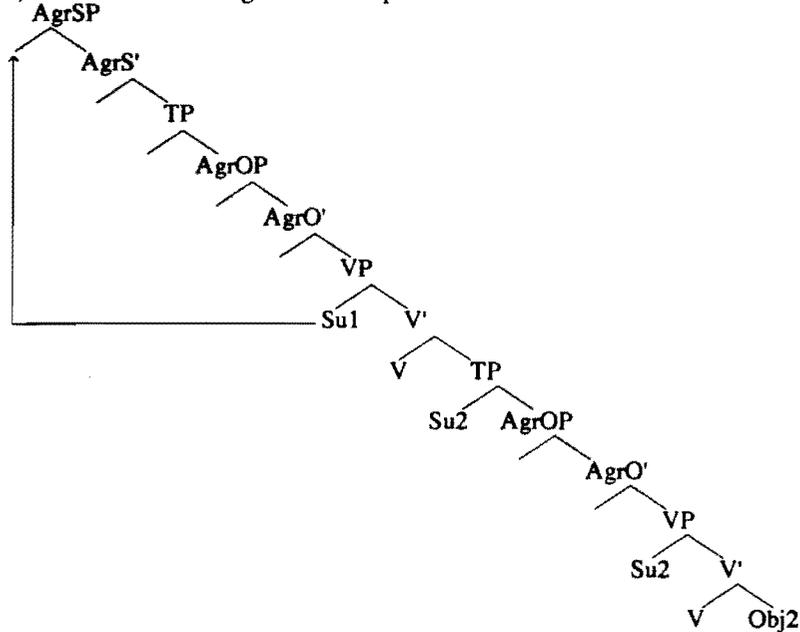
The derivation of the ECM sentence (10) is illustrated in (10')-(10'').

(10) John_i believes *him_i/himself_i to see Mary

(10') Merging of the embedded clause



(10'') Pre-SPELLOUT merger of the complete sentence:



Focusing on the subject of the ECM complement, a reflexive in that position needs to enter a binding-link with a c-commanding antecedent according to (6). In (10') the embedded subject has moved to SpecTP. This move is obviously not motivated by case-considerations, since the embedded subject checks its case in the matrix clause. It is necessary, however, to assume raising to SpecTP in the ECM-complement for checking of some feature (possibly a D-feature of T) to allow the ECM subject to occur in a surface position strictly adjacent to the matrix verb. The [-interpretable] case feature of a reflexive in the position of Su2 at stage (10') of the derivation (just before the ECM complement is merged with the matrix verb) is not yet checked, and consequently the reflexive remains accessible to chain formation while the matrix clause is being merged as shown in (10''). If the matrix subject is coindexed with the reflexive, a binding-link <Su1, Su2> will be established by chain formation as soon as the matrix subject enters the structure by being merged into the matrix VP. By virtue of that binding-link, the reflexive is licensed. If the matrix subject and the reflexive bear different indices, no such link can be established and the reflexive surfaces unlicensed.

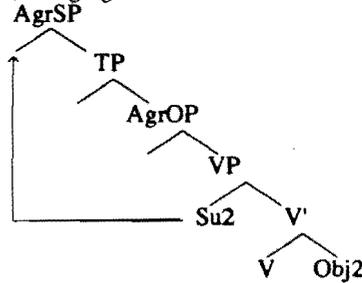
For a pronominal in subject position of the ECM-complement the mirror-image situation obtains: if the pronominal and the matrix subject are coindexed, a superfluous chain-link is created, violating economy of representation.

4.3 Subjects of Finite Complement Clauses

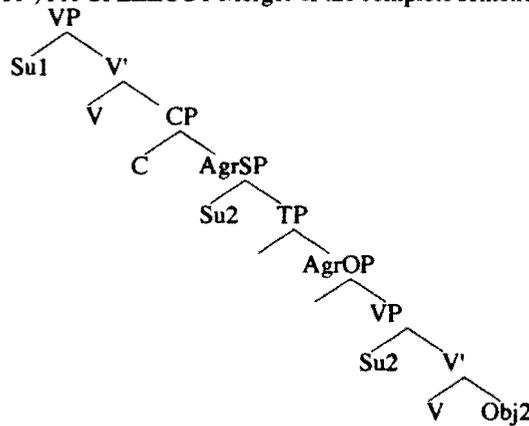
The situation in finite complement clauses such as in (11) where the binding domain of the embedded subject is not extended into the matrix clause is different from that in ECM-complements as illustrated below.

(11) John_i thinks that he_i/*anaphor_j saw Mary

(11') Merging of the embedded clause:



(11'') Pre-SPELLOUT Merger of the complete sentence:



At stage (11') of the derivation of (11) when the embedded clause is completely merged, the subject of the complement clause has its [-interpretable] case features checked in SpecAgrS. That means that at this stage of the derivation, the subject of the complement clause becomes invisible to computational operations in general, and chain formation in particular.

Subsequent merging of the matrix clause in (11'') and particularly the introduction of the matrix subject into the structure is irrelevant for the establishment of binding relations because whatever DP is in the subject position of the embedded clause will be inert for computational operations. Even though a

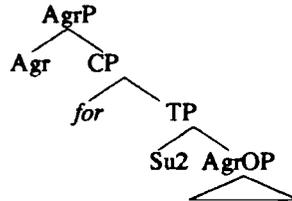
potential antecedent is made available once the matrix VP is merged, no binding-link between the embedded subject and the matrix subject can be established due to the inaccessibility of the embedded subject. It follows that a reflexive in the subject position of the embedded clause will never be able to get licensed even under coindexation with the matrix subject, and it also follows that a pronominal in the embedded subject position can be freely coindexed with the matrix subject: no binding-link can be established, so no violation of economy of representation can occur.

4.4 Complement Clauses Introduced by *for*

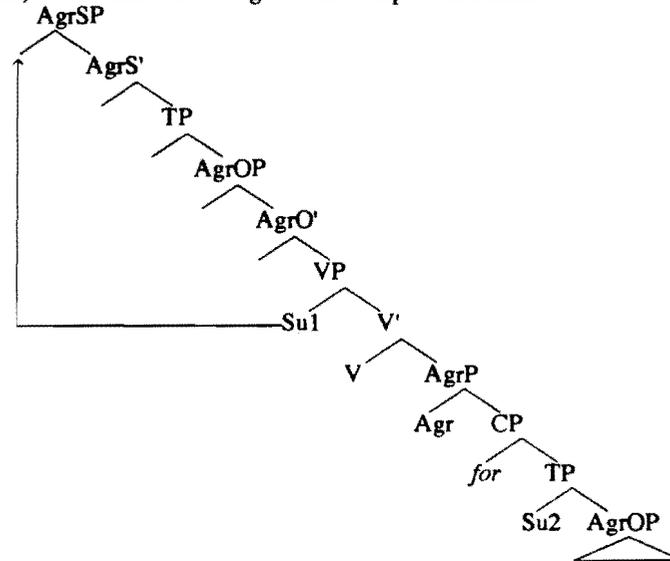
Finally, consider clausal complements introduced by *for* as illustrated in (12). In (12), the binding domain of the subject of the complement clause is extended just as in ECM constructions. It turns out that a perfectly parallel analysis is possible.

First of all, the assumption that *for* is a structural case-assigner is unavoidable: *for* cannot be an assigner of inherent case since there is no connection between the theta-role assigned to the subject of the complement clause and the complementizer *for*. If structural case-assignment is uniformly represented as a Spec-head relation in an agreement projection, as I have been assuming throughout, following Chomsky (1993), the null assumption is that the subject of the complement clause raises covertly to the specifier of an agreement projection above the complementizer. This projection could either be right on top of the embedded CP or it could be the AgrOP of the matrix verb - a question that I will leave unresolved here (but see Postal (1974) for a number of arguments against raising-to-object in such constructions). Note that in the illustration below I have chosen the option of an agreement projection on top of CP for reasons of exposition.

- (12) John_i wants for *him_i/himself_i to see Mary
 (12') Merger of the embedded clause:



(12'') Pre-SPELLOUT Merger of the complete sentence:



Details aside, the important point here is that the subject of the complement clause will still be accessible to chain formation at the stage of the derivation in (12'). When the matrix clause is merged, as shown in (12''), the subject of the matrix clause can serve as an antecedent as soon as it is introduced into the derivation. It follows that a reflexive in the subject-position of the complement clause can establish its binding link with the c-commanding matrix subject. A pronominal in that position must not be coindexed with the matrix subject, otherwise a superfluous binding link is formed, leading to an economy violation and hence a different derivation without coindexation between pronominal and matrix subject is chosen.

5 Further Implications

5.1 NP-Traces and Anaphors

In standard Principles & Parameters syntax it was assumed that NP-traces are subject to principle A of Binding Theory (Chomsky 1981, 1982) just like lexical anaphors. This assumption explained the parallelism between the examples in (13) with overt anaphors and NP-traces (examples from Lasnik/Uriagereka (1988)):

- (13) a.) *John_i believes that himself_j is clever
 b.) *John_i was believed that t_j is clever
 c.) John_i believes himself_j to be clever
 d.) John_i was believed t_j to be clever

In (13a) and (13b) the anaphoric element (*himself* and NP-trace) is not bound within its Governing Category (the embedded clause) and the sentences are ungrammatical. In (13c) and (13d), on the other hand, the Governing Category is the matrix clause, and both the lexical anaphor *himself* in (13c) and the NP-trace in (13d) are correctly bound within this domain.

While the parallelism in these examples is striking, a treatment of the NP-movement cases as involving principle A as a condition on NP-traces is problematic: As has been observed in the literature (e.g. Aoun (1985) and Lasnik (1986)), there is a substantial overlap between principle A and ECP effects on NP-movement. In the examples above, (13b) and (13d) need not be distinguished by Binding Theory, they can be distinguished by the ECP: the trace in (13d) is lexically governed, the trace in (13b) is not, and it also does not have a local antecedent-governor.

To sum up, invoking principle A for NP-trace covers the parallelism between anaphor-binding and NP-movement, but it introduces an unwelcome redundancy between the ECP and principle A, which both require a local antecedent.

The Minimalist binding theory advocated here has the advantage of unifying the analysis of the NP-movement cases and the anaphoric binding cases on a more abstract level, without stipulating that NP-traces are subject to Principle A.

In both (13a) and (13b) the subject of the embedded clause has its [-interpretable] case features checked in the embedded subject position by finite T. It follows that these subjects are inaccessible to the computational system after their features are checked. Neither movement from the embedded subject position is possible, nor the formation of a binding-link between that subject and a matrix antecedent. In (13c) and (13d), on the other hand, the case of the embedded subject is not checked overtly in the embedded infinitival ECM-complement, but covertly in SpecAgrO of the matrix clause. Consequently the [-interpretable] case features are still present on the embedded subjects when the matrix clause is merged, and computational operations (Move and Form Chain) can access these phrases and move them to subject position (13d) or form a binding-link between the anaphor and its antecedent (13b).

In conclusion, the parallelism between locality in NP-movement and principle A of Binding Theory is expected under the assumptions in this paper. Both movement and the formation of binding-links are computational operations that are subject to the MLC and the accessibility restriction. NP-movement and binding are thus unified at a more abstract level, eliminating overlap and redundancy between grammatical principles².

5.2 Deletion of Traces and Chain Formation

In this section I demonstrate that the assumptions of Chomsky (1995) with respect to deletion of traces are not needed under the chain formation approach advocated here. I show that the need for such an assumption does not arise in expletive constructions at all as claimed by Chomsky (1995), and that the assumption can be dropped for successive cyclic movement, too, once the definition of chain formation in (1) is adopted.

Turning to expletive constructions first, Chomsky (1995:70) makes the following claim about intermediate traces in A-positions:

(14) The intermediate trace t of an argument cannot be attracted; hence t does not prevent attraction of an element that it c-commands.

The rationale behind this claim is the following: since intermediate traces do not enter into interpretation, they delete (become invisible for interpretation at LF). According to the economy condition that "deleted α is erased if possible" (Chomsky 1995: 52), as much of the intermediate trace as possible has to erase (become inaccessible to the computational system). The trace itself, being a term, cannot erase for reasons of structure-preservation. Its formal features, however, are deleted and *can* be erased freely. By the economy condition on erasure, they consequently *have* to erase.

Empirically, this assumption has the consequence that it allows LF-raising of the associate in certain types of expletive constructions.

Consider the LF-raising of the associate in an expletive construction such as (15) (example from Chomsky 1995:70):

(15) there seem [t to be some books on the table]

There is merged into the subject position of the complement clause of *seem*. It then raises to the matrix subject position, where it checks the strong D-feature of T. After SpellOut, the case and ϕ -features of the associate *some books* raise to the position of matrix-*there* and check the case- and agreement features of T. This raising would be blocked, however, if the trace in the subject position of the embedded clause would count as a closer item that could be attracted by the matrix T. Assuming that the formal features of the trace delete and erase eliminates t as a possible target for attraction, therefore voiding its status as a blocker for attraction of the associate.

In the example of an expletive construction in (15), Chomsky's argument doesn't go through: By assumption, the expletive *there* only carries categorial features, but no case- or ϕ -features. Consequently, even without the stipulation in (14), it would never bar attraction of the case- and phi-features of the associate anyway. In conclusion, stipulation (14) is not necessary to ensure the availability of raising of the associate across the trace of the expletive in (15).

Turning to successive cyclic movement and the notion of "linked chains", Chomsky observes that his mechanism of FORM CHAIN runs into problems in successive cyclic movement: FORM CHAIN only forms two-membered chains as a result of the application of MOVE. In a sentence such as (16) below the three chains in (17) will be formed:

(16) we are likely [t₃ to be asked [t₂ to [t₁ build airplanes]]]

(17) CH₁=<t₂, t₁>
 CH₂=<t₃, t₂>
 CH₃=<we, t₃>

Chomsky notes that the chains CH₂ and CH₃ should be deviant because they contain arguments but no theta-role. Only the chain CH₁ should fulfill the "chain condition" requirement because it has a theta-position and an argument³. Chomsky (1995:69) suggests the following stipulation to resolve this problem:

(18) Raising of α heading the chain $CH = (\alpha, t)$ deletes the trace formed by this operation - that is, marks it invisible at LF.

The result of (18) is then that what remains at LF is a chain consisting of the highest copy and the copy in base position, with all the intermediate traces eliminated.

I argue here that the stipulation (18) is unnecessary in the model developed here and can therefore be eliminated from the theory.

In successive cyclic movement, the chain formation algorithm (1) in conjunction with a simple reformulation of the "chain condition" renders the stipulation (18) superfluous.

(1) forms increasingly larger chains throughout the derivation by adding a new link to the already existing chain whenever a new coindexed element becomes available in the derivation. Movement and binding links are distinguished in these chains as suggested above. At the C-I interface, a maximal A'-chain is present. I will not go into a discussion of the relevant aspects of the Theta Criterion in a Minimalist framework here, but it seems that with respect to A'-chains an equivalent of the "chain condition" alluded to by Chomsky could be formulated along the lines of (20), with a definition of *distinct arguments* as in (21):

(20) Chain Condition

In an argument chain the number of distinct arguments must match the number of assigned theta-roles.

(21) Distinction of Arguments

Two DPs count as distinct arguments iff they are distinct items in the numeration.

Consider, finally, the case of successive cyclic A'-movement of arguments. Chomsky notes that the intermediate links in such a successive cyclic A'-chain incorrectly always count as adjunct-extraction links, because they involve two A'-positions. Stipulation (18), in Chomsky's view, remedies this shortcoming by eliminating the problematic intermediate traces. Again, it can be shown that the stipulation is not necessary to obtain the desired result of distinguishing links in an A'-chain involving argument-extraction from links in an A'-chain involving adjunct-extraction. If what makes a DP an argument is its position in a structure as determined by Merge, its argument status could arguably be present at each of the copies of that argument, regardless of whether that copy is in an A'-position as a result of successive cyclic A'-movement. Under this assumption, the need for stipulation (18) disappears.

To summarize, in expletive constructions there is no need for any deletion of features in the base position of the expletive to start with, and stipulation (18) is superfluous for successive cyclic A- and A'-movement under the chain formation approach.

6 Summary and Conclusion

To summarize, I have shown that under a chain-link approach to local binding dependencies and under a derivational view of the establishment of such chain

relations the definition of local clausal binding domains becomes superfluous. This approach also allows us to unify conditions on NP-traces and lexical anaphors, and it makes it possible to eliminate stipulations with respect to the formation of multi-membered movement chains.

This result, in my view, is a strong encouragement to explore the resources of Minimalist syntax for the investigation of binding phenomena instead of relegating these phenomena to the domain of "interpretative versions of binding theory" with unexplained domain-stipulations as Chomsky (1993) does. It also indicates that the relation between Case and binding is a crucial one.

An important problem that this approach solves is the elimination of the notion of *government* from binding theory, a welcome result if one subscribes to the Minimalist goal of reducing syntactic relations to those directly expressible in terms of fundamental concepts of phrase-structure.

If this approach is on the right track it also gives support to recent research that emphasizes the role of a derivational view of syntactic relations, such as Epstein's (1995) derivational approach to c-command and Groat's (1995) attempt to replace syntactic representations completely with derivational operations.

Notes

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¹ See Rizzi (1986) for a predecessor of this approach.

² Note that one redundancy remains under a conjunctive formulation of the ECP such as the one in Rizzi (1990): the head government requirement rules out (b) in addition to the violation of computational accessibility. I have no solution for this puzzle, but note that the status of the head government requirement is unclear in the Minimalist program where government is eliminated as a relevant structural relation. For empirical problems with head-government see Culicover (1993).

³ The "chain condition" alluded to by Chomsky must be understood as some version of the Theta Criterion. For a discussion of the Theta Criterion in the Minimalist framework see Chomsky (1995:80-81).

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Michael Gamon
University of Washington
Dept. of Linguistics
Box 354340
Seattle, WA 98195-4340
miga@u.washington.edu

Negative Polarity Licensing and the Rhetorical Interpretation of Questions

Javier Gutiérrez Rexach ¹
 Department of linguistics, UCLA

1 Contexts of NPI licensing

In this paper, I defend a semantic approach to the licensing of Negative Polarity Items (NPIs) in interrogative sentences which explains most of the specific semantic properties of this type of constructions and is compatible with Fauconnier's (1975) and Ladusaw's (1979) approaches. From a descriptive point of view, NPIs are words (*any, ever, etc*) and phrases of diverse categories (*a single thing, lift a finger, etc.*) that occur or are licensed in a very specific and restricted set of environments: within the scope of sentential or VP negation, within the scope of decreasing quantifiers, as complements of adversative predicates, in the protasis of conditionals, in *before*-clauses and in matrix and embedded interrogative sentences.

Ladusaw (1979) proposed a semantic hypothesis to explain why NPIs occur in some of the above contexts. He claims that NPIs are licensed when they occur in the scope of an expression denoting a monotone decreasing function, defined as follows:

- (1) Let $\mathbf{A} = \langle A, \leq_A \rangle$ and $\mathbf{B} = \langle B, \leq_B \rangle$ be two lattices. A map f from \mathbf{A} to \mathbf{B} is *monotone decreasing* (order reversing) iff for all $X, X' \subseteq A$, if $X \leq_A X'$ then $f(X') \leq_B f(X)$

Not all NPIs have the same distribution. There are (at least) two different classes that we will call, following Zwarts (1990) *weak NPIs* and *strong NPIs*. Expressions such as *any, anybody, anything, yet, etc.* are weak NPIs. They can occur in the scope of the negation operator (2a) or in the argument of any decreasing generalized quantifier function (2b,c)

- (2) a. He has not been to Moscow *ever*.
 b. Nobody has *ever* been to Moscow.
 c. Few students have *ever* been to Moscow.

Expressions such as *give a damn, at all, in weeks, until, a bit, lift a finger* and *budge an inch* impose a stronger requirement on their licensing. They occur in the scope of negation and in the argument of generalized quantifiers like *nobody* (3a,b)

¹I would like to thank Manuel Español, Irene Heim, Ed Keenan and Anna Szabolcsi for comments related to this paper.

but not in the argument of generalized quantifiers like *few (A)* or *less than three (A)* (3c,d).

- (3) a. He did not arrive *until five*.
 b. Nobody ate anything *at all*.
 c. *Few students arrived *in weeks*.
 d. *Less than three policemen *lifted a finger* to help us.

The functions that license strong NPIs are a subset of the decreasing functions. Zwarts calls them *anti-additive* since they satisfy one of De Morgan's laws:

- (4) Let $\mathbf{A} = \langle A, \leq_A \rangle$ and $\mathbf{B} = \langle B, \leq_B \rangle$ be two lattices. A map f from \mathbf{A} to \mathbf{B} is *anti-additive* iff for all $X, X' \subseteq A$,
 $f(X \vee_A X') = f(X) \wedge_B f(X')$

The correlation between function type and licensing ability is synthesized in two laws of negative polarity (Zwarts, 1990): (i) Only sentences in which a monotone decreasing expression occurs can contain an NPI of the weak type; (2) Only sentences in which an anti-additive expression occurs can contain an NPI of the strong type.² The problem arises now as to how can we establish the monotonicity properties of questions and relate them to NPI licensing.

2 NPI licensing in questions

As an initial generalization, it seems evident that weak and strong NPIs are licensed in the scope of interrogative quantifiers. An additional characterizing property of the resulting construction is that the presence of an NPI triggers a *rhetorical* or "biased" interpretation. In informal terms, we say that a question ϕ is rhetorical iff when a speaker s utters it, s associates to ϕ a negative presupposition about the answer to ϕ . The occurrence of a strong NPI in a question obligatorily triggers a rhetorical reading, a fact already noticed by Borkin (1971) and Lawler (1971):

- (5) a. Who *bats an eye* when the boss comes around?
 Presupposition: Nobody bats an eye when the boss comes around.
 b. Who has seen Harriet *in years*?
 Presupposition: Nobody has seen Harriet in years.

²Zwarts (1993) presents a three ways distinction: weak, strong and superstrong NPIs. Superstrong NPIs denote *antimorphic* functions. These functions, besides satisfying decreasingness and antiadditivity, are *antimultiplicative*. We say that a function f is antimultiplicative iff for all $X, X' \subseteq A$, $f(X \wedge_A X') = f(X) \vee_B f(X')$ See also Nam (1995), van der Wouden (1994) and Kas (1993) for further details and crosslinguistic examination of Zwarts' classification.

- c. Who *lifted a finger* to help when I needed it?
Presupposition: Nobody lifted a finger to help when I needed it.
- d. Does John read anything *at all*?
Presupposition: John did not read anything at all.
- e. Did *a single person* read "Barriers" ?
Presupposition: Not a single person read *Barriers*.

The rhetorical reading is optional in yes/no questions with weak NPIs. In normal conditions, when a speaker is trying to disambiguate the two readings (rhetorical and non-rhetorical) (s)he places focal stress on the NPI when the rhetorical reading is the one intended (6). In *wh*-questions with weak NPIs we observe the same ambiguity (7).

- (6) a. Does John read anything?
b. Has anybody ever read *Barriers*?
c. Has Mary ever kissed anybody on the first date?
- (7) a. Who has ever been to Moscow? (ambiguous)
b. Who did Mary ever kiss on the first date? (rhetorical reading preferred)
c. Who has ever kissed a girl on the first date? (ambiguous)

The situation is not uniform crosslinguistically. In Spanish, the presence of an NPI (8) or a negative quantifier (9) obligatorily triggers the rhetorical reading (see Bosque, 1980).

- (8) a. ¿Quién *da un duro* por los bosnios? (only rhetorical)
who gives a coin for the bosnians
'Who gives a damn about the bosnians?'
- b. ¿Quién de vosotros ha podido *pegar ojo*? (only rhetorical)
who of you has could close eye
'Who was able to sleep at all?'
- c. ¿Cuándo *daremos abasto*? (only rhetorical)
when give-us enough
'When would we be able to handle it?'
- d. ¿Quién *ha levantado un dedo* para salvarnos? (only rhetorical)
who has lifted a finger to save-us
'Who has lifted a finger to save us?'
- (9) a. ¿Ha dicho alguien *nada*? (only rhetorical)
has said somebody nothing
'Has anybody said anything?' (rhetorical)

- b. ¿Qué ha hecho *nadie* en este departamento recientemente?
 what has done nobody in this department recently
 ‘What has anybody ever done in this department?’ (rhetorical)

In Spanish there is no source for ambiguity. The non-biased or informative counterparts of the interrogative sentences in (9) would be as in (10), where an existential quantifier is substituted for the negative quantifier.

- (10) a. ¿Ha dicho alguien algo?
 has said somebody something
 ‘Has anybody said anything?’ (informative)
- b. ¿Qué ha publicado alguien en este departamento recientemente?
 what has published somebody in this department recently
 ‘What have people in this department published recently?’

The “avoid ambiguity in the syntax” strategy of Spanish, contrasts with the essentially prosodic strategy of English where, as mentioned above, focal stress or a specific intonational contour disambiguates questions with weak NPIs. We have two additional facts that confirm the hypothesis proposed for Spanish. First, The adverb *acaso* activates the rhetorical reading of the question when there are no NPIs in the sentence. This adverb can only occur in yes/no questions, as shown in (11). Second, whereas the NP *algún libro* ‘some book’ is a positive polarity item, the NP *libro alguno* ‘book some’ is an NPI. Hence, only the latter triggers a rhetorical reading (12b).

- (11) a. ¿Ha dicho alguien algo acaso? (rhetorical)
 has said somebody something by-any-chance
 ‘Has anybody said anything?’
- b. *¿Qué ha publicado alguien en este departamento acaso?
 what has published somebody in this department by-any-chance
- (12) a. Ha visto Pedro algún extraterrestre?
 has seen Pedro some extraterrestrial
 ‘Has Pedro seen any extraterrestrial?’ (non-rhetorical)
- b. Ha visto Pedro extraterrestre alguno?
 has seen Pedro extraterrestrial some
 ‘Has Pedro seen any extraterrestrial?’ (rhetorical)

In Catalan and Italian, NPIs are licensed in yes/no questions (Zanuttini, 1991; Progovac, 1994). This is also the case of Hindi, according to Lahiri (1995). In other languages like Chinese *wh*-words can also act as negative polarity items. Huang (1982: 108) presents the following inventory: *shei* ‘who/anybody’, *sheme*

'what/anything', *na* 'which/any', *heshi* 'when/anytime', *nali* 'where/any place', *zeme* 'how/ any way', *weisheme* 'why/any reason'. The sentences in (13), according to Zhang (1991), are ambiguous between the interpretation (i) and (ii). Serbo-croatian displays a similar behaviour, as the example in (14), taken from Progovac (1994), shows.

- (13) a. Shei zhidao?
 who know
 (i) 'Who knows?' or (ii) 'Who knows?' (rhetorical) = 'I don't know'
- b. Shei da ren le?
 who hit person ASP.
 (i) 'Who hit someone?' or
 (ii) 'Who hit anyone?' (rhetorical) = 'I didn't hit anyone'
- (14) Da li je Milan (i-)šta doneo?
 that Q has Milan any-what brought
 'Has Milan brought anything?'

3 Syntactic, semantic and pragmatic accounts

The range of crosslinguistic variation that we have presented suggests that there are two different issues that should receive an independent answer: why are NPIs licensed in interrogative sentences and where does the rhetorical reading come from?. Different theories have tried to deal with one or the two problems. Ladusaw (1979) proposes an explanation of the occurrence of polarity sensitive items in questions which is not directly founded on decreasingness but rather in a pragmatic principle relating form and meaning:

- (15) S[peaker] should pose the question *q* only when he believes it to be possible for H[earer] to express its denotation set without major revision of the form of the question.

Thus, when a speaker asks a question like *Did John ever lift a finger to help?* (s)he is expecting that the hearer is going to express the answer in a form that does not change the form of the question. Obviously, since the interrogative sentence contains an NPI, the only possible declarative response will be one containing a negation, like *No, he didn't ever lift a finger to help.* The explanation predicts that the only possible reading of the sentence is rhetorical, since the denotation set of the interrogative sentence would be empty. Krifka (1991) observes that Ladusaw's account leaves unexplained why NPIs can also occur in neutral or informative questions. The principle in (15) also poses conditions on the expressibility of rhetorical questions which are stricter than necessary. A sentence like *Did he come?* can be

uttered by a speaker *s* to denote a rhetorical question. According to principle (15) then he would expect *Yes, he came* as the answer to the rhetorical question, because this is the declarative sentence whose form would constitute the least revision of the form of the question. But the speaker's expectations are the opposite, since (s)he is presupposing that he did not come.

Progovac's (1994) theory attempts to give an explanation of NPI licensing based primarily on the syntactic constraints of binding theory. For the cases in which NPIs occur in non-overtly negative environments like conditionals and questions, she proposes that there is a null operator that binds the NPI. NPIs licensed by an element other than clausemate negation have to raise at LF. Horn and Lee (1995) observe that her analysis wrongly predicts that strong NPIs like *budge an inch* or *lift a finger* are licensed only by clausemate negation since they are not QPs. Therefore, Progovac's analysis does not explain why idiomatic strong NPIs occur in questions. Second, with respect to the rhetorical reading, she states that "in order to derive rhetorical force in wh-questions it is enough to assume that wh-AGR and Op in Comp are incompatible, both requiring a separate interpretation in the Comp position ... The only remaining option is to suppress wh-AGR in Comp, resulting in the loss of the wh-force ... Since only negated NPIs are tolerated in the Spec of CP, Op in Comp must set its switch to the negative value, and due to Spec/Head AGR, the wh-word gets interpreted as a negated NPI" (98-99). There are several problems for this line of explanation: (i) *wh*-words in questions with NPIs display full agreement (overtly realized and semantically relevant); (ii) the rhetorical interpretation of a question is sometimes optional, namely when weak NPIs occur in it as in (6) and (7). Progovac predicts that the presence of an NPI automatically triggers the "loss of the wh-force". Finally, (iii) no distinctions are made among NPIs.

Krifka's (1990, 1991) theory posits a combination of semantic and pragmatic factors for the licensing of NPIs in different constructions. Specifically he defends that "the pragmatic setting of asking questions" has to be examined more closely if rhetorical readings are to be accounted for. On the semantic side, he presents a lattice-theoretical approach to NPIs. A *polarity lattice* is a triple $L_A = \langle A', L_A, \leq_A \rangle$ where A' is the *NPI representation*, L_A is the lattice sort and the following conditions hold: (a) if A' is of type σ , L_A is of type $\langle \sigma, t \rangle$, (b) \leq_A is a preorder relation on L_A , (c) $A' \in L_A$, and L_A contains at least one more element, and (d) A' is the unique Y such that for every $X \in L_A$, $Y \leq_A X$. For example, the polarity lattice of the NPI *a drop of wine* is $\langle \mathbf{a.drop.of.wine}', L_{\mathbf{a.drop.of.wine}}, \leq_{\mathbf{a.drop.of.wine}} \rangle$ where for all properties X , if $X \in L_{\mathbf{a.drop.of.wine}}$ then X is the property of being a quantity of wine of a certain size and $\mathbf{a.drop.of.wine}'$ is the least element of the lattice (i.e. $\forall x[\mathbf{a.drop.of.wine}'(x) \rightarrow \mathbf{wine}'(x) \wedge x$ is smaller than some quantity ϵ]). The process of question formation consists in attaching the illocutionary operator ERO to the sentence radical. If \mathbf{p}' is a proposition, i a world, s the speaker, and h the hearer, then $\text{ERO}(s, h, i, \mathbf{p}')$ says that s asks h whether $\mathbf{p}'(i)$ is true. In the case of rhetorical questions, Krifka claims that the speaker wants to show that (s)he is sure

to get a negative answer, so (s)he follows the rule:

- (16) If $ERO(s, h, i, \mathbf{A}')$ and \mathbf{A}' is an NPI or PPI representation with lattice sort L_A , then for any $X \in L_A$ with $X \neq \mathbf{A}'$, s has reasons for $\neg ERO(s, h, i, X)$.

According to the rule, if a speaker s asks the question *Did you even drink a drop of wine?* then for any property X in the polarity lattice $L_{a.drop.of.wine}$, s has reasons for not asking whether a proposition containing X is true at i . The speaker asks a question only about the least element in the lattice, namely **a.drop.of.wine**'.

It is not clear whether the above rule captures the essence of what is a rhetorical question. The speaker is not even asking whether the proposition p containing the least element in the relevant polarity lattice is true. (S)he already knows what the answer is and (s)he is asking it for reasons different than knowing whether p is true in i . In that respect, it seems reasonable to claim that in uttering a rhetorical question, $\forall X \in L_A$ the speaker s has reasons for $\neg ERO(s, h, i, X)$. Therefore, rhetorical questions are not properly questions from an illocutionary point of view.

Krifka does not deal either with the issue of what is the specific property of questions that allows the licensing of NPI. Finally, none of the rules predict the licensing of NPIs and rhetorical interpretations in constituent questions.

4 Interrogative quantifiers and their monotonicity properties

Here I will defend the thesis that NPIs are licensed in *wh*-questions because of the monotonicity properties of interrogative quantifiers and also licensed in yes/no questions because of the monotonicity properties of the question formation operator. In Gutiérrez Rexach (1996), I present an extensional version of Groenendijk & Stokhof's (1984) definition of a question. For \mathcal{D} a domain, a question is a function $f \in [\mathcal{P}(\mathcal{D}) \rightarrow 2]$ mapping a unique $X \subseteq \mathcal{D}$ to True. We call X the answer set of f . As defined, questions are strongly exhaustive. An interrogative generalized quantifier Q is a function from properties to questions. An interrogative determiner is a function from properties to interrogative generalized quantifiers. In the sentence *Who is walking?* the *wh*-word *who* denotes an interrogative generalized quantifier. In the sentence *What student is walking* the *wh*-word *what* denotes an interrogative determiner.

- (17) a. $WHO(WALK) = \{\{x : x \in PERSON \cap WALK\}\}$
 b. $WHAT(STUDENT)(WALK) = \{\{x : x \in STUDENT \cap WALK\}\}$

A yes/no question is a function mapping a unique proposition to true. Therefore, the interrogative sentence *Is John walking?* denotes a question that would map the set $\{\wedge Walk(John)\}$ to True. Therefore, $\{\wedge Walk(John)\}$ is the answer set of the question. In order to determine the monotonicity properties of interrogative

quantifiers we have to determine first what kind of entailment relation arises in the interrogative domain. Here we are going to follow Groenendijk and Stokhof's (1989) notion of entailment though not their concrete implementation. They define the (propositional) entailment relation between interrogatives as follows:

- (18) An interrogative A entails an interrogative B iff, whenever a proposition gives a complete and true answer to A, it gives such an answer to B.

Consider now the following examples:

- (19) a. Which guests smoked?
 b. Which guests smoked cigars?
 c. In which state do you have relatives?
 d. In which state of the West Coast do you have relatives?
 e. How many cars are parked in the garage?
 f. How many red cars are parked in the garage?

There is a natural information-based relation between (19a) and (19b) above. Namely, a true complete answer to (19a) contains a partial complete answer to (19b). Informally, (19b) asks for more specific information than (19a). In other words, if A_f is the answer set of (19a), then a subset of A_f is the answer set of (19b). The same applies to (19c) with respect to (19d) and to (19e) with respect to (19f). Let us call this relation between constituent questions *subsumption*:

- (20) Question f subsumes question g ($f \leq g$) iff $A_g \subseteq A_f$.

Clearly, the subsumption relation is a partial order (reflexive, antisymmetric and transitive). Then, if we allow the entailment/subsumption relations between questions to enter the picture, interrogative determiners will exhibit the entailment pattern of declarative NO. As noted above, if question f subsumes question g , then a complete true answer to g is a partial or complete true answer to f but not necessarily viceversa. The subsumption relation presented here is apparently different from the relation of entailment between questions in G&S(1989). For them the entailment relation holds between propositions and here subsumption holds between questions (it is the subset relation between answer sets). Notice, however, that if question f subsumes question g , then question f entails question g in G&S' (1989) sense, so the notion of subsumption could also be captured in their terms. Notice also that the notion of subsumption is identical to Higginbotham's (1993) notion of downward entailment for interrogatives. In order to see the relation between subsumption and entailment, consider a situation in which John, Bill, Sam and Fred are walking and Sam is the only one of them who is a student. Then, the answer sets of *Who is walking?* and *What students are walking?* in this situation are as in (21).

- (21) a. WHO(WALK) = {{John, Bill, Sam, Fred}}

b. WHAT(STUDENT)(WALK) = {{Sam}}

Question (21a) subsumes question (21b) since $\{Sam\} \subseteq \{John, Bill, Sam, Fred\}$. At the propositional level the answer set of (21a) would be $\{\wedge Walk(John) \wedge Walk(Bill) \wedge Walk(Sam) \wedge Walk(Fred)\}$. The propositional answer set of (21b) would be $\{\wedge Walk(Sam)\}$. We see that the proposition $\wedge Walk(John) \wedge Walk(Bill) \wedge Walk(Sam) \wedge Walk(Fred)$ entails the proposition $\wedge Walk(Sam)$ since for all worlds i if John, Bill, Fred and Sam are walking in i then Sam is walking in i . Therefore, if a question f subsumes a question g then at the propositional level (intensionally) f entails g . We show now that interrogative quantifiers and determiners are decreasing.

- (22) i An interrogative quantifier Q is *decreasing* iff $\forall A, B \subseteq E$ if $A \subseteq B$ then $Q(B) \leq Q(A)$
- ii An interrogative determiner D is *decreasing* iff $\forall A, B, C \subseteq E$ if $A \subseteq B$ then $D(B)(C) \leq D(A)(C)$
- (23) **Fact:** Argument interrogative quantifiers Q are decreasing
 Proof: Let $A, B, C \subseteq E$, $A \subseteq B$, $Q = D(C)$ and $D = \text{WHICH, WHAT, etc.}$. We have to show that for arbitrary X, Y , if $Q(B)(X) = Q(A)(Y) = 1$, then $Y \subseteq X$. Assume $Q(B)(X) = Q(A)(Y) = 1$. Since $A \subseteq B$, then $Y = C \cap A \subseteq C \cap B = X$. \square
- (24) **Fact:** Argument interrogative determiners D are decreasing
 Proof: Let $A, B, C \subseteq E$ and $A \subseteq B$. We have to show that $D(B)(C) \leq D(A)(C)$. Let X, Y be such that $D(B)(C)(X) = 1$ and $D(A)(C)(Y) = 1$. Then, $Y = A \cap C \subseteq B \cap C = X$. \square

The notion of subsumption given above predicts entailments between questions arising from their monotonicity pattern as the ones illustrated in (19a) to (19f) above. A complete (partial) answer to question (19b) will be a partial (complete) answer to (19a) since the answer set of (19b) is a subset of the answer set of (19a). Fact (23) also predicts that negative polarity items can occur in the first argument of interrogative determiners.

- (25) Which students that have *ever* been to Moscow want to go back there?

As we saw in section 2 not only weak but also strong NPIs are licensed by interrogative quantifiers. According to Zwart's laws of negative polarity this would only follow if interrogative quantifiers are antiadditive functions. This is indeed the case, as the following examples illustrate:

- (26) a. Who is walking or talking? = Who is walking and who is talking?
 b. Which students are walking or talking? = Which students are walking and which students are talking?

If a speaker s is in a state of ignorance about who is walking or talking in a situation i and he wants to find it out, the questions in (26a) would be equivalent requests for information. The failure of additivity is evident. If the speaker wants to find out who is walking and talking and asks the question *Who is walking or who is talking*, then an answer that specifies only the set of walkers would be a proper answer to this latter question but it would not give s a complete information about both the walkers and the talkers. In other words, the questions below are not equivalent:

- (27) a. Who is walking or talking? \neq Who is walking or who is talking?
 b. Which students are walking or talking? \neq Which students are walking or which students are talking?

The determination of the monotonicity properties of yes/no questions is more problematic. Here we are going to assume the presence of a yes/no operator similar to the one denoted by *whether*, as done in Higginbotham (1993). This operator is antiadditive. Consider the following sentences:

- (28) Is John walking or talking? = Is John walking and is he talking?

The two sentences above are equivalent. If the speaker s wonders whether John is walking or talking he is wondering whether John is walking and whether John is talking. In this respect, the yes/no question operator is antiadditive and licenses weak and strong NPIs.³

5 What is a rhetorical question?

A rhetorical question is not a “well-behaved” question. The speaker knows already the answer and he asks it for rhetorical purposes (mostly irony). For instance, with respect to the question *Who lifted a finger to help me?* the speaker knows already that the answer set of the question is empty yet he asks it to highlight precisely this fact: that the set of persons who have done something to save him is empty. A sentence like (29a) uttered as a rhetorical question has an empty answer set. In a situation i in which the speaker knows that no students came ($\text{STUDENT} \cap \text{COME} = \emptyset$) he would question (29a) only for rhetorical reasons. The corresponding informative question in i is (29b).

- (29) a. Which students came?
 b. Which students did not come?

³An issue that requires further investigation is the interpretation of connectives in questions. Groenendijk and Stokhof (1989) give to question coordination the same treatment as to coordination of declaratives. Szabolcsi (1994) observes that, for A, B questions *A or B* is interpreted as ‘A or, rather B’ (exclusive *or*) and presents evidence from Hungarian supporting her claim. My intuitions are that both the inclusive and the exclusive interpretation of *or* are valid.

Let us consider now a situation j in which the speaker knows that every student went to the party, i.e., $\text{STUDENT} \subseteq \text{COME}$ or $\text{STUDENT} \cap \text{COME} = \text{STUDENT}$. In j , for rhetorical reasons, he would ask (29b). The corresponding informative question is this time (29a). The answer set of (29b) in j is $\text{STUDENT} \cap \neg\text{COME} = \emptyset$, since everybody went to the party. Ladusaw (1979) makes precisely the same claim: rhetorical questions have always empty answer sets. He uses Karttunen's (1977) semantics for questions to model his idea. There is a problem, though, with the use of Karttunen semantics. One of Karttunen's assumptions is that matrix and embedded questions have the same denotations. Since Ladusaw assumes that the presence of a strong NPI triggers the rhetorical reading, it follows that embedded questions with strong NPIs should also have a rhetorical reading. This is not the case, as shown in the following sentence:

- (30) a. ??I know who lifted a finger to help me.
 b. ??I wonder whether he gives a damn about you.

Here we are going to relate rhetoricity and subsumption (entailment). We define the *subsumption set* of a question ϕ as the set of questions subsumed by ϕ : $\text{SUB}(\phi) = \{ \psi | \phi \leq \psi \}$. Recall that if a question is rhetorical then its answer set is empty. It follows (from this fact and the definition of subsumption) that the subsumption set of a rhetorical question is a singleton. A rhetorical question only subsumes itself: if $\text{Rhet}(\phi)$, then $\text{SUB}(\phi) = \{ \phi \}$. In sum, for a speaker to be able to ask a rhetorical question, he has to calculate the entailment set of an informative question set and ask a question about its bottom element. He has to be able to go over the whole entailment set of a question and pick out its smallest element. The presence of the NPI signals precisely this calculation. Nevertheless, we are not claiming that rhetorical interpretations arise only when there are NPIs in the sentence. As observed in the literature, practically any question can be interpreted as rhetorical, depending on the circumstances and the speaker's intentions. What needs to be stressed is the close relationship between subsumption and the calculation of rhetorical questions.

Notice that this is just Fauconnier's (1975) "end of scale" hypothesis applied to subsumption. The fact that NPIs are licensed in questions follows from Zwart's laws of negative polarity. The association of NPIs with rhetoricity is a question of pragmatics. Since NPIs denote end of scale points, the presence of an NPI in a question is signaling the addressee what the communicative intentions of the speaker are. It marks that the answer set is empty.

As we have seen, Krifka also follows Fauconnier in assuming that NPIs denote least elements in an NPI lattice. Following Heim (1987), he claims that the relevant scale (lattice) is determined over the substitution set of the NPI. Heim's (1987) proposal is based on problematic instances of strengthening of the antecedent in conditionals. NPIs are licensed in the protasis of conditionals. Applying the standard notion of decreasingness would imply that any strengthening of the antecedent preserves truth value. A possible strengthening of the antecedent of the conditional

If you ever go to Yemen, you will enjoy it is *If you go to Yemen and get sick there, you will enjoy it*. It is evident that under normal assumptions about people's desires truth value is not preserved. Heim proposed to adopt limited or contextual decreasingness as a solution to the puzzle. Only strengthenings of the antecedent that are induced by alternative items in the position of the NPI are allowed. In the case of *ever*, adverbials like *twice*, *several times*, etc. are admissible strengthenings of the antecedent. In Krifka's terms, *ever* would be the least element in the NPI lattice $\langle \mathbf{ever}', L_{\mathbf{ever}}, \leq_{\mathbf{ever}} \rangle$. Frequency adverbials like those mentioned above are members of the same lattice.

The extension of this strategy to questions gives the wrong results. The relevant NPI lattice of *Who lifted a finger to help?* would be determined by the denotation of *lifted a finger*, namely we would be dealing with a lattice of actions. The NPI would denote the (contextually determined) smallest element in the lattice. Therefore, the question should mean something like 'Who did the least to help?' or 'Who did nothing to help?'. But the above question is never interpreted this way. The relevant lattice in the case of questions is always the answer set lattice, not the lattice constituted by the substitution class of the NPI. Rhetoricity requires that the empty set be empty and this becomes the contextually relevant lattice. This shows that Heim's insight about the contextual determination of decreasingness is correct, but the additional recipe for its determination (the substitution class of the NPI expression) is not applicable to questions.

6 *Why* and *How* questions

There is a well-known asymmetry in the availability of rhetorical questions depending on the type of the question. Consider the following examples from Lawler (1971):

- (31) a. When did Max hit anybody?
b. Why did Max hit anybody?

Question (31a) presupposes that Max did not hit anybody, so it behaves as a rhetorical question. Its answer set is empty: the set of times when Max hit somebody is empty. On the other hand, question (31b) presupposes that Max hit somebody. Therefore, it lacks a proper rhetorical reading. It has what I am going to call, following Lee (1995), a *surprise* reading. By uttering (31b), a speaker expresses surprise by the fact that Max hit somebody. This is why (s)he is asking about Max's motivations for doing so. Consider now the following sentences:

- (32) a. Why did you tell anybody about us?
b. How did anybody buy that house?

Question (32a) presupposes that the addressee told somebody about them and question (32b) presupposes that somebody bought the house. In its most natural reading (32b) expresses the speaker's surprise about the unexpected fact that

somebody bought the house. The assertive content of (32b) is a question about the manner in which the selling transaction took place. It is clearly not a rhetorical reading, since the speaker has no assumption about the emptiness of an answer set.

We can conclude, thus, that *why* and *how* questions lack rhetorical readings. Szabolcsi & Zwarts (1993) claim that manners and reasons constitute join semilattices. Join semilattices are closed under joins but not under complements, since they lack a bottom element.



Since manners and reasons are structured as semilattices without a bottom element, they cannot constitute proper denotations of rhetorical questions (there is no an empty set of manners or reasons). Therefore, the reason why there are no proper rhetorical *why* and *how* questions is semantic. Since they cannot denote empty sets, they do not meet the essential denotational requirement to be a rhetorical question. On the other hand, rhetorical readings are defined for *what*, *who*, *which* questions because these *wh*-words range over individuals and the domain of individuals is structured as a boolean algebra -a lattice closed under meets, joins and complements- (Keenan and Faltz (1985)). *When*-questions also have rhetorical readings because times are structured as linear orders, and have a bottom element.

A potential counterexample for this approach are sentences like the following, where an answer like (33b) seems perfectly reasonable.

- (33) a. Why is there anything on my table?
 b. For no reason

Notice that not only (33a) admits (33b) as an answer but also that (33a) can be construed as rhetorical. Our claim for the non-existence of a bottom element in reason semi-lattices has to be restricted to actions. Intuitively, all actions have a reason or a cause. On the other hand, states or dispositions are not necessarily associated to a reason or cause. We do not need to make this distinction in the case of manners, due to the fact that manners are always associated to actions.

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Types and Distribution of Anaphors

Elena Anagnostopoulou & Martin Everaert
Tilburg University & Utrecht University

1. Introduction

Within Binding Theory (BT) the non-existence of nominative anaphors (NAs) is a long-standing puzzle. This systematic gap has been sometimes viewed as a historical accident (Cole&Sung 1990) or, alternatively, as the result of either purely morphological principles (Maling 1984), or syntactic principles based on an interaction of BT with other modules of the Grammar (Kayne 1984). However, in recent work it has been shown that NAs do, in fact, exist in Albanian (cf. Williams 1988, Everaert 1990, a.o.) and Greek. The aim of this paper is to re-address the question of the distribution of NAs taking into account the findings from Greek. We will show that, given minimalist assumptions (Chomsky 1995), standard BT fails to accommodate the phenomenon under discussion. We will argue that a modified version of BT as developed in Reinhart & Reuland (1993) can capture the distribution of NAs. Within this analysis, the internal structure of anaphors (and the related anaphoric properties) proves to be crucial for our understanding of why languages do or do not have nominative anaphors.

2. Binding Theory and Nominative Anaphors

Standard BT (Chomsky 1981) allows us to give a straightforward explanation for the absence of NAs. All we need to add to the well-known condition A on anaphors (1a) is the restriction in (1b):

- (1) a. Anaphors must be c-commanded by an antecedent within a local domain.
- b. Structurally, nominative outranks all other cases (within a local domain).

If a nominative marked element is structurally higher than all other case-marked elements, then such an element can never be an anaphor because it will never be c-commanded by its antecedent. Under this account, it is predicted that, if a language does not obey either (1a) or (1b), this language will permit NAs. Chinese appears to verify this prediction. The Chinese reflexive *ziji* does not have to be locally bound, violating (1a), and consequently the restriction in (1b) becomes superfluous (cf. Cole&Sung 1990):

- (2) Zhangsan yiwei [Lisi zhidao [ziji mei kaoguo]]
Zhangsan_i thought Lisi_j knows self_i_j not pass
"Zhangsan thought that Lisi knows that self does not pass the examination"

- (7) **O eaftos tu ton antipathi ton Janni*
 The self his_N Cl_A dislikes the John_A
 'Himself dislikes John'

In Anagnostopoulou (1995), it is argued that Experiencer-Object verbs as in (6) must be classified as unaccusative. Thus, the unergative/transitive-unaccusative distinction seems to be relevant for the distribution of NAs in Greek. Note, however, that the same distinction does not play a role in English and Dutch where NAs are uniformly excluded:

- (8) a. *Himself appeals to John
 b. *Himself hates John
- (9) a. *Zichzelf bevalt hem
 Himself_N like-3sg him_D
 "Himself pleases/appeals to him"
 b. *Zichzelf haat hem
 Himself_N hate-3sg him_A
 "Himself hates him"

An obvious asymmetry between Greek and English/Dutch has to do with the form of the reflexive. English and Dutch have a 'pronominal' reflexive consisting of a pronominal form and the morpheme *self/zelf*. The Greek anaphor is 'non-pronominal'. The Greek *o eaftos tu* consists of the definite determiner *o* 'the', the head noun *eaftos* 'self' and a possessive pronoun *tu* 'his'. Iatridou (1988) argues that *o eaftos tu* is, technically speaking, not an anaphor; only the possessor within the NP is coindexed with the antecedent. Anagnostopoulou & Everaert (1995) propose that *o eaftos tu*, unlike *himself/zichzelf*, has the structure of an inalienable possession NP:¹

- (10) a. [DP [D' [D him]_D [NP self]_{NP}]_{D'}]_{DP}
 zich zelf
 b. [DP [D' [D o]_D [NP eaftos]_{NP}]_{D'} [Spec tu Spec]_{DP}

Summarizing, we claim that the following generalizations hold:

- (11) a. If a language has a NA, the anaphor will be 'non-pronominal'. i.e. its form (structure, properties) is relevant.
 b. If a language has a NA, the unaccusative-unergative/transitive distinction is relevant.

¹ Structure (10b) is the simplified version of the structure proposed in Anagnostopoulou & Everaert (1995) which is in accordance with the LCA (Kayne 1994).

4. Potential Solutions

There are two potential explanations for the distribution of NAs in Greek, a BT account along the lines of Belletti&Rizzi (1988) or a Quirky Subject/Scrambling account as sketched by Anagnostopoulou (1995), Massey (1991). In this section, we will discuss and dismiss both of them.

4.1. A BT-account.

On the basis of examples as in (12a), Belletti&Rizzi (1988) claim that Condition A of the BT is an anywhere principle:

- (12) a. Questi pettegolezzi su di sé preoccupano Gianni
 ‘These gossips about himself worry Gianni’
 b. [e] preoccupano [questi pettegolezzi su di sé] Gianni

As is evident, the anaphor in (12a) is not overtly c-commanded by its antecedent. The assumption that Condition A is an anywhere principle, however, leaves the possibility open that the anaphor is bound either at D-structure or at LF assuming reconstruction (12b). A similar analysis could be proposed for the examples in (6), represented as in (13):

- (13) a. O eaftos tu tu aresi tu Petru/ston Petro
 b. [e] tu aresi [o eaftos tu] tu Petru/ston Petro

However, there are conceptual and empirical problems with such an approach. First of all, D-structure binding is untenable within the Minimalist Program where the binding conditions must be satisfied at LF. The viable alternative of reconstruction would be incompatible with the view that this option is not available for A-movement for both conceptual and empirical reasons (cf. Chomsky 1995). Furthermore, neither the D-structure binding analysis nor the reconstruction analysis may offer a principled explanation as to why generalization (11a) holds. Belletti&Rizzi treat (8a/9a) as a Condition C violation. Under such an account, (13) must be assumed to escape condition C, an assumption that can be argued to be plausible (cf. section 3). However, if we treat *o eaftos mu* as an R-expression in the standard BT-sense, we fail to capture the fact that the Greek anaphor behaves exactly like *himself* as far as the domain of binding is concerned (5). Moreover, the ungrammaticality of the examples in (14), where an object is bound by a subject at S-structure and a subject bound by an object at D-structure/LF, will be left unaccounted for, unless additional stipulations are made (Belletti&Rizzi 1988):

- (14) a. *Himself worries himself

- b. *Se stesso piace a se stesso

Finally, this account would imply that Condition B/C must be satisfied at S-structure/LF while Condition A is an anywhere principle, an undesirable dichotomy which is not independently motivated.

4.2. A Quirky Subject/Scrambling approach.

An important observation to make, at this point, is that in Greek, the orders [Exp V Th] and [Th V Exp] are equally neutral with inverse-linking psych verbs of Class 2 (the so called *frighten*-class) and Class 3 (Belletti & Rizzi's (1988) *piacere*-class). This raises the question whether the mechanism of D-structure binding/reconstruction is at all necessary. A straightforward account for the grammaticality of the Greek examples would be to assume that the NAs only apparently c-command their antecedents. If it can be shown that in cases like (13) the experiencer is higher than the theme, then the grammaticality of (13a) is not a surprise from a BT-perspective. There are two possible ways in which this analysis can be implemented further. (a) It can be claimed that the experiencer qualifies as a *quirky subject* while the nominative argument has the status of an *object*. (b) Alternatively, we could assume that starting from an underlying order V-EXP-TH, the order TH-V-EXP results from A's scrambling of the nominative. In what follows, we will briefly discuss both options.

(a) Anagnostopoulou (1995) argues that the experiencer in preverbal position does not behave like a topicalized object, implicating that it could be viewed as a quirky subject. Comparable arguments can be found in Belletti & Rizzi (1988) for Italian and Masullo (1993) for Spanish. However, the arguments presented are not conclusive. In addition, there is strong evidence that the nominative argument is a subject:

(i) (15a,b) show that subjects but not objects can be licensed under ellipsis.

- (15) a. I Maria agapai ton Petro ke misi ton Jianni
The Mary_{i,N} loves the Peter_A and e_i hates the John_A
'Mary loves Peter and hates John'
b. *I Katerina agapai ton Petro ke i Maria misi
The Katerina_N loves the Peter_{i,A} and the Mary_N hates e_i
'Katerina loves Peter and Mary hates'

The nominative NP in inverse-linking psych verb constructions behaves as a subject with respect to ellipsis, irrespectively of its surface position:

- (16) a. I Maria tu aresi tu Petru ke ton eknevrizi ton Janni
The Mary_{i,N} Cl_D likes the Peter_D and e_i Cl_A irritates the John_A
'Mary pleases/appeals to Peter and irritates John'

- b. Tu Petru tu aresi i Maria ke ton Janni ton eknevrizi e
 The Peter_D Cl_D likes the Mary_{iN} and the John_A Cl_A irritates e_i

(ii) Subject raising verbs as in (17) make clear that the nominative argument of psych predicates is a subject:

- (17) a. Ta vivlia arxizun/*arxizi na tu aresun/*aresi tu Petru
 The books_{N/pl} start-3pl/*start-3sg SUBJ Cl_D like-3pl/*like-3sg the Peter_{D/sg} 'The books start to appeal to Peter'
 b. Tu Petru arxizun/*arxizi na tu aresun/*aresi ta vivlia
 The Peter_D start-3pl/*start-3sg SUBJ Cl_D like-3pl/*like-3sg the books_{N/pl} 'The books start to appeal to Peter'

(iii) Nominative themes can occur as controlled PRO-subjects (18a), dative experiencers cannot (18b), unlike Icelandic. Moreover, it is possible to omit the experiencer (18b), but this yields an arbitrary reading which exclusively characterizes pro-objects (cf. Rizzi 1986):

- (18) a. I Maria theli na tu aresi e tu Janni
 The Mary_{iN} wants SUBJ Cl_D likes e_i (PRO/pro) the John_D
 'Mary wants to appeal to John'
 b. I Maria_i theli na aresi i Katerina e_{arb}
 The Mary_{iN} wants SUBJ likes the Katerina e_{arb/D}
 'Mary wants that Katerina appeals to people'

It thus seems clear that the nominative argument passes a number of subjecthood tests which the experiencer fails to pass. We conclude that the non-nominative argument is comparable to the German datives in (19):

- (19) Mir ist kalt
 Me_D is cold
 'I am freezing'

Although structures like (19) are similar to Icelandic quirky constructions, the datives do not qualify as subjects (cf. Zaenen, Maling and Thráinsson 1985).

(b) Massey (1991) has proposed for Albanian that experiencer-object predicates involve A'-scrambling of the nominative over the dative. This approach is compatible with the proposal put forward in Barbosa (1994) and Alexiadou & Anagnostopoulou (1995) that VSO is the basic order in Null Subject Languages like Greek, while SVO surface orders involve Clitic Left Dislocation (CLLD) with a resumptive pro-subject. CLLD is a construction that has many properties in common with scrambling, as Mahajan (1991) and others have shown. Most notably, the dislocated phrase has a mixed status, having A-properties according

to some criteria and A'-properties according to other. If it can be shown independently that in (13), repeated below as (20a), the nominative has an A'-status and it reconstructs to a position lower than the experiencer, then (13/20a) is not a problem for BT. For this purpose, we will test the status of the Nominative with respect to WCO-effects. The predictions are the following: (i) If the nominative occupies an A position, then it will not yield WCO-effects as in the well-formed English example "*Every woman seems to her son to t be intelligent*" (ii) If the nominative argument occupies an A'-position, and it reconstructs to a position *lower* than the experiencer, then WCO-effects will arise; in such a case, the nominative anaphor can be assumed to fall under BT-Principle A. (iii) If the nominative argument occupies an A'-position and it reconstructs to a position *higher* than the experiencer, then WCO-effects will not arise; in this case the nominative anaphor is predicted to be excluded by Principle A. The sentences in (20) show that predictions (ii) and (iii) are both borne out:

- (20) a. O eaftos tu tu aresi tu Petru/aresi ston Petro
 The self his_N Cl_D appeals the Peter_D/appeals to-the Peter_{PP}
 'Himself appeals to Peter'
- b. ?*Kathe gineka tu aresi tu antra tis
 Every woman_N Cl_D appeals the husband her_D
 "Every woman appeals to her husband"
- c. Kathe gineka aresi ston antra tis
 Every woman_N appeals to-the husband her_{PP}
 'Every woman appeals to her husband'

Examples (20b) and (20c) illustrate a very interesting split depending on whether the experiencer is a bare dative (20b) or a prepositional dative (20c).² WCO arises only in the former case, not in the latter. We believe that these data are conclusive: they show that the licensing of the nominative anaphor *o eaftos mu* cannot be reduced to BT Principle A. More specifically, even if the ill-formedness of (20b) is taken to indicate that the preverbal nominative has an A'-status, to account for the contrast between (20b) and (20c) we must assume that the nominative is interpreted in a position *lower* than the experiencer NP but *higher* than the experiencer PP at the stage where binding applies. In other words, we are

²Datives in Greek usually show an alternation: they can either be PPs or bare doubled NPs with morphological genitive case. There are reasons to propose that this alternation can be accounted for in terms of a 'dative shift' transformation, but this issue is beyond the scope of the present paper.

led to postulate the order DATIVE>NOMINATIVE>PP.³ Crucially, however, the nominative anaphor *o eaftos mu* is licensed irrespectively of the NP/PP status of the experiencer, as shown in (20a).

5. An Analysis

In section 3, we formulated a descriptive generalization capturing the distribution of NAs across languages and within a language, which is repeated here:

- (11) a. If a language has a NA, the anaphor will be 'non-pronominal'. i.e. its form (structure, properties) is relevant.
 b. If a language has a NA, the unaccusative-unergative/transitive distinction is relevant.

In this section, we will demonstrate that a principled explanation for (11) can be given within Reinhart and Reuland's (R&R 1993) 'Reflexivity'. We will argue that NAs can only be [+SELF,+R] elements which are able to escape Chain Formation due to their internal structure; this will account for (11a). We will furthermore propose that Abstract Noun-Incorporation(NI) is an alternative device made available by the Computational System for the satisfaction of Binding; (11b) will follow from general restrictions on NI.

5.1. Nominative Anaphors in Reflexivity

In 'Reflexivity' NAs are, in principle, permitted to exist. In this framework, the distribution of anaphors is regulated by the binding conditions, as they are formulated in (21). Conditions (21a,b) are not about the distribution of anaphors vs. pronominals but about reflexive predicates. The definitions of reflexive and reflexive-marked are given in (22):

- (21) a. A reflexive-marked syntactic predicate is reflexive
 b. A reflexive semantic predicate is reflexive-marked

³In double-object constructions, the NP/PP asymmetry w.r.t. WCO shows up in a strikingly similar form:

- (i) a. O Kostas sistise kathe gineka ston antra tis
 The Kostas(N) introduced every woman(A) to-the husband her(PP)
 "Kostas introduced every woman to her husband"
 b. ?*O Kostas tu-sistise kathe gineka tu antra tis
 The Kostas(N) Cl(D)-introduced every woman(A) the husband her(D)

These facts are identical to the experiencer facts showing that the dative is higher than the PP (DATIVE>ACCUSATIVE/THEME>PP).

- (22) a. A predicate is reflexive iff two of its arguments are coindexed
 b. A predicate (of P) is reflexive-marked iff either (i) P is lexically reflexive or (ii) one of P's arguments is a SELF-anaphor

Crucially, the binding conditions do not say anything about the configurational effects of BT. The configurational effects of BT are due to the movement module (i.e. chain formation), which interacts with the reflexivity conditions. In R&R's view, every lexical element, overt or empty, is subject to A-chain formation under the conditions set out in (23).

- (23) a. *Condition on A-chains:* A maximal A-chain ($\alpha_1, \dots, \alpha_n$) contains exactly one link - α_1 - which is +R.
 b. An NP is +R iff it carries full specification for phi-features and structural Case.

NAs are excluded by the Chain Condition (23a) under the assumption that anaphors are typically -R. To illustrate this, consider the examples in (24):

- (24) a. Jan haat zichzelf
 'John hates himself
 b. *Zichzelf haat Jan
 'Himself hates John'

In (24) the predicates are both reflexive and reflexive-marked satisfying (21a,b). The ungrammaticality of (24b) is due to a violation of the Condition on A-chains: in (24b) the head of the chain is -R since the Dutch anaphor *zich* is not fully specified for phi-features.

Given this system, if an anaphor is able to escape (23b) it will be predicted to be +R. We claim that this is the case in Greek. *O eaftos tu* crucially differs from *zichzelf* in that it is headed by a noun (*eaftos*) which acts as a SELF-element while, at the same time, it is fully specified for phi-features ([masc],[3-pers],[inflected for [numb/case]], thus having the structure of an inalienable possession NP (10). In terms of indexing, this translates as follows (cf. Iatridou 1988):

- (25) a. [O eaftos, tu]_i tu aresi [tu Petru]_i
 b. [zich_i zelf]_i bevalt Jan_i

Chain formation in (25b) will result in a violation of (23b) since the chain is headed by the -R element *zich*. No such violation arises in (23a) because the two co-indexed elements *tu* and *tu Petru* do not form an A-chain. This accounts for the difference between languages like Dutch and languages like Greek, i.e. for generalization (11a).

Note, however, that the predicate in (25a) is reflexive-marked but not reflexive. A predicate is reflexive if two of its arguments are co-indexed, and this is not the case in (25a). As it stands, (25a) does not violate the condition on chain formation but it does violate condition A. This suggests that an additional step is needed, in order to make *o eaftos tu* conform with condition A: the possessor *tu* and the object *tu Petru* must become co-arguments.

5.2. [+R] SELF-anaphors and Noun Incorporation

R&R (1993) do not acknowledge the existence of [+SELF,+R] anaphors. They assume that NPs are partitioned into *three* classes according to the properties [\pm SELF], [\pm R]. The proposed typology is given in (26):

(26)	SELF	SE	Pronoun/R- expression
Reflexivizing function	+	-	-
R(eferential independence)	-	-	+

The reason why the [+SELF,+R] combination is missing is theory-internal. More specifically, in Reflexivity, the effect of [\pm SELF] marking is regulated by the Binding Conditions, while [\pm R] specification is relevant to chain formation. From the interaction of these two modules it follows that [+SELF,+R] anaphoric expressions cannot exist. A predicate taking a [+SELF] argument is reflexive-marked, and, therefore, it must be reflexive, i.e. two of its arguments must be coindexed. This, however, will inevitably lead to chain formation since the domain of coindexation is local. The [+R] property of the foot of the chain, on the other hand, will cause a violation of the Condition on Chain Formation. Thus, we will end up with a contradiction. This implies that the non-existence of [+SELF,+R]-elements could be taken to follow as a *theorem* from R&R's system, since specification of an expression as [+SELF] does not, in itself, guarantee that it will qualify as [-R], and vice versa. Nevertheless, we would like to explore an alternative possibility, namely that [+SELF,+R] anaphors exist, but they undergo NI instead of Chain Formation.

In R&R (1991) a SELF-element is viewed as an operator applying to the verb and identifying two of its arguments. They derive this by adjoining SELF to V at LF. In the spirit of this analysis we will assume that SELF-elements are subject to covert NI. This movement is triggered by the semantic defectiveness of the noun (cf. Anagnostopoulou&Everaert 1995). As a result of this incorporation the possessive is promoted, i.e. it becomes an argument of the verb:

- (27) a. [O Jannis]_i agapai [ton eafto_i tu_i]_x
 'John loves himself'
 b. [O Jannis]_i eafto_j-agapai [ton t_j tu_i]_i

As discussed in Fox (1993), evidence from NI-languages (Baker 1988) justifies such an analysis. Overt NI may strand determiners/possessors and in such cases, there is evidence that the possessor becomes an argument of the predicate. In Mohawk, NI with possessor stranding triggers agreement between the verb and the possessor (Baker 1988). The examples in (28) are particularly interesting because they show that coreference between the subject and the possessor is only allowed in the case of overt noun incorporation and simultaneous overt reflexive marking (28c), or without NI (28a); NI without reflexive marking leads to ungrammaticality (28b):

- (28) a. Iʔi k-ohres ne iʔi wak-**nuhs**-a?
I 1sS/3nO-wash DET I 1s-**house**-SUF
'I washed my house'
- b. *Iʔi k-**nuhs**-ohres ne [iʔi t] ?
I 1sS/3nO-**house**-wash DET I
'I washed my house'
- c. Iʔi k-**atat-nuhs**-ohres
I 1sS-REFL-house-wash
'I washed my own house'

A direct consequence of the analysis proposed in (27) is that we correctly predict the unergative/ transitive-unaccusative restriction on NAs (generalization 11b) as instantiated in (6,7). Overt NI is restricted to subjects of unaccusative verbs (Baker 1988), as the examples from Southern Tiwa show.

- (29) a. We-**fan-lur-mi**
C/NEG-**snow-fall**-PRES/NEG
'Snow isn't falling'
- b. *Ø**khwien**-teurawe-we
A-**dog**-run pres
'The dog is running'

It is therefore expected that covert NI will be likewise restricted.

- (30) a. *[O eaftos, tu,] ton antipathi [ton Janni],
b. *[O t, tu,] ton eaftos-antipathi [ton Janni],

5.3. Restricted Possessives, External Possessor constructions

Our analysis of the Greek anaphor *o eaftos tu* straightforwardly extends to restricted possessives (Helke 1979, Ingria 1982) as in (31), which are structurally parallel to *o eaftos tu* in that they occur with an obligatory possessive pronoun which must have an antecedent:

- (31) a. John bumped his head
 b. *John bumped her head
 c. John lost his way
 d. *John lost her way

In these cases as well, noun-incorporation is triggered by the semantic defectiveness of the noun. The (un)grammaticality of the examples suggests that in these cases, the predicate becomes reflexive-marked as a result of the incorporation process itself. Under this analysis, restricted possessives must be viewed as instances of *inherently reflexive predicates*, i.e. predicates which are marked in the lexicon as reflexive. This expresses correctly a major characteristic property of restricted possessives as opposed to reflexive anaphors, namely that the distribution of the former is *lexically governed*:

- (32) a. John *lost* his/*Bill's/*her *mind*
 b. Freud carefully probed his/man's/her *mind*
 (33) a. Jerry *expressed* his/*Dick's/*her *support* for the measure
 b. Ed appreciates his/Ann's/her *support*

As shown in (32) and (33), each noun which occurs as the head of a restricted possessive occurs in this usage only in the context of *a certain designated verb*, a context external to the noun phrase.

External possessor inalienable possession (IP) constructions in Romance (cf. 34) are similar to restricted possessives in English in that there are severe lexical restrictions on the verbs which permit their *subjects* to be interpreted as the possessors of the IP-phrases in object position (cf. Vergnaud and Zubizarreta 1992). It is therefore justified to propose that they form a natural class with restricted possessives and to analyse them in terms of NI (cf. Delfitto and D'Hulst 1995):

- (34) a. Jean leve la main
 b. Jean_i raises [_i HAND]

Interestingly enough, external possessor IPs are licensed in subject position of unaccusative verbs (cf. Vergnaud and Zubizarreta 1992:620):

- (35) La tete lui tourne
 the head to him spins
 'His head spins'

This provides further evidence in favor of our proposal to derive generalization (11b) from general restrictions on NI, as opposed to Chain Formation.

6. Nominative Anaphors as a Morphological Problem

Before concluding, we would like to point out that within the class of [-SELF,-R] anaphors, there is also a bifurcation between languages that permit nominative anaphors and languages which never do. More specifically, the Icelandic *sig* is not licensed as a nominative object in quirky subject constructions while it is licensed as an accusative or dative object (cf. Everaert 1992, Taraldsen 1994). Note that oblique subjects are licit antecedents for *sig*, as the grammaticality of (36c) shows:

- (36) a. *Maríu fannst sig vera gáfuð
 Mary_D thought-3sg sig_N be gifted_N
 'Mary thought she was gifted'
- b. María taldi sig vera gáfaða
 Mary_N believed-3sg sig_A be gifted_A
 'Mary believed herself to be gifted'
- c. Mariu fannst sér fara aftur i norsku
 Mary_D thought-3sg sig_D go backward in Norwegian
 'Mary thought her Norwegian was getting worse'

The fact that (36a) is ruled out cannot be due to a violation of the Chain condition: the tail of the chain is appropriately marked [-R] and, moreover, (36a), (36b) and (36c) are structurally identical. Hence, the ungrammaticality of (36a) must be either a Case problem, as Everaert (1990) and Taraldsen (1994) suggest, or an Agreement problem. We believe that the Chinese facts in (2) repeated below support the second option (cf. also Kitagawa 1986 for Japanese):

- (37) Zhangsan yiwei [Lisi zhidao [ziji mei kaoguo]]
 Zhangsan_i thought Lisi_j knows self_{i,j} not pass
 'Zhangsan thought that Lisi knows that self does not pass the examination'

The contrast between Icelandic and Chinese/Japanese seems to point towards a generalization according to which, [-R] *nominative anaphors can be licensed only in languages which have no predicative inflection for person, number (and gender)*. We would like to propose that this generalization can be subsumed under a broader implicational generalization recently discussed in Huybregts (1996): *If a language L has verbal inflection for person, number, gender, then L has nominal inflection for person, number gender*. Huybregts develops an account for this in terms of Chomsky's (1995) proposal, that there is an asymmetry in the interpretability of Agr-features of N vs. V. The Agr-features of V are [-interpretable] and must be checked against the [+interpretable] Agr-features of N in order to be eliminated. If N doesn't have Agr-features, the Agr-features of V remain unchecked, and the derivation crashes. Chinese-type languages, on the other hand, have no verbal inflection for person, number, gender, and for this

reason, the presence of Agr-features on the NPs is not necessary. Extending this analysis to anaphoric expressions, we propose that for the same reason, [-R] anaphoric expressions can be licensed in [Spec,IP] only in languages like Chinese with no verbal inflection for phi-features. In languages like Icelandic, [-R] anaphors cannot check the [-interpretable] features of V/A because they are defective for phi-features, and the derivation crashes. This line of analysis makes the prediction that [-R] anaphors will not be licensed in [Spec,AgrOP] in languages with object-verbal inflection. At this point, we don't know whether this prediction is borne out.

7. Conclusion

In this paper, we have looked at the distribution of NAs in Greek in comparison to Germanic and Romance languages. We have shown that standard BT fails to accommodate the phenomena under discussion. We have investigated the distribution and the structural properties of the local anaphor *o eaftos tu*, and we have argued that it qualifies as a [+SELF,+R] element according to the properties of anaphoric expressions proposed by R&R (1993). We proposed that [+SELF,+R] anaphors satisfy Binding not by *Chain Formation* but by *Abstract Incorporation*, and we linked the availability of NAs to the latter mechanism. We extended our analysis to *restricted possessives* in English and *external possessor IP constructions* in French pointing out that the latter can occur as subjects of unaccusative predicates similarly to *o eaftos tu*. Finally, we considered the distribution of [-SELF,-R] nominative anaphors and we suggested an account within Chomsky's (1995) system.

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The Imperfectivity-Genericity Correlation

Rajesh Bhatt
 University of Pennsylvania
 bhatt@linc.cis.upenn.edu

1 Introduction

In this paper, I address the following question: what is it about imperfective aspect that in many languages it is ambiguous between a generic/habitual interpretation and a progressive interpretation? Is it the case that the progressive interpretation and the generic/habitual interpretation are specific instantiations of a more general imperfective interpretation in the relevant languages? I answer the first part of this question in the negative and the second part in the positive. Imperfective aspect *per se* does not license genericity. The crucial factor that regulates the availability of generic interpretations is compatibility with stativity. Genericity is permitted only in environments which permit stative readings. A good example is the English progressive which is incompatible with statives and also lacks a generic reading. The Imperfectivity-Genericity correlation is really a genericity-stativity correlation. Generic interpretation in imperfectives arises in a manner similar to the generic reading of the simple past tense in English and the generic and non-generic readings are also similarly connected by the application/ non-application of the genericity operator. Thus the progressive interpretation and the generic reading are specific instantiations of a more general imperfective interpretation.

In the first section, I define the terms *imperfective* and *perfective* as used in the literature on aspect. In section two, I lay out the patterns of interpretation associated with certain aspectual/morphological markings in Bulgarian, English, Hindi, Marathi and Modern Greek. In section three, I present my proposal. Since my proposal uses Carlson (1977)'s treatment of bare plurals as a point of departure, I provide a brief summary of that system. In section four, I apply my proposal to the cases discussed in section two and discuss some problems raised by the imperfective paradox. In section five, I propose a condition that restricts the availability of generic interpretations. Finally, in section six, I discuss the case of unambiguous habituais in Hindi and provide some historical perspective.

2 Imperfectives and Perfectives

Many languages morphologically mark viewpoint aspect¹ on the verb. There is often an imperfective versus perfective opposition on the verb. Thus every verb is either morphologically perfective or imperfective. This is seen most clearly in

languages such as Russian where even infinitival verbs are marked for the perfective/imperfective opposition.

This morphological opposition has a semantic opposition associated with it. Smith (1992) distinguishes three different kinds of viewpoint aspects based on the amount of the situation they make visible. *Perfective* viewpoints include both endpoints of a situation; *Imperfective* viewpoints focus on stages that are neither initial nor final, excluding endpoints; and *Neutral* viewpoints² include the initial point and at least one stage of a situation.

In English, the imperfective viewpoint is marked by the progressive *-ing* suffix. An example of the imperfective viewpoint can be seen in (1). It presents part of a situation with no information about its endpoints. It does not present *closed* situations although it allows inferences about beginnings and endings. (Smith (1992))

- (1) a. Mary was walking to school, (but she didn't actually get there).
 b. Mary was walking to school, (and she's still walking).
 c. Mary was walking to school, (and now she is there).

As the examples in (1) show, the imperfective viewpoint is compatible with the event not reaching its natural ending point, still continuing or actually reaching its natural ending point.

The perfective viewpoint aspect presents the situation as a single whole, as a point. The span of the perfective includes the initial and final endpoints of the situation. This makes inferences involving the endpoint of the situation either paradoxical as in ((2)a and b) or redundant as in (2c).

- (2) a. Mary walked to school, (# but she didn't actually get there).
 b. Mary walked to school, (#and she's still walking).
 c. Mary walked to school, (# and now she is there).

Imperfectives come in at least two varieties: general imperfectives and progressives. General imperfectives can apply to all situation types and are found in French, Russian, Bulgarian, Greek, Marathi, Gujarati etc. The French *Imparfait* in (3) is an example of the general imperfective.

- (3) La mer était calme
 the sea be.pst.impfv calm
 'The sea was calm (today).'
 'The sea used to be calm.'

As the two readings of (3) show, the general imperfective³ is ambiguous between a generic and a non-generic reading. In the case of non-statives, this contrast is sharper. The non-generic reading presents the event as being in progress while the generic reading presents the event as recurring. This can be seen in the Bulgarian example in (4).

- (4) Ivan jadeše jabálki
 Ivan ate-impfv apples
 'Ivan was eating apples.'
 'Ivan used to eat apples.'

Progressives apply only to non-stative situations.⁴ They are found in Chinese, English, Hindi, Navajo etc. An example of the English progressive can be seen in (5a). (5b) shows the incompatibility of the progressive with statives.

- (5) a. Bill was going home.
 b. * Bill was knowing the answer.

Progressive aspect is often marked periphrastically as in the English progressive which is marked by the auxiliary *be* and the suffix *-ing*. Another example of a periphrastically marked progressive is the Hindi progressive in (6) which is marked by the auxiliary *rah* which is homophonous with the verb 'to stay/live'.

- (6) a. Ram phal khaa rah-aa hai
 Ram.M fruit eat PROG-Pfv be.PRS.M
 'Ram is eating fruit.'
 b. # Ram angrezi jaan rah-aa hai
 Ram English know PROG-Pfv be.PRS.M
 '*Ram is knowing English/Ram is getting-to-know English.'

3 Aspectual patterns in some languages

In this section, I present the variation in the availability of certain kinds of interpretation (such as generic, past event, state holding, progressive etc.) in the presence of a particular aspect/verbal morphology (such as simple tenses in English, perfective morphology and imperfective morphology).

In Table (1), the relevant patterns for English are shown. Since English does not have a morphological perfective/imperfective opposition, I use the progressive/simple tense distinction. There is no tense based restriction on the availability of a certain morphological form. As noted earlier, the progressive is incompatible with states and only has an event-in-progress reading. The simple tenses are compatible with states. The simple past is ambiguous between a generic and a non-generic reading. The simple present, however, only produces generic readings with non-statives.⁵

Table (2) shows the distribution of interpretation with aspectual morphology for Bulgarian and Modern Greek. The perfective/imperfective opposition is available only in the past tense in these languages.⁶ However since the present tense form shares its interpretations with the past imperfective, it has been listed under imperfective. The imperfective is systematically ambiguous between a generic and a

	PROG	SIMPLE
PAST.event	Event In Progress	CompletedEvent, Generic
PAST.state	*	State Holds, Generic
PRS.event	Event In Progress	Generic
PRS.state	*	State Holds, Generic

Table 1: English

non-generic progressive like reading. The perfective produces a completed event reading with events and a reading that I call *Change Of State* with statives.

	IMPERFECTIVE	PERFECTIVE
PAST.event	Event In Progress, Generic	Completed Event
PAST.state	State Holds, Generic	Change Of State
PRS.event	Event In Progress, Generic	<i>Not Available</i>
PRS.state	State Holds, Generic	<i>Not Available</i>

Table 2: Bulgarian, Modern Greek

The table for Marathi (Table (3)) shows a pattern very similar to that of Bulgarian and Modern Greek. The only difference is that perfective aspect is not restricted to the past tense. The present perfective is similar to the present perfect in English and the past perfective is similar to the past perfect in English.⁷

	IMPERFECTIVE	PERFECTIVE
PAST.event	Event In Progress, Generic	Completed Event
PAST.state	State Holds, Generic	Change Of State
PRS.event	Event In Progress, Generic	Completed Event
PRS.state	State Holds, Generic	Change Of State

Table 3: Marathi

As opposed to Bulgarian, Marathi and Modern Greek, which have an imperfective/perfective opposition morphologically, Hindi has a perfective/habitual opposition on the verb stem (Cf. table (4)). It also has a periphrastic progressive which is formed by a progressive auxiliary *rah* which is in the perfective aspect (Cf. (6)).

	HABITUAL	PERFECTIVE	PROG
PAST.event	Generic	Completed Event	Event In Progress
PAST.state	Generic	Change Of State	Change Of State
PRS.event	Generic	Completed Event	Event In Progress
PRS.state	Generic	Change Of State	Change Of State

Table 4: Hindi

4 Proposal

I observe that the ambiguity in the imperfective (in Bulgarian, Marathi and Modern Greek) is similar to the ambiguity of the simple past tense in English. Carlson (1977)'s treatment of bare plurals provides an elegant treatment of the ambiguity of the simple past tense. In his system, the two readings emerge from the application/non-application of the *G* (Generic) operator. I extend Carlson (1977)'s analysis to account for the ambiguity of the imperfective in the relevant languages - the two readings arise by application/non-application of the *G* operator.

The past imperfective sentence in (7), from Modern Greek, is ambiguous between a habitual/generic reading and a non-generic reading in which the event of John eating a banana was ongoing at some past time. The generic reading ascribes an intensional property to John while the non-generic reading is extensional. Thus for the generic reading to be true, it is not necessary for John to have eaten a banana regularly at some specific time. For the progressive reading to be true, however, John has to be in the process of eating a banana at some point in the past.

- (7) O Yanis etroge mia banana
 Det John eat-impfv-pst a banana
 'John ate a banana (habitually).'
 'John was eating a banana.'

The ambiguity of (8a)⁸ which can be interpreted as either (8b) or (8c) is very similar to that of (7). The generic reading in (8b) like the generic reading of (7) is intensional - it permits exceptions, and is predicated of the kind 'boy' and not of specific boys. The reading in (8c) is not predicated of a kind and refers to 'some boys' where 'some' is interpreted as the weak quantifier 'sm'.

- (8) a. Boys smoked.
 b. (In those days) Boys used to smoke.
 c. Some boy smoked (in the yard yesterday).

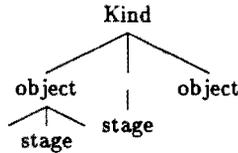
Since there are striking parallels between the ambiguity of the general imperfective and the English simple past tense, I propose that a similar formal device should

be used to capture both these cases. The two readings of (8a) are accounted for by Carlson (1977, 1980) by relating them to the presence (8b) or absence (8c) of a genericity operator. However, his account cannot be applied directly to the general imperfective. In the next section, I provide a brief description of Carlson (1977, 1980)'s system and then describe my amendments.

4.1 Carlson (1977, 1980)'s treatment of genericity

The universe of Carlson's system consists of objects, stages, and kinds. Individuals can be differentiated into kinds and objects. Objects are realized by stages while kinds could be realized either by stages or objects.⁹ The organisation of the elements in this universe can be seen in (9).

(9)



Bare plurals are treated as names of kinds and not as the plural of the corresponding NP/DP with the indefinite determiner. Consequently, the representation of *John* and *Dogs* is similar.

The subject is always the property set of some individual and never of a stage. Intransitive verbs are of type *IV* and take stages as arguments. To combine with the property set of some individual (the subject) as an argument, intransitive verbs which are of type *IV* have to be type-raised to *IV'* which takes the property set of some individual as an argument.

This type-raising can take place by application of a G(eneric) operator or by a *default* type-raising rule. Both these rules are restricted to apply only to verbal *IV*'s.

4.1.1 Some of the Rules

The rule in (10) introduces the *G* operator. The *G* operator applies on the type *IV* and yields the type *IV'*.

- (10) a. S21: If $\alpha \in P_{IV}$ and α is of the form $[[\beta]_v (\gamma)]$ then $F_{1g}(\alpha) = [\alpha]_{IV'}$
 b. T21: If α translates as α' and $\alpha \in P_{IV}$ then $F_{1g}(\alpha)$ translates as $G(\alpha')$

If the *G* operator does not apply to the VP, we still need to do default type raising to make the predicate compatible with the subject. This rule is given in (11).

- (11) a. S23: If $\alpha \in P_{IV}$ and α is of the form $[[\beta]_V(\gamma)]$ then $F_{21}(\alpha) = [\alpha]_{IV}$
 b. T23: If α translates as α' and $\alpha \in P_{IV}$ then $F_{21}(\alpha)$ translates as $\lambda x^i \exists z^s [R(z, x) \text{ and } \alpha'(z)]$

4.1.2 Two sample derivations

In this section, I show how the two readings of (8a), repeated here as (12), are derived.

- (12) Boys smoked.

Let us first consider the generic intensional reading. The derivation for this reading is given in (13).

- (13) a. $[[\text{smoke}'_V]]_{IV}$
 b. $G(\text{smoke}')$; T21
 c. $\lambda X. \downarrow X(b) (G(\text{smoke}'))$
 d. $G(\text{smoke}')(b)$

In the above derivation, the G operator applies to the verb phrase raising its type so that it can combine with the subject. The derivation for the existential event reading is given in (14).

- (14) a. $[[\text{smoke}'_V]]_{IV}$
 b. $\lambda x^i \exists z^s [R(z, x) \text{ and } \text{smoke}'(z)]$; T23
 c. $\lambda X. \downarrow X(b) \lambda x^i \exists z^s [R(z, x) \text{ and } \text{smoke}'(z)]$
 d. $\exists z^s [R(z, b) \text{ and } \text{smoke}'(z)]$

In this derivation, default type raising has to apply to the verb phrase to enable it to combine with the subject. The default-type raising rule contains a realization predicate R which is a relation between an individual and a stage of that individual. The verb phrase which is stage-level combines with a stage that realizes the subject and not the subject itself, thus avoiding a type mismatch. This gives us the existential reading of the bare plural.

4.1.3 Carlson (1980)'s analysis of the progressive

The rule in (15) is used to introduce *-ing*.

- (15) a. S11: If $\alpha \in P_{IV/IV}$ and $\beta \in P_{IV}$ β is of the form $[[\delta]_V(\gamma)]$ then $F_{10}(\alpha, \beta) = [[[\delta]_V \alpha]_{Adj}(\gamma)]_{IV}$

- b. T11: If β translates as β' and α as $Prog'$ then $F_{10}(\alpha, \beta)$ translates as $Prog'(\beta')$

The suffix *-ing* is taken to be of type IV/IV . The result of its application by semantic translation rule T11 does not change the semantic type but it does change the syntactic type as a result of the syntactic composition rule S11. It changes the syntactic type of the progressive participle from a verb to an adjective while the semantic type of the entire VP stays unchanged at IV .

The rule for introduction of be_2 is given in (16).

- (16) a. S13: If $\alpha \in P_{IV'/IV}$ and $\beta \in P_{IV}$ and β is not of the form $[[\delta]_V(\gamma)]$ then $F_{12}(\alpha, \beta) = [\alpha\beta]_{IV'}$
 b. T13: If α translates as α' and β as β' then $F_{12}(\alpha, \beta)$ translates as $\alpha'(\beta')$

The ' β is not of the form $[[\delta]_V(\gamma)]$ ' part of S13 restricts its application to progressive participles (or in general anything of type IV that is not headed by a verb).

The translation of be_2 is given in (17),

- (17) be_2 translates as $\lambda Q \lambda x^i \exists z^s [R(z, x) \text{ and } \downarrow Q(z)]$

For illustration, I will now derive the LF of a sentence like 'Boys were smoking':

- (18) a. $[[smoke'_V]]_{IV}$
 b. $[[[smoke'_V] - ing]_{Ad}]_{IV}, Prog'(smoke')$; T11
 c. $[be[[[smoke'_V] - ing]_{Ad}]_{IV}]_{IV'}, \lambda Q \lambda x^i \exists z^s [R(z, x) \text{ and } \downarrow Q(z)] (Prog'(smoke'))$; T13
 d. $\lambda x^i \exists z^s [R(z, x) \text{ and } Prog'(smoke')(z)]$; λ -conversion
 e. $\lambda X. \downarrow X(b) (\lambda x^i \exists z^s [R(z, x) \text{ and } Prog'(smoke')(z)])$
 f. $\exists z^s [R(z, b) \text{ and } Prog'(smoke')(z)]$; λ -conversion

Rule 11 given in (15) is crucial to this system since by converting the verb into an adjective, it blocks the application of the Generic Rule 21 (in (10)) and the default type raising rule 23 (in (11)). This is because both rule 21 and 23 contain the following clause: ' α is of the form $[[\beta]_V(\gamma)]$ '. The progressive participle is adjectival and hence Rules 21 and 23 cannot apply. Thus the fact that the progressive does not permit a generic reading is captured.

Changing the type of the progressive participle to an adjective is necessary to block a generic reading. In English, this is motivated since progressive participles can function as adjectives.¹⁰ However, this treatment of the progressive does not generalize to other languages failing for different reasons in different languages. Consider Hindi which has a periphrastic progressive which is likewise unambiguous having only the event-in-progress reading. However the progressive involves the use

of a progressive auxiliary without any morphology on the verb. This can be seen in (6).¹¹ It is possible to postulate a zero derivation which would convert the verb into an adjective. However this would be problematic since neither bare verbs nor bare verb - progressive auxiliary combination can function as adjectives in Hindi.

On the other hand, this treatment is also unable to account for the ambiguity of the Bulgarian, Kashmiri, MG and Marathi imperfective. Using Carlson (1977, 1980)'s system unaltered would exclude the generic reading. Keeping these factors in mind, I propose a modification which handles these problems.

5 Ambiguous Imperfectives

The general imperfective is ambiguous between an event-in-progress/ state-holding interpretation and a generic interpretation. This can be seen in (7), repeated here as (19).

- (19) O Yanis etroge mia banana
 Det John eat-impfv-pst a banana
 'John ate a banana (habitually).'
 'John was eating a banana.'

As discussed in the previous section, treating the imperfective morphology as similar to the *-ing* in English produces the wrong results as it blocks the generic reading by application of the rule in (10). Also as discussed in the previous section, the motivations for syntactic typeshifting the progressive participle to an adjective do not carry over to languages other than English. The rule in (20) introduces the progressive interpretation but does not result in a syntactic category change.

- (20) a. GS1: If $\alpha \in P_{IV/IV}$ and $\beta \in P_{IV}$ and β is of the form $[[\delta]_V(\gamma)]$ then $F_{10}(\alpha, \beta) = [[[\delta]_V \alpha]_V(\gamma)]_{IV}$
 b. GT1: If β translates as β' and α as *Impfv'* then $F_{10}(\alpha, \beta)$ translates as *Impfv'(\beta')*

Since this rule does not convert the verb into an adjective, the rule in (10) and (11) can now apply. (21) and (22) are the LFs obtained for the generic and progressive readings respectively of (19).

- (21) $G(\text{Impfv}'(\text{eat} - a - \text{banana}'))(j)$
 (22) $\exists z^*[R(z, j) \text{ and } \text{Impfv}'(\text{eat} - a - \text{banana}')(z)]$

The rule introducing be_2 (given in (16)) is not employed in deriving either of the readings of (19). This is relevant since French, Bulgarian and Modern Greek do not use a *be* as part of the imperfective. The facts from the South Asian languages which

have a general imperfective are somewhat different. The imperfective obligatorily needs a tense auxiliary. In these languages only *be* can act as a tense auxiliary. Still, it is not clear whether the *be* is required for semantic type-shifting reasons as the be_2 in English, for tense-marking reasons or for syntactic reasons of nominative case assignment.

5.1 Interpretation of the habitual/generic reading

We get the fact that the progressive reading is also the existential reading. This fact is reflected in the LF of the progressive interpretation of (19) given in (22). The existential reading can be brought out more clearly by considering the following example which uses bare plurals. Since Modern Greek does not have bare plurals in subject position, I use an example from Marathi in (23).

- (23) *mulge shaaret jaat hote (Marathi)*
boys school go-impfv be-impfv-pst
 ‘Boys used to go to school. (generic, intensional)OR’
 ‘(Some) Boys were going to school. (progressive, existential)’

In the generic reading, the subject is taken to refer to the kind ‘boy’ while in the progressive reading the subject refers to some boys. The interpretation of the subject as the kind ‘boy’ is distinctly missing under the progressive reading. Thus connecting genericity and imperfectivity in this manner enables us to use Carlson (1977)’s treatment of bare plurals without change. The similarity between the ambiguity of the simple past and the imperfective is also captured by this extension of Carlson’s analysis. The two readings: progressive and generic for imperfectives and existential event and generic for the simple past differ only in the non-application vs. application of the *G* operator.

5.2 A potential problem: the imperfective paradox

The account presented so far produces the LF in (24) for the generic reading of the sentence ‘John smoke-impfv-pst’ and the LF in (25) for the the generic reading of the English sentence ‘John smokes’.

- (24) $G(\text{Impfv}'(\text{smoke}'))(j)$
 (25) $G(\text{smoke}')(j)$

These two LFs look quite different but because *smoke* is atelic, the relationship in (26) holds.

- (26) $\text{Impfv}(\phi) \Rightarrow \phi$

Hence (24) entails (25). The reverse entailment also holds - if John smoked in the past, it follows that John was smoking at some point in the past. As a result (24) and (25) have the same truth conditions.

The entailment in (26) does not hold for telic predicates. So if Andrew was drawing a circle it does not follow that he actually drew a circle. This non-entailment was first noticed by Dowty (1977) who named it 'The Imperfective Paradox' and ever since it has been a topic of much work in the semantics literature. Consequently in the case of a telic predicate as in (27) the generic reading of the imperfective sentence is not truth-conditionally equivalent to the generic reading of the corresponding English sentence in the simple past.

- (27) mulge rasta olandit hote (Marathi)
 boys road cross-impfv be-impfv-pst
 'Boys used to cross/be-crossing the road. OR'
 '(Some) Boys were going to school.'

This can be seen in (28) which is the LF of the generic reading of (27) and (29b) which is the LF of (29a).

- (28) $G(\text{Impfv}'(\text{cross} - \text{the} - \text{road}'))(b)$
 (29) a. Boys crossed the road.
 b. $(G(\text{cross} - \text{the} - \text{road}'))(b)$

To see the non-equivalence between (28) and (29b) consider a world where boys start to cross the road each morning, never actually crossing it. A straightforward interpretation of the interaction of G and Impfv would predict that in the world described above (28) would be true while (29b) would be false. The proposition $\text{Impfv}'(\text{cross} - \text{the} - \text{road}')(b)$ would be true on a sufficiently large number of occasions for the generic version of this proposition (28) to be true.¹²

However, the generic reading of $\text{Impfv}'(\text{cross} - \text{the} - \text{road}')(b)$ has the same truth conditions as the generic reading of the English sentence 'John smoked'. Something is wrong then: either the treatment of the habitual reading of the imperfective assumed here is incorrect or our understanding of the interaction between genericity and imperfectivity (more precisely the G and the Impfv operator) is incomplete. There are reasons to suspect that it is the latter.

White (1994) notes that while the imperfective paradox distinguishes activity expressions (atelic) from accomplishment expressions (telic) in that $\text{Impfv}(\phi)$ does not entail ϕ , this negative judgement no longer holds if the progressive is interpreted iteratively. (White (1994) Pg. 54, fn. 62)

This can be seen with the English progressive in (30).

- (30) a. John was going to school \nrightarrow John went to school.
 b. John was going to school every day last year before he had an accident.
 \rightarrow John went to school every day last year before he had an accident.

Similarly¹³ in (28), the presence of the generic operator is sufficient to get us over the imperfective paradox. This is equivalent to saying that the entailment in (31) holds.

$$(31) G(\text{Impfv}(\phi)) \Rightarrow G(\phi)$$

A formal treatment of the interaction between the Imperfective operator and its behaviour under iteration/the Generic operator however, still remains to be given.

6 The Absence of Genericity

In the preceding sections, I have proposed a mechanism that enables us to derive generic readings of the general imperfective. However, I have not discussed why the G operator cannot apply in the presence of a perfective operator in Bulgarian, MG, Hindi and Marathi. A generic reading is never permitted with the perfective aspect in these languages.

A simple answer can be given to this question by postulating that the Perfective operator is of type IV'/IV unlike the imperfective operator which is of type IV/IV . As a result the G operator which is of type IV'/IV is no longer able to apply. This solution while it works is not insightful - it is not clear why the perfective differs from the imperfective in having a different type. Until the relevant distinctions between the perfective and imperfective in Bulgarian, Greek, Hindi and Marathi are explicated, it will lack explanatory adequacy.

Assuming that the notions *imperfective* and *perfective* are semantic notions (as defined earlier), we would not expect their denotation and hence their properties to vary from language to language. However this is exactly what we seem to observe.

According to the definitions in Section 2, English simple tenses are clearly perfective while the English periphrastic progressive is clearly imperfective. But unlike the Bulgarian, MG or Marathi perfectives which do not permit generic readings, English simple tenses which are definitionally perfective permit generic readings.

On the other hand while Bulgarian, MG and Marathi imperfectives permit generic readings the English periphrastic progressive which is definitionally imperfective does not. This suggests that the factors that are responsible for the presence or absence of genericity are in a sense orthogonal to the perfective/imperfective distinction as defined in Section 2.

6.1 Conditions on the G operator

What seems to stay constant with the tense/aspectual forms that permit genericity is that they are compatible with states. Alternatively stated, G is incompatible with operators which are themselves incompatible with states: two examples of this are: the periphrastic progressive in English and Hindi and the perfective in Bulgarian, Modern Greek and Hindi. Consider the following contrast from Greek:

- (32) a. o Kostas pisteve oti i gi ine epipedhi
 DET Kostas believe-imperf that the earth is flat
 'Kostas believes that the earth is flat.'
- b. O Kostas pistepse oti i gi ine epipedhi
 DET Kostas believe-PERF that the earth is flat
 'Kostas came to believe/ended up believing that the earth is flat.'

The perfective operator and a stative predicate together produce a reading which I call the *change of state* reading. The perfective in general needs a change of state to be felicitously used i.e. an action starts, goes on for some time and finally ends with a change of state taking place.¹⁴

To capture this regularity, I propose the following condition on the application of the G operator:

- (33) The G operator can only apply to predicates that are not themselves incompatible with states.

Taking the above assumption as an axiom of our system, we are able to derive the distribution of genericity across several languages. This axiom differs from standard subcategorization restrictions: the G operator predicates a condition of the complement of its own complement. This seems undesirable but unavoidable right now.

One implication of (33) is that it connects the availability of genericity to compatibility with stativity. In a sense, the fact that in the languages discussed here, the imperfective actually permits a generic reading is a side-effect of its compatibility with statives. From this point of view, the real correlation is a genericity-stativity correlation along with the fact that general imperfectives are compatible with states.

6.2 The English progressive

The English progressive does not have a generic reading. Thus 'John is eating an apple' does not mean that John has the property of eating an apple. The progressive is strictly about the here and now. The property that blocks the generic reading is not its imperfectivity since both the English progressive and the Greek imperfective

are semantically imperfective. The relevant property is its incompatibility with stativity. English progressives are incompatible with states, hence by the condition proposed in the previous section. the G operator cannot apply. Consequently the generic reading is ruled out.

7 Unambiguous Generics

According to my account, the existence of unambiguous generics is not to be expected. Genericity arises by the optional application of the *G* operator - so corresponding to the generic reading of the Greek imperfective, there is the progressive reading and corresponding to the generic reading of the English simple past, there is the single event in the past reading. But unambiguous generics exist. One case, the English simple present, has been mentioned earlier in the paper. Here I focus on another such case - the Hindi habitual aspect marker *-ta* which is not used for the progressive and is only a marker of genericity .

My explanation involves postulation of semantic blocking/bleaching effects - if a language has two forms, one of which exclusively conveys the progressive and another which conveys the progressive and a more general form which is used for both the progressive and the generic, the more specific form ends up being used for the progressive and the more general form ends up being used exclusively for the complement.

Historically the Hindi habitual aspect marker was an imperfective marker. When the language developed a periphrastic progressive, the scope of the imperfective was restricted to the habitual. This could have been due to effects of the kind discussed in the above paragraph.

This account is supported by the fact that there are still some instances in Hindi where the imperfective is used to convey the progressive and the progressive though grammatical is conventionally not used:(from Hook (1979,Pg.40))

- (34) a. mai ab chal-ta hoo
I now go/walk-HAB.m be.PRS.1.sg.m
'I am leaving now'
- b. voh abhi chai laa-ta ho-ga
he now tea bring-HAB be-FUT
'He must be bringing the tea now'

The above examples also have a habitual reading.

There is also some crosslinguistic evidence for this claim: the form corresponding to *-ta*, the habitual marker in Hindi is still ambiguous in several related South Asian languages such as Kashmiri, Gujarati and Marathi. (Peter Hook p.c.)

8 Conclusions

The progressive and the habitual reading of the imperfective in Bulgarian, Greek and Marathi differ only in the (non-)application of the G operator. The ambiguity is similar to the ambiguity of the English simple past tense. It is not imperfectivity per se that is responsible for genericity. The compatibility of imperfectives with stativity is what is relevant. Hence the actual correlation is a stativity-genericity correlation and not an imperfectivity-genericity correlation.

Acknowledgments

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¹Smith (1992) distinguishes between two different kinds of aspectual information: situation aspect (also known as *aktionsart*) is realized by constellations of lexical morphemes consisting of a verb and its arguments, including the subject. It refers to the idealized situation type (activity, state, etc.) that is associated with a sentence. Viewpoint aspect focusses on a part of an actual situation. In a sentence like 'Sam was drawing a circle', the situation aspect/type is accomplishment because 'Sam draw a circle' is a telic, durative event i.e. an accomplishment. The viewpoint aspect, realized by *-ing*, is imperfective. It focusses on an internal stage of the event, namely the stage in which Sam is drawing a circle.

² An alternate characterization of the neutral viewpoint is that it is the viewpoint that exists in the absence of an imperfective/ perfective opposition. An example is the French future tense which is not marked for aspect. Thus by default it has neutral viewpoint aspect.

³ The French *Imparfait* is not restricted to the verb 'be'. Cf. (i).

- (i) L'enfant pleurait
 the-child cry.pst.impfv
 'The child was crying.'
 'The child used to cry.'

⁴Verb constellations referring to positions and location provide systematic counterexamples to this claim. Consider sentences like 'The painting was hanging in the living room.'. Such sentences are semantically stative but morphologically identical to a progressive. I do not address these case any further.

⁵For an interesting discussion of this peculiarity of the present tense in English see Carlson (1977), pp. 270-274

⁶This is not completely accurate. The present perfective is morphologically available but only in embedded environments such as the complements of verbs like *want* and *desire* and in adjuncts such as if-clauses. It does not occur in matrix clauses.

⁷Tense in the Indo-Aryan languages (which include Marathi and Hindi) is marked periphrastically by a tense auxiliary which is a form of the copula. It is unclear if the presence of this copula in the present/past perfective makes these constructions parallel to the perfect in English.

⁸This ambiguity is not introduced by the bare plural. It exists in their absence too. Consider 'John smoked' which is ambiguous between an extensional reading where John smoked at some definite point in the past and an intensional, generic reading according to which John had the property of being a smoker in the past. Examples with bare plurals are used to bring out the intensional nature of genericity.

⁹ There are interesting and important differences between *kinds* and *objects*. For example, two realizations of a kind (for e.g. Dog) can be at different locations at the same time but two realizations of an object cannot be at two different locations at one instant of time. We will, however, not make use of this distinction. For further details, the reader is referred to Carlson (1980), Pg. 67-68.

¹⁰Consider 'the running boy', 'the dancing girl'. However this ability seems to be restricted to the progressive participles of intransitive verbs. Consider '*the eating a pizza boy' and '*the telling a story girl'. This asymmetry can be explained by the fact that the syntactic type-changing applies only to the progressive participle and not to the entire VP. In case of intransitives, there is no string difference between an adjectival progressive participle and a VP which consists of a progressive participle.

¹¹ Like other main verbs, the progressive auxiliary is marked for the habitual/perfective opposition. When the progressive auxiliary has perfective morphology, it produces the event-in-progress reading. This corresponds to the order 'V_{root} Prog-Pfv'. The other orders permitted are 'V-Hab Prog-Pfv' (continued V-ing on one occasion) and 'V-Hab Prog-Hab' (keeps V-ing on different occasions). I leave a proper compositional semantics of the interaction between the aspectual morphology and the progressive auxiliary for future work. I will discuss the interpretation associated

with 'V-hab Prog-Pfv' in the section on the Hindi habitual.

¹² The *Impfv* operator is taken to have semantics similar to the *PROG* operator discussed in Landman (1990) (except that it is compatible with statives).

¹³ The example in (30) is not completely parallel to the case in question i.e. *Impfv* under *G* because in (30) we are dealing with *Prog* under *Iteration*. The difference between *Prog* and *Impfv* is perhaps not very significant. The difference between *G* and *Iteration* is more crucial. Following Carlson (1989), we know that *G* and *Iteration* differ with respect to intensionality - *G* contributes intensionality while *Iteration* is extensional.

¹⁴ Change of state readings seem to be a by-product of the interaction of perfective aspect and stativity. They are found in several languages such as Bulgarian, Chinese, Hindi, Kashmiri, Marathi, and Modern Greek. I will not discuss them further here.

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Deriving Binding Domains: Feature Checking and Computational Accessibility*

Michael Gamon
University of Washington

1 Introduction

In this paper I argue for a Minimalist Binding Theory that is based on the following assumptions:

- (i) local binding relations (between an anaphor and its antecedent and between a pronominal and a local antecedent) are chain relations, and they are subject to the Minimal Link Condition
- (ii) binding relations are determined derivationally
- (iii) the formation of chains is an "everywhere" operation throughout the derivation, all copies of DPs are, in principle, relevant for the formation of chains
- (iv) once all the [-interpretable] features of an item have been checked, that item becomes inaccessible to computational operations in general and to the formation of chains in particular

I demonstrate that the facts about binding domains for local clausal binding relations follow from the above assumptions in conjunction with a clausal architecture as assumed in the Minimalist framework. Local binding domains become an automatic consequence of the design of the computational system; they cease to exist as independently defined notions. As a consequence, *government* can be eliminated from binding theory altogether.

I also show that this approach makes it possible to unify conditions on NP-traces and lexical anaphors, and it renders stipulations on the formation of multi-membered chains superfluous.

Let me first turn to the view of local binding relations as chain relations.

2 Local Binding Relations As Chain Relations

Assume that the algorithm in (1) is responsible for creating chains derivationally, that is it applies mandatorily at any point of the derivation where it is applicable¹: (1) can apply independently of movement, forming a chain-link between two lexical items.

(1) Chain Formation Algorithm

alpha forms a chain-link with beta (or with a chain headed by beta) iff

- (i) alpha c-commands beta and
- (ii) alpha and beta bear the same index and
- (iii) alpha and beta are in a local relation

Chain-links now have to be classified as either *movement-chain* links or *binding chain* links. This is necessary because there is an overlap of locality constraints for movement and binding but the two processes are not subject to identical locality conditions. For example, movement is sensitive to adjunct islands, the Coordinate Structure Constraint etc., while this is not the case for binding relations - a fact that has proven problematic for movement analyses of anaphors.

This makes it necessary, then, to allow for a distinction between movement and binding-links in a chain. Within the Minimalist framework this is easily possible under reference to the numeration:

(2) Movement -link:

A *movement link* is a chain $\langle \alpha_{\text{hi}}, \alpha_{\text{lo}} \rangle$ where α_{lo} is one element of the numeration.

(3) Binding-link:

A *binding link* is a chain $\langle \alpha_{\text{hi}}, \beta_{\text{lo}} \rangle$ where α_{hi} and β_{lo} are different elements of the numeration.

In other words, if one and the same element from the numeration is involved in a chain relation, a movement link is created. If, on the other hand, two coindexed elements that are separate items in the numeration are in a chain relation, a binding link is formed.

The basic locality constraint in the algorithm for chain formation can then be identified as the Minimal Link Condition:

(4) Minimal Link Condition:

Form Chain targets the closest potential chain-antecedent for α_{lo} .

I assume that the Minimal Link Condition in (4) is the core locality constraint which is applicable to all chain-links, that is, both movement and binding-links. I will put the difficult question as to what other sorts of barriers are responsible for the diverging locality properties of movement and binding aside here.

A refinement is necessary now, to relativize the notion of closest potential chain-antecedent for movement-links and binding-links:

(5) Closest possible chain antecedent:

The closest possible chain-antecedent is the closest possible

- (i) landing site for movement chains
- (ii) antecedent for binding chains

I also assume that equidistance, as defined in Chomsky (1993), applies to the determination of what counts as the closest possible antecedent of any sort.

As I will argue in section 5.2, the algorithm for chain formation seems to be a necessary ingredient of the Minimalist Theory any way: some mechanism in syntax has to be responsible for creating multi-membered chains - a fact acknowledged but not pursued in Chomsky (1995). There are two new aspects that chain formation as formulated in (1) introduces:

- (i) it is chain formation that is restricted by the MLC, not movement
- (ii) chain formation can apply independently of movement

For reasons of space I will not be able to explore the consequences of the first of these modifications. The second modification, however, will play a crucial role in the remainder of this paper.

Turning next to anaphors, pronominals and the equivalents of principles A and B in this approach, let us assume that the crucial distinction between anaphors and

pronominals is that anaphors have to enter a chain-relation with a c-commanding antecedent to be licensed, while pronominals don't need to enter such a relation:

(6) Anaphors have to enter a binding-link relation with a c-commanding antecedent to be licensed

It follows that anaphors will need to be in a local relation with a c-commanding antecedent, the equivalent of principle A of standard binding theory. It also follows that pronominals should not enter a binding-chain link with an antecedent: Under a reasonable interpretation of economy of representation, as few symbols as possible should be used in the output of a derivation (Zwart (1993)):

(7) Economy of Representation
Use as few symbols as possible in the output of a derivation

Once chain-links count as symbols in a derivation, it follows that any binding-chain link involving a pronominal in its tail-position has to be avoided: the pronominal does not need to be licensed in that way, consequently such a chain-link counts as a superfluous symbol of the representation, and leads to an economy violation. This is the equivalent of principle B of standard binding theory.

In other words, an anaphor has to be close enough to a coindexed antecedent in order to be licensed via formation of a chain-link. A pronominal, on the other hand, must not be too close to a coindexed antecedent: otherwise a superfluous binding-chain link is formed, resulting in a violation of economy of representation.

One technical remark is in order here: In the Minimalist Program economy filters serve to make a choice among alternative derivations that start from the same numeration. If binding-chain links involving pronominals are to be ruled out by economy, there has to be an alternative derivation that is more economical. For this reason I have to assume that indices are not part of the numeration but rather are assigned at some point in the derivation, for the sake of concreteness I will assume that this happens at the point when MERGE applies. Under this assumption a derivation with a locally bound pronominal and a resulting binding chain link is simply a less economical derivation than an alternative derivation where a different index is assigned to the pronominal or antecedent when they are merged into the structure.

3 Feature Checking and Computational Accessibility

Chomsky (1995) introduces a distinction between [-interpretable] and [+interpretable] features. Roughly speaking, [+interpretable] features such as phi-features of DPs and categorial features are not erased once they are checked; they survive until LF. It follows that multiple checking of agreement is possible. [-interpretable] features such as case, on the other hand, are erased as soon as they are checked, therefore there is no such thing as multiple case-checking.

I suggest that the following holds:

(8) Computational Accessibility

A term is accessible to the computational system only as long as it bears [-interpretable] features

To put it differently, once the case-feature of a DP is checked off, the DP becomes invisible for computational operations such as chain formation. (Note that here I restrict discussion to A-chain formation. If it is assumed that the wh-features on a Wh-DP are [-interpretable] as seems necessary to ensure covert raising of all Wh-phrases, this account would also work for wh-dependencies).

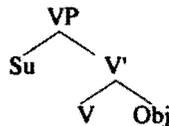
Again, this assumption is not a completely arbitrary one. Note that without an assumption like (8) movement of a DP would not necessarily terminate in a case-position, because it could continue from a case-position into a position with a strong categorial feature [+D]. To the extent that it is true that the head of an A-chain is always in a case-position, (8) makes the right prediction. The Computational Accessibility hypothesis rests crucially on the assumption that the position where the Case of the subject is checked is SpecAgrS, and not SpecTP. In what follows I will assume that the functional head T has to raise to Agr in order to check the Case of a DP in SpecAgrS.

I will now turn to an illustration of how this combination of assumptions makes it possible to derive local clausal binding domains without any independent domain definition.

4 Deriving Clausal Binding Domains*4.1 Simple Transitive Clauses*

Consider the derivation of a simple transitive clause in English as in (9) and the point in the derivation of (9) when the VP of the sentence is completely merged as illustrated in (9').

- (9) John_i saw *him_i/himself_i
 (9') Merging of the VP:



A reflexive in object position has to enter a binding chain relation with a c-commanding antecedent in order to be licensed according to the licensing requirement for anaphors in (6). The first chance to do so occurs at point (9') in the derivation when the VP is completely merged: if the subject is coindexed with the reflexive, the necessary binding-link relation can be established at this stage, and the reflexive is licensed. If the subject is not coindexed with the reflexive, the only chance for licensing is missed, and the structure fails to meet the licensing condition for anaphors in (6).

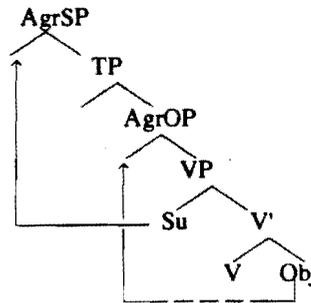
The pronominal in object position, on the other hand, must not be coindexed with the subject. If it is coindexed with the subject, a binding-link is established as

soon as the VP is merged at stage (9') of the derivation. This binding-link is a superfluous element of the representation, hence an alternative derivation - one without coindexing of the pronominal and the subject - is preferred by economy of representation.

Further merge and move-operations are illustrated in (9'') below, but note that none of these operations and the configurations they create alter the binding relations established at (9').

(9'') subsequent Merger and Move before and after SPELLOUT:

— denotes covert movement (post-SPELLOUT)
 — denotes overt movement (pre-SPELLOUT)



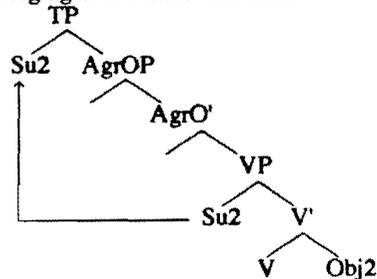
4.2 ECM Constructions

Turning now to ECM constructions where the binding domain of the ECM subject is extended into the matrix clause, the crucial point is that the subject of the embedded clause in Chomsky's analysis raises to SpecAgrOP of the matrix clause - but not until after SPELLOUT. In other words, the [-interpretable] case-features of the ECM-subject are still present at the stage of the derivation when the subject of the matrix clause is merged.

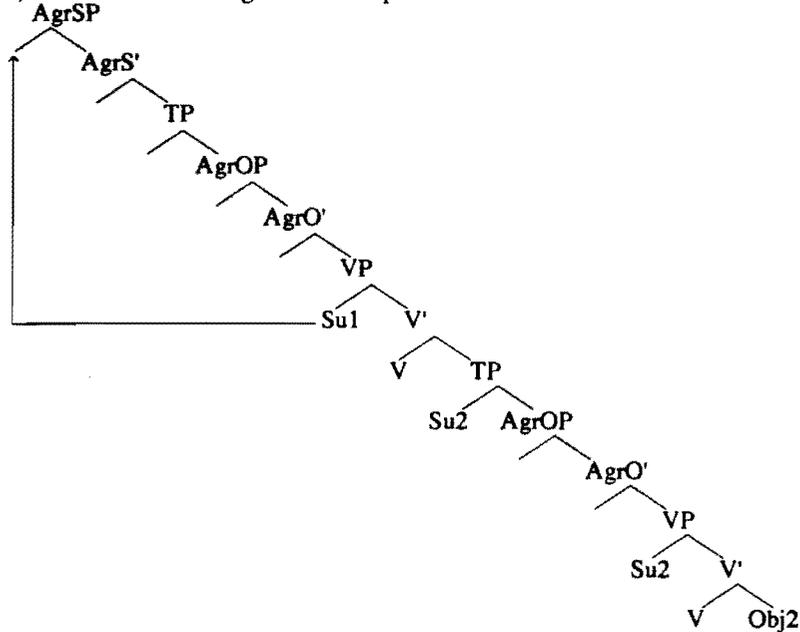
The derivation of the ECM sentence (10) is illustrated in (10')-(10'').

(10) John_i believes *him_i/himself_i to see Mary

(10') Merging of the embedded clause



(10'') Pre-SPELLOUT merger of the complete sentence:



Focusing on the subject of the ECM complement, a reflexive in that position needs to enter a binding-link with a c-commanding antecedent according to (6). In (10') the embedded subject has moved to SpecTP. This move is obviously not motivated by case-considerations, since the embedded subject checks its case in the matrix clause. It is necessary, however, to assume raising to SpecTP in the ECM-complement for checking of some feature (possibly a D-feature of T) to allow the ECM subject to occur in a surface position strictly adjacent to the matrix verb. The [-interpretable] case feature of a reflexive in the position of Su2 at stage (10') of the derivation (just before the ECM complement is merged with the matrix verb) is not yet checked, and consequently the reflexive remains accessible to chain formation while the matrix clause is being merged as shown in (10''). If the matrix subject is coindexed with the reflexive, a binding-link <Su1, Su2> will be established by chain formation as soon as the matrix subject enters the structure by being merged into the matrix VP. By virtue of that binding-link, the reflexive is licensed. If the matrix subject and the reflexive bear different indices, no such link can be established and the reflexive surfaces unlicensed.

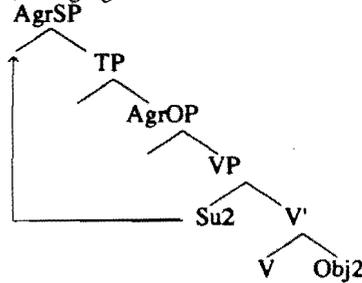
For a pronominal in subject position of the ECM-complement the mirror-image situation obtains: if the pronominal and the matrix subject are coindexed, a superfluous chain-link is created, violating economy of representation.

4.3 Subjects of Finite Complement Clauses

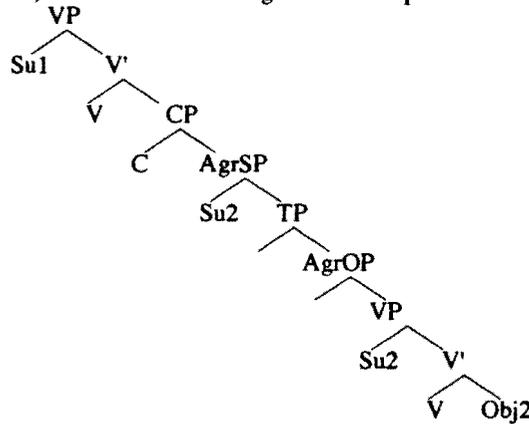
The situation in finite complement clauses such as in (11) where the binding domain of the embedded subject is not extended into the matrix clause is different from that in ECM-complements as illustrated below.

(11) John_i thinks that he_i/*anaphor_j saw Mary

(11') Merging of the embedded clause:



(11'') Pre-SPELLOUT Merger of the complete sentence:



At stage (11') of the derivation of (11) when the embedded clause is completely merged, the subject of the complement clause has its [-interpretable] case features checked in SpecAgrS. That means that at this stage of the derivation, the subject of the complement clause becomes invisible to computational operations in general, and chain formation in particular.

Subsequent merging of the matrix clause in (11'') and particularly the introduction of the matrix subject into the structure is irrelevant for the establishment of binding relations because whatever DP is in the subject position of the embedded clause will be inert for computational operations. Even though a

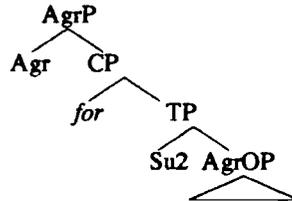
potential antecedent is made available once the matrix VP is merged, no binding-link between the embedded subject and the matrix subject can be established due to the inaccessibility of the embedded subject. It follows that a reflexive in the subject position of the embedded clause will never be able to get licensed even under coindexation with the matrix subject, and it also follows that a pronominal in the embedded subject position can be freely coindexed with the matrix subject: no binding-link can be established, so no violation of economy of representation can occur.

4.4 Complement Clauses Introduced by *for*

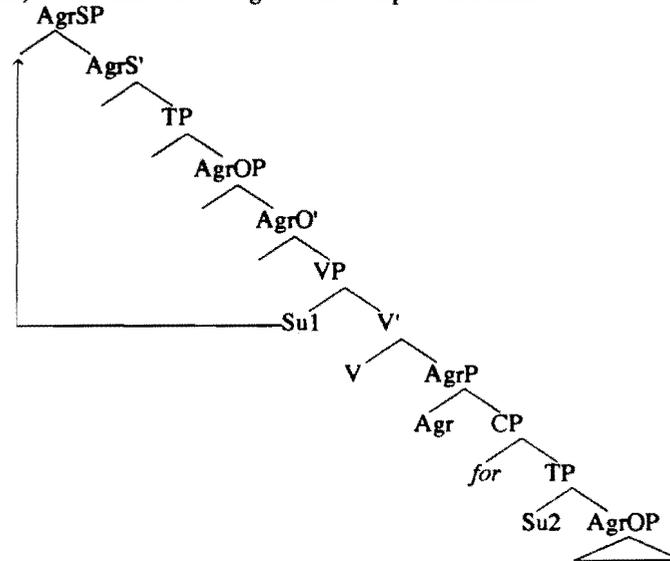
Finally, consider clausal complements introduced by *for* as illustrated in (12). In (12), the binding domain of the subject of the complement clause is extended just as in ECM constructions. It turns out that a perfectly parallel analysis is possible.

First of all, the assumption that *for* is a structural case-assigner is unavoidable: *for* cannot be an assigner of inherent case since there is no connection between the theta-role assigned to the subject of the complement clause and the complementizer *for*. If structural case-assignment is uniformly represented as a Spec-head relation in an agreement projection, as I have been assuming throughout, following Chomsky (1993), the null assumption is that the subject of the complement clause raises covertly to the specifier of an agreement projection above the complementizer. This projection could either be right on top of the embedded CP or it could be the AgrOP of the matrix verb - a question that I will leave unresolved here (but see Postal (1974) for a number of arguments against raising-to-object in such constructions). Note that in the illustration below I have chosen the option of an agreement projection on top of CP for reasons of exposition.

- (12) John_i wants for *him_i/himself_i to see Mary
 (12') Merger of the embedded clause:



(12'') Pre-SPELLOUT Merger of the complete sentence:



Details aside, the important point here is that the subject of the complement clause will still be accessible to chain formation at the stage of the derivation in (12'). When the matrix clause is merged, as shown in (12''), the subject of the matrix clause can serve as an antecedent as soon as it is introduced into the derivation. It follows that a reflexive in the subject-position of the complement clause can establish its binding link with the c-commanding matrix subject. A pronominal in that position must not be coindexed with the matrix subject, otherwise a superfluous binding link is formed, leading to an economy violation and hence a different derivation without coindexation between pronominal and matrix subject is chosen.

5 Further Implications

5.1 NP-Traces and Anaphors

In standard Principles & Parameters syntax it was assumed that NP-traces are subject to principle A of Binding Theory (Chomsky 1981, 1982) just like lexical anaphors. This assumption explained the parallelism between the examples in (13) with overt anaphors and NP-traces (examples from Lasnik/Uriagereka (1988)):

- (13) a.) *John_i believes that himself_j is clever
 b.) *John_i was believed that t_j is clever
 c.) John_i believes himself_j to be clever
 d.) John_i was believed t_j to be clever

In (13a) and (13b) the anaphoric element (*himself* and NP-trace) is not bound within its Governing Category (the embedded clause) and the sentences are ungrammatical. In (13c) and (13d), on the other hand, the Governing Category is the matrix clause, and both the lexical anaphor *himself* in (13c) and the NP-trace in (13d) are correctly bound within this domain.

While the parallelism in these examples is striking, a treatment of the NP-movement cases as involving principle A as a condition on NP-traces is problematic: As has been observed in the literature (e.g. Aoun (1985) and Lasnik (1986)), there is a substantial overlap between principle A and ECP effects on NP-movement. In the examples above, (13b) and (13d) need not be distinguished by Binding Theory, they can be distinguished by the ECP: the trace in (13d) is lexically governed, the trace in (13b) is not, and it also does not have a local antecedent-governor.

To sum up, invoking principle A for NP-trace covers the parallelism between anaphor-binding and NP-movement, but it introduces an unwelcome redundancy between the ECP and principle A, which both require a local antecedent.

The Minimalist binding theory advocated here has the advantage of unifying the analysis of the NP-movement cases and the anaphoric binding cases on a more abstract level, without stipulating that NP-traces are subject to Principle A.

In both (13a) and (13b) the subject of the embedded clause has its [-interpretable] case features checked in the embedded subject position by finite T. It follows that these subjects are inaccessible to the computational system after their features are checked. Neither movement from the embedded subject position is possible, nor the formation of a binding-link between that subject and a matrix antecedent. In (13c) and (13d), on the other hand, the case of the embedded subject is not checked overtly in the embedded infinitival ECM-complement, but covertly in SpecAgrO of the matrix clause. Consequently the [-interpretable] case features are still present on the embedded subjects when the matrix clause is merged, and computational operations (Move and Form Chain) can access these phrases and move them to subject position (13d) or form a binding-link between the anaphor and its antecedent (13b).

In conclusion, the parallelism between locality in NP-movement and principle A of Binding Theory is expected under the assumptions in this paper. Both movement and the formation of binding-links are computational operations that are subject to the MLC and the accessibility restriction. NP-movement and binding are thus unified at a more abstract level, eliminating overlap and redundancy between grammatical principles².

5.2 Deletion of Traces and Chain Formation

In this section I demonstrate that the assumptions of Chomsky (1995) with respect to deletion of traces are not needed under the chain formation approach advocated here. I show that the need for such an assumption does not arise in expletive constructions at all as claimed by Chomsky (1995), and that the assumption can be dropped for successive cyclic movement, too, once the definition of chain formation in (1) is adopted.

Turning to expletive constructions first, Chomsky (1995:70) makes the following claim about intermediate traces in A-positions:

(14) The intermediate trace t of an argument cannot be attracted; hence t does not prevent attraction of an element that it c-commands.

The rationale behind this claim is the following: since intermediate traces do not enter into interpretation, they delete (become invisible for interpretation at LF). According to the economy condition that "deleted α is erased if possible" (Chomsky 1995: 52), as much of the intermediate trace as possible has to erase (become inaccessible to the computational system). The trace itself, being a term, cannot erase for reasons of structure-preservation. Its formal features, however, are deleted and *can* be erased freely. By the economy condition on erasure, they consequently *have* to erase.

Empirically, this assumption has the consequence that it allows LF-raising of the associate in certain types of expletive constructions.

Consider the LF-raising of the associate in an expletive construction such as (15) (example from Chomsky 1995:70):

(15) there seem [t to be some books on the table]

There is merged into the subject position of the complement clause of *seem*. It then raises to the matrix subject position, where it checks the strong D-feature of T. After SpellOut, the case and ϕ -features of the associate *some books* raise to the position of matrix-*there* and check the case- and agreement features of T. This raising would be blocked, however, if the trace in the subject position of the embedded clause would count as a closer item that could be attracted by the matrix T. Assuming that the formal features of the trace delete and erase eliminates t as a possible target for attraction, therefore voiding its status as a blocker for attraction of the associate.

In the example of an expletive construction in (15), Chomsky's argument doesn't go through: By assumption, the expletive *there* only carries categorial features, but no case- or ϕ -features. Consequently, even without the stipulation in (14), it would never bar attraction of the case- and phi-features of the associate anyway. In conclusion, stipulation (14) is not necessary to ensure the availability of raising of the associate across the trace of the expletive in (15).

Turning to successive cyclic movement and the notion of "linked chains", Chomsky observes that his mechanism of FORM CHAIN runs into problems in successive cyclic movement: FORM CHAIN only forms two-membered chains as a result of the application of MOVE. In a sentence such as (16) below the three chains in (17) will be formed:

(16) we are likely [t₃ to be asked [t₂ to [t₁ build airplanes]]]

(17) CH₁=<t₂, t₁>
 CH₂=<t₃, t₂>
 CH₃=<we, t₃>

Chomsky notes that the chains CH₂ and CH₃ should be deviant because they contain arguments but no theta-role. Only the chain CH₁ should fulfill the "chain condition" requirement because it has a theta-position and an argument³. Chomsky (1995:69) suggests the following stipulation to resolve this problem:

(18) Raising of α heading the chain $CH = (\alpha, t)$ deletes the trace formed by this operation - that is, marks it invisible at LF.

The result of (18) is then that what remains at LF is a chain consisting of the highest copy and the copy in base position, with all the intermediate traces eliminated.

I argue here that the stipulation (18) is unnecessary in the model developed here and can therefore be eliminated from the theory.

In successive cyclic movement, the chain formation algorithm (1) in conjunction with a simple reformulation of the "chain condition" renders the stipulation (18) superfluous.

(1) forms increasingly larger chains throughout the derivation by adding a new link to the already existing chain whenever a new coindexed element becomes available in the derivation. Movement and binding links are distinguished in these chains as suggested above. At the C-I interface, a maximal A'-chain is present. I will not go into a discussion of the relevant aspects of the Theta Criterion in a Minimalist framework here, but it seems that with respect to A'-chains an equivalent of the "chain condition" alluded to by Chomsky could be formulated along the lines of (20), with a definition of *distinct arguments* as in (21):

(20) Chain Condition

In an argument chain the number of distinct arguments must match the number of assigned theta-roles.

(21) Distinction of Arguments

Two DPs count as distinct arguments iff they are distinct items in the numeration.

Consider, finally, the case of successive cyclic A'-movement of arguments. Chomsky notes that the intermediate links in such a successive cyclic A'-chain incorrectly always count as adjunct-extraction links, because they involve two A'-positions. Stipulation (18), in Chomsky's view, remedies this shortcoming by eliminating the problematic intermediate traces. Again, it can be shown that the stipulation is not necessary to obtain the desired result of distinguishing links in an A'-chain involving argument-extraction from links in an A'-chain involving adjunct-extraction. If what makes a DP an argument is its position in a structure as determined by Merge, its argument status could arguably be present at each of the copies of that argument, regardless of whether that copy is in an A'-position as a result of successive cyclic A'-movement. Under this assumption, the need for stipulation (18) disappears.

To summarize, in expletive constructions there is no need for any deletion of features in the base position of the expletive to start with, and stipulation (18) is superfluous for successive cyclic A- and A'-movement under the chain formation approach.

6 Summary and Conclusion

To summarize, I have shown that under a chain-link approach to local binding dependencies and under a derivational view of the establishment of such chain

relations the definition of local clausal binding domains becomes superfluous. This approach also allows us to unify conditions on NP-traces and lexical anaphors, and it makes it possible to eliminate stipulations with respect to the formation of multi-membered movement chains.

This result, in my view, is a strong encouragement to explore the resources of Minimalist syntax for the investigation of binding phenomena instead of relegating these phenomena to the domain of "interpretative versions of binding theory" with unexplained domain-stipulations as Chomsky (1993) does. It also indicates that the relation between Case and binding is a crucial one.

An important problem that this approach solves is the elimination of the notion of *government* from binding theory, a welcome result if one subscribes to the Minimalist goal of reducing syntactic relations to those directly expressible in terms of fundamental concepts of phrase-structure.

If this approach is on the right track it also gives support to recent research that emphasizes the role of a derivational view of syntactic relations, such as Epstein's (1995) derivational approach to c-command and Groat's (1995) attempt to replace syntactic representations completely with derivational operations.

Notes

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¹ See Rizzi (1986) for a predecessor of this approach.

² Note that one redundancy remains under a conjunctive formulation of the ECP such as the one in Rizzi (1990): the head government requirement rules out (b) in addition to the violation of computational accessibility. I have no solution for this puzzle, but note that the status of the head government requirement is unclear in the Minimalist program where government is eliminated as a relevant structural relation. For empirical problems with head-government see Culicover (1993).

³ The "chain condition" alluded to by Chomsky must be understood as some version of the Theta Criterion. For a discussion of the Theta Criterion in the Minimalist framework see Chomsky (1995:80-81).

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Michael Gamon
University of Washington
Dept. of Linguistics
Box 354340
Seattle, WA 98195-4340
miga@u.washington.edu

Negative Polarity Licensing and the Rhetorical Interpretation of Questions

Javier Gutiérrez Rexach ¹
 Department of linguistics, UCLA

1 Contexts of NPI licensing

In this paper, I defend a semantic approach to the licensing of Negative Polarity Items (NPIs) in interrogative sentences which explains most of the specific semantic properties of this type of constructions and is compatible with Fauconnier's (1975) and Ladusaw's (1979) approaches. From a descriptive point of view, NPIs are words (*any, ever, etc*) and phrases of diverse categories (*a single thing, lift a finger, etc.*) that occur or are licensed in a very specific and restricted set of environments: within the scope of sentential or VP negation, within the scope of decreasing quantifiers, as complements of adversative predicates, in the protasis of conditionals, in *before*-clauses and in matrix and embedded interrogative sentences.

Ladusaw (1979) proposed a semantic hypothesis to explain why NPIs occur in some of the above contexts. He claims that NPIs are licensed when they occur in the scope of an expression denoting a monotone decreasing function, defined as follows:

- (1) Let $\mathbf{A} = \langle A, \leq_A \rangle$ and $\mathbf{B} = \langle B, \leq_B \rangle$ be two lattices. A map f from \mathbf{A} to \mathbf{B} is *monotone decreasing* (order reversing) iff for all $X, X' \subseteq A$, if $X \leq_A X'$ then $f(X') \leq_B f(X)$

Not all NPIs have the same distribution. There are (at least) two different classes that we will call, following Zwarts (1990) *weak NPIs* and *strong NPIs*. Expressions such as *any, anybody, anything, yet, etc.* are weak NPIs. They can occur in the scope of the negation operator (2a) or in the argument of any decreasing generalized quantifier function (2b,c)

- (2) a. He has not been to Moscow *ever*.
 b. Nobody has *ever* been to Moscow.
 c. Few students have *ever* been to Moscow.

Expressions such as *give a damn, at all, in weeks, until, a bit, lift a finger* and *budge an inch* impose a stronger requirement on their licensing. They occur in the scope of negation and in the argument of generalized quantifiers like *nobody* (3a,b)

¹I would like to thank Manuel Español, Irene Heim, Ed Keenan and Anna Szabolcsi for comments related to this paper.

but not in the argument of generalized quantifiers like *few (A)* or *less than three (A)* (3c,d).

- (3) a. He did not arrive *until five*.
 b. Nobody ate anything *at all*.
 c. *Few students arrived *in weeks*.
 d. *Less than three policemen *lifted a finger* to help us.

The functions that license strong NPIs are a subset of the decreasing functions. Zwarts calls them *anti-additive* since they satisfy one of De Morgan's laws:

- (4) Let $\mathbf{A} = \langle A, \leq_A \rangle$ and $\mathbf{B} = \langle B, \leq_B \rangle$ be two lattices. A map f from \mathbf{A} to \mathbf{B} is *anti-additive* iff for all $X, X' \subseteq A$,
 $f(X \vee_A X') = f(X) \wedge_B f(X')$

The correlation between function type and licensing ability is synthesized in two laws of negative polarity (Zwarts, 1990): (i) Only sentences in which a monotone decreasing expression occurs can contain an NPI of the weak type; (2) Only sentences in which an anti-additive expression occurs can contain an NPI of the strong type.² The problem arises now as to how can we establish the monotonicity properties of questions and relate them to NPI licensing.

2 NPI licensing in questions

As an initial generalization, it seems evident that weak and strong NPIs are licensed in the scope of interrogative quantifiers. An additional characterizing property of the resulting construction is that the presence of an NPI triggers a *rhetorical* or "biased" interpretation. In informal terms, we say that a question ϕ is rhetorical iff when a speaker s utters it, s associates to ϕ a negative presupposition about the answer to ϕ . The occurrence of a strong NPI in a question obligatorily triggers a rhetorical reading, a fact already noticed by Borkin (1971) and Lawler (1971):

- (5) a. Who *bats an eye* when the boss comes around?
 Presupposition: Nobody bats an eye when the boss comes around.
 b. Who has seen Harriet *in years*?
 Presupposition: Nobody has seen Harriet in years.

²Zwarts (1993) presents a three ways distinction: weak, strong and superstrong NPIs. Superstrong NPIs denote *antimorphic* functions. These functions, besides satisfying decreasingness and antiadditivity, are *antimultiplicative*. We say that a function f is antimultiplicative iff for all $X, X' \subseteq A$, $f(X \wedge_A X') = f(X) \vee_B f(X')$ See also Nam (1995), van der Wouden (1994) and Kas (1993) for further details and crosslinguistic examination of Zwarts' classification.

- c. Who *lifted a finger* to help when I needed it?
Presupposition: Nobody lifted a finger to help when I needed it.
- d. Does John read anything *at all*?
Presupposition: John did not read anything at all.
- e. Did *a single person* read "Barriers" ?
Presupposition: Not a single person read *Barriers*.

The rhetorical reading is optional in yes/no questions with weak NPIs. In normal conditions, when a speaker is trying to disambiguate the two readings (rhetorical and non-rhetorical) (s)he places focal stress on the NPI when the rhetorical reading is the one intended (6). In *wh*-questions with weak NPIs we observe the same ambiguity (7).

- (6) a. Does John read anything?
b. Has anybody ever read *Barriers*?
c. Has Mary ever kissed anybody on the first date?
- (7) a. Who has ever been to Moscow? (ambiguous)
b. Who did Mary ever kiss on the first date? (rhetorical reading preferred)
c. Who has ever kissed a girl on the first date? (ambiguous)

The situation is not uniform crosslinguistically. In Spanish, the presence of an NPI (8) or a negative quantifier (9) obligatorily triggers the rhetorical reading (see Bosque, 1980).

- (8) a. ¿Quién *da un duro* por los bosnios? (only rhetorical)
who gives a coin for the bosnians
'Who gives a damn about the bosnians?'
- b. ¿Quién de vosotros ha podido *pegar ojo*? (only rhetorical)
who of you has could close eye
'Who was able to sleep at all?'
- c. ¿Cuándo *daremos abasto*? (only rhetorical)
when give-us enough
'When would we be able to handle it?'
- d. ¿Quién *ha levantado un dedo* para salvarnos? (only rhetorical)
who has lifted a finger to save-us
'Who has lifted a finger to save us?'
- (9) a. ¿Ha dicho alguien *nada*? (only rhetorical)
has said somebody nothing
'Has anybody said anything?' (rhetorical)

- b. ¿Qué ha hecho *nadie* en este departamento recientemente?
 what has done nobody in this department recently
 ‘What has anybody ever done in this department?’ (rhetorical)

In Spanish there is no source for ambiguity. The non-biased or informative counterparts of the interrogative sentences in (9) would be as in (10), where an existential quantifier is substituted for the negative quantifier.

- (10) a. ¿Ha dicho alguien algo?
 has said somebody something
 ‘Has anybody said anything?’ (informative)
- b. ¿Qué ha publicado alguien en este departamento recientemente?
 what has published somebody in this department recently
 ‘What have people in this department published recently?’

The “avoid ambiguity in the syntax” strategy of Spanish, contrasts with the essentially prosodic strategy of English where, as mentioned above, focal stress or a specific intonational contour disambiguates questions with weak NPIs. We have two additional facts that confirm the hypothesis proposed for Spanish. First, The adverb *acaso* activates the rhetorical reading of the question when there are no NPIs in the sentence. This adverb can only occur in yes/no questions, as shown in (11). Second, whereas the NP *algún libro* ‘some book’ is a positive polarity item, the NP *libro alguno* ‘book some’ is an NPI. Hence, only the latter triggers a rhetorical reading (12b).

- (11) a. ¿Ha dicho alguien algo acaso? (rhetorical)
 has said somebody something by-any-chance
 ‘Has anybody said anything?’
- b. *¿Qué ha publicado alguien en este departamento acaso?
 what has published somebody in this department by-any-chance
- (12) a. Ha visto Pedro algún extraterrestre?
 has seen Pedro some extraterrestrial
 ‘Has Pedro seen any extraterrestrial?’ (non-rhetorical)
- b. Ha visto Pedro extraterrestre alguno?
 has seen Pedro extraterrestrial some
 ‘Has Pedro seen any extraterrestrial?’ (rhetorical)

In Catalan and Italian, NPIs are licensed in yes/no questions (Zanuttini, 1991; Progovac, 1994). This is also the case of Hindi, according to Lahiri (1995). In other languages like Chinese *wh*-words can also act as negative polarity items. Huang (1982: 108) presents the following inventory: *shei* ‘who/anybody’, *sheme*

'what/anything', *na* 'which/any', *heshi* 'when/anytime', *nali* 'where/any place', *zeme* 'how/ any way', *weisheme* 'why/any reason'. The sentences in (13), according to Zhang (1991), are ambiguous between the interpretation (i) and (ii). Serbo-croatian displays a similar behaviour, as the example in (14), taken from Progovac (1994), shows.

- (13) a. Shei zhidao?
 who know
 (i) 'Who knows?' or (ii) 'Who knows?' (rhetorical) = 'I don't know'
- b. Shei da ren le?
 who hit person ASP.
 (i) 'Who hit someone?' or
 (ii) 'Who hit anyone?' (rhetorical) = 'I didn't hit anyone'
- (14) Da li je Milan (i-)šta doneo?
 that Q has Milan any-what brought
 'Has Milan brought anything?'

3 Syntactic, semantic and pragmatic accounts

The range of crosslinguistic variation that we have presented suggests that there are two different issues that should receive an independent answer: why are NPIs licensed in interrogative sentences and where does the rhetorical reading come from?. Different theories have tried to deal with one or the two problems. Ladusaw (1979) proposes an explanation of the occurrence of polarity sensitive items in questions which is not directly founded on decreasingness but rather in a pragmatic principle relating form and meaning:

- (15) S[peaker] should pose the question *q* only when he believes it to be possible for H[earer] to express its denotation set without major revision of the form of the question.

Thus, when a speaker asks a question like *Did John ever lift a finger to help?* (s)he is expecting that the hearer is going to express the answer in a form that does not change the form of the question. Obviously, since the interrogative sentence contains an NPI, the only possible declarative response will be one containing a negation, like *No, he didn't ever lift a finger to help.* The explanation predicts that the only possible reading of the sentence is rhetorical, since the denotation set of the interrogative sentence would be empty. Krifka (1991) observes that Ladusaw's account leaves unexplained why NPIs can also occur in neutral or informative questions. The principle in (15) also poses conditions on the expressibility of rhetorical questions which are stricter than necessary. A sentence like *Did he come?* can be

uttered by a speaker *s* to denote a rhetorical question. According to principle (15) then he would expect *Yes, he came* as the answer to the rhetorical question, because this is the declarative sentence whose form would constitute the least revision of the form of the question. But the speaker's expectations are the opposite, since (s)he is presupposing that he did not come.

Progovac's (1994) theory attempts to give an explanation of NPI licensing based primarily on the syntactic constraints of binding theory. For the cases in which NPIs occur in non-overtly negative environments like conditionals and questions, she proposes that there is a null operator that binds the NPI. NPIs licensed by an element other than clausemate negation have to raise at LF. Horn and Lee (1995) observe that her analysis wrongly predicts that strong NPIs like *budge an inch* or *lift a finger* are licensed only by clausemate negation since they are not QPs. Therefore, Progovac's analysis does not explain why idiomatic strong NPIs occur in questions. Second, with respect to the rhetorical reading, she states that "in order to derive rhetorical force in wh-questions it is enough to assume that wh-AGR and Op in Comp are incompatible, both requiring a separate interpretation in the Comp position ... The only remaining option is to suppress wh-AGR in Comp, resulting in the loss of the wh-force ... Since only negated NPIs are tolerated in the Spec of CP, Op in Comp must set its switch to the negative value, and due to Spec/Head AGR, the wh-word gets interpreted as a negated NPI" (98-99). There are several problems for this line of explanation: (i) *wh*-words in questions with NPIs display full agreement (overtly realized and semantically relevant); (ii) the rhetorical interpretation of a question is sometimes optional, namely when weak NPIs occur in it as in (6) and (7). Progovac predicts that the presence of an NPI automatically triggers the "loss of the wh-force". Finally, (iii) no distinctions are made among NPIs.

Krifka's (1990, 1991) theory posits a combination of semantic and pragmatic factors for the licensing of NPIs in different constructions. Specifically he defends that "the pragmatic setting of asking questions" has to be examined more closely if rhetorical readings are to be accounted for. On the semantic side, he presents a lattice-theoretical approach to NPIs. A *polarity lattice* is a triple $L_A = \langle A', L_A, \leq_A \rangle$ where A' is the *NPI representation*, L_A is the lattice sort and the following conditions hold: (a) if A' is of type σ , L_A is of type $\langle \sigma, t \rangle$, (b) \leq_A is a preorder relation on L_A , (c) $A' \in L_A$, and L_A contains at least one more element, and (d) A' is the unique Y such that for every $X \in L_A$, $Y \leq_A X$. For example, the polarity lattice of the NPI *a drop of wine* is $\langle \mathbf{a.drof.of.wine}', L_{\mathbf{a.drop.of.wine}}, \leq_{\mathbf{a.drop.of.wine}} \rangle$ where for all properties X , if $X \in L_{\mathbf{a.drop.of.wine}}$ then X is the property of being a quantity of wine of a certain size and $\mathbf{a.drop.of.wine}'$ is the least element of the lattice (i.e. $\forall x[\mathbf{a.drop.of.wine}'(x) \rightarrow \mathbf{wine}'(x) \wedge x$ is smaller than some quantity ϵ]). The process of question formation consists in attaching the illocutionary operator ERO to the sentence radical. If \mathbf{p}' is a proposition, i a world, s the speaker, and h the hearer, then $\text{ERO}(s, h, i, \mathbf{p}')$ says that s asks h whether $\mathbf{p}'(i)$ is true. In the case of rhetorical questions, Krifka claims that the speaker wants to show that (s)he is sure

to get a negative answer, so (s)he follows the rule:

- (16) If $ERO(s, h, i, \mathbf{A}')$ and \mathbf{A}' is an NPI or PPI representation with lattice sort L_A , then for any $X \in L_A$ with $X \neq \mathbf{A}'$, s has reasons for $\neg ERO(s, h, i, X)$.

According to the rule, if a speaker s asks the question *Did you even drink a drop of wine?* then for any property X in the polarity lattice $L_{a.drop.of.wine}$, s has reasons for not asking whether a proposition containing X is true at i . The speaker asks a question only about the least element in the lattice, namely **a.drop.of.wine**'.

It is not clear whether the above rule captures the essence of what is a rhetorical question. The speaker is not even asking whether the proposition p containing the least element in the relevant polarity lattice is true. (S)he already knows what the answer is and (s)he is asking it for reasons different than knowing whether p is true in i . In that respect, it seems reasonable to claim that in uttering a rhetorical question, $\forall X \in L_A$ the speaker s has reasons for $\neg ERO(s, h, i, X)$. Therefore, rhetorical questions are not properly questions from an illocutionary point of view.

Krifka does not deal either with the issue of what is the specific property of questions that allows the licensing of NPI. Finally, none of the rules predict the licensing of NPIs and rhetorical interpretations in constituent questions.

4 Interrogative quantifiers and their monotonicity properties

Here I will defend the thesis that NPIs are licensed in *wh*-questions because of the monotonicity properties of interrogative quantifiers and also licensed in yes/no questions because of the monotonicity properties of the question formation operator. In Gutiérrez Rexach (1996), I present an extensional version of Groenendijk & Stokhof's (1984) definition of a question. For \mathcal{D} a domain, a question is a function $f \in [\mathcal{P}(\mathcal{D}) \rightarrow 2]$ mapping a unique $X \subseteq \mathcal{D}$ to True. We call X the answer set of f . As defined, questions are strongly exhaustive. An interrogative generalized quantifier Q is a function from properties to questions. An interrogative determiner is a function from properties to interrogative generalized quantifiers. In the sentence *Who is walking?* the *wh*-word *who* denotes an interrogative generalized quantifier. In the sentence *What student is walking* the *wh*-word *what* denotes an interrogative determiner.

- (17) a. $WHO(WALK) = \{\{x : x \in PERSON \cap WALK\}\}$
 b. $WHAT(STUDENT)(WALK) = \{\{x : x \in STUDENT \cap WALK\}\}$

A yes/no question is a function mapping a unique proposition to true. Therefore, the interrogative sentence *Is John walking?* denotes a question that would map the set $\{\wedge Walk(John)\}$ to True. Therefore, $\{\wedge Walk(John)\}$ is the answer set of the question. In order to determine the monotonicity properties of interrogative

quantifiers we have to determine first what kind of entailment relation arises in the interrogative domain. Here we are going to follow Groenendijk and Stokhof's (1989) notion of entailment though not their concrete implementation. They define the (propositional) entailment relation between interrogatives as follows:

- (18) An interrogative A entails an interrogative B iff, whenever a proposition gives a complete and true answer to A, it gives such an answer to B.

Consider now the following examples:

- (19) a. Which guests smoked?
 b. Which guests smoked cigars?
 c. In which state do you have relatives?
 d. In which state of the West Coast do you have relatives?
 e. How many cars are parked in the garage?
 f. How many red cars are parked in the garage?

There is a natural information-based relation between (19a) and (19b) above. Namely, a true complete answer to (19a) contains a partial complete answer to (19b). Informally, (19b) asks for more specific information than (19a). In other words, if A_f is the answer set of (19a), then a subset of A_f is the answer set of (19b). The same applies to (19c) with respect to (19d) and to (19e) with respect to (19f). Let us call this relation between constituent questions *subsumption*:

- (20) Question f subsumes question g ($f \leq g$) iff $A_g \subseteq A_f$.

Clearly, the subsumption relation is a partial order (reflexive, antisymmetric and transitive). Then, if we allow the entailment/subsumption relations between questions to enter the picture, interrogative determiners will exhibit the entailment pattern of declarative NO. As noted above, if question f subsumes question g , then a complete true answer to g is a partial or complete true answer to f but not necessarily viceversa. The subsumption relation presented here is apparently different from the relation of entailment between questions in G&S(1989). For them the entailment relation holds between propositions and here subsumption holds between questions (it is the subset relation between answer sets). Notice, however, that if question f subsumes question g , then question f entails question g in G&S' (1989) sense, so the notion of subsumption could also be captured in their terms. Notice also that the notion of subsumption is identical to Higginbotham's (1993) notion of downward entailment for interrogatives. In order to see the relation between subsumption and entailment, consider a situation in which John, Bill, Sam and Fred are walking and Sam is the only one of them who is a student. Then, the answer sets of *Who is walking?* and *What students are walking?* in this situation are as in (21).

- (21) a. WHO(WALK) = {{John, Bill, Sam, Fred}}

b. WHAT(STUDENT)(WALK) = {{Sam}}

Question (21a) subsumes question (21b) since $\{Sam\} \subseteq \{John, Bill, Sam, Fred\}$. At the propositional level the answer set of (21a) would be $\{\wedge Walk(John) \wedge Walk(Bill) \wedge Walk(Sam) \wedge Walk(Fred)\}$. The propositional answer set of (21b) would be $\{\wedge Walk(Sam)\}$. We see that the proposition $\wedge Walk(John) \wedge Walk(Bill) \wedge Walk(Sam) \wedge Walk(Fred)$ entails the proposition $\wedge Walk(Sam)$ since for all worlds i if John, Bill, Fred and Sam are walking in i then Sam is walking in i . Therefore, if a question f subsumes a question g then at the propositional level (intensionally) f entails g . We show now that interrogative quantifiers and determiners are decreasing.

- (22) i An interrogative quantifier Q is *decreasing* iff $\forall A, B \subseteq E$ if $A \subseteq B$ then $Q(B) \leq Q(A)$
- ii An interrogative determiner D is *decreasing* iff $\forall A, B, C \subseteq E$ if $A \subseteq B$ then $D(B)(C) \leq D(A)(C)$
- (23) **Fact:** Argument interrogative quantifiers Q are decreasing
 Proof: Let $A, B, C \subseteq E$, $A \subseteq B$, $Q = D(C)$ and $D = \text{WHICH, WHAT, etc.}$. We have to show that for arbitrary X, Y , if $Q(B)(X) = Q(A)(Y) = 1$, then $Y \subseteq X$. Assume $Q(B)(X) = Q(A)(Y) = 1$. Since $A \subseteq B$, then $Y = C \cap A \subseteq C \cap B = X$. \square
- (24) **Fact:** Argument interrogative determiners D are decreasing
 Proof: Let $A, B, C \subseteq E$ and $A \subseteq B$. We have to show that $D(B)(C) \leq D(A)(C)$. Let X, Y be such that $D(B)(C)(X) = 1$ and $D(A)(C)(Y) = 1$. Then, $Y = A \cap C \subseteq B \cap C = X$. \square

The notion of subsumption given above predicts entailments between questions arising from their monotonicity pattern as the ones illustrated in (19a) to (19f) above. A complete (partial) answer to question (19b) will be a partial (complete) answer to (19a) since the answer set of (19b) is a subset of the answer set of (19a). Fact (23) also predicts that negative polarity items can occur in the first argument of interrogative determiners.

- (25) Which students that have *ever* been to Moscow want to go back there?

As we saw in section 2 not only weak but also strong NPIs are licensed by interrogative quantifiers. According to Zwart's laws of negative polarity this would only follow if interrogative quantifiers are antiadditive functions. This is indeed the case, as the following examples illustrate:

- (26) a. Who is walking or talking? = Who is walking and who is talking?
 b. Which students are walking or talking? = Which students are walking and which students are talking?

If a speaker s is in a state of ignorance about who is walking or talking in a situation i and he wants to find it out, the questions in (26a) would be equivalent requests for information. The failure of additivity is evident. If the speaker wants to find out who is walking and talking and asks the question *Who is walking or who is talking*, then an answer that specifies only the set of walkers would be a proper answer to this latter question but it would not give s a complete information about both the walkers and the talkers. In other words, the questions below are not equivalent:

- (27) a. Who is walking or talking? \neq Who is walking or who is talking?
 b. Which students are walking or talking? \neq Which students are walking or which students are talking?

The determination of the monotonicity properties of yes/no questions is more problematic. Here we are going to assume the presence of a yes/no operator similar to the one denoted by *whether*, as done in Higginbotham (1993). This operator is antiadditive. Consider the following sentences:

- (28) Is John walking or talking? = Is John walking and is he talking?

The two sentences above are equivalent. If the speaker s wonders whether John is walking or talking he is wondering whether John is walking and whether John is talking. In this respect, the yes/no question operator is antiadditive and licenses weak and strong NPIs.³

5 What is a rhetorical question?

A rhetorical question is not a “well-behaved” question. The speaker knows already the answer and he asks it for rhetorical purposes (mostly irony). For instance, with respect to the question *Who lifted a finger to help me?* the speaker knows already that the answer set of the question is empty yet he asks it to highlight precisely this fact: that the set of persons who have done something to save him is empty. A sentence like (29a) uttered as a rhetorical question has an empty answer set. In a situation i in which the speaker knows that no students came ($\text{STUDENT} \cap \text{COME} = \emptyset$) he would question (29a) only for rhetorical reasons. The corresponding informative question in i is (29b).

- (29) a. Which students came?
 b. Which students did not come?

³An issue that requires further investigation is the interpretation of connectives in questions. Groenendijk and Stokhof (1989) give to question coordination the same treatment as to coordination of declaratives. Szabolcsi (1994) observes that, for A, B questions *A or B* is interpreted as ‘A or, rather B’ (exclusive *or*) and presents evidence from Hungarian supporting her claim. My intuitions are that both the inclusive and the exclusive interpretation of *or* are valid.

Let us consider now a situation j in which the speaker knows that every student went to the party, i.e., $\text{STUDENT} \subseteq \text{COME}$ or $\text{STUDENT} \cap \text{COME} = \text{STUDENT}$. In j , for rhetorical reasons, he would ask (29b). The corresponding informative question is this time (29a). The answer set of (29b) in j is $\text{STUDENT} \cap \neg\text{COME} = \emptyset$, since everybody went to the party. Ladusaw (1979) makes precisely the same claim: rhetorical questions have always empty answer sets. He uses Karttunen's (1977) semantics for questions to model his idea. There is a problem, though, with the use of Karttunen semantics. One of Karttunen's assumptions is that matrix and embedded questions have the same denotations. Since Ladusaw assumes that the presence of a strong NPI triggers the rhetorical reading, it follows that embedded questions with strong NPIs should also have a rhetorical reading. This is not the case, as shown in the following sentence:

- (30) a. ??I know who lifted a finger to help me.
 b. ??I wonder whether he gives a damn about you.

Here we are going to relate rhetoricity and subsumption (entailment). We define the *subsumption set* of a question ϕ as the set of questions subsumed by ϕ : $\text{SUB}(\phi) = \{ \psi \mid \phi \leq \psi \}$. Recall that if a question is rhetorical then its answer set is empty. It follows (from this fact and the definition of subsumption) that the subsumption set of a rhetorical question is a singleton. A rhetorical question only subsumes itself: if $\text{Rhet}(\phi)$, then $\text{SUB}(\phi) = \{ \phi \}$. In sum, for a speaker to be able to ask a rhetorical question, he has to calculate the entailment set of an informative question set and ask a question about its bottom element. He has to be able to go over the whole entailment set of a question and pick out its smallest element. The presence of the NPI signals precisely this calculation. Nevertheless, we are not claiming that rhetorical interpretations arise only when there are NPIs in the sentence. As observed in the literature, practically any question can be interpreted as rhetorical, depending on the circumstances and the speaker's intentions. What needs to be stressed is the close relationship between subsumption and the calculation of rhetorical questions.

Notice that this is just Fauconnier's (1975) "end of scale" hypothesis applied to subsumption. The fact that NPIs are licensed in questions follows from Zwart's laws of negative polarity. The association of NPIs with rhetoricity is a question of pragmatics. Since NPIs denote end of scale points, the presence of an NPI in a question is signaling the addressee what the communicative intentions of the speaker are. It marks that the answer set is empty.

As we have seen, Krifka also follows Fauconnier in assuming that NPIs denote least elements in an NPI lattice. Following Heim (1987), he claims that the relevant scale (lattice) is determined over the substitution set of the NPI. Heim's (1987) proposal is based on problematic instances of strengthening of the antecedent in conditionals. NPIs are licensed in the protasis of conditionals. Applying the standard notion of decreasingness would imply that any strengthening of the antecedent preserves truth value. A possible strengthening of the antecedent of the conditional

If you ever go to Yemen, you will enjoy it is *If you go to Yemen and get sick there, you will enjoy it*. It is evident that under normal assumptions about people's desires truth value is not preserved. Heim proposed to adopt limited or contextual decreasingness as a solution to the puzzle. Only strengthenings of the antecedent that are induced by alternative items in the position of the NPI are allowed. In the case of *ever*, adverbials like *twice*, *several times*, etc. are admissible strengthenings of the antecedent. In Krifka's terms, *ever* would be the least element in the NPI lattice $\langle \mathbf{ever}', L_{\mathbf{ever}}, \leq_{\mathbf{ever}} \rangle$. Frequency adverbials like those mentioned above are members of the same lattice.

The extension of this strategy to questions gives the wrong results. The relevant NPI lattice of *Who lifted a finger to help?* would be determined by the denotation of *lifted a finger*, namely we would be dealing with a lattice of actions. The NPI would denote the (contextually determined) smallest element in the lattice. Therefore, the question should mean something like 'Who did the least to help?' or 'Who did nothing to help?'. But the above question is never interpreted this way. The relevant lattice in the case of questions is always the answer set lattice, not the lattice constituted by the substitution class of the NPI. Rhetoricity requires that the empty set be empty and this becomes the contextually relevant lattice. This shows that Heim's insight about the contextual determination of decreasingness is correct, but the additional recipe for its determination (the substitution class of the NPI expression) is not applicable to questions.

6 *Why* and *How* questions

There is a well-known asymmetry in the availability of rhetorical questions depending on the type of the question. Consider the following examples from Lawler (1971):

- (31) a. When did Max hit anybody?
b. Why did Max hit anybody?

Question (31a) presupposes that Max did not hit anybody, so it behaves as a rhetorical question. Its answer set is empty: the set of times when Max hit somebody is empty. On the other hand, question (31b) presupposes that Max hit somebody. Therefore, it lacks a proper rhetorical reading. It has what I am going to call, following Lee (1995), a *surprise* reading. By uttering (31b), a speaker expresses surprise by the fact that Max hit somebody. This is why (s)he is asking about Max's motivations for doing so. Consider now the following sentences:

- (32) a. Why did you tell anybody about us?
b. How did anybody buy that house?

Question (32a) presupposes that the addressee told somebody about them and question (32b) presupposes that somebody bought the house. In its most natural reading (32b) expresses the speaker's surprise about the unexpected fact that

somebody bought the house. The assertive content of (32b) is a question about the manner in which the selling transaction took place. It is clearly not a rhetorical reading, since the speaker has no assumption about the emptiness of an answer set.

We can conclude, thus, that *why* and *how* questions lack rhetorical readings. Szabolcsi & Zwarts (1993) claim that manners and reasons constitute join semilattices. Join semilattices are closed under joins but not under complements, since they lack a bottom element.



Since manners and reasons are structured as semilattices without a bottom element, they cannot constitute proper denotations of rhetorical questions (there is no an empty set of manners or reasons). Therefore, the reason why there are no proper rhetorical *why* and *how* questions is semantic. Since they cannot denote empty sets, they do not meet the essential denotational requirement to be a rhetorical question. On the other hand, rhetorical readings are defined for *what*, *who*, *which* questions because these *wh*-words range over individuals and the domain of individuals is structured as a boolean algebra -a lattice closed under meets, joins and complements- (Keenan and Faltz (1985)). *When*-questions also have rhetorical readings because times are structured as linear orders, and have a bottom element.

A potential counterexample for this approach are sentences like the following, where an answer like (33b) seems perfectly reasonable.

- (33) a. Why is there anything on my table?
 b. For no reason

Notice that not only (33a) admits (33b) as an answer but also that (33a) can be construed as rhetorical. Our claim for the non-existence of a bottom element in reason semi-lattices has to be restricted to actions. Intuitively, all actions have a reason or a cause. On the other hand, states or dispositions are not necessarily associated to a reason or cause. We do not need to make this distinction in the case of manners, due to the fact that manners are always associated to actions.

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JAVIER GUTIERREZ-REXACH
 DEPARTMENT OF LINGUISTICS, UCLA
 405 HILGARD AVE.
 LOS ANGELES, CA 90024
 E-mail: GUTIER@UCLA.EDU

θ -assigning Nouns, Incorporation, and LF Case-checking in Korean

Jeong-Seok Kim
University of Connecticut

1 Introduction

This paper aims at providing a unified account of the θ -assigning noun in the light verb construction (LVC) and the aspectual construction (AC) in Korean. To achieve this goal, we develop a syntactic underspecification theory which has been pursued in Van Gelderen (1992), Rooryck (1994), and Dubinsky (1994), to name a few.

Let us start by examining what the issues are in the LVC. Consider the following Korean examples.

- (1) a. John-i ku il-ul **hayssta**
 -Nom the job-Acc did
 'John did (or performed) the job'
 b. John-i ku saken-ul **cosa-lul** (chelcehi) **hayssta**
 -Nom the case-Acc investigate-Acc (thoroughly) ha-Past
 'John (thoroughly) investigated the case'
 c. John-i ku saken-ul **cosa-(*chelcehi)-hayssta**
 -Nom the case-Acc investigate-(*thoroughly) -ha-Past
 'John (thoroughly) investigated the case'

In (1a), the verb *ha* is thematically complete or *heavy* in the sense that it has a meaning of 'complete' or 'perform' just like English main verb *do*. On the other hand, *ha* in (1b) is thematically incomplete or *light* in that it has no meaning and thus no argument structure (Cattell 1984).¹ The main topics related to this construction are the following: (a) What is the source of the Acc Case attached to *ku saken* and *cosa*? (b) How can the arguments in (1b), that is, *John* and *ku saken*, be assigned θ -roles when the verb *ha* does not seem to be the source of those θ -roles? If they are within the projection of the θ -assigning noun *cosa*, they must receive Gen(itive) Case, realized by *uy* 'of'. The Case attached to these phrases indicates that they are clausal arguments. But if they are clausal arguments, it is unclear what the source of their θ -role is.

To make this point clear, let us compare (1b) with (1c). In (1c), *cosa* 'investigate' is incorporated into *ha* in the lexicon or in overt syntax. Thus, the morphologically complex form of *cosa-ha* 'investigate' assigns θ -roles to the arguments *John* and *ku saken*. On the other hand, in (1b), it seems that (subject and object) θ -roles are assigned by the θ -assigning noun *cosa*, and the verb *ha* is nothing but a meaningless *expletive verb*. Unlike (1c), in (1b), *cosa* and *ha* are syntactically autonomous and thus lexical items such as the adverb *chelcehi* 'thoroughly' can intervene between them. This is why the example of type (1b) is called LVC. Many previous researches have focused on how to relate the mismatch between Case-marking and θ -role assignment in the LVC. That is, in (1b), it has been generally assumed in Korean literature that the Acc Case of *ku saken* is assigned by the verb *ha* but its θ -role is given by the θ -assigning noun *cosa*. In (1c), which is not a LVC, there is no mismatch between Case and θ -role assignments for

the internal argument *ku saken* because the morphologically complex verb *cosa-ha* assigns both Case and θ -role to it.

We first discuss the LVC and then turn to the AC.

2 The Light Verb Construction

2.1 Basic Paradigms

Let us now define the phenomena which will be addressed in this paper. The θ -assigning nouns in the LVC may be classified into two types; verbal nouns and adjectival nouns. In the analysis of Japanese LVC, Martin (1975) termed θ -assigning nouns as verbal nouns in the sense that they apparently behave as a verb (Case assigner) and as a noun (Case assignee) at the same time.

- (2) John-i ku saken-ul cosa-lul hayssta
 -Nom the case-Acc investigate-Acc ha-Past
 ‘John investigated the case’

In (2), the verbal noun *cosa* seems to be the source of the Acc Case of the NP *ku saken* while it has an Acc Case marker.

In Korean, there is another type of θ -assigning nouns in the LVC. We will call them adjectival nouns. As an illustration, in (3), the θ -assigning noun *kenkang* ‘healthy’ shows both adjectival and nominal properties.

- (3) John-i (*pyenramepsnun / pyenramepsi) kenkang-un/-*ul hata
 -Nom *constant / constantly healthy-Foc/-*Acc ha
 ‘John is (constantly) healthy’

In (3), the θ -assigning noun *kenkang* behaves in a sense as an adjective since it describes some property of the subject *John* and allows modification by adverbials, while it behaves also as a noun since it allows a focus marker like *-un* to be attached although it does not allow an Acc Case marker.

2.2 Previous Analysis: Argument Transfer

Grimshaw and Mester (1988) discuss characteristics of Japanese LVC and argue that they follow from Argument Transfer with the assumption of the hierarchical organization of the argument structure. Their Argument Transfer operation is not arbitrary but constrained by the following restrictions (adapted by Saito and Hoshi 1994).

- (4) a. At least one internal θ -role of the noun must be assigned to an argument outside the NP.
 b. If a θ -role T is assigned outside the NP, then all θ -roles that are higher than T in the thematic hierarchy (Agent > Goal > Theme) must also be assigned outside the NP.

Let us now examine how (4) works for Japanese data. Consider the following contrast.

- (5) a. Mary-ga John-ni [_{NP} toti-no zyooto]-o sita
 -Nom -Dat land-Gen giving-Acc su-Past
 b. *John-ni [_{NP} Mary-no toti-no zyooto]-o sita
 -to -Gen land-Gen giving-Acc su-Past
 'Mary gave a piece of land to John'
- (6) a. (for 5a) zyooto [Agent [Goal [Theme]]], su [] <Acc> ... input
 zyooto [Theme], su [Agent [Goal]] <Acc> ... output
 b. (for 5b) zyooto [Agent [Goal [Theme]]], su [] <Acc> ... input
 zyooto [Agent [Theme]], su [Goal] <Acc> ... output

(5a) is grammatical, observing the restrictions in (4): First, one internal θ -role (Goal) of the θ -assigning noun *zyooto* is assigned to the argument *John* outside the NP. Second, when Goal is assigned outside the NP, the θ -role (Agent) higher than Goal in the thematic hierarchy is assigned to the argument *Mary* outside the NP. However, (5b) is out since it violates (4b); that is, the internal θ -role (Goal) of the θ -assigning noun is assigned to the argument *John* outside the projection of the θ -assigning noun, leaving the thematically higher θ -role (Agent) within its projection, which we can see by the Gen Case marker attached to the agent NP.

Yeom (1994) adopts the operation of Argument Transfer for the analysis of Korean LVC. His basic line of reasoning for θ -role transfer is the same as that of Grimshaw and Mester. However, with respect to Case assignment, his analysis involves a nontrivial problem, which comes from the difference in Case licensing between Japanese and Korean. Consider the following contrast.

- (7) a. (Korean) John-i yenge *-uy/-lul kongpwu-lul hayssta
 -Nom English *-Gen/-Acc study-Acc ha-Past
 b. (Japanese) John-ga eigo-no/?*-o benkyoo-o sita
 -Nom English-Gen/?*-Acc study-Acc su-Past
 'John studied English'

Korean example (7a) shows that the object NP of a θ -assigning noun can only be marked with Acc Case, while Japanese counterpart (7b) shows that it can only be marked with Gen Case. With this point in mind, let us proceed to consider the example below.

- (8) cengpwu-ka tampay-lul swuip-ul hayssta
 government-Nom tobacco-Acc import-Acc ha-Past
 'The government imported the tobacco'

Yeom claims that in (8), light *ha* is the only Acc Case-assigner and the θ -assigning noun *swuip* is an NP just like the object NP *tampay* in that it is a Case-assignee. But two Acc Case markers appear in example (8). Given the apparent asymmetry between two Case-assignees and one Case-assigner in (8), Yeom adopts the explanation of Sells (1990) for Japanese LVC. More precisely, for the Acc Case marker on the verbal noun in (8), Yeom suggests that light *ha* is solely responsible. And for the Case marking of the object NP *tampay*, he claims that the light verb *ha* assigns the [+Aspect] feature to the verbal noun *swuip* which in turn licenses Acc Case on its internal argument *tampay*. In sum, Yeom's claim is that light *ha* is responsible for two occurrences of Acc Case in (8). This line of reasoning seems implausible since simple transitive verbs and light verbs (which are the counterparts

of heavy verbs except for the lack of the argument structure) usually are limited to assigning one Acc Case cross-linguistically (Yoon 1990).

A more serious problem of Yeom's account is found below. In (9a), which is not a LVC, the θ -assigning noun *kenkang* is clearly nominal; it assigns Gen Case to its argument *emeni* 'mother'. What we are interested in is the status of (9b).

- (9) a. John-i [NP emeni-uy **kenkang**]-ul kekcengha-ta
 -Nom mother-Gen **health**-Acc be-concerned
 'John is concerned about (his) mother's health'
 b. *John-i **kenkang**-ul hata
 -Nom **healthy**-Acc ha
 'John is healthy'

Following Yeom, suppose that the light verb *ha* is solely responsible for the Acc Case on the θ -assigning noun. Then it is not obvious why example (9b) is ruled out. The key to the contrast between (8) and (9b) seems to lie in the nature of the θ -assigning noun involved.

Another interesting property of this construction which has not been discussed in Korean literature is that it allows multiple occurrences of verbal nouns.

- (10) cengpwu-ka tampay-lul **swuip**-ul **kumci**-lul **hayssta**
 government-Nom tobacco-Acc import-Acc ban-Acc ha-Past
 'The government banned the import of the tobacco'

Regarding (10), Yeom might say that the Acc Case marker attached to the verbal noun *kumci* 'ban' is licensed by the light verb. If the light verb assigns [+Aspect] to the verbal noun *kumci*, this aspect feature may license the Acc Case on another verbal noun *swuip* 'import'. Now a question arises: How can we explain the Acc Case of the argument *tampay* 'tobacco'? He might be forced to say that if light *ha* assigns another [+Aspect] to the verbal noun *swuip*, this aspect feature can license the Acc Case of the object *tampay*. More precisely, he might want to claim that light *ha* may assign [+Aspect] two times here. This leads us to believe that the Case assigning mechanism adopted explicitly or implicitly in the literature cannot be the right one.

2.3 Proposals: Zero Derivation & Syntactic Underspecification

In order to capture the relation between a θ -assigning noun and light *ha* in Korean LVC, we first consider the implication of positing a zero derivational affix in English and then extend this idea to Korean. Postulation of phonologically zero inflectional morphemes is not a new idea. For example, it is not inconceivable to assume that a phonologically zero pluralizer is attached to plural *deer*. In a similar way, we may say that a zero past participial ending exists in participial *run*.

Chomsky and Halle (1968) observe that the presence of noun-verb pairs in (11a) and noun-adjective pairs in (11b) provides evidence for phonologically zero derivation.

- (11) a. noun-verb pairs: torment, permit, convert, produce, etc.
 b. noun-adjective pairs: immortal, infant, noble, maiden, etc.

They suggest that the words in (11) undergo V → N or A → N phonologically zero derivation. Incorporating their suggestion, we assume that [_N torment] and [_N immortal] have the following nested structures respectively; [_N [_V torment]-ϕ] and [_N [_A immortal]-ϕ] where ϕ is a zero morpheme.

Assimilating the above discussion of English morphology to Korean, we propose the following zero derivation:

- (12) phonologically zero derivation in the lexicon²
 a. *cosa* 'investigate' [uV, -N] → *cosa* 'investigation' [-V, +N]
 b. *kenkang* 'healthy' [uV, +N] → *kenkang* 'health' [-V, +N]
- (13) semantically zero derivation in the lexicon or in overt syntax
 a. *cosa* 'investigate' [uV, -N] → *cosa-ha* 'investigate' [+V, -N]
 b. *kenkang* 'healthy' [uV, +N] → *kenkang-ha* 'healthy' [+V, +N]

For instance, a phonological string such as *cosa* can represent two distinct categories of a defective verb and a noun, whereas *kenkang*, a defective adjective and a noun. As in (12), if a defective verb or a defective adjective undergoes phonologically zero derivation in the lexicon, it becomes a simple noun. Thus, the nouns *cosa* and *kenkang* have the following nested structure; [_N [_{dV} *cosa*]-ϕ] and [_N [_{dA} *kenkang*]-ϕ].³ But they may undergo another language-particular zero derivational process, which we call semantically zero derivation, and they ultimately turn into a complete verb and a complete adjective respectively, having combined with a category-completing affix *ha*, as shown in (13). Thus, the nested structures of *cosa-ha* and *kenkang-ha* are as follows; [_V [_{dV} *cosa*]-*ha*] and [_A [_{dA} *kenkang*]-*ha*].

So far, we have explored the possibility of positing a (phonologically or semantically) zero derivational affix in English and Korean. A question can be raised why a certain lexical item undergoes zero derivation. In relation to this, we propose the following condition.

- (14) A lexical item having an unspecified feature [uF] must undergo zero derivation in the lexicon or in syntax in order to spell out its [uF].

In accordance with (14), the unspecified verbal feature [uV] of a defective verb or a defective adjective must be specified whether the defective category undergoes (phonologically or semantically) zero derivation in the lexicon or in syntax.

We will now present our main proposals for the analysis of the LVC. A crucial feature of the theory proposed here is that lexical features of some lexical item may be syntactically unspecified. Let us first elaborate on the properties of verbal nouns. They function as Case assigners, thus having [-N]. There are a couple of pieces of evidence regarding their verbal character. First, they can license Acc Case. Second, they cannot be modified by adjectives like *kongsikcekin* 'official' but can be by adverbials like *kongsikcekulo* 'officially' as shown in (15).

- (15) *cengpwu-ka tampay-lul *kongsikcekin/kongsikcekulo swuip-ul hayssta*
 government-Nom tobacco-Acc *official/officially import-Acc ha-Past
 'The government officially imported the tobacco'

But their verbal property is defective. The following illustrates this point.

- (16) a. John-i yenge-lul kongpwu (*-ess)-lul hayssta
 -Nom English-Acc study-(*-Past)-Acc ha-Past
 b. John-i yenge-lul kongpwu(-lul) *(ha)-yssta
 -Nom English-Acc study(-Acc) *(ha)-Past
 'John studied English'

They cannot carry verbal inflections (e.g., tense) as shown in (16a). This indicates that they are not [+V] elements. They cannot have [-V] either; if they have [-V, -N], then they have the same features as Ps (prepositions or postpositions). As is well known in Korean literature, Ps cannot license Acc Case as shown in (17).

- (17) John-i cip-*(ul)-ulo kassta
 -Nom home-*(Acc)-to went
 'John went home'

Another fact to reflect their defective character is that they cannot license Acc Case if not followed by light *ha* as in (16b). These facts show that verbal nouns are not full-fledged verbs. In the same light, we propose that an adjectival noun is not a noun but a defective adjective which has [uV, +N].

- (18) a. John-i kenkang *(ha)ta
 -Nom healthy ha
 'John is healthy'
 b. kenkang *(ha)n salam
 healthy ha person
 'a healthy person'

As shown above, the defective adjective *kenkang* neither functions as a predicate in (18a) nor modifies a noun in (18b) without *ha*.

Thus far, we have argued that the θ -assigning noun in the LVC is not a noun but a defective verb or a defective adjective and that its defective character results from the unspecified feature [uV]. The next task we are concerned with is how to spell out the unspecified feature in grammar. Recall that we already proposed that in the lexicon, defective categories may undergo phonologically zero (dV/dA \rightarrow N) derivation and that in the lexicon or in overt syntax, they may undergo semantically zero (dV/dA \rightarrow V/A) derivation in order to spell out their unspecified lexical features. As an alternative way of spelling out the unspecified feature of defective categories, which do not undergo zero derivation in the lexicon or in overt syntax, we adopt the LF incorporation analysis by which a θ -assigning noun is incorporated into the light verb at LF (Saito and Hoshi 1994). Based on the idea that the subject θ -role of a noun may be suppressed (Zubizarreta 1985, Grimshaw 1990), Saito and Hoshi (1994) propose that in Japanese LVC, a θ -assigning noun (which has [-V, +N]) is incorporated into light *su* at LF in order to discharge the undischarged θ -roles (e.g., external θ -role) at the clausal level.

On the other hand, the θ -assigning noun in Korean LVC is not a noun but a defective verb or a defective adjective, unlike the θ -assigning noun in Japanese LVC. In this light, we propose that in Korean, the incorporation of a θ -assigning noun into the light verb is motivated by the defective character (i.e., the unspecified feature [uV]) of the θ -assigning noun. In accordance with condition (14), the unspecified feature [uV] of the θ -assigning noun must be specified.⁴

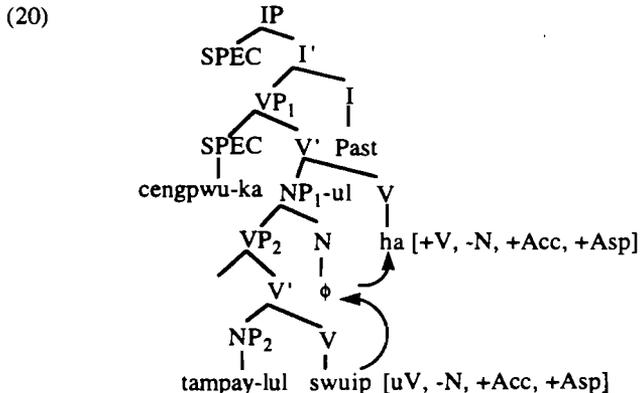
In Chomsky (1992), verbs are taken from the lexicon as fully inflected forms and the inflectional features on the verb must be checked off in the course of derivation. To achieve this goal, the verb raises and adjoins to various functional heads above the VP overtly or covertly, with the result that it checks off its inflectional features against abstract features of the functional heads until none remains. This checking theory also holds that when NPs are inserted into syntactic structures, they already have Case features. These NPs must also move to the appropriate positions where their Case features can be licensed: Nom Case is licensed in Spec of Agrs and Acc Case is licensed in Spec of Agro via Spec-head agreement. In this paper, we assume a slightly different version of Case-checking theory than Chomsky (1992), based on the assumption that AgroP does not exist in Korean, following S.-W. Kim (1994) and others. The no-AgroP hypothesis in Korean is compatible with the idea that a functional category must be postulated on a parametric basis (Chomsky 1994). Under the no-AgroP hypothesis in Korean, we suppose that Acc Case, which is inherent in Korean, is checked by the verb in a head-complement configuration at LF while Nom Case is checked by Infl (the amalgamation of Agrs and T) in a Spec-head configuration overtly.

One apparent problem of this analysis is that an Acc Case marker is attached to a defective category [uV, -N].

- (19) John-i [[vp ppalli talli]-*(ki)]-lul cohahanta
 -Nom fast run-nominalizer-Acc like
 'John likes running fast'

As shown in (19), if we attach the Acc Case marker *lul* to *talli* 'run', the sentence is ungrammatical, while a verb can have an Acc Case marker when it is mediated by a nominalizer such as *ki*.

Drawing on this fact, we propose that a verbal noun is followed by the null nominalizer ϕ [+N] which is an invisible counterpart of the nominalizer *ki* (K.-S. Lee 1990). This null nominalizer is attached to the VP headed by the verbal θ -assigning noun and assigns nominal property to the phrase (VP) and thus allows the whole unit to be the carrier of an Acc Case marker. (20) would be the structure of (8) according to the present analysis.



In (20), *swuip* 'import' assigns a θ -role to the object *tampay* 'tobacco' and checks its Acc Case in a head-complement configuration before incorporation. The unspecified feature [uV] drives the movement of the θ -assigning noun into the light verb, through the null nominalizer position, satisfying the Head Movement Constraint (Chomsky 1986).⁵ As a result, the unspecified feature of the defective verb *swuip* is specified by undergoing dV \rightarrow V (semantically) zero derivation in covert syntax; viz., [_v [_{dV} *swuip*]-*ha*]. In LF, the complex form of the verbal θ -assigning noun *swuip* and the light verb *ha* checks the Acc Case of the NP₁ *tampay-lul swuip* in a head-complement configuration. Note that the amalgamation of *swuip-ha* retains one Acc Case feature which comes from light *ha*; the Acc Case feature of *swuip* disappeared after checking the Acc Case of the argument *tampay*. We thus claim that the LVC is an instantiation of symmetric Case checking between checkers and checkees.

This treatment gets support from scrambling facts.

- (21) a. *tampay*_i-*lul* *cengpwu*-*ka* [_{NP} *t*_i *swuip*] ϕ -*ul* *hayssta*
 tobacco-Acc government-Nom import-NN-Acc ha-Past
 b. * [_t *t*_i *swuip*]_j-*ul* *cengpwu*-*ka* *tampay*_i-*lul* *t*_j *hayssta*
 import-Acc -Nom tobacco-Acc ha-Past
 c. [_{NP} [_{VP} *tampay*-*lul* *swuip*] ϕ]_j-*ul* *cengpwu*-*ka* *t*_i *hayssta*
 tobacco-Acc import-NN-Acc -Nom ha-Past
 'The government imported tobacco'

As shown in (21a), the theme NP *tampay* 'tobacco' in the LVC can be scrambled to the sentence initial position. (21b) shows that the θ -assigning noun *swuip* 'import' cannot be scrambled. Interestingly, it can undergo scrambling along with its theme argument in (21c) (K.-S. Lee 1990). If Yeom's (1994) analysis is right that a θ -assigning noun is an NP, it is not clear at all why it cannot alone undergo scrambling in (21b) because NP-scrambling is free in (21a, c) (Saito 1989).

Our proposal provides a straightforward account for the facts above. First, in (21a), the theme NP *tampay* can move out of the VP headed by *swuip* (in fact, the NP headed by a null nominalizer). (21c) does not pose a problem either, since it involves a preposing of the whole VP (in fact, the NP headed by a null nominalizer) as a unit. That VP can be preposed when it is followed by a nominalizer is well documented (Ahn 1991).

- (22) [[_{VP} *ppalli talli*]-*(*ki*)]_i-*lul* *John*-*i* *t*_i *hayssta*
 fast run-nominalizer-Acc -Nom ha-Past
 'John runs fast'

(22) shows that the VP attached with the nominalizer *ki* can be scrambled without degrading the sentence while the VP alone cannot be scrambled. Compare (22) with (21c). The grammaticality of (21c) signifies that there is an invisible nominalizer which allows a VP to be preposed. Now the ungrammaticality of (21b) is attributed to the violation of Proper Binding Condition (Fiengo 1977), which requires that traces be bound. For the order in (21b) to obtain, first the theme NP₂ *tampay* has to move out of the NP₁ *tampay-lul swuip* and then the NP₁ containing the trace of the moved NP₂ is scrambled to the sentence initial position. In the resulting structure, the trace of the theme NP *tampay* is not c-commanded by its antecedent.

Now, consider again (9b) whose structure is given below.

- (23) *John_i-i [VP t_i [NP [AP **kenkang**]- ϕ]-ul **ha**]-ta
 -Nom healthy-NN-Acc ha
 'John is healthy'

Dubinsky (1994:64) suggests that "morphologically overt head raising (e.g., V-raising) requires a matching of features while LF raising only requires that there be no feature clash." This means that [+V] heads (i.e., verbs and adjectives) can raise to other [+V] heads (e.g., affixal predicates and tense inflections) at LF. Adopting his suggestion, but from a different perspective, we propose the following weaker version of LF head raising condition.

- (24) LF head raising requires that there be no aspectual feature clash.

With this in mind, consider the following pair of sentences.

- (25) Mary-ka cwuk-(nun)-ta
 -Nom die-(Aspect)-Dec
 'Mary dies'
 (26) John-i cengcikha-(*n)-ta
 -Nom honest-(*Aspect)-Dec
 'John is honest'

[-stative] verbs like *cwuk* can bear an aspectual marker like (*n*)*un* as in (25), while [+stative] verbs like *cengcikha* cannot, as in (26). The same contrast seems to obtain in Korean LVC.

- (27) cengpwu-ka tampay-lul swuip-ul ha-(n)-ta
 government-Nom tobacco-Acc import-Acc ha-(Asp)-Dec
 'The government imports the tobacco'
 (28) John-i kenkang ha-(*n)-ta
 -Nom healthy ha-(*Asp)-Dec
 'John is healthy'

[-stative] θ -assigning nouns (=defective verbs) can appear with an aspectual marker as in (27), whereas [+stative] θ -assigning nouns (=defective adjectives) cannot, as in (28). Following Higginbotham (1985), we assume that ϕ -assignment should be expanded beyond the commonly acknowledged relation of ϕ -marking to include other relations such as the feature [+Aspect]. Then we may say that light *ha* uniformly has the specification of [+V, -N, +Acc, +Aspect] just like heavy *ha* except for θ -grid, based on Cattell's (1984) definition of a *light* verb (see footnote 1). Then, we can account for the grammaticality contrast between verbal nouns and adjectival nouns in the LVC when they appear with an Acc Case marker. In (20), when the verbal noun *swuip* incorporates into light *ha* at LF, there is no aspectual feature clash between them since they both are specified as [+Aspect]. However, in (23), when the adjectival noun raises to the light verb through the position of a null nominalizer, this raising engenders the aspectual feature clash since the former has [-Aspect] and the latter [+Aspect]. As a consequence, the Acc Case on adjectival nouns cannot be licensed.

Let's get back to the multiple transitive verbal nouns in the LVC. (29) is the structure of (10).

- (29) cengpwu_i-ka [VP₁ t_i [NP₁ [VP₂ [NP₂ [VP₃ tampay-lul swuip]-φ]-ul
 government-Nom tobacco-Acc import-NN-Acc
 kumci]-φ]-lul ha]-yssta
 ban-NN-Acc ha-Past
 'The government banned the import of the tobacco'

There are three Acc Case markers in (29). Let us justify their appearances one by one. First, the lower verbal noun *swuip* [+Acc] 'import' checks the Acc Case of *tampay* in a head-complement configuration. Second, the higher verbal noun *kumci* [+Acc] 'ban' checks the Acc Case of the NP₂ *tampay-lul swuip* in a head-complement configuration. Third, the light verb *ha* checks the Acc Case of the NP₁ *tampay-lul swuip-ul kumci* in a head-complement configuration. As suggested before, the defective categories, which did not undergo zero derivation before covert syntax, must undergo LF incorporation into the light verb in order to specify their unspecified features [uV]. In accordance with the Head Movement Constraint, the lower verbal noun *swuip* first raises to the higher verbal noun *kumci*, through the lower null nominalizer position, and then the complex form of *swuip-kumci* raises to light *ha*, through the higher null nominalizer position, in order to specify their unspecified feature [uV]. This successive cyclic raising is allowed since there is no aspectual feature clash between the two verbal nouns [+Aspect] and the light verb [+Aspect]. Thus every occurrence of an Acc Case marker is licensed. The structure of *swuip-kumci-ha* is as follows; [v [_{AV} [_{AV} swuip]-[_{AV} kumci]]-ha].

3 Consequence: The Aspectual Construction

It has been observed that event or process nouns may have argument structures just like verbs (Grimshaw 1990). In other words, they can assign θ-roles to their arguments just like the θ-assigning nouns in the LVC. One such case is *yenkwu* 'research' which takes subject and object as its arguments. As shown in (30), the arguments that appear in the projection of the event noun *yenkwu* must be Gen Case-marked.

- (30) a. [NP John-uy ipca ilon-uy yenkwu]
 -Gen particle theory-Gen research
 b. *[NP John-i ipca ilon-uy yenkwu]
 -Nom particle theory-Gen research
 c. *[NP John-uy ipca ilon-ul yenkwu]
 -Gen particle theory-Acc research
 d. *[NP John-i ipca ilon-ul yenkwu]
 -Nom particle theory-Acc research
 'John's research on particle theory'

The arguments in an event nominal clause cannot have verbal (i.e., Nom or Acc) Case as shown in (30b-d). On the other hand, the arguments of a clause can only be marked with verbal Case as shown in (31).

- (31) a. [_{IP} John-i ipca ilon-ul yenkwuhayssta]
 -Nom particle theory-Acc researched
 b. * [_{IP} John-i ipca ilon-uy yenkwuhayssta]
 -Nom particle theory-Gen researched
 c. * [_{IP} John-uy ipca ilon-ul yenkwuhayssta]
 -Gen particle theory-Acc researched
 d. * [_{IP} John-uy ipca ilon-uy yenkwuhayssta]
 -Gen particle theory-Gen researched
 'John did research on particle theory'

However, when an event noun is followed by a morpheme indicating tense or aspect such as *cwung* 'during,' *cen* 'before,' *hwu* 'after,' *tangsi* 'when,' etc., the arguments of an event noun exhibit additional Case possibility as in (32). (Ahn 1991, Y.-S. Lee 1992).

- (32) a. John-uy ipca ilon-uy yenkwu cwung
 -Gen particle theory-Gen research during
 b. ? John-i ipca ilon-uy yenkwu cwung
 -Nom particle theory-Gen research during
 c. * John-uy ipca ilon-ul yenkwu cwung
 -Gen particle theory-Acc research during
 d. John-i ipca ilon-ul yenkwu cwung
 -Nom particle theory-Acc research during
 'during John's research on the particle theory'

All arguments can be marked with Gen Case as in (32a) or with verbal Case as in (32d). But a combination like (32c) in which a mixed Case array appears is not allowed. Interestingly, (32b) in which the subject of the event noun *yenkwu* 'research' is Nom Case-marked and the object is Gen Case-marked is allowed.

In the following, we account for the phenomena described above by extending our syntactic underspecification theory to the θ -assigning noun (i.e., event noun) in the AC.

We have observed that the theme NP of an event noun (= θ -assigning noun) can be marked with Gen Case or Acc Case when the event noun is followed by an aspectual morpheme. This means that the event noun as a Case assigner acts like a noun on one hand and a verb on the other hand. To get out of this contradictory situation, Y.-S. Lee (1992) claims, following Grimshaw (1991), that although an event noun by itself has the lexical specification of [-V, +N] just like a simple noun, it may combine with a functional category of verbal nature, that is, an aspect/tense morpheme. According to her, this is why an event noun can show both nominal and verbal properties with respect to Case marking. In other words, her claim is that the Gen Case of the theme NP in the AC comes from the event noun itself and the Acc Case of the theme NP from the aspectual morpheme (or the combination of an event noun and an aspectual morpheme).

Contra Y.-S. Lee (1992), we argue that aspectual morphemes are nominal [-V, +N]. One evidence comes from Case-marking. Let us take the following examples for illustration.

- (33) John-i [_{PP} [_{NP} yel-si]-*(ey)] achim-ul mekessta
 -Nom 10-o'clock-at breakfast-Acc ate

- 'John had breakfast at 10'
- (34) John-i [PP [NP *yel-si-hwu*]-*(*ey*)] achim-ul mekessta
 -Nom 10-o'clock-after-at breakfast-Acc ate
 'John had breakfast after 10'

In (33), the compound noun *yel-si* '10 o'clock' is the object of postposition *ey* 'at', thus assigned Oblique Case from it, although Oblique Case is not overtly realized in Korean. Compare (33) and (34). In the latter, the aspectual morpheme *hwu* 'after' is combined with the compound noun *yel-si* '10 o'clock'. Now the newly formulated compound word *yel-si-hwu* is the object of postposition *ey* 'at', thus assigned Oblique Case from it. Moreover, each sentence in (33) and (34) is ungrammatical without the postposition *-ey* 'at'. The parallelism between (33) and (34) suggests that the aspectual morpheme has a nominal property as a Case assignee.

If an aspectual morpheme is indeed a noun, then there must be another source of Acc Case in the AC. To account for the Case alternation between Gen Case and Acc Case attached to the theme NP of an event noun, we propose that the event noun has the lexical specification of [-V, +N] or [uV, -N]. Suppose that an event noun is uniformly a full-fledged verb, as proposed by Ahn (1991). Then we may account for (32d) in which the appearance of an Acc Case marker on *ipca ilon* 'particle theory' is licensed by the event noun *yenkwu* 'research'. However, this rigid approach to the categorial status of an event noun cannot subsume (32a). As is well known, the verb in Korean cannot license Gen Case.

To provide a proper account of the data in (32), we propose that the event noun in (32d) is a defective verb which has [uV, -N] just like the verbal θ -assigning noun in the LVC. The following modification test provides evidence that the event noun in (32d) is verbal.

- (35) John-i ipca ilon-ul *cisokcekin / cisokcekulo yenkwu cwung
 -Nom particle theory-Acc *continuous/continuously research during
 'while John continuously researches the particle theory'

However, the verbal property of the event noun in (32d) is defective in that it cannot have verbal inflections (e.g., tense) in (36a) and cannot license Acc Case without an aspectual morpheme such as *cwung* 'during' in (36b).

- (36) a. John-i ipca ilon-ul yenkwu (*-ess) cwung
 -Nom particle theory-Acc research (*-Past) during
 b. John-i ipca ilon-ul yenkwu *(*cwung*)
 -Nom particle theory-Acc research *(during)
 'During John's research on the particle theory'

Now we have the following scenario for (32d) whose structure is given below.

- (37) [NP [IP John_i-i [VP₁ t_i [VP₂ ipca ilon-ul d_vyenkwu] ve]]e] N_ccwung]
 -Nom particle theory-Acc research during
 'during John's research on the particle theory'

The defective verb *yenkwu* checks the Acc Case of its theme NP *ipca ilon* in a head-complement configuration. But it has the unspecified feature [uV] which must be

be discharged at D-structure and some of them can be discharged at LF. Our analysis is also in line with Saito and Hoshi (1994) in that θ -roles may be discharged during derivation, although our focus was on the Case phenomena of Korean LVC and AC.

Endnotes

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1. We use the term *light verb* to refer to the thematically empty use of verbs such as *give* (a kiss), *make* (an inspection), and *have* (a lick) in which 'the action is spelt out in the nominal that follows,' and the nominal determines the argument structure (Cattell 1984). That is, the light verb *ha* has no argument structure but only the ability to license (one) Acc Case.

2. We have defined two types of zero derivation in Korean; phonologically zero derivation and semantically zero derivation. In a sense, phonologically zero derivation is a misnomer since it always accompanies semantically zero derivation, while semantically zero derivation does not necessarily imply phonologically zero derivation. For the purpose of exposition, however, we will use these terms in the paper.

3. 'dV' represents a defective verb [uV, -N]. In a similar way, 'dA' symbolizes a defective adjective [uV, +N].

4. We might motivate the incorporation of a θ -assigning noun into light *ha* in a different way. In Korean LVC, light *ha* has no semantic import as it is an expletive verb. Then we might treat light *ha* as an LF affix such as English *there* or Italian *ci* (Chomsky 1991). According to the Principle of Full Interpretation (Chomsky 1991), it needs to attach to something at LF. Hence, concerning the motivation for LF incorporation of a θ -assigning noun into light *ha*, there seems to be overlap between the two options: the defective character of a θ -assigning noun and the affixal property of the light verb *ha*. At the moment, we lean toward the first option in order to assimilate our analysis of the LVC to the AC. In the AC, unlike the LVC, an expletive element like light *ha* does not appear overtly.

5. In (20), we assume that excorporation is involved in the cyclic raising of a θ -assigning noun up to light *ha*. More precisely, in the first stage, *swuip* raises to the null nominalizer ϕ [+N]; [_N [_{dV} *swuip*] ϕ]. In the second stage, only *swuip* raises to light *ha*; [_v [_{dV} *swuip*] *ha*].

6. We assume that Gen Case attached to the NP-internal arguments is licensed by the head noun (Saito and Hoshi 1994).

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A Unified Analysis of Cardinal NPs and Dependent Generics

Eun-Joo Kwak
Brown University

1. Introduction

I discuss semantic parallel of two separate phenomena, namely the ambiguity of weak quantifier and that of generics. The weak forms of weak quantifiers and generics, i.e., 'cardinal' NPs and 'dependent' generics, show close similarities as to quantificational dependency, maximality, the distinction of stage-level and individual-level predicates, etc. To capture these similarities, I will argue that cardinal NPs and dependent generics should be interpreted in a uniform way, and their semantics should provide accounts for why they usually do not occur with individual-level predicates. I will review Diesing (1992), pointing out that she cannot deal with exceptional cases to the generalizations about cardinal NPs and dependent generics. Adopting Kuroda (1972)'s notion of 'categorical' and 'thetic' judgments, I will propose that cardinal NPs and dependent generics are event-dependent NPs.

2. The Ambiguity of Weak Quantifiers

In this section I argue for the ambiguity of weak quantifiers, and the properties of cardinal NPs. I will consider Milsark's generalization, pointing out that it has systematic exceptions.

2.1 Weak Quantifiers and Cardinal NPs

Inspired by Milsark (1974, 1977), a number of researchers including Enç (1991), Diesing (1992), Ladusaw (1994), and de Hoop (1995) defend the distinction between weak quantifiers which have quantificational readings and those which have cardinal readings.¹ Let us call the former weak quantifiers and the latter 'cardinal NPs'. Weak quantifiers and cardinal NPs have different interpretations as to presuppositionality. For instance, a weak quantifier *some cats* in (1a) quantifies over a set of cats whose existence is already presupposed in the context, whereas a cardinal NP *sm cats* in (1b) introduces a new entity in the discourse, i.e., a set of cats entering the backyard.

- (1) a. Some cats entered the backyard last night.
b. Sm cats entered the backyard last night.

Thus *some cats* is similar to a partitive *some of the cats* in its interpretation.

The difference as to presuppositionality may be seen in various ways. First, since the domain of a weak quantifier is presupposed and restricted by discourse, it cannot be followed by a *WH-ever* clause, which induces an object-independent reading.

- (2) a. * Some cats, whatever ones they are, entered the backyard last night.
b. Sm cats, whatever ones they are, entered the backyard last night.

Second, weak quantifiers may be followed by a discourse-linked question like *which cats*, while it is very awkward to use it as to cardinal NPs.

- (3) A: Some cats entered the backyard last night.
 B: Which cats do you mean?
 A: Some (of the) cats in the neighborhood/ some of the cats John has/
 Felix and Garfield.
 (4) A: Sm cats entered the backyard last night.
 B: ?? Which cats do you mean?

Third, Diesing (1992) and Ladusaw (1994) observe that since weak quantifiers have discourse antecedents, they may be followed by *the others*.

- (5) a. Some cats entered the backyard, but the others stayed outside.
 b. ?? Sm cats entered the backyard, but the others stayed outside.

Fourth, Milsark (1974) discusses the fact that weak quantifiers do not fit in *there*-sentences, because *there*-sentences introduce the existence of new entities in the discourse. Thus only cardinal NPs can occur in the post-copular positions of *there*-sentences.

- (6) a. * There were some cats in the backyard
 b. There were sm cats in the backyard.

The ambiguity of weak quantifiers and cardinal NPs can be further shown by the fact that they cannot be conjoined. Consider (7b-c) as the continuations of the discourse introduced by (7a).

- (7) a. Ten men came to the party just now.
 b. Three men started to dance.
 c. Three men and three women started to dance.

Three men of (7b) is ambiguous between a quantificational and a cardinal readings. It may refer to three of the ten men who just came to the party, or three men whose existence has not been introduced in the discourse yet, e.g., three men who were already in the party. In contrast, the interpretation of *three men* in (7c) is restricted to a cardinal NP. In view of the fact that *three women* of (7b) does not have a discourse antecedent, and thus its interpretation is restricted to a cardinal NP, the unambiguous reading of *three men* in (7c) shows that a weak quantifier and a cardinal NP cannot be conjoined, and thus they should be semantically distinguished.

Another difference between weak quantifiers and cardinal NPs is that cardinal NPs entail maximality, but weak quantifiers do not. To see the maximality of a cardinal NP, let us suppose that four cats sneaked in the backyard last night to steal a fish, and two of them were black. This situation may be described with (8a), in which only part of the four cats are mentioned as the participants of the sneaking event.

- (8) a. Two cats, namely black ones, sneaked in the backyard last night. They stole a fish with other cats sneaking in with them.

On the other hand, when a cardinal NP is used in this situation, the sentence sounds very odd.

- (8) b. ?? Tw cats, namely black ones, sneaked in the backyard last night. They stole a fish with other cats sneaking in with them.

The awkwardness of (8b) shows that a cardinal NP *tw cats* cannot denote any two cats or specific two cats out of the four in this situation. In other words, it cannot refer to only part of the participants. Hence it is concluded that cardinal NPs is subject to 'maximality', entailing the exhaustiveness of participants.

2.2 Milsark's Generalization and Its Exceptions

Given the distinction of weak quantifiers and cardinal NPs, Milsark (1974) makes a generalization concerning the combination of NPs and predicates.

(9) Milsark's Generalization

Stage-level (S-level) predicates may be predicated of cardinal NPs, while individual-level (I-level) predicates may not.

The plausibility of this generalization can be seen in (10).

- | | | |
|---------|------------------------------|-------------------------|
| (10) a. | Every girl was sick. | (strong Q + S-level) |
| b. | Some girls were sick. | (weak Q + S-level) |
| c. | Sm girls were sick. | (cardinal NP + S-level) |
| d. | Every girl was intelligent. | (strong Q + I-level) |
| e. | Some girls were intelligent. | (weak Q + I-level) |
| f. | * Sm girls were intelligent. | (cardinal NP + I-level) |

S-level predicates may occur with any type of NPs, whereas I-level predicates can occur only with quantificational NPs. Milsark's generalization is further supported by the *there*-construction. As discussed in the previous section, *there*-sentences may take only cardinal NPs in the post-copular positions. Given that, the unacceptability of (11d) shows that cardinal NPs cannot occur with I-level predicates.

- (11) a. * There were some girls sick.
 b. * There were some girls intelligent.
 c. There were sm girls sick.
 d. * There were sm girls intelligent.

In spite of the evidence for Milsark's generalization, however, it has systematic exceptions. First, Milsark (1977) notes that the occurrence of a complement phrase greatly enhances the acceptability of a cardinal NP as the subject of an I-level predicate.

- (12) a. * Sm boys are crazy.
 b. * Sm boys are tall.
 c. * Sm girls are smart.
 d. * Sm movies are insipid.

- (13) a. Sm boys are crazier than John.
 b. Sm boys are tall enough to play basketball.
 c. Sm girls are smart enough to solve the problem.
 d. Sm movies are too insipid to be believed.

Contrasting with (12a-d), (13a-d) sound perfect, making exceptions to Milsark's generalization. Second, I observe that two-place I-level predicates show a more complex acceptability pattern, occurring with cardinal NPs. For instance, (14a-e) show gradation in their acceptabilities.

- (14) a. * Sm boy loved sm girl.
 b. (?) John loved sm girl.
 c. (?) Sm boy loved Mary.
 d. Sm boy loved Mary, when she was in the high school.
 e. Sm boy in the neighborhood loved Mary, when she was in the high school.

According to Milsark's generalization, however, (14c-e) should sound as bad as (14a), because the subject positions are occupied by cardinal NPs. (14b) is also incorrectly predicted to be better than (14d-e), since the subject is not a cardinal NP. Third, notice further that symmetric predicates such as *share*, *meet*, etc. are S-level predicates, and thus may occur with cardinal NPs, as shown in (15a-c).

- (15) a. Sm professor shared an office with sm student.
 b. John shared an office with sm professor.
 c. Sm professor shared an office with John.

However, when both of the NP positions are occupied by cardinal NPs, the sentence sounds awkward as shown in (15d).

- (15) d. ?? Sm professor shared an office with sm professor(s).

Given the generalization and its exceptions, the questions are, first, why Milsark's generalization is true in English (and probably in other languages). In other words, how can we derive the generalization from the general properties of the predicate and the NP classes? Second, what kind of similarities do the exceptional cases have? Third, why do they make exceptions to the generalization?

3. The Ambiguity of Generics

In this section, I argue for the ambiguity of generics, pointing out that 'dependent' generics show close similarities to cardinal NPs.

3.1 Independent and Dependent Generics

According to Carlson (1977), the existential and generic readings of bare plurals are determined by the properties of predicates. S-level predicates induce the existential readings of bare plurals, while I-level predicates trigger generic readings. The episodic and generic readings of sentences parallel the existential and generic interpretations of bare plurals. Hence Carlson's non-ambiguity approach leads to a prediction that no generic sentences will involve the existential readings of bare

plurals. However, this prediction is not borne out. Carlson (1989) argues that according to Carlson (1977)'s non-ambiguity approach, (16a-b) are interpreted as (17a-b), respectively.

- (16) a. Robots cook John's morning coffee.
- b. Computers compute the daily weather forecast.
- (17) a. Robots in general have the property of cooking John's morning coffee.
- b. Computers in general have the task of computing the daily weather forecast.

However, Carlson (1989) maintains that more salient readings of (16a-b) are (17a'-b').

- (17') a. John's morning coffee is usually cooked by some robot(s) (possibly by different robots each morning).
- b. The daily weather forecast is usually computed by computers (possibly by different computers each day).

(17a'-b') are generalizations over events such that each instance of a habitual event 'cooking John's morning coffee' involves some robots, and each instance of computing the daily weather forecast involves some computers. Thus *robots* and *computers* of (16) are existential NPs in generic sentences, providing counter-evidence to Carlson (1977). Let us call these 'dependent' generics (D-generics), contrasting with 'independent' generics (I-generics), namely generic NPs occurring in generic sentences. The existence of dependent generics shows that bare plurals are ambiguous, and their interpretations should be rather independent from the properties of predicates.

D-generics show close similarities to cardinal NPs in several respects. First, as cardinal NPs lack quantificational force, D-generics do not have generic force. (cf. footnote 1) Both of these NPs should be dependent on some other elements in sentences to acquire proper quantificational or generic force. Second, both cardinal NPs and D-generics are subject to maximality. (18a-b) show that generic sentences may license a 'telescoping' phenomenon, i.e., quantificational scope may be extended to a following sentence.²

- (18) a. Robots cook John's morning coffee. They cook it at exactly 6 a.m.
- b. Robots clean this building. They clean it in an hour.

However, when the second sentences imply that the anaphoric pronouns do not refer to the maximal plural individuals, the quantificational scope of dependent generics cannot be extended.

- (19) a. ?? Robots cook John's morning coffee. They cook it with other robots.
- b. ?? Robots clean this building. They clean it with other robots.

The lack of the anaphoric relations in (19) shows that *robots* of (19a-b) refers to all the robots involved in each instance of the events of the sentences.

3.2 Diesing's Generalization and Its Exceptions

D-generics show further similarity to cardinal NPs in that D-generics can occur with S-level predicates, but not with I-level predicates. Diesing (1992) observes that (20a) is ambiguous in three ways, but (20b) is unambiguous.

- (20) a. Firemen are available.
b. Firemen are altruistic.

Involving an S-level predicate *available*, (20a) may be interpreted that there are some firemen available (now), or that firemen in general have the property of being available. A third reading is a D-generic reading such that there are some firemen around here (whenever they are needed). Contrastingly, (20b) has only an I-generic reading such that firemen in general have the property of being altruistic. Hence we have Diesing's generalization.

(21) Diesing's Generalization

Stage-level predicates may be predicated of dependent generics, while individual-level predicates may not.

Interestingly, Diesing's generalization also has systematic exceptions. Carlson (1989) observes that when S-level predicates are too simple, they do not license D-generic readings.

- (22) a. Robots cook John's morning coffee.
b. # Robots cook (well).
(23) a. Flowers grow out behind the old shed.
b. # Flowers grow.

(22a) and (23a) are construed as D-generic sentences. E.g., (23a) has an interpretation that for each instance of growing out behind the old shed, there are some flowers occurring in the event. When the predicates are rather simpler as in (22b) and (23b), D-generic readings are no longer available. (22b) and (23b) have only I-generic readings such that robots in general have the property of cooking, and flowers in general have the property of growing.

Carlson argues that the awkwardness of D-generic readings in S-level predicate sentences may be improved by the precedence of proper topics.

- (24) a. # An alarm sounds.
b. # People get laid off.
(25) a. (Topic : What happens in the event of fire) An alarm sounds.
b. (Topic : What happens in a recession) People get laid off.

When (24a-b), involving too simple S-level predicates, are preceded by proper topics as in (25a-b), the D-generic readings of the sentences are natural.

These observations show that D-generic readings are induced by S-level predicates that are accompanied by adverbial NPs, or restricted by specific topics in discourse. Given that, the questions are why the predicate classes are relevant to determine the availability of D-generic readings, and why the occurrences of adverbials or discourse affect D-generic interpretations.

4. Diesing (1992)

A first unified analysis of cardinal NPs and D-generics has been suggested by Diesing (1992), based on a 'mapping' algorithm between syntactic structure and semantic representations. According to Diesing, syntactic structures are partitioned into two parts, namely material from IP and material from VP, and each of the partitions is mapped to the partitions of logical representations. Material from IP is mapped to a restrictive clause and material from VP is mapped to a nuclear scope.

(26) Mapping Hypothesis

- Material from VP is mapped into the nuclear scope.
- Material from IP is mapped into the restrictive clause.

As to the syntactic structure of S-level and I-level predicates, Diesing argues that S-level predicates induce a raising construction, while I-level predicates constitute a control structure. This means that the subjects of S-level predicates may be lowered to the Spec of the VP ([Spec, VP]), but the subjects of I-level predicates may not. In other words, the subjects of S-level predicates may appear in [Spec, IP] or in [Spec, VP], whereas the subjects of I-level predicates appear only in [Spec, IP]. According to the mapping hypothesis, this implies that the subjects of S-level predicates may be bound by a quantifier in the restrictive clause or existentially closed in the nuclear scope. However, the subjects of I-level predicates must be bound by a quantifier.

Based on the mapping hypothesis and the assumptions on the syntactic structure of predicates, Diesing provides an account for Milsark's generalization. According to Diesing's analysis, (27a-b) are interpreted as (28a-b), respectively.

- (27) a. Some girls were sick.
- b. Sm girls were sick.
- (28) a. $\exists x[\text{girls}'(x)] [\text{sick}'(x)]$
- b. $\exists x[\text{girls}'(x) \wedge \text{sick}'(x)]$

Since *sick* is an S-level predicate, the subject may remain in [Spec, IP] or be lowered to [Spec, VP]. When the subject remains in [Spec, IP], it is mapped to a restrictive clause, and bound by the existential quantifier. This yields a quantifier interpretation as in (113a). On the other hand, when it is lowered to [Spec, VP], it is mapped to a nuclear scope, and existentially closed. This amounts to a cardinal interpretation as in (113b). The syntactic ambiguity of the subject position of an S-level predicate induces the semantic ambiguity of its interpretation.

Here is an explanation for why a cardinal NP cannot occur with an I-level predicate.

- (29) a. Some girls were intelligent.
- b. * Sm girls were intelligent.
- (30) a. $\exists x[\text{girls}'(x)] [\text{intelligent}'(x)]$
- b. # $[\text{girls}'(x)] [\text{intelligent}'(x)]$

Since the subject of an I-level predicate cannot be lowered to [Spec, VP], it must be bound by a quantifier in the restrictive clause. A weak quantifier *some girls* has quantificational force by itself, and binds its variable in the restrictive clause,

whereas a cardinal NP *sm girls* does not have quantificational force, ending up with an unbound variable. Thus a cardinal NP cannot occur in an I-level predicate sentence.

A similar argument applies to generic sentences.

- (31) a. Firemen are available.
b. Firemen are altruistic.

The subject of an S-level predicate may be lowered to [Spec, VP] or remain in [Spec, IP]. Thus *firemen* of (31a) may be bound by a generic or existential operator in the restrictive clause or existentially bound in the nuclear scope. This means that it may be an I-generic in the restrictive clause, or a D-generic in the nuclear scope. On the other hand, the subject of an I-level predicate cannot be lowered to [Spec, VP], and thus *firemen* of (31b) cannot occur in the nuclear scope. Hence the D-generic reading is not available to *firemen* of (31b).

Since Diesing's analysis treats cardinal NPs and D-generics uniformly, it is naturally explained why these two types of NPs show close similarities. Moreover, she provides a plausible method for syntax and semantics interface. However, since Diesing attributes the different interpretations of S-level and I-level predicate sentences to their syntactic properties, exceptions to Milsark's and Diesing's generalizations cannot be accounted for. Thus Diesing provides answers for only half of the problems.

5. Proposal

In this section, I will propose that cardinal NPs and D-generics are event-dependent NPs, based on Kuroda (1972)'s arguments for 'thetic' and 'categorical' judgments. I will attribute Milsark's and Diesing's generalization to the specificity problem of events, and provide accounts for exceptions to the generalizations.

5.1 Kuroda (1972)'s Categorical and Thetic Judgments

Inspired by Brentano (1973), Kuroda (1972, 1992) defends the relevance of 'judgment' forms to the interpretation of topic structure. Basically judgments are meant to be cognitive acts involved in judging the truth of sentences. Kuroda maintains that the topic of a sentence is a logical subject, and thus a sentence with a topic is divided into two parts, namely a subject and a predicate, while a topic-less sentence constitutes only one unit. He further argues that these two types of sentences involve different cognitive acts. By uttering a sentence with a topic, the primary interest of a speaker is directed toward the denotation of a topic NP, while it is directed to the event of the sentence in the case of a topic-less sentence. The former type of a cognitive act is called 'categorical judgment', while the latter is called 'thetic judgment'.

To elucidate this point, let us consider Japanese sentences in (32).

- (32) a. *Neko-wa asoko-de nemutte iru.* (categorical judgment)
cat-wa there-at sleeping is
'The cat is sleeping there.'
b. *Neko-ga asoko-de nemutte iru.* (thetic judgment)
cat-ga there-at sleeping is
'The/a cat is sleeping there.'

According to Kuroda, (32a), including a topic NP *neko-wa*, is asserted in a way that a speaker's interest is directed toward a particular cat that is salient in the discourse, and then he relates the occurrence of the event with this entity. On other hand, (32b), a topic-less sentence, is asserted in a way that a speaker's interest is directed toward the event of sleeping that involves some cat, and the identity of this cat is perceived only as the participant of the event. Kuroda argues that to attract the primary attention, a topic NP should be specific. In other words, quantificational NPs can occur in topic positions, but cardinal NPs, which are not specific, cannot. This means that the perceptual procedure of a weak quantifier sentence is categorical judgment, while that of a cardinal NP sentence isthetic judgment.

5.2 The Semantics of Cardinal NPs

I will implement Kuroda's intuition in event semantics, in which predicates are predicated of an event argument, and relations between participants and events are represented by the functions of thematic roles.

- (33) a. Classical account : $[[run]] = \lambda x[run'(x)]$
 b. Event semantics : $[[run]] = \lambda x\lambda e[run'(e) \wedge AG(e) = x]$

In the classical theory, *run* is a function from individual to truth value or a set of individuals that have the property of running. In event semantics, which has been founded by Davidson (1967) and extended by Parsons (1990) and Landman (1993), *run* is a function from individual to event such that an individual stands in the agent relation with respect to an event.

According to Kuroda's notion of judgments, the denotation of cardinal NPs are identified through the mediation of events. Occurring in athetic sentence, a cardinal NP provides a base set of individuals, but which individual is referred to depends on the value of an event. For instance, a cardinal NP *cats* denotes whatever cats occur in some event. Third, the maximality of a cardinal NP requires that it refers to all the participants of an event. Last, since at most one maximal plural individual exists for any sum of individuals, a cardinal NP denotes a unique entity. Thus I conclude that a cardinal NP refers to the supremum (or maximal sum) of individuals that occur in a event.

To implement the event-dependency of a cardinal NP, I propose a function Σ , which takes a property P and an event e, and denotes the supremum of individuals having a property P and bearing some thematic role of an event e.

- (34) $\Sigma = \lambda P\lambda e\lambda x[\exists\theta[\forall e'\forall x'[[e' \leq e \wedge \theta(e') = x' \wedge P(x')] \rightarrow x' \leq x]]]$

I propose that the determiner of a cardinal NP is event-dependent, and thus has the interpretation of the Σ function. Given that, a quantification determiner *some* and a cardinal determiner *sm* are defined as follows.

- (35) a. <"some", $(V/R(V/LNP_{[+TOP]}))/R/N, \lambda P\lambda E\lambda e\exists x[P(x) \wedge E(x)(e)]>$
 b. <"sm", $DNP_{[-TOP]}/R/N, \Sigma>$

V is a category for a set of events, and DNP is a category for an event-dependent individual. To form a category V, *some* combines with an N and a predicate that takes a topic NP. *Sm* combines with an N to make a non-topic DNP. According to (35), a weak quantifier *some cats* and a cardinal NP *sm cats* are defined as follows.

- (36) a. $[[\text{some cats}]] = \lambda E \lambda e \exists x [\text{cats}'(x) \wedge E(x)(e)]$
 b. $[[\text{sm cats}]] = \lambda e [\sum(e)(\text{cats}')]]$

As a generalized quantifier, *some cats* takes a predicate E and an event e, and asserts that there is an individual x such that x is cats and x serves as the argument of E with an event e. In contrast, a cardinal NP *sm cats* takes an event e, and denotes the supremum of cats that bear some thematic role of an event e.

Since NPs are now ambiguous between quantificational and event-dependent readings, predicates are also systematically ambiguous as to the categories of their nominal arguments. They may take either ordinary or event-dependent individuals as arguments. For instance, a one-place predicate such as *enter the backyard* has two interpretations.

- (37) a. $\langle \text{"entered the backyard"}, V/LNP_{[+TOP]} \rangle$
 $\lambda x \lambda e [\text{enter_backyard}'(e) \wedge AG(e) = x]$
 b. $\langle \text{"enter the backyard"}, V/LDNP_{[-TOP]} \rangle$
 $\lambda f \lambda e [\text{enter_backyard}'(e) \wedge AG(e) = f(e)] \rangle$

Given that, the sentence of (38a) is interpreted as a set of events in which there are some cats that are the agent of entering the backyard, while that of (38b) is understood as a set of events that take whatever cats occur in the events as agents.

- (38) a. $[[\text{some cats}^T \text{ entered the backyard}]] =$
 $\lambda e \exists x [\text{cats}'(x) \wedge \text{enter_backyard}'(e) \wedge AG(e) = x]$
 b. $[[\text{sm cats entered the backyard}]] =$
 $\lambda e [\text{enter_backyard}'(e) \wedge AG(e) = \sum(e)(\text{cats}')]]$

Since a sentence usually asserts the existence of a single event rather than denotes a set of events, the existential closure of events is required to get a proper interpretation. Following Krifka (1989), I assume that a declarative marker as defined in (39) plays the role of existential closure, asserting the existence of an event at certain reference time and space that are pragmatically determined.

- (39) $\langle " ", S/RV, \lambda P \exists e [P(e) \wedge t(e) = t_e \wedge s(e) = s_e] \rangle$
 (where τ is the time-trace function of events, and σ is the space-trace function of events)

Given that, the sentences of (40) assert the existence of an event that occurs at the reference time t_e and at the reference space of s_e .

- (40) a. $[[\text{some cats}^T \text{ entered the backyard}]] =$

- $\exists e \exists x [\text{cats}'(x) \wedge \text{enter_backyard}'(e) \wedge \text{AG}(e) = x \wedge \tau(e) = t_e \wedge \sigma(e) = s_e]$
 b. $[[\text{sm cats entered the backyard}]] =$
 $\exists e [\text{enter_backyard}'(e) \wedge \text{AG}(e) = \Sigma(e)(\text{cats}') \wedge \tau(e) = t_e \wedge \sigma(e) = s_e]$

Since the reference time and space are contextually determined, and a context is oriented to a topic, it follows that the reference time and space of a sentence are derived from the time and space of the denotation of a topic.

5.3 The Semantics of Dependent Generics

To derive the ambiguity of generics, I propose two generic determiners that do not have phonological counterparts. One is to derive an I-generic, which is a generalized quantifier, and the other is to derive a D-generic, which is event-dependent.

- (41) a. \emptyset_I determiner for I-generics
 $\langle " ", (V/R(V/LNP_{[+TOP]}))/RN, \lambda P \lambda E \lambda e Gx [P(x) \wedge E(x)(e)] \rangle$
 b. \emptyset_D determiner for D-Generics
 $\langle " ", DNP_{[-TOP]}/RN, \Sigma \rangle$

Taking a set of individuals, the \emptyset_I determiner for an I-generic yields a generalized quantifier with the G operator. On the other hand, the \emptyset_D determiner for a D-generic is defined in the same way as *sm*. This suggests that the denotations of a cardinal NP and a D-generic are basically the same, and they only differ in that a cardinal NP is in the scope of an existential event, and a D-generic is under the scope of a generic event.

Given the two generic determiners, the I-generic and D-generic readings of *robots clean this building* are represented as follows, on the assumption that a declarative marker is ambiguous between the existential closure and the genericity of events.

- (42) a. $[[\text{robots}^T \text{ clean this building}]] =$
 $GeGx [\text{robots}'(x) \wedge \text{clean_building}'(e) \wedge \text{AG}(e) = x \wedge \tau(e) = t_e \wedge$
 $\sigma(e) = s_e]$
 b. $[[\text{robots clean this building}]] =$
 $Ge [\text{clean_building}'(e) \wedge \text{AG}(e) = \Sigma(e)(\text{robots}') \wedge \tau(e) = t_e \wedge \sigma(e) = s_e]$

(42a) asserts the generic event *e* of robots *x* in general such that *e* is cleaning this building at time t_e and space s_e , and *x* is the agent of *e*. In other words, it is interpreted that robots in general usually clean this building at time t_e and space s_e . (42b) says that there is a generic event *e* such that *e* is cleaning this building at time t_e and space s_e , and the agent of *e* is all the robots that occur in *e*. In other words, it concerns a generic event of robots' cleaning this building at t_e and s_e . Which robots are involved in each instance of the generic event is determined by the event.

5.4 Milsark's Generalization and Its Exceptions

Now let us consider Milsark's generalization and its exceptions. According to Kuroda, in a categorical sentence, a topic or primary attention of cognition is an individual, while it is an event in a thetic sentence. He further argues that a topic NP should be specific to attract attention. Given that, I argue that the topic of a thetic sentence is an event, and it should be specific enough to get attention.

(43) Specificity Restriction on Topics

The topic NP or topic event of a sentence should be specific.

This is the mirror restriction of the specificity of a topic NP. According to this restriction, the event of an S-level predicate may be a topic without further specification, because it involves a specific event about an activity or a transient state. On the other hand, the event of an ILP may not be a topic without further specification, because it involves a rather non-specific event such as a permanent state.

For instance, let us consider (44a-b).

- (44) a. Some girls were sick/intelligent.
b. Sm girls were sick/* intelligent.

Some girls denotes some of the girls that are contextually salient, and it is specific enough to be a topic NP. Thus, it can occur in a categorical sentence regardless of predicate classes. On the other hand, *sm girls* denotes whatever girls are involved in a given event, and it is not specific enough to be a topic NP. This means that a sentence with a cardinal NP should take an event as a topic, and the event of this sentence should be specific. Otherwise, the reference time and space of the sentence are not nailed down to specific values, which results a sentence without a truth-value. Given that, an I-level predicate such as *intelligent* may not occur in a thetic sentence with a cardinal NP, because it does not have a specific comparison class, nor involve clear-cut event time and space due to the permanent nature of the event. Hence Milsark's generalization follows.

The other side of this argument is that when the event of an I-level predicate is more specified with the occurrence of a complement or an adverbial, it can play the role of a topic event, and thus a cardinal NP may occur in the sentence. This paves a way to account for exceptions to Milsark's generalization. The event types of (46) are more specific than those of (45), because the complements of (46) provide specific comparison classes for the event types.

- (45) a. * Sm boys are crazy.
b. * Sm girls are smart.
c. * Sm boys are tall.
d. * Sm movies are insipid.
(46) a. Sm boys are crazier than John.
b. Sm girls are smart enough to solve the problem.
c. Sm boys are tall enough to play basketball.
d. Sm movies are too insipid to be believed.

Thus the events of (46) can be topic events, occurring with cardinal NPs, and they are not subject to Milsark's generalization.

Similarly, the event types of (47b-c) are more specified than that of (47a), involving specific NPs such as *John* and *Mary*, and the event types of (47d-e) are further specified with the occurrences of adverbials.

- (47) a. * Sm boy loved sm girl.
 b. (?) John loved sm girl.
 c. (?) Sm boy loved Mary.
 d. Sm boy loved Mary, when she was in the high school.
 e. Sm boy in the neighborhood loved Mary, when she was in the high school.

The specificity of event types directly reflects the acceptability of the sentences.

Finally, the event type of a symmetric predicate such as *share an office* is specific. However, a symmetric predicate involves two symmetric events that can be distinguished by the participants of the events. E.g., when John and Bill share an office, there are two symmetric events such as John's sharing an office with Bill, and Bill's sharing an office with John. Thus when both of the arguments are occupied by cardinal NPs as in (48a), the symmetric events of the predicate are not distinguished, and thus both of the cardinal NPs denote all the individuals that are involved in the two symmetric events due to the maximality.

- (48) a. ?? Sm professor shared an office with sm professor(s).
 b. Sm professor shared an office with sm student.
 c. Sm professor shared an office with John.
 d. John shared an office with sm professor.

Hence it has an awkward entailment such as John and Bill shared an office with John and Bill in the above situation. In other cases, as shown in (48b-d), the symmetric predicate can host cardinal NPs.

5.5 Diesing's Generalization and Its Exceptions

Generic sentences are divided into I-generic and D-generic sentences. I-generic sentences occurring with topic NPs are generalizations over individuals, and D-generic sentences with topic events are generalizations over events. In other words, a generic sentence is a generalization over entities that are considered as instances of a topic. Given that, two conditions should be met to be interpreted as a generic sentence. One is that to get a proper domain of generalization, a topic should be specific. The other is that a topic should entail typical time and space for reference time and space. Since individuals are specific by themselves, I-generic sentences are easily obtained. On the other hand, events may not be topic events, when the event types are not specific enough. Thus I-level predicates are less likely to host topic events in generic sentences. Hence Diesing's generalization follows.

Since I attribute Diesing's generalization to the non-specificity of the events of I-level predicates, it follows that when the events of S-level predicates are not specific enough, they may not license D-generic readings. For instance, even if both (49a-b) involve S-level predicates, the event type of (49a) is more specific than that of (49b).

- (49) a. Robots cook John's morning coffee.
 b. # Robots cook.

The event of (49a) has typical time and space, e.g., 'in the morning' and 'in John's kitchen', etc., and the generalization domain of events is well defined. Hence a D-generic reading is available. However, the event type of cooking does not entail any typical time and space, which makes the generalization domain less clear. Thus the event type of (49b) has the same problem with the event type of an I-level predicate, and makes an exception to Diesing's generalization.

Similarly, when the generalization domain of events is made specific with the precedence of a topic, a D-generic reading is available. Hence (50) and (51) show acceptability contrast.

- (50) a. # An alarm sounds.
 b. # People get laid off.
- (51) a. (Topic : What happens in the event of fire) An alarm sounds.
 b. (Topic : What happens in a recession) People get laid off.

Since the predicates of (50) do not define specific generalization domain, (50) are more likely construed as existential sentences than D-generic sentences. However, when they occur in some specific contexts which provide topics to define the reference time and space as in (51), D-generic readings are available.

6. Conclusion

I have defended the distinction of weak quantifiers and cardinal NPs, and the ambiguity of generics, pointing out that cardinal NPs and D-generics show close similarities, and thus they should be interpreted in a uniform way. Considering Milsark (1974)'s and Diesing (1992)'s generalizations, I have discussed the fact that these generalizations have systematic exceptions. To provide a uniform analysis of cardinal NPs and D-generics, I have implemented Kuroda (1972)'s notion of categorical andthetic judgments in event semantics. I have argued that cardinal NPs and D-generics are event-dependent NPs, entailing maximality. Based on this, I have attributed Milsark's and Diesing's generalizations to the non-specificity of the events of I-level predicates. Thus when the event types of I-level predicates are more specified or those of S-level predicates are too vague, they do not follow the generalizations.

What this study shows is that first, the distinction of S-level and I-level predicates may not be a semantic problem, but rather a perceptual problem related with the event types of those predicates. Second, the existence of event-dependent NPs supports the basic hypothesis of Davidson (1967) that events are another sort of individual, and as fundamental as ordinary individuals.

Footnotes

* I am grateful to my advisor Pauline Jacobson for guiding this research, and to Emmon Bach and Mark Johnson for helpful comments on an earlier draft of this paper. I also thank Samuel Bayer for discussions on events and plurals. I am alone responsible, however, for any remaining errors.

1 Jacobson and Bayer (p.c.) have pointed out that the difference between weak quantifiers and cardinal NPs as to quantificational force can be shown by the fact that first, cardinal NPs are not subject to weak crossover restriction.

- (i) a. * The woman who knew them; spoke to some men_i.
- b. The woman who knew them_i; spoke to sm men_i.

Second, weak quantifiers may have scope interaction with other operators, while cardinal NPs always take narrow scope.

- (ii) a. John believed that some cats entered the backyard.
- b. John believed that sm cats entered the backyard.

The weak quantifier of (iia) has a scope ambiguity with respect to *believe*, and may induce a wide scope reading that for some particular cats, John believed that they entered the backyard. However, (iib) has only the narrow scope reading of sm cats such John believed that there were sm cats that entered the backyard.

2 For more discussion about a telescoping phenomenon, see Roberts (1987) and Poesio and Zucchi (1992).

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¹ Jacobson and Bayer (p.c.) have pointed out that the difference between weak quantifiers and cardinal NPs as to quantificational force can be shown by the fact that first, cardinal NPs are not subject to weak crossover restriction.

- (i) a. * The woman who knew them_j spoke to some men_i.
- b. The woman who knew them_i spoke to sm men_i.

Second, weak quantifiers may have scope interaction with other operators, while cardinal NPs always take narrow scope.

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² For more discussion about a telescoping phenomenon, see Roberts (1987) and Poesio and Zucchi (1992).

The Unspecified Goal Argument

In Que Lee
Simon Fraser University

1. Introduction

The Goal NP in Korean is typically marked by the so-called Dative marker *-ey/eykey*.

- (1) John-i Mary-eykey chayk-ul cwu-ess-ta
John-Nom Mary-Dat book-Acc give-Pst-Ind
'John gave a book to Mary'

An interesting fact is that the Goal argument can also be marked by Accusative Case marker as shown in (2).

- (2) John-i Mary-lul chayk-ul cwu-ess-ta
John-Nom Mary-Acc book-Acc give-Pst-Ind
'John gave Mary a book'

The alternation between Dative and Accusative markers is one of the most discussed issues in analyses of the constructions that show the alternation.

One thing to note is that the Dative marker is, in fact, not a Case marker, but a postposition since it patterns with postpositions, not with Case markers in a variety of syntactic aspects such as Case Drop (Saito (1983)), Case Stacking (Gerdts and Youn (1989), and Conjunction (Kuh (1987)) etc.¹

Sentences like (1) in which Dative *-ey/eykey* is involved seem to be the oblique dative construction, and sentences like (2) which include two object (Accusative-marked) NPs obviously seem to be the double object construction. Here, I use the term 'Dative construction' to indicate constructions that include Dative-marked Goal arguments. Among such constructions, only the types in (3) - (5) are discussed in this paper.

- (3) Give-type Dative Construction
John-i Mary-eykey chayk-ul cwu-ess-ta
John-Nom Mary-Dat book-Acc give-Pst-Ind
'John gave a book to Mary'

¹ For detailed discussion of the status of Dative phrase, refer to Urushibara (1991) and Lee (in prep.).

- (4) Compound Give-Type Construction
 John-i Mary-eykey chayk-ul ilk-e-cwu-ess-ta
 John-Nom Mary-Dat book-Acc read-Conn-give-Pst-Ind
 'John read a book for Mary'
- (5) Morphological Causative Construction
 John-i Mary-eykey chayk-ul ilk-hi-ess-ta
 John-Nom Mary-Dat book-Acc read-Caus-Pst-Ind
 'John had Mary read a book'

Section 2 presents some problems with Dative/Accusative alternation on Goal arguments in such dative constructions. To solve the problems, section 3 and 4 propose the structure of each construction and the Case Theory in Korean, respectively. Section 5 analyzes each construction with respect to the problems of Dative/Accusative alternation. The conclusion of this paper is given in section 6.

2. Problems

All the types of dative constructions illustrated in (3) - (5) show the alternation between Dative and Accusative on the Goal arguments. Compare the sentences in (3)' - (5)' with (3) - (5).

- (3)' Give-type Dative Construction
 John-i Mary-lul chayk-ul cwu-ess-ta
 John-Nom Mary-Acc book-Acc give-Pst-Ind
 'John gave a book to Mary'
- (4)' Compound Give-Type Construction
 John-i Mary-lul chayk-ul ilk-e-cwu-ess-ta
 John-Nom Mary-Acc book-Acc read-Conn-give-Pst-Ind
 'John read a book for Mary'
- (5)' Morphological Causative Construction
 John-i Mary-lul chayk-ul ilk-hi-ess-ta
 John-Nom Mary-Acc book-Acc read-Caus-Pst-Ind
 'John had Mary read a book'

However, in some cases of morphological causatives, the alternation disappears; only Accusative is allowed in a certain group of morphological causatives as in (6).

- (6) a. John-i Mary-*eykey/lul nol-li-ess-ta
 John-Nom Mary-Dat/Acc play-Caus-Pst-Ind
 'John let Mary play'

- b. John-i Mary-*eykey/lul wul-li-ess-ta
 John-Nom Mary-Dat/Acc cry-Caus-Pst-Ind
 'John made Mary cry'
- c. John-i Mary-*eykey/lul cwuk-i-ess-ta
 John-Nom Mary-Dat/Acc die-Caus-Pst-Ind
 'John killed Mary'
- d. John-i Mary-*eykey/lul kel-li-ess-ta
 John-Nom Mary-Dat/Acc walk-Caus-Pst-Ind
 'John made Mary walk'

In the examples in (6), the underived verbs are intransitive. This characterization contrasts with the morphological causative constructions with transitive underived verbs shown in (7).

- (7) a. Emeni-ka ai-eykey/lul chayk-ul ilk-hi-ess-ta
 mother-Nom child-Dat/Acc book-Acc read-Caus-Pst-Ind
 'The mother made her child read a book'
- b. Emeni-ka ai-eykey/lul kulus-ul ssis-ki-ess-ta
 mother-Nom child-Dat/Acc dish-Acc wash-Caus-Pst-Ind
 'The mother made her child wash the dishes'
- c. Emeni-ka ai-eykey/lul os-ul ip-hi-ess-ta
 mother-Nom child-Dat/Acc clothes-Acc put.on-Caus-Pst-Ind
 'The mother put the clothes on her child'
- d. Emeni-ka ai-eykey/lul wuywu-ul mek-i-ess-ta
 mother-Nom child-Dat/Acc milk-Acc eat-Caus-Pst-Ind
 'The mother fed her child milk'
- e. Emeni-ka ai-eykey/lul kewul-ul po-i-ess-ta
 mother-Nom child-Dat/Acc mirror-Acc see-Caus-Pst-Ind
 'The mother show her child the mirror'

A more problematic case is the *give*-type compound. No Goal is allowed in (8) where embedded verbs are intransitive.

- (8) a. John-i (*Mary-eykey/lul) nol-a-cwu-ess-ta
 John-Nom Mary-Dat/Acc play-Conn-give-Pst-Ind
 'John played to/for Mary (lit.)'
- b. John-i (*Mary-eykey/lul) wul-e-cwu-ess-ta
 John-Nom Mary-Dat/Acc cry-Conn-give-Pst-Ind
 'John cried to/for Mary (lit.)'

- c. John-i (*Mary-eykey/lul) cwuk-e-cwu-ess-ta
 John-Nom Mary-Dat/Acc die-Conn-give-Pst-Ind
 'John died to/for Mary (lit.)'
- d. John-i (*Mary-eykey/lul) kel-e-cwu-ess-ta
 John-Nom Mary-Dat/Acc walk-Conn-give-Pst-Ind
 'John walked to/for Mary (lit.)'

Things are more complicated when embedded transitive verbs are involved in the *give*-type compound construction. Only some sentences allow Goal arguments with Dative/Accusative alternation, but some others do not allow the Goal argument at all, even though they all have embedded transitive verbs.

- (9) a. Emeni-ka ai-eykey/lul chayk-ul sa-cwu-ess-ta
 mother-Nom child-Dat/Acc book-Acc buy-give-Pst-Ind
 'The mother bought a book for her child'
- b. Emeni-ka ai-eykey/lul chayk-ul ilk-e-cwu-ess-ta
 mother-Nom child-Dat/Acc book-Acc read-give-Pst-Ind
 'The mother read a book for her child'
- c. Emeni-ka ai-eykey/lul kulus-ul ssis-e-cwu-ess-ta
 mother-Nom child-Dat/Acc dish-Acc wash-give-Pst-Ind
 'The mother washed the dishes and gave them to her child'
 *'The mother washed the dishes for her child'
- d. *Emeni-ka ai-eykey/lul os-ul ip-e-cwu-ess-ta
 mother-Nom child-Dat/Acc clothes-Acc put on-give-Pst-Ind
 'The mother put on the clothes for her child'
- e. *Emeni-ka ai-eykey/lul wuywu-ul mek-e-cwu-ess-ta
 mother-Nom child-Dat/Acc milk-Acc eat-give-Pst-Ind
 'The mother drink milk for her child'

The facts examined so far is summarized in (10).

(10) Dat/Acc Alternation on the Goal Argument

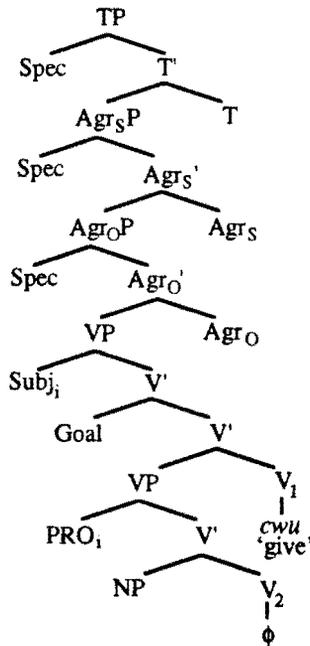
Embedded verb	Cwu -dative (<i>give</i> -type)	Morphological Causative	Cwu-compound (<i>give</i> -compound)
Intransitive	—	*Dat/Acc (6)	*Goal (8)
Transitive	Dat/Acc (3)&(3)'	Dat/Acc (7)	Dat/Acc (9a-c) *Goal (9c-e)

In sum, as in (10), while the simple *give*-type dative construction allows Dative/Accusative alternation as shown in (3) and (3)', other types of dative constructions raise problems with respect to the Goal argument. In the case of the morphological causative construction, the alternation is shown basically with the transitive embedded (or underived) verbs, but not with intransitive embedded ones; when they are transitive, the Goal argument only takes Accusative, not Dative. The *cwu*-compound construction does not allow a Goal argument at all if the embedded verb is intransitive. Even when the construction has transitive embedded verbs, some of them show the alternation and some others do not.

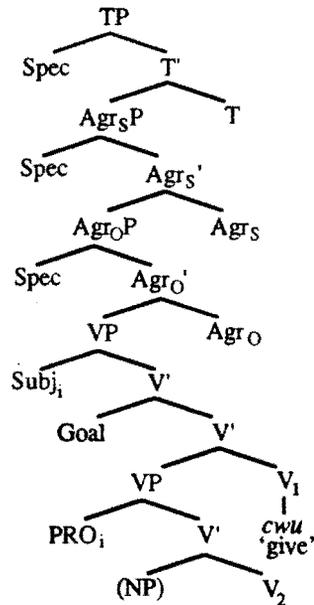
3. The Structures

Before taking the above problems, I propose the structure for each construction. For the sake of convenience in understanding both the structures of *cwu*-dative and *cwu*-compound constructions, first consider the structure of *cwu*-compound construction represented in (11b).²

(11) a. *cwu* -dative



b. *cwu* -compound



² For detailed discussions on motivation and evidence for structures of *give*-type constructions, refer to Lee (1994).

As perceived by intuition, the general template of compound dative verbs' meaning looks like 'do something and give'; for example, 'buy a book and give' in (9a), 'read a book and give' in (9b), and 'wash the dishes and give' in (9c). However, the accurate meaning of the compound dative VP seems to be 'give some action of doing something'. In other words, intuitively, the meaning is not a mere complex ordering of two meanings, 'do something' and 'give it' in a certain time span, but a complex amalgamation of two meanings, 'give x' and 'x: doing something'.

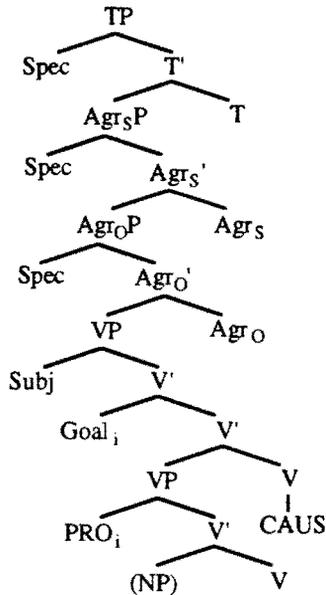
In formal terms, the dative verb has not an NP, but a VP complement.³ To put it differently, in compound verb constructions in general, the axle verb to which another verb is compounded, i.e. *give*, does not select a Theme NP represented as 'something'. Then, the only possible selector of the Theme NP is the compounding verb. At this point, I would like to propose a rough structure of the compound verb construction as delineated in (11b), assuming the Baker (1988) type incorporation for compounding process; V_2 incorporates to V_1 .

The structure of simple *cwu*-dative structure in (11a) is exactly the same as that of *cwu*-compound constructions in (11b) except only for the embedded verb; the embedded verb V_1 which incorporates into the matrix verb *give*, is invisible, which is semantically empty. However, it has all the features of a transitive verb. Hence, it selects its own complement NP. Therefore, the intuitive meaning of the structure (11a) is that 'Subject gives Goal x(x:doing nothing to y(y:something))'.

The structure of morphological causatives is parallel to the structure of *give*-type constructions.

³ Li (1990), in fact, on the basis of cross-linguistic evidence, argues that in a construction that triggers Verb Incorporation (VI), the complement of the matrix verb is not a CP but a bare VP. In my analysis, the dative constructions basically trigger VI. Therefore, in addition to the semantics discussed above, Li's argument makes an empirical support for the VP complement of the dative verb.

(12) Causative



The difference between the structures in (11) and (12) is that PRO is controlled by the Subject in *give*-type dative constructions, while it is controlled by the Goal in morphological causatives.⁴

4. The Case Theory

For the analysis of the dative constructions with respect to Dative/Accusative alternation, I follow the basic ideas of Minimalist Program. The Case theory in Minimalist framework is fundamentally a checking theory; Case features of NPs are checked with those of verbs in terms of Spec-head agreement. On the basis of such ideas, more specifically, I suggest a Case theory as a neutralization process.

First, Case is available in a form of features charged in the Spec position by raising of V which bears the Case property, to Agr. The [+Case] V raises to Agr, charging the [Spec, AgrP] position with Case features mediated by Agr. Here comes another fact consistent with the checking theory proposed in the Minimalist program. Chomsky (1993) argues that features related to inflections must disappear after they are

⁴ Baltin (1995) presents evidence for the existence of PRO, for the location of [Spec, VP]. The Case-related problem with PRO is discussed in section 5 in this paper.

checked. In my theory under discussion here, what makes the features disappear after checking is something like the energy-preservation principle in physics with the effect of energy-shift process. A form of energy, i.e. Case can transfer to some other place, i.e. the Spec position. This transfer process may be called neutralization in that the Case feature of V is discharged by charging the Spec position with the Case feature via Spec-head agreement. The Spec position charged with features is, in turn, discharged of its features by charging a raised NP in the position as a neutralization process.

NPs are assumed to be taken from the lexicon as fully inflected forms. The morphology of the Case marker, although taken along with NP from the lexicon, has inert features. Therefore, it is semantically invisible until it is activated. The activation of the Case morphology is achieved through the neutralization process. Discharging the Case feature of V charges the inert Case feature of NP that is, in fact, manifested on the Case marker. Therefore, the process has checking capacity; the derivation converges if the Case feature of V matches with that of NP, inert but specified, for example, as [+Acc] if the marker is *-ul/lul*, while the derivation crashes if the features do not match, for example, if the [Spec, Agr₀P] is occupied by an NP marked with *-il/ka* which has the feature specified as [+Nom].

5. The Unspecified Gaol Argument

5.1. Transferability

Now, along with above proposal, let us return to the problems presented in section 2.

Consider the sentences in (9), first. Among the sentences, those which do not allow the Goal argument involve a reflexive action as the complement of the matrix verb *cwu-* 'give'; for instance, *to put on clothes* in (9d) and *to eat something* as in (9e) are events reflexive to the Agent, PRO here. In contrast, (9a) and (9b) have actions that can be transferred to somebody else other than the agent of the verb.

Although somewhat difficult to define, 'transferability' is basically a relationship between the Theme and Agent that results when an event connects them. In (9a), *a book* can be transferred to someone as a result of the action *buying*; in (9b), *reading a book* is transferable in that the story of the book is sent to somebody else. However, in (9d) and (9e), it is clear that neither *putting on clothes* or *eating something* involves transferability.

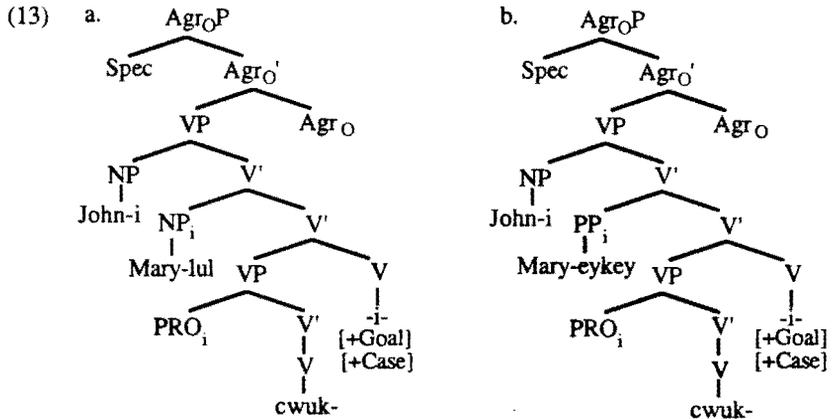
Interestingly enough, in (9c), *washing the dishes* shows an ambiguity since the transferability of the embedded VP is ambiguous. When it has reflexive meaning as 'simply washing the dishes', the sentence cannot take a Goal argument. On the other hand, if the VP is considered as being transferable, as the clean dishes are given to someone else after washed, it may have the Goal argument.

It seems that the semantics of the embedded VP is related to selection of the Goal argument. To capture this fact, I propose that the features of Goal argument are not specified for the verb *cwu-* 'give' in its argument structure. More accurately, the *cwu-* verb takes a Goal argument, but unspecified in [+] or [-] values for [Goal] as well as [Case]. What determines these values is semantics. If the meaning of the embedded VP is [+transfer], the verb *cwu-* bears [+Goal] and [+Case]; if the embedded VP is [-transfer], then the verb *cwu-* bears [-Goal] and [-Case].

5.2. Morphological Causative Constructions

5.2.1. Morphological Causatives with Embedded Intransitive Verbs

Let us start with causative constructions with embedded intransitive verbs. Consider the structure of the example (6c) as shown in (13).⁵



The Subject position is occupied by *John* with the Nominative Case marker *-i* that is inert, and the verb *cwuk-* 'die' which does not have an NP complement. The matrix verb, i.e., the causative morpheme *-i-*, after being incorporated with the lower verb, 'die', raises to the Agr_O . Although the lower verb is intransitive with [-Case], the causative verb is specified as [+Case]. Therefore, it discharges its feature to the [Spec, $Agr_O P$] position in terms of Spec-head agreement.

The NP, which checks the Case feature against that of the verb now charged in [Spec, $Agr_O P$] is not the Subject NP since a relatively higher NP cannot move to the lowest target as demonstrated in Chomsky (1993) due

⁵ I do not discuss detailed matters regarding Case checking, such as Nominative Case, level of checking, constraints on movement like the Shortest Movement, etc. The overall Case checking system in Korean may be referred to in Lee (in prep.).

to the Shortest Movement (Chomsky (1993)), or the Minimal Link Condition (Chomsky and Lasnik (1993) and Chomsky (1995)). Nor is the lowest NP, PRO available to move to the position. PRO never occurs in a position where Nominative Case is available. Moreover, Agr_S which is responsible for Nominative Case never permits PRO in Korean, and Agr_O does not exist in Korean either.⁶ Hence, PRO cannot be associated with projections of Agr.

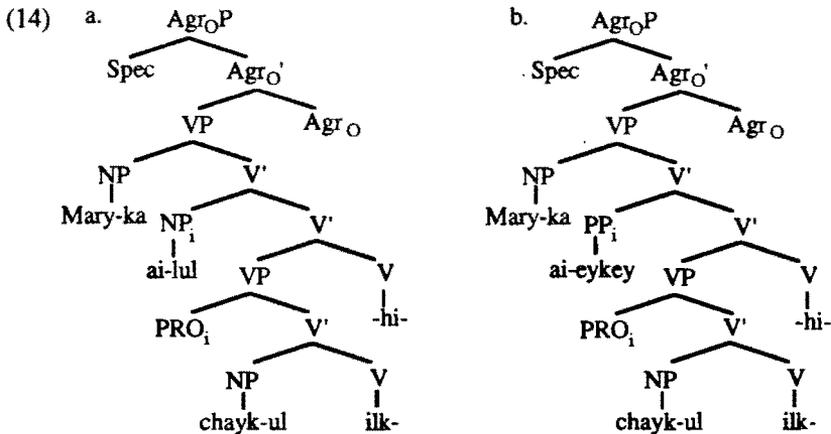
I suggest that PRO gets null Case in [Spec, VP], not in [Spec, IP] as in Chomsky and Lasnik (1991), nor in C⁰ as in Watanabe (1993). Then, if PRO is in [Spec, VP], it does not need to move further since the null Case is available in that position. I put aside further details of Case checking of PRO, here. Refer to Lee (in prep).

Now, the only NP available to move to the [Spec, Agr_OP] position is the Goal. If it is marked by Accusative *-ul/lul* as shown in (13a), the Case features match, and the Case feature charged in the Spec position is discharged to the Accusative marked NP *Mary-lul*, activating the inert Case morphology. The derivation converges.

When, as in (13b), the Goal argument is marked with Dative, which is postposition, then the NP *Mary* is within PP, with Case checked inside the PP in some way (cf. Fujita (1996)). Then, the NP need not, and cannot move for Case reason. No NP is available to raise to the [Spec, Agr_OP] position. Consequently, the derivation crashes since the Case feature of the verb cannot be neutralized, i.e., checked off.

5.2.2 Morphological Causatives with Embedded Transitive Verbs

Consider the following.



⁶ cf. Lee (in prep.)

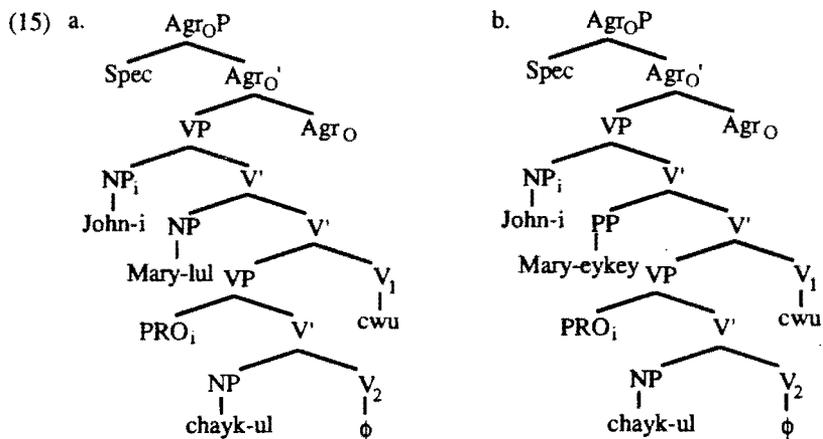
When the embedded verb is transitive like (7a), the lowest NP, *chayk* 'book' is raised to the [Spec, Agr_oP], thereby checking the Accusative Case feature. In this case, if the Goal is marked by Dative, no problems arise. However, if the Goal is marked by Accusative, there must be an explanation for the Accusative Case.

The distinct difference between the constructions with intransitive and transitive embedded verbs is the Case specification. The embedded transitive verbs have [+Case] feature specification. In that sense, when the lower transitive verb is incorporated to the matrix verb which is also [+Case], the Case feature may be conjectured to be much stronger than the case of intransitive embedded verbs. Then, the complex verb raises to Agr_o resulting in overcharging the Case feature. The leftover feature may percolate down to the Goal argument matching the Case feature, if the Goal is marked by Accusative. What makes it possible hinges on the concept of domain proposed by Chomsky (1993). I propose that extra Case is available by floating Case feature running through the same checking domain.

Although the Subject is within the checking domain, it does not count for Accusative Case since the feature specification does not match if it is marked by Nominative marker. Even if it was marked by Accusative marker, the ultimate derivation would crash since there will be no argument to check off the Nominative Case in the [Spec, Agr_sP] if the Subject is Case-checked by the floating feature in the [Spec, VP] position.

5.3. Give-type constructions

As illustrated in the structures of sentences (3a) and (3b) as follows, the simple *give*-type construction in (15) has the embedded VP including a transferable Theme in that nothing is done to the Theme by the invisible verb. Therefore, the verb *cwu-* has a Goal argument, and it is also [+Case] .

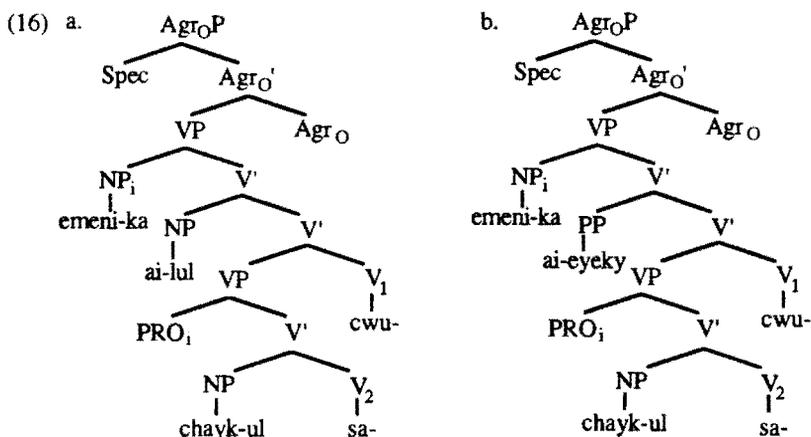


Incorporation of the embedded invisible verb to the matrix *cwu*-results in a heavy Case feature since both verbs contribute Case features like the causative constructions with embedded transitive verbs. Therefore, Accusative Case is also possible. The Case checking processes are exactly like their counterpart in the morphological causative construction with an embedded transitive verb.

5.4. Compound Give-type constructions

In contrast, regarding the case of embedded intransitive verbs in *give*-type compound constructions, intransitive verbs are inherently reflexive; hence, the embedded VP is [-transfer]. As a result, this type of construction cannot have the Goal argument, at all.

Among the *cwu*- compound construction with embedded transitive verbs, the case of embedded VP with [+transfer] as in (9a) - (9c) shows exactly the same process of Case checking as the morphological causative and the simple *give*-type dative constructions with embedded transitive verbs.



Since the embedded VP is [+transfer], a Goal argument is available, and the verb *cwu-* 'give' is specified as [+Case] too. When the embedded transitive verb incorporates into the matrix verb *give*, the complex of the verbs has a heavy Case feature. It overcharges the [Spec, Agr_OP] position when it raises to Agr_O. Hence, the floating redundant Case feature can charge an extra NP activating the Accusative morphology. Therefore, those sentences show the Dative/Accusative alternation.

If the embedded VP is [-transfer] like (9d) - (9e), sentences simply cannot take a Goal argument at all.

6. Conclusions

The significance of my proposal is that information on the argument structure can be derived during the syntactic computation. A similar approach is found in Ritter and Rosen (1993a;b). In the EST framework, such a process was not possible since the process from the lexicon to the computational system is done by what is called "Satisfy", an "all-at-once" operation. All lexical items drawn from the lexicon are presented to D-Structure before computation commences; thereafter, computation has no access to the lexicon. However, lexical information during the syntactic computation is possible in the Minimalist framework without such a constraint, where the lexicon is accessible at any point, while computation is proceeding. Therefore, the morphosyntactic information is adjustable during the process of computation.

The other point I am making here is a little stronger. I claim that semantics may participate in the computation of a structural description; that semantics determines the newly derived morphosyntactic information in the middle of the syntactic computation. Therefore, semantics plays an integral role in syntax. Then, it must be presupposed that semantic

interpretation, at least partial semantic interpretation must be available before LF. To verify this strong claim, a lot of research should be done with cross-examination in many quarters cross-linguistically. Here, I only showed one such case, and provided an appropriate analysis.

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Consequences of Move-F in Japanese*

Hideki Maki

Salem-Teikyo University

1. Introduction

The purpose of this paper is to explore consequences of the Move-F hypothesis put forth by Chomsky (1995). In the Move-F hypothesis, any movement operation has a last resort nature, and affects only a relevant feature. The fact that category movement is involved in overt operations such as *wh*-movement in English is attributed to other factors such as a PF requirement that only a category is given a phonetic interpretation at PF. It follows then that LF operations, which are free from such a PF requirement, just affect a feature rather than a category that contains the feature. In this paper, I examine *wh*-constructions in Japanese, and argue for the Move-F hypothesis. Specifically, I argue that an argument *wh*-phrase in situ does not move to CP SPEC throughout the derivation, but only the *wh*-feature moves to the [+Q] COMP in LF.

There are two major consequences of the Move-F hypothesis. One is that it supports Attract-F hypothesis proposed in Chomsky (1995). The other is that the Strict Cycle Condition proposed in Chomsky (1973) applies even in LF.

Before going to the main argument, I define movement. Barss (1986) argues on the basis of binding facts that movement proceeds in the COMP-to-COMP fashion. Consider the example in (1).

- (1) [which picture of himself_i] does John_i think that Mary likes _{t_i}

In (1) although the anaphor *himself* is not c-commanded by *John*, the latter can be the antecedent of the former. However, if the anaphor is in the base position, it cannot take *John* as its antecedent, as shown in the example in (2).

- (2) *John_i thinks that Mary likes a picture of himself_i

Consider then the example in (3).

- (3) John_i wonders [CP [which picture of himself_i]_j][Mary likes _{t_j}]

In (3) the anaphor can take *John* as its antecedent. This indicates that the embedded CP SPEC position is accessible to binding from the matrix clause. Based on this, Barss (1986) argues that (1) is evidence for the COMP-to-COMP movement. If the *wh*-phrase that contains the anaphor directly moves to the matrix CP SPEC in (1), the anaphor is never locally bound. On the other hand, if the *wh*-phrase moves to the matrix CP SPEC through the embedded CP SPEC, (1) has the structure in (4) in the intermediate stage.

* I am indebted to Howard Lasnik, Diane Lillo-Martin, Mamoru Saito, and Daiko Takahashi for valuable suggestions on this paper. I am also grateful to Keiichiro Kobayashi, Roger Martin, and Satoshi Oku for discussion. All errors are my own.

- (4) _ does John₁ think [CP [which picture of himself_i] that [Mary likes _i]]

If Condition A of the binding theory can be satisfied anywhere in the derivation, as Belletti and Rizzi (1988) argue, the anaphor in (1) satisfies it at the stage of (4).

Further, there is a case that shows that a wh-phrase does not move simply in the COMP-to-COMP fashion, but also adjoins to maximal projections on the way to CP SPEC. Consider the example in (5).

- (5) *John₁ believes [IP Mary to like a picture of himself₁]

In (5) an anaphor is in the ECM complement, and since it is not locally bound by its antecedent John, the example is bad. Consider then the example in (6).

- (6) which picture of himself₁ does John₁ [VP believe [IP Mary to like _i]]

In (6) the wh-phrase that contains the anaphor is moved to the matrix CP SPEC, and the anaphor can take John as its antecedent. Given Belletti and Rizzi's conception of Condition A, the anaphor in (6) should have been locally bound by John at some point of the derivation. If we assume that ECM complements are IPs, there is no intermediate CP SPEC in (6), and the possible position would be a position adjoined to the ECM complement, or a position adjoined to the matrix VP.

The above example thus suggests that when a wh-phrase moves, it adjoins to all the phrases that dominate it on the way to the target. Note also that in the case of head movement, a head necessarily moves to another head. Thus, it seems that when an element moves, it sees elements of the same type, and once it sees one, it adjoins to it. Therefore, I propose to define movement in (7).

- (7) α moves to β only if β is the closest visible element for α .

The notion visible is defined in (8).

- (8) α is visible for β if both α and β are γ , where γ is an X^n ($n \neq 0$), X^0 , or feature.

(7) requires a feature to move to the closest feature, a head to the closest head, and a phrase to the closest phrase, when they are moved. The definition of movement will be relevant when I give an argument for the feature movement hypothesis.

Let us now review previous analyses of wh-constructions in Japanese, and consider the problems. I go over Nishigauchi (1986) and Watanabe (1992).

2. Previous Analyses and Some Problems

Nishigauchi (1986) argues that Subjacency constrains LF movement based on the Wh-Island effect shown by wh-phrases in situ. Consider the example in (9).

- (9) ??kimi-wa [John-ga nani-o katta kadooka] sitteiru ka
 you-top -nom what-acc bought whether know Q
 ??'What do you know whether John bought?'

According to Nishigauchi, (9) is as bad as a Subjacency violation, just like its English counterpart. To derive the similarity between English and Japanese, he argues that in Japanese, an argument wh-phrase moves to CP SPEC in LF, and that LF movement is constrained by Subjacency. Then, in (9) the LF movement of the wh-phrase violates Subjacency, and the example is predicted to be bad.

However, English and Japanese are different with respect to Ross' (1967) Complex NP Constraint. Consider the example in (10).

- (10) *kimi-wa* [NP *nani-o* *katta* *hito*]-ni *atta* *ka*
 you-top what-acc bought man-to met Q
 '*What did you meet the person who bought?'

In (10) the wh-phrase is in a complex NP, and the example is good. Note that as its translation shows, the English counterpart is bad. If a wh-phrase moves to CP SPEC, (10) should be bad, since the wh-phrase is moved out of a complex NP, as shown in (11).

- (11) [CP *nani-o* [IP *kimi-wa* [NP † *katta* *hito*]-ni *atta*] *ka*]
 what-acc you-top bought man-to met Q

Nishigauchi (1986) argues that the apparent violation of Subjacency is actually circumvented in (10). Specifically, he proposes that in (10) the wh-phrase first moves to CP SPEC of the relative clause, and then, the whole complex NP moves to the matrix CP SPEC, as schematized in (12).

- (12) [CP [NP [CP WH_x...x...]]y [IP...y...] Q]

This is what he calls the pied-piping analysis. Since each movement does not violate Subjacency, the example in (10) is expected to be good.

However, the question arises what actually motivates the first movement inside the relative clause. The movement is not triggered by any feature checking, since the head of a relative clause should not have a feature that is checked by a wh-feature. Thus, the pied-piping analysis poses a potential problem.

Watanabe's (1992) pure wh-operator movement hypothesis also faces the same problem. Following Abney (1987), he proposes that wh-phrases in Japanese have the structure in (13).

- (13)
- ```

 DP
 / \
 Qp D'
 / \
 QP D
 | |
 ind 0
 dare
 nani
 ...

```



involved in Japanese wh-constructions is an LF operation, then, given Chomsky's (1995) assumption, there is a possibility that only a relevant feature moves. This assumption of feature movement in turn has the potential to settle the problems raised by category movement.

Before going to a precise analysis of the above examples under the feature movement hypothesis, let us consider how feature movement proceeds with the example in (16).

- (16) [CP [IP John-ga [VP nani-o katta]] ka]  
           -nom      what-acc bought Q  
       '[Q John bought what]'

(16) is good. Given the definition of visibility introduced in Section 1, a feature only sees features when it moves. Thus, the wh-feature in (16) does not adjoin to phrases that dominate it on the way to COMP. However, since a wh-feature finally adjoins to the head that has a [+Q] feature, it is plausible to assume that a feature can see a feature in a head. If this is the case, in (16) the features of the intervening heads are visible for the wh-feature, and thus, the wh-feature moves to COMP by adjoining to the heads V and I, as shown in (17).

- (17) [C' [IP NP [VP WH V] I] C]  
           \_↑\_↑\_↑\_↑

With this assumption, consider the example in (9) again, repeated as (18).

- (18) ??kimi-wa [John-ga nani-o katta kadooka] sitteiru ka  
           you-top      -nom what-acc bought whether know Q  
           '[Q you know {whether John bought what}]'

In (18), the wh-feature moves across a wh-clause, as shown in the LF representation in (19).

- (19) [CP [IP kimi-wa [VP [CP [IP John-ga [VP <sub>i</sub>-nani-o katta] I] ]  
           you-top                                  -nom      what-acc bought  
                                                                                   |\_\_\_\_\_|\_\_\_\_\_|\_\_\_\_\_|  
           kadooka] sitteiru] I] wh-ka]  
           whether know                  Q  
           |\_\_\_\_\_|\_\_\_\_\_|\_\_\_\_\_|\_↑

Hence, the Wh-Island effect will be expected in (18) under the feature movement hypothesis.

The hypothesis also gives a straightforward account for the fact that Japanese argument wh-phrases in situ do not show the Complex NP Constraint effect. Following Murasugi (1991), let us assume that Japanese relative clauses are IPs, and involve a base-generated empty pronoun. With this assumption, consider the example in (10) again, repeated as (20).



Under the feature movement hypothesis, this problem does not arise, since such a movement is not required. Since in (24) the wh-feature moves across a wh-clause on the way to the matrix [+Q] COMP, the Wh-Island effect will be expected.

#### 4. Consequences

Let us now consider what the feature movement hypothesis suggests for the theory of constraints on movement. I will argue that the feature movement hypothesis gives support to Chomsky's (1995) Attract-F hypothesis rather than Chomsky and Lasnik's (1993) Minimize Chain Links.

Chomsky and Lasnik (1993) derive the Wh-Island effect in English from Minimize Chain Links, which is roughly stated in (25).

- (25) Minimize Chain Links (MCL)  
Each step of the movement must be minimal.

With the MCL, consider the example in (26).

- (26) ??what do you know whether John bought  $t_i$

In (26) since the embedded CP SPEC is occupied by whether, the movement cannot make the shortest step, and thus, violates the MCL. Hence, the example is degraded.

Let us then consider how the Wh-Island effect in Japanese is derived from the MCL. Consider first the example in (27), which is grammatical.

- (27) kimi-wa [John-ga nani-o katta to] omou ka  
you-top -nom what-acc bought COMP think Q  
[Q you think [that John bought what]]

Under the assumption that features of heads are visible for a feature, wh-feature movement in (27) proceeds, as in (28).

- (28) [CP [IP kimi-wa [VP [CP [IP John-ga [VP  $t_i$ -nani-o katta] I] to]  
you-top -nom what-acc bought COMP  
omou] I] wh-ka]  
think Q  
\_\_\_\_\_↑

Since the example is grammatical, the derivation does not skip any possible landing site, and thus, does not violate the MCL. Consider then the example in (29).

- (29) ??kimi-wa [John-ga nani-o katta kadooka] sitteiru ka  
you-top -nom what-acc bought whether know Q  
[Q you know [whether John bought what]]

(29) is degraded. Suppose that in (29) the wh-feature of nani "what" moves to the matrix COMP by adjoining to all the intervening heads. The derivation is shown in (30).



The base structure of (34) is schematized in (35).

- (35) [CP [IP...[CP [IP...nani...] kadooka]...] ka]  
           what whether Q  
           [+wh] [+wh]/[+Q] [+Q]

In (35) *kadooka* "whether" is in the embedded COMP due to the fact that Japanese is a head final language. Let us assume that *kadooka* occupies the [+Q] COMP, so that the COMP has both a [+Q] feature and a wh-feature from the wh-phrase. Given the assumption that a [+Q] COMP has a feature that must be checked by a wh-feature, Attract-F forces the higher wh-feature to move to the matrix COMP. If this takes place, however, the intermediate [+Q] COMP will have no wh-feature, so that the COMP cannot satisfy the requirement that a [+Q] COMP must have a wh-feature in its checking domain at LF. Thus, the structure is expected to be bad. Note again that the wh-feature of the lower wh-phrase cannot be attracted by definition. Thus, the ungrammaticality of (34) is expected.

Thus, the Attract-F hypothesis gives a consistent account for the Wh-Island effect in both English and Japanese. Hence, the feature movement hypothesis gives support to the Attract-F hypothesis. Note that even under the Attract-F hypothesis, movement proceeds in the fashion of minimizing chain links, as shown in Section 1. Thus, the feature movement hypothesis leads to an argument for a hybrid theory of Attract-F and Move- $\alpha$ .

The Attract-F hypothesis has an implication that the Strict Cycle Condition proposed in Chomsky (1973) applies in LF as well as in overt syntax. The example in (36) suggests that the condition applies in LF.

- (36) ??*kimi-wa* [*dare-ga nani-o katta ka*] *sitteiru ka*  
           you-top who-nom what-acc bought Q know Q  
           [Q you know [Q who bought what]]

In (36) there are two wh-phrases in a wh-clause. Saito (1987) reports that (36) could have the reading that *dare* "who" takes matrix scope and *nani* "what" takes embedded scope, but the example is degraded. Let us consider the base structure of (36), schematized in (37).

- (37) [CP [IP...[CP [IP dare...nani...] ka]...] ka]  
           who what Q Q  
           [+wh] [+wh] [+Q] [+Q]

There is one derivation that satisfies the requirement of Attract-F and the condition on [+Q] COMPs at the same time. Suppose that the matrix COMP attracts the wh-feature of *dare*, and then, the embedded COMP attracts the wh-feature of *nani*. Since the operation attracts the closest wh-feature in each case, it satisfies the requirement of Attract-F. Therefore, the example should be good. Mamoru Saito (p.c.) points out that this suggests that the Strict Cycle Condition should apply in LF. Note that in the derivation described above, Attract-F first applies to the matrix clause, and then, to the embedded clause. If the Strict Cycle Condition applies in LF, the derivation violates it, and thus, the example is expected to be bad. Hence, the Attract-F hypothesis has an implication that the Strict Cycle Condition applies throughout a derivation.

## 5. Conclusion

To conclude, I proposed that the wh-feature of an argument wh-phrase moves to the [+Q] COMP in LF in Japanese, and showed that the fact that there is no Complex NP Constraint effect for argument wh-phrases in situ follows from the feature movement hypothesis. It was also shown on the basis of the Wh-Island effect that this hypothesis gives support to the Attract-F hypothesis, and that the Attract-F hypothesis has an implication that the Strict Cycle Condition applies in LF.

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Department of Japanese Studies  
Salem-Teikyo University  
Salem, WV 26426-0500

maki@salem.wvnet.edu

## A Typology of psych-verbs: evidence from Japanese

*Wataru Nakamura*  
State University of New York at Buffalo

Psych-verbs have received considerable attention, since their exceptional syntactic behavior presents a serious challenge to any theory of syntax/semantics interface. Recent studies of psych-verbs, e.g. Van Voorst (1992), Filip (1995), Bouchard (1995), have amply demonstrated that a variety of psych-verbs are not reducible to unaccusativity (Belletti & Rizzi 1988), telicity (Tenny 1994), or a combination of aspectual and thematic prominence (Grimshaw 1990). These previous approaches suffer from their failure to take into account the whole range of psych-verbs as well as their strong tendency to restrict the range of semantic information available to syntax. The aim of this paper is to introduce a previously neglected type of psych-verbs in Japanese, illustrated in (1)-(3),<sup>1</sup> and analyze them together with other psych-verbs in terms of the two-tiered system of semantic roles developed within Role & Reference Grammar [RRG] (Van Valin 1993, Van Valin & LaPolla forthcoming):

- (1) Gakusei-ga Hanako-no shi-uchi-ni okot-ta.  
student-Nom. Hanako-Gen. conduct-Dat. get.angry-Past  
(The students got angry about Hanako's conduct.)
- (2) Gakusei-ga shiken-no seiseki-ni kusat-ta.  
student-Nom. test-Gen. score-Dat. be.disappointed-Past.  
(The students were disappointed about their scores of the test.)
- (3) Gakusei-ga Hanako-no shi-ni kanashin-da.  
student-Nom. Hanako-Gen. death-Dat. lament-Past  
(The students lamented Hanako's death.)

### 1. Data

There are two other types of psych-verbs in Japanese than (1)-(3): (4)-(5) assign dative and nominative case, while (6)-(8) assign nominative and accusative case to experiencer and theme (or stimulus) arguments, respectively:

- (4) Taro-ni gaikokugo-ga wakat-ta.  
Taro-Dat. foreign.language-Nom. understand-Past.  
(Taro understood foreign languages.)
- (5) Taro-ni okane-ga i-ru.  
Taro-Dat. money-Nom. need-Pres.  
(Taro needs money.)
- (6) Taro-ga Hanako-wo kirat-ta.  
Taro-Nom. Hanako-Acc. hate-Past  
(Taro hated Hanako.)
- (7) Taro-ga Hanako-wo oshin-da.  
Taro-Nom. Hanako-Acc. miss-Past  
(Taro missed Hanako.)
- (8) Taro-ga Hanako-wo shinji-ta.  
Taro-Nom. Hanako-Acc. trust-Past  
(Taro trusted Hanako.)

(4)-(5) have generated much discussion in the RG and GB literature (e.g. Perlmutter 1984, Takezawa 1987, Dubinsky 1992). There is no monomorphemic causative psych-verb in Japanese that corresponds to English verbs such as *amuse* and *frighten*:

- |      |                                                     |                 |                         |
|------|-----------------------------------------------------|-----------------|-------------------------|
| (9)  | Taro-ga                                             | Hanako-wo/*ni   | kowagar-ase-ta.         |
|      | Taro-Nom.                                           | Hanako-Acc/Dat. | be.terrified-Caus.-Past |
|      | (Taro made Hanako terrified/Taro terrified Hanako.) |                 |                         |
| (10) | Taro-ga                                             | Hanako-wo/*ni   | okor-ase-ta.            |
|      | Taro-Nom.                                           | Hanako-Acc/Dat. | get.angry-Caus.-Past    |
|      | (Taro made Hanako angry/Taro angered Hanako.)       |                 |                         |
| (11) | Taro-ga                                             | Hanako-wo/*ni   | shinpai-s-ase-ta.       |
|      | Taro-Nom.                                           | Hanako-Acc/Dat. | worry-do-Caus.-Past     |
|      | (Taro made Hanako worried/Taro worried Hanako.)     |                 |                         |

As shown in (9)-(11), Japanese attaches the causative affix (*s*)*ase* to non-causative psych-verbs in order to derive causative counterparts.

The remainder of this paper is organized as follows. Section 2 is devoted to a brief overview of RRG, with special reference to its two-tiered argument structure. In Section 3, it is proposed that (1)-(5) involve two marked associations between thematic relations and macroroles. The essential idea is that the variety of psych-verbs arise from the way thematic relations are associated with macroroles. Two pieces of evidence for their linking are provided. Furthermore, it is suggested in Section 4 that this account extends to causative psych-verbs and brings about a semantic typology of psych-verbs. The paper closes with a suggestion of a few lines of further investigation.

## 2. Framework

RRG claims that grammar may be explained only with reference to semantics and pragmatics and posits three parallel components, i.e. syntax, semantics, and pragmatics, as shown in Table 1:

|             |                                                                                                        |
|-------------|--------------------------------------------------------------------------------------------------------|
| Table 1.    | RRG Projection Grammar                                                                                 |
| Syntax:     | Constituent Structure<br>Operator Projection                                                           |
| Semantics:  | Conceptual Structure<br>Thematic Relation (Logical Structure) Tier<br>Macrorole (Actor/Undergoer) Tier |
| Pragmatics: | Focus Structure                                                                                        |

These parallel representations, which are termed projections in RRG, are distinct but co-present and allow simultaneous access to each other (cf. Bresnan 1994). In sharp contrast to Grimshaw (1990) and Tenny (1994), RRG allows syntax to be directly constrained by any type of semantic and/or pragmatic information. I would refer the reader to Van Valin (1993) and Van Valin & LaPolla (forthcoming) for a full account of the theory. I will concentrate here on the RRG conceptual structure.<sup>2</sup>

Conceptual structure consists of two independent subtiers, the thematic relation and the macrorole [MR] tier. Each argument of a predicate bears a relation to both tiers. The thematic relation tier is based on the theory of verbal semantics à la Vendler (1967), termed logical structure [LS] in RRG, which classifies verbs into four aspectual classes, state, achievement, accomplishment, and activity, as shown in Table 2:

Table 2. Aspectual Classification of Verbs

| <u>Verb Class</u> | <u>Logical Structure (LS)</u>                        |
|-------------------|------------------------------------------------------|
| STATE             | predicate' (x) or (x, y)                             |
| ACTIVITY          | do' (x, [predicate' (x) or (x, y)])                  |
| ACHIEVEMENT       | INGR predicate' (x) or (x, y)                        |
| ACCOMPLISHMENT    | BECOME predicate' (x) or (x, y)                      |
| CAUSATIVE         | 'X' CAUSE 'Y', where 'X' and 'Y' are LSs of any type |

'INGR' is an abbreviation for 'ingressive' and refers to instantaneous change, while 'BECOME' encodes change with internal duration. *do'* is a generalized activity predicate and thus serves as the marker of activity verbs. State and activity are primitives in this system. The other classes are derived from them. Achievements add an INGR operator to states, while accomplishments are represented as states plus a BECOME operator. In contrast to Dowty (1979), causation is orthogonal to those aspectual properties (cf. Van Valin & LaPolla forthcoming). Thematic relations such as effector and theme are shorthands for particular argument positions in the decompositional representations in Table 3 and are used only for the sake of readability. Only state and activity verbs are presented in Table 3, since other verbs are derived from them:

Table 3. Thematic Relation Assignment<sup>3</sup>

### 1. STATE VERBS

|                       |                 |               |         |
|-----------------------|-----------------|---------------|---------|
| A. Locational         | be-at' (x, y)   | x=locative    | y=theme |
| B. Non-locational     |                 |               |         |
| 1. State or condition | predicate' (x)  | x=patient     |         |
| 2. Perception         | see' (x, y)     | x=experiencer | y=theme |
| 3. Cognition          | believe' (x, y) | x=experiencer | y=theme |
| 4. Possession         | have' (x, y)    | x=locative    | y=theme |

### 2. ACTIVITY VERBS

|                    |                                     |                       |
|--------------------|-------------------------------------|-----------------------|
| A. Single argument | do' (x, [predicate' (x) or (x, y)]) | x=effector            |
| B. Two arguments   | do' (x, [predicate' (x, y)])        | x=effector<br>y=locus |

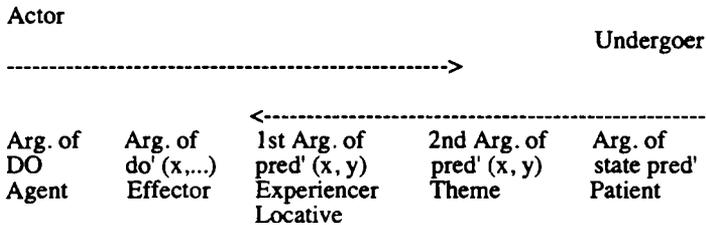
For example, effector is a label for the first argument of *do'*, while experiencer and theme refer to the first and the second argument of a two-place stative predicate, respectively.

Macroroles are generalized semantic roles which correspond to the two primary arguments of a transitive verb (cf. Dowty 1991). Actor and undergoer subsume a number of thematic relations for syntactic purposes, e.g. passivization, raising, and serve as the interface between thematic relations and grammatical relations. Just as actor is not equivalent to agent, it is not equivalent to syntactic subject. Likewise, undergoer is not equivalent to direct object. This is shown by (12a)-(12d):

- (12) a. John [SUBJ, ACTOR] hit Tom [DOBJ, UNDERGOER].  
 b. Tom [SUBJ, UNDERGOER] was hit by John [ACTOR].  
 c. Mary [SUBJ, ACTOR] ran into the classroom.  
 d. Jane [SUBJ, UNDERGOER] got famous after the election.

The unmarked value on the MR tier, i.e. non-macrorole, may be left underspecified.<sup>4</sup> The relationship between these two subtiers within conceptual structure is captured by the actor-undergoer hierarchy [AUH] (13) and macrorole assignment principles [MAP] (14):

(13) Actor-Undergoer Hierarchy [AUH]



["----->" = increasing markedness of realization of thematic relation as macrorole]

(14) Macrorole Assignment Principles [MAP]

a. Number: the number of macroroles which a verb takes

1. If a verb has two or more arguments in its LS, it will take two macroroles.
2. If a verb has one argument in its LS, it will take one macrorole.

Marked option: verbs may take one less macrorole than stated above.

b. Nature: for verbs which take one macrorole,

1. If the verb has an activity predicate in its LS, the macrorole is actor.
2. If the verb has no activity predicate in its LS, the macrorole is undergoer.

(13) determines how to rank actor and undergoer with respect to each other. It states that the argument bearing the thematic relation which appears leftmost on the cline will be the actor and the argument bearing the thematic relation which appears rightmost on it will be the undergoer. Although the prototypical actor is an agent, and the prototypical undergoer is a patient, an effector, experiencer, and locative may also serve as actor, while an experiencer, locative, and theme may also be an undergoer, as illustrated in (15)-(16):

- (15) a. John [effector-actor] dropped the vase accidentally.  
 b. John [experiencer-actor] loved his mother.  
 c. John [locative-actor] had a lot of friends in college.  
 (16) a. Mary angered John [experiencer-undergoer] by her attitude.  
 b. Mary loaded the lorry [locative-undergoer] with bricks.  
 c. Mary borrowed the magazine [theme-undergoer] from John.

Locative and experiencer may act either as actor or undergoer, since they are at the middle of the hierarchy (13).

(14a) is concerned with the number of macroroles which a verb may take. This is largely predictable from its LS; there are only three possibilities: 0, 1, 2. If a verb has two or three arguments in its LS, e.g. [do' (x,  $\emptyset$ )] CAUSE [INGR have' (y, z)], admire' (x, y), the unmarked situation is for it to receive two macroroles, actor and undergoer. If a verb has only one argument in its LS, e.g. do' (x, [walk' (x)]), BECOME broken' (x), it typically receives one macrorole. If the verb contains an activity predicate in its LS, the macrorole has to be an actor; otherwise, it should be an undergoer. Verbs with no LS argument, e.g. snow', rain', have no macrorole.

(14a) is violable minimally, in that it is possible for verbs to receive one less macrorole than stated in (14a). It is normally impossible for verbs with two arguments to have no macrorole. If the number of macroroles does not follow from (14a), it would have to be specified in the lexical entry of the verb. [+MR] means that there is one macrorole, while [-MR] means that there is no macrorole to assign. Here are a few examples from English:

- (17) The cat was lying on the mat.  
 (18) John seemed to be working in the backyard.  
 (19) Mary walked to the bus stop.

Intransitive verbs with two arguments such as *lie*, *walk*, and *seem* have only one macrorole, an undergoer with *seem* and *lie* and an actor with *walk*. The only information that has to be listed in the lexical entries of those English verbs is [+MR].

The choice of actor follows (13) because of (14a1) and (14b1), while the choice of undergoer does not necessarily do so. This is illustrated in (20)-(22), with undergoers underlined:

- (20) a. John loaded bricks [theme-undergoer] onto the lorry.  
 b. John loaded the lorry [locative-undergoer] with bricks.  
 c. The lorry was loaded with bricks.  
 d. The lorry was easy to load with bricks.



I have shown in this section how thematic relations are assigned and how they are associated with macroroles. There are two possible irregularities in the association between thematic relations and macroroles of two-place verbs: to assign one macrorole to a verb which has two subcategorized arguments, in violation of (14a); and to link undergoer with a verb's second lowest argument, in violation of (13). I will show that (1)-(5) exploit these two marked options.

### 3. A RRG account of Japanese psych-verbs

This section shows that there are three ways of associating thematic relations with macroroles of two-place stative psych-verbs, which are licensed by (13) and (14). In order to facilitate the discussion to follow, I provide those three linkings in advance in (23). (23a) follows both (13) and (14), while (23b) and (23c) violate (13) and (14a), respectively:

|         |                               |             |                    |
|---------|-------------------------------|-------------|--------------------|
| (23) a. | (6)-(8)                       |             |                    |
|         | Macroroles:                   | Taro        | Hanako             |
|         | Thematic Relations:           | Actor       | Undergoer          |
|         |                               | Experiencer | Theme              |
| b.      | (4)-(5)                       |             |                    |
|         | Macroroles:                   | Taro        | gaikokugo          |
|         | Thematic Relations:           | Non-MR      | Undergoer          |
|         |                               | Experiencer | Theme              |
|         | [+ MR]                        |             |                    |
| c.      | (1)-(3)                       |             |                    |
|         | Macroroles:                   | Taro        | Hanako no shi-uchi |
|         | Thematic Relations:           | Undergoer   | Non-MR             |
|         |                               | Experiencer | Theme              |
|         | [Experiencer ----> Undergoer] |             |                    |

The first linking (23a) strictly follows (14a), according to which a verb which has more than one core argument has two macroroles. (37a) also follows (26) since it associates experiencer and theme with actor and undergoer, respectively. (6)-(8) fit into the canonical transitive construction and therefore pose no problem for (13) and (14).

The second linking (23b) violates (14a), since it assigns one less macrorole than the number of a verb's subcategorized arguments. (23b) requires that (7) and (8) involve undergoer only, since both (7) and (8) have no activity predicate in their LSs. (23b) follows (13), because it associates theme, not experiencer, with undergoer.

My first proposal is made in (24):

- (24) Psych-verbs with two arguments such as *wakaru* 'understand' have a feature [+ MR] in their lexical entries.<sup>5</sup>

(24) violates (14a), but still follows (14b2). The remaining argument, which is an experiencer, may only be a non-macrorole core argument, since it cannot be an actor or undergoer.

The third linking (23c) violates (13), because experiencer, but not theme, receives the status of undergoer. (25) is my second proposal:

- (25) Some psych-verbs such as *okoru* 'get angry' and *kanashimu* 'lament' associate experiencer with undergoer, in violation of the actor-undergoer hierarchy.

(25) adds nothing to (13) and (14) except the marked undergoer assignment. (25) excludes any possibility of linking actor with either argument. Thus, it is not necessary to put the feature [+ MR] in their lexical entries. As a consequence of linking experiencer with undergoer, theme is demoted into a non-macrorole core argument. It is worth noting here that (25) applies to (20b)-(22b) as well. The lexical decompositions of (20a,b) and their macrorole assignments are given in (26a,b). As already pointed out in Section 2, (26a) follows both (13) and (14), while (26b) manifests a marked linking in which locative, which is ranked higher than theme in the hierarchy, is associated with undergoer:

- (26) a. [do' (John,  $\emptyset$ )] CAUSE [BECOME be-on' (lorry, brick)]
- ```

      |
      v
Effector
      |
      v
Actor

      |
      v
locative
      |
      v
Undergoer

      |
      v
theme
      |
      v
Undergoer
  
```
- b. [do' (John, \emptyset)] CAUSE [BECOME be-on' (lorry, brick)]
- ```

 |
 v
Effector
 |
 v
Actor

 |
 v
locative
 |
 v
Undergoer

 |
 v
theme
 |
 v
Undergoer

```

The same applies to (21a,b)-(22a,b). The fact that (20b)-(22b) employ the same marked linking as (1)-(3) shows that (25) is motivated independently.

An important question that arises here is whether there is any independent evidence for the marked linkings (24) and (25). If not, they would be nothing more than arbitrary stipulations only for case assignment.

There are two pieces of crucial evidence for (24) and (25). The first evidence comes from long-distance quantifier floating, illustrated by (27)-(32):

- (27) \*Gakusei-ga            hon-wo            go-nin            kat-ta.  
 student-Nom.        book-Acc.        five-Class.        buy-Past  
 (Five students bought the book.)
- (28) \*Gakusei-ga            kawa-de            go-nin            oyo-da.  
 student-Nom.        river-Inst.        five-Class.        swim-Past  
 (Five students swam in the river.)
- (29) \*Taro-ga            kodomo-ni        okashi-wo        san-nin            age-ta.  
 Taro-Nom.        child-Dat.        cake-Acc.        three-Class.        give-Past  
 (Taro gave a cake to three children.)

- (30) Gakusei-ga            kawa-de            go-nin            obore-ta.  
 student-Nom.            river-Inst.        five-Class.        get.drowned-Past  
 (Five students got drowned in the river.)
- (31) Gakusei-ga            yakuza-ni        go-nin            nagur-are-ta.  
 student-Nom.            yakuza-Dat.        five-Class.        hit-Pass.-Past  
 (Five students were hit by the yakuza.)
- (32) Hon-wo            gakusei-ga            go-satsu            kat-ta.  
 book-Acc.            student-Nom.        five-Class.        buy-Past  
 (The students bought five books.)

(27)-(32) show that floated quantifiers may not be associated with actor (27-28) or non-macrorole arguments (29) if any syntactic element intervenes between quantifiers and their hosts. Apart from the question of how to explain quantifier floating in Japanese as a whole (cf. Miyagawa 1989: Ch.2, Fukushima 1991), it seems uncontroversial to say that only undergoers may launch long-distance quantifier floating in Japanese:

- (33) A Condition on Long-Distance Quantifier Floating (Japanese)  
 Only undergoers may launch long-distance quantifier floating.

(33) provides a convenient test for distinguishing undergoers from actors and non-macrorole arguments. The crucial question is whether the experiencer NPs in (1)-(5) may host long-distance quantifier floating. (34)-(38) show that they do:

- (34) Gakusei-ga    Hanako-no    shi-uchi-ni    zen-in            okot-ta.  
 student-Nom.    Hanako-Gen.    conduct-Dat.    all-Class.        get.angry-Past  
 (All students got angry about Hanako's conduct.)
- (35) Gakusei-ga    shiken-no    seiseki-ni    zen-in            kusat-ta.  
 student-Nom.    test-Gen.    grade-Dat.    all-Class.        be.disappointed-Past.  
 (All students were disappointed about their grades of the test.)
- (36) Gakusei-ga    Hanako-no    shi-ni            zen-in            kanashin-da.  
 student-Nom.    Hanako-Gen.    death-Dat.    all-Class.        lament-Past  
 (All students lamented Hanako's death.)
- (37) Gaikokugo-ga    Taro-ni    itsu-tsu            wakat-ta.  
 foreign.language-Nom.    Taro-Dat.    five-Class.        understand-Past.  
 (Taro understood five foreign languages.)
- (38) Okane-ga            Taro-ni            takusan            i-ru.  
 money-Nom.            Taro-Dat.            a.lot.of            need-Pres.  
 (Taro needs a lot of money.)

The second evidence comes from the resultative construction, which is illustrated in (39)-(42). This is not applicable to any of (2)-(5), which, in contrast to (1), do not denote a change of state:

- (39) I painted the house white.  
 (40) The yakuza knocked the wrestler out of action.  
 (41) The melon sherbet froze solid.  
 (42) The sculpture was smashed into pieces.

The underlined expressions, which I call resultative attributes (Tsujimura 1990), describe the state of an argument resulting from the action denoted by a verb. For example, (40) roughly means 'the yakuza knocked the wrestler, which forced the wrestler to get out of action.' All the underlined NPs in (39)-(42) have in common is that they are undergoers (cf. Van Valin 1990). (43)-(45) show that neither actors (44-46) nor non-macrorole arguments (43) can control resultative phrases:

- (43) \*John gave a punch to Peter unconscious (Peter got unconscious).
- (44) \*John read the book unconscious.
- (45) \*John ran two hours tired.
- (46) \*John shouted hoarse.

Taken together, one may state (47) as a necessary condition for controlling resultative expressions:

- (47) A Necessary Condition on the Controller of Resultative Expressions  
The controller of a resultative expression must be undergoers.<sup>6</sup>

(47) leads us to regard the subject in (1) is an undergoer, given that it may control resultative expressions such as *kankan-ni* 'furious', as shown in (48):

- (48) *Gakusei-ga Hanako-no shi-uchi-ni kankan-ni okot-ta.*  
student-Nom. Hanako-Gen. conduct-Dat. furious-Dat. get.angry-Past  
(The students got angry about Hanako's conduct furiously.)

(48) indicates that the subject *gakusei* 'student', of which the resultative phrase is predicated, has the status of undergoer.

To sum, up, the two diagnostics (33) and (47) suffice to qualify the subjects in (1)-(3) and the 'objects' in (4)-(5) as undergoer and prove the existence of the marked linking patterns (23b) and (23c).

The hierarchy of case marking constraints (49), proposed in Nakamura (1995), assigns the correct case marking patterns to (1)-(8):

- (49) Case Marking Constraints (Japanese)
  - a. Some argument takes NOMINATIVE case.
  - b. Non-macrorole arguments take DATIVE case.
  - c. Undergoers take ACCUSATIVE case.
  - d. Actors take ERGATIVE case.

\*(49a)-(49d) form a dominance hierarchy (Prince & Smolensky 1993).

The idea that dative is the default case for arguments comes originally from Silverstein (1980). Given that all other syntactic theories stipulate the transitivity of exceptional verbs as well as their case marking beyond nominative and accusative case in their lexical entry, it is arguably plausible to attribute irregularity to the number of macroroles a verb may receive (23b) or marked undergoer selection (23c) and to derive the dative case assignment in (1)-(8) from there with no further stipulation.

#### 4. A Semantic typology of psych-verbs

This section is an extension of (26). It provides two possible linkings for causative psych-verbs licensed by (13) and (14) and offers a solution to the so-called 'picture-noun reflexives' (cf. Jackendoff 1992, Van Valin & LaPolla forthcoming). The LS of a causative psych-verb is given and illustrated in (50):

(50) [do' (x,  $\emptyset$ )] CAUSE [pred' (y, z)] ('x' and 'z' are coindexed.)<sup>7</sup>

e.g. John frightens Mary.  
[do' (John,  $\emptyset$ )] CAUSE [fear' (Mary, John)]

(14) allows either one or two macroroles to be assigned to a two-place verbs. This brings about two linking patterns (51a) and (51b) for causative psych-verbs:

|         |                     |                |             |
|---------|---------------------|----------------|-------------|
| (51) a. | No stipulation      |                |             |
|         | Macroroles:         | Actor          | Undergoer   |
|         | Thematic Relations: | Effector-Theme | Experiencer |
| b.      | [+ MR]              |                |             |
|         | Macroroles:         | Actor          | Non-MR      |
|         | Thematic Relations: | Effector-Theme | Experiencer |

When there is no lexical stipulation about macrorole assignment, (14a1) applies. This leads effector-theme and experiencer arguments to be associated with actor and undergoer. In contrast, when a lexical entry has the feature [+ MR], i.e. there is only one macrorole to assign, (14b1) applies. (14b1) makes sure that if the verb with one macrorole has an activity predicate in its LS, the only macrorole is actor. (23a,b,c) and (51a,b) represent all linking patterns available for psych-verbs.

There is no example of causative psych-verbs in Japanese. (51a) is illustrated by examples from English (52a) and Icelandic (52b) (Sigur sson 1989), while (51b) is illustrated by a Czech example (52c) (Filip 1995):

|         |                                                         |            |                 |                     |
|---------|---------------------------------------------------------|------------|-----------------|---------------------|
| (52) a. | The photo of herself                                    | frightened | Mary.           |                     |
|         | Actor                                                   |            | Undergoer       |                     |
|         | (The photo of herself frightened Mary.)                 |            |                 |                     |
| b.      | Olafur                                                  | hræddi     | Mariu.          |                     |
|         | Actor                                                   |            | Undergoer       |                     |
|         | Olaf (Nom.)                                             | frightened | Mary (Acc.)     |                     |
|         | (Olaf frightened Mary.)                                 |            |                 |                     |
| c.      | Ti                                                      | co         | podporovali     | jeho vlastni stranu |
|         | Actor                                                   |            |                 |                     |
|         | Those (Nom.)                                            | who        | supported       | his own party       |
|         | imponovali                                              |            | Vladimiru.      |                     |
|         |                                                         |            | Non-MR          |                     |
|         | impressed                                               |            | Vladimir (Dat.) |                     |
|         | (Those who supported his own party impressed Vladimir.) |            |                 |                     |

'Picture-noun reflexives', illustrated in (52a) and (52c), have raised problems for syntactic accounts of reflexivization (Pesetsky 1987), since a reflexive pronoun in subject position is bound by a NP in object position, which is, as shown in (53a,b), normally impossible:

- (53) a. \*Herself<sub>i</sub> saw Mary<sub>j</sub> in the mirror.  
 b. \*Himself<sub>i</sub> hit John<sub>j</sub> with a bat.

'Picture-noun reflexives' serve as a good test for the present account of psych-verbs, since they have been taken as evidence for the syntactic account (e.g. Belletti & Rizzi 1988, Cresti 1990, Pesetsky 1995). I will focus on (52a) alone. There is no space to go into the details, but Van Valin & LaPolla (forthcoming: Ch.7) suggest that the logical structure of (52a) provides a solution to this puzzle:

- (54) [be' (photo, [of (herself)])] CAUSE [fear (Mary, [be' (photo, [of (herself)])])]

They follow the spirit of Jackendoff (1992) in proposing (55) as a semantic condition on reflexivization:

- (55) Logical Structure Superiority (LS-Superiority) <sup>8</sup>  
 A constituent of logical structure is LS-superior to a constituent Q  
 iff there is a constituent R in logical structure such that  
 (i) Q is a constituent of R, and  
 (ii) P and R are primary arguments of the same logical structure.

For example, *John* is ls-superior to *Bill Clinton* in a sentence 'John trashed a book about Bill Clinton'. (55) is supplemented by (56):

- (56) Thematic Hierarchy Condition on Reflexivization  
 The reflexive pronoun must not be higher on the actor-undergoer hierarchy than its antecedent (cf. Jackendoff 1972).

(55) and (56), taken together, license reflexive pronouns.

(55) and (56) suffice to explain syntactically anomalous reflexive binding in (52a). First, the antecedent 'Mary' is ls-superior to 'herself', since 'herself' is a subpart of the subject NP 'the photo of herself'. Second, it is important to note that 'the photo of Mary' occurs twice in the logical structure (54). It occurs both as theme and effector. Given that 'Mary' in (54) occurs as experiencer, which is ranked higher than theme in the thematic hierarchy (13), (52a) also satisfies (56) as well. The same explanation holds for the Czech example (52c).

This semantic explanation of 'picture-noun reflexives' obviates the need to regard causative psych-verbs as unaccusative underlyingly (e.g. Belletti & Rizzi 1988) (see also Kuno & Takami 1993: Ch.5 and Bouchard 1995: Ch.4).

## 5. Conclusion

The fact that (13) and (14) allow as many as five marked linking patterns may make them look too powerful, but since they are all predictable from what is not specified in (14) and they actually occur, it seems plausible to regard (13) and (14) as part of the universal linking scheme, in the sense that they predetermine the maximal range of deviations with respect to the association between thematic relations and macroroles and leave it up to particular languages whether and, if yes, to what extent they exploit those marked options.

The analysis of (1)-(8), which was confirmed by the data concerning long-distance quantifier floating, resultative expressions, and case assignment, highlights the need for the macrorole tier in addition to the thematic relation tier. It was shown that the association of these two tiers serves as the basis for a typology of psych-verbs. The consequence is that the variety of psych-verbs are semantic in nature. The notorious binding facts (52a,c), which were analyzed in semantic terms in Section 4, did not turn out to be a problem for the monostratal view of syntax. These two findings, taken together, provide support for RRG, which posits a monostratal syntax with the two-tiered system of semantic roles.

Finally, I leave (57a)-(57c) for future research:

- (57) a. Motivate macrorole assignments in (24), (25), and (51) in more fine-grained semantic terms, for example, by appeal to Dowty's (1991) proto-role properties (cf. Zaenen 1993, Filip 1995).
- b. Explain a set of syntactic facts which have been claimed to motivate/necessitate a multi-stratal account of psych-verbs.
- c. Conduct a cross-linguistic survey of psych-verbs.

## Notes

I would like to thank Donna Gerdts, Jean-Pierre Koenig, and Robert D. Van Valin, Jr., for their helpful discussions and comments on previous versions of this paper. All remaining errors are, of course, mine.

1. See Gerdts (1984), however, which discusses similar constructions in Halkomelem Salish. Gerdts (p.c.) also pointed out that Illocano has this type of psych-verbs. See also Faarlund (1990) for Old Norse examples.
2. I employ the term 'conceptual structure' only as a cover term for thematic relations and macroroles put together.
3. It is important to keep in mind that what is termed theme in RRG includes what is not covered by the traditional definition of theme as something that moves or is located. The point is that theme refer to all the second arguments of two-place stative predicates in Table 3.
4. I adopt the version of (inventory-driven) underspecification proposed by Avery & Rice (1988).
5. (24) has an obvious advantage over the Relational Grammar treatment, e.g. Perlmutter (1984): (24) refers to only one syntactic stratum.
6. The status of undergoer is not enough to serve as a controller of resultative phrases. See Goldberg (1995: Ch.8) for further details.
7. See Van Voorst (1992) and Filip (1995) for evidence that causative psych-verbs are stative.
8. Jackendoff (1992) uses the term cs (i.e. conceptual structure) superiority.

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## Switch-Reference and Functional Multiplicity

Lynn Nichols  
Harvard University

1. INTRODUCTION. The basic facts of the phenomenon of switch-reference are generally thought to be understood. These facts are given a formal analysis in *Finer (1984, 85)*, now reflected in many other treatments of the phenomenon as the standard. There continue to crop up, however, examples in the literature where switch-reference marking does not in fact mark  $\pm$  switch in subject reference according to the basic patterns described (see section 2). Data from *Zuni*<sup>1</sup> exemplifies this, though various examples from *Seri* (*Farrell, Marlett, and Perlmutter 1991*) and *Yavapai* (*Kendall 1975*) would serve to make the point at well. In (1a,b) we see the typical pattern of Same-Subject (SS) and Different-Subject (DS) marking, respectively. The examples in (2a-c), however, all reflect usages of switch-reference marking apparently in conflict with expectation.

- (1)a. Pablo *ʔi:kʰanikya-nan* *ʔaʔ-kya*  
 P. work-SS sleep-factual  
 'Pablo worked and then (Pablo) slept.'
- b. Pablo *ʔi:kʰanikya-p* *ʔan papa* *ʔaʔ-kya*  
 P. work-DS his older.brother sleep-factual  
 'While Pablo worked, his brother slept.'
- (2)a. *ʔimaʂthoʔ hoʔ ʔito:w ʔaʂa-p kʰaʔ hoʔ kʰaʔaʔ kʰumo-kʰe:-naʔm-a*  
 always I-nom. food make-DS neg I-nom. anything be.broken-caus.-neg.-pres.  
 'When(ever) I cook I never break things (dishes).'
- b. *teʔci-p ʔantewa-kya*  
 arrive-DS spend.the.night.-past  
 'He arrived and camped [there] for the night'
- c. *hon ʔa:-teʔci-nan hoʔnaʔ ʔa:-pokli-kya-na-kʰanna*  
 1pl.nom. pl.abs.-arrive-SS 1pl.acc. pl.abs.-smoke-caus.-passive-fut.  
 'When we get there, we will be made to smoke'

This type of data is clearly problematic for *Finer's* analysis of switch-reference, where the morphemes involved in signaling co- or disjoint reference are assumed to have inherent properties associated with nominal reference (i.e.,  $\pm$ anaphoric,  $\pm$ pronominal). In questioning *Finer's* account of the phenomenon, one might claim that the basic nature of switch-reference has been misconstrued: the so-called switch-reference markers in fact have no inherent referential properties and that the observed switch-reference facts derive secondarily from

some other cause. Alternatively, one might conclude that Finer's account accurately describes some switch-reference systems but is inadequate for others. I propose the latter, namely that there is no single switch-reference phenomenon but rather that switch-reference systems are a heterogeneous class of related phenomena. We can accommodate this notion with a similar point made by Haiman and Munro (1983:xiii) that "[t]he origins of switch-reference marking are extremely heterogeneous" if we consider that the various origins of switch-reference morphology may yet be reflected in constraints on the synchronic behavior of these elements.

In particular, I suggest that switch-reference systems vary along a cline of grammaticalization from "incipient" switch-reference systems to "pure" switch-reference systems. In the "incipient" SR system, differential reference maintenance is a secondary effect of a morphosyntactic category having some other primary function. In the "pure" switch-reference system, indication of co- or disjoint reference of adjacent clause subjects is the primary function of the morphology.

Focusing on data from Zuni, I will argue that in one type of incipient system the primary function of the so-called switch reference morphology is in fact to indicate the degree of syntactic integration (tightness of linkage) of two clauses. Under the stronger version of the hypothesis, all switch-reference systems are reflections of degree of clause linkage and reference maintenance is a secondary effect of this structure (in a nutshell, co-reference where there is a tighter connection between two clauses, non-coreference<sup>2</sup> where the connection is looser). Under the weaker version, which I adopt, while switch-reference systems may start out as these secondary effects of different degrees of clause linkage, in some systems reference maintenance is grammaticalized as the primary function encoded by the morphology. We therefore can hypothesize a model for the development and grammaticalization of switch-reference.

2. THE STANDARD ANALYSIS. Finer (1984, 1985) observes the phenomenon of switch reference to consist of the following (listed as (33) of Finer 1985):

- a. SS signals obligatory coreference between subject NPs of hierarchically adjacent clauses.
- b. DS signals obligatory noncoreference between subject NPs of hierarchically adjacent clauses.
- c. The same-subject or different-subject relation is determined strictly locally.
- d. Switch-reference involves subjects only.

Based on these observations, he proposes that the switch-reference morphemes are anaphoric elements that mediate coindexing possibilities between adjacent clauses. The switch-reference marker in Comp is coindexed with the I(nfl) head of the lower clause, forming a discontinuous constituent with it. The SS marker is assumed to have the properties of an anaphor (but in A' position), so that it is bound by the coindexed I(nfl) of the higher clause according to principle

A of the binding theory (Chomsky 1981). The DS marker is an A' pronominal, that in accordance with principle B of the binding theory, cannot be bound in this domain by the higher I(nfl), so that the index of the DS morpheme in Comp must be disjunct from that of the higher I(nfl). According to this analysis, disjoint subject reference is assumed to be obligatory.<sup>3</sup>

2.1. **PROBLEMATIC ASPECTS.** At least two points of this analysis are problematic in light of the range of switch-reference data. First of all, it is not the case that a DS marker will obligatorily encode disjoint reference between adjacent subjects, as shown in (2a,b) above and in the Seri example below from Farrell et al. (1991).

- (2)    ʔp-po-a:ʔ-kašni            ta-X            ʔp-si-o:ʔa            ʔa=ʔa  
 1sg.Subj.-Irreal-Pass.-bite DS-Unspec.Time 1sg.Subj.-Irreal.-cry Aux=Decl  
 'If I am bitten, I will cry'

A closer look at the supposed "irregularity" of (2) brings up the second problematic aspect of the forgoing analysis. At the level of utterance, the subjects of the two clauses are co-referent. Note, however, that of the two clauses linked in this example, the first verb is a passive while the second is a simplex active. It would appear that the switch-reference marking of (2) is determined at an earlier derivational stage, at which the first clause has an active transitive verb and the 1st person argument is its object. At this level of structure, the subjects of the two clauses are indeed different. This state of affairs poses the following problem. There is widespread evidence that binding relationships are determined at surface structure, or, one might say, at the culmination of syntactic derivation, while in example (2) subject disjoint reference appears to inform the choice of switch-reference marker at a non-final stage of derivation.

If switch-reference systems are structurally homogeneous, then the standard analysis outlined above cannot account for this kind of switch-reference data. If, however, there are different types of switch-reference systems, in which there is variation as to whether reference maintenance is the primary function encoded by the morphology in question, the facts in (2) are not switch-reference facts but instead derive from peculiarities of Seri passives and Seri clause structure.

According to the standard analysis, the defining characteristic of the "pure" switch-reference system appears to be that the switch-reference morphemes appearing in Comp have the referential properties characteristic of nominals.<sup>4</sup> Note that such an analysis of switch-reference, assigning the features [+anaphor, -pronominal] to SS and [-anaphor, +pronominal] to DS, creates a paradigm of contrastive function for the two morphemes and therefore assigns both morphemes to the same syntactic position. As we will see, this assumption that DS and SS morphology are always paradigmatic may have obscured from our gaze the different formal/functional nature of so-called switch-reference marking in systems where reference maintenance is not the primary function.

3. **CLAUSE LINKAGE AND THE NATURE OF SWITCH-REFERENCE.** It is proposed that the primary assumptions underlying a standard analysis include at least the following: (1) 'Switch-reference' describes a heterogeneous class of related

phenomena, and (2) In some “incipient” switch-reference systems, DS and SS are not paradigmatically contrastive but rather occupy different syntactic positions. These new assumptions concerning the nature of switch-reference will have a dramatic effect on our ability to explain the so-called “irregular” switch-reference assignments illustrated above.

In the type of incipient switch reference system I will examine here, the so-called switch-reference markers, “DS” and “SS”, occur in different syntactic contexts and mark *degree of syntactic connection, loose vs. tight, between two clauses*. “SS” occurs in I(nfl), the head of IP (and note is mutually exclusive with tense and mood inflection) and marks a relatively tighter integration of main and subordinate clause. Here two IP clauses are linked. The so-called “DS” marker occurs in C(omp), the head of CP, and therefore indicates a looser syntactic connection between two adjacent clauses. In this case, two CP clauses are linked. Although the renaming of these terms is perhaps desirable in light of this analysis<sup>5</sup>, I will stick to “SS” and “DS” in quotation marks for these categories in incipient switch-reference systems (vs. SS and DS in “pure” switch-reference systems) for ease of exposition and to retain a sense of the relatedness of the secondary vs. the primary categories.

3.1. ZUNI CONNECTIVES. Zuni exemplifies the “incipient” type of switch-reference system in which reference maintenance appears to follow as a secondary effect of different types of clause linkage.<sup>6</sup> The formal distinction between the different degrees of syntactic integration of clauses can be seen quite clearly in Zuni. The “SS” morpheme, *-nan*, illustrated earlier in (1a), is transparently compositional, consisting of the stative derivational suffix *-na* and subordinator *-n*. The suffix *-n* attaches to non-finite verbal complements, (3a), where the main clause subject controls the reference of the subject of the non-finite subordinate clause, in the tightest degree of clause linkage possible in Zuni (next to perhaps the serial verb construction). *-na* has several synchronic functions.<sup>7</sup> The most relevant of these for present purposes is its use to form subordinate clauses used adverbially, (3b).

(3)a. toʔn(aʔ) hoʔ            ʔill-a:-n            ʔiha  
 2pl.acc. 1sg.nom. have-go-subord. immed.fut./desid.  
 ‘I want to take you 2 with me’

b. hom papa haliʂoti-na-ʔ tam lan ʔakya yam lemmaʕti-kʔi ʔuʕto:-kya  
 1sg.poss. oldr.bro. rush-subord.-adv. log big with poss. door-loc. put.access-past  
 ‘My older brother, rushing off, barred the door with a big log.’

The suffixation of subordinator *-n* to *-na* indicates a syntactic connection one degree looser than the subordinator *-n* alone.

As a result of the relatively tight syntactic connection signaled by *-nan*, co-reference between subjects of adjacent clauses is not only possible but obligatory. The “SS” itself is therefore only indirectly a mark of the co-reference of adjacent clause subjects since the binding facts follow from the type of syntactic connection.

As for “DS” *-p* (reduced form of *-ppa*), here the distribution, not the internal structure, of the morpheme provides us with a clue to its syntactic role.

Although *-p* is most commonly found suffixed to the stem of a verb, as in (4a), *-p* can also be suffixed to a fully inflected verb. This is illustrated in (4b), where *-p* follows the tense suffix *-kya*.<sup>8</sup>

- (4)a. Pablo ?i:k<sup>h</sup>anikya-p ?an papa ?al-kya  
 P. work-DS his older.brother sleep-factual  
 'While Pablo worked, his brother slept.'
- b. čuwe topinte wopponne ?uk-na?-kya-ppa ?i-yałto:-nan ...  
 corn one sack give-pass.-past-DS reflx.-put.across-SS  
 'One sack of corn would be given him; he would put it on his horse ..'

That *-p(pa)*, in contrast to *-nan*, can adjoin two fully inflected clauses is an indication that *-p* mediates a looser degree of syntactic integration than *-nan*. In the type of clause linkage illustrated in (4b), syntactically determined co-reference between the subjects of the two clauses is not possible.

The observed facts of subject co- or disjoint reference in Zuni follow from the type of syntactic connection between two clauses as indicated by the particular syntactic connective used. The so-called "SS" and "DS" markers of Zuni are NOT inherently specified as marking convergent or disjoint reference via features relevant to binding (i.e.,  $\pm$ anaphoric,  $\pm$ pronominal).

3.2. OTHER PUZZLES RE-EXAMINED. This proposal concerning the nature of switch-reference has implications for a couple of related phenomena that have not yet had a satisfying explanation. In Korean, a language not commonly classified as a switch-reference language, the following facts have been observed.<sup>9</sup>

- (5)a. nae-ka keki ka-se mek-ess-ta  
 1sg.nom. there go-then eat-past-decl.  
 'I went there and ate'
- b. emeni-ka ka-se aeki-nin ul-ess-ta  
 mother nom. go-because child-topic cry-past-decl.  
 'The child cried because [its] mother left.'

When the suffix *-se* means 'and then', linking two sequential actions, the subject of the two clauses must be coreferent. When *-se* means 'because', where the two clauses are connected by causality, the subjects of these clauses obligatorily have disjoint reference. These switch-reference-like effects and their connection to the semantic interpretation of the syntactic connective suffix are not at all surprising, if we assimilate the analysis of the Korean *-se* connective(s) to that for switch-reference proposed above: *-se1* occurs in I(nfl) and indicates a tighter degree of syntactic integration between main and subordinate clause, *-se2* occurs in C(omp) and indicates a looser syntactic connection. Since the morphological requirement of *-se* dictates that it suffix to the verb, the underlying syntactic difference is masked.

A second set of facts that becomes tractable under the proposed revision of switch-reference is the case where "SS" and "DS" are marked in a so-called switch-reference language not by two different morphemes but by a  $\emptyset$  (i.e. no marking) vs. an overt morpheme, as in the case of Seri (Farrell et al. 1991). (6a) illustrates the case of subject co-reference in the absence of overt connective morphology, as contrasted with the presence of an overt DS marker in (6b).

(6)a. mi-nañ kom m-po-k-i:xx X  
 2Pat.-skin the 2sg.subj.-irr.-aug.-wet unspec.time

?ata:p ko-m-si-a: ?a=?a  
 mucus 3obj.-2sg.subj.-irr.-be-aux=decl.  
 'If you wet your skin, you will get a cold'

b. ?im-t-kašni ma ?p-yo-o:?a  
 1sg.obj.-realis-bite DS 1sg.subj.-distal.realis-cry  
 'Since it bit me, I cried.'

While one is hard put to justify the assignment of [+anaphoric, -pronominal] features to this  $\emptyset$  as contrastive to *ma* [-anaphoric, +pronominal] marking, the  $\emptyset$  in Seri accompanied by co-reference of adjacent subjects finds a fairly natural interpretation as marking a tighter degree of syntactic integration, while the overt *ma* marks the looser type of syntactic connection.

4. "IRREGULAR" DS MARKING. With this new understanding of the nature of switch-reference facts as deriving from degree of syntactic integration, we can account for the otherwise opaque appearance of "DS" marking in certain contexts. In this section I will discuss two such cases of unexpected "DS" marking in Zuni. (7a,b) illustrate a minimal pair in the sense that while the syntactic connective varies between *-nan* and *-p*, subjects are co-referent in both examples. (7b) in fact shows three clauses with the same subject linked with *-p*.

(7)a. te?či-nan k'ya:k'en k'ato-kya  
 arrive-SS house enter-past  
 'Arriving [there], he entered the house.'

b. ?a:či-naya? ?ink'in te?či-p ?ewaštoky ?a:či-naya? ?una-p  
 dual-poss place arrive-"DS" girl dual-acc. look.at-"DS"

cawa:k'y hiš top-hot k'anleya-pa  
 youth intens. other-nonspecif. wear.clothes-pl.  
 'He<sub>j</sub> came to where they<sub>k</sub> were. He<sub>j</sub> looked at the two girls<sub>k</sub>. The youth<sub>j</sub> was dressed entirely differently.'

In (7b) the loose degree of formal syntactic connectedness indicated by *-p* implies a loose connection between the actions/descriptions in these clauses. This usage imparts almost an aspectual distinction to the *-nan* vs. *-p* choice.<sup>10</sup> *-p* indicates the action of a clause is relatively more loosely connected (syntactically) to that of the following clause and as a result may be interpreted semantically as being completed before or even unrelated to what follows. The clauses connected by *-nan* are more closely integrated, however, so that the event referred to in clause 1 necessarily leads directly into the event referred to in clause 2. The usage of *-p* illustrated above indicates that *-p* does not have the inherently specified properties (-anaphoric, +pronominal) implying the obligatory disjoint reference that is attributed to DS marking in "pure" switch-reference systems.

A second unexpected usage of the "DS" *-p* in Zuni is illustrated in (8a). Earlier I argued that Zuni *-nan* and *-p*, contrary to the standard notion of switch-reference, do not occupy the same syntactic position and therefore are not paradigmatically contrastive. (The anaphoric properties observed in conjunction with their occurrence follow from the type of clause linkage.) (8a) is an exception to this, however.

- (8)a. ?imaštho? ho? ?ito:w ?aša-**p** k'a? ho? k'a?a? k'uhmo-ke:-na?m-a  
 always I-nom. food make-**DS** neg I-nom. anything be.broken-caus.-neg.-pres.  
 'When(ever) I cook I never break things (dishes).'
- b. teššuk<sup>w</sup>a? ho? ?ito:w ?aš **-nan** k'a? ho? k'a?a? k'uhmo-ke:-na m-kya  
 yest. I-nom. food make-**SS** neg I-nom. anything be.broken-caus.-neg.-past  
 'Yesterday when I was cooking I didn't break anything.'

Here *-p* and *-nan* contrast semantically, appearing to signal contrastive modalities: *-p* = generic, *-nan* = specific. The possibility of such a distinction is accounted for if we assume *-p* occurs in the same syntactic position as *-nan* and therefore contrasts paradigmatically with *-nan*. When *-p* is used in this way, degree of syntactic integration is obviously no longer at issue. Since contrastively generic *-p* occurs in the same syntactic position as *-nan*, subjects of clauses linked by generic *-p* can be co-referent. This is further evidence that *-p* is not inherently specified for features blocking co-reference.<sup>11</sup>

## 5. CONCLUDING REMARKS.

In some languages, switch-reference marking appears to have several, sometimes contradictory, functions. Zuni may be taken as an example of such a language. I hope to have shown the usefulness of the assumption that in such languages reference maintenance has not been fully grammaticalized as the primary function of the morphology in question (unlike, for example, in Eastern Pomo (McLendon 1975), where switch-reference marking appears to be a fully articulated system making both aspectual as well as causal distinctions). Instances of apparent functional multiplicity of switch-reference marking may be ascribed to

- (i) the subordination of reference maintenance to some other primary function,  
 (ii) syntagmatic differences in so-called switch-reference morphology, and  
 (iii) the possibility of both paradigmatic as well as syntagmatic contrasts in switch-reference marking in a single language.

## NOTES

- <sup>1</sup> Isolate, western New Mexico. Zuni examples from my field notes and Bunzel (1933).  
<sup>2</sup> And other types of disjointness; see below.  
<sup>3</sup> That this may not always be the case, at least in Zuni, is discussed below.  
<sup>4</sup> In the standard analysis the claim that C(omp) and I(nfl) are coindexed appeals to the existence of other cases where C(omp) and I(nfl) exhibit some kind of formal/functional connection. The claim that these switch-reference Comp elements have the referential properties characteristic of nominals is less motivated. Furthermore, these two assumptions combined would seem to allow a contradictory mixing of category types.  
<sup>5</sup> e.g. 'Subordinate vs. Coordinate', or 'Loose vs. Tight'.  
<sup>6</sup> The Zuni clause linkage system may be partly modeled on the Hopi system of switch-reference, the result of language contact between Zuni and Hopi as, as suggested by a number of other Zuni - Hopi syntactic parallels, as well as by a number of Uto-Aztecan loanwords in Zuni. The morphological transparency of the Zuni system, the absence of switch-reference in the rest of the New Mexico Pueblo area, as well as the fact that switch-reference is a good candidate for an areal feature of the far southwest all suggest such a model for the development of the Zuni structures described in this section.  
<sup>7</sup> *-na* is used to derive nouns from verb roots
- |       |                         |          |
|-------|-------------------------|----------|
| ʔito- | ʔito- <i>na</i> -kya    |          |
| eat   | eat- <i>stat.</i> -nom. | = 'food' |
- Note the probable presence of *-na* in different inflected forms of the verb stem: in negative suffix *-naʔma* < \* *-naʔ* + *ma* (adv. clause + prohibitive) and in ergative plural agreement *-na:we* < \* *-na* + *:we* (derived stative stem + pl. noun suffix).  
<sup>8</sup> There is evidence that *-kya* historically derives from an auxiliary verb.  
<sup>9</sup> Thanks to Sook Whan Cho for reminding me of the Korean facts.  
<sup>10</sup> Though one following from the syntactic connection, not encoded by it.  
<sup>11</sup> One would expect speakers to exclude this generic *-p* from the position following past tense inflection (cf. 4b); this remains to be tested.

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## Tense System in Japanese and Subject Raising

Kaoru Ohta  
University of Washington

### 1. Introduction

This paper is concerned with the theory of the Tense system in Japanese. The Japanese tense system shows properties somewhat different from the English tense system in that the interpretations assigned to the sentences in the configurations illustrated in (1) are different from those assigned in English.

- (1) a. [ past tense [ past tense ] ]  
 b. [ past tense [ present tense ] ]

Stowell 1993 hypothesizes that such differences can be attributed to the different nature of the tense elements in languages such as English on the one hand, and in languages such as Japanese on the other, proposing that tense elements in English-type languages are Past Polarity (or Anti-Past Polarity) Items. In contrast, Nakamura 1994 argues against Stowell's proposal claiming that tense elements in both types of languages are all Past Polarity Items but the differences follow from the different local domain in which licensing takes place. In what follows, first I will review both Stowell's 1993 and Nakamura's 1994 arguments. Then, I will present an argument supporting Stowell's 1993 hypothesis by providing evidence from the Subject Raising construction in Japanese.

### 2. Embedded Past Tense Under Matrix Past Tense

Let's begin our discussion by examining the examples in (2)-(3).

- (2) Taroo-wa [Hanako-ga Rosu-ni i-ta to] it-ta.  
       -top.       -nom. LA-in exit-past quot. say-past  
 'Taro said that Hanako had been in LA.'  
 (3) Bill said [that Mary was sick].

Both the Japanese sentence in (2) and the English sentence in (3) contain past tense in the embedded clause and the matrix tense is past. As pointed out by Enç 1987, Ogihara 1987, Stowell 1993, and Nakamura 1994, among others, the temporal interpretation assigned to the embedded clause in (2) and (3) is the one in which the time referred to by the embedded clause is prior to the time of the matrix clause. Thus, for instance, in (2) the time in which Hanako stayed in LA was prior to the time of Taro's utterance. Likewise, in (3) Mary's sickness precedes the time at which Bill said that she was sick. This reading is often referred to as the past shifted reading (hereafter, PSR).

However, the English sentence in (3) has an extra interpretation, in which the event time of the embedded clause is cotemporaneous with that of the matrix clause. More specifically, Mary was sick when Bill said so. The availability of this interpretation is often referred to as the sequence of tense (SOT) phenomena. Languages such as English, which allow SOT interpretation, are referred to as SOT languages and those which do not allow SOT interpretation, such as Japanese, are called non-SOT languages.

### 3. Present Tense Under Matrix Past Tense

In addition to the differences observed in the configuration in (1a), where the past tense is embedded under the matrix past, the configuration in (1b) displays yet another different interpretation assigned to non-SOT languages and SOT-languages. Let's consider the examples in (4) and (5).

- (4) Taroo-wa [Hanako-ga Rosu-ni i-ru-to] it-ta.  
       -top.           -nom. LA-in exist-pres.-quot. say-past  
 'Taro said that Hanako was in LA.'
- (5) Bill said [that Mary is sick].

In the Japanese sentence in (4), the embedded predicate allows only the interpretation in which the event time of the embedded clause is cotemporaneous with the matrix event time. In other words, the time of Taro's utterance overlaps with the time of Hanako's existence in LA. This interpretation is often referred to as the "simple-simultaneous" reading (henceforth SSR).

In contrast, the English sentence in (5) allows another interpretation in addition to the SSR. This interpretation is often referred to as the "double-access" reading (DAR). DAR is an interpretation in which the time referred to by the embedded clause overlaps both the time of Bill's utterance and the time indicated by the present tense. Hence, in this sentence, Mary's sickness holds true both of the utterance time and the time of Bill's original utterance. DAR is not available for Japanese sentences such as the one in (4). In (4), Hanako's existence in LA has no relevance to the utterance time. Therefore, Hanako's existence in LA is relevant only to the time in which Taro said that she was there and does not hold true of the time when this sentence was uttered.

In summary, the tense interpretation of Japanese and English can be represented as in (6).

- |     |                            |          |         |
|-----|----------------------------|----------|---------|
| (6) |                            | Japanese | English |
|     | [ ...past [ ...past ] ]    | PSR      | PSR/SOT |
|     | [ ... past [ ... pres. ] ] | SSR      | SSR/DAR |

(PSR: Past Shifted Reading; SSR: Simple Simultaneous Reading;  
 SOT: Sequence of Tense Reading; DAR: Double Access Reading)

### 4. English Tense as Past Polarity Items (PPIs)

Stowell 1993 proposes that the temporal behaviors of tense elements in SOT languages such as English can be explained by assuming that the tense element in these languages is a past polarity item (hereafter PPI). He argues that the availability of SOT in English follows from the hypothesis that past tense is actually a PPI occurring under the ZP (Zeit phrase) in the complement position of TP as illustrated in (7).

- (7) English Past Tense  
 [TP T... [TP [T' T [ZP PPI ] ] ] ...]

The PPI assumed in (7) behaves just like a PRO, allowing the SOT interpretation when licensed by the matrix semantic tense. PSR is possible when the PPI is licensed by the embedded tense.

In Stowell's analysis, the fact that Japanese does not allow SOT is due to the unavailability of a PPI. Japanese past tense is a tense element and must be interpreted as past tense.

Stowell also argues that the availability of SSR and DAR in English is due to the hypothesis that the English present tense is an anti-PPI. Being an anti-PPI, it scopes out of the domain of the semantic past by leaving a trace in its original position in a manner illustrated in (8).

- (8) English Present Tense  
 a. [ ... past tense [ anti-PPI ] ]  
 b. anti-PPI<sub>i</sub> [ ... past tense [ t<sub>i</sub> ] ]

Hence, SSR is attributed to the position of trace in (8b) and DAR is attributed to the position where an anti-PPI ultimately lands. In contrast, the unavailability of DAR in Japanese can be attributed to the hypothesis that the Japanese present tense is not an anti-PPI. As such, it does not scope out of the domain of matrix past tense and therefore it does not allow DAR. I propose that the Japanese present tense is in fact an optional element. As an optional element, SSR naturally follows from the non-existence of the present tense; since it does not project its head, the matrix past forces SSR.

Nakamura 1994, on the other hand, claims that the Japanese present and past tenses are PPIs. He argues that the local domain in which PPIs are licensed is parameterized. Hence, the aforementioned unavailability of SOT and DAR in Japanese is attributed to the fact that Japanese (anti-)PPIs must be locally licensed. Thus, in the Japanese structure in (9) which is similar to (7), PPI must be licensed inside the minimal clause where it exists, in this case the embedded clause.

- (9) Japanese Past Tense  
 [TP... [CP [TP [T [ZP PPI] T] ] ] ... T]

In addition, Nakamura hypothesizes that Japanese present tense is an anti-PPI subject to a licensing condition somewhat different from its English counterpart: while English anti-PPI cannot be in the scope of semantic past tense, Japanese anti-PPI cannot be in the c-command domain of semantic past tense in the same clause. Since the embedded clause in question does not contain past tense, Japanese anti-PPI does not need to scope out a higher clause as shown in (10) and consequently no DAR results.

- (10) Japanese Present Tense  
 [ [ anti-PPI present tense ] past tense...]

In Nakamura's framework, the difference between English and Japanese can be attributed to the different domains in which (anti-)PPI must be licensed. For PPI, English allows long-distance licensing of PPI whereas Japanese does not. For Anti-PPI, Japanese does not allow c-commanding of Anti-PPI by the local past tense whereas English does not allow its c-commanding by the matrix past tense.

In what follows, I will show Nakamura's analysis to be untenable by examining the subject raising (hereafter SR) data. I will argue that in Japanese the

present tense is an optional element whereas past tense is obligatory, thus supporting Stowell's hypothesis.

### 5. Subject Raising in Japanese

Now, let's consider the sentences in (11).

- (11) a. Taroo-wa [Hanako-ga kawai-i-to] omot-ta.  
           -top.          -nom. cute-pres.-quot. think-past  
           'Taro thought that Hanako is cute.'  
       b. Taroo-wa Hanako-o kawai-i-to omot-ta.  
           -top.          -acc. cute-pres.-quot. think-past  
           'Taro thought Hanako to be cute.'

The sentence in (11a) contains an embedded subject marked in the nominative (-ga). In (11b), a similar sentence, the same NP (*Hanako*) is marked in the accusative. Kuno 1976 and Sakai 1994 independently argue that the sentence in (11b) is derived by the rule of SR. They show that the embedded subject in (11a) is raised to the matrix object position as illustrated in (12) (cf. Lasnik and Saito 1991, Lasnik 1993, and Sakai 1994).

- (12) a. [            [ Subject            ]            ]  
       b. [            Subject<sub>i</sub> [ t<sub>i</sub>            ]            ]

Note that the embedded clauses of SR sentences are generally "stative" predicates as Kuno 1976 points out. Hence, the sentence in (13) where the embedded clause involves an eventive predicate *nihon-ni iku* 'to go to Japan' results in ungrammaticality.

- (13) \*Taroo-wa John-o nihon-ni ik-u-to omot-ta.  
           -top.          -acc. Japan-to go-pres.-quot. think-past  
           '(intended) Taro thought that John will go to Japan.'

Compared with the English "raising-to-object" construction (cf. Postal 1974), Japanese SR shows properties somewhat different from those of its English counterpart. Of these properties, two points are relevant to the present discussion: i) the optionality of Japanese SR and ii) the contrast between SR sentences involving present tense embedded clauses and those involving past tense embedded clauses.

In connection to the first property, the application of SR in Japanese is optional as observed earlier in (11). Both the non-SR sentence in (11a) and the SR sentence in (11b) are grammatical. Note that the embedded clause in the Japanese SR construction is tensed. For instance, in (11), the suffix *-i* indicates the present tense for the adjectival predicate. This is not the case in English where the ECM construction involves an infinitival complement, therefore, its embedded subject may not be marked in the nominative as the contrast in (14) and (15) shows.

- (14) a. Mary believed him to be innocent.  
       b. Mary considers herself to be the prettiest.  
       c. The girls found them to be in danger.

- (15) a. \*Mary believed he to be innocent.  
 b. \*Mary considers she to be the prettiest.  
 c. \*The girls found they to be in danger.

In other words, subject-to-object raising in English must take place.

The apparent optionality of SR for Japanese poses two theoretically important questions: First, within the "minimalist" framework (Lasnik 1993 and Chomsky 1995 among others), all required syntactic movement must be forced. This means that no syntactic rule is optional. If Japanese SR is optional, this would pose a question to the minimalist framework. Secondly, assuming that the SR structure is derived by the application of subject-to-object raising, movement of the embedded subject violates the minimality condition. Recall that the embedded subject, which undergoes this operation, must move out of the clause headed by the complementizer-like element *-to*, which is assumed to constitute the head of CP. Hence, the subject apparently moves across CP. I will argue below that these problems are solved by assuming optionality of the present tense in Japanese.

The second property relevant to the present discussion is the difference in acceptability of the SR sentences involving the embedded present tense and those involving the embedded past tense as originally pointed out by Kuno 1976. Consider the sentences in (16) and (17).

- (16) a. Yamada-wa zibun-o orokana otoko-da-to omot-ta.  
           -top. self-acc. stupid man-be=pres.-quot. think-past  
           'Yamada thought himself to be a stupid man.'  
 b. Baisinin-tati-wa sono otoko-o hannin-da-to sinzi-ta.  
    juror-pl.-top. that man-acc. culprit-be=pres.-quot. believe-past  
    'Jurors believed the man to be the culprit.'  
 c. Gakusei-tati-wa Yoko-o kawai-i-to iihat-ta.  
    student-pl.-top. -acc. cute-pres.-quot. insist-past  
    'Students insisted that Yoko is pretty.'
- (17) a. (=Kuno's 1976 (89))  
       ?Yamada-wa zibun-o orokana otoko-dat-ta-to omot-ta.  
           -top. self-acc. stupid man-be=past-quot. think-past  
           'Yamada thought himself to have been a stupid man.'  
 b. ??Baisinin-tati-wa sono otoko-o hannin-dat-ta-to sinzi-ta.  
    juror-pl.-top. that man-acc. culprit-be-past-quot. believe-past  
    'Jurors believed the man to have been the culprit.'  
 c. ??Gakusei-tati-wa Yoko-o kawaikat-ta-to iihat-ta.  
    student-pl.-top. -acc. cute-past-quot. insist-past  
    'Students insisted that Yoko was pretty.'

In the examples in (16), the embedded clause contains the present tense. As the accusative marker *-o* indicates, the application of SR does not result in unacceptability. In contrast, the sentences in (17), where the embedded tense is past, are marginal at best. In other words, SR is possible when the embedded clause is present tense but it affects the acceptability of sentences when applied to embedded clauses involving past tense.

The contrast observed in (16) and (17) indicates that the status of the present and past tenses are somewhat different. As Nakamura 1994 claims, if both present and past tenses are (anti-) PPI, an element projected in the complement position of TP, then it is necessary to state two things which are specific to the rule of SR: i)

the application of SR in Japanese is optional and ii) application of SR is blocked when the embedded clause is past. This is an undesirable result because i) the optionality of SR is attributed to the optionality of application of a rule and ii) it is necessary to stipulate an ad hoc restriction on this rule to guarantee that SR not be applicable when the embedded clause contains the past tense.

## 6. Present Tense as an Optional Element

Now, let's abandon the hypothesis that tense in Japanese is a(n) (anti-) PPI and instead, assume that the present tense is an optional element in Japanese and that the past tense is an obligatory element with tense generated as the head of TP. Following this analysis, the optionality of the Japanese SR construction and the present and past tense asymmetry of the applicability of SR can be easily accounted for.

First, the optionality of SR can be attributed to the optionality of tense, rather than the optionality of application of a rule. Thus, when the embedded clause selects present tense, non-SR sentences are derived. On the other hand, when the present tense is not selected in the embedded clause, SR must occur for Case-theoretic reasons. Since the head of TP is not projected, there is nothing to assign Case to the subject of the embedded clause. Therefore, in order to receive Case, the embedded subject must move to the matrix object position. To illustrate, non-SR sentences and SR sentences are schematically represented as in (18a) and (18b).

- (18) a. non-SR sentence  
       [           [ NP-nom.       Tense ]-to   V        ]  
       b. SR-sentence  
       [   NP<sub>i</sub>-acc. [ t<sub>i</sub>        Ø ]-to   V        ]

By assuming that the complementizer-like element *-to* is somehow incorporated, perhaps at LF, invoking S-bar deletion effect, SR does not violate the minimality condition.

Secondly, the present and past asymmetry of the applicability of SR illustrated in (16) and (17) can also easily be accounted for. Recall that the present tense is an optional element and the past tense is an obligatory element. Thus, there is no instance where the embedded clause lacks the head of TP as illustrated in (19).

- (19) [ ... [ [ Subject ... Past Tense ]-to ] V ]

Hence, the embedded subject does not have to move to the matrix object position because it can receive Case in the embedded clause. Therefore, application of SR results in unacceptability when the embedded clause contains past tense.

## 7. Summary

As the discussion above shows, tense elements in Japanese cannot be a(n) (anti-) PPI as Nakamura 1994 argues. The SR facts indicates that the properties of both non-SR and SR constructions can be accounted for only if we assume that the tense system of Japanese is distinct from that in English. As Stowell 1993 implies, the tense elements of Japanese are realized as the head of HP.

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Department of Asian Languages and Literature  
 University of Washington  
 Box 353521, Seattle, WA 98195  
 e-mail: kaoru@u.washington.edu

## Movement to Spec and Case Tendency in Persian

Siamak Rezaei<sup>1</sup>  
University of Edinburgh

### Abstract

Persian is one of the Indo-European languages that allows multiple movements from finite embedded clauses. There have been attempts to capture this phenomenon by introducing new principles or by assuming that Spec of CP is an A position in Persian. Here we will elaborate on this phenomenon and propose a new approach for capturing it. Our proposal for the analysis of this kind of movement restricts and formalizes the principle of case tendency [Kar90] in Persian. Unlike some approaches, we do not assume an A-position for Spec of CP in Persian, which is at odds with Chomsky's suggestion that Spec of CP is always an A'-position. We show examples of movement from finite embedded clauses and elaborate on two types of movement from these clauses, Fronting (i.e. spec movement) and long distance scrambling (i.e. adjunction). Our analysis has further consequences for the analysis of *attraction* phenomenon [Com81] in Persian restrictive relative clauses. Given the *promotion* analysis of relative clauses, the attraction facts can be accounted for straightforwardly.

### 1 Finite Clausal Arguments

Persian is an SOV pro-drop language and the position after the clause is the place where finite clausal arguments appear. For verbs which subcategorize for a clausal argument (e.g. "say" in "he said that ...") the clausal argument (if present) appears in this position. In the following we have shown an instance of finite clausal arguments. Here SPCF stands for specific oblique marker.

- (1) oo aqide dārad [ke ahmad sib rā xord].  
he belief have-3S [that Ahmad apple SPCF ate-3S]  
'He believes that Ahmad ate the apple.'

It is important that in most cases the clausal argument of the verb can also appear as a simple NP or PP. In these cases the phrase corresponding to clausal argument canonically appears before the verb:

- (2) a. oo in mājārā rā be man goft.  
he this adventure SPCF to I told-3S  
'He said to me this adventure.'
- b. oo (in; ra) be man goft [ke ali zerang ast].  
he this SPCF to I told-3S [that Ali clever is]  
'He said to me that Ali is clever.'

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In the last example (2-b) the NP *in* co-indexes with the whole sentential argument. Examples like this have motivated some of the linguists such as Moyne and Carden [MC74] to propose that:

- (1) Sentential arguments originate in pre-verbal position in Persian.
- (2) They are dominated by an NP.
- (3) They are moved to the post-verbal position by an obligatory extraposition rule.

To my knowledge Karimi [Kar89] is the only linguist who presents arguments indicating that Persian finite sentential complements are not dominated by an NP node, and as a result they do not originate in the pre-verbal position. As in Dutch, the issue that sentential arguments originate post/pre-verbally may be controversial.

## 2 Structure of Clausal Argument

In this paper we assume the structure in Figure 1 for Persian finite clausal arguments. In this structure if the clausal argument is extraposed, the NP (i.e. *in*) may be absent, otherwise it must be present.

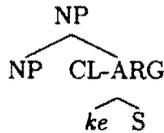


Figure 1: Structure for Persian Finite Embedded Clauses

The structure which we described is in line with the proposal of Moyne and Carden [MC74], i.e. an NP-dominated preverbal clause. But as Soheili [SI76] and others have shown, extraposition is not always obligatory and it depends on the type of clausal argument. In (3-a) we see an example of a subject clausal argument.

- (3) a. (in<sub>i</sub>) be-nazar-mires-e [ke ali sib rā xord-eh ast]<sub>i</sub>.  
 (this) is=seeming [that Ali apple SPCF eaten is-3S  
 'It seems that Ali has eaten the apple.'
- b. \* in [ke ali sib rā xord-eh ast] be-nazar-mires-e.

In (4-a) we see an example of an object clausal argument. (4-b) is the extraposed version of (4-a). While in (4-c) - with roughly the same meaning as (4-a) - the clausal argument is governed by a preposition.

- (4) a. [in haqiqat]<sub>i</sub> [ke irāq be irān hamle kard]<sub>i</sub> rā mi-dān-am.  
 this fact [that Iraq to Iran rush did] SPCF know-1S  
 'I know this fact that Iraq invaded Iran.'

- b. [in haqiqat], rā mi-dān-am [ke irāq be irān hamle kard],  
 c. man az [in haqiqat], [ke irāq be irān hamle kard], āgāh hast-am.

In general the extraposition is obligatory for subject complements, while it is optional for complements other than subject and (direct) object; that is complement clauses preceded by a preposition. Note that object complements are extraposed most of the time. [SI76] states that the non-extraposed examples (center-embedded) are difficult to comprehend. According to Soheili Isfahani center-embedding reduces comprehensibility and this may be related to a limitation on the human capacity for temporary memory.

### 3 Relative Clauses

So far we have considered clausal arguments in Persian. Here we will discuss relative clauses. In Persian, NPs (whether marked by a preposition or not) can be further modified by relative clauses. These relative clauses normally come immediately after the NP which they modify :

- (5) a. mard sib-i/\*sib rā [ke did-i] xord.  
 man apple-REL SPCF [that saw-2S] ate-3S  
 'The man ate the apple you saw.'  
 b. mard sib-i rā xord [ke did-i].

In Persian, relative clauses are always marked by a clause marker *ke* that comes at the beginning of the relative clause, and the modified noun phrase is usually marked by a relative marker *-i* at the end. This suffix is a restrictive relative clause marker and is required on the head of a restrictive relative clause [Com81]. As we have shown, a (restrictive) relative clause can be extraposed to the end of the clause. The interaction between extraposition of relative clauses and clausal arguments is an interesting issue in Persian, which shed lights on the actual position of clausal arguments. If we assume that the clausal arguments are base generated post-verbally then it shouldn't be possible for embedded clauses to appear between verbs and clausal arguments. But this is not the case in Persian and an example of this is shown in (6-a).

- (6) a. ali be mard-i<sub>j</sub> goft [ke injā bood]<sub>j</sub> [be-rav-ad xāne]<sub>k</sub>.  
 Ali to man-REL told [that here was] [SUB-go-3S home]  
 'Ali told to the man who was here to go home.'  
 b. ali be mard-i<sub>j</sub> goft [be-rav-ad xāne]<sub>k</sub> [ke injā bood]<sub>j</sub>.

These examples further support the proposal of extraposition of clausal arguments in Persian. In extraposition, an embedded clause is moved to a place after the right boundary of the embedding clause. If this position is already filled by another extraposed relative clause then it is not possible to extrapose other relative clauses. In other words there is only one position available for

relative clauses in post-verbal position in Persian.

#### 4 Fronting and Scrambling

In Persian, there are examples of movement from embedded clauses into main clauses. In this section after reviewing some examples of this movement we will argue for two different types of movements.

The examples of embedded clauses - clausal arguments and relative clauses - which we presented in the previous sections don't have any instance of fronting in them. In fronting a category from an embedded clause is moved to the domain of the clause which dominates it. In this section we will review examples of fronting for the sentences we saw earlier. An example of fronting is shown in (7-a). This sentence corresponds to the non-fronted example (7-b). Note that *sib* does not belong to the subcategorization frame of the matrix verb.

- (7) a. ali sib rā entezār dār-ad [ke - be-xor-am].  
 Ali apple SPCF expectation have-3S [that - SUB-eat-1S].  
 'Ali expects me to eat the apple.'  
 b. ali entezār dār-ad [ke sib rā be-xor-am].

The fronting phenomenon is not restricted to the direct object case. (8) shows an instance of subject fronting.

- (8) oo ahmad rā goft [ke - sib rā be-xor-ad].  
 he Ahmad SPCF told-3S [that - apple SPCF SUB-eat-3S]  
 'He said that Ahmad eat the apple.'

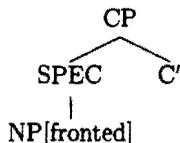
As in the above examples the fronted category is usually marked with *rā*. In fact some have suggested that *rā* is a topic marker. In the following we will elaborate on this.

##### 4.1 Is Fronting a Case of NP Left-Dislocation?

NP-left dislocation is a possible way for an Ezafe (NP) construct to be extracted from inside a NP or PP in order to be preposed to the clause. The preposed NP leaves a resumptive pronoun '-sh' which is cliticized to its governor:

- (9) a. tup rā az hassan greft-am.  
 b. hassan rā tup rā az-ash greft-am.  
 Hassan SPCF ball SPCF from-CLITIC caught-1S  
 'Hassan, I caught the ball from him.'

Note that the left-dislocated noun phrase always co-refers with a clitic and conveys old information. This suggests that the phenomenon is a topicalisation process. The examples of NP left-dislocation can be represented by the following structure, in which the left-dislocated NP goes to the SPEC position:



Note that in NP Left-dislocation, the topicalised noun phrase leaves a pronoun/clitic in its place inside the matrix clause. This is not required for the examples of fronting we have studied. In (10) *gušt* can appear anywhere in the matrix clause and it does not leave a pronoun in its initial position inside the embedded clause. In fact in (10) the sentence does not sound grammatical when there is a pronoun inside the phrase co-referring with the moved element. In addition *rā* is not obligatory after the fronted noun phrase. These facts clearly distinguish fronted noun phrases from non-subject topicalised NPs. In fact some examples of fronted constituents carry new information such as contrast, which is evidence against the assumption that they are topics.

- (10) *gušt man goft-am [ke (? an<sub>i</sub> ra) na-xor-d].*  
 meat I told-1S [that it SPCF not-eat-3S]  
 'The meat, I told him not to eat it.'

#### 4.2 *Is Fronting an Instance of Raising?*

Having shown that the fronting examples are not instances of NP left-dislocation or topicalization in Persian, the second possibility is for them to be instances of some other kind of leftward movement, e.g. raising. But if fronting is an instance of raising, then why isn't possible to front an element from the clausal argument when *in* is present in the main clause? This is shown in the following:

- (11) \* *ali sib az in<sub>i</sub> xošēš=nemyād ke [man - be-xor-am]<sub>i</sub>.*  
 Ali apple from this not-like that [I - SUB-eat-1S]  
 'Ali doesn't like that I eat the apple.'

Another issue is that there are more complex examples of the leftward movement phenomenon which we haven't mentioned, examples such as (12) where we have in addition to the fronted noun phrase instances of prepositional phrases which are also scrambled into the matrix clause. These examples further create problem for the raising approach to fronting, because in most approaches there is a single position considered for raising and moving more than one element creates problems.

- (12) *mard sag rā az xāne be kuče say=kard [be-bar-ad].*  
 man dog SPCF from home to alley try-3S [SUB-take-3S].  
 'The man tried to take the dog from home to the alley.'

We should also note that the case marking of the fronted noun phrase is not necessarily the same as in the embedded clause. In (13) the fronted subject of the embedded clause is marked by *rā* in the matrix clause. As we said *rā* does not appear with subject phrases. In other words we don't have a subject to subject raising here.

- (13) *oo ahmad rā goft [ke - sib rā be-xor-ad].*  
 he Ahmad SPCF told-3S [that - apple SPCF SUB-eat-3S]  
 'He said that Ahmad eat the apple.'

Note that they are not raised to objects either, because no instance of these can be passivised. These facts shows that fronting is not an example of raising either.

### 4.3 Previous Formal Approaches to Fronting

In the following we will review two formal approaches for representing some instances of fronting in Persian and then we will propose our solution for capturing instances of NP movement. First we will review Karimi's proposal for *rā* and her proposed case tendency principle for capturing fronting. Then we will discuss Yoon's proposal for representing examples of NP long distance movement from Persian subject complement clauses.

#### 4.3.1 Fronting and Case Tendency Proposal

Karimi, in a GB framework, proposes that *rā* in Persian is a specific oblique marker and obligatorily case marks a noun phrase if that noun phrase is specific and is oblique. She argues that a noun phrase is oblique if it is not in the minimal government-projection of a noun, adjective or preposition. In other words she considers a noun phrase oblique, if its case is not nominative [-NOM] (i.e. it is not a subject) and it is not preceded by a preposition, e.g. direct object of the sentence. By this solution she captures many instances of the function of *rā* in Persian in a principled way. We will elaborate on some of these [Kar90]:

- (14) a. *man in ketāb rā did-am.*  
 I this book SPCF saw-1S  
 'I saw this book.'  
 b. \* *man in ketāb did-am.*

For this sentence to be grammatical, *rā* must appear after *in ketāb*. According to Karimi's proposal, since *in ketāb* is specific and is the direct object of the sentence (i.e [-NOM] and accusative marked), it is both oblique and specific and must be case marked by *rā*. *rā* co-occurs with noun phrases that are not direct objects:

- (15) *man rā be-em mi-xand-e.*  
 me SPCF to-me laugh-3S  
 'As for me, she laughs at me.'

According to Karimi's proposal, here *man* is specific and oblique and *rā* must appear after it. *man* is specific because it is a pronoun and all pronouns are specific. *man* is oblique because it is co-indexed with *-em* and inherits the [-NOM] case of *-em*. In addition, it is not governed by a preposition.

Karimi does not elaborate much on examples of long distance topicalization, but she gives examples that support the case marking of the fronted category inside its present clause.

- (16) *gušt behtar-e beg-i na-xor-ad.*  
 meat better-is tell-2S not-ate-3S  
 'As for meat, it is better to tell him/her not to eat.'

In (16) she assumes that *gušt* is case marked by the verb *beg-i* and she considers the verb of the sentence to be an instance of a oblique assigner verb. To represent this and also the phenomenon of attraction in Persian relative clauses, she proposes the Case Tendency principle for Persian.

(17) The Case Tendency

The case of a non-argument NP tends to be determined by its position in the CP containing it, or the closest CP.

But what are the underlying formal principles for case tendency in Persian? Karimi does not discuss this.

#### 4.3.2 Fronting and A-SPEC Proposal

[Yoo92] discusses some interesting properties of finite raising in some languages and also discusses subject complement clauses and movement from them in Persian. He argues that the movements (or raising in his terminology) from subject complement clauses are examples of A-movement and not A'-movement because:

- idiom chunks can be raised. As seen in (18)

(18) sar-e ali lāzem ni-st [ke kolā gozāšt-e be-šav-ad].  
 Head-of Ali necessary not-be that hat put-PASS SUB-inch-3S  
 'Ali is not necessary that (he) be ripped off.'

Here *sar-e S.O. kola gozāšt* is an idiom chunk.

- Raised nominals can bind from the raised position as seen in (19):

(19) ali barāy-ash lāzem ast [ke har ruz varzeš kon-ad].  
 Ali for-him needed is that every day exercise do-3S  
 'Ali is necessary for himself to exercise every day.'

- Raised nominals can undergo further raising and passive.

He<sup>2</sup> considers examples where only one of the arguments is scrambled and he argues that these kinds of arguments will move to the SPEC position and then to the subject position. But as we argued for (12), it is possible to move/raise more than one argument. Also in (19) the moved element doesn't necessarily agree with the matrix verb. Hence his assumption of movement of these argument to an A(argument)-SPEC position and then to a subject position is not correct. For this he assumes that the SPEC of CP in Persian is an A-position.

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<sup>2</sup>He discusses more cases, but we have chosen some of them. The interested reader can see [Yoo92]. It seems to me that he follows Karimi's proposal for representing clausal arguments, which we rejected.

#### 4.4 Our Account of Fronting and Scrambling

In the previous sections we showed counter evidence against the proposal that the sentential arguments canonically appear post-verbally. Here we assume that:

- (1) The sentential arguments originate in pre-verbal position in Persian.
- (2) They are dominated by an NP.
- (3) Fronted constituent moves to SPEC of NP.
- (4) The frozen CP is moved to the post-verbal position.

Basing our approach on these assumptions we can easily justify the absence of movement into main clauses in cases where there is a noun phrase co-indexed with the clausal argument. In example (11) repeated as (20) there are two bounding nodes in the sentence that prevent the movement of the arguments: one is the tense claused itself and the other is the dominating noun phrase *in*.

- (20) \*mard *in*<sub>i</sub> rā sag rā say=kard [ke be kuče be-bar-ad]<sub>i</sub>.  
 man this SPCF dog SPCF try-3S [that to alley SUB-take-3S].  
 'The man tried to take the dog to the alley.'

In other words for any movement to occur it should pass two bounding nodes, which is generally assumed not to be possible [Ros67], [Cho86]. When *in* is not present, then there is only one bounding node and according to CNPC it doesn't prevent the movement of arguments. Note that when *in* is not present, the extraposition of the embedded clause is obligatory. We assume that constituents from the clausal arguments may move into the matrix clause before the extraposition happens. After extraposition the clause becomes frozen and no constituent can move from it. This is also true for extraposed relative clauses.

Based on this we can now represent the possible kinds of movement and the constraints on them. We will distinguish between examples in which the fronted category is preceded by a preposition and those in which it is not. According to this, we will distinguish between Examples (21-a) and (21-b) where in the former we have two instances of scrambling and in the latter we have only one instance of fronting.

- (21) a. mard az xāne be kuče say=kard [sag rā be-bar-ad].  
 man from home to alley try-3S [dog SPCF SUB-take-3S].  
 'The man tried to take the dog from home to the alley.'
- b. mard sag rā say=kard [az xane be kuče be-bar-d].

In our analysis we assume that the scrambling examples are instances of adjunct attachment (A' movement). As a result we can see one or more instances of scrambling in Persian.

We will propose the structure shown in Figure 2 for representing clausal arguments. For fronting we assume that the fronted category moves to the SPEC position of the clausal complement (i.e. SPEC of NP). This is shown in Figure 3.

Since there is only one SPEC position for each clausal argument, there is only one case of fronting. Like Karimi, we assume that these fronted arguments

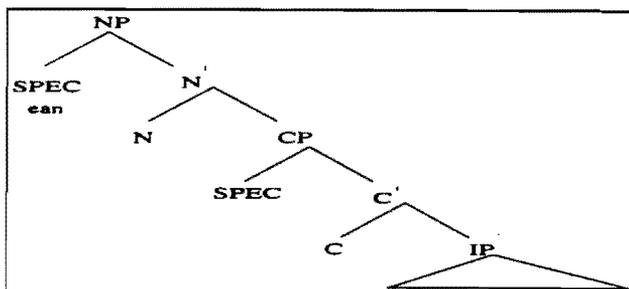


Figure 2: Structure for Clausal arguments in Persian

are case marked by the verb in their new domain. According to her analysis, the fronted categories are inside the domain of the verb and can be case marked by the verb because of *the case tendency principle*.

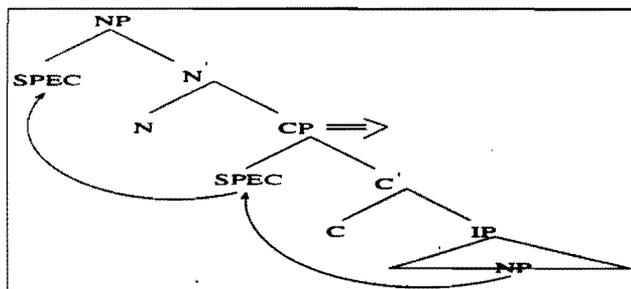


Figure 3: A Structure for NP Fronting in Persian

Karimi claims that in Persian, the case of a non-argument NP tends to be determined by its position in the CP containing it, or the closest CP [Kar90]. But Karimi's proposal faces problems in representing sentences like (21-a) where two constituents are scrambled into the main clause. Scrambled constituents always retain their own case marking even in the new clause.

In contrast to Karimi we assume that the principle at most can apply to arguments in SPEC position, an A'-position. In other words in Persian, if the SPEC of complement clause is not empty, then it must be case marked locally.

Note that unlike Karimi, we don't need to assume that some verbs in Persian are oblique assigner (cf [Kar90]), because in our analysis, the oblique case of the absent dominating NP (i.e. *in*) can be assigned to the SPEC of it (for non-subject complement clauses). In contrast to Karimi, we argue that the clausal arguments originate in pre-verbal positions.

The fronted constituent which is in the SPEC position of the clausal argument, can undergo an NP left dislocation process. This is shown in (22).

- (22) gorbe, rā man pā-sh, rā goft-am ke be-bin-id.  
 cat SPCF I foot-it SPCF told-1S that SUBJ-see-3P  
 'The cat, I told you to see its foot.'

And it can also move to higher level clauses:

- (23) man sib rā goft-am [ke beg-e [ke - - na-xor-ad]].  
 I apple SPCF told-1S [that tell-3S [that - - not-eat-3S]]  
 'Apple, I said to S.O. to tell not to eat it.'

The so called NP fronting phenomenon can be more complex and we can have instances in which two categories are fronted, but into two different clauses:

- (24) man ali rā goft-am [ke sib rā beg-e [ke - - na-xor-ad]].  
 I Ali SPCF told-1S [that apple SPCF tell-3S [that - - not-eat-3S]]  
 'I said Ali that tell S.O. not to eat the Apple.'  
 'I said to S.O. that tell Ali not to eat the apple.'

In (24) the object of the most embedded clause can be fronted into the SPEC position of the higher clause. The subject of the most embedded clause can be controlled by the addressee of the clause one level higher (second translation), or not (first translation). The addressee of this clause is moved to the SPEC position of the main clause. To elaborate more, we propose that for non-subject clausal arguments we have the following constraints:

1. In the case of fronting, the fronted noun phrase is case marked inside the new clause, but it agrees with its trace in number ( and person). Case of weak unbounded dependency.
2. In the case of scrambling , the scrambled noun phrase is not case marked inside the new clause and it agrees with its trace both in number and case. Case of strong unbounded dependency.
3. Only one of the NPs of the extraposed clause can be fronted and move to the SPEC position of the complement clause in the preverbal position. These are generally marked by *rā* for non-subject complement clauses.
4. Other NPs of the extraposed clause which scramble into the matrix clause need to be case marked by a preposition.

Now we discuss the fronting of subject arguments of verbs with a modal-like meaning such as *be-nazar resid-an* (seem). (25) shows an example of this in Persian where *sib* is being moved:

- (25) sib rā be-nazar-mires-e [ke ali xord-eh ast].  
 apple SPCF is-seeming-3S [that Ali eaten is-3S]  
 'It seems that Ali has eaten the apple.'

We can extend our analysis for non-subject complement clauses to cover movement examples of subject complement clauses. Based on this we can argue why we cannot have *in* and movement at the same time.

- (26) \* *in*<sub>i</sub> *sib rā be-nazar-mires-e [ke ali xord-eh ast]<sub>i</sub>*.  
 this apple SPCF is-seeming-3S [that Ali eaten is-3S]  
 'It seems that Ali has eaten the apple.'

We can claim that our proposal can naturally be extended to cover instances of subject complements where there is no dominating NP. In our analysis we assumed that the verb can case mark the fronted arguments that go into the SPEC. But the SPEC position of subject clausal arguments is out of the domain of the verb of main clause and therefore cannot be case marked as oblique. Hence this position cannot be followed by *rā* in subject complement clauses. This justifies the ungrammaticality of (27) in which *Ali*, being the subject of the embedded clause, is followed by a marker of obliqueness.

- (27) \* *ali rā be-nazar-mires-e [ke sib rā xord-eh ast]*.  
 ALI SPCF is-seeming-3S [that APPLE SPCF eaten is-3S]  
 'It seems that Ali has eaten the apple.'

In (27) *Ali* cannot receive oblique case from the verb. In fact according to our analysis, in these cases the SPEC can only get the case of the subject complement, which is not oblique. However, the verb is always third person. This is further highlighted in the following example:

- (28) *to be-nazar-mires-e [ke sib rā xord-eh -i]*.  
 You is-seeming-3S [that APPLE SPCF eaten is-2S]  
 'It seems that you have eaten the apple.'

Note that although the sentence is grammatical there is no agreement between *to* and *be-nazar-mires-e*. As a result the inflection cannot case mark *to*. The only possible answer is to consider all instances of this as adjunct attachment. But this solution requires that we assume subjects and objects that are not governed by any preposition can also be moved by adjunction<sup>3</sup>, since in Persian we have examples such as (29) where an object and a subject are moved from an embedded clause to a higher domain:

- (29) *ali sib rā be-nazar-mires-e [ke xord-eh ast]*.  
 Ali apple SPCF is-seeming-3S [that eaten is-3S]  
 'It seems that Ali has eaten the apple.'

It seems that in Persian, modal-like verbs that have a subject complement behave differently when their complement clause is not dominated by an NP (i.e. *in*).

<sup>3</sup>This wasn't possible for the non-subject case.

Based on Yoon's arguments on movement of these arguments into an A position, and the fact that any number of arguments from the embedded clause can scramble and come before the modal-like verb, we conclude that these modal-like verbs when their subject clausal arguments are not dominated by an NP (i.e. *in*), behave as modal verbs in Persian.

The only restriction on the movement is that the modal verb and the optional comp *ke* must precede the verb of the clause. Note that the modal-like verb and *ke* behave as a parenthetical constituent. This is also true for other modals of Persian:

- (30) ali sib rā bā čangāl bāyad (ke) xord-eh bāsh-ad.  
 Ali apple SPCF with fork must (that) eaten SUB-is-3S  
 'Ali must have eaten the apple with fork.'

Here *ke* functions as a stress marker (See [Nb92]). Based on this we can represent sentences such as (31) where all the arguments come before the modal verb.

- (31) ali sib rā bā čangāl be-nazar-mires-e (ke) xord-eh ast.  
 Ali apple SPCF with fork is-seeming that eaten is-3S  
 'It seems that Ali has eaten the apple.'

The structure we outlined in Figure 1 is analogous to the structure of an NP which is modified by a relative clause. The difference is that in the latter, the NP must be co-indexed with an empty category inside the embedded clause (i.e. *CI-arg*). The former case is similar to the case of noun complement structure in Persian. In general in the above structure the tensed clause and the dominating NP act as barriers and therefore fronting cannot occur in relative clauses, tensed clausal arguments and noun complement structures.

## 5 The Reverse Case of Fronting in Relative Clauses

In relative clauses, there is no case of fronting or scrambling. Here we will concentrate instead on the issue of case marking in constructions which involve relative clauses. [Com81] gives interesting examples of case marking of head noun phrases that are modified by relative clauses. The examples are:

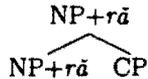
- (32) zan-i [ke did-id] injā-st.  
 woman-RES [that saw-2P] here-is  
 'The woman that you saw is here.'
- (33) a. ān zan-i rā [ke diruz āmad] did-am.  
 that woman-RES SPCF [that yesterday came-3S] saw-1S  
 'I saw that woman who came yesterday.'
- b. [ān zan-i ke diruz āmad] (rā) did-am.

In (33-a), the head noun phrase of the relative clause can become *attracted* to the relative clause and lose its specific object marker *rā*. This is shown in (33-b).

Note that here the head noun phrase and the relative clause can be case marked with *rā* which is here a specific accusative marker. A phenomenon similar to this is present in Latin and Greek; it is called *Attraction*. Note that attraction is not restricted to examples where the head noun is a direct object in the relative clause, but *rā* only appears after attracted noun phrases which are not subjects in the relative clause<sup>4</sup>.

- (34) a. mard-i ke [sib rā xord-eh bood] injā-st.  
man-RES that [apple SPCF eat-en was] here-is  
'The man who has eaten the apple is here.'  
b. \* [mard-i rā ke sib rā xord-eh bood] injā-st.
- (35) a. mard-i ke [sib rā be-eš dād-am] injā-st.  
man-RES that [apple SPCF to-him gave-1S] here-is  
'The man to whom I gave the apple is here.'  
b. [mard-i rā ke sib rā be-eš dād-am] injā-st.

But what is the structure of relative clauses to accommodate these examples of case marking, and how does the case tendency principle work for attraction in Persian? [Kar90] suggests a configuration as follows for this:



According to this configuration, *rā* may appear following the head noun of the relative clause or the complete relative noun phrase [Kar90]. Karimi further suggests that the principle of Case Tendency is responsible for the different examples of attraction in Persian. But she gives no more detail about the underlying principle of case tendency and attraction in Persian and does not formalize them further. In order to capture attraction in relative clauses we propose the structure in Figure 4.

The head noun, when it is located in its NP position, can be case marked from outside of the relative clause, especially when the relative clause is extraposed. When the head noun is located in an A'-position (i.e. SPEC) then the whole relative clause can be case marked and the head noun gets its case marking from its empty position inside the relative clause.

Note that in both cases the head noun projects an NP barrier and prevents any example of scrambling from inside of the relative clause into the matrix clause. That is the two landing sites for the head noun of a relative clause (NP and SPEC) are unified. In other words, this will always force a projection of NP that acts as a barrier for extraction out of the relative clause.

<sup>4</sup>In general when the head noun is governed by a preposition attraction does not apply. In other words the preposition case marking is very strong.

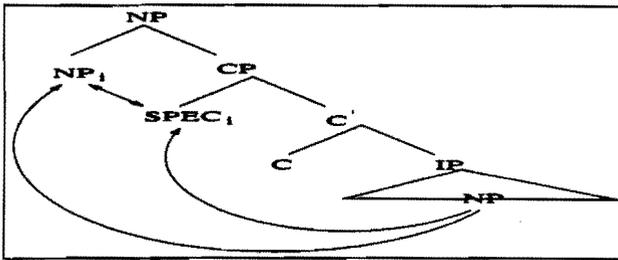


Figure 4: Structure for Relative Clauses in Persian

When a noun phrase is attracted, it will be case marked locally from the relative clause. In this case, if the head noun is co-indexed with a non-subject A'-SPEC position and is specific then it will be case marked by specific oblique marker *rā*. Note that attraction is only possible in restrictive relative clauses. [Afa94] discusses a *promotion* analysis for restrictive relative clauses in Norwegian. Her approach is analogous to ours. She considers two separate structures for Norwegian restrictive relative clauses, with promotion and with no promotion. The former corresponds to the case with attraction in Persian and the latter corresponds to the traditional treatment of head nouns as separate constituents from the relative clauses.

The structure of relative clauses may be considered as parallel to the structure of Persian complement clauses that we studied. But this needs further investigation.

In summary, we showed in this section that the principle of case tendency in Persian is the result of the interaction of principles of the universal grammar, and we represented the phenomenon of attraction by movement to SPEC of CP.

## 6 Conclusion and Summary

In the previous sections we discussed embedded clauses of Persian and our analysis further supports the proposal that the sentential arguments originate in pre-verbal position in Persian and they are dominated by an NP. These arguments are often moved to the post-verbal position by extraposition. In our approach we captured fronting of noun phrases. In our framework we assumed that the fronted category is in fact part of the extraposed clause and during the clause movement this extraposed category is left in its actual place. In other words our approach contrasts with the traditional approach to fronting which treats fronting as an exceptional leftward movement, while we do not treat it as a case of leftward movement. We further proposed that the left-over category if it is not already case marked by a proposition (i.e scrambling) will receive oblique case from the verb of the matrix clause. In the case of movement from the finite non-subject embedded clauses we argued that:

1. In the case of fronting, the fronted noun phrase is case marked inside the new clause, but it agrees with its trace in number ( and person).

2. In the case of scrambling, the scrambled noun phrase is not case marked inside the new clause and it agrees with its trace both in number and case.
3. Only one of the NPs of the extraposed clause can be fronted and moves to the SPEC position of the complement clause in preverbal position. These are marked by *rā* for non-subject complement clauses.
4. Other NPs of the extraposed clause which scramble into the matrix clause must be properly case marked.

Further we considered movement from embedded subject complements as examples of local scrambling where the modal-like verb behaves as a modal verb. Finally we considered the case marking of relative clauses in Persian and we argued that the attraction phenomenon is a result of a promotion like phenomenon.

The proposed principle of case tendency in Persian [Kar90] was further suggested to be a result of the interaction of deeper principles of the universal grammar, but with different parameter settings for Persian.

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# Temporal Adjectives and Feature Interpretation

Luis Silva Villar & Javier Gutiérrez Rexach (UCLA) <sup>1</sup>

## 1 Adjectives and the Structure of DP

One of the more conspicuous problems for any theoretical approach to word order data is to determine when different syntactic positions are associated with different interpretations and when differences in word order are the product of the interaction of syntactic constraints properly. Any theory attempting to give a partial or global solution to this problem has to deal with more intricate and deeper issues like the structure of constituents and the basic organization of grammatical processes. It is also apparent that there also arise theoretical questions which are profoundly interwound like economy and optionality.

In this paper we analyze the problem of the contrasting positions of adjectives and we propose a minimalist account of the special behaviour of Spanish temporal adjectives within the framework presented in Chomsky (1995). Let us start with a revealing crosslinguistic contrast: the optionality of the position of adjectives with respect to the noun in Romance Languages contrast with the rigidity of their position in Germanic languages, as shown in (1) and (2).

- (1) a. the happy boy (Germanic)  
 b. \*the boy happy
- (2) a. el niño feliz (Romance)  
 the boy happy  
 b. el feliz niño  
 the happy boy

Giorgi & Longobardi (1991), Valois (1991) and Cinque (1990, 1993), among others, have presented accounts of the different distributional behaviour of adjectives in Romance. All these accounts have as their main purpose to correlate the distribution of adjectives with respect to the noun (pre- and postpositions) and their respective interpretation. Adjectives of one (semantic) type will occupy a certain position, whereas adjectives of a different type will exhibit a different distribution. By testing the behaviour of temporal adjectives in Spanish, we show that a more complex approach is necessary for a proper treatment of the issue.

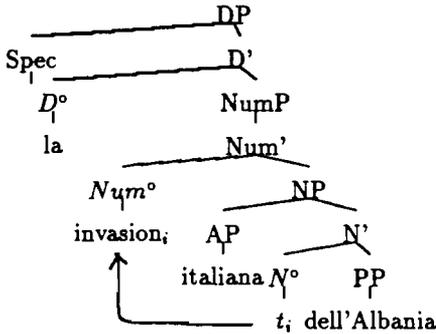
Three theories of adjective placement have been developed in recent years within the GB framework. In the first theory, APs occupy Specifier positions, as claimed by Giorgi & Longobardi, Cinque and Longobardi. According to Cinque the surface

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<sup>1</sup>We would like to thank the audiences of WECOL 95 and the Conference on Interfaces in Grammar (Oporto, Nov.95) where different versions of this paper were presented.

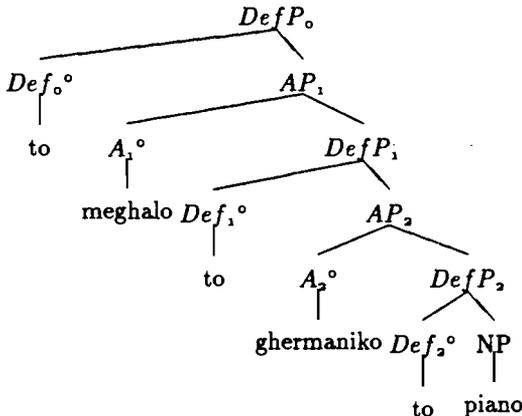
position of adjectives in Romance is to be attributed to the raising of the N to a functional head between N and D, as shown in (3). We take this functional projection to be NumP.

(3)



The second theory, presented in Androtsopoulou (1994, 1995), is based on a particular strategy for adjective modification that can be observed in Greek definite DPs. This strategy is characterized by multiple occurrences of the definite determiner *to* 'the'. We give the structure she proposes in (4), where *to meghalo to ghermaniko to piano* = the big the german the piano.

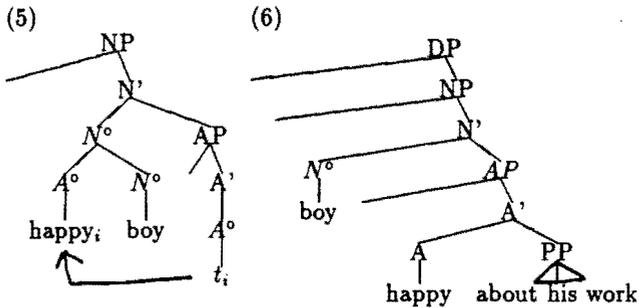
(4)



The extra determiners head functional definite projections or DefPs. The head of each DefP encodes agreement features, and the determiners generated under DefP are expletive determiners. In Androtsopoulou's approach, each adjective heads

its own phrase. The relative permutation of adjectives is strictly ordered by the pied-piping of  $DefP_2$  in (4) to the specifier of the corresponding projection of the immediately higher adjective  $DefP_1$ , and so on.

In this paper we present a theory which is closer in spirit to the one defended by Valois (1991). Valois gives a dual status to event nominal adjectives in French. When they occur in a prenominal position, as in (5), their distribution is derived through head movement from the postnominal position. In other words, the  $A^\circ$  head incorporates into the noun, as proposed by Stowell (1981). When adjectives occur postnominally, they are maximal projections (6), as proved by the fact that complements or modifiers are freely attached to them.



## 2 Romance temporal Adjectives

A well known generalization about the interpretation of Romance adjectives is that adjective placement disambiguates meaning. In (7), the adjectives preceding the noun are interpreted as attributive (Giorgi & Longobardi, 1991), intensional (Kamp, 1975), or subject oriented (Jackendoff, 1972). Adjectives following the noun, such as the ones in (8), are interpreted as predicative, extensional or objective.

- (7) a. el pobre hombre (Spanish)  
the poor man
- b. il mio grande amico (Italian)  
the my big friend  
'my great friend'
- (8) a. el hombre pobre (Spanish)  
the man poor
- b. il mio amico grande (Italian)  
the my friend big  
'my big friend'

In this paper we study a special class of adjectives: temporal adjectives. These adjectives have the distinctive property that they can occur before or after the noun, as in (9), with the interpretation remaining constant.

- (9) a. el anterior presidente  
       the former president  
       b. el presidente anterior  
       the president former

Therefore in these cases we can neither resort to the attributive/predicative semantic distinction to explain their distribution nor there is a clear way of matching positions and interpretation. In what follows we hypothesize that there are two different types of temporal adjectives in Spanish with different checking requirements and we give a minimalist explanation of their behaviour. In a nutshell, we claim that temporal interpretation is not related to being in a certain overt or covert syntactic position, but to the effects of the computation of a temporal feature at certain stage of the derivation after the insertion of the noun. In the derivation tree that reflects the derivation process, the stage where [+temp.] is computed is marked as TP. In section 5, we will explain the nature of this abstract temporal feature.

### 3 Types of Temporal Adjectives

One important property of temporal adjectives is that, as opposed to the predicative adjectives presented in (7) and (8), the interpretation that they have in prenominal position is not predictable from the one they have in postnominal position by hypothesizing a process that computes an additional feature making the adjective attributive. In other words, it seems that we cannot associate changes in interpretation (or, conversely, invariance) to covert /overt movement operations. There are two different scenarios. Either the interpretation remains constant when the adjectives occur in pre/postnominal position or they display asymmetric temporal/non-temporal readings. Thus, we consider two different types of temporal adjectives (inherently temporal and ambiguous). We claim that there are two different syntactic procedures (sets of operations) for the computation of the temporal feature.

#### 3.1 Inherently Temporal Adjectives

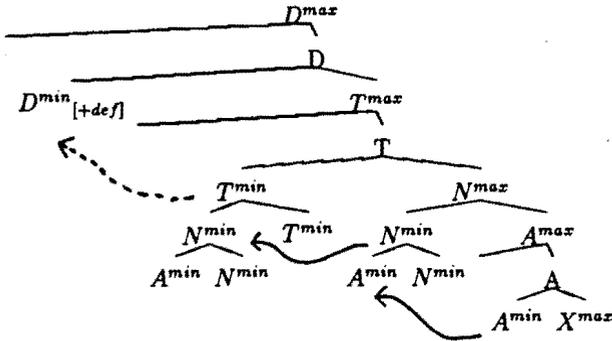
The temporal feature present in the feature specification matrix of this class of adjectives can enter the domain of the following operations:

##### A) Move-L (*X<sup>o</sup> Movement*).

Move-L is just overt head movement. The adjective adjoins to  $N^{min}$  and the cluster [ $A^{min} - N^{min}$ ] is attracted to  $T^{min}$ . The selection of the temporal feature from the

numeration is the triggering factor. Notice that this procedure, as shown in (10), is a minimalist version of the ones proposed by Stowell, Valois and Sadler & Arnold (1994).

(10)



There is strong evidence supporting the specificity of this type of computation (derivation). Here is some of it:

1. No material can be inserted in the string *Adjective-Noun*. We see that in (11b) and (12a) PP complements intervene between the adjective and the noun, causing ungrammaticality.

- (11) a. el anterior presidente  
the former president
- b. \*el anterior a González presidente  
the previous to González president
- c. el presidente anterior a González  
the president previous to González

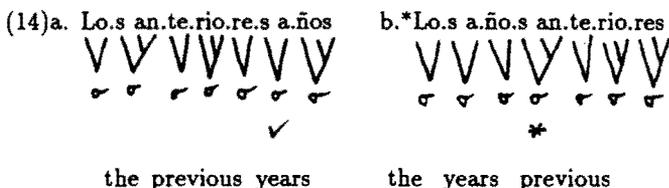
- (12) a. \*el antiguo de las Indias comercio  
the old from the Indies trade
- b. el antiguo comercio de las Indias  
the old trade from the Indies

2. Valois (1991) noticed the contrast in (13):

- (13) a. les frequents([z]) invasions de Jupiter  
the frequent invasions of Jupiter
- b. \*les invasions([z]) infrequentes de Jupiter  
the invasions infrequents of Jupiter

Only prenominal adjectives, for instance *frecuents* in (13a), trigger "liaison" with a following vowel initial word. The contrast follows if one assumes that "liaison" is the result or "spell-out" effect of head incorporation.

3. The assignment of syllable structure varies depending on the position of the adjectives. Only the coda segment of the last syllable of an incorporated adjective can be parsed as an onset of the first syllable of the following noun. See the contrast in (14).



4. An interesting property of standard Leonese and colloquial Spanish is the drop of the possessor mark *de* 'of' in possessive DP constructions (Bare Genitives), as in (16a) and (17a) (Silva-Villar, in progress). Examples (15) and (16) are from colloquial Spanish and (17) is from standard Leonese.

- |                                                                                                     |                                                                       |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <p>(15) a.el libro'l niño<br/>the book'the kid<br/>'the kid's book'</p>                             | <p>b.la casa'la tía<br/>the house'the aunt<br/>'the aunt's house'</p> |
| <p>(16) a.el pobre niño'la esquina<br/>the poor kid'the corner<br/>'the poor kid of the corner'</p> | <p>b.*el niño pobre'la esquina<br/>the kid poor'the corner</p>        |
| <p>(17) a.el bonitu carru'l guaje<br/>the beautiful cart'the kid<br/>'the kid's beautiful cart'</p> | <p>b.*el carru bonitu'l guaje<br/>the cart beautiful'the kid</p>      |

In these constructions, the possessor definite determiner incorporates into the vowel ended possessee word. Incorporation is blocked when the adjective follows the noun at the Spell Out. This blocking effect is easily accounted for if we assume syntactic incorporation of the adjective and the noun.

5. While derivational affixes (in the examples diminutives) can be attached to the post nominal adjectives in (18a), (19a) and (20a), the attachment is no longer possible when adjectives occur in prenominal position, as in (18b) to (20b). Thus, we can infer that some derivational processes block syntactic incorporation, suggesting that the relation is deeper than mere concatenation. Examples in (18) are from Spanish, and (19), (20) are from Montañés -a northern Spanish dialect spoken in Cantabria-.

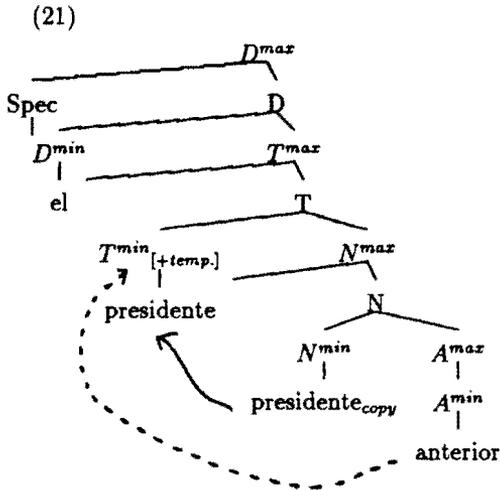
- (18) a. el niño pobretón  
the boy poor-very
- b. \*el pobretón niño vs. el pobre niño  
the poor-very boy vs. the poor boy
- (19) a. la vaca guapuca  
the cow beautiful-dim.
- b. \*la guapuca vaca vs. la guapa vaca  
the beautiful-dim. cow vs. the beautiful cow
- (20) a. un lin jovenzuco  
a kid young-dim.
- b. \*un jovenzuco lin vs. un joven lin  
a young-dim. kid vs. a young kid

Cinque (1993) and Bosque (1993) observed that prenominal adjectives cannot incorporate elements because they are inflected. But if we take into account the above facts and we assume that inflection is [-interpretable] at the LF interface, as proposed in Chomsky (1995), then it can be argued that the presence of inflectional affixes in preposed adjectives is due to a Spell-Out condition of some languages, with no effect at the LF interface.

### B) Move-F (*Feature Movement*).

The second procedure available for the computation of the [+temp.] nominal feature in adjectives which carry it as part of their lexical specification is *Move-F*. By an application of the *Move-F* operation, temporal features are attracted (Chomsky, 1995) to  $T^{min}$ , satisfying the corresponding checking requirement. The lexical item –the adjective– remains *in situ* at the Spell-Out and at LF<sup>2</sup>. Hence, in (21), the noun *presidente* ‘president’ moves to  $T_{[+temp]}^{min}$ , setting the computation in the stage where nominal temporal features enter in the domain of the ATTRACT-F operation. At the  $T^{max}$  stage, ATTRACT-F applies only to the temporal feature of the adjective, allowing the adjective to remain *in situ* while the feature is checked.

<sup>2</sup>See in Gutiérrez & Silva (1994) further consequences of this operation in the domain of Spanish DPs.



Notice that, in a more traditional setting, it could be argued that adjectives postposed at the Spell-Out check their temporal feature by covert movement at LF. But if we have ATTRACT-F in the inventory of our operations, covert movement should become uneconomical and unnecessary. This argument seems to be valid in general, not only in this particular case. Consider, for examples, apparent cases of  $N^{min}$  to  $D^{min}$  raising of proper names at LF, as argued in Longobardi (1994). An alternative minimalist account with no covert movement of lexical items is easily conceivable: only the [+def] semantic feature<sup>3</sup> of proper nouns is attracted to the [+def] specifier of DP. This allows us to give a more fine grained account of the LF properties of DPs, not only definiteness but also focus, specificity, etc. (see Gutiérrez & Silva, 1994).

### 3.2 Ambiguous Adjectives

We call *ambiguous temporal adjectives* a class of adjectives which have two different meanings depending on the presence or absence of the [+temp.] feature in their feature specification matrix. Some examples are:

- *próximo* = 'next'/'close'
- *antiguo* = 'former'/'old'
- *raro* = 'not frequent' / 'strange'

Consider the examples in (22) and (23):

<sup>3</sup>For any universe E, a proper noun *j* denotes the principal filter generated by I(*j*), the denotation of *j* in the model. Definites denote principal filters (Barwise & Cooper, 1981).

- (22) a. el próximo gobierno  
the next government
- b. el gobierno próximo  
the government close  
'the government close (to the citizens)'
- (23) a. el antiguo colegio de los jesuitas  
the former school of the jesuits
- b. el colegio antiguo de los jesuitas  
the school old of the jesuits  
'the old school of the jesuits'

We observe that when the adjective *próximo* precedes the noun it is interpreted as [+temp.] 'next', whereas when it follows the noun the preferred interpretation is [-temp.] 'close'. The same behaviour is displayed by *antiguo* in (23). The Determiner Phrase in (23a), where the adjective *antiguo* precedes the noun, is interpreted as 'the former school of the jesuits', The Determiner Phrase (23b), where the adjective follows the noun, is interpreted as 'the old school of the jesuits'. Therefore, the following generalization emerges: when an ambiguous adjective precedes the noun it is interpreted as [+temporal]. When it follows the noun, it can be either [+temp.] or [-temp.].

#### Linearization Patterns:

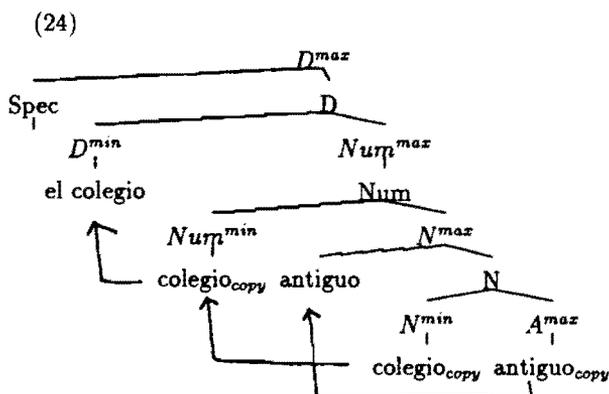
- $Adj_{[+temp.]} - Noun$
- $Noun - Adj_{[+temp.]/[-temp.]}$

There are three possible derivations to generate the above outputs.

#### A) [-temp.] interpretation

Whenever an adjective lacks the [+temp] specification in its matrix, there will be no computational step involving the checking of a [+temp.] feature because there is no feature to feed it. In more traditional  $X^{\text{bar}}$ -theoretic terms, there will be no (nominal) TP within the DP projection.

Assume that *antiguo* in (23b) lacks the [+temp] feature. Then, as the derivation in (24) shows, the noun raises to  $Num^{\text{max}}$ , or even  $D^{\text{max}}$ , as proposed by Longobardi (1994). The adjective raises to  $[Spec_{\alpha}, N^{\text{max}}]$ , where  $Spec_{\alpha}$  is one of the potential multiple specifiers in the projection.



We propose similar derivations for the examples in (25). In both cases the adjective *próximo* is not specified as [+temp.]. Hence, no TP exists within either of the DPs. This explains the interpretation *próximo*='close'.

- (25) a. la silla próxima a ti  
 the chair close to you
- b. un pariente próximo  
 a relative close  
 'a close relative'

## B) [+temp.] interpretation

### B.1 Consider example (26):

- (26) Pepe va a ser mi próximo pariente  
 Pepe is-going to be my next relative

Let us assume that in this case *próximo* has a [+temp.] specification. Therefore, this feature has to be checked in order to satisfy *Full Interpretation(FI)*. An application of the operation *Move-L* will trigger movement of the adjective to  $T^{max}$  and derive the output in (26).

**B.2** The third derivation consists of an application of *Move-F* which will affect only the temporal feature. This generates an output string where the adjective follows the noun and *FI* is satisfied. The derived output is (21).

It must be emphasized that in the two cases the noun raises to  $T^{min}$  in order to license a computational step that selects temporal features in a broad sense. It might well be a feature associated to semantic orderings in general. Evidence for this claim comes from the fact that some nouns do not select a [+temp.] feature, as

shown in (27). In example (27a) some sort of ordering (preferably a spatial ordering) is understood. In example (27b) the understood ordering is temporal. This semantic feature associated to order as present in the adjective *próximo* is sufficient to license the application of the relevant operation.

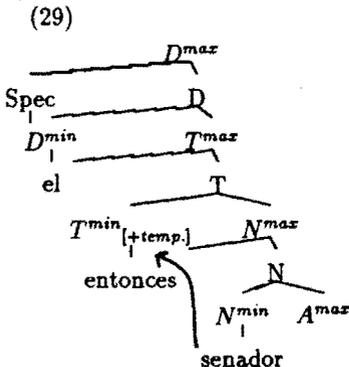
- (27) a. la próxima silla (spatial order)  
           the next chair  
       b. la próxima canción (temporal order)  
           the next song

#### 4 Temporal Adverbs and the Nature of Temporal Features in DP

Temporal adverbs can modify a noun only when the noun raises to  $T^{max}$ . In other words, nouns like the one in (27a) can be never modified by a temporal adverb.<sup>4</sup> We claim that temporal adverbs are generated under  $T^{min}$ , as predicted by the fact that they can never occur after the noun at the *Spell-Out* (28a,b) and they cannot be modified (28c).

- (28) a. el entonces senador vs \*el senador entonces  
           the then senator vs the senator then  
       b. los hoy/ahora estudiantes vs \*los estudiantes hoy/ahora  
           the today/now students vs the students today/now  
       c. \*los hoy mismo estudiantes  
           the today EMPH. students

The derivation in (29) shows how (28a) is generated. The adverb *entonces* is selected and merged at  $T^{min}$ . A subsequent *Move* operation raises the noun and adjoins it to the adverb in order to check the temporal feature.



<sup>4</sup>Consider \**la ahora silla* which is plainly ungrammatical.

As shown in (30), the initial *Merge* operation can apply successively to several temporal adverbs.

- (30) a. los mañana futuros coroneles vs \*los coroneles mañana futuros  
 the tomorrow future colonels vs the colonels tomorrow future  
 b. los hoy ya estudiantes  
 the today already students

Till now we have been delaying the issue of the concrete nature of what we have called "the (abstract) nominal temporal feature". We can make some clarifications about its semantic characterization. Consider (31):

- (31) a. \*los de vez en cuando estudiantes  
 the from time to time students  
 b. \*los a menudo estudiantes  
 the often students  
 c. \*los nunca estudiantes  
 the never students

It can be noticed that what opposes the adverbs in (31) to the ones in (28) and (30) is that the former are frequency adverbs. We also see that when the aspectual (iterative) prefix *re-* is attached to temporal adjectives the result is ungrammatical, as in (32).

- (32) a. \*el repróximo gobierno  
 the RE-next government  
 b. \*el reinmediato curso  
 the RE-immediate course

Therefore, we can infer that the feature [+temp.] is "referential" or "specific" in DP, and the following condition has to be satisfied:

**Referentiality Condition:** If  $D^{max}$  is specified as [+temp.,  $\alpha_1, \dots, \alpha_n$ ], then  $D^{max}$  is specified as [+temp., ..., +ref., ...].

## 5 Temporal Prefixes

The abstract feature [+temp.] has a concrete morphological *Spell-Out*: the prepositional prefixes *pre-*, *ante-*, *inter-*, *post*, etc. These temporal prepositions have to be specified as [+referential] or deictic as required by the referentiality condition. The adjective incorporates into the preposition. This incorporation process can take place in the syntax or it can be a pure historical lexical process. In the latter case

the speaker ceases to interpret the preposition as a “syntactic” preposition, as in cases like *precedente, subsecuente. anterior, posterior, etc.*

On the other hand, the affixes *pre-, post-, ante-, inter-, etc.* are ambiguous. Either they mark a temporal relation, as in (33a), or they affect the predicative content of the  $A^{min}$  root, as in (33b). The adjective *precolombian* in (33a) anchors in time the denotation of the noun. The adjective *pre-cancerous* in (33b) describes a property of symptoms.

- (33) a. el periodo precolombino  
           the period precolombian  
           ‘the precolombian period’  
       b. los síntomas precancerosos  
           the symptoms precancerous  
           ‘the precancerous symptoms’

In the first case we claim that the adjective carries the [+temp.] feature in its lexical specification. In the second case, the feature is absent. Temporal prepositional prefixes constitute morphological spell-outs of the [+temp.] feature. They can be either base-generated under  $T^{max}$  or have their [+temp.] feature attracted by T, as in (33a).

When adjectives are [-temp.], the prefix cannot be inserted under  $T^{min}$ , nor can the feature be attracted by *Move-F*, as in (33b). Therefore the DP in (34b) is ill-formed, since an illicit movement operation has raised the adjective to  $T^{max}$ . We also see that (34c) is anomalous in the strictly temporal or non-predicative interpretation.<sup>5</sup>

- (34) a. los síntomas son precancerosos  
           the symptoms are precancerous  
       b. \*los precancerosos síntomas  
           the precancerous symptoms  
       c. \*los síntomas precancerosos (strictly temporal reading)  
           the symptoms precancerous

The dual nature of the prepositional prefixes that we are defending is also confirmed by the fact that only predicative adjectives can be intensified, as shown in (35). Only a predicative adjective like *pre-cancerous* in (35b) can be modified by an intensifier affecting the extent of the property (see Amiot, 1995).

- (35) a. \*el periodo casi/un poco precolombino  
           the period almost/a little precolombian

<sup>5</sup>In cases like *el tal precolombino periodo*, raising to a prenominal position seems to be associated not only with the checking of the temporal feature but also of the feature [+intensional] (attributive). The pure extensional temporal reading is only available when *precolombino* occurs in postnominal position.

- b. los síntomas casi/un poco precancerosos  
 the symptoms almost/a little precancerous

## 6 Temporal Adjectives and Specificity

We have claimed that temporal adjectives are [+referential]/[+specific] in DP. An expected consequence would be that they can only enter in a checking relation with [+definite]/[+specific] determiners. Indeed we see that this is the case. The existential or inespecific reading of the indefinite is blocked when they co-occur with temporal adjectives. Therefore, in an existential *there* construction which requires a weak reading of the determiner a 'un', only the [-temp.] interpretation of ambiguous adjectives is allowed, as in (36a).

- (36) a. Ana cree que hay un colegio antiguo en esa calle  
 Ana believes that there-is a school old on that street  
 'Ana believes that there is an old school on that street'
- b. \*Ana cree que hay un antiguo colegio en esa calle  
 Ana believes that there-is an old school on that street  
 'Ana believes that there is a former school on that street'

Suppose that *antiguo* were specified as [+temp.]. Then, in order to satisfy *FI*, the feature would have to be checked and the noun would have to raise higher than QP (to  $T^{max}$  or  $D^{max}$ ). This means that the computation would be driven to a stage beyond QP which would involve the checking of a strong nominal feature ([+specific], [+def.]), conflicting with the selectional requirements of the existential construction (36b).

## 7 Conclusions

- The temporal interpretation of adjectives is driven by the insertion of a temporal feature at a certain stage of the derivation after the computation of the features associated with the noun.
- There are two different procedures for the computation of the [+temp.] feature: MOVE-L and MOVE-F. The first one entails the incorporation of the  $A^{min}$  into the  $N^{min}$ . The second one does not entail overt or covert movement of lexical items, but checking of individual features.
- Syntactic computation is sensitive to the feature structure of adjectives. The single opposition attributive/predicative (Giorgi & Longobardi, Cinque) does not derive the full complexity of the results.

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Luis Silva – Villar  
 Department of Spanish & Portuguese  
 UCLA  
 405 Hilgard Ave.  
 lsilva@ucla.edu

Javier Gutiérrez – Rexach  
 Department of Linguistics  
 UCLA  
 405 Hilgard Ave.  
 gutier@ucla.edu

# Another Perspective on Hand Orientation in American Sign Language

Janine Toole and Linda Uyechi<sup>1</sup>

## 1. Introduction

Battison (1978) proposed two conditions on sign formation to account for the possible hand configurations found in two-handed lexical signs in American Sign Language: the Symmetry and Dominance Conditions. These conditions have gained wide acceptance as they provide significant insight into sign construction. In this paper we deal with the notion of 'orientation' adopted in the Symmetry Condition, given in (1). In particular, we address problems that arise from the vague notions of 'identical orientation' and 'symmetrical orientation' that are used to state the condition. A detailed examination of the definitions for these terms reveals that any precise interpretation of these constructs produces an inadequate account of the relevant data. The purpose of this paper is provide an alternative, mathematically precise, account of the constraints on hand orientation in two-handed signs.

- (1) Symmetry Condition (Battison 1978:35)
- (a) If both hands of a sign move independently during its articulation, then
  - (b) both hands must be specified for the same location, the same handshape, the same movement (whether performed simultaneously or in alternation), and the *specification for orientation must be either symmetrical or identical*. [emphasis ours]

The analysis of orientation proposed in this paper reinforces Battison's original notion that signs articulated with two hands are inherently symmetric. In addition, by adding mathematical rigor to the condition, we not only capture the symmetry of hand orientation, but also discover that the set of possible changes in orientation attested in ASL belongs to a mathematically closed set of values.

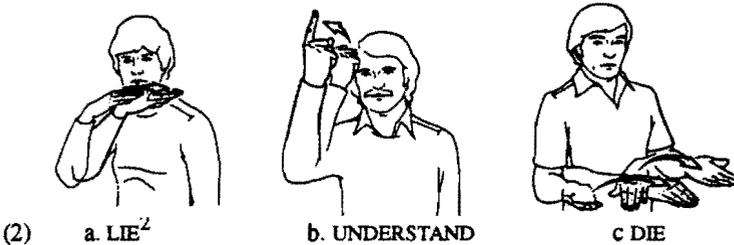
The paper is organized as follows. In section 2 we provide a brief introduction to sign phonology and discuss Battison's conditions on sign formation, highlighting the problems with the definition of orientation. We then present an alternative analysis which avoids the problems identified in section 2, and present our conclusions in section 4.

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## 2. Background

Stokoe (1960) claimed that there were three main parameters in the description of a lexical sign: handshape, location and movement (*tab*, *dez*, and *sig*, in Stokoe's terminology). In order to provide a more adequate account of lexical signs Battison (1978) introduced a fourth parameter, hand orientation. More recently, Stack (1988), Hayes (1993), and Uyechi (1995) argue that of the four parameters, only handshape, location and orientation are phonological primitives. On this analysis, movement is not a primitive. Rather, it is derived from changes in the other three parameters, as illustrated by the signs in (2).



To articulate (2a), the hand starts at one side of the chin and ends at the other side. This is an example of a change in location. In (2b) the hand starts in a position in which all the fingers and thumb are folded into a fist with the hand held at the side of the signer's head and the palm of the hand facing towards the signer. To articulate the sign the index finger is extended until it points straight up. This is an example of a change in handshape. To articulate (2c) the hands start in a position in which one palm faces up and the other down. The hands are then rotated 180 degrees so that each palm faces the other way. This is an example of a change in orientation. All movements articulated in monomorphemic lexicalized signs can be represented by these three components of movement: change in location, change in handshape, and change in orientation (Uyechi 1995). It is this analysis of phonological primitives that we take as our starting point.

In this paper, we deal with the phonological parameter of 'orientation.' More specifically, we are concerned with orientation in signs that are articulated with two hands. Battison (1978) captures some properties of two-handed signs in a typology in which all signs articulated with two hands are classified as either Type 1, Type 2, or Type 3 signs. Examples of each of these types of signs are given in (3).

A Type 1 sign is one in which both hands have the same handshape and perform the same movement. In (3a), the index fingers of both hands are extended while the remaining fingers are curled under the thumb. The fingertips of the index

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2. In this paper we follow the convention of glossing signs with small capitals

fingers point away from the signer and the palms of the hands face down. To articulate the signs, the hands move towards each other until the sides of the index fingers touch.

A Type 2 sign is articulated with the hands in the same handshape, but one hand is static while the other hand moves. For example, in (3b) the hands are in the same handshape as for (3a). To articulate this sign, one hand is held static with the index finger pointing upward while the other hand moves towards it with the tip of the index finger pointed towards the tip of the static index finger.

A Type 3 sign is articulated with the hands in different handshapes, and one hand held static while the other hand moves. In (3c), for example, one hand is held static with the palm facing upward and the fingers and thumb extended to form a flat surface. The moving hand is held with the index finger extended and the palm facing the signer. To articulate the sign, the hand moves up and down so that the side of the index finger touches the open palm of the static hand.

(3) Typology of Two-Handed Signs (Battison 1978)

- a. Type 1: Both hands active; same handshape, location, and movement.



- b. Type 2: One hand passive; same handshape.



- c. Type 3: One hand passive (restricted set of handshapes); different handshapes.



Battison's Dominance Condition and Symmetry Conditions, (4) and (5), capture the properties of these three types of signs. The major contribution of the Dominance Condition, (4), is to recognize the constraints on the shape of the static hand in a sign in which only one of the hands moves. The Dominance Condition primarily captures the properties of Type 3 signs.

- (4) Dominance Condition (Battison 1978:35)
- (a) If the hands of a two-handed sign do not share the same specification for handshape (i.e. they are different), then
  - (b) one hand must be passive while the active hand articulates the movement, and
  - (c) the specification of the passive hand is restricted to be one of a small set: A, S, B, 5, G, C, O.<sup>3</sup>

The Symmetry Condition, repeated in (5), captures the properties of Type 1 signs. Signs which conform to neither the Symmetry nor the Dominance Conditions are Type 2 signs.

- (5) Symmetry Condition (Battison 1978:35)
- (a) If both hands of a sign move independently during its articulation, then
  - (b) both hands must be specified for the same location, the same handshape, the same movement (whether performed simultaneously or in alternation), and *the specification for orientation must be either symmetrical or identical.* [emphasis ours]

Although we will not present arguments for it in this paper, we believe, following Sandler (1993), that Type 2 and Type 3 signs are phonologically one-handed signs; in those signs the static hand acts as a place of articulation. Type 1 signs are, then, the only true two-handed signs. Thus, in the discussion that follows when we say 'two-handed sign' we are referring to a Type 1 sign.<sup>4</sup>

The Symmetry Condition states that the orientation of a two-handed sign must be either 'symmetrical' or 'identical.' Battison's definitions for these terms are given in (6).<sup>5</sup> According to this definition, the sign in (3a) has 'symmetrical

3. 'A, S, B, 5, G, C, O' are names for handshapes found in ASL.

4. While we believe that the claims we make in this paper are relevant to all phonologically two-handed signs, in the absence of convincing evidence it is equally valid for the reader to evaluate our analysis of orientation with reference to Battison's Type 1 signs.

5. Battison's (1978) use of the term 'symmetry' implies the informal sense of the word, meaning aesthetic sameness. Stewart & Golubitsky (1992) present an accessible formal interpretation of 'symmetry'.

orientation.' If a plane is placed between the hands, the hands form mirror images of each other with respect to that plane. Notably, Battison defines 'symmetrical orientation' in relative terms, the orientation of one hand is stated with respect to the position of the other, while 'identical orientation' is defined in absolute terms, using the signer's body as a reference point.

- (6) Symmetrical and Identical Orientation (Battison 1978:35)
- a. 'Symmetrical orientation' can be defined as any orientation in which identical parts (any parts) of the two hands have mirror image orientations *with respect to the plane which separates them*. [emphasis ours]
  - b. 'Identical orientation' means that both hands have the same orientation *with respect to the body* (e.g. fingers pointed out from the body and palms down), but it says nothing about the orientation of the hands with respect to each other. [emphasis ours]

### 2.1 The Problems with Orientation

Although we agree that the intuition behind the Symmetry Condition is essentially correct, the definition of orientation is, as we will show, problematic for two reasons. Firstly, it is imprecise and subject to more than one interpretation. Secondly, and more seriously, it does not provide an accurate account of the restrictions on orientation in two-handed signs.

The source of these problems is the definition of identical orientation. The main body of the definition in (6b) states that "both hands have the same orientation with respect to the body." But what exactly does this mean? As indicated by his parenthetical example referring to the orientation of the fingers and palm, Battison focuses attention on those two parts of the hand. Previous work, such as Klima and Bellugi (1979), Liddell and Johnson (1989), Sandler (1989), and Brentari (1990) adopt similar interpretations of hand orientation, though palm orientation is usually explicitly or implicitly privileged.

To our way of thinking there are at least three reasonable interpretations to consider: (i) a *strict* reading in which all parts of the hand must be in the same relation to the signer's body, (ii) a *strong* reading in which the fingers and palms must be in the same relation to the signer's body, and (iii) a *weak* reading in which only the fingers *or* the palms must be in the same relation to the signer's body. The strict version is clearly incorrect. Because humans are bilaterally symmetric (the left half of the body is a mirror image of the right), the only way we could get all parts of the hands to be in the same relation to the body is if we had two left hands (or two right hands). Indeed, no two-handed sign meets this physiologically impossible constraint.

The strong reading of identical orientation accepts the implicit need to allow for the mirrored physiology of the human body, but requires that both the palms and

fingertips have the same orientation with respect to the body. However, when we consider a sign like (2c), repeated as (7b), we find that this interpretation is also too strict. Recall that to articulate the sign, both hands are horizontal in front of the body with the fingertips pointing away from the signer and one palm faces up while the other palm faces down. This sign is not symmetrical because the hands are not mirror images of each other across the plane that separates them, and the orientation of the hands are not identical in the strong sense because even though the fingers of both hands face in the same direction, the palms face in opposite directions and are, therefore, not in the same relation "with respect to the body". Thus, this well-formed two-handed sign is incorrectly ruled out under the strong definition of 'identical orientation.'



(7) a. ALIKE  
i. [+SYM][+ID<sub>strong</sub>]  
ii. [+SYM][+ID<sub>weak</sub>]



b. DIE  
i. [-SYM][-ID<sub>strong</sub>]  
ii. [-SYM][+ID<sub>weak</sub>]



c. Ungrammatical  
i. [-SYM][-ID<sub>strong</sub>]  
ii. [-SYM][+ID<sub>weak</sub>]

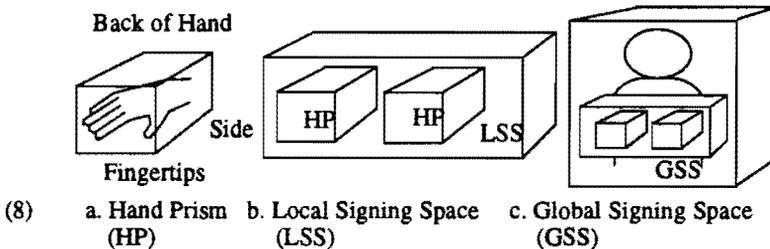
This leaves us with the weak reading of 'identical orientation' which states that only the fingers *or* the palms need to be in the same relation to the body. This can account for a sign like (7b) if we choose an interpretation in which the fingertips must be in the same relation to the body. Under that reading, (7b) is weakly identical because the fingertips of both hands point away from the signer's body and the Symmetry Condition correctly accounts for this well-formed sign. However, the weak version of 'identical orientation' is *too* weak, as illustrated by the gesture in (7c) which is physiologically possible, but is not a well-formed sign. The weak interpretation would lead to a prediction that this is a well-formed sign because it is weakly identical in the same way that (7b) is weakly identical: the fingertips face in the same direction.

We propose, therefore, that there are two related problems with the orientation clause of the Symmetry Condition. Firstly, the notion of 'identical orientation' lends itself to more than one interpretation. Secondly, none of the interpretations we considered adequately account for the set of Type 1 signs. To summarize, the strict reading of 'identical orientation' is physiologically impossible, the strong reading rules out well-formed signs, such as (7b), and the weak reading, while accounting for signs like (7b), is too weak and fails to rule out ill-formed gestures like (7c).

### 3. An Alternative Approach

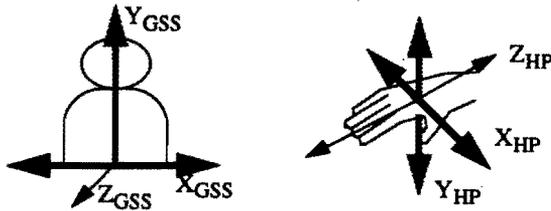
In this section we propose an alternative analysis of hand orientation that avoids the problems identified in the previous section. We start by rejecting the two-pronged definition of orientation which includes both relative and absolute interpretations of orientation. In this we are in agreement with Irene Greftegreff who proposes for Norwegian Sign Language that “The orientation of the articulator and the directionality of movement in a number of signs are best described in terms of local co-ordinates” (Greftegreff 1992:180). We take this to point towards the need for a relative reference system and adopt a representation for signing space that can capture the *relative* relations between the hands. To do this, we adopt the geometry-based system, illustrated in (8), that is argued for in Uyechi (1995).

In this model, signing space is characterized as a series of embedded three-dimensional prisms. To begin with, as shown in (8a), each hand is represented as a hand prism (HP). Each side of the hand, that is, the palm, fingertips, back of the hand, wrist, thumb-side, and pinky-side of the hand, is associated with a face of a six-sided prism. In turn, the hand prisms are embedded in a rectangular prism, shown in (8b), called local signing space (LSS) that represents the space in which a monomorphemic sign is articulated. Local signing space is, in turn, embedded in a prism called global signing space, (8c), that is associated with the signer's body.



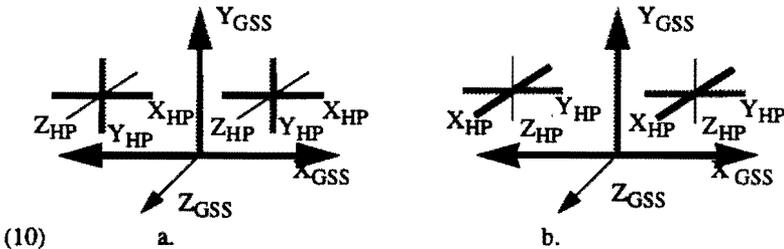
The result is a formal representation of signing space based on a three-dimensional Cartesian coordinate system. Furthermore, note that the space represented by rectangular prisms in (8) can equivalently be represented by identifying a set of axes along each of the three dimensions of the space. For example, global signing space, (8c), can be represented as shown in (9a). The X-axis is the axis parallel to and intersecting the signer's waist, the Y-axis runs along the signer's spine, and the Z-axis is perpendicular to the X- and Y-axes, intersecting the signer's belly button. A hand prism can also be represented in terms of its rectangular axes. For example, the hand configuration used to articulate (7b) is represented in (9b) such that the X-axis intersects the hand at its thumb and pinky sides, the Y-axis intersects the palm and back of the hand, and the Z-axis intersects the base and fingertips of the hand.<sup>6</sup> For ease of reference, the axes are coded as follows; the X-axis is represented by a thick black line, the Y-axis is represented by a grey line and the Z-axis is represented

by a thin black line.



(9) a. Global Signing Space (GSS) b. Hand Prism (HP)

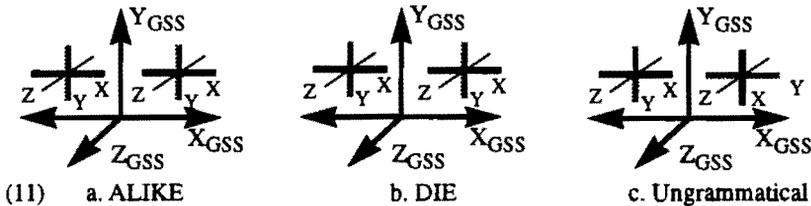
The axial representation is, as we will show, the most appropriate choice for a discussion about the orientation of the hands. Using the axes of signing space as references, and combining the information of the hand prism with that of global signing space, we can capture the relative position of the hand with respect to the signer's body. For example, if the fingers of both hands point away from the signer and the palms face up or down, as in (7b), then each axis of the hand prism is oriented parallel to the corresponding axis of global signing space (i.e. the X-axis of the HP is parallel to the X-axis of GSS, the Y-axis of HP is parallel to the Y-axis of GSS, and the Z-axis of HP is parallel to the Z-axis of GSS). This is illustrated in (10a). If, however, the fingers point upwards and the palms face each other, then the X-axes of the hands are parallel to the Z-axis of global signing space, the Z-axes of the hands are parallel to the Y-axis of global signing space, and the Y-axes of the hands prisms are parallel to the X-axis of global signing space. This is illustrated in (10b).



(10)

6. In the geometry-based model (Uyechi 1995), 'hand configuration' includes information about handshape, i.e., the relative positions of the fingers and thumb, as well as the relative orientation of the hand within the hand prism. Thus, the representation of the hand in (9b) is for a specific hand configuration.

Using this axial representation, the data in (7) are represented in (11).<sup>7</sup> In (11a), representing (7a), all of the axes of the hand prism are parallel to the axes of global signing space. This captures the orientation of the hands in this sign; the fingers point away from the signer's body, and the palms face downward. As shown in (11b), the representation for (7b) is the same as the representation for (7a) because the three dimensions of the hand have the same orientation with respect to the body. Even though the palms of the hands face in opposite directions, the Y-axes of the hand prisms are parallel to each other. The representation for (7c) is shown in (11c). The representation for the signer's right hand (shown on the left of the diagram) is in the same configuration as for (7a). However, the representation for the signer's left hand differs. The fingers point away from the signer so the Z-axes of the hand prism and global signing space are parallel. However, the palm faces to the side, so the Y-axis of the hand prism is parallel to the X-axis of global signing space. Similarly, the sides of the hand are parallel to the floor, so the X-axis of the hand prism is parallel to the Y-axis of global signing space.



From these illustrations, a surprisingly simple observation emerges. In (11a) and (11b), the X-axes (thick black lines) of the hand prisms are parallel to each other, the Y-axes (grey lines) of the hand prisms are parallel to each other and the Z-axes (thin black lines) of the hand prisms are parallel to each other. In contrast, in (11c), the X- and Y-axes of the hand prisms are not parallel. (11a) and (11b) represent well-formed signs, and (11c) represents an ill-formed gesture. Hence, a gesture is a well-formed sign if its corresponding axes are parallel, where by 'corresponding axes' we mean the X-axes of both hands, the Y-axes of both hands, and the Z-axes of both hands. The constraint in (12) captures the generalization derived from the representations in (11).

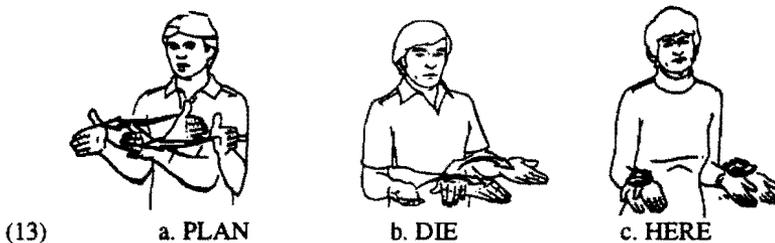
(12) Constraint on Orientation in Two-Handed Signs

In a two-handed sign, corresponding axes must be parallel.

7. In these diagrams the axes of global signing space have not been coded as it is the axes of the hand prisms which are of major interest.

In the context of the geometry-based representation system, this constraint unambiguously captures the intent of the orientation clause of the Symmetry Condition and correctly accounts for the well-formed signs in (7a) and (7b) while ruling out the ill-formed gesture in (7c). But this constraint not only accounts for the data, it also unifies the notion of orientation that in Battison's account required a two-pronged definition of orientation, split between a relative reference system and an absolute reference system. In this account, we adopt a uniformly relative system of representation.

Finally, this representation produces another significant result. Given any orientation that satisfies the orientation constraint, rotating the axes of the hands 90 degrees produces a configuration that also obeys the orientation constraint. This is true whether the hand prisms are 'linked,' that is they rotate in the same direction, or 'unlinked', rotating in opposite directions. For example, in (13a) the hands are oriented so that the palms face each other. If we treat the hands as 'linked' and rotate them 90 degrees about the Z-axis, the result is the starting position for (13b). If we treat the hands as 'unlinked' and rotate the configuration of (13a) 90 degrees about the Z-axis, the hands are in the position of (13c).



In formal terms, the set of orientations in two-handed signs in ASL is a mathematically closed set. In other words, applying the transformation 'Rotate 90 degrees' to a gesture that satisfies the orientation constraint produces another gesture that also satisfies the orientation constraint. This formal characteristic of signs is surprising from the perspective of the starting point of our investigation, namely considering the interpretation of orientation in Battison's Symmetry Condition. Yet, the finding is completely unsurprising in light of our understanding of sign language as a natural language. The orientation properties of the articulators in Type 1 signs are consistent with the formal properties of other constrained natural systems.

#### 4. Conclusion

In this paper we highlighted a problem with the specification of orientation in Battison's Symmetry Condition. To correctly account for the data we introduced a geometry-based formal representation of signing space that provides the framework for stating a more explicit constraint on orientation. As a result, Battison's two-

pronged approach to orientation, requiring both 'symmetrical' and 'identical orientation,' was reduced to a single unambiguous interpretation of orientation. In addition, this led to the observation that the orientation of two-handed signs is formally a closed set.

In sum, this analysis leads us to a linguistically satisfying result because it accounts for data that was problematic for Battison's Symmetry Condition. Additionally, the realization that the orientation of the hands in two-handed signs can be formalized in geometric terms and, furthermore, that the representation leads to a mathematically well-defined set of relations confirms our understanding of ASL as a natural system guided by a set of principles that are consistent with those of other systems found in nature.

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- (Pictures from: Humphries, Padden & O'Rourke (1980), illustrated by Frank Paul.)

Janine Toole  
Linguistics Department  
Simon Fraser University  
Burnaby, BC  
CANADA V5A 1S6  
toole@sfu.ca

Linda Uyechi  
Linguistics Department  
Stanford University  
Stanford, California  
USA 94305-2150  
uyechi@csli.stanford.edu

# The Acquisition of Optimality Theoretic Systems<sup>1</sup>

William J. Turkel  
University of British Columbia

## 1. Introduction

This paper explores the connection between Optimality Theoretic (OT) models of natural language and the class of computational models known as Genetic Algorithms (GAs). Genetic algorithms have been used to model the acquisition of syntax cast in a Principles and Parameters (P&P) framework. Unlike the P&P work, where the genetic algorithm is added to the theory as the acquisition component, I make the strong claim that an OT system properly construed is a genetic algorithm. To the extent that genetic algorithms are an adequate model of acquisition, this entails that one Optimality Theoretic system can be used to acquire another. I briefly describe a model of language acquisition where an OT system is used to acquire the constraint rankings of other OT systems. The model crucially depends on both serial and parallel operation, suggesting that both modes have a role in the formulation of Optimality Theory. In addition, the model provides a relatively detailed description of *Gen* which is consistent with the assumptions of Optimality Theory.

An overview of the paper is as follows. I first describe an abstract system which is a good characterisation of both OT and genetic algorithms. Relating each to this system, we see that they complement one another. I then discuss genetic algorithms as a model of language acquisition, using Clark's work on P&P theory as an example (1992a, Clark & Roberts 1993). Finally, I show how a genetic algorithm can be used as an acquisition model for Optimality Theory.

## 2. Optimality Theory and Genetic Algorithms

*2.1 An Abstract System.* Consider an abstract system with the following characteristics. One part of the system is a generating mechanism which creates a number of symbolic objects. These objects must be quite similar to one another, but they tend not to be identical. Call the generating mechanism a *generator*. Another part of the system is an *evaluator*, which tests each of

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<sup>1</sup>This is a substantially rewritten version of a paper which was available on the Rutgers Optimality Archive as ROA-11 from March 1994. Subsequent to the 1994 paper, the genetic algorithm model was implemented in work with Douglas Pulleyblank (Pulleyblank & Turkel 1995a, 1995b), who is responsible for many improvements to the system. Thanks also to many other members of the Optimality Theory community for ideas and discussion. All errors are mine.

the objects for suitability to some task. The evaluator considers each object independently of the others, and returns one or more as its best candidates. The system acts iteratively, such that the best candidates from one pass are fed into the generator and used as the seeds for the creation of the next set of candidates.

The overall architecture of the system is abstract enough that it can be used for a variety of tasks. For example, changing the nature of the generator will have an effect on the kinds of symbolic objects processed by the system. Changing the nature of the evaluator will result in different objects being designated 'best'. As described, the abstract system is a simple generate-and-test optimisation mechanism. When operated iteratively, it demonstrates evolutionary behaviour. Each generation of objects is slightly better (on average) than the previous, because the best candidates of the previous generation gave rise to the candidates of the current generation.

*2.2 Optimality Theory.* The description of the abstract system is a fairly good characterisation of the theoretical machinery of Optimality Theory (McCarthy & Prince 1993, Prince & Smolensky 1993) In Optimality Theory, a function *Gen* creates a set of candidate outputs. "Gen contains information about the representational primitives and their universally irrevocable relations..." and "...generates for any given input a large space of candidate analyses by freely exercising the basic structural resources of the representational theory" (Prince & Smolensky 1993, 4-5). The candidate analyses are then tested against a set of ranked constraints with the following assumptions. The constraints are violable, but the violation incurred by the optimal candidate is minimal. The notion of minimal violation is cast in terms of *harmony*, where the most harmonic candidate least violates the constraint set. The constraints are ranked on a language-particular basis, and the notion of minimal violation is defined in terms of this ranking. The constraint ranking consists of a *strict dominance hierarchy* of constraints, such that each constraint has absolute priority over all the constraints lower in the hierarchy.

The iterative operation of the abstract system best corresponds to the architectural variant of Optimality Theory known as *harmonic serialism*, where "... Gen provides a set of candidate analyses for an input, which are harmonically evaluated; the optimal form is then fed back into Gen, which produces another set of analyses, which are then evaluated; and so on until no further improvement in representational Harmony is possible" (Prince & Smolensky 1993, 4).

There are other variants of OT, in particular one where all of the candidates are produced by *Gen* in one step and evaluated in parallel. This parallel mode tends to be assumed in most OT work. In this paper I assume that both variants are available as a part of Universal Grammar.

The operation of an OT system is usually represented in tableaux. The constraints are ranked from left to right as columns of the table, and the candidates are listed on separate rows. At each point where a candidate violates a constraint, a star is placed in the cell at the intersection of the appropriate row and column. If a candidate violates a particular constraint  $n$  times, there will be  $n$  stars in that cell. We refer to the assignment of a star to a candidate as the *assessment of a mark*. The collection of all marks incurred by a candidate  $c$  is denoted  $marks(c)$ .

An OT system differs from the abstract system primarily in the richness of its evaluator mechanism. Optimality Theoretic analyses tend to emphasise the role of constraint interaction, and to downplay the role of *Gen*, assuming that the generator does what is necessary under the circumstances.

*2.3 Genetic Algorithms.* The description of the abstract system is also a good characterisation of Genetic Algorithms, a family of computational models inspired by evolution (Holland 1975/1992, Goldberg 1989). A GA operates over a set of simple chromosome-like data structures. The data structures are usually bit strings which encode a proposed solution to some problem. (In Clark 1992a the bit strings are parameter settings for hypothesised P&P theory grammars). The GA typically starts with a randomly generated population of these chromosomes, evaluates the *fitness* of each, and gives the best a chance to reproduce. Reproduction of the chromosomes involves the recombination of the parental information in such a way as to create new chromosomes. These offspring are added to the population, the fitness of each chromosome is tested, and the best are again more likely to reproduce. Over time, the average fitness of the population rises. The process is iterated until an optimal or near-optimal chromosome is found.

Since GAs are a general technique for optimisation, they do not specify the nature of the representations to be tested or the nature of the fitness function in any detail. These are assumed to be part of the problem domain.

*2.4 Evolutionary Operation of Optimality Theoretic Systems.* OT systems and GAs can both be described by reference to an abstract system which generates symbolic objects, tests them, and returns a subset of the objects which are better suited to some task. Thus OT systems and GAs are similar to one another, and, furthermore, complementary in the sense that *one theory is articulated precisely where the other is not*. GAs are very detailed in their specification of the generator (postulating operations such as recombination and mutation) but they are not detailed in their specification of the fitness function or the nature of representations. On the other hand, OT systems provide an explicit evaluator and set of primitives for the representations, but do not describe the generator in any detail.

I propose that we enrich our notion of an Optimality Theoretic system in the following ways:

1. *Gen* is to be understood as operating in a fashion similar to the generator of GAs. It can take a single symbolic object (in this case a generally well-formed linguistic representation) and modify (i.e., mutate) it in such a way as to produce another valid object. It can also take a pair of representations and recombine them in such a way as to produce a different pair of generally well-formed representations. This corresponds to Prince & Smolensky's free exercise of basic structural resources.
2. Constraint hierarchies are represented in such a way that they count as well-formed linguistic representations, and can thus be manipulated by *Gen*. This idea is familiar from the LISP family of programming languages where a *list* is used to represent both programs and data.
3. Optimality Theoretic systems are capable of two modes of operation. The first is the parallel operation which is assumed in most work, and which is demonstrably crucial for a number of linguistic analyses (see e.g., Prince & Smolensky 1993, Chapters 4 & 7). The second mode of operation is serial. As we have seen, the GA crucially relies on iterative behaviour to find an optimal or near-optimal candidate. By operating iteratively, the GA has to consider fewer alternatives in each generation, and explores only part of the search space in each cycle. In the application to which we will put the serial-mode OT system, namely acquiring constraint rankings, the search space will be too large to explore in parallel. With  $N$  constraints, we will have  $N!$  possible rankings. We need to test only a very small subset of possible rankings with each pass of the system, and converge towards the correct ranking over time.

### 3. Genetic Algorithms as a Model of Acquisition

The process of language acquisition can be seen as an *adaptive system* in that it is an optimisation problem with a substantial degree of uncertainty and complexity, which must exploit information as it is acquired (Holland 1975/1992).

Holland developed GAs to model such adaptive systems. In this section I describe the work of Robin Clark (1992a, Clark & Roberts 1993) which uses GAs as a model of syntactic acquisition.

*3.1 The Problem of Language Acquisition.* If language learning is a faculty which can be usefully modelled algorithmically, then the process will be inherently bounded in terms of the computational resources (space and time)

that it has at its disposal. We can frame the problem as follows: how does a learning device with limited computational resources use input data to form hypotheses? One assumption that has proven to be particularly fruitful is the idea that the learner is biased to make certain kinds of generalisations. So in a P&P system, there are a finite number of domains of finite variation, the *parameters* of the system. The learner has a certain amount of flexibility, and yet is still able to acquire the system in a reasonable amount of time.

If the parameters were all independent of one another, then a learning algorithm would simply look for evidence for the setting of each, and set it in the correct way. The usefulness and appeal of the P&P approach comes from the fact that the parameters are not independent of one another, but interact in complex ways.

Some approaches to parameter-setting rely on this interaction, and attempt to use deductive methods for acquisition. Deductive methods suffer high computational cost, and can be equivalent to brute-force enumeration in the worst case (Clark 1992a). For any reasonable number of parameters (e.g., around 30) the search space is too large for such enumeration to be a useful strategy.

The method of acquisition presented here is nondeductive instead. The genetic algorithm can locate a target without the computational cost of the deductive approaches, and is robust enough to deal with noisy, equivocal data.

*3.2 Selection of Syntactic Knowledge.* Clark (1992a) proposes that parameter-setting is accomplished with a GA, and describes a model with the following components: 1) bit strings which represent hypothesised vectors of parameter settings, 2) a one point crossover operator, 3) a mutation operator, 4) a fitness function with three components, and 5) allocation of reproductive opportunities based on fitness.

The representations which the GA processes are bit strings corresponding to parameter settings. There is a fixed central algorithm, corresponding to UG. Within this algorithm are various flags, indicating points where code must be inserted for the parser to function. The parameter values act as pointers to parameterised code. The result is a special 'self-constructing' parser designed to analyse the hypothesis string (Clark 1992a).

The learner is error-driven, in that hypotheses are changed on the basis of evidence from the external environment, with the requirement that the new hypothesis better account for the data.

The fitness metric consists of a summation function and two additional components. The summation function adds up the number of violations in the various modules of the parser and passes the sum to the learner. The learner does not have access to information about which components were violated, merely the gross amount of violation incurred. One of the other components rates subset hypotheses more highly than superset hypotheses, and the other

prefers hypotheses which lead to compact representations over those which do not. The fitness metric is designed so that it can distinguish between the performance of various hypotheses, even when none of them correctly deals with an input datum.

The overall operation of the system is as follows. An initial population of distinct hypothesis strings are generated randomly. A parsing device is constructed for each, and the parsing devices are tested against input sentences. The fitness of each hypothesis is used to allocate reproductive opportunities. Reproduction consists of crossover. Mutation is applied to the population, and the least fit elements are removed. If the target sequence has been reached, the algorithm halts, otherwise it creates parsing devices for the current population and iterates.

#### 4. A Model of Language Acquisition for OT

In this section I discuss the problem of acquiring Optimality Theoretic systems. I first present the learnability work of Tesar & Smolensky (1993) and discuss how it fits into a theory of acquisition. I then compare the problem of acquiring constraint rankings with the problem of parameter setting. Finally, I describe the way that a serial-mode OT system can acquire other (presumably parallel-mode) OT systems.

*4.1 The Learnability of Optimality Theory.* Tesar & Smolensky (1993) describe a learning algorithm (Recursive Constraint Demotion) which takes pairs consisting of an input and its well-formed (optimal) parse, and outputs a *stratified hierarchy* of constraints. A stratified hierarchy is a constraint ranking where members of a stratum are not ranked with respect to one another, but each dominates the remaining constraints which are not members of the stratum.

The key idea behind the learning algorithm is that the marks incurred by any suboptimal parse must outrank the marks incurred by the optimal parse. For every positive datum of an input and its optimal parse, any alternative analysis we may generate will be suboptimal. This allows the learner to determine constraint rankings from pairs of inputs and optimal parses.

From the point of view of a model of language acquisition, the assumption of having the optimal parse available as part of the input is problematic. A plausible model must be able to learn under conditions of partial information and occasional errors in the input. Nevertheless, the learning algorithm is a useful contribution, and may be integrated into iterative models of acquisition where the 'optimal' parse is hypothesised rather than given.

*4.2 The Problem of Acquiring Constraint Rankings.* Under the assumption of innate knowledge of the universal constraints, the primary task of the OT

learner is the determination of the dominance ranking of the constraints particular to the target language, which is analogous to parameter-setting in P&P theory.

The problem of acquiring OT systems differs from the problem of parameter setting in a couple of ways (Pulleyblank & Turkel 1995b). For one thing, the search space is much larger. Assuming  $N$  binary parameters, there will be  $2^N$  possible grammars. Assuming  $N$  constraints, there will be  $N!$  possible grammars. As a point of comparison, with 30 parameters, there are about  $1 \times 10^9$  possible grammars. But with 30 constraints, there are about  $3 \times 10^{31}$  possible grammars. A theory which is equivalent to brute-force enumeration is untenable for parameter-setting and is inconceivable for constraint ordering.

Another difference is that the OT parser will be uniform across different constraint rankings. Unlike the P&P implementation, which required a new parser to be constructed for each hypothesised set of parameter settings, the OT parser is already constructed, and merely processes with different constraint rankings. Its overall operation does not need to change with each hypothesis.

Finally, note that the genetic algorithm was basically external to the machinery of P&P theory. Under the view presented here, the genetic algorithm is the machinery of OT. Instead of grafting on a separate learning device, we say that the OT system is organised such that it can act as its own learning device. Thus we are able to avoid the proliferation of theoretical machinery.

*4.3 The Architecture of the Model.* In this section I provide a top-down decomposition of the proposed model. I use a syntax based on the Scheme dialect of LISP (Friedman & Felleisen 1989) to describe the basic structure of the components. **Typewriter font** is used for procedure names, *Italics* for formal parameters and Roman for actual arguments. Comment lines begin with a semicolon (;).

*4.3.1 Instantiating Grammars.* I assume that UG includes a set of universal constraints and the machinery required to implement OT systems. At the uppermost level, we have a higher-order function which instantiates specific grammars.

```
(instantiate-grammar
 ; Given a constraint ranking and a mode of operation
 ; (i.e., serial or parallel) return a grammar
 (lambda (mode ranking) ...))
→ a grammar
```

```
(grammar
 ; A grammar maps a single input to a single output.
```

```
(lambda (input)
 ... (H-eval ... (Gen input)))
→ output
```

The standard assumption about the generator is that it takes a single representation and returns a set of representations consisting of modifications to the input. I will assume that the generator takes a set of representations and returns a set of representations. If the input set contains one element, then the generator returns a number of variations on that element (this is the standard operation). If the input set is empty, then the generator randomly creates a set of appropriate representations and returns that. If the input set contains more than one representation, then the generator returns a set consisting of new representations built from the bits and pieces of the representations in the input set.

```
(Gen
 (lambda (input) ...))
→ output set
```

; Examples

```
(Gen input) → {mod1, mod2, ..., modn}
```

```
(Gen \emptyset) → {rand1, rand2, ..., randn}
```

```
(Gen {input1, input2, ..., inputn}) → {recom1, recom2, ..., recomn}
```

The evaluator takes a set of representations and evaluates them against a set of constraints. I assume that the constraints are compiled into the evaluator during the instantiation of the grammar. Under standard assumptions, the output of the evaluator is the single best member of the input set. We will have to assume, however, that the evaluator can sometimes return a set consisting of good members of the input set (different mode of operation). Without getting into the details yet, let's say that when the output set contains more than one member, its cardinality will still be less than that of the input set. Intuitively, not all of the members of the input set will be equally harmonic, and we wish to return some subset whose members are more harmonic than the rest. An empty output set corresponds to the *null parse* of Prince & Smolensky (1993, Chapter 4).

```
(H-eval
 (lambda (mode input-set) ...))
→ possibly empty set of more/most harmonic members
```

We now have enough machinery to describe some of the architectural variants of the theory. Consider first the standard parallel mode OT system which

is assumed in most work. Assume that the constraint ranking has been determined for the language (i.e., that this is an adult system). The mode of operation of the grammar is Parallel, and H-eval will return a set consisting of the single most harmonic member of its input.

```
(instantiate-grammar Parallel Lang-specific-ranking) →
(grammar
 (lambda (input)
 (H-eval Most (Gen input))))
```

The next variant which we might wish to consider is the harmonic serial mode OT system. In this case, the mode of operation is Serial. I assume that `instantiate-grammar` adds iterating code similar to that shown below. H-eval is still required to return the single most harmonic candidate found in a given pass through the loop.<sup>2</sup> I leave the exact formulation of the loop termination test open.

```
(instantiate-grammar Serial Lang-specific-ranking) →
(grammar
 (lambda (input)
 (if no-further-improvement?
 input
 (grammar
 (H-eval Most (Gen input))))))
```

To get an OT system with evolutionary operation, we will need a serial mode grammar where H-eval returns a set of more harmonic members on each pass through the loop. The nature of the constraint ranking (M-Ranking) and the loop termination test (`converged?`) are discussed below. The function FM simply returns the foremost element of a list (from Prince & Smolensky 1993, 69, this is obviously equivalent to LISP `car`). Since the input set has converged, any element in it is optimal, including the first.

```
(instantiate-grammar Serial M-Ranking) →
(grammar
 (lambda (input-set)
 (if converged?
 (FM input-set)
 (grammar
 (H-eval More (Gen input-set))))))
```

---

<sup>2</sup>Contrary to Prince & Smolensky 1993, Chapter 5, which claims that the serial/parallel distinction pertains to *Gen*, I suggest that it is actually a characteristic of the *Gen*/H-eval loop.

*4.3.2 Representations.* The grammars which we instantiate will have to process linguistic representations. If we wish to use an OT system to acquire another OT system, then the grammars will also have to process constraint rankings. I assume that constraint rankings are the same kind of symbolic objects as well formed linguistic representations. As a first approximation, let us say that constraint rankings are represented as lists of symbols (much like LISP programs). Symbol lists can also be used to represent feature bundles, sets, trees and other linguistically relevant data structures.<sup>3</sup>

*4.3.3 Mutation and Recombination.* We have seen that when the generator receives a single input, it outputs a set of modifications of that input, and when it receives a set of inputs, it outputs a set of recombinations. We have to consider the operation of the generator when dealing with constraint rankings and when dealing with linguistic representations. I will cover only the former in any detail, although I presume the latter to be analogous.

If the generator is creating modifications of a single input, then the sorts of operators which we want to use will be analogous to the mutation operator of the traditional GA. Some examples of operators are swapping adjacent or non-adjacent pairs of constraints, reversing segments of the list, rotating the list to the left or right (so that the first element becomes the last, or vice versa) and so on.

If the generator is creating new objects from bits and pieces of old ones, then the sorts of operators we will want to use will be analogous to the crossover operator of the traditional GA. Operators which work with two lists will have to be designed so that one constraint does not appear at two points in the list. For this reason, the one point crossover algorithm will not work, although many suitable algorithms can be devised. For example, consider one based upon *mark cancellation* (Prince & Smolensky 1993).

Mark cancellation takes two lists of symbols and recursively cancels any common symbols, one pair at a time. Say we want to crossover two constraint ranking lists. We first pick a point on each list to serve as the crossover point. We remove the head of each list at that point, and attach it to a tail consisting of the other list from which all of the head symbols have been cancelled with mark cancellation. This gives us a recombination algorithm which is akin to one point crossover, but which can be implemented primarily in terms of primitives which the theory already requires for other purposes.

```
(mc-crossover
 (lambda (point list1 list2)
```

---

<sup>3</sup>The process of Genetic Programming (Koza 1992) takes a related approach; genetic algorithms operate in a search space where the chromosomes are LISP programs rather than bit strings.

```
(adjoin-lists
 (head-list point list1)
 (cancel-marks (head-list point list1) list2))
(adjoin-lists
 (head-list point list2)
 (cancel-marks (head-list point list2) list1))))
```

; Example

```
(mc-crossover 2 (A E B C F D) (D E C A B F))
→ (A E D C B F) (D E A B C F)
```

The mutation and recombination operators which we have provided allow the generator to easily explore the possibility space of constraint rankings. When it has to explore the space of linguistic representations, however, its operation will need to be both more powerful and more tightly constrained. It will have to be more powerful in the sense that it can explore permutations of lexical and structural objects, and can manipulate nested lists. But it will be more constrained because not every list of linguistic symbols will be wellformed, unlike every list of unique constraints.<sup>4</sup>

The power of the generator can be increased by giving it recombination and mutation operators which work with nested lists. These would probably consist of tree-rearranging and tree-pruning mechanisms, facilities for adjoining trees and cancelling common subtrees and so forth.<sup>5</sup> The generator can be constrained by adding filters which rule out symbolic lists that do not correspond to valid (i.e., generally well-formed) linguistic objects. There is no reason for such filters not to be implemented as an OT system of very high level constraints.

*4.3.4 Operational Overview.* At the beginning of the acquisition process, the language learner has an evolutionary serial mode OT system instantiated. There are no inputs to the generator at first, so it randomly creates a set of

<sup>4</sup>Actually, there may be some constraint lists which are not well-formed. For example, the system might not allow the so-called undominated constraints to be dominated. It might also rule out any ranking which does not maintain the relative order of the peak and margin hierarchies (Prince & Smolensky 1993, Chapter 8). If such well-formedness requirements hold of constraint lists, they can be easily added to the system presented here.

<sup>5</sup>Again the reader is referred to Koza 1992, which discusses such processes for LISP programs. For a related proposal, see the discussion of *treebot ecology* in Clark 1992b. See also the discussion in Prince & Smolensky 1993 (79, fn 49).

constraint rankings.<sup>6</sup> The system will be exposed to input from the ambient language and will test the fitness of each of its candidate constraint rankings against the M-Ranking. The most fit constraint rankings (i.e., the most harmonic, with respect to the M-Ranking) will be passed back into the generator for the next iteration of the system. The generator will apply its recombination/mutation operators to the rankings to produce new rankings. That set of rankings will again be evaluated against the M-Ranking, and the system will eventually converge to the target constraint ranking. At that point, the adult parallel mode system is instantiated with the target ranking.

*4.3.5 The M-Ranking.* The crux of the system is the fitness testing. Consider a single candidate tested against three binary constraints. Instead of creating the familiar tableau, we can write this as a binary number, where 1 is equal to a star and 0 to an empty cell. The best candidate possible would be one which did not violate any constraints 000. The next best candidate would violate only the lowest ranked constraint 001. In order from best to worst, the candidates are 000, 001, 010, 011, 100, 101, 110, 111. Let's call this measure *absolute harmony*. The absolute harmony of a candidate for  $N$  constraints will be equal to  $(N-X)/N$  where  $X$  is the binary value corresponding to the candidate's row in the tableau. This measure captures the nature of candidates assessed against a strict dominance hierarchy in an absolute rather than relative fashion.<sup>7</sup> The basic idea is that of Tesar & Smolensky: "The fact that surface forms are optimal means that every positive example contains a great number of implicit negative examples: for any given input, every candidate output other than the correct form is ill-formed." (Tesar & Smolensky 1993). Unlike Tesar & Smolensky, however, I do not use that insight as the basis for a deductive system. Rather, I note that, all other things being equal, the forms output by the grammar will *tend to have a low absolute harmony*. So we want our idea of the fitness of hypothesised constraint rankings to reflect this tendency.<sup>8</sup>

---

<sup>6</sup>It may be the case that there is some default order to the constraints which is also innate. In this model, such information could be reflected in the initial population (e.g., the majority of the initial set of rankings could be the default ranking) or it could be reflected in the recombination operators of the generator. In the latter case, the system might be predisposed towards those recombinations which would lead to a default ranking.

<sup>7</sup>I make two simplifying assumptions: all constraints can be cast as binary constraints, and constraint violation is all-or-none. Thus each cell in this tableau can contain at most one star. The system presented here can be readily generalised to more complex constraints and tableaux.

<sup>8</sup>Although cast in terms of binary numbers, the system can be implemented without requiring the power of arithmetic. Instead, a system of recursive mark cancellation is used. See also Pulleyblank & Turkel 1995a.

Note that a system which uses absolute harmony as the core measure of fitness only has access to how good something is overall, and not to which constraints have been violated. In this respect, the model is similar to the P&P implementation.

How does absolute harmony help us? Say that we are able to instantiate a parallel mode grammar with a hypothesised constraint ranking. When we test the PLD against this constraint ranking, we get absolute harmony values. Because the system is not deductive we can have incomplete or noisy information about which constraints are obeyed by a surface form, and which are violated.

Now we wrap our parallel mode grammar in an averaging function, which returns the average absolute harmony of PLD surface forms when assessed against a particular hypothesised constraint ranking.

The M-Ranking is almost like an inverse of the *encapsulated constraints* of Prince & Smolensky 1993 (Chapter 8). Instead of packaging up the results of a number of constraints into a composite constraint, the M-Ranking takes a single value (the average absolute harmony of the PLD assessed against a hypothesised constraint ranking) and *returns it as if it were a row in a constraint tableau*. In other words, the M-Ranking is a single function which simulates the effect of a candidate tested against a number of constraints. This means that the evaluator can use the standard tableau evaluation mechanism to assess the output of the M-Ranking. M-Ranking stands for *Meta-Ranking*... it is not really a ranking, it just simulates one for the purposes of assessing hypothesised constraint rankings.

*4.3.6 Convergence.* One possibility for convergence is that the system will not stop testing hypotheses until it reaches the exact ranking which it is attempting to acquire. In this case, each of the members of the set of constraint rankings will be equal to the target ranking.

Since the process is error-driven, however, it will settle into its final state when it can no longer discriminate between pairs of constraint rankings in terms of their ability to generate the target language. Thus, the final ranking may or may not correspond to the exact ranking of the target. Clark and Roberts (1993) use this as a model of diachronic change. It gives us a picture of language variation as well. Two dialects may differ in the ordering of a few low level constraints. Two dialects differ in terms of a few intermediate level constraints, and so forth (Pulleyblank & Turkel 1995b).

*4.4 Traps.* Certain formal relationships between parameters and between parameter values can lead to what Clark (1992a) has called *traps*. One example is the *subset condition* of Berwick (1985) which states that the learner must guess the smallest language compatible with the input. Failure to do so can

lead to a situation where the learner hypothesises a superset language, and is unable to retreat from this incorrect guess because no positive evidence bears on the issue.

In the P&P implementation of a GA learning theory, the fitness function was specifically designed so that the system would avoid subset condition violations and other traps that can arise in parameter setting (Clark 1992a). Even without such a sophisticated fitness mechanism, a GA learner for P&P may perform well in the presence of traps (Turkel 1995). Similar results have been obtained for GA-based learners for OT (Pulleyblank & Turkel 1995a, 1995b).

## 5. Conclusion

In conclusion, we have shown that OT systems are capable of acting as GAs under certain circumstances. This provides us with a robust and efficient mechanism for acquiring OT systems, and does not require that we add anything to the theory which has not already been proposed. Furthermore, the model of acquisition presented in this paper provides some internal structure for *Gen* and suggests that both serial and parallel modes of operation are available as a part of Universal Grammar.

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Department of Linguistics  
University of British Columbia  
C369-1866 Main Mall  
Vancouver, B.C.  
CANADA V6T 1Z1

bill@hivnet.ubc.ca

## Morphology, Accent and Foot Form in Tanana Athabaskan Metrics

Siri G. Tuttle  
University of Washington

### 1. Problem to be Addressed

This paper takes as point of departure a small detail of the Tanana Athabaskan metrical system. Despite overall similarity in two closely related language areas of the Tanana (Salcha, or Middle Tanana, and Minto, or Lower Tanana) in terms of metrical structure, there is a difference in the treatment of possessed nouns which opens up questions about the entire system.

The detail to be dealt with is shown in (1). In possessed nominals which are prefixed and suffixed, Salcha places stress on the stem of the possessed noun, regardless of the quantity of the stem syllable; the suffix syllable, which is heavy, is unstressed. In Minto, the possessed suffix is stressed along with a bimoraic stem; when the stem is rendered monomoraic by syllabification with the suffix, the suffix is stressed; the light stem may be destressed in favor of the prefix, as shown in (1).

#### (1) AMinor Detail

|                 |                                            | Salcha           | Minto            |
|-----------------|--------------------------------------------|------------------|------------------|
| monomoraic stem | səts'əyəʔ 'my hat', from /ts'əx/, 'hat'    | x<br>səts'əyəʔ   | x x<br>səts'əyæʔ |
| bimoraic stem   | sət'luləʔ 'my rope,' from /t'l'ul/, 'rope' | x<br>sət'luləʔ   | x x<br>sət'lulæʔ |
| disyllabic stem | sətənələʔ 'my box', from /tənəl/ 'box'     | x x<br>sətənələʔ | x x<br>sətənələʔ |

McCarthy and Prince (1993) claim that differences in phonologies are best represented as differences in ranking of constraints. If they are correct, then it should be the case that such a minor metrical difference will be best (most simply and insightfully) represented as a difference in constraint ranking. I will argue here that the difference found between Salcha and Minto stress involves a difference in underlying representations: a lexical difference. However, a constraint-based model does provide an explanatory structure for this difference which a rule-based approach does not address so directly.

The Salcha data in this paper come from audio tape made between 1962 and

1991, by various researchers, and from the field recordings and notes of the author (1991-1993). Salcha became extinct in 1993 on the death of Eva Moffit, the last speaker. The Minto data represent the dialect of Isabel Charlie, recorded by James Kari in 1991 and by the author (1993, 1995).

## 2. Background

Descriptions of Athabaskan metrical systems have included observations of stress on heavy syllables (Golla 1971, Kari 1990, Tuttle 1992, 1995a), foot structure (Rice 1990, Tuttle 1992, 1994, 1995a, Hargus 1995) and attraction of lexical tone to a stressed syllable (Rice 1990). Many of the Athabaskan languages have lexical tone; coexistence of tone with stress is claimed by Rice (1990) and Tuttle (1995a). Salcha and Minto, which are representative of Middle and Lower Tanana respectively, differ in their tonal status; Minto demonstrates low tone from historical vowel constriction (Krauss in Krauss and Golla 1981), but Salcha does not (Krauss 1982). Both Salcha and Minto, however, have a few morphemes which are lexically marked with high pitch; this high pitch is independent of historical constriction, and its origin may have been intonational (Ritter, p.c.)

All accounts of Athabaskan metrical structure recognize an important role for morphology as well as for syllable weight. While in many cases the correct representation can be arrived at by purely metrical means, extrametricality must be invoked to account for nonfinality effects.

### 2.1 *Morphological Background: Suffixed Nouns*

The morphological structure to be concentrated on in this paper is the possessed noun. Genitive constructions in Athabaskan are formed by preceding the noun representing the thing possessed by the possessor, and usually, following the noun with a suffix. In some languages, including Tanana, the possessing nominal may be a free noun or a pronominal affix; in others, a possessor agreement marker must be present whether or not there is a free nominal possessor. Some nouns are not suffixed. Some nouns, belonging mostly to the semantic classes of kin terms and body parts, are obligatorily possessed, and an indefinite possessor and suffix must be present in all representations of these nouns. Obligatorily possessed nouns may be "repossessed" as, for example, when a human possesses a body part of an animal.

Structure and examples of possessed nouns are shown in (2). The examples are from Salcha.

## (2) Salcha Possessed Nouns

|                                                      |                                                         |                                                           |                                                          |
|------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|
| Alienably possessed noun with suffix: /ts'əx/, 'hat' | Alienably possessed noun without suffix: /yəx/, 'house' | Inalienably possessed noun with suffix: /-gan/ +əʔ, 'arm' | Inalienably possessed noun: /-θəθ/, 'skin'; not suffixed |
| ʊts'əyəʔ<br>'his/her hat'                            | John yəx<br>'John's house'                              | č'əganəʔ 'arm'                                            | dənigi θəθ<br>'moose skin'                               |

## 2.2 Morphological background: suffixed verbs

There are very few suffixes in Tanana Athabaskan. For this reason, to show the regularities of post-stem metrification, it is necessary to look at elements which attach to verb stems as well as those which attach to noun stems. For purposes of exposition only, I will refer to both the nominalizers and the possessed suffix as suffixes; nothing about the syntax or larger morphological organization is to be inferred from this oversimplification.

Athabaskan verbs are stem-final, and may have quite a number of prefixes and a smaller number of suffixes. These verbs are descriptively classed as having position-class morphology. The chart in (2) shows the basics of Tanana verbal morphology, which is very similar to that found across the language family:

## (3) Tanana Athabaskan verb

| Disjunct |   |          | Conjunct |      |      |          |     |    | Stem | Suf |
|----------|---|----------|----------|------|------|----------|-----|----|------|-----|
| PP       | A | Inc Stem | Pr       | Qual | Mode | Conj Neg | Sub | Cl | Stem | Suf |

The boundaries represented by double lines in this graph are morphological and prosodic in nature. Since I will not be discussing verbs in detail in this paper, the main thing to observe is that stems may be suffixed as well as prefixed, and that the prefixes can be divided into two major groups (disjunct and conjunct) with the pronominals at the left edge of the conjunct domain being grouped both with the conjunct affixes (a mainly prosodic grouping) and with the disjunct elements (a mainly syntactic grouping.) Verbs may be suffixed by nominalizers, complementizers, or sentential markers which denote interrogative or negative status. Examples of three of these suffixes are shown in (4).

## (4) Suffixes to verbs

|        | /-ən/<br>'human<br>nominalizer'                   | /-ə/<br>'non-human<br>nominalizer'     | /-ə/<br>'negative'                                     |
|--------|---------------------------------------------------|----------------------------------------|--------------------------------------------------------|
| Salcha | č'alən<br>'the one who is<br>eating<br>something' | č'alr<br>'what he or<br>she is eating' | č'əh'alə ~<br>č'əh'alə<br>'he or she is<br>not eating' |
| Minto  | č'alən<br>'the one who is<br>eating<br>something' | č'alr<br>'what he or<br>she is eating' | č'əθ'alə<br>'he or she is<br>not eating'               |

## 3. Data: The Tanana stress system

Stress in Tanana Athabaskan is sensitive to syllable quantity and to morphological information. The rhythmic pattern is trochaic. Heavy syllables include those with bimoraic vowels as nuclei and those which are closed with a consonant. The bimoraic vowels are the "full" vowels i, æ, u and a; the monomoraic vowels are ə, ʊ and the raised, lowered and rounded allophones of ə: ɪ, ʊ and ɑ in both languages, word-final i and æ in Minto. In schematics I will show bimoraic vowels as V and monomoraic vowels as v.

## 3.1 Stems

Both the trochaic rhythm and the sensitivity to quantity can be demonstrated within disyllabic stems, which are more numerous in Tanana than in some other Athabaskan languages. Disyllabic stems are found in CvCv and CvCvC configurations. In both Salcha and Minto, stress is initial on disyllabic CvCv stems. Note that word-final schwa in Minto is phonetically [æ] or [i], but nevertheless does not attract stress.

## (5) Headedness of Feet in Stems

| UR      | Gloss               | Salcha      | Minto       |
|---------|---------------------|-------------|-------------|
| /jɪgɪ/  | 'berries'           | x<br>jɪ.gɪ  | x<br>jɪ.gæ  |
| /tənə/  | 'road'              | x<br>tɛ.nə  | x<br>tɛ.næ  |
| /dlɪgɪ/ | 'tree-<br>squirrel' | x<br>dlɪ.gɪ | x<br>dlɪ.gɪ |

(6) shows that rhythm alone does not determine stress placement in stems: when a disyllabic stem ends in a closed syllable, this syllable is stressed in both Salcha and Minto.

## (6) Closed Syllables in Stems

| UR        | Gloss                | Salcha        | Minto         |
|-----------|----------------------|---------------|---------------|
| /t'əyəθ/  | 'cottonwood'         | x<br>t'ə.yəθ  | x<br>t'ə.yəθ  |
| /tθəɪɾyh/ | 'ground<br>squirrel' | x<br>tθə.ɪɾyh | x<br>tθə.ɪɾyh |
| /tɪ'əyəs/ | 'eel, leech'         | x<br>tɪ'ə.yəs | x<br>tɪ'ə.yəs |
| /tənəl/   | 'box'                | x<br>tə.nəl   | x<br>tə.nəl   |
| /xənəθ/   | 'raft'               | x<br>xən.nəθ  | x<br>xən.nəθ  |

A full vowel in the second syllable of a disyllabic stem will also attract stress. Salcha and Minto differ in how they interpret some of these disyllables, as shown in (7): the first two examples differ in that the final vowel attracts stress in Minto, but not Salcha; in the third example Salcha and Minto analyze the word in the same way. (compare with /tənə/ 'road' above.)

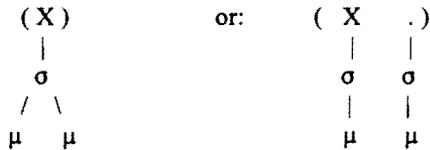
## (7) Bimoraic Vowels in Stems

| UR                           | Gloss    | Salcha       | Minto        |
|------------------------------|----------|--------------|--------------|
| /dəbə/ (S)<br>/dəbæ/ (M)     | 'sheep'  | x<br>də.βə   | x<br>də.bæ   |
| /ts'əbə/ (S)<br>/ts'əbæ/ (M) | 'spruce' | x<br>ts'ə.βə | x<br>ts'ə.bæ |
| /dənæ/ (both)                | 'person' | x<br>də.næ   | x<br>də.næ   |

The patterns seen in disyllabic stems are consistent with a moraic trochee. The footform constraint will therefore be, for both Salcha and Minto:

## (8) Foot form: Moraic trochee

Make feet of the form:

3.2 *Prefixed forms*

Prefixed forms in Tanana include verbs, nouns and postpositions. In this description I will deal only with verbs and nouns.

3.2.1 *Prefixed verbs*

Prefixed verbs demonstrate the iterativity of the stress system. Table (9) shows the stress patterns seen in Salcha and Minto when one, two and three Cv prefix syllables are added to a stem.

## (9) Metrifcation of Prefixed Verbs

| Prefix string        | UR                                                            | Salcha                                                   | Minto                                                    |
|----------------------|---------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| Cv                   | ts' + ə + tɬəx (S)<br>tr' + ə + trəx<br>(M)<br>'we're crying' | x<br>ts'ə.tɬəx                                           | x<br>tr'ə.trəx                                           |
| Cv + Cv              | č' + ə + s + l +<br>dzəɬ<br>(both)<br>'I'm dancing'           | x x<br>č'ə.dzə.dzəɬ                                      | x x<br>č'ə.dzə.dzəɬ                                      |
| Cv + Cv +<br>Cv      | č' + ɣə + s + l +<br>dzits<br>'I danced'                      | x x<br>č'ə.ɣə.dzə.dzits ~<br>x x<br>č'ɣə.dzə.dzits       | x x<br>č'ə.ɣə.dzə.dzits ~<br>x x<br>č'ɣə.dzə.dzits       |
| Cv + Cv +<br>Cv + Cv | č' + t + ɣ + ə + s<br>+ l + dzəɬ<br>'I will dance'            | x x x<br>č'ə.tə.ɣə.dzə.dzəɬ ~<br>x x<br>č'ə.tɣə.dzə.dzəɬ | x x x<br>č'ə.tə.ɣə.dzə.dzəɬ ~<br>x x<br>č'ə.tɣə.dzə.dzəɬ |

Prefix strings which create heavy syllables will interrupt the rhythmic pattern. Adjacent stresses are common. Examples are seen in (10):

## (10) Heavy Syllables in Prefix Strings

| Prefix string | UR                                                                  | Salcha                     | Minto                      |
|---------------|---------------------------------------------------------------------|----------------------------|----------------------------|
| CVC           | č' + ə + n + l +<br>dzəɬ<br>'you (sg) are<br>dancing'               | x x<br>č'in.dzəɬ           | x x<br>č'il.dzəɬ           |
| CvCCVC        | č' + x + t + ɣ +<br>ə + l + dzəɬ<br>'they will dance'               | x x x<br>č'əx.tal.dzəɬ     | x x x<br>č'əx.tal.dzəɬ     |
| CVCvCCVC      | na # č' + x + t +<br>ɣ + ə + l + dzəɬ<br>'they will dance<br>again' | x x x x<br>nac'əx.tal.dzəɬ | x x x x<br>nac'əx.tal.dzəɬ |

### 3.2.2 *Prefixed nouns*

Nouns are commonly prefixed with the possessive pronouns, as shown above in (2). The stress patterns which emerge in the nouns which do *not* take a possessed suffix are all consistent with verbal prefixed forms: they show stress on heavy syllables, and groupings of CvCv prefixes are stressed trochaically. Examples are seen in (11).

#### (11) Metrifcation of Prefixed Nouns

| Prefix string | UR                                 | Salcha          | Minto           |
|---------------|------------------------------------|-----------------|-----------------|
| Cv-           | sə+θəθ<br>'my (own) skin'          | x<br>sə.ðəθ     | x<br>sə.ðəθ     |
| CvCv-         | sə+ɕ'ə+θəθ<br>'my (animal) skin'   | x x<br>səɕ'əðəθ | x x<br>səɕ'əðəθ |
| CvC-          | nəx+θəθ<br>'your (pl) (own) skins' | x x<br>nəxðəθ   | x x<br>yuxðəθ   |

As shown in (11), prefixed nouns follow the same pattern as prefixed verbs: light syllables are unstressed unless they are grouped in CvCv, in which case the rhythm is trochaic; heavy syllables are stressed; and adjacent stresses are unremarkable.

To account for the regularity of stress on word-final stems, I propose a constraint:

#### (12) ALIGN Pwd, R, Foot, R

Align the right edge of every prosodic word with the right edge of a foot.

Since all syllables are parsed into feet except when this would result in the footing of a single monomoraic syllable, I propose the ranking:

#### (13) Foot Form (Moraic trochee) >> Parse-Syllable

where Parse-syllable is understood to mean: Parse all syllables into feet.

## 3.3 Suffixed forms

In Tanana Athabaskan, some of the post-stem morphemes disrupt the stress of the words they attach to, and some do not. (14) shows the behavior of four elements which attach to verb stems: two nominalizers, the negative and the interrogative markers.

(14) Metrifaction of Suffixed Verbs

|                             | 'human nominalizer'<br>(-vC)                     | 'non-human nominalizer'<br>(-v)          | 'negative'<br>(-V), (-v)                                            | 'interrogative'<br>(-VC, -v)             |
|-----------------------------|--------------------------------------------------|------------------------------------------|---------------------------------------------------------------------|------------------------------------------|
| Salcha<br>(bimoraic stem)   | x<br>č'alən<br>'the one who is eating something' | x<br>č'alɪ<br>'what he or she is eating' | x x x<br>č'əh'alɛ ~<br>x x<br>č'əh'alə<br>'he or she is not eating' | x<br>č'alə<br>'is she or he eating?'     |
| Salcha<br>(monomoraic stem) | x<br>č'ənʊdzən<br>'the one who is plucking'      | x<br>č'ənʊdzɪ<br>'what she is plucking'  | x x<br>č'əhnʊdzɛ ~<br>x x<br>č'əhnʊdzə<br>'she is not plucking'     | x<br>č'ənʊdzə<br>'is she plucking?'      |
| Minto<br>(bimoraic stem)    | x<br>č'alən<br>'the one who is eating something' | x<br>č'alɪ<br>'what he or she is eating' | x x x<br>č'əθ'alɛ<br>'he or she is not eating'                      | x x<br>č'alɪ?<br>'is he or she eating?'  |
| Minto<br>(monomoraic stem)  | x<br>č'ənʊdzən<br>'the one who is plucking'      | x<br>č'ənʊdzɪ<br>'what she is plucking'  | x x<br>č'əθnʊdzɛ ~<br>x x x<br>č'əθnʊdzɛ<br>'she is not plucking'   | x x<br>č'ənʊdzi? ~<br>x x<br>č'ənʊdzi? ~ |

As the table shows, the nominalizers are unstressed, despite the fact that the

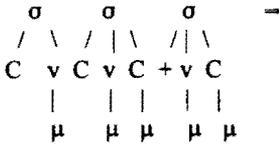
human nominalizer forms a syllable which would be heavy elsewhere in the language.

The negative suffix is stressed in Minto and in Salcha when the high-pitched, nasalized allomorph is used; the interrogative suffix is stressed in Minto but not in Salcha. A bimoraic stem preceding a stressed suffix retains its stress, but a monomoraic stem may lose it.

We have two patterns so far, then. In one pattern, no matter what the syllabic quantity of a post-stem element, it is not stressed (nominalizers.) In the other, a heavy post-stem element is stressed; this may affect the stress on monomoraic but not on bimoraic stems.

Vowel quantity is very important in this situation, because it creates the first context in which we have seen a violation of the basic rules of quantity in Tanana metrics. Stems, when unsuffixed, are always bimoraic, either by nature (having a bimoraic vowel) or by position (having a consonant coda). When suffixed, however, a stem with a monomoraic vowel loses its quantity: its coda, which gives it its weight, is resyllabified as an onset, stranding the monomoraic vowel. The resyllabification is shown in (15):

(15) Syllabification of Stem with Suffix



In any such configuration, where we find stem stress on a monomoraic syllable and no suffix stress on a heavy syllable, the metrical rules of the language are violated in two ways: leaving a heavy syllable unstressed, and stressing a light one.

The possessed suffix in Salcha acts like the human nominalizer in both languages. The possessed suffix in Minto, however, acts like the negative suffix acts in both languages. Going back to the table showing the minor difference, we see:

## (16) The Minor Difference, Again

|                 |                     | Salcha           | Minto            |
|-----------------|---------------------|------------------|------------------|
| monomoraic stem | səts'əyə? 'my hat'  | x<br>səts'əyə?   | x x<br>səts'əyæ? |
| bimoraic stem   | sət'lulə? 'my rope' | x<br>sət'lulə?   | x x<br>sət'lulæ? |
| disyllabic stem | sətənələ? 'my box'  | x x<br>sətənələ? | x x<br>sətənələ? |

There are three questions to be answered then. First, how do we get stem stress with the nominalizer; second, how do we get suffix stress with the negative; and third, can we account for the different behavior of the possessed suffix in Salcha and Minto by appealing to the difference between the treatment of the nominalizer and the negative?

## 4. Analysis

4.1 *Getting stem stress when the stem is light*

Stress on stems seems perfectly natural when quantity is a consideration, a foot is required at the right edge of a prosodic word, and all stems are heavy syllables. However, when a stem syllable is metrically light and is followed by a heavy suffix, some mechanism must be found to rule out suffix stress. I propose that stems are accented by a constraint which associates the head of a foot with a stem:

## (17) Associate Stem, H(ft):

Every stem must be associated with the head of a foot.

This constraint is nondirectional: it doesn't refer to edges, as an alignment constraint would do. The reason for using association rather than alignment in the Tanana case is that alignment of right edges will result in disruption of the alignment of feet and syllables; alignment of left edges will produce the wrong prominential result in disyllables.

Associate-Stem is ranked above another important constraint: Nonfinality. I formulate Nonfinality in terms of the head of a foot, within the domain of the prosodic word.

- (18) Nonfinality  
 \*H(ft)]<sub>Prosodic Word</sub>

Nonfinality is ranked above Foot Form. This means that either directionality or quantity in feet may be violated in order to avoid a word-final stress--as long as the syllable involved is not a stem. A tableau is given in (19):

- (19) Metrification of Heavy Suffix (Salcha, Minto)

|                                | Associate-Stem | Nonfinality | Foot Form: MT |
|--------------------------------|----------------|-------------|---------------|
| ( x . )<br>č'ə.[nʊ.dz]ə̃n      |                |             | *             |
| (x . )( x )<br>č'ə.[nʊ.dz]ə̃n  | *!             | *           |               |
| ( . x )( x )<br>č'ə.[nʊ.dz]ə̃n |                | *!          | *             |

The behavior of the possessed suffix in Salcha is exactly parallel to this, as seen in (20):

- (20) Metrification of Possessed Suffix (Salcha)

|                                | Associate-Stem | Nonfinality | Foot Form: MT |
|--------------------------------|----------------|-------------|---------------|
| ( x . )<br>sə.[ts'ə.ɣ]ə̃ʔ      |                |             | *             |
| (x . )( x )<br>sə.[ts'ə.ɣ]ə̃ʔ  | *!             | *           |               |
| ( . x )( x )<br>sə.[ts'ə.ɣ]ə̃ʔ |                | *!          | *             |

The light suffixes, the non-human nominalizer, the Salcha interrogative and the light Salcha negative, do not cause violations for any of these three constraints, because they can form a proper disyllabic moraic trochee with the stem. We have, therefore, taken care of the problem of unstressed heavy suffixes.

#### 4.2 Getting suffix stress

It remains to discover a difference between the stressed and unstressed suffixes which can be expressed in as general a way as possible. Looking at a table of the suffixes, divided into stressed and unstressed, makes the difference jump out and bite us:

##### (21) Stressed vs. Unstressed Suffixes

| Stressed Suffixes                                        | Unstressed Suffixes                               |
|----------------------------------------------------------|---------------------------------------------------|
| Salcha heavy negative,<br>Minto negative: - <del>æ</del> | Salcha light negative: -ə                         |
| Minto interrogative: -(h)iʔ                              | Salcha interrogative: -ə                          |
| Minto possessed: -æʔ                                     | Salcha possessed: -əʔ                             |
|                                                          | Salcha and Minto Nominalizers:<br>-ə, -i, -æ, -ən |

The difference between the stressed suffixes and those which do not carry stress is that every suffix which is stressable is associated with a lexical tone. In the case of the Minto interrogative and possessed suffixes, the tone is low; in the case of the negative, the tone is high. None of the suffixes which are unstressed, regardless of their syllable weight, is associated with a tone.

I propose that the simplest and most general way to characterize the difference between the stressed and unstressed suffixes is by means of a second association constraint which connects the head of a foot with a syllable associated to tone. This constraint is stated in (22):

##### (22) Associate T, H(ft)

This constraint requires that every tonal syllable be the head of a foot. Its place in the ranking is certainly above Nonfinality, since stressed suffixes are found finally. It must also outrank Associate-Stem, since a violation of Associate-T is worse than a violation of Associate-Stem. Since bimoraic stems retain their stress before stressed suffixes, but monomoraic stems may be stressed or not, I suggest that another constraint, Rhythm, is probably involved. Rhythm, which operates at the phrasal level to reduce clash (Tuttle 1992), may be responsible for the first variant in (23), where the light stem is unstressed; the optionality of its effect suggests that it is equally ranked with Associate-Stem, as shown in (23):

(23)

| Minto Forms                                                            | Associate-T | Rhythm | Associate-Stem | Nonfinality | Foot Form: MT |
|------------------------------------------------------------------------|-------------|--------|----------------|-------------|---------------|
| (x .) (x) $\text{s}\theta\text{.}[\text{ts}'\theta\text{.y}]\text{æ}?$ |             |        | *              | *           |               |
| (. x) (x) $\text{s}\theta\text{.}[\text{ts}'\theta\text{.y}]\text{æ}?$ |             | *      |                | *           | *             |
| (x .) $\text{s}\theta\text{.}[\text{ts}'\theta\text{.y}]\text{æ}?$     | *!          |        |                |             | *             |

### 5. Conclusion: the Nature of the Difference

This paper set out to discover the best way to describe a very small difference in the prosodic structure of two very closely related dialects. Descriptively, we have found that the simplest way to state the difference is in terms of lexical marking. Overall, the metrical systems of Salcha and Minto are very much the same. It is not surprising to find that a difference in metrical structure is most simply attributed to a difference in lexical tone, since the tonal difference is the most obvious prosodic divide between the two.

What does this rather obvious descriptive statement have to say to Optimality Theory, which makes the claim that all differences between phonologies (including, we hope, the very small ones) are due to differences in ranking of constraints?

What we have found is that the constraint rankings which produce the correct surface representations are in fact identical; what is different is the underlying representation: the possessed suffix is tonal in Minto, and not tonal in Salcha. The need to refer to tonal association in metrification exists in both.

Is it a good idea, then, to attempt to reduce the difference in association to a constraint difference? In purely synchronic terms, it may not matter how a morpheme changes a detail of its underlying representation. However, constraint-based theory opens an interesting window on lexical comparison. If we think of the difference between Salcha /- $\theta$ ?/ and Minto /- $\text{æ}$ ?/ as representing a change in Salcha's representation (from tonal to nontonal /- $\theta$ ?/) then its present extrametricality can be linked to the larger process of tone loss.

Salcha is most likely not "non-tonal" historically, but "ex-tonal", as its territory is situated in the middle of a tonal river valley. We might therefore conceive of a change in ranking between association constraints connected to particular morphemes, and a general injunction to avoid association. The status of the possessed suffixes could be expressed by the different rankings in (24):

- (24) Salcha:        Avoid Association >> Associate Possessive Low  
 Minto:           Associate Possessive Low >> Avoid Association

That "Avoid Association" is active in Minto can be shown by reference to tones on stems, which are variable by stem, suggesting a loss of tonal association by lexical diffusion. (Tuttle 1995b).

Therefore, it seems that a constraint-based analysis of this lexical difference is not so farfetched as it might seem at first glance. It brings together tendencies in both languages which would otherwise have to be stipulated, while showing as well that the metrical systems of Salcha and Minto are properly regarded as nearly identical.

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Negative Polarity Items in Temporal-clauses\*  
June Wickboldt  
Indiana University

## 1. Introduction: The Puzzle

Negative Polarity Items (NPIs) are words and phrases like *any*, *ever*, *lift a finger*, and *give a damn*. They are licensed in the scope of a negative expression, as in (1a).

- (1)a. John didn't buy *any* beer / *give a damn*.  
b. \*John bought *any* beer / *gave a damn*.

NPIs also occur in not explicitly negative environments. Some temporal clauses without explicit negatives allow NPIs. The issues this paper addresses is what licenses the NPIs in 'temporal clefts' (2-3) and temporal clauses (4-7) when no negative is explicit.

- (2) It's been two weeks since John bought *any* cigarettes.  
(3) It's been years since Mary *gave a damn* about politics.  
(4) Mary kept running long after she had *any* chance of winning.  
(5) Mary kept running long after she had *a ghost of a chance* of winning.  
(6) John called us as soon as he knew of *any* survivors.  
(7) John called us as soon as Fred *budged an inch*.

Cross-linguistic examples of NPIs in temporal clauses are in Appendix I.

The aims of this paper are

- (i) to demonstrate that sentence-level syntactic and semantic NPI licensing theories cannot account for the NPIs in (2)-(7);  
(ii) to offer an alternative analysis based on the claim that NPI licensing in temporal clauses is not due to a NEG element, or operator, in the meaning of the connective; these NPIs are licensed by the entailments, and/or the presuppositions the connective interacting with the described situations gives;  
(iii) to propose conditions for the licensing of NPIs in temporal clauses.

## 2. Syntactic and semantic theories

### 2.1 Progovac (1993, 1994)

Integrating syntax and semantics, Progovac argues for two methods of NPI licensing: (i) directly by an overtly negative expression and (ii) indirectly by a covertly negative expression (e.g. adversative predicates) and a Polarity Operator in Comp. As none of the examples under discussion have overt negatives, I will

ignore that method. Her analysis excludes the Polarity Operator from a *wh*-Comp, and Upward Entailing (UE) clauses by means of a filter, given in (8).

- (8) \*OP in an UE clause (or if *wh*-Comp) (1994:68)

The filter gives the correct results for *after*-clauses (9-10), which are UE (see 2.1.1), and *wh*-Comp-clauses, as in (11).

- (9) \*I read the newspapers after [CP OP[ [IP Mary left]] =P's (71)  
 (10) \*I read the newspapers after anyone left. =P's (74)  
 (11) \*Jane forgot where anyone left her books.

### 2.1.1. Monotonicity of Temporal Connectives

Central to Progovac's claim is the monotonicity of the clause when there is no overt negative. Let's consider now the monotonicity of temporal connectives. I have adopted the notion of "entailment on a constant perspective" (Kadmon and Landman 1993:381), (cf. "DEness restricted to specified sorts" (Krifka 1991:166; Heim 1987)), and consider the temporal perspective constant. Monotonicity defined in terms of propositions (Sanchez *et al* 1994:598), as given in (12).

- (12) Definition of Entailment  
 $p$  is more informative than  $q$ , if  $p \implies q$   
 then in downward-entailing contexts,  $q$  may be replaced by  $p$ , *salva veritate*,  
 and in upward-entailing contexts,  $p$  may be replaced by  $q$ , *salva veritate*

To see how this works, consider (13). The more informative 'he has a red pencil' entails 'he has pencil.' In a DE context, the less informative entails the more informative, as in (13b).

- (13) a. He has a red pencil.  $\implies$  He has a pencil.  
 b. He does not have a pencil.  $\implies$  He does not have a red pencil.  
 c. He does not have a red pencil  $\implies$  He does not have a pencil.

Using this diagnostic, we see *since* is UE (14): the more informative 'John ate licorice ice cream' may not replace 'John ate ice cream' and still preserve the truth of the statement (14a). The less informative may replace the more informative with the truth preserved (14b).

- (14)a. Since John ate ice cream, he has been feeling ill  $\implies$   
 Since John ate licorice ice cream, he has been feeling ill.  
 b. Since John ate licorice ice cream, he has been feeling ill.  $\implies$   
 Since John ate ice cream, he has been feeling ill

Likewise, *after* is UE (15):

- (15)a. Mary left after she had eaten a green vegetable.  $\implies$   
 Mary left after she had eaten kale.  
 b. Mary left after she had eaten kale.  $\implies$   
 Mary left after she had eaten a green vegetable.

*Before* is DE (16): the more informative 'she had eaten kale' may replace the less informative 'she had eaten a green vegetable' (16a).

- (16)a. Mary left before she had eaten a green vegetable.  $\implies$  Mary left before she had eaten kale.  
 b. Mary left before she had eaten kale.  $\implies$  Mary left before she had eaten a green vegetable.

*Long after* is UE (17):

- (17)a. Mary kept going by bus long after she had bought a car.  $\implies$  Mary kept going by bus long after she had bought a sports car.  
 b. Mary kept going by bus long after she had bought a sports car.  $\implies$  Mary kept going by bus long after she had bought a car.

*As soon as* is UE:

- (18)a. Mary left as soon as she had eaten a green vegetable.  $\implies$  Mary left as soon as she had eaten kale.  
 b. Mary left as soon as she had eaten kale.  $\implies$  Mary left as soon as she had eaten a green vegetable.

Because *since*-, *long after*-, and *as soon as*- clauses are UE, Progovac's filter does not allow a Polarity Operator in their Comps. As a result, since no direct licensing is possible, her analysis cannot account for the occurrence of NPIs in these clauses.

## 2.2. Ladusaw (1980)

Semantic theories of NPI licensing are based on monotonicity. Ladusaw's statement of licensing is "A negative polarity item is acceptable only if it is interpreted in the scope of a downward-entailing expression" (1980b:13). It was shown above this condition on sentence-level content is not adequate for the data under consideration..

## 2.3. Sanchez Valencia *et al* (1994)

The starting point for the Sanchez *et al* (1994) analysis is the observation that strong NPIs like *drink a drop*, *give a damn*, *ghost of a chance* are not licensed in all DE environments. Take, for example, (19): an adversative predicate may license a weak NPI like *any* or *ever*, but not a strong NPI.

- (19)a. Mary forgot that John drank *any* wine at the party.  
 b. \*Mary forgot that John *drank a drop* (of wine) at the party.

To account for this fact, they propose the Anti-additivity Theory. Their formulation of NPI Licensing is given in (20).

- (20) Laws of negative polarity (Sanchez *et al* 1994:592)
- Only sentences in which a monotone decreasing expression occurs can contain a negative polarity item of the weak type.
  - Only sentences in which an anti-additive expression occurs can contain a negative polarity item of the strong type

Anti-additivity is stronger than DE. The relationship can be stated as in (21).

- (21) If a connective is anti-additive, then it is DE, and if DE then its argument is non-veridical (i.e. the event did not occur).

Formally, anti-additivity is defined as (22).

- (22) Definition of Anti-additivity: if  $F$  is anti-additive, then  

$$F(x \vee y) \iff F(x) \& F(y)$$

As an example, take the expression *not*. The biconditional in (23) holds: *no* is anti-additive. Note that this is the inclusive interpretation of the disjunct.

- (23) John has no books or pencils  $\iff$   
 John has no books and John has no pencils.

Their analysis considers temporal connectives and defines *before*, *after*, *since*, and *until* in terms of additivity and multiplicativity. The latter will be ignored here as it is not relevant to the discussion. From their analysis of *before*, they conclude that this connective is anti-additive and non-veridical, regardless of tense or aspect. The claim is problematic. The argument of *before*, may be veridical as in (24a).

- (24)a. They left before any bombs had exploded.  
 $\implies$  Bombs exploded.
- They left before any bombs had exploded--fortunately, because later three explosions destroyed the station.
  - \*They left before any bombs had exploded. In fact no bombs exploded; they were defused by the police.

The acceptable continuation in (24b) verifies the entailment 'bombs exploded' as does the unacceptable contradictory continuation in (24c). The argument is also veridical when a strong NPI is used (25).

- (25) Tom had to beg Bill before he *lifted a finger*.  $\implies$  Bill did help / did something.

Contrary to Sanchez *et al*, *before* does not necessarily imply that its argument is non-veridical. Consider now (26) and (27) as natural language test of anti-additivity.

- (26)a.  $p \text{ Before } (q \vee r) \iff (p \text{ Before } q) \& (p \text{ Before } r)$   
 b. Max died before he could see his grandchildren or he could change his will.  $\iff$

Max died before he could see his grandchildren and Max died before he could change his will.

When the argument is modal (and the matrix entails it is non-veridical), anti-additivity holds. For (27), where the arguments are veridical, an inclusive interpretation is possible, but pragmatically odd. A speaker knowing when Max left and being as informative as possible would either choose one event or use *and*. A speaker not knowing exactly when Max left is giving two choices, one of which is thought to be true: an exclusive interpretation of *or*.

- (27) Max left before the lights went out or the police came.  $\Leftarrow \Rightarrow$   
 Max left before the lights went out and Max left before the police came.

Let's turn now to their analysis of *since*. They claim, based on Kamp's (1968) tense-logic definition of *since*, that this connective is additive as formulated in (28).

- (28)  $p \text{ Since } (q \vee r) \Leftarrow \Rightarrow (p \text{ Since } q) \vee (p \text{ Since } r)$

A fundamental problem with (28) is that temporal *since* may not take a disjunctive argument, whether inclusive or exclusive. Temporal *since* requires a unique event, or more precisely, a unique temporal anchor provided by the argument description. A *since*-clause with a two-event argument as in (29) is ungrammatical.

- (29) \*The children have arrived *since* Mary left or Bill went to bed.  $\Leftarrow \Rightarrow$   
 The children have arrived *since* Mary left or the children have arrived *since* Bill went to bed.

Given that neither Additivity nor Anti-additivity is applicable to *since*, their analysis does not help to explain why *since*-clauses may have NPIs. Moreover, as *since*, *long after*, and *as soon as* are UE, their analysis cannot account for the weak NPIs in these clauses.

### 3. An alternative analysis: 'discourse licensing'

The analysis proposed here is based on the claim that not only the asserted information in a sentence affects the licensing of NPIs, but that the entailments and presuppositions of the sentence affect the licensing of NPIs. Specifically, negative expressions in entailments or presuppositions may license NPIs. The negative expressions create the strong DE environment needed to license strong, as well as weak, NPIs. "Discourse" refers to all the information the sentence gives, both asserted content, the entailments, and the presuppositions needed in the context to make the sentence felicitous.

There are precedents to this approach. Zribi-Hertz (1989) argues convincingly for discourse binding conditions to account for long-distance reflexives in English. More closely related to the issue in question is the second study. Aspectual adverbs give a great amount of information in the presuppositions they induce (ter Meulen 1995). She demonstrates that they allow what she calls



### 3.2 *long after*

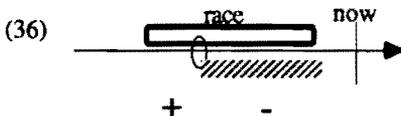
First, let's consider the different entailments of the *after*-sentence in (34) and the *long after*-sentence in (4). While (33) neither entails that Mary won or did not win, (4) entails that she did not win.

- (34) Mary kept running **after** she had a chance of winning.  
 (4) Mary kept running **long after** she had any chance of winning, \*but she won.  $\Rightarrow$  Mary did not win.

(4) asserts that 'Mary kept running' and entails besides 'Mary did not win' that 'Mary kept running after she no longer had a chance of winning.' *No longer* in this entailment triggers the presupposition that 'When she started running Mary had a chance of winning.' Given the entailment that Mary did not win and the presupposition that at the start she had a chance of winning, we infer that 'Sometime during the race, circumstances changed, and since that time, Mary had had no chance of winning.' From this we infer that 'There was some interval during which Mary had no chance of winning.'

- (35) Content -
- |                                                                          |                      |
|--------------------------------------------------------------------------|----------------------|
| a. Mary kept running.                                                    | Asserted Information |
| b. Mary kept running after she <i>no longer</i> had a chance of winning. | Entailment           |
| c. Mary did not win.                                                     | Entailment           |
- Context -
- |                                                                        |                                               |
|------------------------------------------------------------------------|-----------------------------------------------|
| d. When she started running Mary had a chance of winning.              | Presupposition from <i>no longer</i>          |
| e. Sometime during the race, circumstances changed.                    | Presupposition from <i>no longer</i> and (d). |
| f. Mary had had no chance of winning since then.                       | Presupposition                                |
| g. There was some interval during which Mary had no chance of winning. | Presupposition                                |

The oval in (36) represent the 'change of circumstances' which switches the polarity from positive to negative.



In the information from (4), the NP *chance* is in the scope of a negative in the entailment (35b) and the presupposition (35f), and so is in a DE environment.

### 3.3 *as soon as*

(37) John called us as soon as he knew of any survivors.

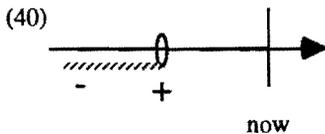
(37) asserts 'John called us' and entails 'John called us when he knew of survivors.' *As soon as* as well as *when* trigger the presupposition 'John knew of survivors.' Note that *as soon as* allows the NPIs *any* or *budge an inch* while *when* does not (38a-c).

- (38)a. \*John called us when he knew of any survivors.  
 b. John called us as soon as Fred budged an inch / Fred had a hope in hell.  
 c. \*John called us when Fred budged an inch / Fred had a hope in hell.

This indicates that *as soon as* triggers the presupposition 'There was an interval during which John did not know of survivors.'

- (39) Content -  
 a. John called us. Asserted  
 b. John called us when he knew of survivors. Entailment  
Context -  
 c. John knew of survivors (at some time). Presupposition  
 d. There was an interval during which he did not know of survivors. Presupposition from *as soon as*

The oval in (40) represents when John learned of survivors, and marks when the polarity switches from negative to positive.



The information from (37) includes a presupposition (39d) in which the NP *survivors* is in the scope of a negative, and in a DE environment.

So far, we have considered NP NPIs, let's turn now to VP NPIs. For these idiomatic NPIs, neutral phrases are required in positive environments. For licensing of VP NPIs in temporal clauses, let's consider (3).

(3) It's been years since Mary gave a damn about politics.

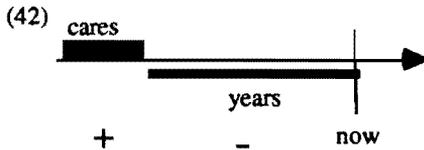
The information from (3) is given in (41).

- (41) Content -  
 a. It's been years. / Years have passed. Asserted Information  
 b. Mary hasn't cared about politics for years. Entailment

Context -

- |                                                     |                                  |
|-----------------------------------------------------|----------------------------------|
| c. Mary cared about politics. (at one time)         | Presupposition<br>from 'since S' |
| d. There is some interval that satisfies 'since S.' | Presupposition<br>from cleft     |
| e. Mary cared about politics years ago.             | Presupposition                   |
| f. Mary still doesn't care about politics.          | Presupposition                   |

(42) presents a time-line picture of this information. The polarity of 'cares' is positive until some point years ago when it switches to negative.



On this analysis, the NPI *give a damn* is licensed because the VP 'care about politics' is in the scope of negation in the entailment (40b), and the negative creates a DE environment.

#### 4. Licensing Conditions

Based on the data and analysis presented, the following licensing conditions for NPIs in temporal clauses.

- (43) For  $p$  [temporal connective]  $q$ ,

NPIs are licensed in temporal clauses iff

- (i) the NP or the VP in  $q$  is in the scope of a NEG expression in an entailment or presupposition of the context set of the sentence, and
- (ii) an entailment or a presupposition of S, can switch the polarity of the situation in the embedded clause from + to - (or - to +) for an interval relative to S.

Testing these conditions on other temporal clauses indicates that they make the correct predictions for the occurrence of NPIs. Consider (44), with a *since*- clause and its entailments and presupposition.

- (44) Since Mary wrote the book, she has been happy.

Content -

- |                                                              |                      |
|--------------------------------------------------------------|----------------------|
| a. Mary has been happy.                                      | Asserted Information |
| b. From the time Mary finished the book, she has been happy. | Entailment           |
| c. Mary is still happy / is happy now.                       | Entailment           |

- Context -  
d. Mary wrote the book.

Presupposition  
from 'since S'

The information in (44a-d) does not satisfy the conditions in (43): (i) the NP *book* is not in the scope of a negative; and (ii) the polarity of the situation described in the *since*- clause does not change, so it is predicted that an NPI in the *since*- clause is ungrammatical, as is the case (45).

- (45) \*Since Mary wrote any book, she has been happy.

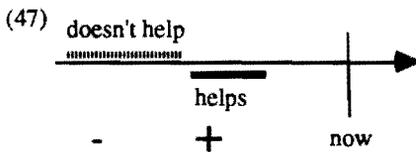
Now consider a *before*- sentence (46).

- (46) Tom had to beg Bill before he helped us.

- Content -
- |                                                      |                      |
|------------------------------------------------------|----------------------|
| a. Tom had to beg Bill.                              | Asserted Information |
| b. Tom begged Bill to help us.                       | Entailment           |
| c. Bill did not help Tom until after Tom begged him. | Entailment           |
| d. Bill helped us.                                   | Entailment           |

- Context -  
e. There was some interval during which Bill did not help us.  
Presupposition from 'until after S'

In (46c) and (46e) the VP is in the scope of a negative. The time-line picture in (47) shows how the polarity switches from negative to positive. Both of the licensing conditions are satisfied, so it is predicted that a VP NPI may occur in the *before*- clause. This is the case (48).



- (48) Tom had to beg Bill before he lifted a finger to help us.

## Conclusions

Licensing conditions stated only in terms of the asserted content of a sentence are inadequate for accounting for NPIs in temporal clauses. Along with the asserted information and its entailments, contextual information from presuppositions needs to be included. From an analysis of asserted and contextual information, licensing conditions were proposed, and these were demonstrated to make correct predictions. It remains for future research to analyze the entailments and presuppositions of other

sentences having NPIs in not explicitly negative environments to determine the general applicability of this approach.

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#### Appendix I Cross-linguistic data

Dutch: (A. ter Meulen p.c.)

- (1) Het es twee jaar geleden sinds hij *ook maar iets* geschreven heeft  
 it is two years ago since he *anything at all* written has  
 'It's been two years since he wrote anything at all'

German: (M. Krifka 1991)

- (2) Er schrieb Gedichte noch lange nachdem er *irgendwelche*  
 he wrote poems still long after he *any*

Hoffungen hatte sie zu veröffentlichen  
 hopes had them to publish

'He wrote poems long after he had any hope of getting them published.'

German: (M. Krifka 1991)

- (3) Der Esel schrie stundenlang bevor er sich *vom Fleck rührte*  
 the donkey cried hours-long before he REFL *from spot moved*  
 'The donkey screamed for hours before it budged an inch'

German: (M. Krifka 1991)

- (4) Die Mutter schrie das Kind an sobald es *einen Mucks machte*  
 the mother shouted the child at as soon as it *a peep made*  
 'The mother shouted at the child, as soon as he uttered *the slightest sound.*'

German: (P. Cramer p.c.)

- (6) Es ist zwei Jahre her seitdem er *auch nur irgendetwas* geschrieben hat  
 it is two years 'now' since he *anything at all* written has  
 'It's been two years now since he wrote *anything at all*'

Russian: (M. Yadroff p.c.)

- (7) Prošlo dva goda s tex por kak on napisal *čto-libo*  
 went two years since he wrote *anything*  
 'It's been two years since he wrote anything'

Serbian/Croatian: (L. Progovac p.c.)

- (8) Ina vec sto godina otkako je Marija *ikome* pisala  
 has already hundred years since is Mary *anyone* written  
 'It's been a hundred years since Mary wrote to anyone'

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## A Minimalist Approach to the Chinese BA-construction

Ke Zou

California State University, Dominguez Hills

The BA-construction is a widely-discussed topic in Chinese grammar and has drawn a great deal of attention in recent Chinese linguistic studies. This paper intends to discuss three canonical types of BA-constructions and to propose and argue for a morpho-syntactic analysis of the BA-constructions within the Minimalist framework.

### 1. Three Canonical Types of BA-constructions

One canonical type of BA-constructions is composed of a subject, BA, a BA-NP, and a transitive verb. The BA-NP is the logical object of the verb but appears to be the surface object of BA, as shown by (1) and (2) (note: ASP = aspect marker; CL = classifier):

- (1) wo ba juzi bo-le.  
 I BA orange peel-ASP  
 'I peeled the orange.'
- (2) ta ba na jian chenyi xi-le.  
 he BA that CL shirt wash-ASP  
 'He washed that shirt.'

A second canonical type of BA-constructions consists of a subject, BA, a BA-NP, a transitive verb and a postverbal NP. Both the BA-NP and the postverbal NP are the logical objects of the verb, in the sense that the BA-NP is what the verbal action affects and the postverbal NP is the direct target of such an action. However, at the surface structure, the BA-NP appears to be the object of BA, whereas the postverbal NP remains the object of the verb. Besides, there exists an inalienably possessive or part-whole relation between the BA-NP and the postverbal NP: that is, either the BA-NP is an inalienably possessor and the postverbal NP is a possessee or the BA-NP denotes a whole entity and the postverbal NP refers to its part, as exemplified by (3) and (4):<sup>1</sup>

- (3) a. wo bo-le juzi(-de) pi.  
 I peel-ASP orange('s) skin  
 b. wo ba juzi bo-le pi.  
 I BA orange peel-ASP skin  
 'I peeled the skin of the orange.'
- (4) a. Lisi reng-le yi jian yifu.  
 Lisi throw-ASP one CL clothes  
 b. Lisi ba yifu reng-le yi jian.  
 Lisi BA clothes throw-ASP one CL  
 'Lisi threw away one piece of clothes.'

A third canonical type of BA-constructions is also composed of a subject, BA, a BA-NP, a transitive verb and a postverbal NP. But unlike the second type, the BA-NP and the postverbal NP here are direct object and indirect object originally, the verb is a ditransitive verb, and there is no inalienably possessive or part-whole relation between the BA-NP and postverbal NP, as shown by (5) and (6):<sup>2</sup>

- (5) a. ta gei-le pengyou na ben shu.  
       he give-ASP friend that CL book  
       b. ta ba na ben shu gei-le pengyou.  
       he BA that CL book give-ASP friend  
       'He gave his friend that book.'
- (6) a. wo gaosu-le Lisi zhe jian shi.  
       wo tell-ASP Lisi this CL matter  
       b. wo ba zhe jian shi gaosu-le Lisi.  
       I BA this CL matter tell-ASP Lisi  
       'I told Lisi this matter.'

## 2. Properties and Constraints

### 2.1. Aspectual Features

It has been noted by many linguists (e.g. Hashimoto 1971; Mei 1978; Lü 1984; Lu and Ma 1985; Cheng 1986 and 1988; Li 1990; Liu 1992; Sijbesma 1992) that the well-formedness of the BA-construction is closely related to the aspect feature of its verb: that is, its verb needs to take either the perfective aspect marker *-le* or the progressive aspect marker *-zhe*. By contrast, such aspect markers are not necessary in the corresponding non-BA sentences:<sup>3</sup>

- (7) a. wo ba ta ma-le.  
       I BA him scold-ASP  
       'I scolded him.'  
       b. \*wo ba ta ma.  
       I BA him scold  
       c. wo ma(-le) ta.  
       I scold(-ASP) him
- (8) a. ni ba na feng xin dai-zhe!  
       you BA that CL letter carry-ASP  
       'You carry this letter!'  
       b. \*ni ba na feng xin dai!  
       you BA that CL letter carry  
       c. ni dai(-zhe) na feng xin!  
       you carry(-ASP) that CL letter.

## 2.2. The Situation Types of Verbs

The well-formedness of the BA-construction is also related to the situation type or situation aspect of its verb: that is, only *accomplishment verbs* and *achievement verbs*, but not *stative verbs* or *activity verbs*, can occur in the BA-construction (Smith 1991; Liu 1992):<sup>4</sup>

- (9) a. \*wo ba na ben shu you-le. (stative verb)  
 I BA that CL book own-ASP  
 b. wo you na ben shu.  
 I own that CL book  
 'I have that book.'
- (10) a. \*wo ba lu you-le. (activity verb)  
 I BA road walk-ASP  
 b. wo you-le lu.  
 I walk-ASP road  
 'I walked on the road.'
- (11) wo ba na jian yifu xi-le. (accomplishment verb)  
 I BA that CL coat wash-ASP  
 'I sold that car.'
- (12) wo ba na pan qi ying-le. (achievement verb)  
 I BA the CL chess win-ASP  
 'I won that chess game.'

## 2.3. The BA-NP

It has been mentioned in almost all major work on the BA-construction that the BA-NP must be definite or specific, and a nonspecific and indefinite noun phrase cannot serve as a BA-NP, as illustrated below:<sup>5</sup>

i) BA-NP is an overtly marked definite noun phrase:

- (13) ta ba na ge pingguo chi-le.  
 he BA that CL apple eat-ASP  
 'He ate that apple.'

ii) BA-NP is a bare noun phrase interpreted as definite:

- (14) ta ba pingguo chi-le.  
 he BA apple eat-ASP  
 'He ate the apple.'

iii) BA-NP is an overtly marked indefinite noun phrase being interpreted as specific:

- (15) ta ba yi ge jihui cuoguo-le.  
 he BA one CL opportunity miss-ASP  
 'He missed an opportunity.'

iv) BA-NP is a nonspecific indefinite noun phrase:

- (16) \*qin ni ba yi zhi bi gei wo.  
Please you BA one CL pen give me

#### 2.4. The Postverbal NP

The postverbal NP in the BA-construction may or may not have an inalienably possessive or part-whole relation with the BA-NP, as shown by (3), (4), (5) and (6) above. The very significance of this inalienable and alienable distinction to the BA-construction is that if there is an inalienably possessive or part-whole relation between the BA-NP and postverbal NP, then the postverbal NP cannot be definite:

- (17) a. ta ba Lisi bang-le yi tiao tui.  
he BA Lisi tie-ASP one CL leg  
'He tied up a leg of Lisi's.'  
b. \*ta ba Lisi bang-le na yi tiao tui.  
he BA Lisi tie-ASP that one CL leg  
(18) a. wo ba Luxun-de shu mai-le yi ben.  
I BA Luxun's book sell-ASP one CL  
'I sold one copy of Luxun's books.'  
b. \*wo ba Luxun-de shu mai-le zhe ben.  
I BA Luxun's book sell-ASP this CL

But if there is no inalienably possessive or part-whole relation between the BA-NP and postverbal NP, then the postverbal NP can be definite:

- (19) ta ba shu gei-le zhe wei pengyou.  
he BA book give-ASP this CL friend  
'He gave the book to this friend.'  
(20) ta ba qiangkou dui-zhe na ge ren.  
ta BA muzzle aim-ASP that CL man  
'he aimed at that person with his gun.'

#### 3. BA as a Base-Generated Functional Category

The question about the status of BA has bugged many linguists for a long time, and there are basically four different analyses in the literature: i) BA is a lexical verb (Hashimoto 1971); ii) BA is an inserted Case marker (Huang 1982 & 1992; Koopman 1984; Goodall 1987); iii) BA is a preposition (Travis 1984; Cheng 1986; Li 1990); iv) BA is an inserted head of the causative phrase (Sijbesma 1992). These four analyses may not be correct, as argued by Zou (1995). If the four analyses are incorrect, what is really the status of BA? The question still remains, begging for an answer.

According to Wang's (1958) study, BA was originally a lexical verb, meaning *take, hold, use*, as shown by the two examples from the ancient Chinese:

- (21) *ba jin kan*  
*take mirror look*  
 'take mirror and look (at oneself)'  
 (22) *ba juan kan*  
*take book read*  
 'take the book and read it'

Except in a few idiomatic expressions, BA cannot be used as a lexical verb in the Modern Chinese, because it has already grammaticalized into a functional category (Lü 1955), as shown by the contrast between (23) and (24):

- (23) *Zhangsan zuotian ba-le men.*  
*Zhangsan yesterday keep-ASP door*  
 'Zhangsan kept guard of the door yesterday.'  
 (24) a. \**Zhangsan zuotian ba-le shu.*  
*Zhangsan yesterday keep-ASP book*  
 b. \**Zhangsan zuotian ba-le wanju.*  
*Zhangsan yesterday keep-ASP toy*

The grammaticalization of BA into a functional category is also evidenced semantically, as BA does not have any substantial meaning in the BA-construction (Chao 1968). Moreover, there is a piece of phonetic evidence for the grammaticalization of BA into a functional category: the lexical verb BA, as in (23), must be pronounced as [ba]; while the pronunciation of the functional category BA, as in the BA-construction, can be optionally changed from [ba] to [bai] (Lü 1955).

Considering the synchronic selectional restrictions, the semantic properties and syntactic constraints of the BA-construction, and the diachronic evidence from the Ancient Chinese, we may draw the following conclusion: BA is a base-generated functional category derived from its lexical counterpart by grammaticalization.

#### 4. A Morpho-Syntactic Analysis of BA-constructions

##### 4.1. Theoretical Background

The discussion given above suggests the following two generalizations about the BA-construction:

- (25) a. BA is a base-generated functional category and has no thematic relation with the BA-NP.  
 b. The BA-NP and postverbal NP may or may not have an inalienably possessive/part-whole relation.



(Chomsky 1993). NP2 *juzi* receives a  $\theta$ -role from the verb *bo-le* and moves into the Spec of ASPP to check its Case against ASP. As for NP1 *wo*, it receives a  $\theta$ -role from V' by virtue of its internal subject status and moves to the Spec of BAP to check its Case against BA. Hence, (1) is simply derived by verb-raising and NP-movement:

(1") [<sub>BAP</sub> *wo*<sub>i</sub> [<sub>BA</sub> *ba*] [<sub>ASPP</sub> *juzi*<sub>j</sub> [<sub>ASP</sub> *bo-le*<sub>k</sub>]  
           I          BA                  orange          peel-ASP  
       [<sub>VP</sub> [<sub>NP1</sub> *t*<sub>i</sub>] [<sub>V'</sub> [<sub>V</sub> *t*<sub>k</sub>] [<sub>NP2</sub> *t*<sub>j</sub>]]]]]

The motivation and arguments for the derivation of (1) are as follows. First, raising the verb *bo-le* to ASP is morphologically driven because its aspectual feature *-le* has to be checked against the feature of ASP in the checking domain of the latter; otherwise the derivation will crash at PF because the strong aspectual feature of ASP is not a legitimate object at PF (cf. Chomsky 1993). This verb-raising is also legitimate by the Minimal Link Condition (Chomsky 1994), as it attaches the verb to the nearest head ASP that immediately C-commands VP, without skipping an already-filled head position. As for the non-overt verb-raising from ASP to BA at LF, it is forced by the Principle of Full Interpretation and meets with the Principle of Procrastinate, assuming that the agreement feature of BA is "weak" and unable to attract overt verb-raising (cf. Chomsky 1993).

Second, the movement of NP2 *juzi* to the Spec of ASPP is forced by the Case Filter and licit under the Shortest Movement Condition (Chomsky 1993). That is, when the verb *bo-le* is raised to ASP from V to yield the chain (*bo-le*<sub>k</sub>, *t*<sub>k</sub>), its minimal domain is {Spec of ASPP, Spec of VP, NP2}. Because the Spec of ASPP and the Spec of VP are in the same minimal domain, they are equidistant from NP2. Thus, NP2 could move to the Spec of ASPP by crossing the Spec of VP which is filled with NP1 or its trace.

Third, the movement of NP1 *wo* to the Spec of BAP is also forced by the Case Filter, and it is also licit by the Shortest Movement Condition, attributable to the non-overt verb-raising from ASP to BA at LF.

#### 4.3. The BA-Construction (2)

This analysis also accounts for the second canonical type of BA-constructions which consists of a subject, BA, a BA-NP, a transitive verb and a postverbal NP, and where there is an inalienably possessive or part-whole relation between the BA-NP and postverbal NP, as shown by (3) and (4). First, consider the BA-sentences where there exists an inalienably possessive relation between the BA-NP and postverbal NP. Take (3b) for example, as repeated below:





a transitive verb and a postverbal NP. But there exists no inalienably possessive or part-whole relation between its BA-NP and postverbal NP. Consider (5b) again:

- (5b) ta ba na ben shu gei-le pengyou.  
 he BA that CL book give-ASP friend  
 'He gave his friend that book.'

Given the postulation in (26b), the BA-NP *na ben shu* and the postverbal NP *pengyou* in (5b) can not be generated as components of a single noun phrase, as *pengyou* is not the inalienable possessor of *na ben shu*. This then raises a question about the structure of VP in (5b): where are the positions of these two NPs if they have no inalienably possessive or part-whole relation? Before answering this question, I want to review the transitivity alternation in Chinese. According to Cheng's (1989) observation, only accomplishment and achievement verbs, but not stative or activity verbs, allow the transitivity alternation to be intransitive verbs. Put it differently, only the logical object of accomplishment and achievement verbs can appear preverbally as subject, but this option is not available to the logical object of stative and activity verbs:

- (28) a. wo you na ben shu. (stative verb)  
 I own that CL book  
 'I have that book.'  
 b. \*na ben shu you-le.  
 that CL book own-ASP
- (29) a. wo you-le lu. (activity verb)  
 I walk-ASP road  
 'I have walked.'  
 b. \*lu you-le.  
 road walk-ASP
- (30) a. wo po-le na ge juzi. (accomplishment verb)  
 I peel-ASP that CL orange  
 'I peeled that orange.'  
 b. na ge juzi po-le.  
 that CL orange peel-ASP  
 'That orange was peeled.'
- (31) a. ta zhao-dao-le tade qianbao. (achievement verb)  
 he find-ASP his wallet  
 'He found his wallet.'  
 b. ta-de qianbao zhao-dao-le.  
 his wallet find-ASP  
 'His wallet was found.'

In fact, this transitivity alternation is also available to the accomplishment and achievement verbs that take two objects: that is, their direct object could appear in the

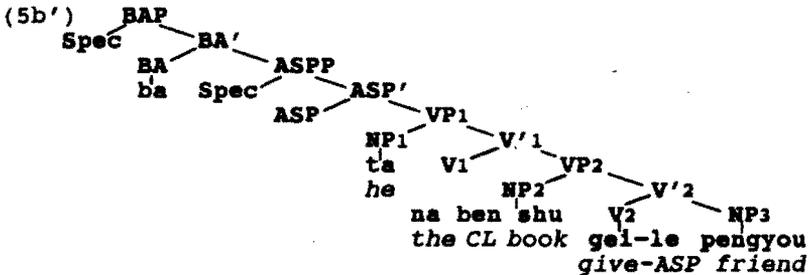
preverbal position to act as subject while their indirect object remains in the postverbal position:

- (32) a. ta gei-le tade pengyou na ben shu.  
 he give-ASP his friend that CL book  
 'He gave his friend that book.'  
 b. na ben shu gei-le tade pengyou.  
 that CL book give-ASP his friend  
 'That book was given to his friend.'

The similarity between (32b) and (5b) suggests that in (5b) the BA-NP na ben shu could be treated as a "subject" with respect to the verb (i.e. VP-internal subject), and the postverbal NP pengyou has to be treated as an object; otherwise, the sentence would be ungrammatical:

- (33) \*ta ba pengyou gei-le na ben shu.  
 he BA friend give-ASP that CL book

To capture the generalization that in (5b) the BA-NP na ben shu could be taken as a sort of *subject* or an "outer" object of the verb and the postverbal NP pengyou must be treated as an inner object, a natural approach is to take the BA-NP na ben shu as an "inner subject" of VP and take the postverbal NP pengyou as a complement of V, assuming Larson's (1988) VP-shell hypothesis. The structural representation of this, coupled with the basic structure of BA-constructions in (27), is displayed below:



With this structural analysis, the derivation of (5b) would also fall under verb-raising and NP-movement: i) V2 gei-le is raised to ASP via the "light" V1 to check its aspectual feature; ii) NP1 ta receives a  $\theta$ -role from V'1 by virtue of its "outer subject" status and moves to the Spec of BAP to check its Case; iii) NP2 na ben shu gets a  $\theta$ -role from V'2 by virtue of its "inner subject" status and moves to the Spec of ASPP to check its Case; and iv) NP3 pengyou gets both a  $\theta$ -role and inherent Case from V2 gei-le:

(5b<sup>n</sup>) [<sub>BAP</sub> ta<sub>1</sub> [<sub>BA</sub> ba] [<sub>ASPP</sub> na ben shu<sub>j</sub> [<sub>ASP</sub> gei-le<sub>k</sub>]  
 he BA that CL book give-ASP  
 [<sub>VP1</sub> [<sub>NP1</sub> t<sub>1</sub>] [<sub>V'1</sub> [<sub>V1</sub> t<sub>k</sub>']] [<sub>VP2</sub> [<sub>NP2</sub> t<sub>j</sub>] [<sub>V'2</sub>  
 [<sub>V2</sub> t<sub>k</sub>] [<sub>NP3</sub> pengyou]]]]]]]]  
 friend

The motivation and arguments for raising the verb *gei-le* to ASP, the movement of NP1 *ta* to the Spec of BAP and the movement of NP2 *na ben shu* into the Spec of ASPP are similar to those given in the above sections. That is, the verb-raising first attaches the verb to V1 which immediately c-commands VP2 and then it moves the verb to ASP which immediately c-commands VP2, thus satisfying the Minimal Link Condition. The movement of NP2 *na ben shu* is licit under the Shortest Movement Condition: i) as the raising of the verb *gei-le* from V1 to ASP forms the chain (*gei-le<sub>k</sub>*, *t<sub>k</sub>*) with the minimal domain {Spec of ASPP, Spec of VP1, VP2}, the Spec of ASPP and the Spec of VP1 become equidistant from VP2 or anything it contains; and ii) thus, NP2 *na ben shu*, as a specifier of VP2, may move into the Spec of ASPP by crossing the Spec of VP1 that is filled with NP1 or its trace. In addition, the movement of NP1 *ta* into the Spec of BAP is also legitimate by the Shortest Movement Condition, attributable to the nonovert verb-raising from ASP to BA at LF.

One crucial consequence of this analysis is that it automatically rules out the ill-formed sentence in (33) as a violation of the Shortest Movement Condition. The structural representation of (33) is the same as that of (5b') and its derivation is shown below:

(33')\* [<sub>BAP</sub> ta<sub>1</sub> [<sub>BA</sub> ba] [<sub>ASPP</sub> pengyou<sub>j</sub> [<sub>ASP</sub> gei-le<sub>k</sub>] [<sub>VP1</sub>  
 he BA friend give-ASP  
 [<sub>NP1</sub> t<sub>1</sub>] [<sub>V'1</sub> [<sub>V1</sub> t<sub>k</sub>']] [<sub>VP2</sub> [<sub>NP2</sub> na ben shu] [<sub>V'2</sub>  
 that CL book  
 [<sub>V2</sub> t<sub>k</sub>] [<sub>NP3</sub> t<sub>j</sub>]]]]]]]]

(33') is the almost same as (5b<sup>n</sup>), except that NP3 *pengyou* rather than NP2 *na ben shu* moves to the Spec of ASPP. It is this movement of NP3 that violates the Shortest Movement Condition: i) as the raising of the verb *gei-le* from V1 to ASP forms the chain (*gei-le<sub>k</sub>*, *t<sub>k</sub>*) with the minimal domain {Spec of ASPP, Spec of VP1, VP2}, the Spec of ASPP and the Spec of VP1 are equidistant from VP2 or any element it may contain; and ii) NP3 *pengyou*, being a complement of V2, cannot move into the Spec of ASPP since such movement would cross over NP2 *na ben shu* in the Spec of VP2, which is not a member of the minimal domain and is closer to the Spec of ASPP than NP3 (Chomsky 1993).

## Notes

<sup>1</sup> By the *inalienably possessive* or *part-whole* relation between the BA-NP and the postverbal NP, we mean that the two NPs are inherently related to each other before the verbal action takes place. For example, in (3b) the skin is a part of the orange no matter whether one peels it or not. This inherent relation is also reflected in syntax, as illustrated by the movement relation between (3a) and (i) below (Cheung 1973):

- (i) wo ba juzi(-de) pi bo-le.  
 I BA orange('s) skin peel-ASP  
 'I peeled the skin of the orange.'

<sup>2</sup> Take (5b) for instance, where the postverbal NP *pengyou* 'friend' was not the possessor of the BA-NP *na ben shu* 'that book' until it was given to him or her, and the two NPs cannot be moved together to the preverbal position, as shown by the contrast between (5a) and (i) below:

- (i) \*ta ba pengyou-de na ben shu gei-le.  
 he BA friend's that CL book give-ASP

<sup>3</sup> *-le* can be either a perfective aspect marker or an inchoative marker. Their differences are: the perfective aspect marker is always attached to a verb, whereas the inchoative marker always appears at the sentence-final position; and the perfective aspect marker indicates the completion of an action or presents a closed event, while the inchoative marker signifies either a change of state or a currently relevant state (Li & Thompson 1981).

<sup>4</sup> However, if a stative verb or an activity verb forms a V-V compound with a resultative or directional verb, then it can appear in the BA-construction:

- (i) Lisi ba Mali ai-shang-le.  
 Lisi BA Mary love-ascend-ASP  
 'Lisi fell in love with Mary.'  
 (ii) wo ba lu you-wan le.  
 I BA road walk-finish-ASP  
 'I walked through the road.'

This is due to the fact that compounding a stative verb or an activity verb with a resultative or directional verb changes the situation type of the former, as the V-V compound is not a stative or activity verb any more, and it presents a situation with an initial point and a final point that signifies a change of state, a completion of action or a closure of event (Smith 1991; Liu 1992).

In fact, there is also an *affectedness* condition on the object of an achievement verb in the BA-construction: that is, the logical object of an achievement verb in the BA-construction (BA-NP) must be affected by the action conveyed by the achievement verb (Cheng 1986), as shown by the following grammatical contrast:

- (i) a. \**tamen ba shanding daoda-le.*  
       they BA summit reach-ASP  
       b. *tamen daoda-le shanding.*  
       they reach-ASP summit  
       'They reached the summit.'
- (ii) a. \**wo ba na ke shu kanjian-le.*  
        I BA that CL tree see-ASP  
        b. *wo kanjian-le na ke shu.*  
        I see-ASP that CL tree  
        'I saw that tree.'

<sup>5</sup> For example, Hashimoto (1971) says that the BA-NP must be an NP with definite reference, and Lü (1984) says that the BA-NP must refer to something specific or known from the context or by implication. Besides, Sijbesma (1992) presents a good summary of the discussion on this issue, suggesting that the BA-NP tends to be definite in terms of interpretation, but it may also be indefinite in form only if it is interpreted as specific, and that this very constraint on the BA-NP might be translated into Barwise and Cooper's (1981) term: that is, only strong NPs, which include definite and specific indefinite NPs, may act as BA-NPs, but weak NPs, which are nonspecific indefinite NPs, may not.

<sup>6</sup> The evidence for treating aspect phrase as a functional category comes from the very fact that aspect markers are inflectional and bound morphemes and are required to be phonologically and morphologically attached to verbs (cf. Chao 1968; Lü 1984; Dai 1992).

<sup>7</sup> The basic structure of BA-constructions in (27) is also supported cross-linguistically in terms of the properties of functional categories: BA and aspect marker, like any other functional categories across languages (Abney 1987; Ouhalla 1991), select only non-argument complements, have categorial-selectional properties specifying what kind of syntactic categories they select, and have morphological selectional properties concerning the categorial nature of an item they can attach to.

<sup>8</sup> Inherent Case is generally associated with a particular thematic role, and there is no adjacency requirement on its realization, etc. Thus, the marked Case property of

the BA-construction shown in (3b) is due to the fact that the verb may assign this inherent Case when both the BA-NP and postverbal NP are available. In this respect, the BA-construction is parallel to the "partial double object construction" in a Bantu language (e.g. Chimwiini) and in English, concerning the assignment of inherent Case (cf. Baker 1988 and Larson 1988).

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Dr. Ke Zou  
 English Department  
 California State University, Dominguez Hills  
 Carson, CA 90747  
 E-mail: kzou@dhvx20.csudh.edu