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FEATURE CHECKING AND SPANISH *SE* *

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1. Introduction

The role of the clitic *se* in non-reflexive constructions in Spanish has been puzzling generative linguists since the seventies. In particular, *se* appears in many apparently unrelated constructions and this has suggested the existence of various types of *se*, which have often been differentiated on the basis of some features attributed to *se* itself, such as [+/-] theta-role/case absorption (Belletti (1982), Manzini (1982), among many others). The impersonal passive *se* is an instance of this approach to the problem. Belletti (1982) proposes that *se* in examples such as (1a) (the equivalent of Belletti's Italian examples) has the property of the passive morpheme, i.e., it absorbs case and is assigned the external theta-role, forcing movement of the object NP to spec of IP, which explains the subject agreement on the verb.

- (1) a. Las casas se venden
The houses-pl SE sell-pl.
'The houses are for sale'
b. Se venden las casas.
SE sell-pl the houses-pl (= (1a))
c. Se vende casas
SE se' -sing houses-pl (= (1a))

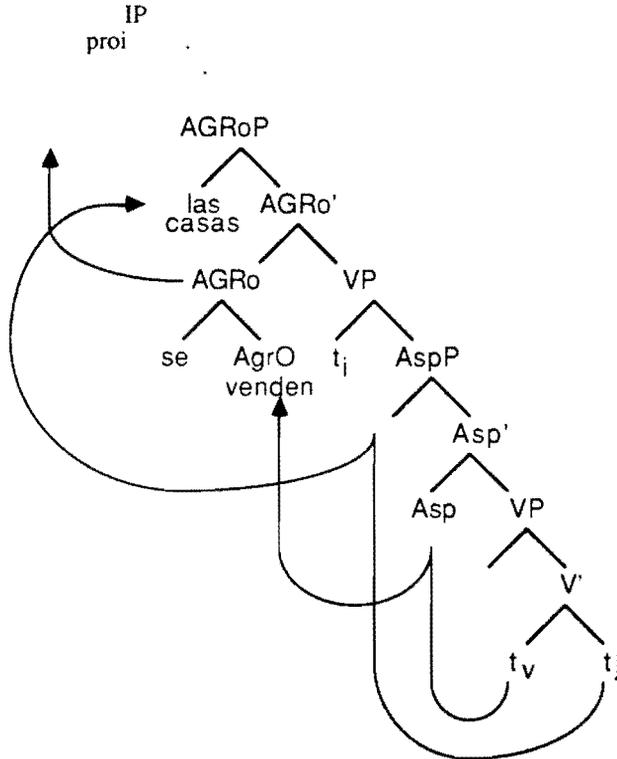
Belletti (1988) alluded to the fact that (1b), with a definite NP, is ungrammatical in Italian, which she relates to partitive case assignment. However, in Spanish, this restriction on definiteness applies only in (1c), in which there is no agreement on the verb. (1c) can therefore be explained by Belletti's 1988 analysis, but there is still a problem with (1b). In order to explain the verbal agreement in (1b), where the NP appears in a postverbal position, it has been suggested by Belletti (1982) and many others that the NP is simply an inverted subject.

There is reason to believe, however, that the NP in (1b) is not an inverted subject, nor in fact, does it remain in object position. Following the basic idea of Raposo & Uriagereka (1990), who study similar constructions in Portuguese, we claim that the NP in (1b) has moved to an intermediate functional position, which we take to be AGR-O. We propose that this movement is forced and linked to the fact that *se* is the overt manifestation of the strong [+N] feature of AGR-O. The guiding idea behind our proposal is that the strength of a feature is not an "absolute" property of a particular functional projection defined as a "parameter" for a language, but rather correlates with the presence of lexical material in the head of this category.

One implication of this proposal is that the "semantic" properties of the different *se*'s stem from the nature of the functional head in which they are generated, as illustrated in the structure given in the tree below (A)¹. In particular, we propose that the properties of the constructions involving other types of *se*, such as the one which we call the "aspectual" *se* (v. Almagro 1993) and impersonal *se* (1c), follow from the fact that *se* is a strengthener of Inner Aspect (in the sense of Travis (1991) in the former, and of D in the latter.

Finally, we will suggest that other elements such as English particles and floated quantifiers, have similar properties.

(A)



2. Impersonal passive *se*

In the impersonal passive *se* construction the verb agrees with the noun phrase (the Theme) which either precedes or follows it, as can be seen in (1a) and (1b) respectively. A particular characteristic of this construction is that the agent cannot be expressed in most dialects. However, there is evidence that the lexical NP in this construction is not the only argument, unlike what has generally been assumed to be the case (Belletti (1982), Burzio (1986)). Following Otero's (1984) suggestion for the non-agreeing construction (1c), we would argue that there is an implied [+HUMAN, +ARB] agent in these construction. Evidence for these features can be observed by comparing a BE passive with the SE passive, as in (2).

- (2) a. Las casas fueron destruidas (por el temblor).
 'The houses were destroyed (by the earthquake)...'
 b. Se destruyeron las casas.
 SE destroyed the houses
 'The houses were destroyed'

In (2a) the sentence can be interpreted as having a [-ANIMATE] agent such as an earthquake, but in (2b) the interpretation must be that the houses were destroyed by a [+HUMAN] agent. This is already evidence that the Theme is not a true subject. What we will now show in the following sections is that the Theme in (1b) has not moved in syntax to the subject position. We leave aside for the moment the question of where the NP is when it is in preverbal position.

2.1 Evidence that the NP is not in subject position

The non-"subjecthood" of the NP in (1b) is already clearly suggested by its postverbal position. Since Spanish does not allow verb raising to C (i.e. higher than AGR-S) in declarative sentences, it is unlikely that the NP is in Spec of IP. Nevertheless, this option must be ruled out on empirical grounds. We will endeavor to do just this. Our first piece of evidence comes from the distribution of bare plurals in Spanish (i.e., plurals without an article). Traditional grammarians (e.g. Gili Gaya (1976)) note that bare plurals tend to appear in object position. It seems however, that this is a more general constraint, in that bare plurals may appear only in object position and never in subject position, as can be seen in (3) for the regular transitives, (4a,b) for regular passives, (4c,d) for inverted passive subjects, and (5) for inverted subjects.

- (3) a. Las mujeres comen manzanas.
The women eat apples
'(The) women eat/are eating apples.'
- b. *Mujeres comen manzanas
'Women eat apples.'
- (4) a. Las mujeres fueron vistas en ese bar.
'The women were seen in that bar.'
- b. *Mujeres fueron vistas en ese bar
'Women were seen in that bar.'
- c. *Fueron vistas en ese bar mujeres.
'Were seen women in that bar.'
- (5) a. Comen manzanas las mujeres.
Eat apples the women
'The women eat apples.'
- b. *Comen manzanas mujeres
Eat apples women
'Women eat apples.'

Note that the bare plural in Spanish does not necessarily imply generic meaning as shown by the two possible interpretations of (3). Thus, it cannot be argued that this is a semantic constraint accounted for in terms of the position of generic subjects.

We do not have an explanation for this constraint, but we believe that it is a reliable test to show subjecthood. In this way, we can see that the postverbal NP in impersonal passive constructions patterns with objects, as in (6), whereas the preverbal NP patterns with subjects, as in (7).

- (6) Se vieron mujeres en ese bar.
SE saw women in that bar
'Women were seen in that bar.'

- (7) a. Las mujeres se vieron en ese bar
The women SE saw in that bar
'The women were seen in that bar.'
b. *Mujeres se vieron en ese bar.
Women SE see in that bar
'Women were seen in that bar.'

We do not have a complete analysis of sentences such as (7), although we believe that this NP is not in Spec of IP, but rather is in some kind of topicalized position, as suggested by Raposo and Uriagereka (1990). Note in this respect that bare plurals are also disallowed in topicalized position, as shown in (8).

- (8) a. Los libros, los puse en la mesa.
The books them put-I on the table
The books, I put them on the table.
b. *Libros, los puse en la mesa.
Books, them put-I on the table.
Books, I put them on the table.

Although bare plurals can appear in the object position of *se* constructions, it is not the case that indefinites must appear in this position, as we can see in (9). Therefore, there is no indefiniteness effect such as that found in partitive case constructions, as suggested by Belletti (1988) for unaccusatives.²

- (9) a. Cuidadosamente se pusieron (todas) las porcelanas sobre la mesa.
Carefully SE put (all) the porcelains on the table.
'The porcelain figures were carefully put on the table.'

Perhaps a stronger case for the non-subjecthood of the NP in impersonal passive constructions can be adduced from the phenomenon of sub-extraction discussed in Torrego (1985) and Demonte (1987) for Spanish (see also Huang (1982) for general discussions of other languages). As has been shown, sub-extraction out of NPs yield grammatical results only in the case of (direct) objects. Hence, the contrast between (10a) and (10b).

- (10) a. ¿De qué marca compró la compañía los camiones?
'Of what brand did the company buy the trucks?'
b. *¿De qué marca los camiones chocaron contra el árbol?
'Of what brand the trucks crashed into the tree?'

Once again, this test can be used to show that the argument in passives (11) and inversion (12) pattern with subjects in that they do not allow sub-extraction.

- (11) *¿De qué marca fueron comprados los camiones?
'Of what brand were the trucks bought?'
(12) *¿De qué marca chocaron contra el árbol los camiones?
'Of what brand crashed into the tree the trucks?'

As expected, the post-verbal agreeing *se* construction patterns with objects, as shown in (13) (compare with (10a)). Note that the NP in the non-agreeing construction behaves like a subject, e.g. (14). This is expected since indefinite NPs do not allow *de que* constructions in Spanish. Nevertheless, we include it for completeness (see the discussion in the section on other types of *se*).

- (13) ¿De qué marca se compraron los camiones?
Of what brand SE bought-pl the trucks-pl?
'Trucks of what brand were bought?'
- (14) *¿De qué marca se compró unos camiones.
Of what brand SE bought-sing some trucks-pl (=13)

We have clearly shown that the postverbal NP is not in subject position, as indicated by the fact that it follows the verb. But it is also not an inverted subject, as shown by the extraction facts. We will now turn to showing that it does not remain in object position, but has moved to AGR-O.³ However, before we do so, we must examine another set of facts relating to the marking of direct objects in Spanish.

2.2 Differential object marking in Spanish

As in many languages (see Bosson (1991)) Spanish does not mark all objects in the same way. In general, we could say that [+ANIMATE, +DEFINITE] objects are marked by the presence of what appears on the surface to be the preposition *a*. This is not the case for [-ANIMATE] objects. However, this is the same morpheme which marks datives (which is also the most common form of differential object marking). There has been much discussion on the identity and function of this *a*. In particular, Demonte (1987) has shown that, though some of the evidence is contradictory, these *a*-constructions do not behave as datives. As we can see by the contrast in (15) and (16), objects that are [+DEFINITE +ANIMATE] must be marked with *a* (e.g.16). Sentence (17) shows that the dative clitic is used with these NPs.

- (15) Juan llevó (*a) los libros a la biblioteca.
'Juan took the books to the library.'
- (16) Juan llevó *(a) los estudiantes a la biblioteca
'Juan took the students to the library'
- (17) Se les (*los) llevó a la biblioteca.
SE les-dat. (*los-acc) took to the library.
'They were taken to the library.'

However, we will show below that, in the *se* construction, the *a*-NP is indeed dative, as shown by the clitic pronoun used to substitute for it. The interesting fact for the construction under study is that these *a*-NPs do not appear in agreeing *se* constructions. Examples (18), (19) and (20) show that it is precisely with these objects that agreement on the verb is blocked and the default third person singular must be used.

- (18) Se llevaron los libros a la biblioteca.
SE took the books to the library
'The books were taken to the library.'

- (19) *Se llevaron (a) los estudiantes a la biblioteca (non-reflexive)
SE took-pl the students-pl to the library
'The books were taken to the library.'
- (20) Se llevó a los estudiantes a la biblioteca.
SE took-sing the students-pl to the library
The students were taken to the library.

The problem raised by this *a*-NP construction can be formulated, in our view, by asking why the *a*-NP is not forced to move to spec AGR-O by *se*, thus triggering agreement on the verb, which we argue is the case for non-animate NPs. In fact, what we would like to suggest is that the *a*-NP construction provides (indirect) evidence for our proposal that *se* forces movement of object NPs.

First, we will show that the *a* on the NP in the *se* construction is the manifestation of dative case. In order to do this we will use the test proposed by Demonte (1987) to differentiate between the accusative and the dative *a*-NPs. Demonte (op.cit) shows that one of the differences between datives and accusatives is that it is not possible to extract from a dative *a*-NP, but it is possible from an accusative *a*-NP. As one can see by the contrast between (21a) and (21b), it is the case in impersonal *se* passives that extraction is not allowed.

- (21) a. Se llevó a los estudiantes de la profesora Martínez de paseo.
SE took A the students of the Prof. Martínez on a trip.
The students of Prof. Martínez were taken on a trip.
- b. *¿De qué profesora se llevó a los estudiantes de paseo?
Of what teacher SE took the students on a trip?

Another test used by Demonte (1987) to differentiate the dative from the accusative is the possibility of secondary predication. As we can see in (22), *a*-NPs in *se* constructions cannot have a secondary predicate, while [-ANIMATE] NPs can, as we see in (23).

- (22) *Se vigiló a los soldados completamente borrachos.
SE guarded the soldiers completely drunk.
'The completely drunk soldiers were guarded.'
- (23) En ese país se sirven los mariscos completamente crudos.
In that country SE serve the seafoods completely raw
'In that country seafood is served completely raw.'

What this indicates is that the *a* plays a more important role in *se* constructions than just marking animacy. It appears to also satisfy the case (and agreement) requirements of the object NP. Chomsky (1993) has proposed that an NP may only move to satisfy its own requirements. This is enforced by the principle of GREED. If our analysis of *a* in *se* constructions is correct, all the features of the object NP have been satisfied by the dative *a*, and thus movement to AGR-O is prevented by GREED. This explains the absence of verbal agreement in (20) and confirms our hypothesis that *se* forces movement of the NP. As we shall see below, the *a*-NPs in *se* constructions behave differently than objects in agreeing constructions.

2.3 Evidence that the NP has moved to AGR-O

We will now present several pieces of evidence showing that the object NP in the agreeing impersonal *se* constructions has indeed moved to AGR-O. The behavior of floated quantifiers, as suggested in Sportiche (1988), is an indication of the presence of movement of an NP. With this in mind, compare examples (24), (25) and (26). Floating is not allowed from transitive objects in Spanish (see (24)). In this respect, inverted subjects pattern with transitive objects, as shown in (25) and so do the *a*-NP objects, as shown in (26).

- (24) *Mis amigas leyeron los libros todos.
My friends read the books all.
- (25) *Caminaron las mujeres todas.
Walked the women all.
- (26) *Se vigiló a los soldados todos.
SE guarded the soldiers all.
- (27) (?) Se leyeron los libros todos.
SE read the books all
'All the books were read.'

In (24) the object *los libros* has moved overtly leaving the quantifier *todos* behind. However, since AGR-O is weak in transitive clauses in Spanish, this movement violates the principle of PROCRASTINATE (see Chomsky (1993)). Example (25) further shows that floating quantifiers are not possible with postposed subjects, as is usually the case in other Romance languages. On the other hand, this movement is licit in agreeing impersonal *se* constructions, as in (27), since, as we have assumed, AGR-O in this construction is [+STRONG]. Contrast this with (26), where, as we have shown in the previous section, the principle of GREED prevents movement of the *a*-NP.

Note that if Bonneau & Zushi (1993) are correct in claiming that floated quantifiers are clitic-like elements generated in AGR positions and that they are licensed by Spec-head agreement, it must be the case that the object NP in (27) is moved to AGR-O, since this is the position occupied by the object floated quantifier in Bonneau & Zushi's hypothesis. This is further support for our view that the object of agreeing *se* impersonal passive constructions moves to AGR-O, and not to any intermediate positions.

Our second piece of evidence that the object NP has moved comes from the distribution of the negative adverb *nunca* 'never'. We will not discuss the complete distribution of this element (see, for example, Zanuttini (1994), for a comparative study of negation in Romance), rather, we will focus on the specific aspects relevant to our discussion. Consider the examples (28) and (29a,b,c).

- (28) Yo (*nunca) no/nunca leo (nunca) los libros (nunca).
I never neg read the books.
'I never read the books.'
- (29) a. *Yo no le doy a Juan nunca los libros. (Unstressed)
I not him give John never the books.
'I never give John the books.'
- b. *Yo no le doy los libros nunca a Juan. (Unstressed)
I not him give the books never to John
'I never give the books to John.'

- c. Yo no le doy nunca los libros a Juan (a Juan los libros)
I not him give never the books to John (= (b))

The two facts that are relevant about the distribution of *nunca* are, first, that it must be within the scope of *no* whenever *no* is present and, second, that whenever *no* is present *nunca* must follow the main verb. Otherwise, *nunca* may appear in a number of positions, as shown in (28) for a simple transitive sentence and in (29c) for a double object. However, an important restriction on its distribution is that *nunca* may never appear between the direct and the indirect object, whether indirect object shift has taken place as in (29a) or not, as in (29b). We take this to mean that the direct object in the double object construction has not moved to AGR-O. As is well known, adverbs like *nunca* may always appear in final position, and thus this position is not particularly revealing.

Following Zanuttini (1994), we will assume that negation involves two components, a Polarity Phrase which contains the negative marker *no*, and a neg phrase which will contain *nunca*. Furthermore, we follow Travis (1993) and Collins and Thrainsson (1993), among others, in assuming that the Neg phrase may appear outside VP (that is, above AGR-O) or inside the VP shell structure. Now compare (30a,b) with (28) and (29a,b) respectively.

- (30) a. No se leen (nunca) los libros (nunca).
No SE read the books never
'The books are never read.'
- b. No se le dan (nunca) los libros (nunca) a Juan.
No SE him give (never) the books (never) to John
'The books are never given to John.'
- c. *No se le dan a Juan nunca los libros.
No SE to him give to John never the books
'The books are never given to John.'
- d. No se vigila nunca a los soldados (nunca).
No SE guard never A the soldiers
'The soldiers are never guarded'

The contrast between (30b) and (29b) follows directly from our analysis, since in (30b) the NP in the agreeing *se* construction has moved to AGR-O, thus allowing *nunca* to appear between the direct and the indirect objects within the VP shell, which is not the case in (29b) where movement in syntax in simple double object constructions is prevented by PROCRASTINATE. On the other hand, it is always possible for *nunca* to appear in the higher Neg Phrase, as in (30a, b). This pattern is clearly reminiscent of the phenomenon of object shift in Germanic languages (Vickner (1990), Collins and Thrainsson (1993), among others)⁴. This parallelism with object shift is reinforced by the distribution of demonstrative pronouns in the agreeing impersonal *se* construction, as seen in (31a-d). As it is well known from the Germanic literature on object shift, definite pronouns appear to move to a higher position than NPs and indefinite pronouns. (29d) and (30e) have been added for completeness to show that the *a*-NP seems to behave like a regular NP in normal constructions.⁵

- (31) a. Yo no leo nunca estos.
I no read never these.
'I never read these.'

- b. *No se leen nunca estos.
No SE read never these
'These are never read.'
- c. No se leen estos nunca.
No SE read these never.
'These are never read.'
- d. ¿Las tijeras? ...No se venden (nunca) ningunas (nunca).
The scissors?... No SE sell (never) any (never)
'The scissors?...None ever sell.'
- e. No se vigila (nunca) a estos (nunca)
No SE guard never A these never.
'These are never guarded.'

The last piece of evidence that we shall discuss concerns agreement with the higher verb in causatives and restructuring constructions. What we have shown so far is that whenever there is agreement on the verb in *se* constructions the object NP must move to AGR-O overtly to check features. Causatives and restructuring provide an interesting testing ground for our hypothesis since object agreement may appear on the higher verb in them, thus showing that the embedded object has moved to the matrix AGR-O. Clitic climbing in causatives and restructuring does not trigger object agreement on the matrix verb, as is illustrated in (32) and (33). We take this to mean that the clitic has not moved through the matrix AGR-O in syntax, and thus cannot trigger object agreement (but see note 8).

- (32) Juan se las hizo/*hicieron comer a Pedro.
John-sing to him them made-sing/made-pl eat A Peter
'John made Peter eat them.'
- (33) Juan se las puede/*pueden comer.
John-sing SE them can-sing/*pl eat
'John can eat them.'

Interestingly enough, object agreement may show up on the causative and restructuring verb in impersonal *se* constructions, as illustrated in (34) and (35).

- (34) Se hicieron pintar las casas.
SE made-pl pain the houses-pl
'Somebody made the houses be painted.'
- (35) Se pueden pintar las casas.
SE can-pl paint
'The houses can be painted.'

That the object NP has raised overtly to the specifier of AGR-O of the matrix clause is suggested by the fact that whenever the restructuring process is blocked, as in (36) and (37), or there is an intervening NP, as in (38), object agreement cannot appear on the matrix verb.

- (36) a. Ellos les (*las) hicieron no divulgarlas (Mejías-Bikandi
and Moore (1994))
They-pl to them (*them) made-pl. NO divulge them
'They made them not divulge them.'
- b. *Se hicieron no divulgar las noticias.
SE to them made-pl NO divulge the news-pl.
'Somebody forced the news not to be divulged.'

- (37) c. Se hizo no divulgar las noticias.
Se made-sing NO divulge the news-pl
'Somebody forced the news not to be divulged.'
- a. Ellos (*las) pueden no divulgarlas
They (*them) can not divulge them.
'They can not divulge them.'
- b. *Se pueden no divulgar las noticias.
SE can-pl NO divulge the news-pl
'The news can be not divulged.'
- c. Se puede no divulgar las noticias.
SE can NO divulge the news.
'The news can be not divulged.'
- (38) a. *Se les hicieron (a los niños) pintar las casas (a los niños).
Se them made-pl (A the children) paint the houses-pl (A the children)
The children were made to paint the houses.
- b. Se les hizo (a los niños) pintar las casas (a los niños).
SE them made-sing (A the children) paint the houses-pl (A the children)
'The children were made to paint the houses.'

What (38a) suggests is that the presence of the embedded subject prevents raising of the embedded object even when restructuring has taken place (that is, when the embedded subject follows the verb).⁶ A distinction must therefore be made between NP movement and head movement with respect to crossing (i.e. Relativized Minimality, in the sense of Rizzi (1990)), since clitic climbing is not prevented when the subject is postverbal, as shown in (39). This seems to argue in favor of treating clitic movement as a case of head movement, as suggested by Kayne (1991) (see also Moore (1994) for more evidence).

- (39) Luis se las hizo pintar a Juan.
Luis SE them made paint A John.
Luis made John paint them.

Once again, the causative and restructuring facts discussed above clearly argue for overt object movement to AGR-O in agreeing impersonal *se* passive constructions.

3. *Se* in other functional positions

Up to this point we have shown that there is a type of *se*, namely the *se* in agreeing impersonal passive, which has the property of strengthening the AGR-O position, forcing the object NP to move to the specifier of that position to check case and agreement features. We have provided several pieces of evidence for these assumptions in the preceding sections. However, we have not discussed one of the interesting expectations raised by our theory, that is, that *se* could appear in other functional positions, accounting for different properties related to the constructions in which *se* is involved. We have already alluded to this possibility in the discussion of non-agreeing impersonal *se*. In this section we will turn to this type of *se* as well as what we have called the "aspectual" *se*, as discussed in Almagro (1993). We must warn the reader that this is a tentative and partial account of the distribution of these different types of *se*, which is part of ongoing research.

The non-agreeing impersonal *se* differs crucially from its agreeing counterpart in two ways: first, as we have seen, the verb does not agree with its object (40a).

Secondly and more interestingly, the object must be indefinite in many (but by no means all) dialects (40b) (for similar judgements see García (1975)). In these dialects, the NP cannot be substituted for by a clitic, as seen in (40c). We suggest that these facts can be made to follow if we assume that *se* is in the D⁰ position as the manifestation of partitive case (see Belletti 1988), cliticizes onto the verb, and forces movement of the NP into the specifier of DP. The indefinite NP then checks partitive case with *se*, and then must incorporate into the verb at LF in order for the case to be visible. This explains the absence of overt agreement on the verb since there is no lexical element in AGR-O forcing movement of the object. It also explains the indefiniteness effect, since D is already occupied by the partitive case *se*. We will assume without discussion, following Kayne (1994) that indefinite articles and quantifiers are "cliticized" onto the noun.

- (40) a. *Se vende casas.*
SE sell-sing houses-pl
'Houses are for sale.'
- b. *Se vende unas/* todas las/* las casas.*
SE sell-sing some/*the houses-pl.
'Some houses are for sale.'
- c. **Se las vende*
SE them sell.
'They are sold.'

The incorporation of the noun is strongly suggested by the fact that the object NP cannot be modified by adjectives (41), or moved preverbally (42), unlike the object in the agreeing impersonal *se* construction (43).

- (41) **Se vende hermosas casas.*
SE sell-sing beautiful houses-pl
'Beautiful houses are for sale.'
- (42) **Unas casas se vende.*
Some houses SE sell
'Some houses are for sale.'
- (43) *Se venden hermosas casas.*
SE sell-pl beautiful houses-pl
'Beautiful houses are for sale.'

As expected, those dialects which allow the object NP to be replaced by a clitic also lack the definiteness effect. We can speculate that in these dialects *se* occupies the K position in KP, thus illustrating once again that *se* may occupy various functional head positions.⁷ We leave this option open for future research.

The aspectual *se* construction differs from the previous two in that there is an overt subject present and the verb agrees with this subject, not with the direct object. Further, this *se* behaves as a reflexive in that it has a full paradigm of forms (*me, te, se, nos, os, se*). Whenever it is present, it causes some change in the aspectual content of the sentence by indicating completeness or delimitedness. This is exemplified in (44a, b).⁸

- (44) a. María comió una fruta.
 'Mary ate a fruit.'
 b. María se comió una fruta.
 María SE ate a fruit.
 'María ate up a fruit.'

The aspectual property of *se* in this construction is clearly exemplified by its effect on the morphological past imperfect. As is well known, the imperfect in Romance languages can be used to refer to repeated actions in the past (45a) or to an action which is seen as ongoing at a particular point in time (45b). However, if *se* is present, the imperfect can only be interpreted as a series of completed actions, as shown by the ungrammaticality of (46b).

- (45) a. María siempre salía de la clase a eso de las 7.
 'María always left the class at around 7 o'clock'
 b. María salía de su casa cuando se encontró con un amigo.
 'María was leaving her house when she met a friend.'
- (46) a. María siempre se salía de la clase cuando esta era aburrida.
 'María always got out of the class when it was boring.'
 b. *María se salía de la casa cuando se encontró con un amigo.
 'María was getting out of the house when she met a friend.'

Because of these effects, we would like to suggest that this *se* is generated in the inner aspect position, in the sense of Travis (1991), forcing movement of the object NP to the specifier of Inner Aspect. However, it is difficult to find evidence of this movement, given its very local nature. Again, we leave this for future research.

4. Conclusions

To conclude, we would like to suggest that several other types of elements have properties similar to *se* in Spanish. In particular, particles in English (v. Johnson 1991, Den Dikken 1992) appear to have the same property as what we have called the aspectual *se*. We have argued elsewhere (Bruhn-Garavito, Bonneau and Libert (1994) that the distribution of object NPs (47a,b) and pronouns (47c,d) in English in particle constructions follow straightforwardly from the simple assumption that the particle is in the head of Inner Aspect and forces movement of the object into the Inner Aspect Phrase, with possible excorporation of the verb. Pronouns in English, however, must cliticize onto AGR-O in syntax (Chomsky, 1994). This analysis also extends to particles in double object constructions where we assume that the particle occupies the inner T position (Collins and Thrainsson (1993)).

- (47) a. They ate the cookies up.
 b. They ate up the cookies.
 c. John ate them up.
 d. *John ate up them.

The K strengthener *se* found in some dialects of Spanish has a parallel, we believe, in the distribution of the 'them all' constructions in English (48), as well as in the inflected quantifiers of Hebrew (see Shlonsky (1991)).

- (48) a. John ate them all/*all them.
 b. John ate *the apples all/all the apples

In future research we expect to show that other elements such as the Irish *a*, the Chinese *BA*, as well as several elements in other languages, also act as strengthener of functional positions.

Notes

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¹ We do not make any specific claim as to the "semantic" properties of *se* other than those related to the functional head in which it is generated. However, it has been suggested that perhaps all types of *se* (including "true" reflexive *se*) may trigger raising of an NP object and that *se* has a bimorphemic internal structure (v.Pica & Snyder (1994), among others). This "unified" analysis of *se* is compatible with our analysis.

² As in Spanish, the verb in Italian postverbal NPs with *se* (*si* in Italian) does show agreement with the NP. However, we do not know whether this construction exhibits the absence of the Definiteness Effect characteristic of the agreeing impersonal *se* as happens in Spanish.

³ Uriagereka & Raposo (1990) notice the incompatibility of *se* with Control in Portuguese. They use this observation for the non-subjecthood of the pre-verbal NP in pre-verbal agreeing *se* constructions. This test extends to agreeing *se* constructions in Spanish as well, as shown in Otero (1984). Thus, this is further support for the argument developed in this section.

⁴ "Scrambling" of the indirect object in Spanish appears to be very restricted, perhaps only to *a*-NP. The fact that *nunca* cannot appear after the scrambled indirect object (cf. (29a) and (30c)) suggests that it is a VP internal process not to be associated to the phenomenon of object shift found in Germanic languages (see Vickner 1990).

⁵ Non-agreeing *se* constructions do not allow pronouns in object position since the object NP is restricted by the Definiteness Effect. However, indefinite quantifiers like *ningunas* incorporate into the verb, as in (i). This is what we expect since no object movement is involved in this construction.

(i) No se vende nunca *ningunas/ningunas tijeras
 Neg SE sell not any any scissors

⁶ Not every speaker accepts the embedded subject in pre-verbal position (e.g. (38a)), as noticed in Mejias-Bikandi & Moore (1994). However, one of the authors of this paper (Joyce Bruhn-Garavito) is from the dialect of Spanish (i.e. Colombia) which allows this freely. Hence, the ungrammaticality of (38a) cannot be attributed to the pre-verbal position of the embedded *a*-subject. This is explained in Mejias-Bikandi and Moore in terms of different categories selected by the causative verb (i.e. IP and VP for certain dialects of Spanish). We do not wish to commit ourselves to any particular theory of the structure of causatives, although any theory of causatives must incorporate the facts discussed here. However, the facts discussed in this section suggest that causatives and restructuring may not involve the same process.

⁷ The judgements related to the non-agreeing *se* constructions are not shared by all speakers (but see García (1975) for similar judgements and compare with Otero (1984)). We do not have a full account for these variations.

⁸ The existence of different types of *se* raises the question of why there can only be one (type) of *se* per clause. A related question is why *se* in agreeing *se* constructions, unlike Aspectual *se*, cannot appear in clauses with an overt Agent. The answer to the first question may be related to the semantic properties of *se*. If all types of *se* have the same basic semantics of reflexive requiring identification with its antecedent, as suggested in Pica and Snyder (1994), any extra *se* will be left undefined with respect to its identificational features. The absence of agreeing *se* in clauses with an overt Agent may, on the one hand, be related to the fact that only one overt set of agreement markers may appear on the verb in Spanish. If *se* is in AGR-O, AGR-O is strong and thus object agreement must be realized overtly, preventing the overt realization of subject agreement. One implication of our proposal is that *se* in unergative constructions (e.g. *se rie* 'he/she laughs') would involve null object movement, as the strong feature of AGR-O has to be checked by SPELL-OUT. This lends support to Chomsky's (1994) conjecture that all unergative verbs are transitive.

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Prominence at Two Levels:
Stress, Pitch, and Contrast in Welsh

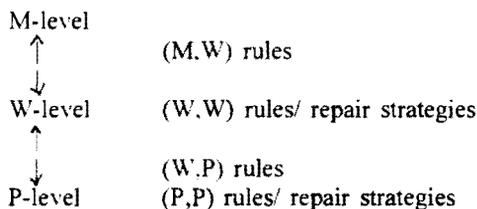
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1. Introduction.

This paper is a development of a certain Welsh problem originally introduced by A.R. Thomas (1979/1984). The data bear on the question of the correspondence between feature contrasts and stress (or more specifically prosodic prominence). The distribution of contrasts is examined from the perspective of a constraint-based theory of phonology, and I argue that a language that distinguishes prominent from non-prominent syllables may in fact demand two sets of related but not identical constraints. A second question addressed here bears on the issue of levels in phonology: might constraints differ, or be differently ranked, at different levels of the phonological component. A related question is raised in McCarthy and Prince 1993, where it is suggested that for Axininca Campa, a different ranking of constraints will be necessary to account for differences between suffixal and prefixal operations. The evidence from Welsh suggests that different levels of representation will require different well-formedness conditions.

Here I employ three levels of phonological representation, as proposed in Goldsmith 1990, 1993, to account for the data under investigation, as illustrated in (1): the M-level at which morphemes are phonologically specified uniquely; a W-level, at which syllabification and metrification apply to a fully-formed string, and a P-level, at which resyllabification and remetrification may apply, if necessary, to account for surface-level phonological alternations. A further distinction between the W- and P-levels is found in the type of phonological alternations that we can expect to find at each level--distinctive features, and the contrasts they represent, play a role at the W-level, while the P-level accounts for non-distinctive (allophonic) alternations. Phonotactic constraints may be stated at the W-level and at the P-level.

(1) Three levels of representation:



Autosegmental licensing, which was first proposed to account for differences within the syllable (Goldsmith 1989; see Ito and Mester 1993 for a related approach), is employed here to account for the distinctions apparent within the metrical foot (cf. also Bosch 1991)--in particular, prosodically prominent positions may license a larger set of contrasts than prosodically weak positions. (Bosch and Wiltshire 1992 argue for Tamil that prosodic prominence is equivalent to greater licensing ability.) Within a theory of phonology based on constraints and repairs, this licensing will serve as one type of syllable-based constraint. Example (2) illustrates licensing-based distinctions for a language that has both voiced and voiceless obstruents in stressed positions, but lacks this opposition in unstressed position¹. In (2) the laryngeal features are not licensed in the unstressed syllable, accounting for the lack of contrast.

- (2) Autosegmental licensing by prosodic constituents
(Full stressed syllable; restricted unstressed syllable):

Stressed syllable:	Unstressed syllable:
*	
σ: {articulator features}	σ: {articulator features}
{sonority features}	{sonority features}
{channel features}	{channel features}
{laryngeal features}	

Autosegmental licensing allows us to represent the intuition borne out in evidence from natural language that phonological prominence involves more than simply the phonetic correlates of intensity, duration, and pitch. Rather, if distinctions in contrast exist between stressed and unstressed syllables, those syllables receiving stress will license a greater number of contrasts than those receiving no stress.

2. Vowel reduction in North Welsh.

Autosegmental licensing within the metrical foot stipulates that increased feature contrasts must be co-extensive with prosodic prominence. It might also be argued that a certain contrast could be available (or licensed) in a particular context because the context itself provides the opportunity for the acoustic cues discriminating between various possibilities. Thus we might expect a stressed syllable to license a greater range of vocalic features than an unstressed syllable, since the additional duration concomitant with stress facilitates the perception of vocalic contrasts.

However, some dialects of N. Welsh seem to offer a counter-example to a directly phonetic explanation of the distribution of contrasts; and also contradict the representational explanation offered by autosegmental licensing: in North Welsh, a syllable with a greater range of contrasts is

unstressed, and the stressed syllable seems to permit a restricted range of contrasts by comparison. While regular stress in Welsh falls on the penult, there is evidence of vowel reduction in the stressed syllable in forms such as those in (3)².

(3) [i]³, [u] corresponding to stressed [e]
(Sweet 1882):

min	mɛni	'wish' (IMP, VN)
ti:v	tɛvi	'grow'
tin	tɛni	'pull'
prin	prɛni	'buy'
govin	govɛnoð	'ask' (IMP, 3s.Pret)
derbɪn	derbɛnjoð	'receive'
disgɪn	disgɛnoð	'descend'
stri:t	strɛdoð	'street'
golun	golɛnoð	'let go' (IMP, 3s.Pret)
gostun	gostɛnoð	'let down'
meðul	meðɛljoð	'think'
kɛxun	kɛxɛnoð	'start'
dru:s	drɛsa	'door' (SG, PL)
bur	bɛrða	'table'
ku:x	kɛxod	'b at'

In the data here, [u] and [i] appear in word-final syllables, but are reduced to [e] when the addition of a suffix results in their repositioning into the penult--although the penult receives stress in these regular forms. Not only is the contrast between these two high vowels neutralized, but it is neutralized in favor of [e], a combination of facts which leads us to consider this a type of vowel reduction.

Here I follow Thomas (1979/1984) in assuming that North Welsh employs an underlying distinction between two different high mixed vowels, a front round V and a back unround V. As he argues, the surface system of vowels in North Welsh demonstrates a regularity of patterning that argues for a slightly different underlying system, in (4):

(4) Surface: [i | u | e | o | a]
Underlying : /i | y | e | o | a /
| = high back unround
y = high front round

Thomas' analysis, which of course finds a parallel in Welsh orthography (and most likely represents the surface phonemic contrasts of 16th c Welsh) is

based on the regular alternations of [u] and some [ɪ], morphophonologically, and phonologically: some [ɪ] seem to pattern with [u], while others do not.

In sum, the North Welsh vowel system illustrated in (5) employs three distinct vowel heights (high, mid, low), represented by the features [low] and [open]: furthermore, only the high vowels have contrastive rounding or labiality--among the [+open] vowels, rounding is not distinctive, but predictable. The high vowel patterning with [u] is the focus of our interest for this paper: I follow Thomas' lead in defining this alternating vowel as an underlying front round /y/--this allows us to account for the variety of phonological and morphophonological alternations he discusses. The non-alternating high mixed vowel is represented by the back unround vowel underlyingly.

(5) Distinctive feature specification⁵:

	i	y	ɨ	u	e	o	a
low							+
coronal	+	+	-	-	+	-	
open					+	+	
labial	-	+	-	+			

In non-final syllables, then, this feature specification allows us to account for the neutralization of /y u/ in North Welsh. To arrive at the surface system of high vowels in non-final syllables, high vowels that are distinctively specified for [+labial] are pared down. The neutralization of round vowels in non-final syllables, and the distribution of high vowels in final syllables are summarized in (6).

(6) In non-final syllables:

underlying	i	ɨ	y	u
correspond to			\	/
surface	i	ɪ	ɛ	

In final syllables:

underlying	i	ɨ	y	u
correspond to		\	/	
surface	i	ɪ	u	

Examining the alternations in non-final syllables, we see that the underlying coronal contrast found in these distinctively [+labial] vowels is eliminated in favor of [-cor]; these same vowels become [+open]; and labiality in non-final syllables is not distinctive. Thus /y/ and /u/ become [+open], and unspecified for [coronal] and [labial]--that is, they are both realized as schwa.

We are faced with a situation in which the high round vowels /u/ and /y/ reduce to schwa in all but the final syllable. Surprisingly, however, this means that they also reduce in the stressed syllable--the penult. Why should a contrast be licensed in a word-final position, when the same contrast is not licensed in the environment of stress?

These facts call into question a purely functional definition of licensing which appeal to factors of production and perception to account for differences in possible contexts. It may be true that final syllables are often the locus of increased duration, phonetically, which may provide the proper context for the perception of vocalic contrasts. However, long syllabic nuclei would also provide the environment likely to permit the perception of contrasts in this view. In fact, South Welsh dialects, which also exhibit similar centralization facts, demonstrate both long and short vocalic nuclei in stressed penultimate syllables: yet these long, stressed penultimate vowels no more permit the vowel contrast than do the North Welsh non-final syllables.

The data here also call into question the validity of equating metrical structure with prosodic prominence or feature contrasts through autosegmental licensing. What then is the relation, if any, between metrical structure and feature contrasts? How do the facts of vowel reduction in Welsh relate to the distribution of prominence via metrical structure?

To respond to these questions we turn to another characteristic of spoken Welsh, which is that stress, or prominence, exhibits two distinct properties: the "rhythmic stress", or "beat" falls on the penultimate syllable, while pitch prominence is word final (D.M. Jones 1949)⁶, as schematized in (7).

(7) Schema of surface prominence in North Welsh:

$\sigma^n \acute{\sigma} \underline{\sigma} \downarrow_{\text{word}}$ where $\acute{\sigma}$ = rhythmic stress (loudness)
 $\underline{\sigma}$ = pitch prominence (higher pitch)

More commonly, of course, prominence is represented by the cooccurrence of both stress (loudness) and pitch (fundamental frequency) on the same syllable. Phonetic studies comparing the perception of the two may be interpreted as favoring pitch over stress as the proper cue for prominence in English: according to Lieberman (1965) stress and pitch cannot be easily separated, while Bolinger (1958) found for English that "tests with both natural and artificial stress have shown that the primary cue of what is usually termed stress in the utterance is pitch prominence." In sum, instrumental studies of English indicate that pitch "is the most reliable" perceptual cue for stress (Hyman 1978; see also references cited therein); Lehiste 1970 cites similar findings in other languages. This is precisely why the Welsh data provide such an interesting case-study: Welsh is fairly unusual

in placing pitch prominence and loudness on different syllables in the word. In this regard it seems to be no accident that (i) both accented positions (the stressed syllable, and the syllable with higher pitch) can be located by means of ordinary rules of metrification, and also (ii) prosodic prominence as defined by a range of feature contrasts is tied to one or the other type of accentuation. Indeed, it is precisely this correspondence between feature contrasts and pitch prominence that suggests a solution to this unusual case.

3. Phonological prominence in the final syllable.

In other words, two kinds of prominence seem to be at work in the phonology of modern Welsh: prominence of the final syllable, and prominence in the penult. The first kind corresponds to pitch prominence in terms of surface pronunciation--this also corresponds, however, to structural prominence. The second kind of prominence is the rhythmic stress falling regularly on the penult, perceived in terms of loudness, but not pitch. As a qualification, however, this rhythmic stress does not correspond to structural prominence, if structural prominence is defined as an increase in potential contrasts in one prosodic position. Instead, these syllables are reduced, resulting in the unusual correspondence of stress and vowel reduction at the phonetic level. The relations among representations at three levels are illustrated in (8).

(8) Correspondences among levels of representation:

M-level		tyn 'pull!'	tyn+III	'to pull'
	syllabification			
W-level	stress (final σ)	t [́] yn	tɛn	III
	W-level licensing			
P-level	stress (penult. σ)	t [́] ɪn	tɛn	I
	P-level licensing			

Pitch prominence, corresponding to structural prominence, is assigned to the ultima at the W-level: at this level licensing restrictions account for the vowel reduction in all unstressed syllables. At the P-level, however, stress is assigned to the penult--at this level (regardless of stress factors) the high mixed vowels /ɪ/ and /y/ are phonetically realized as the high central unround [ɪ].

At the W-level, the structural prominence of the final syllable represents a more extensive 'system' (in the Firthian sense); that is, a greater number of feature contrasts are available here. This corresponds in phonotactic terms to a more robust licensing capability--the underlyingly

contrastive vowels [u] and [i] are not neutralized in final syllables, but are neutralized elsewhere in the word, and final syllables in Welsh are never reduced. At the P-level, however, rhythmic stress is placed on the penultimate syllable, while the "stress" or rather, prominence of the word level is interpreted as pitch prominence. The penultimate syllable, though receiving rhythmic stress, is at the same time structurally weaker than the ultima in terms of licensing ability⁷.

Additional evidence pointing up the relative strength of the final syllable comes from a variety of sources. First, according to Watkins (1993), the conventions of Welsh poetry permit unstressed final syllables to serve as rhyming syllables, though stress is penultimate: the data in (9) (cited in traditional orthography) all represent full rhyming pairs (Watkins 1993:302).

- (9) Rhyme permitted in unstressed ultima
(Watkins 1993:302):
caru 'to love' ~ canu 'to sing'
ty^{nnu} 'to pull, draw' ~ magu 'to bring up, rear'
ty^{mor} 'season, term' ~ agor 'to open'

Second, in colloquial Welsh it is not impossible to find examples of the syncope of stressed (penultimate) vowels in words "which do not normally carry sentence stress," such as in (10):

- (10) Syncope of stressed penultimate syllable
(Watkins 1993:302):
to < eto 'again'
ma < dvma 'here is'
ma < yma 'here'
fyd/ed < hefyd 'also'
na < dyna 'there is'
cw/co < acw 'yonder'

The relationship of word stress to sentence stress, and the apparent syncope of stressed syllables in (10) reported by Watkins, opens up the question of fast speech effects in Welsh phonology in general. The fact that stressed syllables may delete at a sentence level, while unstressed syllables do not remains a puzzle.

Third, Watkins (1953) provides evidence from Cwm Tawe Welsh that the stressed penultimate vowel (in these examples, [a]) may also be reduced to schwa (11).

(11) Reduction of stressed penultimate vowel

(Watkins 1953):

<u>dangos</u>	[dɑŋgɔs]	'to show'
<u>darllen</u>	[dɑɫɛn]	'to read'
<u>damshel</u>	[dɑmʃɛl]	
<u>arian</u>	[ɛrjan]	'silver'
<u>dachre</u>	[dɑxre]	
<u>mardod</u>	[mɑrdɔd]	

Watkins notes particularly that "while the vowel of the penult is liable to weaken, the vowel of the last syllable remains clear" (Watkins 1953:8). Citing the results of some laboratory experiments, he concludes that the pitch of the final syllable is indeed higher than that of the penultimate (Watkins 1953:9).

External evidence from the English of Cwm Tawe Welsh speakers seems to point to this penultimate vowel reduction as a phonological, not phonetic, occurrence. In words borrowed from English into Welsh, speakers reduce the penultimate /a/ to [ɛ] in Welsh pronunciation, but not in the English pronunciation of these same words, as in (12):

(12) Reduction of stressed vowel in Welsh but not English (Watkins 1953):

Llansamlet Welsh	Llansamlet English	
bəko	bako	'tobacco'
bɛ kur	bɑ:kɛ	'banker'
ɫɛstik	lastik	'elastic'
bɛrbur	barbɛ	'barber'
ɛndi	andi	'handy'

While automatic alternations are typically carried over into the pronunciation of a second language, the fact that the English and Welsh pronunciations differ indicates that this is indeed a feature of word-level Welsh phonology, but may not be an automatic alternation. At the word-level, the ultima receives the accent, and vowels in non-final syllables may be reduced. We can account for the Cwm Tawe data by noting that the unaccented syllable fails to license the feature [low], which uniquely specifies the low vowel [a], at the W-level. Like the high round vowels then, /a/ in this dialect may be centralized to schwa due to the W-level prominence on final syllables; despite their surface stress, penultimate syllables are structurally weaker--less prominent in this sense--than final syllables.

Note also that even these relatively recent borrowings from English into Welsh demonstrate the same distribution of contrasts: final syllables have full, and non-final syllables reduced, vowels. These data call into question the claim that the distribution of vowel contrasts is today merely a relic of

the history of the Welsh language, dating from the time when accent was indeed final, and not penultimate. Instead, word-level accent on the ultima remains a synchronically useful explanatory device for the structural prominence of the final syllable, coupled with the pitch accent that reflects this metrical prominence.

4. Evidence from word games.

The suggestion that constraints may differ at different levels of representation finds a test case in evidence from a word game used in North Welsh described by Awbery 1987. In the game of Cleversticks, a syllable formed by the onset [g] and a copy of the preceding vowel is inserted after each syllable nucleus in the word (alternatively, -Vg is inserted before each syllabic nucleus: the available data do not appear to favor one analysis over another). That is, every CV gesture is transformed into a CVgV gesture, as in (13):

- (13) Cleversticks (Awbery 1987): CV_i(C) --> CV_igV_i(C)
- | | |
|----------------------------------|----------------|
| Welsh: [ˈbore ˈda:] | ˈgood morningˈ |
| Cleversticks: [ˈbogoˈrege ˈdaga] | |
| Welsh: | Cleversticks: |
| [forð] ˈroadˈ | [fogorð] |
| [nid] ˈnotˈ | [nigid] |
| [vavr] ˈbigˈ | [vagavr] |
| [troj] ˈto turnˈ | [trogoj] |
| [ˈgweli] ˈbedˈ | [ˈgwegeˈligi] |
| [ˈhofi] ˈto likeˈ | [ˈhogoˈfigi] |
| [ˈmedul] ˈto thinkˈ | [ˈmegeˈdugul] |
| [ˈduad] ˈto comeˈ | [ˈduguˈagad] |

The process responsible for this word game can be seen as a form of syllabic reduplication in which the infixed syllable template is prespecified to some extent: here the form of the consonant is [g]. Whether a word is monosyllabic or polysyllabic, every syllable nucleus is reduplicated in this way.

Awbery discusses the relations between the game-building rule and other phonological alternations that are evident in Welsh. The interaction between the Well-formedness conditions and the game-building rule suggest that the game itself must be a cross-level rule mediating between the W and the P level. The rules for Cleversticks appear to take W-level forms as input, and the created forms themselves provide the input for P-level phonotactics. To put it another way, the Cleversticks forms on the surface do not correspond to W-level phonotactic constraints, but do correspond to specifically P-level conditions.

One of the W-level phonotactics of particular interest in this analysis is the centralization of the two High round vowels. As has been noted above, final syllables may include either of the high round vowels; non-final syllables may not, these vowels both being realized as [ɛ]. As a corollary, the vowel [ɛ] never occurs in final syllables. From the data provided by Awbery, it appears that this statement of W-level phonotactics does not apply to the forms altered by the Cleversticks word game: indeed, Cleversticks forms violate these tactics quite obviously.

In particular, Cleversticks forms may include a [i] or [u] in non-final syllables, as in (14):

(14) [u] or [i] possible in non-final syllable in Cleversticks:	
Welsh:	Cleversticks:
[stri:d] 'street'	[strɪɪd], but pl. [strædoð]
[mɛðul] 'to think'	[ˈmeɛˈðugul], but [mæðəlɪʊx]
[ˈhum]* 'hollow, valley'	[kugum], but pl. [kæmmoð]
	* nasal mutation form of [kum]

That these are indeed centralizing vowels is illustrated by the related forms [strædoð] 'streets', [mæðəlɪʊx] pl. Imperative, 'think!', and [kæmmoð] 'valleys'. Nonetheless, the rules for Cleversticks operate on already-centralized forms, forms that can be said to comply with W-level tactics. The diagram in (15) illustrates the positioning of the Cleversticks rule: note that the high vowel is centralized in "streets" --and this is the form acted upon by Cleversticks.

(15) Cleversticks as (W.P) rule--takes W-level as	
input:	'street' 'streets'
M-level	strɪd strɪd+oð
W-level	strɪd stræd oð
	strɪɪd stragædogoð < Cleversticks
P-level	strɪɪd stragædogoð

Additional data demonstrate that this word game does not take fully surface level (P-level) forms as input to the game strategy. Evidence comes from automatic vowel lengthening.

North Welsh does not permit long vowels in non-final syllables; in fact, long vowels are possible only in monosyllables. In monosyllables, vowel length is predictable except before a sonorant: before a single voiced stop or fricative, a vowel is long; before a voiceless stop, [m] or [t], it must

be short. However, Cleversticks eliminates all vowel length, creating forms of two monomoraic syllables from a single bimoraic syllable (16):

(16)	No long vowels in polysyllables:	
	Welsh:	Cleversticks:
	[do:d] 'to come'	[ˈdogod]
	[glo:x] 'clock'	[ˈglogox]
	[xi:n] 'you-sg. at' (<u>chi'n</u>)	[ˈxigin]
	[nha:d]* 'father'	[ˈnhagad]
	* nasal mutation form of <u>tad</u>	
	[stri:d] 'street'	[strigid]
	[he:n] 'old'	[ˈhegen]
	(*[he:gen] or *[hege:n])	

Thus in fact the forms created by the Cleversticks game continue to conform to this particular surface constraint against long vowels in polysyllables. Furthermore, even where the long vowel is bimoraic at the underlying level, it is shortened when Cleversticks places this vowel in a disyllable. The word hen [he:n] 'old', above, provides such evidence: the Cleversticks form of this word demonstrates two monomoraic syllables, as (17) demonstrates more fully:

(17)	Cleversticks as (W.P) rule--		
	provides input to P-level tactics, eg:		
	P-level constraint against long vowel in disyllable.		
	'street'	'old'	
M-level	strɪd	he:n	
↓			
W-level	strɪd	he:n	
↓			
	strigid	he:gen	< Cleversticks
↓			
P-level	strigid	hegen	
	(Without Cleversticks: [stri:d], [he:n]).		

As (17) illustrates, whether the long vowel is specified underlyingly (as in [he:n]), or not (as in [strɪd]), it fails to surface--or is "undone"--in Cleversticks forms. The overarching generalization here is that Cleversticks game-words do conform to the P-level tactic specifying that long vowels occur in monosyllables only.

In summary, then, it appears that the rules for the Cleversticks word-game act on a W-level phonological word, but themselves create a word that conforms then to P-level phonotactics.

5. Conclusions.

At issue then is the proper interpretation of the relationship between stress, pitch, and feature contrasts in Welsh. What stress, pitch, and feature contrasts maintain in common, in the most general sense, is prominence: certain prosodic positions in the word may exhibit metrical prominence, pitch prominence, and/or structural prominence. In Welsh, the workings of surface-level metrical prominence seem relatively obvious: regular "rhythmic" stress falls on the penultimate syllable. However, the relation between this sort of prominence and the other two is more complex. Even if we were to analyze pitch prominence as a trivial reflex of penultimate stress in Welsh, we would fail to explain the puzzling facts introduced above: in Welsh, the final syllable in the phonological word is a "full" syllable, and the penultimate syllable is reduced (along with all other non-final syllables), despite the fact that it receives regular stress.

Thus Welsh appears to represent a language employing two types of prosodic prominence: a structural prominence of feature contrasts on the ultima at the W-level, corresponding also to pitch prominence; and also a metrical ("rhythmic") prominence, stress, regularly falling on the penultimate syllable. Each phonological word, or stress domain, includes both types of prominence. This paper has argued for a representation of prosodic prominence that addresses the complex relations between stress, pitch, and feature distinctions by means of licensing restrictions at two levels.

In summary, with an increasing reliance on phonotactic constraints to account for phonological alternations in current phonological theory (cf. Goldsmith 1991, McCarthy and Prince 1993, Paradis 1988, Prince and Smolensky 1993, and others), it remains in our interest to explore the kinds of regular patterns that can be captured by constraints. Autosegmental licensing addresses the differences we may expect to find between stressed and unstressed syllables--where a stressed syllable allows contrasts that an unstressed syllable does not, then a single set of ranked constraints will not suffice.

ENDNOTES

1. The architecture of features employed here draws mainly on Clements (1989, 1993), where a unified set of features for vowels and consonants is presented.
2. Similar facts of vowel reduction are apparent in South Welsh dialects also (cf. Sommerfelt 1925, Awbery 1986, and others). Nevertheless, some differences in the vowel systems (S. Welsh has no high mixed vowel [ɪ] on the surface) and in syllable structure (S. Welsh permits long vowels in penultimate syllables while N. Welsh does not) lead us to restrict our discussion to the specifics of North Welsh dialects. For this reason data used in this paper come from specifically North Welsh sources: Fynes-Clinton 1913, Morris Jones 1913, and Sweet 1882.

3. Here [i] represents a high central unround vowel, also called a "high mixed" vowel (IPA "barred i").
4. This too represents a historical stage of Welsh: the rounding of [y] disappears in the 18th c., and resulting in the phonetic neutralization of the two high mixed, or central, vowels [y] and [ɨ] (Watkins 1993).
5. In this analysis, the schwa (which does not occur underlyingly, but only at the word level) has a special status in that it is the only vowel which is unspecified for every feature except [+open].
6. Jones (1949) has suggested that the pitch peak remains as a marker of the accent peak from an earlier stage of Welsh--the accent shift, from ultima to penult, has been variously proposed as a 9th c. (Watkins 1972) or 11th c. (Jackson 1953) event. Clearly, however, the effects of word-final accent remain in modern Welsh today: as Thomas (1979/1984) states, the final syllable is "often (perceptually) the stronger of the two, and always structurally the stronger."
7. In N. Welsh, vowels may be long only in monosyllables, and these may be contrastively long only before [r l n]. Otherwise in stressed monosyllables vowels are long before fricatives, voiced stops, or word-finally; and short before [r m l p t k].

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Nominally Phrasal Copular Constructions*

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0. Introduction

In this paper, we will account for some puzzling alternations of word order found in Modern Irish copular constructions. We will claim, in particular, that these alternations are part of a complex interaction between head movement of predicates, definiteness effects, and pronominal object shift. In particular, we argue that complex phrasal nominal predicates undergo head movement in Modern Irish.

The various orderings of the modern Irish copular constructions are seen in the sentences in (1). (Throughout, the notional **subject** is indicated in **bold**, the *property* being attributed to that subject is indicated in *italics*.)

- 1) a) Is é **Jean Luc Picard** *an captaen*
 C him the captain
 "Jean Luc Picard is the captain"
- b) Is *dochtúir ainmhithe* (f) **Beverly Crusher**
 C doctor animals (agr)
 "Beverly Crusher is a doctor of animals"
- c) Is é *an dochtúir* é
 C him the doctor him
 "he is the doctor"

In sentences (b) and (c), the subject follows the predicate, while in (a) the reverse order appears.

We will start out by quickly sketching our analysis of Irish copular constructions and discussing the structure of sentences like those in (1). We will then present some evidence from extraction phenomena, anaphoric islands, and the responsive system to support our hypothesis.

1. Background

1.1 Irish Word Order

Irish is a VSO language, as is seen in (2).

- 2) *Leanann an t-ainmní an bhriathar i nGaeilge*
follow.PRES the subject the verb in Irish
 ‘The subject follows the verb in Irish’

Following McCloskey (1983) among many others, we will assume that this order is derived from an underlying SVO order. Adopting the analysis from Bobaljik and Carnie (1992) the surface order is derived by the head movement of V to the highest Inflectional head (3)

- 3) $[AgrSP \overset{AgrS}{\uparrow} [TP \overset{T}{\uparrow} [AgrOP \overset{AgrO}{\uparrow} [VP \overset{V}{\uparrow}]]]]$

We will not pursue any position here about the location of nominal elements, instead will simply assume the account of Bobaljik and Carnie (1992) where the subject is in the specifier of TP, and the object in the specifier of AgrOP (4), giving the structure in (5).

- 4) $[AgrS [T [AgrO [subj [V obj]]]]]$

- 5) $[AgrSP [AgrS +T +V +AgrO]_i [TP \mathbf{Subj}_j [t_j [AgrOP \mathbf{Obj}_k [t_j [VP t_j t_i t_k]]]]]]]$

1.2 Some background on “Be” in Irish

Irish has three different “be” constructions. A verbal “be” (6) is found with adverbial, prepositional, adjectival, and verbal predicates.

- 6) *Tá an dochtúir mór* (adverbs, PPs, adjectives, Verbs
Be the doctor big stage level nominal predicates)
 “the doctor is big”

Irish also has a non-verbal construction, using the tense/aspect complementizer *Is*. This is found with individual level nominal predicates and lexically marked APs and PPs. This comes in two basic orders, one where the subject (in bold) is preceded by the predicate (in italics) which is only found with definite predicates (seen in 7a), and one where the subject precedes the predicate (seen in 7b)

- 7) a) *Is dochtúir ainmhithe (í)* **Beverly Crusher**
 C doctor animals (agr)
 “Beverly Crusher is a doctor of animals”

- b) Is í **Beverly Crusher** an dochtúir ainmhithe
 "Beverly Crusher is the doctor of animals"

In most of the traditional literature (e.g. ó Siadhail (1989)), the *is* morpheme is treated like a verb. We assume, following Carnie (1993), Doherty (1992) and Ahlqvist (1972) that it is really a complementizer particle, which bears aspect and tense features, i.e. is not a lexical verb. *Tá*, on the other hand is a real verb. It functions as an auxiliary and is found productively with adjectival, adverbial, PP, and verbal predicates. It is never found with nominal predicates:

- 8) a) Tá sé mór "he is big"
Be.pres he big
 b) Tá Seán go maith "John is well"
be.pres John adv well
 c) Tá Seán i mBaile Átha Claith "John is in Dublin"
be.pres J in Dublin
 d) Tá Seán ag rith "John is running"
be.pres J prog run.dvn
 e) *Tá sé dochtúir "He is a doctor"
be.pres he doctor

Is is found almost exclusively with nominal predicates. It is generally not found with adjectival or prepositional predicates (9):

- 9) a) Is dochtúir mé "I am a doctor" (NPs - Productive)
C doctor I
 b) *Is cliste iad "they are clever" (*adj)
C clever them
 c) *Is í nDaoire Seán "**John is in Derry" (*PP)
C in Derry J
 d) *Is ag rith é "he is running" (*Verb)
C prog run him

The few adjectival and prepositional exceptions to this rule, as noted by Doherty (1992), are all individual level predicates (10):

- 10)a) *fiú* worthwhile *fíor* true
maith good *olc* evil
aisteach odd *iontach* wonderful
ceart right *cóir* just
leor sufficient *mór* big
beag small *fuair* cold
gruama gloomy *cosúil* similar
ionann equivalent *greannmhar* funny
mall slow
- b) Más ceart mo chuimhne "If my memory is right"
if right my memory (Doherty 1992)

- | | | | |
|----|----|----------|-----------------------|
| c) | de | “of” | meaning origin |
| | as | “out of” | meaning origin |
| | ó | “from” | meaning origin |
| | le | “with” | indicating possession |
- d) Is liomsa an t-Alfa Romeo sin “I own that Alfa Romeo”
C with.me the Alfa Romeo that (from Doherty 1992)

Doherty (1992) claims that the choice between *is* and *tá* follows from the stage/individual level distinction of Carlson (1977), *is* being found exclusively with individual level predicates. This is consistent with the interpretation of nominal clauses in Irish. In English, a sentence like (11a) is ambiguous in its readings. The Irish equivalent in (12) can only have individual level readings. To get the stage level reading, a different construction must be used: that in (13), which uses the stative aspectual preposition *ina*. The *Is* morpheme is ungrammatical in this context (14).

- 11) a. John was a doctor
 b. PAST [doctor'(John)] Individual level
 c. (∃L)[PAST(L) & doctor'(John,L) Stage level
- 12) Ba dhochtúir Seán
C.past doctor him
 “he was a doctor”
- 13) Bhí Seán ina dhochtúir (ach níl díolúine aige anois)
be.past J in.his doctor (but be.not license at.3.s now)
 “John was a doctor (but he doesn’t have a license now)”
- 14) *Ba dhochtúir é ach níl díolúine aige anois
 “He was a doctor but now he doesn’t have a license”

Unfortunately, the stage/individual level distinction does not suffice to determine when you use *is* or *tá*. There are some individual level predicates that only ever appear with *tá*. This is seen in (15)

- 15) a) Bhí sé cliste b) Bíonn madraí ag amhastrach
be.past he clever *be.habitual dogs prog bark*
 “He was clever” “Dogs bark”
- c) *Ba Chliste é
C.past clever him
 “He was clever (before he died)”

Carnie (1993) argues that the distinction follows rather from what elements are allowed to undergo head movement for feature checking in a given language. He argued there that nominal predicates are allowed to bear inflectional features in Irish, and behave like verbs in that they undergo head movement to the front of the clause, as schematized abstractly in (16).

- 16) $[_{FP} \dots \overset{\uparrow}{F} \dots F \dots [_{NP} N \dots]]$

This approach is supported by facts from small clauses (Chung and McCloskey 1987) where, unlike other non-verbal predicates, nominal predicates are not allowed (17). The ungrammaticality of (17b) follows from the fact that nominal predicates in Irish must bear inflectional features. Since small clauses don't have inflectional heads, this predicate has nothing to check its features against.

- 17) a) Agus [é i gCalafóirnia]... "And he is/was in California"
 And him in California
- b) *agus [é dlíodóir] "and he is/was a lawyer"
 and him lawyer

2. Two Kinds of Is

The analysis above leads us to a very straightforward account of the word order alternation seen in (7) above. Recall the two different word orders, seen in (18) below. The *predicate* (b) first order is found with indefinite attributed properties, the *subject* first order is found only with definite attributed properties.

- 18a) Is é **Jean Luc Picard** *an captaen*
 C agr the captain
 "Jean Luc Picard is the captain"
- b) Is *dochtúir* (í) **Beverly Crusher**
 C doctor (agr)
 "Beverly Crusher is a doctor"

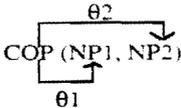
Notice that this word order alternation is very different from the canonical/reverse distinction of Moro (1993). The alternation seen here is completely dependent upon the definiteness of the predicate NP-- a feature not found in the alternations Moro discusses¹. In fact, the reverse/canonical alternation can be found only as a subtype of the clauses seen in (18a). Note in particular the positioning of the agreement morpheme, which precedes both nominals.

- 19) a) Is é Jean Luc Picard an captaen (canonical)
 b) Is é an Captaen Jean Luc Picard (reverse)

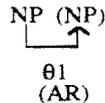
The reader will note that in contrast to the sentences in (19), the optional agreement morpheme in sentence (18b) must follow the indefinite predicate NP and precede the subject NP. In addition the reverse/canonical pairs are never allowed with sentences of the type seen in (18b). The alternation in (18) thus seems to be of a different nature than those treated by Moro, and we will not discuss the canonical/reverse distinction further. For more discussion see Carnie (forthcoming).

The predicate first order is immediately accounted for by the head raising analysis presented in section (1), i.e. the indefinite nominal predicate raises just like a verb. The subject first order is more complex, however. We follow Rapoport (1987), among many others, in assuming that definite and indefinite attributed properties have different argument structures (contra Heggie (1988) and Moro (1993)). Sentences like (18a) have an abstract two place COP predicate which take both the subject and the property being assigned to that subject as arguments (20a) which are assigned different theta roles (attribute, and attribute recipient). The indefinites, on the other hand, directly theta-mark their subject with the recipient role (20b). This corresponds to the fact that definite NPs are referring expressions and have saturated argument structures, whereas indefinite NPs are not referring expressions and can directly predicate another noun.

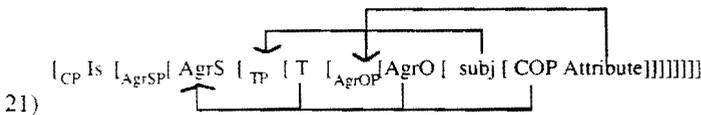
20) a)



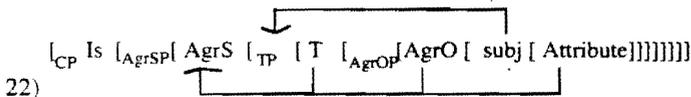
b)



With definite predicates like that in (18a) then, it is the abstract predicate COP, not the nominal predicate, that undergoes head movement. The COP morpheme is realized phonologically with the subject agreement features of the AgrS head, in the form of a pronominal element. Both nominals appear in argument positions. This is seen in (21):



This can be contrasted with indefinite predicates, where the predicate nominal itself undergoes the raising (22)².



There is, in fact, one more non-clefted order of the Irish copula construction seen in (23).

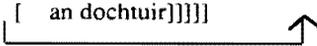
- 23) Is é an dochtúir é
 C agr the doctor him
 "he is the doctor"

Given that there is a definite predicate or attribute, we predict that the subject pronoun should follow the agreement morpheme in the "subject" position. Instead it appears after the predicate. To account for this order, we turn to the phenomenon of Weak Pronoun Post-posing discussed in Chung and McCloskey

(1987) and Duffield (1994). Weak pronominal objects shift to the right as seen in (24)

- 24) a) Scaoil an Captaen **na féasair** ag na Clingíonaí
 Fired the Captain the phasers at the Klingons
 "The Captain fired the phasers at the Klingons"
- b) ?Scaoil an Captaen **iad** ag na Clingíonaí
 "The Captain fired them at the Klingons"
- c) Scaoil an Captaen ag na Clingíonaí **iad**
 "The Captain fired them at the Klingons"

Since the pronominals in the copular clause are weak grade, they are also subject to this rightward movement (25)

[Is [[AgrS^é] [TP^é [an dochtúir]]]] 

25)

This, then, derives the three basic word orders of Irish copular clauses. A summary of clause types is given in (26).

26)

C (Particle)	AgrS (Predicate)	Spec,TP (Subject)	Spec,AgrO (Object)	R-adj	
Ní <i>Neg</i>	fhaca <i>Saw</i>	Seán <i>John</i>	an dochtúir <i>the doctor</i>		Verb
Ní <i>Neg</i>	dochtúir <i>doctor</i>	Seán <i>John</i>			Indef N
Ní <i>Neg</i>	hé <i>COP</i>	Seán <i>John</i>	an dochtúir <i>the doctor</i>		Def NP
Ní <i>Neg</i>	hé <i>COP</i>	t _i	an dochtúir <i>the doctor</i>	é _i <i>she</i>	pro subj

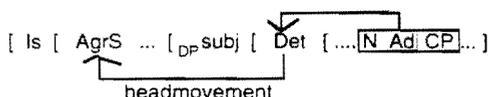
3. Evidence for the Head Movement Analysis

In section 2, we proposed that indefinite nominal predicates undergo head raising for feature checking in order to account for their initial position in the clause. Given that by definition head movement is the raising of heads, the question of how a phrasal or complex nominal predicate can participate in this process arises. Surprisingly in Irish, entire phrasal and complex NPs appear in this first position (27), a position we claim is associated with head movement.

- 27) Is [dochtúir ainmhithe] Seán
 C doctor animals.gen John
 "He is a doctor of animals"

At first, this may seem to be strong evidence against the head movement analysis suggested above. However, there is extensive evidence that in fact these complex phrasal elements are behaving like heads. We suggest that for all indefinite nominal predicates it is really the indefinite determiner (a normally phonologically null element) which functions predicationally, and that all the complements to this determiner incorporate into it. It is this determiner head, then, which undergoes the head movement (28), thus accounting for the apparent anomalous appearance of complex predicates in a position normally reserved exclusively for heads.

28)



In this section, we will present three types of evidence that show that such incorporation takes place. Evidence from *wh*-extraction, anaphoric islands, and the responsive system all suggest that indefinite NP predicates form incorporated heads, since they behave more like words than phrases.

3.1 Evidence from *wh*-extraction.

One piece of evidence in favor of the incorporated status of indefinite nominal predicates comes from *wh*-extraction. The argument is as follows. If predicates have undergone head movement forming complex heads, then the subcomponents should not be able to extract via *wh*-movement. Before proceeding to the actual test, it is worth noting that Moro (1993) and Heycock (1991) have argued that a similar blocking of extraction from copular clauses in English can be accounted for using subjacency. However, Irish does consistently allow subjacency/ECP type violations (McCloskey 1979). If the speaker leaves a resumptive pronoun at the extraction site and changes the highest complementizer from a^L to a^N , then a sentence with such a violation is rendered grammatical (see McCloskey 1979 for more details). This is seen in the following examples. In (29), we have an example of a sentence with a *wh*-island. *Wh*-movement of the subject of the embedded clause (29b) is licit, as long as the highest complementizer is a^N , and the resumptive pronoun *sé* 'him' is found at the extraction site. The ECP and subjacency are allowed to be violated under such conditions. Similar facts are found with nominal islands as is seen in (30).

29) a) *Bíonn fios agat i gconaí [CP caidé_i a^L bhuailfidh an píobaire t_i]*
be.hab know at.2.s always what_i COMP play.fut the piper t_i
 "You always know what the piper will play"

b) *Cén Píobaire_j [CP a^N mbíonn fios agat i gconaí [CP caidé_i a^L bhuailfidh sé_j t_i]]*
Which piper COMP be.hab know at.2.s always what_i COMP play.fut him
 "Which piper do you always know what he will play"

30) a) Tá máthair an fhir san otharlann
Be.pres mother the man.gen in.the hospital
 "The man's mother is in the hospital"

b) Cé a^N bhfuil a_i mháthair san otharlann
who COMP be.pres his mother in.the hospital
 "Who is (his) mother in the hospital"

Given that such extraction is licit, we can use wh-extraction as a test for the "word" or incorporated status of a nominal, in contrast to the situation found in English, discussed by Moro (1993) and Heycock (1991) where subadjacency violations are indications of islandhood. If wh-extraction is licit, then the sequence of morphemes is phrasal, if wh-extraction is illicit, then it is functioning like a single word.

This pattern is exactly what we find with nominal predicates. An incorporated indefinite NP predicate like that in (31) does not allow extraction, despite the fact that Irish normally allows extraction out of nominal islands (*arb* is the special form of *a^N* found in copular clauses).

31)a) Is [_{NP} amhrán_i [_{CP}^{aL} bhuaifidh an píobaire t_i]](é) "Yellow Submarine"
C song COMP play.fut. the piper agr
 "Yellow Submarine' is a song which the piper is going to play"

b) *Cén Píobaire_i arb [_{NP} amhrán_i [_{CP}^{aL} bhuaifeadh sé_i t_i]](é) "Yellow Sub"
Which piper rel song COMP play.cond him agr
 "**Which Piper is 'Yellow Submarine' a song which he/t_i is going to play"

These can be strikingly contrasted with the definite NP attributes, which are not predicates and do not undergo incorporation or head movement. In these sentences wh-extraction from the definite NP is licit.

32) a) Is é "Yellow Submarine" [_{NP} an t-amhrán_i [_{CP}^{aL} bhuaifidh an píobaire t_i]]
C agr the song COMP play.fut. the piper
 "Yellow Submarine' is the song which the piper is going to play"

b) Cén Píobaire_i arb é "Yellow Submarine" [_{NP} an t-amhrán_i [_{CP}^{aL} bhuaifeadh sé_i t_i]]
Which piper rel agr the song COMP play.cond him
 "Which Piper is 'Yellow Submarine' the song which he/t_i is going to play"

This conclusion is given support by the *in situ* status of wh-questions of subconstituents in Irish questions. In Irish, wh-movement is always marked by a wh-complementizer. In the formation of wh-questions of indefinite nominal predicate constituents, however, no such wh-complementizer is ever found (33), showing that questions have the wh-element *in situ*. Wh-*in situ* is found nowhere else in this language.

33)a) *Cad arb a dhochtuir (é) McCoy
What rel his doctor agr McCoy
 "**What would McCoy be a doctor of?"

- b) Cen sort dochtura (é) McCoy
What kind doctor. gen agr McCoy
 "McCoy is what kind of Doctor?"

3.2 Evidence from Anaphoric Islands

Slightly more subtle evidence comes from the binding theory. In English, binding out of a phrase (as in 34a) is licit. The word "animal" can serve as an antecedent to the pronoun. In (34b and c) however, we see that binding out of a syntactic compound is noticeably degraded³, and that binding from a lexical compound is completely ungrammatical.

- 34) a) *Binding from a phrase:*
 John is [a doctor of [animals]_i] but he is allergic to them_i
- b) *From a "syntactic" compound:*
 ?John is [an [animal]_i doctor] but he is allergic to them_i
- c) *From a lexical compound:*
 *My favorite tool is the fly_i-swatter but they_i are all extinct

We can use this as a diagnostic for "word" status. If we compare the definite and indefinite sentences we see there is a similar contrast in the binding facts. Binding out of the incorporated indefinite is less grammatical (35a) than binding out of the clearly phrasal element in (35b)

- 35)a) ?Is dochtúir ainmhithe_i Seán ach is fuath leis iad_i
 C doctor animals John but C hate with.3 them
 John is a doctor of animals but he hates them(animals)
- b) Is é Seán an dochtúir ainmhithe_i ach is fuath leis iad_i
 C agr J the doctor of animals but C hate with.3 them
 John is the doctor of animals but he hates them(animals)

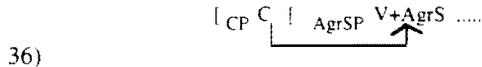
This is consistent with the notion that the indefinite head moved predicate NP is really an incorporated structure.

2.3 Evidence from the Responsive System.

Finally, there is some evidence that not only are these predicates incorporated words, but that they are not in a specifier position either. Moro (1993), Heggie(1988), and Heycock (1991) have all argued that in the English reverse copular construction the predicate NP is in a specifier position (For Moro and Heycock this is the specifier of IP, for Heggie the specifier of CP). We claim that there is substantial evidence that this is incorrect at least for Irish. This evidence comes from the responsive system.

In order to understand how this works, however, we must first discuss complementizer cliticization. McCloskey (1992) argues in some detail that

complementizers in Irish lower to adjoin to the verb in its inflectional head. This is schematized in (36). We refer you to his work for more details.



Turning now to the issue at hand, Irish has no words for yes or no. Instead the verb is repeated in either the positive or negative form as seen in (37), where the negative form is indicated by an adjoined complementizer:

- 37)a) An bhfaca tú an Ferengí? b) Ní fhaca OR c) Chonaic
 Q saw you the Ferengi Neg saw Saw
 "Did you see the Ferengi?" "no" "yes"

This can be analyzed as the elision of everything to the right of the verb in a manner familiar from VP ellipsis (38).

- 38) Elide everything except AgrS (and adjoined complementizer)

For example, you elide the shaded parts of the sentence schematized in (39).

39)

C +	AgrS	Spec,TP	Spec,AgrO	R-adj
Ní	fhaca	Seán	an ferengí	inné
Neg	Saw	John	the Ferengi	today

Given that we have claimed predicates in copular clauses are in AgrS, then when this elision occurs, then the predicate should remain. At least for the adjectival and prepositional predicates that appear in this construction this is true (40-41).

- 40) Q: An le Seán an Subaru? A: Is leis "Yes"
 Q with J the Subaru C AgrS
 "Does John own the Subaru?" C with.him
- 41) Q An ceart mo chuimhne A: Is ceart "Yes"
 Q right my memory C AgrS
 "Is my memory is right?" (from Doherty 1992)

In sentences with definite NP predicates, this is also true. Recall that in the analysis sketched above, definite NP predicates do not incorporate, rather, they are the argument of an abstract COP predicate. Thus in sentences with definite NPs we expect only the pronominal agreement realization of the abstract predicate to remain (42). This predication is true.

- 42) Q: An é Ceannasaí an Enterprise William Riker? Is é
 Q COP Commander the C AgrS
 "Is William Riker the Commander of the Enterprise?"

* We would like to thank the organizers of WECOL for running an excellent conference, and to thank the audience that attended it for their helpful comments. We would also like to thank Rachel Walker, Andrea Moro, Caroline Heycock, Jacqueline Guéron, Josef Aoun, Marie Therese Vinet, Dónall Ó Baoill, James McCloskey, Máire Ní Chiosáin, Alec Marantz, David Pesetsky and Ken Hale for their comments and advice.

¹This of course is a simplification, since there are cases where indefinite NPs cannot participate in the canonical/reverse construction discussed in Moro. We will not discuss this here, and refer the reader to Moro (1993) for discussion.

²We have not attempted to deal with the issue of case here. However, we can speculate briefly about the accusative case found on the subject nominal.

- i.) Is dochtúir é
Cop doctor him.acc
 He is a doctor.

It appears as if the subject is showing up with accusative case. We believe that, surface phonology to the contrary, these NPs are not, in fact, accusative (for an alternative view see Carnie 1993). For all NPs, except 3rd person pronouns, there is no morphological case difference between nominative and accusative case. Nominative case pronouns are simply the accusative forms preceded by an "s" (*/f/*) (ii):

- | | | | | |
|-----|------|--------|-----|--------|
| ii) | sé | "he" | é | "him" |
| | sí | "she" | í | "her" |
| | siad | "they" | iad | "them" |

Ken Hale (p.c.) has pointed out to us that the "s" forms are never found anywhere except to the immediate right of a tensed verb. For example, in co-ordinate NP subjects, a pronominal subject does not show up with "s", even though it is in a nominative case position (iii):

- iii) Chuir Lwaxana Troi agus é an ríomhaire sa réaltlong
 Put.past and him the computer in.the starship
 "He and Lwaxana Troi put the computer in the starship"

The "s" forms are only a feature of the basic "é/í/iad" set being cliticized to the right of a tense verb (iv):

- iv) Chuir sé an ríomhaire sa réaltlong
 Chuir+s+é
 Put.past he the computer in.the starship
 He put the computer in the starship

On this account, nominative case is assigned to the subjects of copular clauses, just as in normal verbal clauses. The lack of the "s" is attributable to the fact that these pronouns are not adjacent to a tensed verb, but to a noun (or abstract COP).

³Thanks to Michael Rochemont for pointing this out to us.

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Nasal Harmony in Optimal Domains Theory

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This paper proposes an analysis of nasal harmony within the framework of Optimal Domains Theory (ODT), and demonstrates that transparency and opacity derive from principled constraints that limit the realization of Nasal on potential anchors. The analysis differs fundamentally from the autosegmental analysis in two respects: it does not treat harmony as feature spreading, and it does not use feature specification or feature geometry to distinguish transparent and opaque segments from segments that undergo harmony. The ODT approach can account for the presence of inherently nasal segments that are transparent to harmony, as demonstrated in our analysis of Terena, unlike the autosegmental analysis, which incorrectly predicts that nasal segments will always trigger or be opaque. We also discuss why obstruents are typically opaque to nasal harmony, in light of the notion of contrast and the need to preserve contrast in harmony systems. The ODT analysis is based on the notion of the feature domain and the articulation of constraints which govern both the size and the composition of the feature domain, in this case for the feature [Nasal].

1 Optimal Domains Theory

The primary idea of ODT, as outlined in Cole & Kisseberth 1994, is that phonological features are parsed in *domains*. F-domains are abstract structures, explicitly encoded in phonological representation, with the same status as the structural domains of foot and syllable. F-domains may be aligned with other feature domains or with prosodic domains such as Prosodic Word, Foot or Syllable. Harmony occurs when an F-domain is subject to wide-scope alignment, extending beyond the segment that sponsors [F] in underlying representation. However, a wide F-domain is not a sufficient condition for harmony; it is also necessary that the harmony feature be realized on anchors in the F-domain.

The ODT analysis makes no critical assumptions about the underlying specification or underspecification of elements in the F-domain of the harmony feature. If a segment in an F-domain is not inherently specified for the feature F, then F may be inserted on that element (1a). If the segment is specified for F, then nothing more is required (1b). If the segment is specified for some feature G which cannot combine with F, then it is possible that G will remain unparsed in order for F to be inserted on the segment (1c), or that F will fail to be inserted on the segment (1d). The result is that both

underspecified and specified segments can undergo harmony (i.e., a single harmony system can be both feature-changing and feature-filling).

1. Parsing F-domains

- a. ...X... → (...X_F...)
- b. ...X_F... → (...X_F...)
- c. ...X_G... → (...X<<sub>G
- d. ...X_G... → (...X_G...)</sub>

There are three basic constraints of Universal Grammar that govern the alignment of F-domains. Basic Alignment (2) states that an F-domain will be co-extensive with the segment that sponsors it in underlying representation. The Wide-Scope Alignment constraints (3) derive the broad domains that give rise to harmony, and align an F-domain with a morphological or prosodic category. The Expression constraint (4) states that the feature [F] must be realized in the phonetic expression of every element in an F-domain.

2. Basic Alignment

- BA-left: Align(F-domain, L; Sponsor, L)
- BA-right: Align(F-domain, R; Sponsor, R)

3. Wide-Scope Alignment

- WSA-left: Align(F-domain,L; P-Cat/M-Cat,L)
- WSA-right: Align(F-domain,R; P-Cat/M-Cat,R)

4. Expression: The phonetic feature [F] must be expressed on every element in an F-domain.

In addition to these constraints, constraints on feature distribution play an important role in accounting for patterns of opacity and transparency in harmony systems. For instance, grounding constraints (as described in Archangeli and Pulleyblank 1994) limit feature distribution by imposing negative or positive constraints on feature combinations.¹ In the ODT analysis of harmony, opacity and transparency arise when grounding constraints dominate wide scope alignment, prohibiting certain segments from realizing the harmony feature. In general, the three types of behavior that segments may exhibit in harmony systems—participancy, transparency, and opacity—are derived through the interaction of the alignment and Expression constraints

¹Pulleyblank (1989) employs a variety of grounding constraints on feature co-occurrence to account for opacity in nasal harmony systems in an autosegmental analysis, an approach which is developed further in Gerfen (1993). The ODT analyses of Terena and Orejon follow Pulleyblank in attributing a role to the grounding constraints Nas→Voice and *[Nas, Obstruent], although there are many points of difference between the two approaches and their characterization of the phenomena. In particular, the ODT analysis considers a variety of ways in which a grounding constraint violation can be avoided, opacity being only one of them, and attempts to explain why the particular resolution that leads to opacity is favored in some nasal harmony systems.

with grounding constraints, as summarized in (5).²

5. Constraint rankings

Harmony:	WSA >> BA
	Expression >> *Insert [F]
Transparency:	grounding constraint >> Expression
	WSA >> Expression
Opacity:	grounding constraint >> WSA
	Expression >> WSA

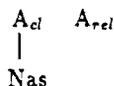
The tableau in (6) provides a schematic example of domain structure parsed for an underlying feature F, and demonstrates how harmony, transparency, and opacity arise from domain parsing. The constraints involved include the WSA, BA and Expression constraints for the feature [F], as well as the grounding constraint *[F,G] and the faithfulness constraint *Insert[F] (from the Fill family of constraints). (6a) has a narrow F-domain, and therefore no harmony; (6b) has a wide F-domain, and full harmony; (6c) has a wide F-domain, but the medial vowel is transparent; and in (6d), the medial V is opaque.

6. A schematic example of parsed F-domains

input:	$V_F...V_G...V$	*[F,G]	WSA-rt	Express	*Insert	BA-rt
a.	$(V_F)...V_G...V$		*			
b.	$(V_F...V_{FG}...V_F)$	*			**	*
c.	$(V_F...V_G...V_F)$			*	*	*
d.	$(V_F...V_G...V)$		*			*

The next two sections present explicit ODT analyses of nasal harmony in Terena and Orejon, where both transparency and opacity are encountered. These analyses reflect two assumptions we make concerning the status of nasal segments. We attribute to prenasalized stops, represented below as [nd, mb], etc., an aperture structure representation that specifies distinct closure and release nodes, in which the Nasal feature is linked only to the closure (Steriade 1993), as shown in (7). In addition, following Rice 1993, a prenasalized stop is interpreted (perhaps not exclusively) as the phonetic expression of the phonological structure [Nasal, Obstruent, Stop].

7. Aperture structure of prenasal stops



²The ODT analysis of opacity in terms of the alignment of feature domains also extends to systems in which opacity arises from prosodic constraints on targets and does not involve grounding constraints at all. See Cole and Kisseberth 1994b.

2 Terena Nasal Harmony

Nasal harmony in Terena (Bendor-Samuel 1960) marks 1st person forms (nouns and verbs), through the nasalization of the stem, starting at the left edge and extending up until the first stop or fricative.³ The stop or fricative at the boundary of nasal and oral domains is realized as prenasalized. The set of consonants found in non-nasal words is shown in (8), and represents the underlying inventory. Examples of nasal harmony are shown in (9); notice in particular the last three forms, in which nasal harmony passes through an underlying nasal stop.

8. Terena consonant inventory

p	t	k	
	s	š	h hy
	l	r	?
m	n		
	y	w	

9. Terena examples

<i>3sg. subject</i>	<i>1sg. subject</i>	
piho	mbiho	'went'
otopiko	ōndopiko	'chopped'
simoa	nzimoa	'came'
iwatako	īwāndako	'sat'
arunoe	ārūnōē	'girl'
yono	ŷōnō	'walked'
omo	ōmō	'carried'

The interesting features of the Terena system are the transparent nasal stops and the opaque obstruents that undergo a partial nasalization, deriving prenasalized stops. In the ODT analysis of Terena, harmony results from two alignment constraints. WSA-left (10a) requires a domain for the feature Nasal at the left edge of every stem that bears the morphological feature *1sg.* This constraint, highly-ranked, is sufficient to introduce the Nasal feature on *1sg.* words. The ODT analysis does not require the presence of a floating morphemic Nasal feature. The second alignment constraint is WSA-right (10b), which requires the right edge of a nasal domain at the right edge of every *1sg.* word. WSA-left is undominated, since every *1sg.* word has a nasal domain at its left edge, but WSA-right must be dominated, since the presence of an opaque segment stops the full rightward extension of the nasal domain.

³Autosegmental analyses of Terena appear in van der Hulst and Smith 1982, and Trigo 1988. See also Steriade 1993.

10. Nasal domain alignment

- a. Wide Scope Alignment-left: Align(1sg, L; N-domain, L)
- b. Wide Scope Alignment-right: Align(1sg, R; N-domain, R)

All sonorants, including vowels, nasal stops, glides and /r/, occur with nasalization in a Nasal domain. This is accomplished by the Express [Nasal] constraint. The transparency of nasal stops in this system requires no special stipulation. Expression requires the Nasal feature to be realized on every element in a Nasal domain, and it is satisfied by the underlying Nasal feature of a nasal stop. It is evident that ODT avoids the false prediction of the autosegmental analysis, that an underlying Nasal feature will block nasal harmony. The following tableau illustrates evaluation of underlying /omo/ 'carried, 1sg.'. The optimal candidate (11e) satisfies both of the WSA constraints and Expression, with two violations of *Insert[Nasal] incurred by the nasalization of each of the vowels in the harmony domain.⁴

11. Evaluation: transparent nasal stop in Terena⁵

input: omo (1sg)	WSA-lf	Express	WSA-rt	*Insert[N]
a. omo	*!		*	
b. (omo)		*!(o,o)		*
c. (̄̄mo)			*! mo	*
d. (̄̄m̄o)			*! o	*
→e. (̄̄m̄ō)				**

The blocking behavior of obstruents, as in an example like *ōndopiko* (cf. (12)), derives from the combined effects of the Express [Nasal] constraint and the faithfulness constraint Parse [Obstruent]. Expression requires Nasal to be realized uniformly throughout a Nasal domain. An obstruent in a Nasal domain can realize the feature Nasal in two ways: by combining [Nasal, Obstruent] and surfacing as a prenasalized stop (12b), or by losing the Obstruent feature and surfacing as a full nasal stop (12c). But neither of these results is optimal in Terena. The prenasalized stop does not fully satisfy Expression, since nasality is not uniformly realized throughout the duration of the stop. The full nasal stop satisfies Expression, but at the expense of a Parse [Obstruent] violation, since Nasal and Obstruent cannot both be linked to a single aperture position. If both Express [Nasal] and Parse [Obstruent] are

⁴In the interest of space, WSA-lf and *Insert[N] will not be included in the remaining tableaux. WSA-lf is undominated, and therefore always satisfied by the optimal form. *Insert[N] is not crucial in identifying the optimal candidate in the evaluation of harmony forms considered here, since it is dominated by WSA-rt. *Insert[N] plays a crucial role in the grammar only in the very general sense of prohibiting the free insertion of Nasal in words that do not undergo the 1sg. nasal harmony.

⁵Vertical lines separating constraints indicate constraint ranking. Constraints that are not separated are not critically ranked with respect to each other.

ranked above WSA-right, then an obstruent will block harmony. Evaluation of candidates for underlying /otopiko/ with 1sg. inflection is shown below.⁶

12. Evaluation: medial opacity in Terena

input: oto...(1sg)	Express	Parse[Obst]	WSA-rt	*[N,Obst]
a. (õtõ...)	*!(t)			
b. (õndõ...)	*!(d)			*
c. (õnõ...)		*!		
→d. (õn)do...			*(d _r o) ⁷	*
e. (õ)to...			*!(t _{c,r} o)	

Although the candidates in (12a-c) all parse the maximal Nasal domain, satisfying both WSA-left and WSA-right, none of them is optimal, due to the dilemma posed by the presence of an underlying obstruent in the middle of the domain. The form in (12d) is the winner, indicating that both Express [Nasal] and Parse [Obstruent] are ranked above WSA-right. (12d) is also superior to (12e) in its right alignment, if alignment is calculated in terms of aperture positions, and not in terms of entire segments, and if WSA-right dominates *[Nasal, Obstruent].

The next tableau illustrates the evaluation of underlying /piho/ 'went, 1sg.', and is completely parallel to the tableau above, except that this time the opaque obstruent is the first element in the domain. This example shows that WSA-left is undominated in the grammar of Terena, since the Nasal domain does not skip an initial obstruent, even if doing so yields a much larger, and better right-aligned Nasal domain, as in the form in (13a).

13. Evaluation: initial opacity in Terena

input: piho(1sg.)	WSA -lf	Expr	Parse [Obstr]	WSA -rt	*[N, Obstr]
a. p(ihõ)	*!p				
b. (mbihõ)		*!(b _r)			*
c. (pihõ)		*!(p _{c,r})			
d. (mihõ)			*!		
→e. (m)biho				*(b _r iho)	*
f. ()piho				*!(p _{c,r} iho)	

To summarize, the constraint hierarchy necessary to derive the patterns of transparency and opacity found in Terena includes the following rankings:

⁶We do not explicitly consider candidates in which underlying /t/ is realized as [nt] or [ŋ], which can be excluded by undominated constraints governing the distribution of Voice on nasal segments.

⁷Subscripts denote the aperture positions of closure (c) and release (r).

14. Constraint ranking for Terena

deriving opaque obstruents:	Express[N], Parse[Obst] >> WSA-rt
deriving prenasalized stops:	WSA-rt >> *[N,Obst]
deriving participating sonorants:	Align-rt, Express[N] >> *Insert[N]

3 Orejon Nasal Harmony

Orejon is a Tucano language described in Velie 1975, with additional material available in the dictionary of Velie and Velie 1981. Nasal harmony is manifest in Orejon in the distribution of oral and nasal vowels. While Nasal is freely contrastive on consonants in underlying forms, it is contrastive for vowels only in the stem-initial syllable, where it triggers a rightward harmony, extending across spans of vowels, and the weak glides /h, j/.⁸ Examples of nasal harmony are shown in (15), where it is seen that harmony is blocked by voiced and voiceless consonants. Note that the nasalized vowel can be preceded by an initial voiceless consonant, as in (15b).

15. Orejon nasal harmony

- a. $\bar{a}ico$ 'espíritu malo'
 $\bar{a}gada$ 'músculo'
 $\bar{a}ise$ 'lo que fue comido'
 $\bar{u}ido$ 'lugar donde se echa algo o se cava'
 $\bar{a}bi$ 'corazón'
 $\bar{e}oyi$ 'amarrar, agarrar con los dedos'
 $\bar{a}jitu$ 'bastón'
 $\bar{a}hija$ 'risa'
- b. $p\bar{i}b\bar{i}$ 'hanchaco'
 $p\bar{i}catu$ 'palo seco, podrido'
 $c\bar{a}de$ (c $\bar{a}de$ mano oiyi) 'preferir'
 $s\bar{e}j\bar{e}$ 'especie de pájaro'
 $s\bar{o}j\bar{o}bi$ 'pupo, ombligo'
 $s\bar{i}j\bar{e}$ (s $\bar{i}j\bar{e}$ c \bar{a} ñi j \bar{a}) 'naranja podrido'

In stem-internal position, nasal vowels occur in only two environments: in a nasal harmony domain that is triggered by a nasal vowel in the initial syllable, and immediately following a nasal stop.⁹ Only the contrastive vowel

⁸The systematic transparency of laryngeal segments in nasal harmony systems is discussed in Piggott 1992. Since velar and laryngeal glides involve minimal oral constriction, we speculate that they may actually undergo nasalization in Orejon. Unfortunately, no details about the phonetic properties of these sounds is given in the available references on Orejon.

⁹The nasalization of vowels following nasal stops is described in Velie 1975, but is not marked in the transcription of Velie and Velie 1981.

nasalization, on the first stem syllable, triggers harmony. The nasalization originating on a nasal stop extends only as far as the following vowel; it does not systematically extend through a following /j/, as shown by the examples in (16). In contrast, nasalization triggered by a vowel *obligatorily* extends rightward through /j/ or /h/, as in *sējē* 'especie de pájaro', *tājōse* 'enterrado', and the last two forms in (15).

16. No nasal harmony following nasal stops

nējada 'flor.'
nāji 'nieto'

There are no stems with an initial voiced consonant (/b,d,g/) followed by a nasalized vowel (*#D \tilde{V}). A nasalized vowel in the stem-initial syllable is always preceded by a nasal stop (#N \tilde{V}), a voiceless consonant (#T \tilde{V}), or no consonant at all (# \tilde{V}). Putting this observation together with the fact, noted above, that nasal stops are always followed by a nasal vowel suggests that in addition to the rightward harmony, there is a local assimilation of Nasal within a syllable. Specifically, the Nasal feature associated with a nasal stop spreads onto the following vowel, and the Nasal feature associated with a vowel in the stem-initial syllable spreads onto a preceding voiced consonant. This local assimilation has the effect of neutralizing the contrast between voiced and nasal stops before a nasalized vowel.¹⁰ Voiceless consonants are not affected by the local assimilation of Nasal, as evidenced by the examples in (15b), where a nasal vowel follows an initial voiceless consonant.

17. Local Nasal assimilation

D \tilde{V} → N \tilde{V}
N \tilde{V} → N \tilde{V}
DV → DV
NV → N \tilde{V}

The facts discussed so far are accounted for with the following set of constraints. The restricted distribution of nasal vowels is expressed through the Nasal Licensing constraint (18), which limits the feature Nasal on vowels to the initial syllable of a stem.¹¹ Local nasal assimilation derives from the Syllable/Nasal Alignment constraint in (19). Nasal Licensing is dominated by Syllable/Nasal Alignment (and Align-right, discussed below) with the

¹⁰The contrast between voiced and nasal stops (D:N) is maintained, however, in stem-internal position, where there are no contrastively nasal vowels.

¹¹The distributional restriction on Nasal can be expressed in ODT in terms of an exploded Parse constraint, which distinguishes among prosodically strong and weak anchors for a feature (Cole and Kisseberth 1994b). Counting the initial syllable as a strong position, the ranking Parse(N)-strong >> *[N, Vocalic] >> Parse(N) will give the result that Nasal is parsed on vowels only in an initial syllable.

result that Nasal can occur on vowels in stem-internal syllables only as a result of local nasal assimilation or nasal harmony.

18. Nasal Licensing: *[Nasal, Vocalic], unless in stem-initial syllable.

19. Syllable/Nasal Alignment: Align a Nasal domain with the left and right edges of a syllable.

When local nasal assimilation causes an underlying voiced obstruent to surface as a nasal stop ($D\tilde{V} \rightarrow N\tilde{V}$), it induces a violation of Parse [Obstruent]. Therefore, Syllable/Nasal Alignment must dominate Parse [Obstruent] in the constraint hierarchy, as demonstrated in the tableau in (20).

21. Evaluation: initial $d\tilde{V}$ in Orejon

	UR: $d\tilde{V}$	Syll/N	Parse[Obst]
a.	$d(\tilde{V})$	*!	
→b.	$(n\tilde{V})$		*

The failure of voiceless stops to nasalize preceding a nasal vowel (e.g., (15b)) follows from the Nasal/Voice grounding condition (22), which must therefore dominate Syllable/Nasal Alignment, along with *Insert[Voice], as shown in the tableau in (23).

22. Nasal/Voice Grounding: If Nasal, then Voice.

23. Evaluation: initial $t\tilde{V}$ in Orejon

	UR: $t\tilde{V}$	N/Vc	*Insert[V]	Syll/N
→a.	$t(\tilde{V})$			*
b.	$(\tilde{n}\tilde{V})$	*!		
c.	$(n\tilde{V})$		*!	

In addition to these constraints, another alignment constraint is needed to account for rightward nasal harmony. The Align-right constraint (24) aligns a nasal domain to the right edge of a stem, but only in the case that the underlying sponsor of the Nasal feature is a vowel, which is identified here as a weak anchor. Thus, harmony is triggered only by contrastively nasal vowels, i.e., those in the initial syllable.

24. Weak Wide Scope Alignment (WSA-rt): Align(N-domain, R; Stem, R); applies only to Nasal domains in which the sponsor of Nasal is weak (Vocalic).

As noted above, rightward nasal harmony is blocked by voiced and voiceless stops and fricatives.¹² This is similar to the Terena pattern, except that

¹²There is no evidence available to indicate whether nasal stops are transparent or opaque to harmony in the environment (C) \tilde{V} NV. Vowels following a nasal stop are independently nasalized, although that nasalization is not marked in the transcription. Evi-

in Orejon, the palatal glide /y/ also blocks harmony, as in *ēōyi* 'amarrar, agarrar con los dedos' and *jēyo* 'puente de un solo palo'. The complete consonant inventory is shown below.

25. Orejon consonant inventory¹³

p	t	k	?
b	d	g	
	s	x	h
m	n	ñ	
	y		

In order to distinguish /y/ from the glides /h, j/ that do not block harmony, we analyze /y/ as an obstruent in this system. The class of segments we need to distinguish with the feature Obstruent contains just those segments which require a significant oral airflow, incompatible with simultaneous nasalization.¹⁴ Under this interpretation, Orejon displays the same pattern of obstruent opacity as Terena, and can be analyzed in a parallel fashion. Specifically, opacity derives from the constraints Parse [Obstruent], *[Nasal, Obstruent], and Express [Nasal], which all dominate WSA-right. The only difference in the opacity of Terena and Orejon is that in Terena the grounding constraint *[Nasal, Obstruent] is dominated by WSA-right, giving rise to nasal obstruents (i.e., prenasalized stops) at the boundary of oral and nasal domains. Nasal obstruents are not observed in Orejon, which is accounted for with an undominated *[Nasal, Obstruent] constraint. The tableau in (26) illustrates the evaluation of *ābI* 'corazon', in which a medial obstruent blocks nasal harmony.

dence would have to come in the form of a stem in which an internal nasal stop is followed by a transparent /j/ or /h/ in the next syllable, e.g., (C)ṼNVjV. If the final vowel is nasalized, then the nasalization must come from the initial syllable, since nasal stops do not generally spread nasalization rightward beyond the syllable (c.f., (16)). Unfortunately, a preliminary search reveals no such examples.

¹³In citing examples, we adopt the non-standard transcription of Velie and Velie, in which the velar stop /k/ is represented by 'qu' before front vowels, and by 'c' elsewhere, and the velar glide /x/ is represented by 'j', as noted above. Also, Velie 1975 indicates the presence of preglottalized voiced stops, which are not transcribed in Velie and Velie 1981.

¹⁴This analysis would be confirmed if phonetic study revealed a genuine phonetic difference between the opaque palatal glide in Orejon and the transparent palatal glide in Terena, such that opacity correlated with greater air turbulence or increased pressure behind the constriction site. However, we maintain that even in the absence of such a phonetic distinction, it is possible for two languages to define the cut-off point for obstruency differently in the phonological grammar, on the basis of the degree of oral airflow. As noted by Cohn 1993a, on a continuum of constriction degrees (from stop to vowel), contrastive nasalization is possible only at the two ends, requiring either full closure or no constriction. Nasalization is not compatible with the airflow requirement of fricatives, necessary to distinguish them from their stop counterparts. The status of approximants,

26. Evaluation: medial opacity in Orejon

input:	ābI	Express	Parse[Obst]	*[N,Obst]	WSA-rt
a.	(ābI)	*!(b)			
b.	(āmI)		!		
c.	(āmbI)	*!(b)		*	
d.	(ām)bI			*!	*(b _r I)
→e.	(ā)bI				*(b _c ,rI)

In addition to the absence vs. presence of prenasalized stops, there is one other important difference between Orejon and Terena. In Terena, the nasal domain is always strictly aligned at the left edge of the word, whereas in Orejon nasalization can originate on the first vowel, apparently skipping an initial voiceless stop. This distinction follows from the different ranking of the leftward alignment constraints on nasal domains in the two languages. In Terena, the morphologically governed WSA-left constraint is undominated. In Orejon, leftward alignment of the Nasal domain is accomplished by the Syllable/Nasal Alignment constraint (which dominates and therefore renders inactive the leftward Basic Alignment constraint for Nasal domains), and Syllable/Nasal Alignment is dominated by the grounding constraint on Nasal/Voice and *Insert[Voice], as seen in (23), so that a voiceless consonant preceding a nasal vowel does not undergo nasalization. In short, leftward alignment of a nasal domain is undominated in Terena and dominated in Orejon. A complete tableau illustrating the evaluation of the Orejon example *sōjōbI* 'pupo, ombligo' (15b), with both initial transparency and medial opacity, is shown below.

27. Evaluation: transparency and opacity in Orejon

input:	Expr	N/ Vc	Syll/ Nas	Prs [Obstr]	*[N, *Obstr]	WSA -rt
a.	(sōjōbI)	*!(b)	!(s)			
b.	(sōjōmI)		!(s)			
c.	s(ōjōmI)		*(s)	*		
d.	s(ōjōm)bI		*(s)		*!	*(b _r I)
e.	s(ō)jōbI		*(s)			*!(jōb _{c,r} I)
→f.	s(ōjō)bI		*(s)			*(b _c ,rI)

The first candidate in this tableau has the widest nasal domain, but incurs a violation of Expression and the Nasal/Voice grounding constraint. The

including primarily the glides, varies somewhat across languages. A glide will block harmony only if the threshold for nasalization is drawn at a constriction degree less than that of glides, which implies that fricatives and stops will also block. In the ODT approach, it is possible to couch the present analysis of obstruent opacity without an explicit use of the feature Obstruent, by reformulating the constraints pertaining to obstruents (i.e., alignment, grounding, and Expression) so they make direct reference to constriction type.

Expression violation is resolved in the candidates (b-d), which however incur violations of Parse [Obstruent] and *[Nasal, Obstruent]. The Nasal/Voice violation is resolved in (c-f) at the expense of a violation of the lower-ranked Syllable/Nasal Alignment. Only the candidates (e) and (f) satisfy the Parse [Obstruent] and *[Nasal, Obstruent] constraints, and between them (f) best satisfies the wide scope alignment of Align-right, emerging as the winner.

We end the discussion of Orejon by briefly considering the analysis of a form in which an initial voiced or nasal stop is followed by an underlying nasal vowel, e.g. $D\bar{V}CV$. If the second consonant is an obstruent, then it will block harmony and the form should surface as $N\bar{V}CV$, which is also derivable from an underlying $NVCV$ via local nasal assimilation. Numerous examples of this sort exist, such as *māso* 'punchana', which would undergo an evaluation parallel to the one in (26). If, however, the second consonant in $D\bar{V}CV$ is a transparent /j/ or /h/, then the surface result should be $N\bar{V}j\bar{V}$. Examples like this can also be found, such as *nĭjō* 'esposa'. It may seem as though this surface form could derive from underlying /nijo/, with nasality originating on the nasal stop, however that analysis must be rejected given that nasality from a nasal stop does not systematically spread beyond the syllable, as noted above in (16). Under the present analysis, the surface form *nĭjō* is unambiguously derived from /dĭjo/ by Syllable/Nasal Alignment, and the wide scope Align-right constraint.

4 Discussion

The analyses of nasal harmony presented here show that harmony results from the wide-scope alignment of feature domains. Feature domains can arise through the need to parse an underlying feature, as in Orejon, or through a morphologically-governed Alignment constraint that identifies a feature domain with a particular morphological category, as in Terena. In both analyses, the domain alignment constraints alleviate the need to posit a floating Nasal feature in the underlying form of stems or suffixes, as has been proposed in numerous autosegmental analyses of these and other nasal harmony systems. By avoiding the floating feature, we also avoid the problem of how to order the floating feature differently in the two languages examined here: strictly *before* the initial consonant in Terena, but *after* an initial voiceless consonant in Orejon (cf. Pulleyblank 1989).

The ODT analysis succeeds in accounting for opacity in nasal harmony while assuming a privative Nasal feature. There is no appeal to the ad-hoc specification of a [-Nasal] feature, or to special feature geometries for nasal and non-nasal segments, in accounting for the behavior of opaque segments. In both of the systems examined here, opacity is limited to obstruents, and is ultimately due to the high-ranking of the Express [Nasal] and Parse [Obstru-

ent] constraints: if Nasal must be expressed on all elements in the harmony domain, and if obstruents cannot lose their Obstruent feature, then the only outcome is for obstruents to remain outside of the domain of nasalization.

The pattern of obstruent opacity seen in Orejon and Terena is seen in other nasal harmony systems as well, including Urhobo, Sundanese, Aguaruna, and Mixtec, which means that the ranking of Express [Nasal] and Parse [Obstruent] over Wide Scope Alignment is relatively unmarked. Given the tenet of Optimality Theory that universal constraints can be extrinsically ranked in individual grammars, cross-linguistic trends in constraint ranking must be accounted for by appealing to higher-order principles. One principle that seems to be at work in nasal harmony systems is identified here as the Principle of Contrast Preservation (PCP), which disallows the neutralization of contrast, particularly in the absence of strong contextual cues. The PCP may ultimately be responsible for why obstruents don't simply undergo nasal harmony, becoming full nasals and allowing further extension of the harmony domain. If nasal harmony could obliterate the distinction between obstruents and nasals, then it would lead to substantial loss of contrast, undermining the most fundamental purpose of phonological features. In languages with morphological nasal harmony like that of Terena or Mixtec, the neutralization could cause a massive collapse in distinctions between root morphemes. It seems to be a very general property of nasal harmony systems that they avoid non-contextual neutralization. Of course, neutralization does occur in phonological systems, and in fact we have an instance of neutralization in the obstruent nasalization in Orejon, where it is argued that a voiced obstruent becomes a nasal stop before a nasal vowel. But note that in this case neutralization is limited to a specific phonological context—the stem-initial syllable. The three-way distinction between voiced, voiceless and nasal stops in underlying forms is preserved in stem-internal positions.

The PCP may also play a role in explaining why voiceless obstruents, even more than voiced obstruents, fail to undergo nasal harmony. This pattern is accounted for in ODT through the undominated constraints on Nasal/Voice grounding and *Insert [Voice]. The *Insert constraint, like Parse, is a faithfulness constraint, that serves the Principle of Contrast Preservation. In order for voiceless obstruents to undergo nasalization, deriving a voiced nasal stop, *Insert [Voice] and Parse [Obstruent] must be dominated. Yet, if Parse [Obstruent] is dominated, then a voiced obstruent in the same system will also undergo nasalization, and there would be a total collapse of the underlying system of contrast: T, D and N would all surface as N in nasal harmony domains. This is the sort of wholesale neutralization that is avoided in long-distance nasal harmony systems.

As discussed above, obstruent opacity requires the high ranking of both Parse [Obstruent] and Express [Nasal]. When Express [Nasal] is dominated,

obstruent transparency may result. There are systems, such as Desano (Kaye 1971) and Guaraní (Rivas 1974, Gregores and Suárez 1967) in which voiceless obstruents are transparent to harmony, providing evidence that the ranking of Express [Nasal] is subject to variation. This suggests the possibility of a system in which voiced obstruents are transparent as well, with undominated Parse [Obstruent] and dominated Express [Nasal], and yet this pattern is conspicuously absent in the nasal harmony systems discussed in the literature. We leave the resolution of this issue to future research, but suggest that the answer may again lie in the need to preserve a perceivable contrast between T, D and N, distinguishing (...VTV...), (...VDV...), and (...VN̄V...).

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The Innateness of Phonemic Perception

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It has been recognized since the discovery of phonemic representation that adults perceive speech in terms of the phonemic distinctions of their own language. Baudouin's definition of the phoneme as 'the mental image of a speech sound' (1895). Sapir's discussion of his Nootka interpreter's transcription of 'the intention of the actual rumble of speech' (1921, 56), and Swadesh's observation that adults perceive all speech in terms of the phonemes of their native language (1934) emphasized the status of the phoneme as a perceptual phenomenon. Evidence for the phonemic representation of speech sounds includes the widespread use and learnability of alphabetic writing systems; the traditional arrangements of syllabic writing systems (where symbols are arranged by phoneme groups); the characteristics of rhyme and alliteration patterns in oral and written verse; folk naming of correlative phoneme sets (like the 'broad' and 'slender' consonant groups of Irish); and differential learning of L2 sounds that can and cannot readily be identified with an L1 phoneme (as described in Wode 1992). Experimental investigation has confirmed that adult speakers perceive speech sounds categorically (Liberman et al. 1967, Lisker and Abramson 1970), and that they have considerable difficulty in discriminating between sounds which are phonetically different if those sounds do not represent a phonemic distinction in their native language (Goto 1971, Trehub 1976, Strange and Jenkins 1978, etc.).

The perceptions of very young infants are quite different from those of adults. It is widely recognized that infants as young as one month of age show something like categorical perception of speech sounds (e.g. Eimas et al. 1971, 1987). It has further been shown that young infants can perceive most of the phonetic distinctions used in any language (Eimas 1975, Streeter 1976, Lasky et al. 1975, Trehub 1976, Aslin et al. 1981, Werker et al. 1981, Werker and Tees 1984, etc.), even distinctions that are not used or perceived by the adult speakers around them. For example, Kikuyu-learning infants aged 2-3 months have been shown to be able to perceive the voiced-voiceless distinction that is used in English but not in Kikuyu (Streeter 1976). And English-learning infants at 6-8 months could discriminate both the Hindi /tʌ/ - /t̪ʌ/ and /tʰʌ/ - /dʰʌ/ distinctions almost as well as Hindi-speaking adults could, although most of the English speaking adults who were tested could not perform either of these discrimination tasks (Werker et al. 1981).

From examples like this, we must conclude that very young infants start out being able to perceive all of the usable phonetic distinctions – the universal set of distinctions used in the world's languages – and end up as an adults with seemingly more limited perceptual capabilities.

The decline in sensitivity to phonetic differences is specific to linguistic perception; it does not involve a loss of general auditory capabilities. Adult English speakers, who ordinarily fail to discriminate the Hindi retroflex-dental contrast because they process the stimuli phonemically, can perceive the difference in certain circumstances (Werker and Lalonde 1988). If the inter-stimulus interval is very short (less than 500 msec.), for example, adult English speakers give evidence of being able to discriminate this non-native contrast (Werker and Tees 1984, Werker and Logan 1985). Other studies have shown that adults can be trained to discriminate nearly any non-native contrast (Tees and Werker 1984, Pisoni et al. 1982, Morosan and Jamieson 1989), so it is clear that the decrease in

perceptual ability is not a matter of decreasing auditory sensitivity, but of a change in processing strategy – what Werker and her colleagues call a ‘developmental reorganization’ of perception (Werker and Pegg 1992).

This reorganization of perception is not particularly surprising. It would be inefficient for listeners to continue to attend to differences which are either predictable or irrelevant in speech. What is remarkable about this change from a universal phonetic sensitivity to a native-language phonemic sensitivity is the evidence of recent years about *when* children begin to perceive in terms of native-language phonemes. Werker and Tees (1983) found that children aged 12, 8, and 4 years old performed perception tasks like adults: that is, these English-speaking children performed as poorly on the Hindi (non-English) contrasts as English-speaking adults did. They then tested English-learning infants 6-8, 8-10, and 10-12 months of age for their ability to discriminate two contrasts: Hindi retroflexes vs. dentals, and Nihlakapmx (Thompson) glottalized velars versus glottalized uvulars. The infants were exposed to speech stimuli from a single phonetic category, and were conditioned to respond with a head turn to the presentation of a sound from a contrasting category. The absence of a head-turn thus represented, in effect, a judgement of ‘same’; its occurrence, ‘different’. Almost all of the 6-8 month old infants could discriminate the Hindi and Thompson contrasts, but among the infants 10-12 months of age, only two of ten could distinguish retroflex from dental, and only one could distinguish velars from uvulars (Werker & Tees 1984, Werker & Lalonde 1988). A different procedure used by other researchers (Best & McRoberts 1989) reportedly produced the same finding for the velar-uvular contrast. There is thus important evidence that a ‘developmental reorganization’ takes place within the child’s first year and results in something much like phonemic perception.

This evidence for early development of phonemic perception seems to confirm the conclusions of many observers of individual children – that the child’s perceptions, even at the onset of speech, resemble adult phonemic representations (e.g. Stampe 1969, 1972; Smith 1973, Pupier 1977). There are several bases for claims for the phonological accuracy of the child’s perception and representations: 1) Perceptual confusions or systematic misperceptions on the child’s part are rare (and transient, when they do occur). E.g., a child who pronounces *baby*, *bird*, and *bee* as [bi] might be expected to mis-hear one as the other, but this never seems to occur systematically.

2) Striking regularities in the child productions are often explainable only with the assumption of accurate representation, e.g. A child pronounced adult /ɛ/ as [æ] before adult /r/, but as [ɛ] elsewhere, even though he deleted the /r/ (a word like *serviette* was [sæ:ɛi]) (Pupier 1977). Further, the child seems to go beyond the phonetic form to perceive in terms of adult intentions, as when adult [baʔŋ] or [baʔŋ] is pronounced by the child as [bɑdɔn], although the adults around him never used a released [l] or [d], or a second vowel.

3) Mastery of a new articulation affects known words, without the child’s having to re-learn them. There are exceptions, and some words may lag behind, but such exceptions may be attributed to the influence of the child’s own pronunciations on his underlying forms (cf. Macken 1980). (The absence of some information from the child’s phonological forms would not substantially affect this basic claim.)

1. The Nature of Phonemic Perception.

It is important to consider here what is meant by ‘phonemic perception’, ‘phoneme’, etc. Werker and Pegg (1992) seem to hedge on Werker’s earlier claim

that the reorganized, language-specific perceptions of children at the end of their first year are actually 'phonemic perception'. Instead, they refer to this as 'language-specific phonetic perception', because, they say, they have no evidence that the child actually distinguishes lexical minimal pairs on the basis of these sound differences.

But this assumes that the phoneme is primarily a unit of lexical contrast, rather than a unit of perception, memory, and intention – a 'possible sound' in a given language. It was the structuralists, in an effort to make phonological analysis 'empiricist', who took the criteria of contrast and complementary distribution of phonemic analysis and changed their status from heuristics to definitions. But as Chomsky (1964) and Stampe (1987) have argued, when the distributional theory of the phoneme and the perceptual theory disagree, the distributional theory always turns out to be wrong. This seems a small loss, since distributional analysis seems to be an impossible model for acquisition (Donegan 1985).

A key to better understanding of the relationship between phonemes and their allophones and thus, the relationship between different phonemes, was offered by Bazell (1954). Bazell contrasted the phonemicists' hesitation to group initial [h] and non-initial [ŋ] in English as allophones of a single phoneme with the general willingness to group Japanese [ɸ] (which occurs before [u]) and [h] (which occurs elsewhere) as a single phoneme, /h/. He pointed out that this was simply because there was no phonetic motivation for an alternation of /h/ with final [ŋ], while the appearance of [ɸ] before [u] is motivated.

According to Bazell, the distribution itself meant little without reference to the intrinsic character of the segments, and the aim of phonemic analysis 'is to reach a system whereby intrinsic features and distribution are *mutually explanatory* ... The phonemes are the arbitrary residue left after the deduction ("discounting") of whatever is to be regarded as motivated.' (1954, 134).

Stampe (1987) has claimed that this principle of phonemic analysis applies to hearers as well as to phonemicists. He observes that allophones are in a relationship of substitution with the basic phoneme, and the substitutions are phonetically motivated. If there is no phonetic motivation for the substitution, there is no motivation for a phonemic unity. Stampe also pointed out that there are phonetic motivations for the basic phonemes, as well as for allophones. For example, the nasality of vowels before nasals is motivated or optimal, and therefore discounted, but the non-nasality of vowels is motivated, too. Likewise, the appearance of fricatives for stops in weak or medial positions is motivated, but the basic stops are motivated, too. The motivations toward optimal segments, first described with Jakobson's implicational laws (Jakobson 1968), interact with the motivations for allophonic substitutions and create a set of possible intentions, which underlie the phonetic realizations.

A phoneme is thus a sound that can be perceived and produced as itself (not as a variant of some other sound). Thus a phoneme is what the hearer perceives as the sound the speaker intended to say; the hearer arrives at the speaker's intention by identifying the speaker's limitations as a speaker with his own limitations and by attributing to the speaker the same kinds of substitutions he himself would make, if he were speaking. It is important to realize that phonemic representation varies with the actual pronunciation, or utterance. Variant pronunciations of a word like *sixths*, like [sɪksθs], [sɪks], [sɪksɪts], may have different phonemic representations. Phonemic representation refers to the utterance; it is not essentially lexical.

But let us return to the original question of the child's perceptions and how they become phonemic. Obviously, phonemic perception is not 'innate' in the sense that

each child is born with this kind of language-specific perception. So how does a child determine which characteristics of adult speech must be attended to and remembered, and which others are predictable from the phonetic limitations of the adult speakers? How does the English-learner discover that vowel nasalization and stop aspiration may be ignored, while the Hindi-learner discovers that these differences must be noticed and remembered? What happens to the child's perceptual abilities within the first 10 months of life?

2. The Discovery of Phonetic Features and Processes

An important part of the answer to this question seems to be that the child learns about the abilities and limitations of her own vocal apparatus, through vocalization and babbling. Although the infant vocal tract is straighter and shorter than the adult's¹ (Bosma 1975, Lieberman et al. 1972), it begins to assume a more adult-like form by about 3-4 mos (Sasaki et al. 1977). The infant's earliest sounds are mostly phonatory, or vowel-like, with only occasional closing gestures, but by about 4-6 months, they begin to include closing, consonantal gestures with varying places of constriction. Then these come to alternate with open, fully resonant vowels, eventually becoming more like the sequences of CV syllables that have come to be called 'canonical babbling'. In all of this prelinguistic vocalization, babbling, and early imitation, the child acquires three important kinds of knowledge.

2.1. Features

First, through auditory (and proprioceptive) feedback, the child begins to establish motor-auditory-kinesthetic connections, connections between articulatory gestures or positions and their acoustic or auditory effects (Fry 1966, 188-190; Locke & Pearson 1992, 115; Menn 1992). All of the infant's own vocalizations can contribute to the establishment of these acoustic-articulatory connections as she creates a mapping of gestures or articulatory positions to sensory outputs, a sort of 'phonetic guidance system'. Other factors that may influence the development of the system include observation of speech activity in others and active articulatory practice with auditory self-monitoring (Locke and Pearson 1992). These associations of particular gestures or kinds of gestures with particular acoustic effects can be identified with what phonologists call 'phonetic features'. For example, the articulatory action of complete oral closure (and release) results in an interval of silence or of low amplitude, followed by an abrupt onset of energy over a range of frequencies; an incomplete oral closure (and release) results in more sound during the constriction and a less abrupt increase in amplitude at its release. When the child recognizes this association, she has discovered the feature [continuant]. So-called 'feature analysis' is thus, in a sense, 'feature synthesis': it is the establishment of a connection between articulation and effect. The connection of auditory characteristics to articulations is, of course, essential for imitation (including self-imitation).²

¹ The infant vocal tract has a broader oral cavity, a shorter pharynx, a gradually sloping oropharyngeal channel, a relatively anterior tongue mass, a closely approximating velum and epiglottis, and a relatively high larynx (Kent 1992, 69).

² This view of a 'feature' as an aspect of speech that is independently controllable and has a detectable (often quantal) result allows that, in babbling, children learn about more features than their target language distinguishes. Knowing the acoustic

2.2. Fortitions

Second, the child begins to experience the articulatory and perceptual optimality of certain combinations of phonetic features, and to learn about the difficulties the less-optimal combinations represent. Such problems include the inhibition of voicing by the close constrictions obstruents require, the superior audibility of varying vowel articulations when the velic port is closed, the audibility of nasality in voiced sounds and its relative inaudibility in voiceless ones, or the finer adjustments required for fricatives as opposed to stops or for front or rounded vowels that are mid as opposed to high. These may represent phonetic constraints on the child's productions: obstruents become voiceless, vowels become non-nasal, nasals become voiced, fricatives become stops, front or rounded vowels become high.

2.3. Lenitions

Third, the child experiences co-articulation and the context-dependent variation in the sounds that she intends to produce. An articulation may have variant forms that occur in different articulatory contexts, and such combinatory variation has varying acoustic effects; these variations must be integrated into the child's phonetic awareness. For example, the child finds that an optimal dorsal consonant, the velar [k], may be fronted to [c] before or after front vowels, or backed to [q] before or after low back vowels. Or an optimal stop, the voiceless [p], may be voiced between voiced segments. Or an optimal vowel, which is non-nasal, may be nasalized adjacent to a nasal consonant.³

The child's vocal explorations thus result in an implicit body of knowledge about the constraints that limit her ability to produce particular individual sounds (simultaneous feature combinations) or sequences of sounds, and about the alterations or substitutions that result when she submits to these constraints. The perceptual aspect of this body of knowledge includes both the recognition of optimal segments, and the realization that deviations from these optima occur in certain circumstances so as to optimize sequences. The features, the constraints

results of some articulatory gestures may allow the child to draw conclusions, from their acoustic effects, about gestures that she cannot yet perform (she may realize that [e] requires a tongue-fronting gesture and a non-low jaw position that are less extreme than those required for [i], without being able to achieve the intermediate target. And from the motor-auditory-kinesthetic linkings she knows, she may draw conclusions about feature combinations that she cannot yet produce – e.g. she may realize that [l] is +sonorant, +voice, +coronal, and that it has an additional auditory property (which we call +lateral) that she cannot yet produce.

³ Some co-articulation may be universal and inevitable, the result of mechanical properties of the vocal tract. There are other aspects of articulation, however, which represent articulatory optima, but which a given language may require its speakers to learn to avoid. For example, although velar stops appear to be the optimal dorsal stops, some languages distinguish velar stops from palatals or uvulars (regardless of the following vowel). Similarly, although continuous voicing represents an articulatory optimum, some languages distinguish voiced and voiceless consonants intervocally.

the child discovers, and the adjustments or substitutions that respond to these constraints form the basis of phonology. These constraints are universal. Likewise, the interactions of these substitutions are universal: the substitutions that optimize phonetic properties of individual segments apply before those that optimize sequences (Donegan and Stampe 1979).

3. Phonological Implications of the Phonetic System

But, of course, phonologies of different languages differ in what they require their speakers to learn. One can overcome a constraint by learning to pronounce the difficult configuration. Doing so requires some effort and attention, so the speaker or learner prefers, for perceptual and/or articulatory reasons, that constraints apply. In learning to pronounce a language, the speaker learns to overcome only those constraints his language requires him to. Speakers of English may allow the constraint, *vowels are non-nasal*, to apply; speakers of Hindi or French may not. Speakers of Hawaiian may allow the constraint, *obstruents are voiceless*, to apply; speakers of English may not.

The context-free, segment-optimizing, fortitive constraints (like 'Vowels are non-nasal', or 'Obstruents are voiceless') limit the inventory of 'possible' sounds, in the sense of sounds the child can actually produce; they may also limit the inventory of sounds the child will perceive as 'possible' – that is, intended or memorable or significant. If a phoneme is 'the mental image of a sound' (Baudouin 1895), these constraints limit the child's phoneme inventory. But by considering other phonetic constraints which optimize *sequences* of sounds, the child may discount certain phonetic features (like vowel nasalization before nasals, or voicing in obstruents between vowels) as the inevitable results of context-sensitive, sequence-optimizing, lenitive constraints that apply in her own productions and, presumably, in those of adult speakers around her. Thus, sounds that are ruled out by the segment-optimizing constraints – but which in fact occur – may be perceived as variants, or allophones, of sounds that are allowed.

It will help to look at a couple of very simple examples of this interaction in some adult languages. Fortitive and lenitive constraints differ in phonetic motivation, and may consequently have opposite effects. For example, the constraint *-son -> -voi* (Obstruent Devoicing, or OD) creates articulatorily and perceptually optimal obstruents by substituting voiceless for voiced obstruents. The constraint *-son -> +voi /+voi__+voi* (Intervocalic Voicing, or IV) creates articulatorily optimal sequences, making voicing continuous, by substituting voiced for voiceless obstruents (especially in syllable-final or unstressed positions). Devoicing applies in Southern Chinook, Hawaiian, Tamil, Yidj, etc., but not in English, Sanskrit, Danish, French, etc. Intervocalic Voicing applies in Yidj, S. Chinook, Sanskrit, and Danish (with some qualifications, in most of these languages), but not in English, French or (usually) in Hawaiian.

Since each process is phonetically motivated, the preferred state for each is application (+), but speakers of any language must learn to master some difficulties, thus acquiring the skills that allow them to limit or 'turn off' some processes (-). Other processes continue to apply. The interaction of fortitions and lenitions that apply for adults creates a language-specific phoneme inventory and a pattern of automatic alternations.

We can see this in the schematic example in the table below. A '+' indicates that the process applies; a '-' indicates that process does not apply: the speaker must learn to produce the more-difficult configuration that the process avoids.

	<u>S. Chinook</u>	<u>Hawaiian</u>	<u>Sanskrit</u>	<u>English</u>
OD: -son -> -voi	+	+	-	-
IV: -son -> +voi /+voi_+voi	+	-	+	-
The inventories that result are:	/p/	/p/	/p/ /b/	/p/ /b/
and the phonetic realizations are:	[p~b]	[p]	[p~b] [b]	[p] [b]

In each case, the phoneme inventory is defined by the interaction of the universal constraints: the fortitions limit the set of intendable sounds to a set of relatively optimal segments, and the lenitions determine their pronunciation in context (sometimes creating 'impossible' sounds (like [b] in S. Chinook) as modifications of the 'possible' sounds).

The learner, then, can arrive at the phoneme inventory of his language and the relations of phonetic to phonemic forms – not by analyzing distributions of sounds, but by discovering which phonetic processes fail to apply in his language. In effect, he learns the phonemic inventory of the language by discovering which of his own phonetic limitations he is going to have to learn to overcome. The child does not have to perform a distributional analysis in order to discover this: decisions can be made on the basis of a single form.

The S. Chinook learner, for example, hearing forms like [paba], can assume that OD applies, ruling out */b/ as a possible phoneme. She can attribute the [b]'s she hears to the application of IV. The Hawaiian learner, hearing only forms like [papa], can also assume that OD applies, and also rules out */b/, but because she hears intervocalic [p], she must note that IV does not apply. (Her initial pronunciations may undergo IV, until she acquires the articulatory control to overcome it.) The English learner, hearing [p]-initial and [b]-initial forms like [pa] and [bi], must recognize that OD does not apply. He need not remember or compare minimal pairs: it is the absence of a phonetic motivation for the voicing difference that tells him that both /p/ and /b/ are intendable sounds. He also hears voiceless intervocalic stops, and must recognize that IV does not apply, either.

Like the English learner, the Sanskrit learner hears both [p]-initial and [b]-initial forms like [pa] and [bi], and must recognize that OD does not apply. The intervocalic stops he hears, however, are always voiced (at least in certain prosodic environments), so he may, unlike the English learner, allow IV to apply. This means that some intervocalic [b]'s might arise from /p/'s. But since /b/ is an intendable sound, a phoneme, these [b]'s are at first perceived as /b/'s. Only later, when the child begins to identify some morphological variants, does he begin to identify these phonetic [b]'s with /p/'s. But even this does not require distributional analysis. His phonemic representations of morphemes can be revised to morphophonemic representations *one at a time*, as he recognizes the morphological unity of the varying forms, because the substitution that accounts for the alternations is there all the time, available to him, part of his knowledge of articulatory optima and the substitutions speakers with vocal tracts like his may use to achieve them.

Note that the application of both automatic processes means that the S. Chinook learner has the least to learn with respect to the articulatory skill it takes to control voicing. The English learner, who must overcome both the OD and the IV processes by learning to produce voicing distinctions in all environments, has the most to learn in this respect.

Compare the application and non-application of Vowel Denasalization (VD), a fortition, and Vowel Nasalization, a lenition, in English, Hawaiian, Hindi, and French:

	<u>English</u>	<u>Hawaiian</u>	<u>Hindi</u>	<u>French</u>
<u>VD</u> : V -> -nas	+	+	-	-
<u>VN</u> : V -> +nas / _+nas	+	(-)	+	-
The inventories that result are:	/a/	/a/	/a/ /ɑ/	/a/ /ɑ/
and the phonetic realizations are:	[a ~ ɑ]	[a]	[a ~ ɑ] [ɑ]	[a] [ɑ]

In order to arrive at these inventories, children learning these languages must consider the phonetic realizations on the light of the phonetically motivated processes. The English learner may allow both VD and VN to apply, and can perceive nasalized vowels as variants of non-nasal ones, attributing their occurrence to VN. The Hawaiian learner may also allow VD to apply, since phonetic nasalized vowels are not ordinarily encountered. (Any nasalization that does occur can be attributed to VN, which may apply optionally.) The Hawaiian learner is thus in nearly the same position as the English learner, except that 1) he has fewer phonetic instances of vowel nasalization to account for and 2) he must learn to produce non-nasalized vowels before nasals, at least in some circumstances – VN is an option which may apply in faster or more careless speech, in unaccented syllables, etc., but it is not allowed to apply always, as it does in English.

The Hindi learner, hearing nasalized vowels where their occurrence cannot be attributed to the presence of a following nasal, must recognize vowel nasalization as the intention of the speaker. In doing so, he admits he must master the difficulty represented by VD, and learn not to denasalize vowels. He can, however, allow VN to apply, since he hears no *non*-nasalized vowels before nasals. This means, however, that a nasalized vowel before a nasal is perceived as a nasalized vowel (cf. Lahiri and Marslen-Wilson 1991). (A nasalized vowel may eventually be interpreted morphophonemically, as a non-nasalized vowel, when the learner recognizes a morphological identity of forms with nasalized and non-nasalized vowels and attributed the nasalized variant to the nasalization process.)

Like the Hindi learner, the French learner hears nasalized vowels in non-nasal environments, and must thus admit them to the inventory, overcoming VD. Unlike the Hindi learner, the French learner must also learn not to nasalize vowels before nasal consonants.

<u>Phonetic categorization</u>	<u>Process marking</u>	<u>Inventory</u>
English learner hears [d̃an], [dat]	VD applies: VN applies:	/a/, */ɑ/ [a] [ɑ]
Hawaiian learner hears [kapu], [kane]	VD applies: VN does not apply:	/a/, */ɑ/ [a]
Hindi learner hears forms like [ba], [hã] Hindi learner hears forms like [b̃in]	VD does not apply: VN applies:	/a/, /ɑ/ [a] [ɑ]

French learner hears forms like [tā], [pi]	VD does not apply:	/a/	/ā/
French learner hears forms like [bən]	VN does not apply:		
		[a]	[ā]

4. Summary

As children discover their phonetic abilities, in early vocalization, babbling, and imitation, they also discover the limitations on these abilities and the substitutions that optimize their productions and make them conform to these limitations. These limitations tend to keep a child's own inventory of productions small, while the set of different segments the child can hear may be quite large. To learn to speak like adults, children have to overcome some of these limitations, learning how to pronounce some segments and sequences which are not optimal. As they begin to recognize adult productions, they learn which of these phonetic difficulties they must master – always hoping to have to master as few as possible – always hoping to allow the substitutions which optimize segments or sequences to apply. To admit a phoneme to the inventory is to admit that one will have to learn to produce that sound as itself, and not as a variant of some other sound.

Phonemic perception is perception of sounds as intended or intendable. The 'developmental reorganization' that results in phonemic perception occurs when children begin to perceive in terms of what they might themselves pronounce. The limitations on our phonetic abilities cause us to reduce the variety of sounds we hear to a small, controllable, intendable inventory. So phonemic perception is innate because these phonetic abilities and limitations are innate. Phonemic perception is learned by learning which of these innate limitations we must overcome.

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Charting the Learning Path: Cues to Parameter Setting

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Current approaches to the problem of learnability of grammars assume a highly constrained theory of Universal Grammar (UG), within which cross-language variation is kept to certain limits. These limits are set, depending on one's theory, either by a series of variable parameters which learners must fix at their correct values (Chomsky 1981), or by a series of constraints which learners must correctly rank (Prince & Smolensky 1993). An explanatory theory ought to specify how the learner sets the parameters or ranks the constraints on the basis of relevant input data.

There are two fundamental problems we must overcome in developing a learning model. The first is that parameters and constraints interact in complex ways, and it is difficult to reliably discern what specific contribution each one makes to the whole. A learner whose hypothesized grammar does not successfully account for the target input would have no reliable information as to the nature of the error. We can call this the Credit Problem (Clark 1989 calls this the Selection Problem). A second fundamental problem is that parameters and constraints are stated in terms of abstract entities which the learner is not initially able to identify. For example, metrical theory is couched in terms of concepts such as heavy syllable, head, constituent, and projection. These entities do not come labelled as such in the input, but must themselves be constructed by the learner. Since parameters are stated in terms of metrical theory, whereas the cues to these parameters must be stated in terms of observable data, it is an empirical issue as to what the correct cue to a given parameter is (the same holds if the problem is construed as one of constraint ranking). We can call this the Epistemological Problem:

- (1) Two fundamental problems
 1. *The Credit Problem*: When there is a mismatch between a target form and a learner's grammar, there is no way of reliably knowing which parameters/constraints must be reset to yield a correct output.
 2. *The Epistemological Problem*: There is a gap between the vocabulary in terms of which parameters/constraints are couched and the learner's analysis of the input.

These problems make it a challenge to devise a reliable procedure that guarantees that the learner will converge on the target grammar.

1. A Cue-based Learner (Dresher & Kaye 1990)

The model of Dresher & Kaye (1990), which is a learning model for a

parametric version of metrical phonology, was designed as an attempt to overcome these problems in one area of phonology, though the principles are intended to hold in other domains also. I will sketch some general properties of the model, and briefly show how they work in an example case. Then I will consider some alternative approaches which have been recently proposed; I will argue that they fail to adequately address one or both of the fundamental problems.

Some of the main features of the Dresher & Kaye (1990) model are listed in (2):¹

- (2) Properties of a cue-based learner (Dresher & Kaye 1990)
 - A. UG associates every parameter with a cue.
 - B. A cue is not an input sentence or form but is something that can be derived from input.
 - C. Cues must be appropriate to their parameters.
 - D. What the correct cue to any given parameter is must be empirically determined (by the linguist not the learner, to whom it is supplied by UG). There is thus no parameter-independent general algorithm for parameter setting.
 - E. Parameter setting proceeds in a (partial) order set by UG: this ordering reflects dependencies among cues, and specifies a learning path.
 - F. A parameter which has a default state remains in it until the learner detects its cue, which acts as the trigger to move to the marked setting. Symmetrical parameters (e.g. directional parameters) may have positive cues for both values.
 - G. The learning strategy is loosely speaking 'deterministic', in the sense that the learner may not backtrack or undo parameter settings that have already been set.
 - H. Determinism does not hold in the following case: when a parameter is set to a new value, all parameters which depend upon it (follow it in the order) revert to default.
 - I. Cues are local in the sense that each decision depends on finding a specific configuration in the input, and acts on this without regard to the final result. Hence, learners are not trying to match the input.
 - J. Cues become increasingly abstract and grammar-internal the further along the learning path they are.

Some comments on these properties:

C: Cues must be appropriate to their parameters in the sense that the cue must reflect a fundamental property of the parameter, rather than being fortuitously related to it.

E: The setting of a parameter later on the learning path depends on the results of earlier ones.

G: Determinism here is understood in the sense of Marcus (1980) and Berwick (1985). Some such restriction is necessary if the learner is to be prevented from getting into infinite loops.²

By way of illustration, consider the core stress system of English, which for purposes of this example we can consider to be the same as Latin. This stress pattern can be characterized as in (3):

(3) English/Latin

Main stress falls on the penultimate syllable if it has a long vowel or is closed by a consonant; otherwise, main stress falls on the antepenultimate syllable.

Some words illustrating this pattern are shown in (4):

(4) Some words

- a. álgebra, Cánada, génesis, América
- b. Vancóu:ver, aró:ma, horí:zon, Mànitó:ba
- c. agénda, appéndice, Hèlsínki, Pàracélsus

Following standard accounts (e.g. Halle & Vergnaud 1987), the metrical patterns of sample words are derived from grid representations such as in (5):

(5) Acquired representations

a. x	b. x	c. x	
(x)	(x x)	(x)	Line 2
x(x x)<x>	(x x)(x)<x>	x(x)<x>	Line 1
L L L L	L L H L	L H L	Line 0
Ameri ca	Mani to:ba	agenda	Syllables

In these grids, *H* represents a heavy syllable (a syllable containing a long vowel or closed by a consonant), *L* a light syllable (a syllable containing a short vowel). The relative stress of a syllable is indicated by the height of its grid column. Parentheses indicate constituent boundaries. Angle brackets indicate an extrametrical syllable. In each line 0 constituent, one and only one element projects a mark on line 1: this element is the head of the line 0 constituent. Line 1 marks are similarly gathered into a constituent whose head is on line 2.

Let us assume that the grids in (5), constructed in accordance with parameters which we will take up as we proceed, are what learners of English have to arrive at. I assume also that the input that the learners have to work with consists of words associated with primitive grids which represent only the

observed stress contours of each word. For the words in (5), the input (i.e. the learner's representation of the surface form) would look like (6):

(6) Initial representations

<p>a. x x x x x x S S S S America</p>	<p>b. x x x x x x x S S S S Manito:ba</p>	<p>c. x x x x x S S S agenda</p>	<p>Line 2 Line 1 Line 0 Syllables</p>
---	---	--	---

The input grids indicate the shape of the stress contour of a word, but they lack constituent boundaries and extrametricality markings: these must be supplied by the learners. Also, since the distinction between heavy and light syllables is not self-evident to begin with, *L* and *H* are replaced by *S*, which represents any syllable.

In English, the location of stress depends on the distribution of heavy syllables, as well as location in the word. Hence, a learner can make no progress in acquiring the correct pattern without first determining that English distinguishes light from heavy syllables; i.e. English stress is quantity sensitive, henceforth QS. Stress systems which do not distinguish between syllable types are called quantity insensitive, or QI. The task, then, is to discover that English stress is QS without making use of the generalization in (3), since this pattern cannot itself be discerned until one distinguishes between light and heavy syllables.

One operation that is available to a learner at this early stage in the acquisition of the system is classification. It is reasonable to suppose that learners begin with simple representations and must be driven to adopt more complex ones. Thus, we may suppose that the default is to assume that all syllables are the same for purposes of stress, i.e. assume that stress is QI. Because all syllables have the same status in QI systems, it follows that words with the same number of syllables are all alike from the point of view of the metrical parameters. In QS systems, by contrast, this is not the case, as is demonstrated by the equivalence classes of word types shown in (7):

(7) Word classes in QI and QS systems

	QI: Syllable = S	QS: Syllable = H or L
2 syllable words:	{SS}	{LL} {HL} {LH} {HH}
3 syllable words:	{SSS}	{LLL} {HLL} {LHL} {HHL} {LLH} {HLH} {LHH} {HHH}
4 syllable words:	{SSSS}	{LLLL} {HLLL} {LHLL} ...

In QI systems, all words with *n* syllables should have the same stress contour, since they are all effectively equivalent. Taking QI to be the default

case, a learner will continue to assume QI until it encounters evidence that words of equal length can have different stress contours:

- (8) QS
- a. Subset: QI languages are subset of QS languages.
 - b. Default: Assume all syllables have the same status (QI).
 - c. Cue: Words of n syllables, conflicting stress contours (QS).

Such evidence is abundant in English, as is apparent in (4); for example, the three-syllable words in (4a) have initial stress, conflicting with the three-syllable words in (b) and (c) which have stress on the middle syllable; similarly, *América* conflicts with *Mànitóba*, and so on. The existence of conflicting stress contours on a wide scale would lead the learner to abandon the default hypothesis. Note that QS is not the only cause of such conflicts: the language in question may have lexical accent, for example. A fuller specification of the learning path would have to include means for distinguishing between QS and lexical accent, but we cannot consider all the possibilities here (see Drescher 1994 for some discussion). Similar considerations hold all along the line. Assuming though, that other possibilities are ruled out, the learner is led to revise the input representations, now distinguishing between light and heavy syllables.

Here, too, there are choices to make, because not every language has the same characterization of what a heavy syllable is. Some languages do not count closed syllables with short vowels as heavy. (9) gives a slightly oversimplified picture of the possibilities, but one we will adopt here: we will assume that syllables that end with a short vowel (short open syllables) are universally light, and that syllables with long vowels are universally heavy. Closed syllables may go either way:

- (9) Light and heavy syllables
- | | | |
|-------------------------|---------------|-------------------------|
| <u>Always Light (L)</u> | <u>L or H</u> | <u>Always Heavy (H)</u> |
| ...V. | ...VC. | ...VV |

In order to determine which style of QS English adopts, we can continue with the classification test we used to diagnose QS in the first place. We assume that when learners determine that a language is QS, they revise their initial representations, now characterizing syllables as being either L or H. Suppose that the initial revision incorrectly assumes that closed syllables are light; we would arrive at the word classes in (10):

- (10) Assuming QS, closed syllables light: conflicting words
- | | | | |
|----------|-------------------|----------------------|------------------|
| L L L: | ál.ge.bra (/xx) | a.gén.da (x/x) | Hèl.sín.ki (V/x) |
| L L L L: | A.mé.ri.ca (x/xx) | Pà.ra.cél.sus (Vx/x) | |

The new representations still contain conflicting words: thus, words of the pattern *LLL* do not all have the same stress contour, nor do words of the pattern *LLLL*. These conflicts, which would again exist on a large scale in the language, would serve as a trigger to try the other possibility in (9), which leads to representations in which closed syllables count as heavy:

- (11) Assuming QS, closed syllables heavy: no conflicting words
- | | | | |
|----------|--------------------|----------|----------------|
| H H H: | Vàncóu:ver | H H L: | Hèlsínki |
| H L L: | álgebra | L L H: | génesis |
| L L L: | Cánada | L H L: | aró:ma, agénda |
| L H H: | horí:zon, appéndix | L L L L: | América |
| L L H L: | Mànitó:ba | L L H H: | Pàracélsus |

These representations contain no conflicts, an indication that the representations can serve as a basis for proceeding to set further metrical parameters.

Having found the heavy syllables, what we know about the sample words in (6) is given in (12):

- (12) New representations with light and heavy syllables
- | | | | |
|---------|-----------|--------|-----------|
| a. x | b. x | c. x | Line 2 |
| x | x x | x | Line 1 |
| x x x x | x x x x | x x x | Line 0 |
| L L L L | L L H L | L H L | Syllables |
| America | Manito:ba | agenda | |

Main stress is assigned by promoting either the leftmost or rightmost line 1 mark onto line 2. So, although main stress is not confined to the first or last syllable, it is limited to the first or last line 1 mark, which is the head of the first or last line 0 constituent. This fact suggests a cue for main stress, given in (13):

- (13) Main stress
- a. Parameter: Project the {left/right}-most element of the line 1 constituent.
 - b. Cue: Scan a constituent-sized window at the edge of a word. Main stress should consistently appear in either the left or right window.

It follows from (13) that we do not need to know exactly what the constituents of a word are in order to determine whether main stress is on the left or the right, but we do need to know how big a metrical constituent is. In particular, we need to know if line 0 constituents are bounded or not; for purposes of this discussion, let us limit bounded constituents to binary ones:

- (14) Bounded constituent construction
- a. Parameter: Line 0 constituents are bounded.
 - b. Cue: The presence of a stressed non-edge *L* indicates bounded constituents.

If a language has bounded constituents, then a constituent-sized window would not be more than two syllables long. By contrast, if a language does not utilize bounded constituents, the only constituents it will have, if it has any, are those created by heavy syllables and by edge rules. English has bounded constituents; how might a learner determine this? A number of possible cues come to mind, for example the presence of alternating stress, but this turns out to be a slippery cue, for various reasons. The essential difference between languages with bounded constituents and languages without them is that in a language with no bounded constituents, constituent edges must be associated either with heavy syllables, or with the edge of a word. Therefore, the only light syllable that can be stressed is one that is at a word edge. It follows that the presence of a stressed light syllable that is not at a word edge is evidence for bounded constituents.³ We adopt this as the correct cue for boundedness, given in (14b).

English has such internal stressed light syllables: an example - actually, the only example in our data set - is the word *America*. Without this word, the forms in (4) would be equally analyzable as an unbounded stress system with the pattern: stress the last heavy syllable which does not occur in the final syllable; otherwise, stress the initial syllable.

We will not look at the remaining parameters here; continuing in this fashion, we can go on to specify the entire learning path for acquiring the metrical system of this language. The way this learning model addresses the Credit Problem and the Epistemological Problem should by now be clear. The Credit Problem is solved for the learner by associating each parameter with a cue: the learner always knows what to look for to set a parameter. Moreover, the learner is never asked to apportion credit for an entire form to a set of parameters. The Epistemological Problem is solved by ordering the parameters; the parameters we have discussed are ordered as in (15):

- (15) Order in which parameters must be set
- a. Syllable Quantity: Establish whether feet are QI (default) or QS.
 - b. Foot size: If QI, only bounded feet are available; if QS, unbounded is default.
 - c. Main stress: Depends on correct setting of (a) and (b).

This ordering allows for a general progression, both in the representations and in the cues, from relatively simple to more complex and more abstract. The cue for quantity sensitivity, for example, coming near the beginning of this

learning path, is couched in terms that presuppose little knowledge of any details of the grammar. The learner needs only to be able to keep track of stress contours and syllables. By contrast, the cue for main stress is considerably more sophisticated in what it assumes about the grammar. If parameters were unordered, then the cues would not be able to be stated in this progressive fashion.

I would like to turn now to consider some other learning algorithms that have been proposed in the recent literature. I think that all of them represent interesting proposals; but each of them makes some crucially wrong assumption about the nature of the learning problem.

2. The Triggering Learning Algorithm (Gibson & Wexler 1994)

Let's consider first the model sketched in Gibson & Wexler (1994).⁴ Gibson & Wexler formulate a general scheme they call the Triggering Learning Algorithm (TLA):

(16) The Triggering Learning Algorithm (Gibson & Wexler 1994)

Given an initial set of values for n binary-valued parameters, the learner attempts to syntactically analyze an incoming sentence S . If S can be successfully analyzed, then the learner's hypothesis regarding the target grammar is left unchanged. If, however, the learner cannot analyze S , then the learner uniformly selects a parameter P (with probability $1/n$ for each parameter), changes the value associated with P , and tries to reprocess S using the new parameter value. If analysis is now possible, then the parameter value change is adopted. Otherwise, the original parameter value is retained.

This algorithm incorporates two constraints which are due to Robin Clark, though he does not accept them as being valid:

(17) The Single Value Constraint

Assume that the sequence $\{h_0, h_1, \dots, h_n\}$ is the successive series of hypotheses proposed by the learner, where h_0 is the initial hypothesis and h_n is the target grammar. Then h_i differs from h_{i-1} by the value of at most one parameter for $i > 0$.

(18) The Greediness Constraint

Upon encountering an input sentence that cannot be analyzed with the current parameter settings (i.e., is ungrammatical), the language learner will adopt a new set of parameter settings only if they allow the unanalyzable input to be syntactically analyzed.

The notion of trigger is implicit in the TLA. Gibson & Wexler define triggers as in (19). Only local triggers (19b) are of real interest to us. Put

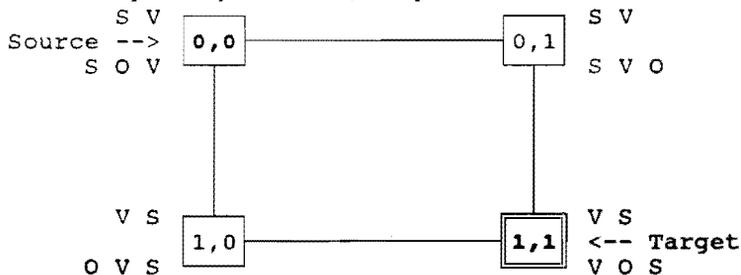
informally, a local trigger is a sentence of the target language which requires the learner at a particular space to set one parameter to its correct value:

(19) Triggers (Gibson & Wexler 1994)

- a. A *global trigger* for value v of parameter P_i , $P_i(v)$, is a sentence S from the target grammar L such that S is grammatical if and only if the value for P_i is v , no matter what the values for parameters other than P_i are.
- b. Given values for all parameters but one, parameter P_i , a *local trigger* for value v of parameter P_i , $P_i(v)$, is a sentence S from the target grammar L such that S is grammatical if and only if the value for P_i is v .

An example of how this learning algorithm is supposed to work is given in (20), where each square represents a setting of two syntactic parameters. The first parameter determines whether the head of Spec X' is initial (value 1) or final (0). In this case, the head is the verb (V) and its specifier is the subject (S). The second parameter similarly encodes whether the head of a complement is initial or final, here exemplified by the relation between a verb and its object (O). These two parameters define a space with four states:

(20) Parameter space: (Spec-Head f/i , Comp-Head f/i): final=0, initial=1



Assume now that the target language is VOS (1,1), and the learner's current hypothesis is SOV (0,0). Suppose the learner hears a sentence of the form $V O S$. This sentence is not parsable by the learner, who now determines that the current state is not correct. Even though there is only one setting of parameters that corresponds to $V O S$, we can see that it would take a change of both parameters for the learner to reach it. This is not allowed by the Single Value Constraint, which makes available only the two neighbouring spaces. Neither space yields the target $V O S$. Therefore, according to the Greediness Constraint, the learner cannot move. Thus, the sentence $V O S$ is not a trigger to a learner at (0,0).

Fortunately in this case, there is another type of sentence from the target

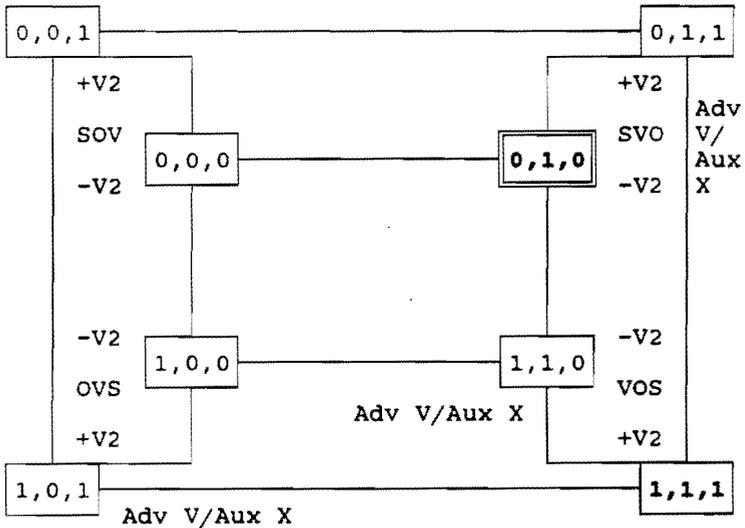
that the learner will eventually hear, namely *V S*. *V S* is a trigger to a learner at (0,0), since there is a neighbouring space which parses it, namely (1,0). So the learner moves to there. From there, a further presentation of *V O S*, which is a trigger to a learner at (1,0), will take the learner to the target.

Gibson & Wexler point out that the TLA will not be successful in the case of subset parameters, i.e. parameters where the sentences generated by one value are a proper subset of the sentences generated under the other value; in that case, the learner who is mistakenly in the superset state will have no triggers, since all input sentences can be analyzed. They restrict their discussion to nonsubset parameters.

The main point of their paper is that the TLA does not guarantee that a learner will converge on the target, because there are nonsubset parameter sets where there are no triggers. The type of example they illustrate involves local maxima, which are triggerless islands in the parameter space.

Their illustration requires us to add one more parameter, the parameter that is responsible for verb-second effects (assuming this is one parameter). This parameter has the value 0 if the grammar is not V2, and 1 if it is. V2 has the potential to obscure the effects of the other parameters by requiring movement of the verb into second position, and some other constituent into first position. The parameter space can be diagrammed as in (21):

(21) Parameter space adding V2: 0 = -V2, 1 = +V2



Suppose the target is (0,1,0): SVO with no V2. Such a language has structures as in (22a):

- (22) Sample structures: target (0,1,0), source (1,1,1) is local maximum
- a. (0,1,0): S V, S V O, S Aux V, S Aux V O, Adv S V, Adv S V O, Adv S Aux V O
 - b. (1,1,1): S V, S V O, S Aux V, S Aux V O, Adv V S, Adv V O S, Adv Aux V O S, O V S, O Aux V S
 - c. Potential triggers are: Adv S V, Adv S V O, Adv S Aux V O

Suppose also that the learner is currently at (1,1,1): VOS +V2, with forms as in (22b). There are some sentences that look the same in both, even though their structures are different, e.g. *S V O*. So learners in (1,1,1) will not move when they hear any of these. It turns out that all the potential triggers are not in spaces accessible to the learner. For example, the target string *Adv S V* is not parsable by the learner; but none of the three moves it can make results in this string. It would have to change two parameters to see any improvement. Therefore, the learner is stuck at a local maximum.

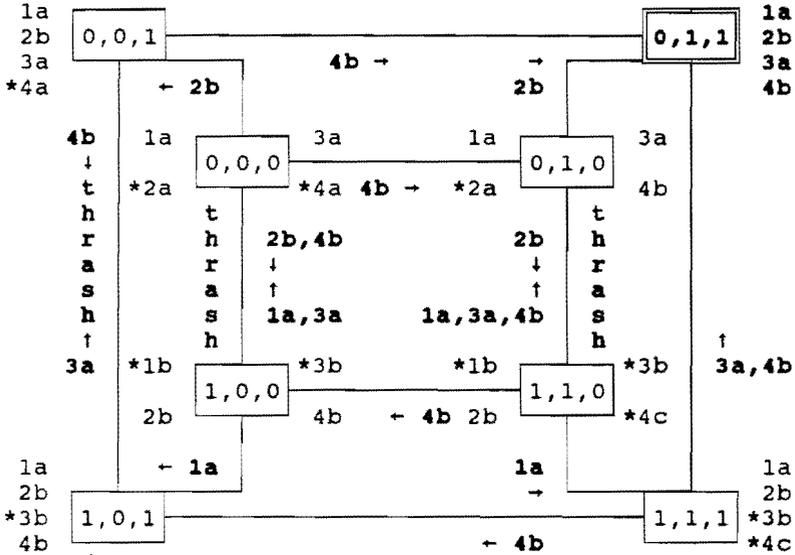
Local maxima, therefore, are a second threat to learners adopting the TLA. Another, mentioned theoretically by Frank & Kapur (1993) which I will illustrate with real parameters, is what we can call thrashing: the possibility that a learner can go back and forth between two or more states indefinitely. To illustrate this, we will look at the interaction of parameters of metrical theory.

To keep the problem manageable, let us assume for now that all parameters are fixed except for three. For concreteness, let's assume that main stress is on the right, feet are binary, and the rightmost syllable is extrametrical (so far, as in English nouns). The free parameters in the diagram are as follows: the first number is the value of the foot head parameter, which is 0 if set to Left, i.e. trochee, and 1 if set to Right, or iamb - in the diagram, the four boxes in the top half are trochees, the bottom four are iambs; the second parameter codes direction of construction of feet, either left to right = 0 on the left side of the diagram, or right to left = 1 on the right side; and the third number represents syllable quantity, either QI = 0 for the four inside boxes, or QS = 1 for the four outside ones:

(23) Parameter space: (Foot head, Direction, QI/QS)

Assume we keep fixed: main stress on the right, feet are binary, the rightmost syllable is extrametrical. Parameters in the diagram:

- a. Foot head: Left (Trochee) = 0 Right (Iamb) = 1
 b. Direction: Left to right = 0 Right to left = 1
 c. QI/QS: QI = 0 QS = 1



(24) Sample forms: a = stressed on 1st syllable, b = stressed on 2nd, etc.

	Target (0,1,1)	(0,0,1)	(1,0,1)	(1,0,0)	(0,0,0)
1. álgebra	a	álgebra	a	a	*b
2. agénda	b	agénda	b	b	*a
3. Cánada	a	Cánada	a	*b	*b
4. América	b	*Ámerica	*a	b	b

Suppose the target is (T, R, QS), i.e. (0,1,1) (as in English nouns). Four sample words are listed in (24). The correct stress patterns corresponding to the target are as in English, with stress on the first syllable in the first and third words, *álgebra* and *Cánada*, and on the second syllable in the second and fourth words, *agénda* and *América*. The notation 2b means that the second word is stressed on the second syllable; 4c means the fourth word is stressed on the third syllable, and so on. Next to each box are listed the forms generated by those parameter settings; asterisks indicate forms that are ungrammatical relative to the target. Forms in bold along the lines associated with arrows are words that could move the learner in the indicated direction.

Suppose that the learner is at (0,0,0). Of the four sample words, the learner has two correct, and differs in the second and fourth words: the learner's grammar generates and parses *ágena* and *Ámerica*, the target has *agénda* and *América*. Neither of these words is a local trigger, according to the definition, because they do not force the learner to change one parameter to its correct value. Suppose the learner hears the word 2b (*agénda*). There are two possible moves that will result in matching this form: one is to (0,0,1), which results in a correct change of the third parameter; but the learner could also successfully account for 2b (in appearance, if not in actuality) by moving away from the target to (1,0,0), losing the correct value of the second parameter. At (1,0,0), the learner again has two out of four words correct - this time the other two words. It can resolve them by moving back to (0,0,0), a return trip which can be taken many times. This situation arises in a number of cases here, and the more types of words we add, the worse the problem will be. If there are also some built-in preferences - i.e. if given a choice the learner will prefer certain routes - it is possible for the learner to prefer the thrashing paths, and wander the parameter space indefinitely.

Gibson & Wexler consider a number of ways of overcoming the problem of local maxima. They observe that local maxima arise when the learner mistakenly gets into a +V2 state, and that the problem would not arise if the learner could be prevented from trying +V2 until it has tried -V2 options. The solution they appear to favour is to adopt default states for parameters together with requiring that parameters be set in a partial order. Thus, their model becomes closer to ours in these respects. However, they still wish to preserve the essential features of the TLA. But over and above the technical difficulties, I think the TLA runs into some serious conceptual problems which I would now like to discuss.

The essential difference between the TLA and the cue-based learner has to do with the conception of what the learner is trying to do, and what constitutes a trigger, or cue. Under the TLA, the learner is trying to match the target input forms; hence, a trigger is an actual input form. A cue-based parameter learner, by contrast, is not trying to match the target forms, but uses them as sources of cues. Thus, whereas triggers in the TLA are extensional entities, actual forms that are part of E-language, cues are intentional entities. Similarly, the two learning models treat parameter dependencies in different ways. In the cue-based learner, parameter dependencies are fixed by UG, and reflect essential properties of the parameters themselves; in the TLA, dependencies between parameters arise purely as a result of accidental features of the input.

Further, Gibson & Wexler's account is predicated on the assumption that the target sentences come in the form of strings like those in (22), which have the form *S O V, Adv Aux S O V*, etc. Of course, the real target sentences that the learner sees are not in that form, but are actual utterances: *John kicked the*

ball, Je le vois, etc. A successful analysis of the complete sentence involves not just its syntactic word order, but everything else as well: phonology, morphology, etc. So the set of parameters in play are not just those affecting word order, but all of them. Now, chances are that a learner, especially at an early stage, is unable to match even simple sentences with respect to any component of the grammar: not just word order may be off, but also morphology, inflection, segmental phonology, metrical and prosodic properties, and so on. So if a learner hears a sentence of the form *SVO* and is currently at *SOV*, a change to *SVO* will still not result in a complete match of the whole sentence. Similarly, any change in another type of parameter - say, a morphological parameter - might result in a successful match there, but will not be considered a success by the learner, because the word order is still not right. Recall that a learner does not know what effect any given parameter has, and is not satisfied with improvements that fall short of success. So, taken literally, the TLA would not let a learner get off the ground. This is because it requires a chain of complete successes. In any one domain, such a chain could be compiled, perhaps, by starting with small targets which can be matched, and working up from there. But over the grammar as a whole no target is small enough to be perfectly matched, especially at early stages.

Let us suppose, then, that Gibson & Wexler intend that the learner can separate out the word order properties of a sentence from its other properties. Let's say that success must be total only within this domain. The problem with this is that the domain of facts influencing the setting of word order parameters is not limited to word order. Suppose that pronouns can be clitics, or not. So *Je le vois* could be an example of *SOV* (if the subject and object are not clitics), or *SV* (if the object is a clitic, so that there is no lexical material in the actual object position), or just *V* (if both subject and object are clitics):

(25) Representations of *Je le vois*

- | | | |
|----|--------------------------------------|-------|
| a. | Subject nonclitic, object nonclitic: | S O V |
| b. | Subject nonclitic, object clitic: | S V |
| c. | Subject clitic, object clitic: | V |

The learner's analysis depends on the current state of its grammar. The terms *S*, *V*, *O* are not primitives coming from the target, but are assigned by the learner, based on knowledge of the grammar. So we cannot limit the parameter space relevant to word order only to word order parameters. For example, if the learner is currently assuming *SVO* plus (25a) and hears the sentence *Je le vois*, it perceives the sentence as *SOV*. Now the learner can change word order and move to *SOV* plus (25a); or, without changing word order, it can move to *SVO* plus (25b). Clearly, word order parameters cannot be correctly set without taking into account clitic status and other such matters. But how does the learner know which group of parameters forms a subspace

within which matching must be perfect? It appears that, even on Gibson & Wexler's own account, the learner must have some idea about what sort of thing a parameter does.

3. A Genetic Algorithm (Clark 1990, 1992, Clark & Roberts 1993)

I would now like to look briefly at another approach to parameter setting developed by Clark (1990, 1992), and applied to V2 changes in the history of French by Clark & Roberts (1993).

Clark believes, as we do, that it is impossible to figure out which parameters are correct and which are incorrect when the learner's grammar does not give the right results.⁵ Unlike us, he does not believe it is possible to associate reliable cues to parameters. Rather, he believes that it is possible to assign a fitness measure which gives the relative fitness of a grammar compared to others. His idea is that parameter setting proceeds by way of a genetic algorithm which enacts a Darwinian competition of survival of the fittest. He proposes that a learner simultaneously considers a number of competing hypotheses. Initially, these hypotheses may be selected randomly. Each candidate is exposed to input which it attempts to parse. At the end of a round of parsing, the learner assesses how well each candidate did. The candidates are ranked according to their relative fitness. The fittest go on to reproduce candidates in the next generation, the least fit die out. Through successive iterations of this procedure, the candidate set presumably becomes increasingly fit, and converges toward the correct grammar.

This approach is at the opposite pole from the cue-based learner. The cue-based learner knows why it set a particular parameter to a particular value - because it saw or failed to see a cue - but it has no way to evaluate the overall success of its grammar. The learner following the genetic algorithm has no idea what contribution any particular parameter makes, but has an exquisite sense of the overall relative success of the grammar.

The proposed fitness measure is given in (26):

$$(26) \text{ Fitness metric (Clark 1992, Clark \& Roberts 1993)}$$

$$\frac{(\sum_{j=1}^n v_j + b\sum_{j=1}^n s_j + c\sum_{j=1}^n e_j) - (v_i + bs_i + ce_i)}{(n-1)(\sum_{j=1}^n v_j + b\sum_{j=1}^n s_j + c\sum_{j=1}^n e_j)}$$

where

v_i = the number of violations signaled by the parser associated with a given parameter setting;

s_i = the number of superset settings in the counter; b is a constant superset penalty < 1 ;

e_i = the measure of elegance (= number of nodes) of counter i ; $c < 1$ is a scaling factor.

There are three main terms in the metric. The first term, v , refers to the number of violations signaled by the parser associated with a given parameter setting. To the extent that a candidate parameter counter is wrong, there will be some sentences that it will fail to parse. Whereas in the Gibson & Wexler scheme the learner is told only if a hypothesis succeeds or fails, Clark proposes to quantify the failure in terms of the number of violations incurred. The sum term totals up all the violations created by all the candidates. Let's say there are five candidates who together total 50 violations. We then subtract from the total the number of violations incurred by any candidate i , and divide by the total (multiplied by $n-1$), and we have a measure of how well candidate i is doing compared to the rest. For example, if the candidate creates 10 violations, its score is $50 - 10 = 40$ divided by some number; if the second candidate creates 30 violations, its score is $50 - 30 = 20$ divided by that number, a lower score.

This term is the main component of the fitness metric. Clark builds in two other terms, scaled down by constant factors to make sure they are small relative to the v term. The second term is a superset penalty, designed to have the effect of the Subset Condition. If two candidates differ only in one subset parameter, and the target language is the subset language, they ought to score identically with respect to violations, since anything that the subset parameter value can parse the superset value can do, too. To keep the learner out of the superset, Clark builds in a penalty, the term s . So if two candidates both have 10 violations, they will have equal scores of 10 (roughly, forgetting about the subtraction and division). If candidate 1 has one superset parameter value, its score will be lowered by the constant term b . Candidate 2, let's say with 2 supersets, is penalized by $2b$. Clark (1990) suggests that b is very small, around 0.00002: it has to be much smaller than 1, since it should not count nearly as much as a violation. Whatever the number, it is enough to put candidate 1 ahead of its superset competitor. The third term, e , is another refinement, a measure of elegance, which Clark roughly equates with the number of nodes that a candidate hypothesis needs to parse the target sentences. This is to give the effect of economy, preferring simple grammars to more complex ones. Clark & Roberts argue (p. 342) that the empirical facts of French show that the constant c is greater than b , i.e. elegance counts more than subsetness.

I would like to raise some questions about the feasibility and plausibility of the fitness metric; lacking calculations and detailed proof, these remarks have to remain at a general level. Consider, for example, the subset penalty. This penalty refers to E-language (extensional) subsets, actual subsets calculated over sentences. Clark suggests that superset parameters are listed in a table, i.e. supplied to the learner by UG. In the cue-based learner, I-language subsets are a function of the learner's built-in learning path.

The Subset Principle, as formulated by Berwick (1985), is given in (27):

(30) Syllable Types in QI and QS Systems

	<u>QI Systems</u>	<u>QS Systems</u>
Stressed	Heavy, Light	Heavy, Light
Unstressed	Heavy, Light	- , Light

(31) QS: alternative cue, different subset relation

- a. Subset: QS languages are subset of QI languages.
- b. Default: Assume QS.
- c. Cue: Look for an unstressed heavy syllable.

This approach to determining quantity sensitivity is not particularly good, for it is easily fooled. Nevertheless, the example illustrates that subset relations need not be construed in terms of extensional languages. In a cue-based learner, the notion is intensional - the cues determine the subset relation. But the learner following the genetic algorithm has no idea about what any individual parameter does, and yet does know which parameters create extensional supersets. Why such an extensional relation should be part of UG needs to be explained.

It is also not clear whether a useful fitness metric can be devised for every aspect of the grammar. Consider the metrical parameters, for example. A look back at (23) shows that there is no clear correlation between the number of words correct and the distance from the target. And there are many much more dramatic examples. Imagine a language with simple alternating stress. If we change the foot parameter from trochee to iamb, every syllable will receive the wrong stress. If we then move further from the target by changing other parameter values in the wrong direction, our performance - in terms of syllables or words correct - will appear to improve. In general, depending on the situation, small changes can have big effects and big changes can have small effects. It remains to be shown that the fitness metric can provide a useful guide to a learner in these circumstances.

4. Recursive Constraint Demotion Algorithm (Tesar & Smolensky 1993)

Finally, I would like to consider the Recursive Constraint Demotion (RCD) learning algorithm proposed by Tesar & Smolensky (1993) for learning how to rank constraints in Optimality Theory. They characterize the learning problem as in (32):

(32) The learning problem (Tesar & Smolensky 1993)

The initial data for the learning problem are pairs consisting of an input and its well-formed (optimal) parse.

By input, they mean an underlying form known to the learner, not input from the target language which the learner is trying to match. They give an example

of a learner learning a language which allows only CV syllables. They assume a number of universal constraints on syllable structure, some of which are given in (33). These constraints may have language-particular rankings: lower-ranking constraints may be violated to preserve higher-ranking ones:

- (33) Some CV syllable structure constraints
- a. ONS Syllables have onsets
 - b. -COD Syllables do not have codas
 - c. PARSE Underlying material is parsed into syllable structure

They write (p. 8), "For example, the learner...might have as an initial datum the input /VCVC/ together with its well-formed parse $\cdot\Box V.CV.<C>...$ Together with this single piece of explicit positive evidence comes a large mass of implicit negative evidence. Every alternative parse of this input is known to be ill-formed;" for example, the parse $*\cdot\Box V.CVC.$ is ill-formed. In (34), \Box designates an epenthetic segment; $< >$ designates a (deleted) segment with no phonetic representation; $\alpha < \beta$ indicates that form α is less harmonic than β ; $C_1 >> C_2$ indicates that constraint C_1 dominates C_2 :

- (34) Example: syllable structure
- a. Underlying form: /VCVC/ (e.g. /amuk/)
 - b. (Optimal) surface parse: $\cdot\Box V.CV.<C>.$ (e.g. [tamu])
 - c. Alternative parse $*\cdot\Box V.CVC.$ (e.g. *[tamuk])
 - d. Conclude: $\cdot\Box V.CVC. < \cdot\Box V.CV.<C>$
 - e. Hence: -COD $>>$ PARSE

Thus, with respect to the unknown constraint hierarchy, the learner knows (34d) that (34b) is better than (34c). From this, the learner can conclude (34e) that -COD dominates PARSE in this language. The RCD algorithm then demotes PARSE relative to -COD. Recursive applications of this algorithm, the details of which we need not go into here, rank all the relevant constraints.

To rephrase Tesar & Smolensky's statement of the problem in other words, they are assuming that before the learner has any idea how to rank the constraints, it knows that a word whose phonetic representation is, say, [tamu] has a certain surface syllable structure as well as an underlying representation, say, /amuk/. If indeed the learner already knows this, then it is true that it can deduce that the constraints are ranked as they are. As to how the learner acquires underlying representations, this is a problem for everyone, and I do not question this assumption here. However, Tesar & Smolensky do not explain how it is that the learner can know what the well-formed surface representation is before having ranked the constraints.

In the example given, the surface parse could appear to be fairly transparent. However, we have seen that representations, even surface

representations, are not fixed from the outset, but are gradually developed as the learner acquires more of the grammar. This is one way to solve the Epistemological Problem. With respect to syllable structure, there are many cases where the correct surface parse is not obvious, if we allow some segments to sometimes appear in the nucleus and sometimes in the coda, or sometimes in a coda and sometimes in an appendix, and so on. But the Epistemological Problem in Tesar & Smolensky's algorithm can be seen in its full force when we turn to an example from metrical theory.

Imagine that the learner encounters the word *agénda* before knowing how any constraints are ranked. The learner must assign a surface parse to this form; however, any of the parses in (35) may be possible:

- (35) Some possible metrical parses of *agénda*, metrical system unknown
- | | | | | | | | | | |
|----|---------|----|---------|----|---------|----|---------|----|---------|
| a. | x | b. | x | c. | x | d. | x | e. | x |
| | x | | x | | x | | x | | x |
| | x x x | | x x x | | x x x | | x x x | | x x x |
| | [S S] S | | S [S S] | | L [H] L | | [L L] L | | L [L L] |

The correct parse, by Tesar & Smolensky's assumption, is already known before any constraints have been ranked - but, assuming the parsing is not given directly by the acoustic signal, how can this be?

Suppose we drop the assumption that the surface representation is known beforehand: how would the learning algorithm go? The learner can't rank any constraints because it doesn't know which candidate wins.

I will not attempt to solve this problem here, but let's consider what kinds of solutions there may be:

1. The surface parse may be given directly in the signal, and so is available from the start. Then, no theory would have any problem; however, there is no evidence for this assumption.

2. The learner arrives at the representations through some means other than constraint ranking, say by some set of learning principles, P. So, from the initial state, the learner applies P and arrives at the stage which Tesar & Smolensky assume is the input to constraint ranking, call this stage S_1 . The questions to ask now are: could the learner have arrived at S_1 without having already ranked the constraints? If no, i.e. if S_1 itself involves constraint ranking, then Tesar & Smolensky's algorithm is superfluous. If yes, i.e. the learner is at S_1 but has ranked no constraints, then what role do the constraints play? So it seems that the danger is that either the algorithm or the constraints are superfluous. The direction I would pursue is to suppose that S_1 itself involves constraint ranking, i.e. that the establishing of representations and constraint-ranking influence each other, and that both are in motion in the course of acquisition.

5. Conclusion

To conclude, I think that an ordered cue-based learner of the type sketched in (2) is the most promising approach to solving the fundamental problems of grammar acquisition set out in (1). The next step is to attempt to incorporate the results of the work of Fikkert (1994) and others on the actual path of development followed by children. These data show even more forcefully that the target input forms to the learners are moving targets, not given in advance of applying a learning algorithm. Rather, adult representations are mental constructs, themselves the results of the acquisition of grammar.

Notes

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¹ For further discussion of various aspects of this learning model see also Dresher (1991/to appear, 1992, 1994).

² See Nyberg (1991a, b), for detailed discussion of the merits and drawbacks of determinism. He argues for a limited nondeterministic learning model.

³ We abstract away here from the effects of extrametricality, which can potentially change the location of the effective edge; for further discussion, see Dresher & Kaye (1990) and Dresher (1991/to appear).

⁴ See also Frank & Kapur (1993) and Niyogi & Berwick (1993) for refinements and further investigation.

⁵ A different approach motivated in part by the Credit Problem is taken by Kapur (to appear), but limitations of space preclude us from discussing it here.

⁶ For an overview of the complexities of this parameter, see the articles collected in Jaeggli & Safir (1989).

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A parametric acquisition model for stress*

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0. Introduction

Parametric approaches to metrical theory have been quite successful in their application to machine learning (cf. Drescher & Kaye 1990, Drescher 1992, Gillis *et al.* 1992, Daelemans, W. *et al.* 1992). Drescher and Kaye have shown that a *machine* equipped with metrical theory – the representation of UG – is able to learn the grammar of a language from the data. That is, on the basis of cues present in the data, it can set the relevant parameters correctly. What this shows is that parametric theories of stress in principle obey the learnability criterion; they are able to solve the *logical problem of acquisition* (Hornstein & Lightfoot 1981), sketched in (1):

(1) Learning Theory
 DATA <-----> UNIVERSAL GRAMMAR <-----> GRAMMAR

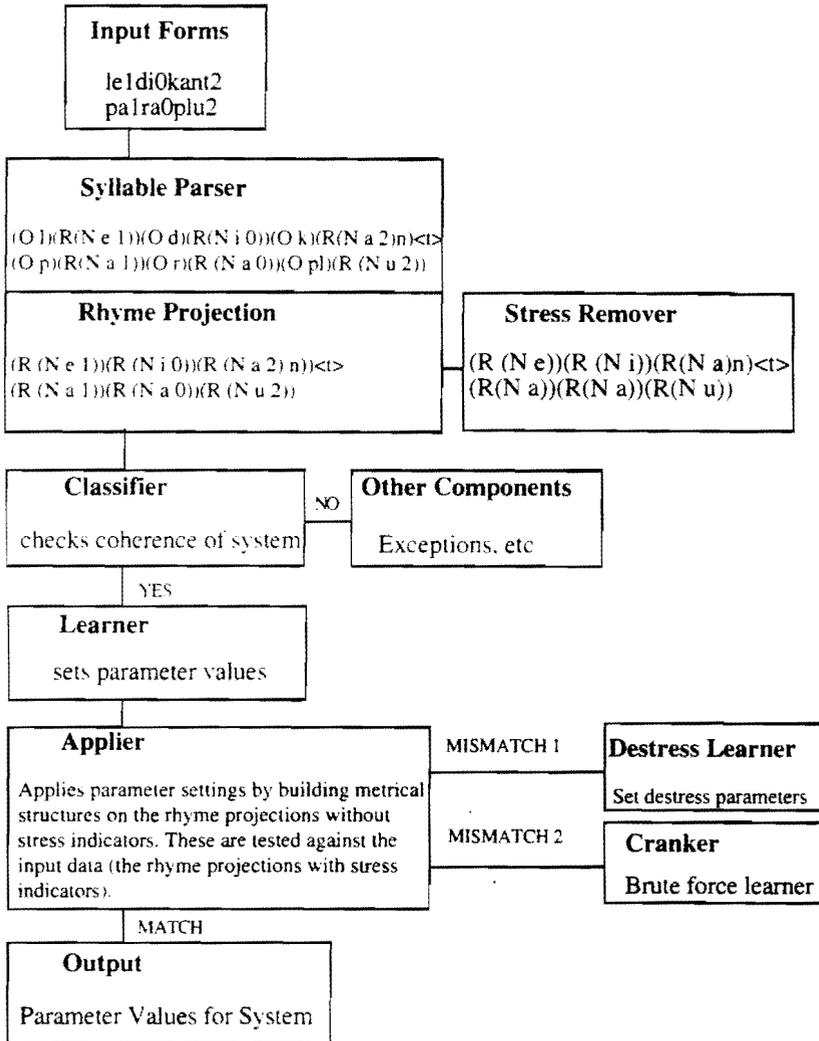
However, this is not to say that parametric learning models are also good models for *child* language acquisition; they do not necessarily solve the *developmental problem of acquisition*: how does language development take place in real time? This problem is largely ignored in these models. In this paper I will relate both problems.

The study is based on spontaneous longitudinal data from 12 children acquiring Dutch. The children, aged between 1;0 and 1;11 years at the start of a one-year period of data-collection, were recorded at two-week intervals. Although the main focus is on Dutch data, the account makes interesting predictions for the acquisition of prosodic structure in general.

I first give a description of the model proposed by Drescher & Kaye (1990). Then, I describe the different stages in the children's acquisition of the Dutch stress system. Subsequently, I investigate whether the model proposed by Drescher & Kaye can also account for *child* language acquisition. It will be shown that there are many differences between machine learners and children, and these differences have to be incorporated into the model in order to arrive at a more realistic model of language acquisition.

1. Drescher & Kaye's stress learning model

Drescher & Kaye's approach follows the 'principles and parameters' model of Chomsky (1981a, b). In such a model the learning process consists of fixing the parameters that underlie stress systems on the basis of the input received. It is assumed that each parameter has the default or unmarked value in UG, which is the value for which positive evidence is not (or least) available. The learner's task is to look for positive evidence for the marked value. If no evidence is found, the parameters are kept in the default value; i.e. nothing happens. Otherwise the parameter is set to the marked value. However, once a parameter is set to the marked value, it cannot be changed again, since the learner in the model is deterministic. The model is sketched in (2):

(2) *The Structure of Dresher & Kaye's Learning Model*

The data or input forms that are sent to the machine learner, go through several stages of pre-processing before they become the input to the stress-learning system. The input forms are first segmented and coded for degree of stress, where 0 means no stress, 1 secondary stress, and 2 main stress. Subsequently they are sent to the syllable parser, which separates onsets (O) and rhymes (R). Only the rhyme

projections are kept, since onsets do not contribute to weight. Before these forms become the input to the learning system, they first have to pass the classifier. The classifier's task is to test the transparency of the system. If there are no obvious conflicts, the forms are sent to the learner. The learner is equipped with the set of stress parameters, given in (3), their default values and cues to detect the marked values. The default values assumed by Drescher & Kaye are given in the first column; the default values based on the present study are given in the second column, and the values required for Dutch, largely based on analyses of Trommelen & Zonneveld (1989, 1990), the grammar that the children in this study ultimately need to learn, are given in the third column.

(3) <i>Parameters of metrical theory</i>	<i>D & K</i>	<i>Fikkert</i>	<i>Dutch</i>
• <i>Quantity-Sensitivity (QS) Parameter</i> ¹ Feet are	QI	QI	QS
• <i>Weight Parameter</i> ² Feet are QS to the	Rhyme?	?	Rhyme?
• <i>Iterativity Parameter</i> ³ Feet are iterative	Yes	No	Yes
• <i>Extrametricity (EM) Parameter</i> ⁴ There is an extrametrical syllable	No	No	Yes
• <i>Edge of Extrametricality (EoE) Parameter</i> The extrametrical syllable is on the	—	?	Right
• <i>Binary/Unboundedness (B/U) Parameter</i> ⁵ Feet are	Binary	Binary	Binary
• <i>Main Stress Parameter</i> ⁶ The word-tree is strong on	—	Right	Right
• <i>Obligatory Branchingness (OB) Parameter</i> The main stress foot must branch	?	No	Yes
• <i>Directionality Parameter</i> ⁷ Feet are built from the	—	Right	Right
• <i>Headedness Parameter</i> Feet are strong on the	—	Left	Left

The learner in the model fixes the parameter values on the basis of cues in the data. The set of parameter values forms the learner's hypothesis about the grammar of the language. The applier receives this set of parameter values from the learner to build metrical structures on the rhyme projections without stress indicators. The derived output forms are then checked against the input forms (the rhyme projections with stress indicators). If the parameter settings received from the learner are correct, there will be a complete match between the output and the input forms. The learner has been successful. If input and output forms do not match the forms are either sent to the destress learner, or to the cranker, which is an unintelligent brute force learner which simply looks for all other legal settings of the parameters until it finds the set of parameters in accordance with the input data. It is clear that ideally the model would not have to make use of this cranker.

To summarise, the learner in the model is an instantaneous learner: it fixes all parameters at the same time. As long as the input data contain the relevant cues the machine learner does quite well in determining the parameter values. However, especially to determine the values for the directionality and headedness parameters the learner needs long input words. Let us now turn to the child acquisition data.

2. Patterns in the acquisition of stress by Dutch children

One of the most intriguing results when studying the acquisition process is how fast and systematic it really is. At the initial stage of acquisition (stage 0) the child only produces monosyllabic forms, which mostly correspond to monosyllabic adult target forms. Longer words are simply not selected for production by the child; it seems that the child has a *selection strategy*: only those words that fit into the child's grammatical system are selected for production (cf. Schwartz & Leonard 1982). However, disyllabic words appear relatively early in the child's production vocabulary. Disyllabic adult words with initial stress are produced correctly insofar as stress and the number of syllables is concerned from a very early stage, as shown in (4a), but disyllabic words with final stress show a clear pattern of development, as shown in (4b):

(4)	Adult target	Stage 1	Stage 2	Stage 3	Stage 4
a.	baby 'baby' /be:bi:/	[be:bi:]	[be:bi:]	[be:bi:]	[be:bi:]
	auto 'car' /o:to:/	[to:to:]	[o:to:]	[o:tə]	[o:to:]
b.	gitaar 'guitar' /χi:ta:r/[ta:]	[ta:]	[si:ta:]	[hi:ta:ɹ]	[hi:ta:ɹ]
	giraf 'giraffe' /fi:raf/	[haf]	[fi:af]	[si:a:f]	[si:ra:f]

Of the latter group of words, which form more than one foot in the adult grammar, only the final monosyllabic foot is produced at the first stage. At the second stage both target syllables are produced, however, they are realised with a trochaic stress pattern. In most cases the initial unstressed syllable of the target word is concatenated to the left of the monosyllabic form of stage 1, as in (4b). However, sometimes this syllable is adjoined to the right, as in (5a). A second syllable can also be produced by reduplication, as in (5b). This shows that the child builds on its own previous representation of the word.

(5) a.	<i>Metathesis</i>			
	papier 'paper' /pa:pi:r/	→	[pi:pa:]	Catootje (1;10.25)
		→	[pi:pa:j]	Catootje (1;11.10)
b.	<i>Reduplication</i>			
	ballon 'balloon' /bɑ:lɔn/	→	[pə'pɔm]	Noortje (2;5.23)
	konijn 'rabbit' /ko:nɛin/	→	[ke'kein]	Noortje (2;7.2)
	ballon 'balloon' /bɑ:lɔn/	→	[pa:'bɔn]	Catootje (1;11.10)

At stage 1 and 2 the child's forms seem to consist of exactly one foot. At stage 3 each syllable forms a foot on its own, resulting in two feet, which are produced with an equal amount of stress. This clearly shows that the child has not yet considered the main stress parameter. Finally, at the fourth stage, the form is produced correctly, as far as the number of syllables and stress is concerned.

One important observation is that the stressed syllable of the target word is always produced; however, it need not be produced as stressed by the child, which is clear from the data of stage 2 in (4b). This shows that the adult foot structure is not copied along with the segmental material, and that stress and segmental structure are largely independent.

Trisyllabic and longer words are initially avoided by the child, probably due to the selection strategy. However, when they enter the child's production vocabulary, they show the patterns in (6). The forms in (6a), with penultimate stress, are similar to the forms in (4a): at the first two stages one trochaic foot is produced. At the third stage a second foot is produced, and both feet receive an equal amount of stress. At the fourth stage both stress and the number of syllables are as in the adult target forms.

The words in (6b) and (6c), which differ in the location of main stress in the adult forms, show a similar developmental pattern. At the first stage, the rightmost foot is produced *independent of the stress level in the adult word*. It is not the main stressed foot, but the rightmost foot that is produced. Apparently, the degree of stress does not matter at this stage; it seems that the child only makes a distinction between stressed and unstressed syllables, not between main and secondary stressed syllables. At stage 2, the initial syllable of the target word is adjoined to the form of stage 1, and the resulting string of segments is produced as a trochee. Again, the child builds upon its own previous representation of the word. At stage 3 two feet are produced, both with an equal amount of stress. At stage 4 main stress is assigned, but to the rightmost foot, but to the rightmost *branching* (i.e. disyllabic) foot.

(6)	Adult target	Stage 1	Stage 2	Stage 3	Stage 4
a.	pantoffel	[tɔfhi:]	[tɔfɔ]	[pantɔfɔ]	[.pantɔfɔ]
	'slipper' /pantɔfəl/				
	spaghetti	[hɛtə]	[hɛtə]	[pa:hɛtə]	[pa:hɛtə]
	'spaghetti' /spa:ɣɛti:/				
b.	telefoon	[fɔm]	[tɪfɔ:m]	[te:nə'ʃɔ̃n]	[te:lə,fo:m]
	'telephone' /te:lə fo:n/				
	krokodil	[di:w]	[ko:wɪ]	['kɛkɛ'kɪw]	['ko:kə,dɪw]
	'crocodile' /kro:ko:dɪl/				
c.	olifant	[fan]	[o:fan]	[o:fi:fan]	[o:fi:fant]
	'elephant' /o:li:fant/				
	kangoeroe	[kou]	['ka:ku:]	['ka:kə ru:ŋ]	['koku:ju:ŋ]
	'kangaroo' /kæŋgə ru:/				

For the data in (6b) there is a fifth stage in which the stress pattern is as in the adult words: final main stress, and antepenultimate secondary stress, as can be seen in (7):

(7)	Stage 5		
	krokodil 'crocodile' /kro:ko:dɪl/	→	[kRO:RO:dɪw] Leon (2;4.15)
	papegaai 'parrot' /pa:pə'ɣa:j/	→	[pəpə'ɣeij] Leon (2;4.15)
	apparaat 'machine' /a:pa:ra:t/	→	[apə'ra:t] Leon (2;8.5)
	Amsterdam <i>iden</i> /amstər'dam/	→	[ɛmstə,dɛm] Tirza (2;3.27)
	koningin 'queen' /ko:nɪŋn/	→	['ko:nɪŋŋ] Tirza (2;5.5)

Moreover, some children have an intermediate stage between stage 2 and 3: a stage at which the child's form is still disyllabic, but already may contain two feet. Data illustrating this intermediate stage 3' are given in (8):

- (8) *Stage 3'*
- a. *Trisyllabic targets with initial main stress*
- | | | | |
|----------------------------------|---|-----------|----------------|
| caravan 'caravan' /kəɾəˈvæn/ | → | [keːʋfɪn] | Robin (2;2.27) |
| kangoeroe 'kangaroo' /kəŋgəˈruː/ | → | [kaːkuːŋ] | Tom (1;6.11) |
| olifant 'elephant' /oːliːfənt/ | → | [oːfənt] | Tom (1;7.23) |
| olifant 'elephant' /oːliːfənt/ | → | [oːfənt] | Eva (1;9.8) |
- b. *Trisyllabic targets with final main stress*
- | | | | |
|------------------------------------|---|------------|-----------------|
| pelikaan 'pelican' /peːliːkaːn/ | → | [keːkaːm] | Tom (1;7.9) |
| parachute 'parachute' /paːraːʃyːt/ | → | [paːplət] | Tom (1;7.9) |
| muzikant 'musician' /myːziːkənt/ | → | [tiːkʰɪnt] | Tirza (1;11.19) |
| boerderij 'farm' /buːrdəˈrei/ | → | [pyːhaːj] | Tirza (2;0.18) |

The data representing stage 3' can only be understood if we assume that the child's segmental representation of the words does not change from stage 2 to stage 3', but the child now realises two feet, i.e. the prosodic structure changes, and therefore, the child produces each syllable as a foot. Again, these data show the importance of the child's own previous representations of the words, and illustrate that prosodic and segmental structure are largely independent.

3. Discussion

An important difference between children and machine learners is that children are incremental learners: they go through several stages before they reach the final steady state, whereas machines fix all parameters at once; i.e. they are instantaneous learners. How can we account for the different stages, and especially for the *transitions* from one stage to the next? And how do the data fit into the model proposed by Dresher & Kaye?

If the model also works as a model of child language acquisition, errors in child language cannot be based on wrongly fixed parameter values. Moreover, the model predicts that children start out assuming quantity-insensitive binary feet, parsed iteratively, since these are the default values. Children acquiring Dutch must at some point change the setting for the QS parameter and arrive at quantity-sensitive binary feet.

We saw that not all disyllabic target words are produced as disyllabic by the child. However, if the child produces disyllabic words, stress is invariably initial. We also saw that all forms of stage 1 are maximally disyllabic and consist maximally of one foot. The fact that all output forms are at most one foot, even though the input forms can contain more than one foot, is evidence for the default value [No] for the iterativity parameter. Thus, at stage 1 the child's template is extended from a monosyllabic to a disyllabic template, which is exactly one foot. Since the input contains both trochaic and iambic words, the child has to make a decision about headedness and direction of parsing, since not both types of disyllabic target words can be one foot: one has to be more than one foot. The different settings for the directionality and headedness parameters predict different results, as is illustrated in (9):

(9)	<i>Target words:</i>	$(\sigma_s \sigma_w)_{Wd}$	[be:bi:]	$(\sigma_w \sigma_s)_{Wd}$	[fi:raf]
a.	D:LR, H:L	$(\sigma_s \sigma_w)$	[be:bi:]	(σ_w)	[fi:]
b.	D:RL, H:L	$(\sigma_s \sigma_w)$	[be:bi:]	(σ_s)	[raf]
c.	D:RL, H:R	(σ_w)	[bi:]	$(\sigma_w \sigma_s)$	[fi:raf]
d.	D:LR, H:R	(σ_s)	[be:]	$(\sigma_w \sigma_s)$	[fi:raf]

Where D = Directionality, and H = Headedness, L = Left, R = Right

Only the settings of (9b) explain the observed pattern characterising stage 1 in child language. The child seems to have left-headed feet parsed from the right, or from the word *ending*. Biases towards word endings are commonly found in the literature on child language (cf. Slobin 1973). They are often viewed as performance properties, but I hypothesise that they reflect a universal default value, [Right-to-left], for the directionality parameter. The child language literature also often refers to biases to attend to stressed syllables (cf. Echols 1987, 1988). These two biases together seem to guide the child in discovering the basic foot type of the language, as shown in (10). (10a) shows the results on the assumption that the first stressed syllable from a word edge and the word edge itself form the properties on the basis of which the cue for the directionality parameter has to be defined. Not only does it make the right predictions, this analysis does not need to make reference to 'skipping', as in (10b), or illegitimate feet, as in (10c). Moreover, the direction of parsing can be determined on the basis of disyllabic words, as shown in (9). This is a particularly important result, since children seem to learn stress on the basis of short words, unlike Dresher & Kaye's stress learner, which need to receive quite long words to determine the values for the directionality and headedness parameters.

(10)a. *Parse from word edge until a stressed syllable is included in the parse*

D:LR $(\sigma_s) \sigma_w \sigma_s \sigma_w$ D:RL $\sigma_s \sigma_w (\sigma_s \sigma_w)$

D:LR $(\sigma_w \sigma_s) \sigma_w \sigma_s$ D:RL $\sigma_w \sigma_s \sigma_w (\sigma_s)$

b. *Parse from first stress until another stress is found*

D:LR $(\sigma_s \sigma_w) \sigma_s \sigma_w$ D:RL $\sigma_s (\sigma_w \sigma_s) \sigma_w$

D:LR $\sigma_w (\sigma_s \sigma_w) \sigma_s$ D:RL $\sigma_w \sigma_s (\sigma_w \sigma_s)$

c. *Parse from edge until the second stressed syllable*

D:LR $(\sigma_s \sigma_w) \sigma_s \sigma_w$ D:RL $\sigma_s (\sigma_w \sigma_s \sigma_w)$

D:LR $(\sigma_w \sigma_s \sigma_w) \sigma_s$ D:RL $\sigma_w \sigma_s (\sigma_w \sigma_s)$

Another interesting result of (10a) is the following: iambic feet cannot be parsed from right to left: they can only occur if the direction of parsing is from left to right. If children indeed have a bias towards the end of words and a bias towards stressed syllables only disyllabic feet with initial stress and monosyllabic feet are generated. This approach makes interesting predictions for the acquisition of both iambic languages, and languages in which the directionality of foot parsing is from left to right.⁸ I do not know whether these predictions are borne out, since I do not know any acquisition studies on such languages, but the hypotheses are testable.

There exists, however, independent evidence for the default value [Left-headed] for the headedness parameter. Both Prince (1986) and Hayes (1987) argue that the only QI foot is a syllabic trochee: a left-headed foot consisting of two syllables. Iambic systems seem to be QS without exception. As we will see, children have QI insensitive feet at stage 1 and 2, which have to be trochaic assuming the asymmetric foot typology. Similarly, parsing from the right results in trochees, whereas parsing from the left would result in iambs, which are not favoured for QI systems.⁹

On the assumption that the default values are as stated in (3) (second column), the child has not yet set any of the parameters to the marked value at this stage. S/he parses one binary foot from right to left. These feet are by default QI. The motivation for this default value comes from several facts. First, whereas both rhyme structures and the number of syllables are important for QS languages, QI languages only consider the number of syllables, and therefore require less knowledge from the learner. Second, if we look at the data from stage 2 we see that there appear heavy and superheavy stressless syllables, clearly indicating that the system is QI. If QS were the default value, the parameter is set to the marked value QI at stage 2. However, children would never arrive at the required value QS, on the assumption that learning is deterministic. Third, there is a strong positive cue to detect QS, namely, the existence of words in the input with an equal number of syllables but a different stress pattern.

It is important to note that, although this cue is already available at stage 1, the QS parameter does not seem to play a role yet. This illustrates another difference with the machine learner, where all parameters are relevant from the start. That not all parameters and cues are used from the start becomes particularly clear, if we compare the child learner with the machine learner. Suppose that the child builds metrical trees on the segmental strings of the input forms to test the current settings of the parameters. If the child acts like the machine learner we expect that disyllabic target words with final stress will be realised as disyllabic words with initial stress, given the default values. Although there is a stage at which this prediction is borne out, this is not the first stage in the development. At the first stage these words are typically reduced to the final stressed (monosyllabic) feet of the adult target. Only when stress is not assigned to the *whole* string of segments of the adult targets, but only on the segments in the final foot, do we expect the forms typical of stage 1. In other words, not the whole adult input form is considered, but only part of it, another crucial difference with the machine learner. If only the final foot is considered as input to the learning system, then the output forms created on the basis of the parameter settings match the input forms, and thus, the child will not change any parameters, since there is no evidence for the marked settings. The relevant parameters (all still in the default value) are given in (11). Not all parameters are included, since not all of them are relevant at this stage.

(11) **Relevant parameters still in the default value at stage 1**

<i>Directionality parameter</i>	Feet are built from the	[Right]
<i>Headedness parameter</i>	Feet are strong on the	[Left]
<i>QS parameter</i>	Feet are QS	[No]
<i>EM parameter</i>	There is an extrametrical syllable	[No]
<i>B/U parameter</i>	Feet are	[Binary]
<i>Iterativity parameter</i>	Feet are built iteratively	[No]

Although no stress errors are detected at stage 1, the child may discover, by comparing the adult target forms with the output forms, that they do not match in the number of syllables. To solve this mismatch between input and output, the next step in the development is to produce an extra syllable in words that have one syllable in the output form, and two (or more) in the adult target form (stage 2). When metrical structures are built on the resulting disyllabic forms, the output forms will be QI left-headed binary feet, because, so far, there has been no evidence that any of the stress parameters are inappropriately set. Therefore, the parameter values at stage 2 are the same as at stage 1 (11).

When the output forms of stage 2 are compared with the target forms, the child may detect that disyllabic and trisyllabic targets with final stress are produced with the wrong stress pattern. At stage 3 the child has detected disyllabic words with initial *and* final stress. In other words, the cue for the QS parameter is found. Therefore, the child now sets the QS parameter to the marked setting [QS]. Children seem to regard any closed syllable as heavy, since all closed syllables, whether heavy or superheavy, are stressed in the child's output forms. Now the child's production forms can contain two feet. It seems that the iterativity parameter is set to its marked value [Iterative] at stage 3. Although now the main stress parameter could be relevant too, it is clear from the fact that the child produces forms consisting of two feet with an equal amount of stress indicates that the parameter is simply not considered yet.

Dresher & Kaye predict that, once children have decided that the language they are learning is QS, the unmarked value for the B/U parameter, 'feet are [Binary/Unbounded]', is set to the default value [Unbounded]. However, the data do not give evidence for a stage at which the child assumes that the language has unbounded feet. Rather, it seems that children still only allow maximally binary feet, parsed exhaustively from right to left.

To summarise, at stage 3 the child has set the parameters in (12a) from the default to the marked values. I hypothesise that the remaining parameters in (11), which all had the default value at stages 1 and 2, now become fixed in the default value. They are no longer subject to change.

(12) **Parameters set at stage 3**

<i>QS parameter:</i>	Feet are QS	[Yes]
<i>Weight parameter:</i>	Closed syllables are heavy	[Yes]
<i>Iterativity parameter:</i>	Feet are iterative	[Yes]
<i>B/U parameter:</i>	Feet are	[Binary]

When the level stress forms of stage 3 are compared with the target forms, the child may discover that there is a difference between main stress and secondary stress in the adult forms; therefore s/he may focus on the location of main stress.

Since the disyllabic target words with final stress are now produced correctly, we could conclude that children have learned that main stress is assigned to the rightmost foot. However, we would expect to find main stress on the rightmost foot in longer words too. This prediction is not borne out by the data from most children. Rather, it looks as if the children have discovered that the first *branching* foot from the right receives main stress. That is, main stress is assigned to the right. However, in addition to the main stress parameter, there seems to be an Obligatory Branchingness parameter. The child language data in (6b, c) seem to suggest that by default main stress feet are branching, i.e. disyllabic. The cue for the marked value [No] would then be the existence of final stress on a monosyllabic foot in the

presence of a disyllabic foot, i.e. words as in (6b). However, there is some evidence from Leon's data, given in (13), that the default value is [No].

(13) *Leon's data arguing for default value [No] for the OB parameter*

a.	ooievaar 'stork' /o:ʝə va:r/	→	[o:fa'fa:ɹ]	Leon (1;10.1)
	krokodil 'crocodile' /kro:ko:dul/	→	[titi:ty:ɹ]	Leon (1;10.15)
	pelikaan 'pelican' /pe:li:ka:n/	→	[me:ka:'ka:n]	Leon (1;10.15)
b.	olifant 'elephant' /o:li:fant/	→	['o:nə'fənt]	Leon (1;11.12)
	ooievaar 'stork' /o:ʝə va:r/	→	[o:fi:fa:ɹ]	Leon (1;11.12)
c.	krokodil 'crocodile' /kro:ko:dul/	→	['kro:ku:dul]	Leon (2;2.4)
		→	['ko:kə'dul]	Leon (2;2.4)
	Amsterdam <i>idem</i> /amstər'dəm/	→	['amstə'dəm]	Leon (2;3.18)
d.	krokodil 'crocodile' /kro:ko:dul/	→	['kro:ko:'dɹ]	Leon (2;4.15)
	papegaai 'parrot' /pa:pə'χa:ʝ/	→	[pəpə'χeiʝ]	Leon (2;4.15)
	apparaat 'machine' /a:pa:'ra:t/	→	[əpə'ra:t]	Leon (2;8.5)

Leon's data in (13a) seem to indicate that the default value for the OB parameter is [No], and main stress is therefore assigned to the final foot of the word. When he discovers the cue for the marked value of this parameter, the existence of main stress on the antepenultimate syllable, all forms are subject to change. However, the words in (13c) are now incorrectly produced with antepenultimate stress. When these forms are checked against the input data, a mismatch is discovered. However, since the parameter is already set to the marked value, there is no way to resolve this mismatch. Therefore, the forms in (13c) are marked as exceptions. Since most trisyllabic forms with final main stress end in a superheavy syllable, this may lead to the discovery of the difference between heavy and superheavy syllables. Words like *krokodil*, however, have to be marked as exceptions to the OB parameter. This issue needs further investigation, especially with older children, since the concept of superheavy syllables was still not acquired by most children in this study at the end of the recording period.¹⁰

To conclude, at stage 4 the remaining parameters are set. In other words, the child has more or less mastered the stress system of the language, since all parameters now have the value as indicated in (3). They are set in the order indicated in (14):

(14) **Parameters set at stage 4**

<i>Directionality Parameter:</i>	Feet are built from the	[Right]
<i>Headedness Parameter:</i>	Feet are strong on the	[Left]
<i>EM Parameter:</i>	There is an extrametrical syllable	[No]
<i>QS Parameter:</i>	Feet are QS	[Yes]
<i>Weight Parameter:</i>	Closed syllables are heavy	[Yes]
<i>Iterativity Parameter:</i>	Feet are iterative	[Yes]
<i>B/U Parameter:</i>	Feet are	[Binary]
<i>Main stress Parameter:</i>	The word-tree is strong on the	[Right]
<i>OB Parameter</i>	Main-stressed feet must branch	[Yes]

4. Conclusions

To conclude, it has been shown that the model proposed by Drescher & Kaye is not only successful as a model for machine learning; it also sheds more light on child language acquisition. On the assumption that learning is deterministic, and that UG contains, beside a set of principles and parameters, a set of cues associated with the parameters, children are able to set the parameters to the values required by the language they are learning on the basis of simple data, and they basically do so before the age of 3. However, there are also important differences between machines learners and children.

First, children are incremental learners: they go through several intermediate stages before they reach the final steady state, whereas machines fix all parameters at once: i.e. they are instantaneous learners. The incremental learning property can be implemented in the model by making the learning module recursive.

Second, whereas a machine learner takes all parameters into consideration, children may first focus on some parameters, and only focus on others when they are 'ready' to use the cues, even when cues are available at an earlier stage.

A third difference with the machine learner is that children are able to use a selection strategy: they only select certain input words for production. The machine learner has no other choice than to consider the full range of data.

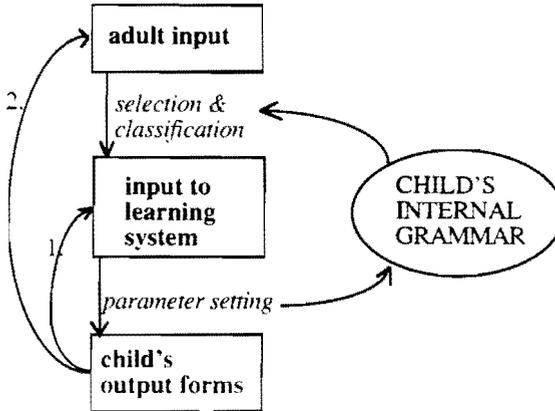
Fourth, it has been shown that the non-deterministic 'cranker' in the Drescher & Kaye model was not needed. This is a desirable result, since the cranker is an unintelligent brute force learner which simply checks all possible combinations of parameter values. Such a learner is computationally costly.

Fifth, the input that children use differs in important ways from the input the machines are supplied with. An important conclusion that we can draw from the data is that the child's output may also serve as input (cf. Elbers 1993). That is, the child's previous form plays an important role in the development of that form. We saw that the child's output forms are constantly in transition towards the adult target forms, and since the output forms also serve as input forms, the input to the child is not fixed. For machine learners, on the other hand, the input is fixed. Moreover, children at the initial stages of acquisition have not fully parsed the input. They parse out part of the adult word if the whole target word is 'too long'. This part is then mapped onto the child's own template. Machine learners parse the whole input and mapping does not play a role. Furthermore, Drescher and Kaye assume that the data are fully segmented and syllabified, and that the different degrees of stress are indicated in the data. However, children learn stress and syllable structure simultaneously, and therefore do not necessarily have a complete representation of the adult words in terms of syllable structure. Moreover, the children only seem to make a difference between stressed and stressless syllables, and between heavy and light syllables. The distinction between primary and secondary stressed syllables or between heavy and superheavy syllables is made only at later stages in the development. Last but not least, unlike machine learners, children are able to learn the stress system on the basis of simple and short words.

The model I propose is given in (15). The adult data are subject to selection strategies, which are partly guided by the child's grammar. That is, neither *all* adult input forms, nor *whole* adult forms need to be taken as input to the learning system by children. On the basis of the input data to the learning system the child determines parameter settings, which are used to assign stress. The output forms are first compared to the input to the learning system, which should result in a complete match. Secondly, they are compared to the adult input forms. At this point

mismatches may be detected, which may lead to either selecting more of the adult input forms, i.e. extending the child's prosodic template, as for instance at stage 2 where an extra syllable is realised, or to a change in parameter settings, as at stage 3, 4, and 5. The input data are run through the learning system until a complete match between adult input and children's output is reached. At this final state the child has mastered the adult's grammatical system.

(15) *Model of acquisition*



1. The output is first checked against the input to the learning system.
2. Then the output is checked against the adult input. If there are any mismatches, the adult input forms go through the system again.

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¹ The existence of words with the same number of syllables but different stress patterns is a positive cue for detecting QS. Therefore, the value [QI] is assumed to be the default value.

² There is no positive cue for either value; the learner simply checks the possibilities in this order. However, there is no principled reason behind this ordering.

³ The cue for the marked value [No] is the absence of secondary stress; however, one could also argue that the presence of secondary stress is a positive cue for the value [Yes], and therefore assume the default value [No]. I will provide evidence for this from child language.

⁴ There is no positive cue to detect extrametricality; stress at both edges of the word, however, is an indication for no extrametricality. Nevertheless, Dresher & Kaye assume that no extrametricality is the default case. Dutch exhibits a special case of extrametricality: a final syllable is made extrametrical *after* foot formation. This is referred to as 'late extrametricality'. Fikkert (1994, to appear) argues that extrametricality is better accounted for by assuming the Obligatory Branchingness Parameter.

⁵ QI languages allow only binary feet and therefore have the value [Binary] for the B/U parameter. However, for QS languages Dresher & Kaye assume the default value [Unbounded], because a positive cue exists for binary feet, but not for unbounded feet: namely, the existence of a light stressed non-peripheral syllable in a word or stress on both the rightmost and leftmost light syllable. Since the value for the B/U parameter is dependent on the value for the QS parameter, Dresher & Kaye have to assume that the B/U parameter may follow a path from [Binary] to [Unbounded] and back to [Binary]. I will show that this problem of retreating from marked values simply does not arise in Dutch child language, giving support to the claim that unbounded feet do not exist (Prince 1986, 1990, Prince & Smolensky 1993).

⁶ Dresher & Kaye do not assume a default value for this parameter. The learner simply has to check a foot-sized window at the edges to determine the location of main stress. This requires that the learner already knows what kind of feet the language has. Therefore, this parameter is set relatively late.

⁷ Dresher & Kaye do not assume default values for the directionality parameter and the headedness parameter. The four possible configurations that these parameters generate have to be tested simultaneously until the learner finds a consistent fit.

⁸ Since in adult Dutch feet are trochaic and parsed from right to left, crucial evidence for the default values of the directionality parameter and the headedness parameter would have to come from acquisition data from languages which have iambic feet or in which feet are built from left to right.

⁹ This makes the prediction that, if a language has trochees, right-to-left parsing is less marked than left-to-right parsing.

¹⁰ In adult Dutch the generalisation seems to be that when the final syllable is superheavy, it is stressed, but when it is heavy, stress is on the antepenultimate syllable. It therefore seems that superheavy syllables are regarded as disyllabic, and form a branching foot. This complicates the matter for acquisition, since it requires that the child knows the difference between heavy and superheavy syllables. However, at the age of 3 many children did not yet realise superheavy syllables as such, and it can be concluded that this aspect is not yet acquired.

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Partial Wh-Movement in German: A Nonhomogeneous Wh-Dependency*

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In this paper I discuss locality properties of the partial wh-movement construction in German. I demonstrate that the link between the scope-marker and the wh-phrase is always sensitive to weak islands, whether the extracted element is an argument or an adjunct; the link between the wh-phrase and its trace, on the other hand, is sensitive to weak islands only if an adjunct is extracted, but not if an argument is extracted. I will refer to these two different locality requirements on the two links within the same chain as the "nonhomogeneous locality property" of this construction. I also propose that this property of the construction can best be captured in an analysis that allows a chain to be formed at LF which includes the scope-marker, the wh-phrase and the trace without any covert movement of the wh-phrase to the position of the scope-marker. The proposed analysis is compatible with Minimalist assumptions.

1. Partial Wh-Movement

Partial wh-movement in German, as discussed in M. Daniel (1986, 1989) has the following three basic properties¹:

- (i) - a wh-phrase is moved from its original position to an intermediate SpecCP position. This wh-phrase is referred to as the partially moved wh-phrase
- (ii) - the matrix SpecCP is occupied by the scope-marker was. There is only one invariant form of that scope-marker.
- (iii) - the intermediate SpecCP position, even though filled by the partially moved wh-phrase, counts as a [-wh] position

These properties are illustrated in (1)-(3). In the English glosses the scope-marker is represented by SM:

- (1) [CPWas glaubst [IP Du [CP wen_i Hans t_j besucht hat]]]?
[CP SM believe [IP you [CP who_j Hans t_j visited has]]]?
'who do you believe Hans has visited'
- (2) * [CPWas glaubst [IP Du [CP Hans wen besucht hat]]]?
[CP SM believe [IP you [CP Hans who visited has]]]?
'Hans who do you believe visited?'
- (3) * [CP Ich glaube [IP [CP wen Hans besucht hat]]]
[CP I believe [IP [CP who_j Hans t_j visited has]]]

(1) is a grammatical instance of partial wh-movement, with all three properties mentioned above. (2) differs from (1) in having the wh-

phrase in situ instead of in the intermediate SpecCP position, which results in ungrammaticality. (3) illustrates that a matrix verb such as glauben ('to believe') does not allow a [+wh] complement. Consequently the complement CP in (1) must count as a [-wh] complement, otherwise the selectional properties of the matrix verb would be violated.

2. The Nonhomogeneous Locality Property of Partial Wh-Movement

In this section I will show that partial wh-movement of arguments is sensitive to weak islands in the sense of Cinque (1990). This is an unexpected state of affairs since weak islands in German do not block regular wh-extraction of arguments. Furthermore, I will demonstrate that the partial wh-movement construction has a peculiar "nonhomogeneous" property: the link between the scope-marker and the wh-phrase is sensitive to both weak and strong islands, while the link between the wh-phrase and the trace is only sensitive to strong islands in instances of argument-extraction. In this paper I restrict the discussion to argument extraction, but it must be noted that in corresponding examples with adjunct extraction, both the link between scope-marker and wh-phrase and that between the wh-phrase and the trace are sensitive to both strong and weak islands. These facts are illustrated in the appendix to this paper.

The paradigm in (4)-(6) illustrates that partial wh-movement in German is sensitive to strong islands. To facilitate the reading of the examples, the island nodes are printed in boldface:

subject island:

- (4) * [CP was ist [IP [CP [mit wem]_i [IP Hans t_j gesprochen hat]] schade]]?
 [CP SM is [IP [CP [with whom]_i [IP Hans t_j spoken has]] a-pity]]?

complex NP island:

- (5) * [CP was hat [IP Peter [NP die Behauptung [CP [mit wem]_i Hans t_j gesprochen hat]] geglaubt]]?
 [CP SM has [IP Peter [NP the claim [CP [with whom]_i Hans t_j spoken has]] believed]]?

adjunct island:

- (6) * [CP was hat [IP Hans das Auto gesehen [CP bevor [er glaubte [[mit wem]_i Peter t_j sprach]]]]]?
 [CP SM has [IP Hans the car seen [CP before [he believed [[with whom]_i Peter t_j spoke]]]]]?

In (4)-(6) a subject island, a complex NP island, and an adjunct island block partial wh-movement of an argument. This is not unexpected, since regular wh-movement of both arguments and adjuncts in German is also sensitive to strong islands, as shown in (7)-(9) with argument extraction out of a subject island, a complex NP island, and an adjunct island, respectively. Again, the adjunct extraction cases are illustrated in the appendix to this paper:

subject island:

- (7) ?? [CP [mit wem]_i ist [IP [CP dass [IP Hans t_j gesprochen hat]] schade]]?
 [CP [with whom]_i is [IP [CP that [IP Hans t_j spoken has]] a-pity]]?

complex NP island:

- (8) * [CP [mit wem]_i hat [IP Peter [NP die Behauptung [CP dass Hans t_j gesprochen hat]] geglaubt]]?
 [CP [with whom]_i has [IP Peter [NP the claim [CP that Hans t_j spoken has]] believed]]?

adjunct island:

- (9) * [CP [mit wem]_i hat [IP Hans das Auto gesehen [CP bevor [Peter t_j sprach]]]]?
 [CP [with whom]_i has [IP Hans the car seen [CP before [Peter t_j spoke]]]]?

Next consider cases where a weak island such as a wh-island, a factive island, an extraposition island, or a negative island² intervenes between the scope-marker and the intermediate wh-phrase mit wem ('with whom') in partial wh-movement constructions as in (10)-(13).

wh-island:

- (10) * [CP was fragt [IP sie sich [CP warum_j [IP Hans t_j glaubt [CP [mit wem]_i [IP Jakob t_j gesprochen hat]]]]]]?
 [CP SM asks [IP she herself [CP why_j [IP Hans t_j believes [CP [with whom]_i [IP Jakob t_j spoken has]]]]]]?

factive island:

- (11)?? [CP was hast [IP Du bedauert [CP [mit wem]_i [IP Du t_j gesprochen hast]]]]?
 [CP SM have [IP you regretted [CP [with whom]_i [IP you t_j spoken have]]]]?
 'who do you regret that you spoke to'

extraposition island:

- (12)* [CP was ist [IP es schade [CP [mit wem]_i [IP Hans t_j gesprochen hat]]]]?
 [CP SM is [IP it a-pity [CP [with whom]_i [IP Hans t_j spoken has]]]]?
 'with whom is it a pity that Hans has spoken'

negative island:

- (13)? [CP was hast [IP Du nicht geglaubt [CP wen_i [IP Du t_j gesehen hast]]]]?
 [CP SM have [IP you not believed [CP who_i [IP you t_j seen have]]]]?
 'who didn't you believe that you saw?'

Even though the wh-element in examples (10)-(13) is extracted from an argument-position, partial wh-movement is impossible, being sensitive to weak islands. This is surprising, since in full wh-movement in German (as in English) movement of argument wh-phrases is not sensitive to weak islands, as shown in (14)-(17):

wh-island:

- (14)? [CP [mit wem]_i fragt [IP sie sich [CP warum_j [IP Hans t_j glaubt [CP dass [IP Jakob t_j gesprochen hat]]]]]]?
 [CP [with whom]_i asks [IP she herself [CP why_j [IP Hans t_j believes [CP that [IP Jakob t_j spoken has]]]]]]?
 'With whom does she wonder why Hans believes that Jakob has spoken'

factive island:

- (15) [CP [mit wem]_i hast [IP Du bedauert [CP dass [IP Du t_j gesprochen hast]]]]?
 [CP [with whom]_i have [IP you regretted [CP that [IP you t_j spoken have]]]]?
 'who do you regret that you spoke to'

extraposition island:

- (16) [CP [mit wem]_i ist [IP es schade [CP dass [IP Hans t_j gesprochen hat]]]]?
 [CP [with whom]_i is [IP it a-pity [CP that [IP Hans t_j spoken has]]]]?
 'with whom is it a pity that Hans has spoken'

- (20)* was fragst Du Dich [CP warum er denkt [mit wem_i er t_j gesprochen hat]]?
 SM ask you yourself [CP why he thinks [with whom_i he t_j spoken has]]?
 'with whom do you wonder why he thinks he spoke'

In (21), on the other hand, the wh-island boundary occurs between the wh-phrase and its trace, and the result is fine:

- (21) was denkst Du [mit wem_i er sich fragt [CP warum er t_j gesprochen hat]]?
 SM think you [with whom_i he himself asks [CP why he t_j spoken has]]?
 'with whom do you think he wonders why he spoke'

Similar contrastive pairs can be constructed for factive islands and extraposition-islands. The examples involving a factive island are given in (22) and (23), the examples involving an extraposition island in (24) and (25), and the examples involving a negative island in (26) and (27).

factive island:

- (22)* was bedauerst Du [CP mit wem_i er glaubt [dass er t_j gesprochen hat]]?
 SM regret you [CP with whom_i he believes [that he t_j spoken has]]?
 'who do you regret that he believes he spoke to'
 (23) was glaubst Du [mit wem_i er bedauert [CP dass er t_j gesprochen hat]]?
 SM believe you [with whom_i he regrets [CP that he t_j spoken has]]?
 'who do you believe he regrets having spoken to'

extraposition island:

- (24)* was ist es schade [CP mit wem_i [Hans glaubt [t_j' dass [er t_j gesprochen hat]]]]?
 SM is it a-pity [CP with whom_i [Hans believes [t_j' that [he t_j spoken has]]]]?
 'with whom do you think it is a pity that Hans believes he spoke'

- (25) was glaubst Du [mit wem_i [es schade ist [CP t_i' dass [Hans t_i gesprochen hat]]]]?
 SM believe you [with whom_i [it a-pity is [CP t_i' that [Hans t_i spoken has]]]]?
 'with whom do you think it is a pity that Hans has spoken

negative island:

- (26)?? was hast Du **nicht** geglaubt [wen_i Du t_i gesehen hast]?
 SM have you **not** believed [who_i you t_i seen have]?
 'who didn't you believe that you saw?'
 (27) was glaubst Du [mit wem_i Du **nicht** t_i gesprochen hast]?
 SM believe you [with whom_i you **not** t_i spoken have]?
 'who do you believe you didn't speak to?'

In (22), (24) and (26) the weak island occurs between the scope-marker and the wh-phrase, leading to ungrammaticality, while in (23), (25) and (27) the same islands occur between the partially moved wh-phrase and the trace.

To conclude: partial wh-dependencies in German are nonhomogeneous. In argument extraction the link between the scope-marker and the wh-phrase is sensitive to weak islands, while the link between the wh-phrase and the trace is not.

3. Towards an analysis

The properties of the partial wh-movement construction that are in need of explanation are:

- (i) a wh-phrase is moved from its original position to an intermediate SpecCP position
- (ii) the matrix SpecCP is occupied by the scope-marker was
- (iii) the intermediate SpecCP position, even though filled by the partially moved wh-phrase, counts as a [-wh] position

To this list we can add the fourth property discussed above, namely that the link between the scope marker and the partially moved wh-phrase is always sensitive to weak islands, while the link between the partially moved wh-phrase and the trace in base-position is subject to strong islands only, if an argument is extracted. This finding goes against the claim made in Dayal (1994) that sensitivity of partial wh-movement to negative islands is not a result of a general sensitivity of the construction to weak islands. Dayal suggests that the negative island facts should be treated as a semantic phenomenon. Given the full range of island facts, however, it seems to me that a generalization is missed if weak islands are not considered a determining factor.

Turning to the nonhomogeneous locality property, it seems clear that in order to capture the fact that a strict locality constraint holds

between the scope-marker and the partially moved wh-phrase, it has to be assumed that a chain-relation exists between the two. This chain could either come into existence through LF-movement of the wh-phrase to the position of the scope-marker - as McDaniel (1986, 1989) assumes - or through a process of chain formation operating independently of movement. Consider these options in turn:

If there is LF-movement of the wh-phrase to the position of the scope-marker, the resulting LF-chain will look as in (28):

(28) $\langle \text{wh-phrase}_j, t'_j, t_j \rangle$

In this chain, and at the level of LF, it is not clear why the first link should be subject to different locality conditions from the second link. At S-structure, of course, before the movement of the wh-phrase to the scope-position takes place, the necessary distinction can be made. If we follow one of the central hypotheses of the Minimalist Program, however, the level of representation of S-structure does not exist, and therefore no constraints can operate on that level. Following this position, and assuming that the wh-phrase moves to the position of the scope-marker covertly, (28) would be the representation of the LF-chain. The necessary distinction between the two links of the chain which have been shown to be subject to different locality constraints would be lost.

Of course an alternative LF derivation could be postulated, in which only part of the wh-phrase moves and then adjoins to the scope-marker. The details of such an analysis are not clear to me at this point, so I will disregard this alternative in what follows, although it could possibly account for the nonhomogeneous locality property at LF.

Under an operation of Form Chain that is independent of movement, in contrast, a chain as in (29) will be formed, without any covert movement:

(29) $\langle \text{SM}_j, \text{wh-phrase}_j, \text{trace}_j \rangle$

In this chain, two parts can be distinguished that are subject to different locality constraints: there is a link between the scope-marker and the wh-phrase, and another link between the wh-phrase and the trace. Since this representation allows us to make the necessary distinction, I assume it is the correct LF-representation.

The next question to answer then is why the first link, the one between the scope-marker and the partially moved wh-phrase, counts as "nonreferential" in the sense that it is subject to weak islands, while the second link, the one between the partially moved wh-phrase and

the trace, can count as "referential", as long as an argument is extracted. A tentative explanation I would like to offer for this fact is that - contrary to the claim made in Rizzi (1990), adopted in a modified form by Cinque (1990) - it is not the index in a dependency which determines the "referential" versus "nonreferential" property of that dependency. Note that in a chain as in (29) there is only one index³. I would like to suggest that it is rather the wh-phrase itself which has to be responsible for this distinction. In (29) the link between the wh-phrase and the trace may count as referential as long as the element that heads that link, namely the wh-phrase, has referential properties⁴. The link between the scope-marker and the wh-phrase, on the other hand is headed by the scope-marker, an element whose only function is to indicate scope, without any further semantic content. I will consequently assume that this link cannot count as referential under any circumstances. Under these assumptions, the nonhomogeneous locality property of the construction follows: the nonreferential link of the chain will be subject to weak and strong islands, while the referential link of the chain will only be subject to strong islands.

Having established that the LF-representation of the partial wh-movement construction is the one in (29), and that the two links in that dependency are subject to different locality constraints based on the nature of the element that heads the respective link, I will now turn to the remaining three properties of the construction that were mentioned above. To recapitulate, these properties are that a wh-phrase is moved from its original position to an intermediate SpecCP position while the matrix SpecCP is occupied by the scope-marker *was* and that the intermediate SpecCP position, even though filled by the partially moved wh-phrase, counts as a [-wh] position. These properties can be captured under the following assumptions:

- (i) the scope-marker itself does not carry any wh-feature.
- (ii) the matrix SpecCP has to be occupied by a wh-element in overt syntax because the wh-feature in C is strong

A conflict arises from these two assumptions: In overt syntax the scope-marker in the matrix SpecCP has to bear a wh-feature, otherwise the strong feature of C could not be checked, and the result would be ungrammaticality. Since it does not come with an inherent wh-feature, the scope-marker has to acquire the feature in some way. I will claim that it is the need for a wh-feature which conspires to derive both the property that a real wh-phrase has to be partially moved, and the property that the partially moved wh-phrase counts as a [-wh] element as far as selectional properties of the higher verb are concerned. I assume that the scope-marker can acquire a wh-feature from a full wh-phrase under very specific circumstances as stated in (30)

- (30) If the scope-marker is in a chain with a wh-phrase in A'-position it can acquire the wh-feature from that wh-phrase.

It follows from (30) that the wh-phrase has to be partially moved to an A'-position, otherwise the scope-marker will not be able to pick up the wh-feature⁵. If an intermediate element in a wh-dependency generally counts as [-wh] - just like an intermediate trace - it follows that the partially moved wh-phrase will count as a [-wh] element. This then explains why the partially moved wh-phrase can occur in a [-wh] Comp, selected by a matrix verb like 'glauben' (to believe).

To summarize: under the analysis outlined in this paper, the nonhomogeneous locality property of the partial wh-movement construction follows from properties of a chain as in (29) at LF. In order for this analysis to go through, it has to be assumed that the operation Form Chain can apply independently of movement. The link of the chain headed by the scope-marker is nonreferential, due to lack of any semantic content of the scope-marker. It is therefore always sensitive to both weak and strong islands. The link between the partially moved wh-phrase and the trace, on the other hand, is only subject to strong islands as long as the wh-phrase has the necessary referential properties.

Partial movement of the real wh-phrase is necessary to ensure that under the restriction stated in (30) the scope-marker acquires the wh-feature necessary to check the wh-feature in C. (30) in conjunction with the assumption that intermediate elements in a wh-dependency count as [-wh] also explains why the partially moved wh-phrase is [-wh].

This analysis is compatible with minimalist assumptions: no S-structure condition is needed, the relevant locality constraints - whatever their exact nature may be - can apply at LF.

What remains problematic are the formulation of the referential - nonreferential distinction and the nature of the statement in (30).

Further investigation would also have to take into account some dialectal variation described by McDaniel (1986 and 1989), and, more importantly, properties of the "Multiple Wh-movement" construction discussed there. In that construction there is both full wh-movement to the matrix SpecCP and partial movement of a second wh-phrase to an intermediate A'-position. Since this construction is extremely marginal in my dialect, I have not yet been able to test it for possible nonhomogeneous properties parallel to the ones discussed in this paper.

Appendix: Adjunct extraction from weak islands and partial wh-movement of adjuncts⁶

1. Adjunct extraction from weak islands:

wh-island

- (29)* [CP wann_j fragt [IP sie sich [CP wen_j [IP Hans t_j t_j gesehen hat]]]]?
 [CP when_j asks [IP she herself [CP who_j [IP Hans t_j t_j seen has]]]]?

factive island

- (30)?? [CP wann_j hast [IP Du bedauert [CP dass [IP Du mit Peter t_j gesprochen hast]]]]?
 [CP when have [IP you regretted [CP that [IP you with Peter t_j spoken have]]]]?

extraposition island

- (31)* [CP wann_j ist [IP es schade [CP dass [IP Hans mit Peter t_j gesprochen hat]]]]]?
 [CP when_j is [IP it a-pity [CP that [IP Hans with Peter t_j spoken has]]]]]?

2. Partial extraction of adjuncts from weak islands:

a. weak island between partially moved wh-phrase and trace:

wh-island

- (32)* was glaubst Du [wann_j er sich fragt [CP [mit wem]_j er t_j gesprochen hat]]?
 SM believe you [when_j he himself asks [CP [with whom]_j he t_j spoken has]]?

factive island

- (33)* was glaubst Du [wann_j er bedauert [CP dass er mit Peter t_j gesprochen hat]]]
 SM believe you [when_j he regrets [CP that he with Peter t_j spoken has]]]?

extraposition island

- (34)* was glaubst Du [wann_j [es schade ist [CP t_j' dass [Hans mit Peter t_j gesprochen hat]]]]]
 SM believe you [when_j [it a-pity is [CP t_j' that [Hans with Peter t_j spoken has]]]]]?

b. weak island between scope-marker and partially moved wh-phrase

wh-island

- (35)* was fragst Du Dich [CP warum er denkt [wann_i er mit Peter t_j gesprochen hat]]?
 SM ask you yourself [CP why he thinks [when_i he with Peter t_j spoken has]]?

factive island

- (36)* was bedauerst Du [CP wann_i er glaubt [dass er mit Peter t_j gesprochen hat]]?
 SM regret you [CP when_i he believes [that he with Peter t_j spoken has]]?

extraposition island

- (37)* was ist es schade [CP wann_i [Hans glaubt [t_j' dass [er mit Peter t_j gesprochen hat]]]]?
 SM is it a-pity [CP when_i Hans believes [t_j' that [he with Peter t_j spoken has]]]?

Notes:

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¹ I ignore here another property mentioned by McDaniel (1986, 1989), namely that there has to be a continuous sequence of scope-marker-filled SpecCPs between the top scope-marker and the wh-phrase in more complex examples. Neither the nature of this restriction nor the reliability of the grammaticality judgements in German are clear to me at this point. A similar restriction seems to hold in Romanian partial wh-movement (McDaniel 1986) and in Hindi "kyaa-questions" (Mahajan 1990).

² The blocking effect of negative islands on partial wh-movement in German has been observed by Rizzi (1992).

³ Rizzi (1992) claims that the scope-marker does not bear a referential index since it is not assigned an argumental Theta role at any level of representation. He claims that a chain like the one in (29) - but crucially without an index on the scope-marker - is formed at S-structure. The sensitivity of the link between scope-marker and wh-phrase to negative islands is in his analysis then a consequence of the lack of a referential index on the scope-marker. Being without that index, the scope-marker has to link up with the wh-phrase via antecedent-government, which is blocked by the intervening negative A'-specifier. It seems to me problematic, however, to assume the existence of chain-links without indices in a partial wh-movement dependency because the restrictions on

the kind of elements that the scope-marker can enter a chain relation with are hard to formulate once a common index does not serve as a restriction.

⁴This is a stance also taken recently in Chung (1994).

⁵It has been pointed out to me that this movement is potentially problematic for the principle of Greed of Chomsky (1993), since the partially moved wh-phrase does not move to get one of its own features checked, but rather to check the strong wh-feature in C via the scope-marker. As Wilder and Cavar (1994) point out, however, a similar situation arises in multiple questions in English: One of the wh-phrases stays in situ, indicating that the wh-feature on the wh-phrase cannot be strong. It follows that overt wh-movement in English is triggered by the strong wh-feature in C, while the wh-feature of the question word is weak. Greed in its strongest form cannot be maintained, they conclude, but rather has to be replaced by a condition that allows an element to move early to check strong features of another element.

⁶I exclude negative islands from the list of examples because some of the data are murky. While the negative island effects are quite solid in instances of partial wh-movement where the island boundary occurs between the scope-marker and the partially moved wh-phrase, they are less clear in instances of regular wh-extraction of an adjunct and in instances of partial wh-movement when the island boundary occurs between the partially moved wh-phrase and the trace.

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The passive implicit argument and the impersonal pronoun *man* in German

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1 Introduction

In this paper, we propose that the external implicit argument in the Passive is to be represented as the empty version of the impersonal pronoun *man* “one (impersonal).” We analyze the passive implicit argument as an empty category in [Spec,VP] and treat the participle morpheme *en* as an aspectual morpheme that interacts with the tense of the auxiliary to locate in time the event expressed by the verb underlying the participle. We propose an account of the syntax of participle constructions in terms of the Minimalist Program (Chomsky 1992) that derives a Passive sentence and its corresponding Perfect-Active sentence from the same participial clause, with the differences following from the choice of the auxiliary.

The paper is organized in the following way. In the second section, we will discuss some of the properties of *man*. It will be argued that the interpretation and the binding properties of the Passive implicit argument can be given a coherent and satisfactory explanation if we analyze it as the empty version of *man*. In the third section, we give a brief survey of the historic development of use and interpretation of the Perfect-Participle in German. In the fourth section, we will discuss the syntax of participle constructions and outline the conditions under which the empty impersonal pronoun is licensed.

2 The Interpretation of *man* and *pass*

To show that the Passive implicit argument (henceforth *pass*) is the empty version of *man*, we will demonstrate that *man* and *pass* behave alike in a number of environments. One observation is that *pass* like *man* can have a variety of interpretations which can be grouped into the generic use ((1) and (2)) and the existential use (3) of *man* and *pass*. In (1-3) below, the sentences in b) show the passives of the active sentences in a); their (synonymous) interpretations are given in c). The examples in (1-3) show that the Passive implicit argument can have the same variety of interpretations that *man* exhibits.

- (1) a. Ohne Wasser kann man nur drei Tage überleben
 Without water can one only three days survive
 b. Ohne Wasser kann nur drei Tage überlebt werden
 Without water can only three days survived become
 c. “(All) Humans can live without water for only three days”

- (2) a. In Österreich spricht man Deutsch
In Austria speaks one German
 b. In Österreich wird Deutsch gesprochen
In Austria becomes German spoken
 c. "(Most) Austrians speak German"
 (3) a. Man hat die Bank überfallen
One has the bank robbed
 b. Die Bank wurde überfallen
The bank became robbed
 c. "Somebody robbed the bank"

Secondly, *pass* and *man* unlike indefinite NPs, but very much like bare plurals (cf. Carlson 1977), persistently fail to interact with negation, quantified NPs and opacity inducing operators. The most important generalizations can be summarized as follows. In their existential use, *man* can *pass* have only narrow scope with respect to negation (cf. 4) and quantified NPs (cf. 5). That is to say that the sentences in (4) can not mean *a certain individual did not rob the bank* and the sentences in (5) can not mean *a certain individual observed all citizens in the GDR*. This is especially remarkable since *man* in (4a) and (5a) c-commands (at S-Structure) the negation and the quantifier, respectively

- (4) a. Man hat die Bank nicht überfallen
One has the bank not robbed
 b. Die Bank wurde nicht überfallen
The bank became not robbed
 c. "Nobody robbed the bank"
 (5) a. In der DDR hat man jeden Bürger observiert
In the GDR has one each citizen observed
 b. In der DDR wurde jeder Bürger observiert
In the GDR became each citizen observed
 c. "In the GDR each citizen was observed by someone or other"

In their generic use, *man* and *pass* have wide scope with respect to negation (cf. 6) and quantified NPs (cf. 7)¹. In (6a) we use a passive sentence so that the pronominal subject *man* goes back to a theta-object that initially was within the scope

¹ In the examples below, we chose - for the sake of illustration - a universally quantified NP, since the universal quantifier in object position can more easily than other quantifiers take inverse scope over the subject. It is important for our argument to note that a universally quantified NP and an existentially interpreted indefinite NP can always take scope over each other independently of whether they occupy the subject or the object position, respectively.

of the negation. Nevertheless, the sentence cannot mean *not all Germans are appreciated in Austria*. In the same vein, (6b) cannot mean *not all Austrians appreciate the Germans*². The meanings of the sentences in (7) are straightforward. (7a) can only mean that *Casanovas are such that they court every woman*; in particular, it does not allow for a wide scope reading of *every woman*: *every woman is such that Casanovas usually court them*. In other words, although the two possible readings of (7a) are truth-functionally equivalent, we can tell that (7a) has only a wide scope reading of *man* from the fact that (7a) is a statement that characterizes *Casanovas* and can not be taken to characterize *every woman*. Similar judgments obtain for (7b). (7b) means *when one is in the military (ie.: if one is a recruit) one uses every opportunity to desert*. (7b) is a statement that characterizes *recruits* and does not characterize *opportunities to desert*. In any case, we can enhance the contrast between the two possible readings by interpreting the implicit generic subject in, for instance, (7b) with an expression like *most recruits (most recruits use every opportunity to desert)*. Then the two readings are also truth-functionally distinct and it is clear that (7b) only has the interpretation where *most recruits* has wide scope over *every opportunity*.

- (6) a. Man wird als Deutscher nicht geschätzt in Österreich
One becomes as a German not appreciated in Austria
 "All Germans are not appreciated in Austria"
- b. Die Deutschen werden in Österreich nicht geschätzt
The Germans become in Austria not appreciated
 "Austrians do typically not appreciate the Germans"
- (7) a. Als Casanova umwirbt man jede Frau
As Casanova courts one every woman
 "A typical Casanova courts every woman"
- b. Beim Militär wird jede Gelegenheit genutzt, um zu desertieren
In the military becomes every opportunity used in order to desert

Finally, *man* and *pass* have always narrow scope with respect to opacity inducing operators. In their existential use, *man* and *pass* thus, behave like bare plurals in intensional contexts: they can only have an opaque reading. That is to say

² For the understanding of examples (6) and (7), it is important to note that *man* and *pass* in their generic use, can combine with certain locative PPs and expressions like *als Deutscher (as a German)* to yield a joint interpretation that can be rendered by the corresponding bare plurals:

- i) In Österreich spricht man Deutsch
In Austria speaks one German
Austrians speak German

that the sentences in (8) can not mean that *someone is such that Hans believes of him that he has robbed the bank*. In their generic use, *man* and *pass* however, differ from bare plurals in their behavior in intensional contexts to the extent that generic bare plurals can also have a transparent reading, as (9a) suggests. Let us assume that John believes that Peter, Joe and Jack are altruistic and that these three guys are the firemen in John's village, then a speaker of the same village (among others who know about these facts) can use (9a) to report John's propositional attitude. At first glance it seems that a similar story could be made up for (9b), interpreting the expression *man in diesem Dorf* (one in this village) as the speaker's description. However, since the *de re* interpretation in (9a) rests on the possibility of focussing *firemen* yielding the reading *those in the village of whom John believes that they are altruistic are firemen*, it is clear that *man* in (9b) cannot have a *de re* interpretation: *man* cannot be stressed and focussed. Furthermore, *man*, being a pronoun, cannot function as a predicate which is required for the relevant interpretation in (9b). Thus, in their generic use too, *man* and *pass* can only have an opaque reading in intensional contexts (9bc).

- (8) a. Hans glaubt, dass man die Bank überfallen hat
Hans believes that one the bank robbed has
 b. Hans glaubt, dass die Bank überfallen wurde
Hans believes that the bank robbed became
- (9) a. John believes that firemen in this village are altruistic
 b. Hans glaubt dass man (in diesem Dorf) viel musiziert
Hans believes that one (in this village) a lot music-makes
 c. Hans glaubt dass in diesem Dorf viel musiziert wird
Hans believes that in this village a lot music-made becomes

So far we have seen that *man* behaves essentially like bare plurals in the environments discussed above. Bare plurals and *man* however, differ radically with personal pronouns. The reference of bare plurals can be taken up by personal pronouns that occur in the same sentence (10a) or in a following sentence (10b)³. In the examples below underlined DPs are to be interpreted as coreferent.

- (10) a. May hates raccoons because they stole her sweet corn
 b. Dogs came into the room. They began to tear apart the couch

The reference of *man* however, cannot be taken up by any personal pronoun, be it singular or plural (cf. 11). (12) shows that the reference of *man* cannot easily be taken up by another instance of *man* if they occur in different sentences (12a) and that

³ The examples are taken from (Carlson 1977).

we can have a referential dependency between two instances of *man* only if they occur in a binding configuration (cf. 12bc). In (12b) neither instance of *man* c-commands the other and coreference is excluded. In (12c), the first instance of *man* c-commands the second one and coreference is possible. That in (12c), the first occurrence of *man* really *binds* the second one is shown by the fact that this configuration gives rise to sloppy-identity readings in VP-deletion contexts.

- (11) a.?? Man hat die Bank überfallen, weil er/sie Geld brauchte/n
One has the bank robbed, because he/they money needed
 b.?? Man hat die Bank überfallen. Sie trugen grüne Jacken/er trug eine grüne Jacke
One has the bank robbed. They/he wore green jackets: a green jacket
- (12) a.?? Man hat die Bank überfallen. Man hat eine Frau als Geisel genommen
One hat the bank robbed. One has a woman as hostage taken
 b.?? Die Frau, der man Blumen schenkte, sagte, dass man die richtige Sorte getroffen habe
The woman to whom one flowers gave said that one the right sort chosen has
 c. Man hat Otto mitgeteilt, dass man ihn besuchen will
One has Otto told that one him visit wants

Summing up, we can say that the reference of *man* (if there is any) can not be taken up by personal pronouns (11) and *man* itself is unable to pick up the reference to an individual that has been established in the previous context (12ab). *Man* can also not be taken to refer to a kind, to the kind of humans, for instance, since *man* cannot occur as the subject of a kind-level predicate as is shown in (13).

- (13) * Bald darauf war man ausgestorben
Soon thereafter was one extinct

Man is like bare plurals. But it differs from them in one important respect. Let us look at the referential dependency between the bare plural and the pronoun in (10a) again. Here the pronoun *they* neither functions as a bound pronoun nor as an E-type pronoun. It seems that a bare plural other than a referential generic bare plural as in *Dinosaurs are extinct* does two things: it introduces a variable and by denoting a set it introduces a domain that provides the range for the unselective quantifier binding its variable. It is this domain that seems to be picked up by the pronoun in (10a). The shared domain is then independently quantified over by the unselective quantifier selected by the verb in the matrix and in the embedded clause. (14) shows that *man* does not introduce such a domain. In (14a), the object pronoun cannot be referentially dependent on *man* (if *man* is replaced by an expression like *Europeans*, the sentence is okay). That the oddness in (14a) is not due to a morphological mismatch between the plural personal pronoun and *man* (after all *man* is marked [3PS,SG,MASC]) is

shown in (14b). Here *man* is modified by the locative PP *in Österreich* that apparently provides the relevant domain and coreference between *man* and *sie* “them” becomes (marginally) possible. So, for a personal pronoun to be able to pick up a domain, this domain must be *explicitly* specified in the previous context. The contrast between (14a) and (14b) hence suggests that *man* cannot be analyzed as introducing a predicate, the predicate *human(x)*, for instance.

- (14) a. * Man_i schätzt die Deutschen_i nicht, weil sie_j sie_j in zwei Weltkriege gestürzt haben
One appreciates the Germans not because they them in(to) two World Wars thrown have
- b. ? In Österreich schätzt man_i die Deutschen_i nicht, weil sie_j sie_j in zwei Weltkriege gestürzt haben
In Austria appreciates one the Germans not because they them in(to) two World Wars thrown have
 “(In Austria) one does not like the Germans because they pulled them into two World Wars”

To explain the facts in (11)-(14), we propose that *man* and *pass* are analyzed as variables that are to be bound by an unselective quantifier (cf. Heim 1982, Kratzer 1988). The choice of the unselective quantifier is determined by the verb: an episodic verb licenses the operator of existential closure; a generic verb licenses a generic operator. A bare plural introduces a variable and a domain (a set of individuals), *man* (and *pass*), however, only introduces a bare variable and its minimal semantic content ([+human]) just serves as a restriction on the value-assignment to that variable. It is in accordance with its pronominal nature that the range of the variable is determined pragmatically, that is to say that *man* can pick a domain from the context. The scopal properties of *man* and *pass* can then be accounted for by assuming the following strict hierarchy of operators/quantifiers at LF (cf. Beghelli & Stowell 1994).

- (15) Gen > Universal > ... > Neg > Existential Closure

There is one problem with this analysis. We can not explain why the variable introduced by *man* can not bind the personal pronoun *er* “he” in (16a), since *er* “he” can normally function as a bound pronoun and since we can not resort to any morphological mismatch between *man* and *er* “he”, both being [3PS,SG,MASC] pronouns. We have to assume (or stipulate) that the two variables in (16a) are of a different kind. A possible answer is the following: since *man* has to be assigned a domain, we may assume that the variable introduced by it actually ranges over sets of individuals. Once *man* is assigned a set, the unselective operator quantifies over the individuals of that set. The examples in (16bc) provide some evidence for this assumption. In (16c), we observe a typical bound pronoun interpretation: *for most x, x believes that x skies better than anybody else*. This interpretation is excluded in

(16b)⁴. (16b) can only mean that *Austrians hold the collective belief that the average Austrian skies better than anybody else*. The two occurrences of *man* however, share the same domain. Since *man* cannot pick up any reference we may assume that this domain-sharing is due to binding (cf. 16d). In (16d), the first instance of *man* does not c-command the second one and coreference between them is only possible if the domain is assigned again to the second instance by the locative pronominal *dort* "there".

- (16) a.* Man_i hat Otto mitgeteilt dass er_i ihn besuchen will
One has Otto told that he him visit wants
 b. In Österreich glaubt man_i, dass man_j besser schifährt als jeder andere
In Austria believes one that one better skies than everybody else
 c. Oft glaubt man_i dass man_j besser schifährt als jeder andere
Oft believes one that one better skies than everybody else
 d. Eine Frau_i, die man_j in Österreich gut behandelte, glaubt, dass man_k
 *(dort) sehr freundlich ist
A woman_i, whom one in Austria well treated believes that one (there) kind is
"A woman who one treated well in Austria believes that one is kind (there)"

Whatever the explanation for the fact in (16a) might be, it provides an important argument for our hypothesis that *pass* is the empty version of *man*. The behavior of *man* with respect to personal pronouns corresponds to and explains the pattern in (17). (17) shows that *pass* taken as an empty pronoun in an A-position triggers Principle C-effects (17a), but fails to corefer with pronouns other than *man* (17b-d).

- (17) a.* Otto wurde pass_i mitgeteilt, dass Hans_j ihn besuchen will
Otto became pass told that Hans him visit wants
 b.?? Otto wurde pass_i mitgeteilt, dass er_j ihn besuchen will
Otto became pass told that he him visit wants
 c.?? Otto wurde pass_i mitgeteilt, dass sie_j ihn besuchen wollen
Otto became pass told that they him visit want
 d. Otto wurde pass_i mitgeteilt, dass man_j ihn besuchen will
Otto became pass told that one him visit wants

If we analyze the Passive implicit argument as the empty version of *man* then its interpretation and its binding properties receive a coherent and satisfactory

⁴ For reasons that we do not understand.

explanation (we will later show that the failure of *pass* to bind anaphors, as opposed to *man* follows from its licensing conditions).

3 The History of the Perfect-Participle⁵

The German Perfect-Participle morphology goes back to a Proto-germanic aspectual morpheme that has been used productively to form perfective verbs from imperfective ones up to the period of Middle High German (cf. Gothic *ga* = New High German *ge* in (18)).

(18) Goth.: *slepan* (sleep) -> *ga-slepan* (fall asleep)

Later on *ge* was replaced by other particles. Furthermore it has been used (and it is still used) to form the Perfect-Participle. The Perfect-Participle was initially used only attributively, that is, within a DP. Only transitive verbs and intransitive *perfective* verbs could form a Perfect-Participle. According to (Paul 1920) intransitive *imperfective* verbs could originally not form a Perfect-Participle. (Paul 1920) reports that the Perfect-Participle of transitive verbs had a passive interpretation and the Perfect-Participle of perfective intransitive verbs was active. It signified the state that holds of the object after the completion of the event described by the verb underlying the participle. In temporal terms, it expressed simultaneity of the resulting state with the *reference time* (cf. Reichenbach 1947) of the finite verb of the sentence and initially it did not express that the corresponding event has taken place before (although this was implied at least for non-stative verbs), according to (Paul 1920).

Perfective intransitive verbs in Paul's terminology are called *achievements* in the terminology of (Vendler 1967). Imperfective intransitive verbs in Paul's terminology correspond to *activities* and (intransitive) *statives* in Vendler's terminology. An activity describes an event that does not have an inherent endpoint, that is, an event without a final state. Activities simply describe the process that the subject of the verb entertains. Some examples of verbs which typically belong to this aspectual class are *climb, cry, dance, laugh, run, ... , walk*. An achievement describes an event that results in a final state. Achievements describe the process that the object undergoes in reaching the final state. Some examples of verbs which typically belong to this aspectual class are *arrive, die, grow up, ..., mature*. The class of transitive verbs contains *accomplishments* and (transitive) *statives*. Accomplishments describe the process that the subject entertains and the object undergoes to reach the final state of the object.

We analyze the Perfect-Participle morphology as shifting the reference from the event (the process) to the final state that is the *consequence* of the completion of

⁵ In this brief historical survey, I heavily rely on the classic work on German grammar by Hermann Paul (1878, republished in 1920)

the process expressed by the verb. It is not quite clear to us how the Perfect-participles of transitive stative verbs fit with this interpretation of the semantics of the Perfect-Participle morphology. Note, however, that if *A is in the state of loving B at time t* then *the state of B being loved at time t* is a consequence of the former state.

Whereas the consequential state is properly contained within the interval during which the antecedental state holds with stative verbs, the consequential state follows the interval that the antecedental process took to complete with eventive verbs (achievements and accomplishments). This is important for the temporal interpretation of the attributive Perfect-Participle: the loaded gun is the gun that has been loaded, but the loved child is the child that is being loved.

Since the Perfect-participle morphology had the meaning of shifting the reference from the antecedental state or process to the consequential state, it is clear that it could not apply to verbs that express an activity. Furthermore, since the resulting participle denotes the consequential state that holds of the object of the underlying verb⁶, it is clear that the subject of transitive verbs was suppressed, while no such suppression of an argument was required for intransitive perfective verbs, that is, achievements. Thus, the passive interpretation of the Perfect-Participle of transitive verbs followed from the semantics of the Perfect-participle morphology.

After the loss of the Germanic synthetic Perfect-tenses, a previously introduced periphrastic construction that involved an attributive Perfect-Participle was used more and more as a substitute for the old Perfect-tenses. I could not find any description of its syntax (so far) but a sentence like *I have found the book* originally was expressed in the following way (cf. Kayne 1993):

- (19) Ich habe das Buch als ein gefundenes
I have the book as a found (one)

In this construction, the Participle of transitive verbs presumably had still a passive meaning, in the sense of dropping the subject. In Old High German, the participle in this construction was still inflected and showed agreement in Case, Gender and Number with the object. What is important is the fact that initially only transitive and intransitive perfective verbs could form this kind of Perfect-construction; intransitive imperfective verbs were excluded from it. When this construction was later extended to include also intransitive perfective verbs, the meaning of the Perfect-participle morphology must have altered.

We suggest that in order for the Participle to figure in the formation of a complex tense-category, the meaning of the Participle morphology shifted back from the reference to the consequential state to the reference to the *completed* antecedental process with accomplishments and achievements. This interpretation was then

6 That the consequential state holds of the object of the verbs follows simply from their semantics.

extended to stative transitives and to activities. Appealing to Reichenbach's tense theory, we assume that it was reinterpreted as meaning $e < r$ (event-time precedes reference-time). This reinterpretation had probably two major effects. First and most importantly, the Perfect-Participle of transitive verbs lost its passive nature, since it was the sole effect of the semantics of the Participle morphology (the intransitive ones never had any passive meaning). Secondly, the possessive verb *haben* "have" was stripped of its semantics, in the sense that one has found a book does not necessarily mean that one (still) has it. So *haben* "have" lost its possessive meaning and its theta-roles to open the way for the modern Perfect-Active construction, the details of which we will discuss below.

Now the question arises whether the Perfect-participle morphology has retained its meaning in the Participial Passive construction like (20). The answer is no. If we want to give a uniform account of the passive construction in modern German, then we have to take into account also intransitive verbs. In modern German, both perfective and imperfective intransitive verbs can form a Passive (cf. (21), imagine a report about a medieval town infested by plague).

- (20) Das Buch wurde gefunden
The book became found
- (21) Hier wird getanzt und gestorben
Here becomes danced and died

If the Participle morphology had retained its original meaning, the Participle of *die* should have an active interpretation and the Participle of *dance* should not be formable at all. Thus, we assume that there is one participle that, based on the aspectual morpheme with the meaning $e < r$, gives rise to both Perfect-Active and Participial Passive sentences. There is also the attributive Perfect-Participle⁷ that until now has preserved its original interpretation and distribution (no imperfective intransitive verb may form an attributive Perfect-Participle). This shows again that the reinterpretation of the participle in the periphrastic constructions was the sole consequence of the need for an aspectual morpheme that could interact with tense and

⁷The attributive Perfect-Participle has probably given rise to the so-called *adjectival passive* (cf (i)), the argument being that intransitive verbs, be they perfective (ii) or imperfective (iii,) can still not form an adjectival passive.

- (i) Das Buch ist gefunden
The book is found
- (ii) * Hier ist gestorben
Here is died
- (iii) * Hier ist getanzt
Here is danced

apply to all verbs in a uniform way in order to give rise to a new tense-category. We identify the passive meaning of the sentences in (20) and (21) with the possibility of licensing *pass*, the empty version of the impersonal pronoun *man*.

4 The Syntax of Participle Constructions

Recall that in section 2, we argued that sentences like the ones in (22) are semantically equivalent, that is, synonymous. Syntactically, they only differ in two respects. (22b) licenses an empty *man*, as we have argued, while (22a) does not and (22b) requires a past tense marker on its auxiliary to express a past event, while (22a) relies on the “perfective” interpretation of the participle to express the pastness of the event.

- (22) a. Man hat das Buch gefunden
 One has the book found
 b. Das Buch wurde pass gefunden
 The book became pass found

In what follows we try to relate these two differences to each other, that is to say, that we propose that both sentences are based on the same participial clause and that their differences follow from the *temporal* properties of the different auxiliaries they employ. We assume that main verbs (and potentially also auxiliaries) have an additional temporal argument. Specifically, we assume - in a Larsonian analysis - the following organisation of the arguments of a transitive verb in German (*Temp* stands for the temporal argument of the verb):

- (23) [_{VP1} Subject [_{V1-bar} [_{VP2} Temp [_{V2-bar} Object V2]] V1]]

We assume that participle constructions are bisentential, consisting of an auxiliary and a participial clause. The participial clause, like any finite clause rooted in a transitive verb, contains an ArgS-head, a Tense-head and an AgrO-head. The auxiliary clause contains an AgrS-head and a Tense-head. This follows from the stipulations given below:

- (24) Every clause contains a (functional) tense head
 (25) “Projection Principle”: The number of Agr-heads a verb projects equals the number of its non-temporal arguments

The participial clause lacks an abstract Tense predicate, instead of which it contains an aspectual morpheme requiring the assignment of a temporal index (the reference-time) with respect to which the aspectual morpheme locates the event-time of the main verb as prior. The empty impersonal pronoun is licensed as the *Specifier of an X⁰-chain* that lacks a temporal index (26).

- (26) A is the Specifier of the X^0 -chain ($a_1 \dots a_n$) if A is either the Specifier of a_1 , or A is the Specifier of a_2 , ..., or A is the Specifier of a_n

The difference between the Perfect-Active and the Participial Passive follows then from the choice of the auxiliary in the following way. *Haben* "have" behaves like a control verb in the temporal domain: it has a temporal argument the temporal index of which (the *reference-time* specified by its tense morpheme) it assigns to the embedded Tense-head licensing the perfective interpretation of the participle and barring an empty impersonal pronoun. *Werden* "become" behaves like a raising verb in the temporal domain: it lacks a temporal argument and thus fails to assign a temporal index to the embedded Tense-head. The perfective interpretation of the participle cannot be licensed and the temporal argument of the participle raises to the auxiliary clause to be licensed by the tense of the auxiliary. The embedded Tense-head, in order to escape a violation of Full Interpretation, licenses the empty impersonal pronoun. Minimality guarantees that the empty pronoun can only be licensed in [Spec, VP] of the participial clause. Thus, the empty impersonal pronoun is incapable of licensing an anaphor by entering into a Spec-head relation with a functional head. We assume that anaphors have to be licensed by movement (adjoining to the local AgrS-head). Thus our analysis gives an original explanation for why the passive implicit argument, though occupying an A-positions, cannot bind anaphors.

We have defined minimality as given in (27) and (28) since, in the case of a transitive verb, we are dealing here with the three arguments (including the the temporal argument) and Chomsky's notion of *equidistance* that underlies his definition only works for maximally two arguments. Nothing really hinges on the particular execution that we give below merely for the sake of completeness (we believe that any minimalist account of the licensing of the arguments of ditransitive verbs will also provide a solution to our analysis of participial clauses).

- (27) Minimality: Do not move across the first potential licenser unless it is to meet the Correspondence Rule
- (28) Correspondence Rule: The hierarchy of those arguments that appear in the Spec-positions of functional heads corresponds to the (thematic) hierarchy of arguments in the VP

Lexical arguments have to move out of the VP into functional positions in order to be licensed. Specifically, we assume that the Specifiers of Agr-heads are potential licensers for nominal arguments and that the Specifier of the Tense-head is a potential licenser for the temporal argument. Lexical arguments have to be licensed by checking off lexical Case. Empty arguments can be licensed by assigning them lexical Case or the (abstract) Case index of a transitive verb in a Spec-head relation. We assume the following conditions on the checking of lexical Case (note that we

make the checking of Accusative Case dependent on the availability of a temporal index):

- (29) An Agr-head checks Nominative iff it immediately dominates a tense morpheme
- (29') An Agr-head checks Nominative iff it is a member of an X^0 -chain containing a tense morpheme)
- (30) An Agr-head checks Accusative iff it both immediately dominates a verb (marked with abstract Case) and is a member of an X^0 -chain containing a Tense-head with a temporal index
- (31) [_{AgrS-P} [TP [_{AgrO-P} [_{VP} ... V] Agr-O] ge-en] Agr S]

Let us discuss a sample derivation. (31) shows the participial clause that is projected by a transitive verb. Let us first look at the case where the participial clause is embedded under *werden* "become". In this case, the embedded Tense-head is not marked with a temporal index. We observe that the German verb never agrees with the direct object. Thus, we assume that the AgrO-head is empty and that the verb can substitute into this position. By verb-movement, we derive a chain that starts with the lowest verb position and ends in the Tense-head, where the verb adjoins to the aspectual morpheme *ge-en*. Since this X^0 -chain is not marked with a Tense-feature, there are three positions where *pass* can potentially be licensed: the Specifier-positions of TP, AgrO-P or VP1. The Specifiers of TP and AgrO-P are excluded as licensing positions by (28). If the empty category moved into one of these positions, the temporal argument and the object could not be moved into licensing positions without violating (28). Thus, the empty category can only be licensed in [Spec,VP1] where it is fully licensed by being assigned the abstract Case index of the (transitive) verb in a Spec-head relation. Then the temporal argument and the object move into the Specifiers of TP and AgrO-P, respectively, observing the Correspondence Rule. However, they can not be licensed in these positions. The AgrO-head cannot assign Accusative (by (30)) and the Tense-head cannot assign an interval. Eventually, they are licensed in [Spec,AgrP] and [Spec,TP] in the auxiliary clause. To obey minimality, the object has to move through the Specifier of the AgrS-head barring the empty category also from being licensed in this position.

In the case where the participial clause is embedded under the auxiliary *haben* "have", the embedded Tense-head is marked with a temporal index. Thus the empty impersonal pronoun can be licensed. The arguments of the participle observing the Correspondence Rule and minimality move into the respective functional Specifier-positions. The temporal argument and the direct object can be licensed in their Specifier-positions, since the Tense-head can now assign an interval and the AgrO-head is capable of checking Accusative. Only the subject has to move further on in order to check Nominative in the Spec-position of AgrP in the auxiliary clause.

In the case of the passive sentence, however, there is evidence that the object does not have to move all the way up to the auxiliary clause in order to be licensed. In fact, (32a) suggests that it can check Nominative in the Specifier of AgrO in the participial clause, since in the unmarked case (no focusing, no scrambling) the indirect object always precedes the direct object: fronting the Nominative argument in (32a) has the flavor of scrambling, that is, the effect of defocusing the direct object. We observe that the German participle undergoes verb raising (cf. Evers 1975) and (presumably) adjoins to the auxiliary in the AgrS-head in the matrix clause. Thus, the embedded AgrO-head can, by verb raising, become a member of a chain that contains a tense morpheme (the one of the auxiliary), if we assume that the participle morpheme occurs lower in the tree (below AgrO), possibly heading VP1 (as an aspectual verb) or its own Aspectphrase. If this solution is on the right track, then we have to assume that the definition in (29') is the relevant one for the checking of Nominative Case in German. Furthermore, this solution could provide an explanation for why German allows passives of intransitive verbs (32b): the empty impersonal pronoun could be licensed by being assigned Nominative in the Specifier-position of VP1 or of the Aspectphrase directly dominating VP1.

- (32) a. weil dem Kind das Fahrrad gestohlen wurde
because the child.DAT the bicycle.NOM stolen became
 b. weil getanzt wird
because danced becomes

That it is the special conditions of Nominative assignment in German that allow for passives of intransitive verbs makes the prediction that the latter are excluded in non-finite contexts. This prediction is borne out, as (33) shows.

- (33) a. dass getanzt wird ist schön
that danced becomes is nice
 b.* dass [getanzt zu werden] schön ist
that [danced to become] nice is
 c. die Hoffnung, dass getanzt wird
the hope that danced becomes
 d.* die Hoffnung, getanzt zu werden
the hope danced to become

We have given a uniform account of the Perfect-Active and the Participial Passive construction. We have argued that both constructions are based on a reinterpreted Perfect-participle and that this reinterpretation was the effect of the establishment of a new analytical Perfect-tense. Finally, we sketched a uniform account of passives of both transitive and intransitive verbs that rests on the identification of "passiveness" with the presence and licensing of an empty impersonal pronoun.

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Categories and arguments

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1. A gap in the typology of verbs

Verbs can take various types of complements, e.g. DP, CP, double object, SC or none. Within each of these categories we find verbs with or without an external argument. So, in (1) we have the alternating verb *break*, with or without an external argument, as well as an external argument taking verb such as *hit* and the ergative *arrive*. Similarly for the other examples in (1)-(5). In my thesis (Hoekstra 1984:250 ff.) I noted one gap in this system: if a verb has no complement but only an external argument, as in (5a), there are no counterparts lacking the external argument [1]. This is illustrated in (5b).

(1) NP-complement:

- a. John broke the vase
- b. The vase broke
- c. John hit Bill
- d. Bill arrived

(2) CP-complement:

- a. John believes that the earth is round
- b. It seems (to John) that the earth is round
- c. John believes hot dogs to be dangerous
- d. Hot dogs seem (to John) to be dangerous

(3) double object:

- a. John gave Bill a book on logic
- b. The book on logic appealed to John [2]

(4) SC-complement:

- a. John considered this plan dangerous
- b. This plan proved dangerous

(5) unergative:

- a. John laughed
- b. ? (possible candidates weather verbs)

As for weather verbs, as possible candidates of (5b), I shall assume that they have a (quasi)-external argument (cf. Hoekstra 1984, fn. 201), Bennis 1986, ch. 2).

Assuming that there is indeed this gap, the question is why. In this paper I shall first review Hale & Keyser's (1991, 1993, 1994) theory of argument structure, which gives a particular rationale for the gap (although not intended). Then I shall develop a new theory of the notion transitivity from which the gap follows in a more principled fashion.

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2. Hale & Keyser's theory of argument structure

Hale & Keyser develop a lexical theory of argument structure which represents argument structure in the lexicon in terms of a syntax which is defined in the same structural terms as what they call Big Syntax. Specifically, the theory makes use of the notions head, Spec and Comp, and of the lexical categories N, A, V and P, as well as syntactic principles such as the head movement constraint, or the more general ECP. Without going into the details of their theory, I would like to single out a number of features of their system which are relevant to the present discussion.

The first concerns their classification of categories, given in I.

- I.
- A is a predicate
 - P takes a complement and forms a predicate.
 - V takes a complement and denotes an event
 - N denotes a thing

These characterizations lead to the following combinations, each with their own interpretation:

- II.
- Verbs take complements
 - a. V AP/PP : change of state or position
 - b. V NP : verbs of creation
 - c. V VP : causative
 - d. V \emptyset : not allowed

Hale & Keyser reject Stowell's (1981) approach in which each category may have a subject, projected in its specifier. Rather, AP and PP, though being predicates, do not take subjects themselves, but rather combine with V (henceforth V₂) to form VP with its subject. The combination yields, as specified in IIa, a change of state or position predicate. VP and NP are not predicates: they denote events and things, resp. Hence they combine with V (henceforth V₁) to form a VP which does not inherit a subject on account of the predicative nature of their complement. Rather, their subject is supplied in Big Syntax, triggered by the syntactic principle of predication à la Rothstein (1983). At the level of argument structure, then, [V₁ NP/VP] structures are incomplete.

- (6)
- a. [_{VP} NP V₂ AP/PP]
 - b. [_{VP} V₁ NP/VP]
 - c. [_{VP} V₁ [_{VP} NP V₂ AP/PP]]

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VPs of type (6a), in contrast, are complete as they have a subject at the level of argument structure. Therefore only those of the (6a) type may occupy the VP-complement position in (6b), giving (6c). As VPs of the type (6b) are themselves incomplete, they may not be embedded at the level of argument structure. The consequence of this is a drastic limitation of possible VP-types permitted at the level of argument structure, which is held to account for the limited amount of verb types found in natural languages.

In this system, candidates for (5b) would be verbs in the category (6b), as those in (6a) lexically have a subject. Those in (6b) could potentially have a formal subject that could satisfy the EPP in its predication guise. Yet, given the interpretation of V-VP as causative, a genuine (as opposed to formal) subject is required. The same is true for V NP which is interpreted as creation of N. Unergatives in this system are of the V NP type, on the assumption that a verb such as "laugh" is to be analyzed as "do/create a laugh".

It is evident that all verbs will thus have a subject, either internal by virtue of the inherent predicative nature of the complement (in the case of V2), or external by virtue of the semantic interpretation of V₁. So, along these lines Hale & Keyser's theory provides an answer to our problem, i.e. by stipulating that verbs must have a complement. But why would this be true? My answer to this involves the assumption in III.

III. the category Verb does not exist as a primitive category.

If V is a derivative category, the fact that it takes a complement will hence have to be explained on the basis of how verbs arise. This issue is discussed in the following sections. In many ways the program I develop remains close to Hale & Keyser's program, but there is one important difference: while they construct a lexical theory of argument structure, I see no particular motivation for this lexical conception, and therefore assume that the derivation of verbs is a syntactic matter.

3. The Strict separation hypothesis

Disregarding the category verb, for the moment, we are left with three of the standard L-cats: N, A and P. In Hale & Keyser's system, these differ in that the latter takes a complement. In this respect, P is like F-categories, and also like transitive verbs. This property makes P into a relator concept, unlike A and N which denote properties and things resp. There are also pure relator verbs, but these differ from P in the types of F-cats they combine with, in particular with Tense. Actually, it is this relationship with functional categories that defines the notion of verb, rather than some common property of meaning. A typical, and perhaps most neutral, verbal relator is BE, and

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"ergative" GET, which may be regarded as pure bearers of functional or inflectional features. Other, so-called lexical verbs incorporate a nominal category. As we will see, both lexical and functional verbs may incorporate a prepositional relator. The category verb therefore is not primitive, but derivative. This may be regarded as a consequence of my central hypothesis in IV:

IV. *The strict separation hypothesis*

L-cats are characterized by features that denote ontological classes of individuals; F-cats are characterized by grammatical features

The only basic L-cats are nominals, therefore. In addition we have the relator category of P. The category V might itself be taken as a functional category, which may incorporate a lexical base, which is itself not verbal. Let us now turn to how such lexical verbs arise.

4. The derivation of verbs

As a first illustration, consider the verb *clear* as in (7):

(7) The screen cleared

In this case it would seem rather evident that the verb derives through incorporation of the adjective, as Hale & Keyser also assume. They assume the structure in (6a), in conformity with the assumptions mentioned in section 2 above. In this structure, *the screen* is the subject of V_2 , an abstract verb into which the head A of the complement is incorporated. I rather assume the structure in (8), in conformity with Stowell's analysis of subjects, as well as with the general assumption made in Hoekstra (1984) that "theta-marking" by a head is confined to the domain of the head [3]. F in this representation stands for Functional, comprising at this point all of the various F-categories (AGR, Tense etc.) relevant to this construction. This functional structure may either be lexicalized through the purely functional verb *get*, as in (8a), or, as in Hale & Keyser's analysis, through incorporation of *clear* into F, turning the adjectival head into a verbal one, as in (8b):

(8)		F	[_{AP} [the screen] clear]
a.	<u>the screen</u> ,	got	[_{AP} ξ clear]
b.	<u>the screen</u> ,	<u>clear</u> _i -ed	[_{AP} ξ ξ]

For concreteness sake I will assume here that the word "cleared" is not built up in the syntax, but rather is selected from the lexicon, imposing

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requirements on the structure which must be able to check all of its specified features, as in Chomsky (1992). Hence, if the word *cleared* is selected, head movement to F is required. When *clear* is selected, the relator verb *got* supplements it to compose with the same syntax. The point here is that the lexical V arises through the conflation of an L-element and F-material, and is hence not a primitive element.

The analysis in (8) is forced upon us by IV: the verb *clear* harbours both L-features (denoting the class of things which have the property 'clear'), as well as the grammatical features of ingression. It is a property of English that the verb *clear* harbours this ingressive component. In a language such as Yoruba, sentence (7) might mean what in English is expressed by "The screen was clear", i.e. a non-dynamic state of affairs. One would expect that some parameter sets these systems apart, but this is a matter that requires further investigation. For now, we may conclude that Hale & Keyser's assumption about the nature of subjects of A and the interpretation of V-AP as dynamic are empirically inadequate in view of stative adjectival predications (the same is true for P, as we will see), but also theoretically excluded under IV and the consequences that flow from it.

Where BE is a purely verbal functional category, i.e. a carrier of merely verbal inflectional features such as Tense and AGR, HAVE is a more complex relator concept, to be regarded as the composition of BE's grammatical features and those of a prepositional relator (or oblique marker), as in Benveniste's (1960) hypothesis, and Kayne's (1993) more recent incorporation implementation of this central idea. Here too we find reason to reject Hale & Keyser's claim that subjects are never subjects of A or P. Like BE-predications, HAVE-predications are, in what we take to be the canonical case (but see Belvin 1993, Déchaine, Hoekstra & Rooryck 1994), stative. I assume, therefore, that the structure of a sentence such as (9) is as in (10):

- (9) The table has four legs
 (10) F [_{PP} [four legs] P [the table]

where F, unlike in (8) does not have a dynamic feature of ingression. In BE-type languages, the structure in (10) may give rise to "to the table are four legs", but in English, P incorporates into F, yielding HAVE. We need not wonder at this point what the exact P would be to fill the relevant position in the tree at D-structure [4]. Under Chomsky's lexicalist theory in his minimalist program, the element selected from the lexicon is HAVE (or rather, for this example, *has*). The precise structure of (10) includes the projection of F, O-AGR, T and S-AGR, as in (11).

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(11) -- S-AGR -- T -- O-AGR --- F [PP [DP₁ four legs] P_{have} [DP₂ the table]]

HAVE raises up to F, making [SPEC,F] and [SPEC,PP] equidistant, thereby allowing DP₂ to move to [SPEC,F]. DP₁ in turn may move to [SPEC,O-AGR] to check its Accusative Case as a result of HAVE's further movement. Note that if instead of HAVE, a non-incorporating element were chosen for the P-position, DP₂ would not be allowed to move up. Nor would there be any reason to postulate an O-AGR projection, F not inheriting Case assigning potential through the incorporation of P-features. DP₁ could therefore only be licit with Nominative Case. The point here is that the potential to license Accusative derives from the incorporated preposition. (cf. also Mahajan 1993).

5. Transitivity

Turning to transitive verbs, now, it will be clear that they too must be compositional. If we limit our attention to dynamic transitives first, they must have F-features to account for their dynamism, as well as an incorporated P-relator, to account for their Case-assigning potential, in addition, of course, to their L-features, inherited from an incorporated N or A. Let us now see whether an analysis can be provided that meets all these requirements. An easy illustration is available if we look at the transitive counterpart of (7):

(12) John cleared the screen

Our assumptions so far lead us to the structure in (13), where F, as in (8), represents the verbal features, including the ingressive component:

(13) F [[AP [DP₁ the screen] clear] P [DP₂ John]]

P incorporates into F, as does *clear*. As a result, F includes Accusative Case licensing potential, so that the superstructure, as well as the derivation, is as in (11). This analysis finds strong support when we consider the perfect tense counterpart of (12) in (14):

(14) John has cleared the screen

We would obviously like to have a uniform analysis of HAVE as resulting from BE plus an incorporated prepositional set of features. Without going into the structure of the participial part at this point, the structure in (13), with AP replaced by a participial structure, immediately yields the required result that HAVE is (13)'s F plus P, again yielding the required derivation in

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which DP₂ is able to reach T-related S-AGR so as to be licensed with Nominative Case, while DP₁ benefits from HAVEs Accusative Case licensing potential, which it inherits from the incorporated P.

The passive counterpart of (14) is derived in a straightforward fashion: again, the subject of the PP is a participial structure. As P does not incorporate, F has no Accusative licensing potential, and F is lexicalized with the functional verb BE. DP₁ is licensed with Nominative Case, while DP₂ is case licensed by P itself.

Just like there are non-dynamic counterparts to ingressive structures in the ergative case ("the screen is clear" vs. "the screen clears"/"the screen gets clear"), the same holds for transitives. This constitutes a similar argument for the Stowell version of predicate internal subjects, and against Hale & Keyser's view that AP/PP transmit their predication requirement to a V. The relevant cases concern stative verbs such as *know*, as in (15):

(15) John knows the answer

The functional structure lacks a dynamic component, while the transitivity points at the presence of a prepositional element incorporated into F. The structure relevant for constructions like (15) is as in (16):

(16) F [PP [[the answer] know] P [John]]

with as closest paraphrase "knowledge of the answer is to John". Indeed, the meaning of (15) is rendered in precisely this fashion in various languages. As in the case of (13) the P incorporates into F, allowing *John* to move out and receive Nominative Case, and contributing Accusative Case licensing potential to F.

6. X-bar representation of subjects

Although the proposal I make here about the structure of transitives and their passive counterparts may appear to diverge quite substantially from traditional conceptions, this is merely apparent. Under a rather standard view, *by*-phrases in passives are regarded as adjuncts, let us say as in (17):

(17)

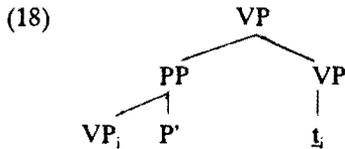
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      VP
     /  \
    PP   VP
  
```

Sportiche (1987) introduced an approach to modification which attempts to

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bring it under something like the projection principle. Indeed, there is a subject-predicate relationship between the modifier and the modified, but unlike other such relations, this particular relationship is not configurationally expressed in term of the X-bar relation of [specifier,X']. Barriers (1994), extending ideas of Sportiche (1994), argues that in (17) movement of the lower VP into the specifier of PP as in (18) derives this structural relationship:



It will be clear that this derived structure, minus the adjunction on VP and hence the trace of VP, is basically the structure I start out with. In this structure the subject-predicate relationship between VP and the "adjunct" PP is directly expressed in the standard way.

7. Verb typology

Let us sum up the above discussion. We have postulated two types of verbal construction: transitives (including unergatives) and (ergative) intransitives. The former are uniformly analyzed as involving an external argument that is not part of the argument structure of the lexical head itself, but rather results from an oblique prepositional element which is incorporated into the verb. Verbs are dynamic if the functional structure dominating the lexical projection (or thematic complex) includes a dynamic component. The schema in (19) summarizes this:



In comparison to Hale & Keyser's analysis in (6), the structure of intransitives is similar to their analysis of (ergative) intransitives. There are two differences. First, in my approach the dominating element is a (verb creating) functional component, while Hale & Keyser take V to be a lexical category on a par with A and N. The second difference is in the origin of the subject: while it is the subject of V₂ of their analysis, it originates in the specifier of XP. Similarly for transitives. The V₁ component of their (6b/c) is decomposed under my analysis: in part it corresponds to the same functional information as relevant

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to ergative intransitive, and in part it corresponds to the P of the external argument in my proposal.

The stipulation in Hale & Keyser's framework that the subject of their V_1 is not present in the lexical structure, is superfluous in my approach, as these subjects are analyzed as complements of P. Hence, the externality of the external argument, required in their approach to delimit the variation of verb types, is a feature of my analysis as well. Burzio's generalization also finds an automatic account, as Accusative Case potential derives from the incorporation of the oblique marker of the external argument. Hence, where Accusative Case is available, an external argument is available, and vice versa.

Verbs, then, form a mixed set of elements. In fact, we may distinguish several types of verbs, depending on the components of which they are made up. The general schema for verbs is as in (20):

$$(20) \quad F + (\{N,A\}) + (P)$$

If no P incorporates, we are dealing with an "ergative" verb. This may be either a "lexical" verb, if an A or N is incorporated, or a "functional" verb, if no such incorporation takes place. The common property of verbs is their functional component. The gap noted in section 1, i.e. the lack of zero-argument verbs is true only in as far as lexical verbs is concerned. These necessarily have an argument, inherited from the incorporated lexical source.

Obviously, many questions still have to be addressed, e.g. which types of "lexical" verbs can be distinguished etc. This is a research program, which so far looks promising to me, given the progress in the wake of Hale & Keyser's work.

I am aware that the work reported here is strongly reminiscent of the generative semantics tradition. Such an impression is not incorrect, but there is an important difference. We here attempt to reduce both the set of primitives and the calculus. The calculus is head movement, constrained by the ECP. This paper proposes a drastic reduction on possible primitives, formulated in the Strict Separation Hypothesis. The problem with generative semantics was not so much that the proposals were wrong, but rather that the set of possible primitives as well as the calculus was so unconstrained that any perspective on explanatory adequacy was lost. By formulating a narrow theory of possible primitives and the ways in which they may combine, we may hope to attain a higher level of explanation.

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Notes

1. The same is true for verbs with only a prepositional object.
2. English has no clear cases of ergative counterparts to double object verbs, unlike e.g. Dutch and Italian, which have a class of dative-experiencer verbs, cf. Hoekstra (1984) for Dutch and Belletti & Rizzi (1981) for Italian.
3. It will be evident that there is no place in this framework (just as in H&K's) for a theory of theta-roles. There are no primitive elements with several arguments, which need to be internally differentiated (from each other, e.g. in terms of agent vs. patient) and externally identified (as similar to arguments of other primitive elements, e.g. agents).
4. Although irrelevant at this point, I think that English does not have a suitable overt counterpart to the P which is required in this case, which may be the reason why English necessarily uses HAVE, i.e. why there is no suitable BE plus over PP counterpart. English *to*, unlike e.g. French *à*, is not a stative *pr* position (cf. "This train is to London" and "A train to London" vs. French "Ce train est à Paris").

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Semantic Functional Projections? \exists P: Evidence from Russian

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In this paper I propose an analysis of the copula that treats it as an auxiliary verb void of lexical content. *Be* is not projected as a main verb at D-structure, but is inserted into one of the functional projections in the course of the derivation as a Last Resort, to perform syntactic functions of Tense-support and/or \exists -support. Existential Closure is viewed as a semantic operation that requires syntactic support, since the presence/absence of the copula in "vacuous" Present-tense languages directly correlates with existential/non-existential interpretation of the structures. Finally, I am proposing that \exists -support can occur in two ways: (i) in copular structures \exists_{Op} is supported by the mechanism of *be*-insertion; (ii) in non-copular structures the support of an \exists_{Op} must be achieved by V to \exists movement.

1. Introduction *

In the world's languages the copular verb *be* behaves in roughly two ways. In some languages copular *be* must appear in all tenses; such languages are English, German, French, to name just a few. In other languages *be* must appear in the Past and Future tenses, but is omitted or appears irregularly in the Present tense; to this second group belong Russian, Turkish, Hebrew, Arabic, and many others.

In this paper I am going to analyze the Russian copula and show that its irregular behavior in the Present tense becomes explained if we assume that *be* is a "dummy" inserted in the structure to perform a certain syntactic function. I am going to argue that the function of *be* is to support either Tense, or Existential Operator (\exists_{Op}), or both.

I am going to assume that in Russian (and, presumably, in other languages where *be* can be omitted in the Present tense) Present Tense is morphologically unspecified (or "vacuous"), meaning that the TP of a Present-tense structure has no tense feature. Consequently, the verbs in Present-tense sentences do not raise to T for feature checking (in the sense of Chomsky 1992). If we combine this assumption with the proposal about the "dummy" nature of *be* it will follow that in those languages where the Present tense is unspecified *be* will not be found in the Present tense at all, due to the Economy principle (Chomsky 1991).

However, this must be an oversimplification, since in Russian Present-tense sentences *be* is obligatorily present in some contexts, obligatorily absent in other contexts, and seems to be optional in a limited number of cases.

Thus, the properties of the Present tense morphology *per se* cannot account for the complexity of the emerging picture. In the rest of this paper I will be defending the claim that the \exists_{Op} needs lexical support to perform the Existential Closure, and those cases where we see an overt Present-tense *be* in Russian are cases where Existential Closure applies.

The paper will be organized as follows. I will first present the data on the Present-tense usage of *be*. Then I present the proposal in some detail. After this I will show how this proposal accounts for the cases where *be* is obligatorily absent. Next, I discuss cases where *be* is obligatorily present together with those where the copula is possible but is not obligatory. Thirdly, I will discuss at some length a problematic case of "inalienable possession" structures. Finally, I will overview morphological and syntactic evidence for the proposed syntactic structure.

2. Present-tense *be* -structures in Russian: data

In Russian, seven structures can be listed where *be* appears in the Past and Future tenses. The data are given in the Present tense, and the possibility of using *be* overtly is shown by the standard parentheses/asterisk notation. Parentheses around *be* denote variation and not optionality of usage.

In this paper I will limit the discussion to postverbal NPs. Therefore, the 'subjects' of the structures are given as names or definite descriptions to keep their interpretation constant and, thus, exclude their possible interference with existential quantification. Whenever possible, examples are given for both stage-level and individual-level predicates (Carlson 1977, Kratzer 1989).

(1) auxiliary-*be* (passive, category of state)

- | | |
|---|---|
| a. Kolja (*est') ubit.
Kolja-Nom is killed
'Kolja is deceived.' | b. Mashe (*est') obidno.
Masha-Dat is offended
'Masha is offended.' |
|---|---|

(2) equative

- | | |
|--|---|
| a. Nash uchitel' (*est') Kolja.
our teacher-Nom is Kolja-Nom
'Our teacher is Kolja.' | b. Kolja (*est') nash gost'.
Kolja-Nom is our guest-Nom
'Kolja is our guest.' |
|--|---|

(3) predicative

- | | |
|--|---|
| a. Kolja (*est') durak.
Kolja-Nom is fool-Nom
'Kolja is a fool.' | b. Masha (*est') p'janaja.
Masha-Nom is drunk-Nom
'Masha is drunk.' |
|--|---|

(4) generic /definitive

- | | |
|--|---|
| a. Sobaka (*est') drug cheloveka.
dog-Nom is friend-Nom person-Gen
'A dog is a friend of man.' | b. Vorona (*est') ptica.
crow-Nom is bird-Nom
'(A) crow is a bird.' |
|--|---|

(5) locative

- | | |
|--|--|
| a. Kreml' (*est') v Moskve.
Kremlin-Nom is in Moscow
'The Kremlin is in Moscow.' | b. Mashina (*est') pered domom.
car-Nom is front house
'The car is in front of the house.' |
|--|--|

(6) existential

- | | |
|--|--|
| a. V Moskve (est') tramvai.
in Moscow is street-cars-pl-Nom
'There are street cars in Moscow.' | b. V dome (est') telefon.
in house is phone-sg-Nom
'There's a phone in the house.' |
|--|--|

(7) possessive

- | | |
|---|---|
| a. "alienable" possession | |
| (i) U Koli (est') mashina.
at Kolja-Gen is car-Nom
'Kolja has a car.' | (ii) U Koli (est') vsego chas.
at Kolja-Gen is only hour
'Kolja has only an hour.' |
| b. "inalienable" possession | |
| (i) U Mashi (*est') sinie glaza.
at Masha-Gen is blue eyes-Nom
'Masha has blue eyes.' | (ii) U Mashi (*est') xoroshee nastroyenie.
at Masha-Gen is good mood-Nom
'Masha is in a good mood.' |

In auxiliary-*be*, equative, predicative, generic, and locative structures (examples in (1) - (5)) the presence of *be* in the Present tense is ungrammatical. In existential and possessive structures ((6) and (7)), the Present-tense copula is present in some contexts and absent in other contexts. In all the structures, the stage-/ individual-level distinction does not correlate with the presence/ absence of the copula.

3. The syntax of Existential closure

I adopt the basic assumptions of Heim's (1982) theory of indefiniteness. I follow Heim in assuming that NPs introduce free variables, and that the distinction between definite and indefinite NPs is due to the Novelty/Familiarity Condition. Novelty Condition, basically, requires that Existential Closure should apply only to those variables that are "novel" in the discourse. Indefinite NPs are "novel" and need to be bound by a quantifier to get interpreted. In the absence of a "lexical" quantifier, the variables introduced by indefinite NPs are bound by Existential Closure. Heim assumes that Existential Closure is a default operation, i. e. whenever there is a free novel variable, it gets bound by Existential Closure without further constraints.

Counter this last assumption, I claim that Existential Closure is not default, and \exists_{Op} is available only if a certain condition is met. This condition is stated in (8).

(8) the Lexicalization Requirement

Existential Closure can occur iff \exists_{Op} has lexical support.

Notice that this condition can be falsified if we find a sentence where an NP gets an existential interpretation without lexicalization of an \exists_{Op} .

Now we need to be more specific about the mechanism of lexicalizing the \exists_{Op} . In the spirit of Diesing's Mapping Hypothesis (Diesing 1990, 1992) which limits the scope of Existential Closure to the material inside the VP, I propose a functional projection $\exists P$, immediately above the VP, where \exists_{Op} is located.

(9) \exists_{Op} is associated with a functional projection $\exists P$, immediately above the VP.

Coming back to the Lexicalization Requirement, it basically says that there must be some lexical material in the $\exists P$ for the \exists_{Op} to do its semantic job.

Lexicalization of the $\exists P$ can proceed in two major ways: (i) via verb-movement into \exists , and (ii) via lexical insertion into SPEC or head of the $\exists P$. I am claiming that in copular structures with existential reading *be* is inserted in \exists to support an \exists_{Op} .

Thus, the big picture of the behavior of the copula will follow from the proposed mechanism of *be*-insertion.

(10) Mechanism of *be*-support

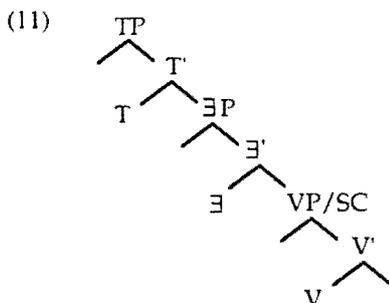
(i) *be* is inserted in T if there is a Tense feature that needs support;

(ii) *be* is inserted in \exists if there is an \exists_{Op} in the structure.

As was mentioned above, Present tense in Russian does not require support. Technically, this means that TP in Present-tense structures has no Tense feature. Such status of the TP allows verbs in Present-tense sentences to move through T on their way to AGR (in case of main verbs) or C (in yes/no questions) without activating Tense (semantically or morphologically). Another possibility is that TP is not projected at all in Present-tense structures in languages with morphologically unspecified Present tense. I will discuss this option later.

In copular structures, as follows from the mechanism in (10), the Present-tense *be* will be found only in existential contexts. In Russian, therefore, this requirement forces *be*-insertion in the Present-tense copular structures as a Last Resort if and only if there is a free variable that needs binding by an \exists_{OP} . The ungrammaticality of *be* in non-existential Present-tense sentences follows from Chomsky's Economy principle (1991) which rules out "unnecessary" insertions.

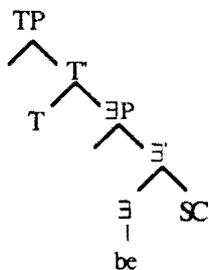
I suggest that the position where the copula is inserted in existential contexts is the head of $\exists P$. This structure is given in (11).¹



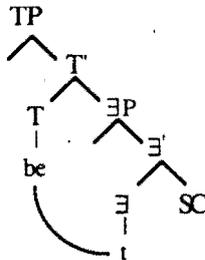
In existential structures in Russian, the copula is inserted in \exists and stays there in the Present-tense sentences, as there is no Tense feature to be checked. In Past and Future tense structures, \exists to T raising takes place, since Tense features [past] and [future] must be checked.²

The trees for Russian \exists -structures are given in (12).

(12) a. Present tense



b. Past and Future tenses



In English, all tenses have abstract morphological specifications, and, therefore, must be checked. Consequently, we expect *have* and *be*, which are auxiliary verbs, to always end up in T, in all tenses.

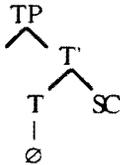
Before I present non- \exists structures, I am going to introduce the Economy of Projection Principle (Speas 1994: 186), which requires that an XP be projected in the structure iff it has semantic or syntactic content at some level of representation.

(13) the Economy of Projection Principle (EPP)
Project XP only if XP has content.

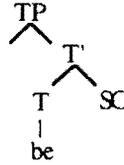
According to the EPP, AgrP, for example, which has no semantic content, will or will not be projected depending on whether agreement morphology is base-generated in AGR⁰ or on the verb (in the latter case AgrP remains truly empty and cannot be projected). Those projections that can have semantic content, e.g. TP, AspP, \exists P, will be projected only if the semantic content is there; so, for example, TP will not be projected in tenseless infinitival clauses, etc.

Since in non- \exists structures the \exists P will be empty at all levels of representation, I will assume it is not projected at all. The TP projection may also be affected by the EPP, as its semantic content varies from one Tense to another. If, as it has been proposed by Enç (1981) and others, Present tense is semantically vacuous across languages, then it will follow from the EPP that TP will not be projected in Present-tense structures in languages that have no overt Present-tense morphology.³ This prediction remains to be checked, and, therefore, I will have TPs projected in Present-tense Russian structures, although we must keep in mind that they may be not actually projected. Russian non- \exists structures are represented in (14).

(14) a. Present tense



b. Past and Future tenses



Non- \exists sentences in Russian show a contrast between the Past and Future on the one hand, and Present tense on the other hand, w.r.t. using the copula. In the Past and Future, *be* is inserted directly in T, to support the relevant morphological features. In the Present tense, *be*-insertion does not take place at all.

In English non- \exists structures, no contrasts will be found: in all tenses the auxiliary is in T, supporting the tense features.

Thus, we see that sentences with overt copula are only superficially similar; structurally they must be represented in three different ways, by trees in (12a), (12b), and (14b).

English *have*-sentences have only a two-way structural ambiguity, distinguishing between \exists /non- \exists structures, since the Present tense in English behaves syntactically the same way other tenses do.⁴

In conclusion, I am claiming that Russian copular sentences and English *have*-possessives can have different underlying representations and derivations, which is reflected in their semantics (in both languages) and surface syntax (in Russian).

4. Interpreting the data

Based on the assumptions and proposals in the previous section, let us state the predictions this analysis makes for "vacuous" Present tense languages and then look at Russian data to see if these predictions are borne out.

(15) Predictions of the analysis:

- (i) Present-tense *be* will be ungrammatical in non- \exists structures.
- (ii) Present-tense *be* will be grammatical in \exists structures.

Let us first look at the structures where the copula is always ungrammatical in the Present tense. On the *be*-insertion analysis, these structures should have a non-existential interpretation. This, in fact, is the case: none of these structures contains a postverbal NP that can be interpreted existentially.⁵

Auxiliary-*be* structures (1) contain participial or adverbial predicates -- no variables are introduced. In equative structures (2), predicative NPs are referential and in compliance with the Novelty Condition cannot be Existentially closed. Predicative sentences (3) contain a predicate that is either an adjective or an NP denoting a property -- in both cases they do not introduce individual variables, and, therefore Existential Closure does not apply. Generic structures (4) are similar to predicative in the interpretation of the predicate, which denotes a property; the subject NP in generic structures, although indefinite, has a generic interpretation, and cannot get bound by an \exists_{Op} because it is bound by a Generic operator. Finally, in locative structures (5), the PP denoting a location has a referential interpretation and cannot be interpreted existentially.

What makes the Present-tense *be* ungrammatical in these cases? On the proposed analysis, these sentences are ruled out by the Economy Principle. Semantically, *be*-insertions may create vacuous quantification effects, if *be* is inserted in \exists in the Present tense lexicalizing the \exists_{Op} without a free variable for the Operator to bind.

Thus, we have seen that the first prediction (15(i)) is borne out, i. e. non- \exists structures are only good in the Present tense without *be*, and are ungrammatical if *be* is used. Let us now turn to the second prediction (15(ii)).

There are two structures, existentials (6) and possessives (7), that allow Present-tense *be*. In order to check the prediction we need to see if they contain a free variable that needs to be bound by an \exists_{Op} to get an existential interpretation.

In the examples given in (6a,b) and (7a) the structure consists of a PP and an NP. NPs in all these examples are indefinite, and, according to Heim, introduce free variables. They all get existential interpretations; therefore, the variables must be bound by an \exists_{Op} .

So far, the second prediction is also borne out: in structures where NPs get existential interpretation *be* appears in the Present tense. However, existential and possessive structures are not fully explained yet, because inside these structures there is a variation with respect to the possibility of using the Present-tense *be*. Therefore, we need to look at these structures to see if those cases where the copula is used are always \exists cases, and if in non- \exists cases *be* is always bad.

In the next section I will briefly show that this is, in fact, the case for structures exemplified in (6a,b) and (7a). In Section 6 I will turn to a seemingly problematic case of "inalienable possessives" to show how the proposed analysis can account for the variation that possessives demonstrate.

5. Existentials and Possessives: Definiteness effect

A detailed study of existential and possessive structures presented in Kondrashova (in progress) shows that the presence/absence of the present-tense copula depends mainly on the interpretation of the Theme NP in these structures. If the NP has a referential or specific interpretation, the copula cannot be used in the Present tense. Examples follow.

(16) Possessive structure: referential NP

- a. *U moej podrugi est' Kolina mashina.
at my friend is Kolja's car
b. U moej podrugi Kolina mashina.
'My friend has Kolja's car.'

(17) Existential structure: referential NP

- a. *V Moskve est' moj drug.
in Moscow is my friend
b. V Moskve moj drug.
'My friend is in Moscow.'

The examples in (16a) and (17a) show that existential and possessive structures in which NPs get a referential interpretation are ungrammatical with the Present-tense copula. (16b) and (17b) show the corresponding grammatical sentences, without *be*.

On the other hand, those sentences that contain existentially interpreted NPs always allow usage of *be* in the Present tense, as shown in (18a) and (19a).⁶

(18) Possessive structure: indefinite nonspecific NP

- a. U moej podrugi est' mashina. Ona ezdit na nej kazhdyj den'.
at my friend is car she drives on it every day
b. *U moej podrugi mashina. Ona ezdit na nej kazhdyj den'.
'My friend has a car. She drives it every day.'

(19) Existential structure: indefinite nonspecific NP

- a. V Moskve est' tramvai.
in Moscow is street cars
b. ?V Moskve tramvai.
'There are street cars in Moscow.'

Here we see that overt Present-tense *be* structures behave similarly to English *there*-insertion sentences (see Milsark (1974), *inter alia*), i. e. they demonstrate the Definiteness effect. Unlike Milsark's analysis, this behavior is explained by Economy violations. Vacuous quantification is also expected in these cases, because appearance of the copula in the Present tense can introduce an \exists_{op} in a structure without a free individual variable.

According to Heim (1982), definite (referential) NPs cannot be bound by Existential closure because they do not conform to the Novelty Condition. Notice that although definite NPs introduce variables, they cannot be bound by an \exists_{op} . Therefore, in all cases when the NPs have definite interpretation (e. g., (12a,b), (13a,b)) there is no free variable for the \exists_{op} to bind. Thus, in these cases overt *be* is ungrammatical because it violates the Economy Principle. The "good" examples with Present-tense *be* ((14a), (15a)) all contain indefinite NPs that need to be

existentially interpreted. Consequently, *be*-insertion in these cases is forced by the Lexicalization Requirement (8).

Now we are left with an unexplained case of "inalienable" possessives (7b), repeated here as (16a,b).

- (20) a. *U Mashi est' sinie glaza.
 at Masha is blue eyes
 'Masha has blue eyes.'
 b. *U Mashi est' xoroshee nastroeinie.
 at Masha is good mood
 'Masha is in a good mood.'

Notice that the sentences in (20a,b) contain indefinite NPs, and therefore should allow *be* in the Present tense. However, they are ungrammatical with the Present-tense copula. This paradox cannot be resolved by ascribing the difference between (7a) and (7b) to a well-known semantic distinction between individual-level and stage-level predicates (Carlsoln 1977, Kratzer 1989), since both individual-level (20a), and stage-level (20b) predicates are bad in (7b)-type structures.

In the next section I will propose an answer to this puzzle that hinges on the properties of Existential quantification in natural languages.

6. "Misbehaving" indefinites and the Proper Subset Condition

In this section I will examine the cases that I listed as "inalienable possessives" in the Data section (7b). I will argue that the reason why Present-tense *be* is bad in these examples has nothing to do with "inalienability" of the possession relation, but is a result of a constraint on Existential quantification in natural languages which I will call the Proper Subset Condition.⁷

I will start with English *have*-sentences⁸ that demonstrate an interesting ambiguity of interpretation, and compare them to Russian *be*-possessives in which the same semantic ambiguity is syntactically resolved.

The sentence in (21a) can have two interpretations, formalized in (21b,c).

- (21) a. John has stupid teachers.
 b. $\exists x$ [teacher(x) \wedge stupid(x) \wedge have(j,x)], where $x \geq 2$
 c. $\forall x$ [[teacher(x) \wedge have(j,x)] \rightarrow stupid(x)], where $x \geq 2$

The readings in (21b) and (21c) can be paraphrased as follows.

- (21) b'. Some of John's teachers are stupid.
 c'. All of John's teachers are stupid.

Compare these readings with Russian sentences in (22).

- (22) a. U Koli est' glupye uchitelja.
 at Kolja is stupid teachers
 'Kolja has (some) stupid teachers.'
 b. U Koli glupye uchitelja.
 at Kolja stupid teachers
 'Kolja has (all) stupid teachers.'

The structure with the Present-tense *be* (22a) has an existential reading, whereas the *be*-less structure (22b) has a generic (or universal) interpretation; both sentences are unambiguous. The readings for (22a) and (22b) can be expressed by the formulae in (22a',b') which exactly match the ones in (22b,c).

- (22) a'. $\exists x [\text{uchitel}'(x) \wedge \text{glupyj}(x) \wedge u(k,x)]$, where $x \geq 2$
 b'. $\forall x [[\text{uchitel}'(x) \wedge u(k,x)] \rightarrow \text{glupyj}(x)]$, where $x \geq 2$

Thus, in Russian Present-tense copular structures we see an overt syntactic reflex of ambiguities between existential on the one hand, and universal or generic interpretation on the other.

Now I will demonstrate a similar effect in singular NPs, which will make us look at existential vs. referential readings. The English sentence in (23a) is ambiguous between existential and non-existential interpretations of the NP 'car'. The non-existential interpretation corresponds to referential reading here. The readings are given in (23b,c).

- (23) a. Mary has a good car.
 b. $\exists x [\text{car}(x) \wedge \text{good}(x) \wedge \text{have}(m,x)]$, where $x = 1$
 c. $\text{tx} : \text{car}(x) \wedge \text{have}(m,x); \text{good}(\text{tx})$

Paraphrases of the readings in (23b,c) are given in (23b',c').

- (23) b'. Mary has one/a good car.
 c'. Mary's car is good.

Again, as in the case of plural NPs, Russian disambiguates the structures. The sentences in (24a,b) correspond to the two readings given in (23b',b') and (23c',c').

- (24) a. U Mashi est' xoroshaja mashina.
 at Masha is good car
 'Masha has one/a good car.'
 b. U Mashi xoroshaja mashina.
 at Masha good car
 'Masha's car is good.'

(24a) shows that with overt *be* in the structure this sentence gets only an existential interpretation. In fact, the speakers cannot use it if they know that Masha has only one car. In contrast, (24b) is saying something about 'the car' that Masha has, i.e. the NP gets a referential interpretation.

It is not surprising that Present-tense *be* is ungrammatical with referential NPs. As we have shown earlier, this is fully predictable on the *be*-insertion analysis. However, what is interesting is that we can analogize definites and referentials to universals and generics, so that we will have an existential reading on the one hand, and non-existential readings, including universals, generics, definites, and referentials, on the other hand.

Next, I will show how we can define the \exists /non- \exists distinction using the formalism of the Set Theory. After that I will return to the problem of "inalienable

possessives" to demonstrate that the proposed constraint can account for the notoriously capricious behavior of these structures.

Let us start with an illustration of how truth conditions can be determined by introducing sets of individuals. Take a sentence in (21a).

(21) a. John has stupid teachers.

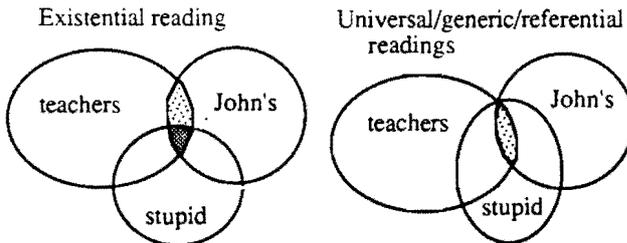
Let *A* be a set of individuals that are teachers, *B* a set of individuals that have some relation to John ('John's'), and *C* a set of all individuals that are stupid.

Obviously, the sentence (21a) is true if and only if there exist individuals (x =individual, $x \geq 2$) that belong to all three sets, i. e. iff $\exists x \in A \cap B \cap C$. However, as is shown in diagram (25), the intersections of the sets can appear in two different configurations:

- 1) intersection of the first two sets can be larger (contain more elements) than the intersection of all three sets;
- 2) intersection of the first two sets can be equal to the intersection of all three sets.

If we look at (21 b,c) where two semantic interpretations of (21a) are given, we will find that they are exactly what the situations 1) and 2) describe. This gives us a clue to how \exists and non- \exists readings can be distinguished. The left hand side of the diagram (25) shows situation 1) = \exists reading; the right hand side represents situation 2) = non- \exists reading. Notice that non- \exists reading in such contexts will correspond to a universal or generic interpretation if the NP introducing a variable is plural, and to a referential/specific interpretation in case of a singular NP.

(25) Defining \exists /non- \exists ambiguity



Let us now formulate the constraint that disallows existential quantification in situation 2) (right hand side of the diagram). Logically, in both 1) and 2) the existence of individuals that belong to the intersection of the three sets is truth conditionally implied. However, in natural languages, if a variable is quantified over by a Gn operator or Universal quantifier, it excludes the usage of an Existential operator, due, perhaps, to the prohibition on vacuous quantification.

In order to derive the \exists /non- \exists distinction in a formal way, I will use the definitions in (26), and formulate the constraint on Existential quantification in (27).

(26) Definitions:

Let D be the intersection of A and B ($D = A \cap B$), and X be the intersection of A , B , and C ($X = A \cap B \cap C$), then

- (i) for non-Existential readings $X = D$;
- (ii) for Existential readings $X \subset D$, $X \neq \emptyset$.

(27) The Proper Subset Condition (PSC):

An existential operator \exists_{op} binds a variable $x \in X$ in its scope iff X is a proper subset of D , where D is a set of relevant entities, established or presupposed in the discourse.

A linguistic comment is due here. Notice that D cannot be the intersection of any two sets. It must be the intersection of the sets introduced by NPs. Interestingly, the adjective works as a restrictor here, and ultimately determines whether *be* can be used in the Present-tense in these structures.

I will make more comments as we start looking at examples illustrating violations of the PSC. I will first look at "alienable" possessives and show that they are sensitive to the PSC, and then demonstrate that "inalienability" effects are, actually, the PSC violations.

- (28) a. U Koli est' otec.
'Kolja has a father.'
- b. U Koli est' dedushka.
'Kolja has a grandfather.'
- c. U Koli est' brat.
'Kolja has a brother.'
- (29) a. *U Koli est' vysokij otec.
'Kolja has a tall father.'
- b. U Koli est' vysokij dedushka.
'Kolja has a tall grandfather.'
- c. U Koli est' vysokij brat.
'Kolja has a tall brother.'
- (30) a. *U Koli est' vysokie otcy.
'Kolja has tall fathers.'
- b. *U Koli est' vysokie dedushki.
'Kolja has tall grandfathers.'
- c. U Koli est' vysokie brat'ja.
'Kolja has tall brothers.'

In (28a-c) we see possessive structures with overt *be*. The PSC does not apply to these cases, as there is no restrictive adjective that introduces the third set. The PP and NP create the set D , and, therefore, these cases assert the existence of $x \in D$, but the set X is not created in these cases.

The sentences in (29a-c) are the ones to which the PSC applies. Let us see how it works. The set D is an intersection of 'Kolja's' and 'fathers' in (29a), 'Kolja's' and 'grandfathers' in (29b), and 'Kolja's' and 'brothers' in (29c). The number of

elements belonging to D is established pragmatically. In (29a) $D = 1$; in (29b) $D = 2$; in (29c) $D \geq 1$.

The next step is to apply the restrictive set 'tall', which yields the set X. The number of elements in X will be 1, as NPs in (29a-c) are in the singular. Now it is clear that in the case when X is not empty (i. e. if in all three cases there actually exist individuals that have the three properties: 'belong to Kolja', 'tall', and 'being father/ grandfather/ brother'), only (29b,c) will conform to the PSC, while (29a) will violate it. Grammaticality judgments demonstrate this.

Now let us look at the case of plurals in (30a-c). The "sizes" of sets D for (30a-c) will remain the same as in (29a-c), i. e. $D = 1$ in (30a); $D = 2$ in (30b); and $D \geq 1$ in (30c), but X will be different. The sentences will be true if and only if there exist at least 2 individuals with the relevant properties, i. e. $X \geq 2$. (30a) is trivially excluded, since with $D = 1$, plural NP 'father' cannot be used. It will also violate the PSC in the same way the sentence (29a) does, and thus is excluded twice. The interesting case is (30b). Since D is pragmatically limited to the number of 2, and $X \geq 2$, X can only be an improper subset of D. Thus, (30b) is a clear case of a PSC violation. In (30c) the number of elements in D is not restricted pragmatically. The parameters will, therefore, be $D \geq 2$, $X \geq 2$. The sentence is grammatical on all readings where X is "smaller" than D.

Finally, let us look at "inalienable" possessives repeated here from (20a,b).

- (31) a. *U Mashi est' sinie glaza.
 at Masha is blue eyes
 'Masha has blue eyes.'
 b. *U Mashi est' xoroshee nastroenie.
 at Masha is good mood
 'Masha is in a good mood.'

The ungrammaticality of (31a,b) is clearly due to PSC violations. In (31a), Masha cannot have more than 1 mood at a time, so this case is exactly like 'father' examples. (31b) is exactly like 'grandfather' cases, where D is limited to 2. Now we see that those "inalienables" that come in as "singletons" and "doublets" in the real world must be used in possessive structures without *be*, since existential quantification will be ruled out by the PSC in these cases.

In order to prove that "inalienability" is not really a factor in determining whether to use *be* or not, let us look at things that are inalienable pragmatically and are "owned" in numbers exceeding 2. Such examples are given in (32) and (33).

- (32) a. U Mashi est' sedye volosy. = 'Masha has some gray hair'.
 at Masha is gray hair-pl
 b. U Mashi sedye volosy. = 'Masha has gray hair, (her hair is gray)'.
 (33) a. U Koli est' korichnevaja rodinka. = 'Kolja has a brown mole'
 at Kolja is brown mole. (and he has other, non-brown moles too).
 b. U Koli korichnevaja rodinka. = 'Kolja has a mole, and it is brown'

The sentences in (32a) (adapted from Seliverstova 1990) and (33a) are perfectly grammatical with the Present-tense copula. This is because they do not violate the PSC, the number of hairs being large enough (note that the NP 'hair' is plural in

Russian), and the number of moles an individual can have also not limited to any particular number. As a result, the "size" of D in each of these cases is flexible, and a reading where X is "smaller" than D is available.

Notice that in these cases "inalienables" behave exactly like "alienables" analyzed above: (22a,b) and (24a,b). They have existential readings when the copula is present ((32a), (33a)). But *without* *be*, "inalienables" in (32b) and (33b) get non- \exists interpretations, generic and referential, which correspond to improper subset situations. Compare semantic formulae for (32a,b) and (33a,b) given in (32a',b') and (33a',b') with (21a,b) and (23b,c).

- (32) a'. $\exists x[\text{hair}(x) \wedge \text{gray}(x) \wedge \text{have}(m,x)]$, where $x \in X$, $X \subset D$, $X \neq \emptyset$
 b'. $\text{Gn} [[\text{hair}(x) \wedge \text{have}(m,x)] \rightarrow \text{gray}(x)]$, where $x \in X$, $X = D$
 (33) a'. $\exists x[\text{mole}(x) \wedge \text{brown}(x) \wedge \text{have}(k,x)]$, where $x \in X$, $X \subset D$, $X \neq \emptyset$
 b'. $\lambda x : \text{mole}(x) \wedge \text{have}(k,x); \text{brown}(tx)$, where $x \in X$, $X = D$

Therefore, we can conclude that the "alienable/ inalienable" distinction is an epiphenomenon; in essence, the presence vs. absence of *be* corresponds to \exists /non- \exists interpretation.

Before I finish this section, I want to mention an additional result that adopting the PSC gives us. It has been noted by many, and convincingly described by Seliverstova (1990) in her insightful book, that Present-tense *be*-structures imply the existence of an entity which does *not* have the relevant property. For example, the sentence in (32a) implies that Masha has some hair which is not gray, whereas the *be*-less structure in (32b) does not have this implicature.

The Proper Subset Condition gives us a principled account of this descriptive fact. It follows directly from the PSC that if there exists an x , such that x belongs to a set X , and X is a proper subset of D , then there exists a y , such that y belongs to D , and y does not belong to X . In our example (32a), which has an \exists -reading, $x \in X$ means that there exist x 's that have 3 properties: 'being hair', 'gray', and 'being Masha's'; also, there must exist some y 's that have 2 properties: 'being hair' and 'being Masha's', but do not have the property 'gray' (i.e. $y \in D$, $y \notin X$). This dependency is formalized in (34).

- (34) $\exists x (x \in X) : X \subset D \leftrightarrow \exists y (y \in D) : y \notin X$

This result is important, since this implicature is strongly present in the semantics that the native speakers of Russian construe for these cases. For example, as was noted by Seliverstova, the reason all native speakers reject 'U Mashi est' sinie glaza' ('Mary has blue eyes'. -- with overt *be*) is because they get an absurd reading on which Masha has another pair of eyes, that is not blue, but perhaps brown, that she is wearing on weekends, for example.

In summary, we have seen that *be* appears in the Present-tense only in those contexts where Existential quantification occurs, to support the \exists_{op} . In non-existential sentences, the presence of *be* in the Present tense is ruled out by the Economy Principle and by constraint on vacuous quantification. The Proper Subset Condition is a filter which blocks Existential quantification in certain restrictive

contexts where the variable is either "familiar" or bound by another operator, and introducing an \exists_{op} would result in vacuous quantification. Since the presence of *be* in Russian Present-tense sentences is solely determined by Existential quantification, applying the PSC to relevant contexts allows us to make precise predictions about the behavior of the copula in the Present tense.

7. Evidence for the two-loci *be* -insertion

The first piece of evidence comes from morphology. In Russian, present-tense *be* is different from other tense forms of *be* (as well as from all other verbs) in that it has no agreement morphology. Compare the tense-paradigms of *be* in (35).

(35) a. <u>Present-tense <i>be</i></u> :	est'	
b. <u>Future-tense <i>be</i></u>		
person:	singular:	plural:
1	budu	budem
2	budesh	budete
3	budet	budut
c. <u>Past-tense <i>be</i></u>		
gender:	singular:	plural:
Feminine	byla	\
Masculine	byl	byli
Neuter	bylo	/

In the Future tense, the copula agrees with the subject in person and number, in the Past tense it agrees in number and gender. In contrast, in the Present tense there is no agreement whatsoever. This striking fact is further illustrated by the examples in (36), with a plural subject, and (37), where the subject is 3d person, singular, Feminine.

- (36) a. U Koli byli glupye uchitelja.
 at Kolja **be-Pst-pl** stupid teachers-Nom-pl
- b. U Koli budut glupye uchitelja.
be-Fut-pl teachers-Nom-pl
- c. U Koli est' glupye uchitelja.
be-Prs- \emptyset teachers-Nom-pl
 'Kolja had/ will have/ has stupid teachers.'
- (37) a. U Mashi byla mashina.
 at Masha **be-Pst-sg-F** car-Nom-3sg-F
- b. U Mashi budet mashina.
be-Fut-3sg car-Nom-3sg-F
- c. U Mashi est' mashina.
be-Prs- \emptyset car-Nom-3sg-F
 'Masha had/ will have/ has a car.'

Be-forms are underlined, and agreement markers are glossed in bold face. It is clear that the copula agrees with the Nominative argument in the Past (36a), (37a), in the Future (36b), (37b), but not in the Present tense (36c), (37c).

On the theory that I am proposing, this puzzling fact is easily explained. In fact, it follows directly from the structure in (11). Assuming that AGR \bar{S} P is located immediately above the TP, and that agreement is triggered by T to AGR \bar{S}

movement (Chomsky 1992), it follows that agreement will be available for *be* in the Past and Future tenses, since the copula is inserted in T at S-structure (see structures (12b) and (14b)). On the other hand, since the TP in the Present-tense structures lacks the tense feature, raising of the copula to T is disallowed by the Economy principle, and, as a result, the position of *be* in the structure is too low to trigger agreement, as seen in (12a). Morphological facts, therefore, confirm the proposed analysis.

Next, I would like to show that there is syntactic evidence for the split positioning of *be*. This evidence comes from historical facts about Russian discussed in Sheveleva (1993), and modern Russian dialects (Kuz'mina and Nemchenko 1968, Sheveleva 1993).

Sheveleva describes sentences found in Church Slavonic texts of the IV-VI centuries written in North-Western parts of Russia, where two forms of *be* cooccur inside one clause. These sentences, she notices, have existential meaning, and are anomalous for Church Slavonic grammar. Sheveleva argues that these forms were introduced into Church Slavonic texts under the influence of contemporary Russian spoken in North-Western provinces. Examples from Sheveleva (1993: 137) follow.

(38) *be*-doubling in Church Slavonic

- a. Bjashe obitel' est' nekoja ne ot slavnyx v predelax velikogo Novograda
 was cloister is some not of great within limits (of the) great Novgorod
 'There was a monastery, not a famous one, in the lands of the Great Novgorod.'
- b. bjashe zhe est' episkop Stefan iskusen syj knjigami
 was prc is bishop Stefan skilled being (with) books
 'There was a bishop, Stephan, who was experienced with books.'

In (38a,b) the sentence-initial *be*-form is Past tense, the second *be* is unmarked for Tense, and is identical to modern Russian Present-tense *be*. Notice that the sentences are interpreted as Past-tense events.

On the proposed analysis, the first *be*-form is in T, supporting the [past] feature, and the second *be*-form (*est'*) is in \exists to support Existential Closure of NPs *obitel'* and *episkop*. The syntactic difference between modern Russian copula and *be* in the texts cited by Sheveleva is that in modern Russian, *be* can perform more than one function via head-movement. In those contexts where both tense and Existential Closure need support, *be* moves from \exists to T, thus performing two functions. In Church Slavonic influenced by Old Russian, the auxiliary strategy was used instead of the movement strategy to support Tense. The reasons for this remain to be investigated, but it is clear that two loci for *be*-insertion are needed to provide structure for sentences in (38).

The same phenomenon is found in modern Russian dialects spoken in the North-West. Morphological forms of the copula in these dialects are the same as in standard Russian (with some phonetic variation). Therefore, it is easy to see that tensed forms agree with the subject, while the untensed form (Present-tense form) has no agreement.

(39) *be*-doubling in North-Western dialects

- a. zhara taka byla esti
 heat-3sg-F such was-sg-F is- \emptyset
 'There was such a heat.'

b. jarmanki byli est' chastye
 fairs-pl were-pl is- \emptyset frequent
 'There were frequent fairs.'

These dialects can be analyzed similarly to the Church Slavonic examples (38a,b), where each functional head, i. e. T and \exists , gets lexical support independently, which results in having two auxiliaries in the structure. In standard modern Russian, the number of auxiliaries is limited to one, and head-movement strategy is used to provide support to Tense in existential structures.

8. Concluding Remarks

It has been shown that the irregular behavior of the Present-tense copula in Russian becomes explained if we adopt a theory that provides a principled link between Existential Quantification and syntactic structure. I have argued that the Existential Operator (\exists_{op}) has a fixed location in the syntactic structure, and that it operates only if the functional projection that contains it, the $\exists P$, is lexicalized, i.e. if it contains some lexical material.

This approach predicts that in non-copula structures that get existential interpretation, the main verb lexicalizes the $\exists P$ by V to \exists movement. Copular sentences present a Last Resort case, where lexical insertion replaces the movement strategy.

Crosslinguistically, lexical-insertion to the $\exists P$ to support an \exists_{op} is not limited to the copular verb. For example, Turkish uses a special particle-like verb *var* in existential contexts, and a different verb *olmak* to support Tense as well as Aspect and Modality. It has been argued (Borer 1994) that in Chinese the particle *ta* is responsible for triggering Existential Quantification.

To be able to predict what lexical item will perform \exists -support, and which will be responsible for Tense- or Aspect-support, a powerful theory of auxiliary selection is needed. Before such a theory can be created, it is necessary to bring in more data on the nature of functional projections and the role they play in semantic interpretation. In this article I suggested that functional projections can play an important role in semantics, "flagging" the location of a quantifier in the structure. My hope is that this approach will be fruitful for both syntax and semantics, as it makes the link between these two parts of the language more explicit.

Notes:

* I would like to thank Chris Collins, Molly Diesing, Angelika Kratzer, Fred Landman and Sally McConnell-Ginet for helpful discussions. I am also grateful to the audiences at FASL-3, Langues et Grammaire-1, Cornell Tuesday Colloquium, and WECOL-24 for many interesting comments. A special thanks goes to Kyle Johnson for discussions and detailed comments on the manuscript.

¹ I am assuming Stowell's small clause analysis of copular structures (Stowell 1978), although other analyses may also be compatible with the *be*-support proposal.

² The particulars of this checking process depend on two parameters (i) "strength"/ "weakness" of morphological features, and (ii) main verb/ auxiliary distinction. Both are fairly standard (see, e.g., Chomsky 1992). The first parameter

determines whether checking must occur at S-structure or can be delayed till LF. The second one distinguishes the behavior of main verbs and auxiliaries w.r.t. raising: in cases of "weak" morphology main verbs check the relevant feature at LF, whereas auxiliaries raise at S-structure.

³ Null Present-tense morphology may correlate with what I called "vacuous" Tense, i.e. a TP which has no tense feature, in the latter case overt morphological marking could be used to test the properties of functional projections. However to establish such a correlation (or its absence) requires an extensive crosslinguistic study which will have to remain for future research.

⁴ For English *have* I am assuming that it is projected as a VP, and raises V to T in non- \exists contexts, and V to \exists to T in \exists contexts.

⁵ For the purposes of the present paper, I will limit the discussion of Existential Quantification to cases where individual variables are bound by an \exists_{op} . This leaves the question of binding event variables open. Since individual- / stage-level distinction between predicates does not affect the syntax the way interpretation of NPs does, it appears that the mechanism of binding individual variables is essentially different from the mechanism of binding event variables.

⁶ In some cases the copula is allowed to be omitted in the Present tense existential sentences. This is because in spoken Russian variables can be licensed from outside the sentence, in the discourse. This conclusion derives from the fact that in presentational existential contexts the copula must always be present (as the contrast in (18) shows), but in answers to questions it is often optional. The sentence in (19b) is, actually, semantically and syntactically ambiguous, and is ungrammatical as a discourse-initial statement. See Kondrashova (in progress) for further discussion of optionality problem, and an analysis of structural ambiguities in null copula sentences.

⁷ The Proper Subset Condition is similar to Chierchia's (1992) non-vacuity presupposition, which has been proposed to account for anomalous readings created in some contexts by adverbs of quantification.

⁸ *Have*-sentences in English are also parallel to Russian *be*-possessives, as well as English *there*-insertion sentences, in that in some contexts they demonstrate the Definiteness effect (see Partee 1983, Partee and Landman 1984, Stowell, p.c.). This fact is explained on this theory by allowing *have* to have two derivations, one where it goes directly to T, the other where it first lands in \exists , and then moves on to T; the second derivation will be expected to demonstrate the Definiteness effect.

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Aspect and Direct Objects in Japanese

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I The phenomena

Transitive verbs in Japanese are characterized by two case assignment patterns. In (1a), we find the standard nominative/accusative pattern while (1b) exemplifies the less typical nominative/nominative pattern. The first pattern is typically associated with 'affected' direct objects, while double-*ga* case marking is restricted to what are typically understood as stative predicates (verbs, adjectives and certain nominal forms). Clearly, accusative case in Japanese is not automatically assigned to the sister of the verb.

- (1) Transitive case marking (Kuno 1973)
- | | |
|--|--|
| <p>a. T-ga hon-o yomu
T-NOM book-ACC read
'T reads a book'</p> | <p>b. T-ga eigo-ga wakaru
T-NOM English-NOM understand
'T understands English'</p> |
|--|--|

In addition, almost all Japanese verbs can occur in what is normally known as the *te-iru* form (the gerund of the verb combines with some form of the verb *iru* 'be [animate]'). As shown in (2), with some verbs this expression represents a true progressive, equivalent in all basic respects to the English progressive. With other predicates, however, it has a perfective interpretation.

- (2) The *te-iru* form (Kindaichi 1976)
- | | |
|---|---|
| <p>a. Progressive
Ima oyoide-iru
Now running-are
'(T) is running now'</p> | <p>b. Perfective
Ima sinde-iru
Now, dying-are
'(T) is dead now'
NOT
*'(T) is dying now'</p> |
|---|---|

In addition, predicates which are not felicitous under *te-iru* are stative. This parallels English where stative predicates such as *love*, *need*, or *be green* are generally not natural in the progressive.

What we find in Japanese, then, is that all transitive verbs which mark their direct objects with accusative case are also progressive under *te-iru*. Predicates which mark their objects with nominative case are either perfective under *te-iru* or not felicitous with *te-iru*. Examples of all three kinds of verbs are given in (3a-c).

- (3) *Te-iru* and object case assignment
- | |
|--|
| <p>a. <i>Te-iru</i> is progressive/accusative object
Gohan-o tabete-iru '(T) is eating dinner'
Kuruma-o aratte-iru '(T) is washing the car'
Sono kabe-o nutte-iru '(T) is painting that wall'
Kore-o benkyoo-site-iru '(T) is studying this'</p> |
|--|

As I have noted in parentheses, the traditional aspectual categories are labeled activities, achievements, and statives. Intuitively, an activity is a controlled process which is generally marked by some kind of internal step (i.e. *run, walk, swim*, etc.). Activities are usually associated with volitional control and they do not have inherent conclusions. Achievements are discrete changes defined by a simple before and after (i.e. *die, arrive, open*, etc.), while statives are simple unbounded states (*love, hate, be green, belong*, etc.).

To sum up so far then, I am arguing for a direct correlation between inherent aspectual structure and case assignment. In particular, I am making the empirical claim that accusative case assignment is limited to activity predicates. Is this so? Apparent exceptions to this correlation include the four kinds of verbs found in (7). Traditionally, accusative case is indicative of direct objects which are intentionally affected by the action of an agent. In all of these examples, the object is unaffected and a number of them look quite stative in meaning. I argue, however, that regardless of what intuition tells us, the syntactic patterns of (4) through (6) confirm the correlation between accusative case and activity predicates. In particular, in (7a-c) the aspectual patterns of the predicate type parallel those of a typical activity as shown in (4), even though the direct object is not affected in any standard sense of the word. In (7d), then, one can argue that the apparent direct object of a verb like *iku go* is not actually a real direct object at all. Thus, in spite of the surface *o*-marking, the object in (7d) does not passivize, and it does not occur in what is known as the *te-aru* form (also known as the intransitivizing resultative). Martin (1975) and others call this kind of argument a perlocative or traversal object. It indicates the path of movement and is therefore distinct from an accusative-marked object. As such, the kinds of examples found in (7) do not contradict the basic correlation between accusative case assignment and activity predicates.

(7) Apparent exceptions (Jacobsen 1992)

a. Perception verbs

Ex: *Ongaku-o kiku* 'hear/listen to music'

kiki-hazimeru 'begin to listen'

kiki-tuzukeru 'continue to listen'

kiki-owaru 'finish listening'

**sanzikan kakkete kiku* 'take three hours to listen'

sanzikan kiku 'listen for three hours'

te-iru is progressive

b. Emotion predicates

Ex: *T-o nikumu* 'hate T'

nikumi-hazimeru 'begin to hate'

nikumi-tuzukeru 'continue to hate'

nikumi-owaru 'finish hating'

**sanzikan kakkete nikumu* 'take three hours to hate'

sanzikan nikumu 'hate for three hours'

te-iru is progressive (on-going)

- c. Stative predicates
 Ex: Zyooheki-ga mati-o kakonde-iru 'Walls surrounds the town'
 (c.f. Fuan-ga sutaa-o kakonde-iru 'Fans surround the star')
 kakomi-hazimeru 'begin to surround'
 kakomi-tuzukeru 'continue to surround'
 kakomi-owaru 'finish surrounding'
 *sanzikan kakkete kakomu 'take three hours to surround'
 sanzikan kakomu 'surround for three hours'
 te-iru is progressive (on-going)
- d. Motion predicates (traversal objects)
 Ex: kono miti-o iku 'go along this road'
 (c.f. keeki-o taberu 'eat the cake')
 Passive:
 *kono miti-ga ikareta 'this road was gone'
 (c.f. keeki-ga taberareta 'the cake was eaten')
Te-aru:
 *kono miti-ga itte-aru 'this road has been gone'
 (c.f. keeki-ga tabete-aru 'the cake has been eaten')

The overall correlation I am arguing for is also strengthened by the fact that some predicates allow both case marking patterns. The aspectual ambiguity of *suru* 'do' in (8a) is noted in part by Dubinsky (1985), Grimshaw & Mester (1988), and Miyagawa (1989), and we see that the aspectual ambiguity correlates with the object case assignment, *o* for an activity, *ga* for an achievement. The *wakaru* 'understand' ambiguity in (8b) is less clear, but the general impression is that *wakaru* is three ways ambiguous. In this it is like an English predicate such as *continue*. When it is purely stative (i.e. when *te-iru* is the least felicitous), it is basically a double-*ga* predicate. With *te-iru*, both *ga* and *o* case-marking are possible, but it is not completely clear that one is an achievement and one an activity. It is worth noting, however, that when you say something like 'Please understand', only *o*-marking is possible. When *wakaru* is treated as a transitive volitional predicate, it behaves just like any other transitive volitional predicate.

- (8) Case/aspectual ambiguity
- a. *Suru* 'do'
 nioi-ga site-iru 'smells, has gotten pungent'
 tennis-o site-iru 'is playing tennis'
- b. *Wakaru* 'understand'
 kore-ga/*o wakaru 'understands this'
 kore-ga wakatte-iru 'has come to understand this'
 kore-o wakatte-iru '?is understanding' or 'has come to understand'
 (c.f. kore-o/*ga wakatte kudasai 'Please understand this')

So far, then, the various tests and classifications have divided predicates into one of three aspectual types: activities, achievements, and statives. Further, we have seen that accusative case is limited to activity predicates. Now, given that case assignment is basically a syntactic phenomena, how can we best account for this correlation? In the literature on case assignment in Japanese, the standard approach is to stipulate some kind of link between stative verbs and nominative-marked objects. This is not a very satisfying approach for several reasons. First, such a stipulation is obviously not very revealing simply because it is a stipulation.

Second, the claim that nominative case is assigned to the direct objects of stative verbs is not even accurate given verbs such as *ki-ga tuku* 'realize' and *dekiru* 'can do, finish', both of which are double-*ga* predicates and both of which are achievements. Third, what is the lexical specification of the predicates in (8)? If a single predicate may exhibit more than one case assignment pattern, the lexical solution will obviously require a fair amount of ambiguity in the lexicon.

My approach is to argue that inherent aspectual structure is mapped directly into syntax and that each aspectual type has a different syntactic structure. The consequences of such a hypothesis can be found in a number of languages including Italian and English (McClure 1994). In Japanese, in particular then, I argue that case assignment is determined by the overall syntax of the predicate and not by the lexical entry of a particular verb. As this syntax reflects aspectual structure, it is not a surprise that inherent aspect and case assignment should correlate in Japanese. In the next section of this paper, I outline a semantics for each of the three aspectual types, and I then define a mapping from this semantics into straightforward X-bar structures. In the final section of the paper, I begin with (and ultimately reject) Chomsky's (1992) mechanism for case assignment by Agr to derive the correlations between aspectual structure and case assignment observed so far.

II A semantics and syntax for inherent aspect

I now look at how to characterize the three types of aspect exemplified in (4) through (6) above.

Let's say that a state is an unstructured interval of time where we can learn everything there is to know about an interval by looking at a single moment in time. States are homogeneous without clear boundaries. Let us represent such a state as *s*, as shown in (9a).

In (9b), then, we have the representation of an achievement. Intuitively, an achievement is composed of two states: before and after a moment of change. A single change is represented by *c* = <*s s'*> (the ordered pair *s s'*). We would probably want to say that the two states of a (natural) achievement are not identical to each other, and they are well-ordered with respect to time. Following Dowty, the set of all achievements is represented in the syntax by the BECOME operator.

Finally, recall that activities may be characterized as processes with internal steps. We can now see that such internal steps may be characterized as achievements. In (9c), activities are defined as chains of achievements without clear bounds. A single process is represented by *p* = {<*s s'*> <*s' s''*>...<*s_n s_{n+1}*>...} (a set of achievements). Again, we would probably want to say that the achievements in a (natural) process are not identical, and they are all well-ordered in time. In addition, the achievements in a (natural) process are well connected (i.e. head-to-tail), and they have one individual in common (i.e. they have an Agent). It is significant that only activities require a particular kind of syntactic argument, and as we will see below, the Agent in my analysis is an aspectual argument. It is not directly licensed by the verb, and its semantic role is to hold the chain of changes together. The set of all activities is then represented in the syntax by the DO operator.

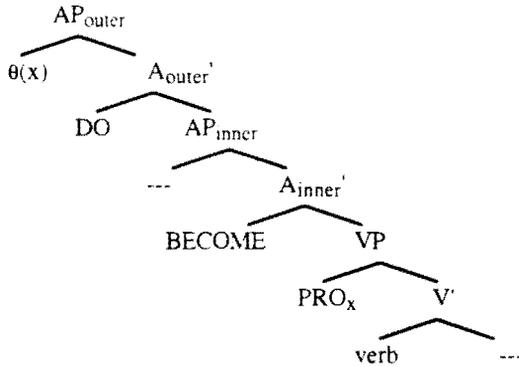
- (9) Statives, achievements, and activities
- a. Statives
 - s, a possible state
 - b. Achievements (BECOME)
 - c = $\langle s \ s' \rangle$ where $s \ s'$ and s precedes s' in time
 - c. Activities (DO)
 - p = $\{ \langle s^1 \ s^2 \rangle \langle s^3 \ s^4 \rangle, \dots, \langle s^n \ s^{n+1} \rangle, \dots \}$ where
 - $\langle s^n \ s^{n+1} \rangle \ \langle s^{n+2} \ s^{n+3} \rangle$ for all s^n ;
 - $\langle s^n \ s^{n+1} \rangle$ precedes $\langle s^{n+2} \ s^{n+3} \rangle$ in time for all s^n ;
 - for all pairs of contiguous changes $\langle s^n \ s^{n+1} \rangle \ \langle s^{n+2} \ s^{n+3} \rangle$,
 $s^{n+1} = s^{n+2}$
 - there is a θ -role such that for all s^n and s^{n+1} , $\theta(s^n) = \theta(s^{n+1})$
 (i.e. there is an Agent)

Note that the aspectual semantics outlined in (9) is compositional. Each more complex structure is composed of simpler structures. States are basic, while achievements are pairs of states. Activities are then defined as sets of pairs of states or sets of achievements. It is obviously very easy to map such a semantics into syntax. I do this along the relatively well-trod path of Travis 1991, Noonan 1993, among others, although the specifics of my proposal are actually quite different from any of these earlier analyses. I propose that aspect is projected as two functional heads in the manner of (10), where I have labeled the two aspectual heads AP_{outer} and AP_{inner} . DO (the set of well-formed activities) is mapped into the outer position, while BECOME (the set of well-formed achievements) is mapped into the inner position. Paralleling the treatment of negation in Pollock (1989), these aspectual projections are licensed only when required by the predicate in question. We therefore have three different syntactic projections, one for each type of inherent aspectual structure. Aspectually more complex structures are mapped into syntactically more complex structures.

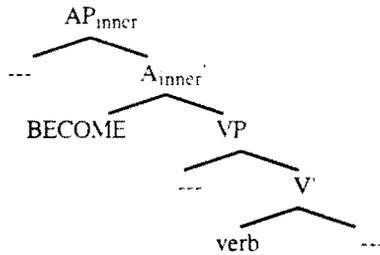
In (10a) note in particular the control relationship between the Agent in the Spec of AP_{outer} and the PRO in the Spec of VP. Syntactically, DO is defined as a control predicate which establishes a relationship between an individual (i.e. the Agent) and an embedded achievement. As the Agent is licensed by the DO operator, it must be mapped into the Spec position closest to the DO operator (i.e. the Spec of AP_{outer}). The representation in (10a) therefore gives us a syntactic representation of the intuitive Agent/Experiencer ambiguity associated (in most semantics of aspect) with the subject of an activity (c.f. Dowty 1979).

(10) General aspectual projections

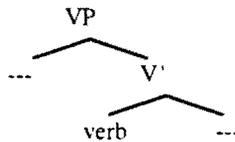
a. Activity



b. Achievement

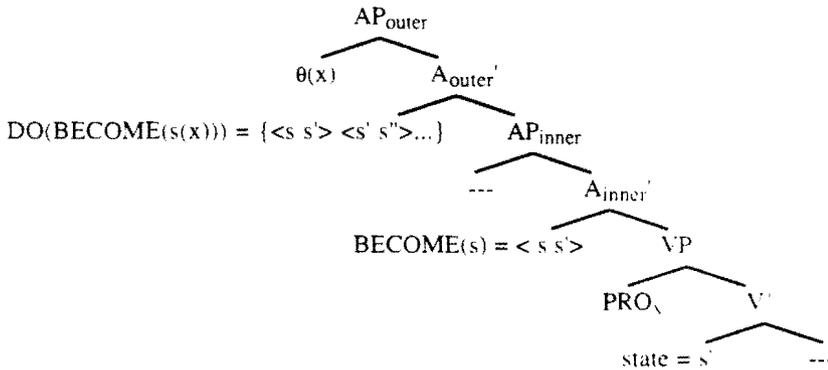


c. State



The semantic interpretation of the structures in (10) is outlined in (11). Aspectually, the verbal head is interpreted as an incomplete form of the verb (i.e. as a basic state) which incorporates the aspectual information represented by the aspectual operators through head-to-head movement along the lines of Travis (1984).

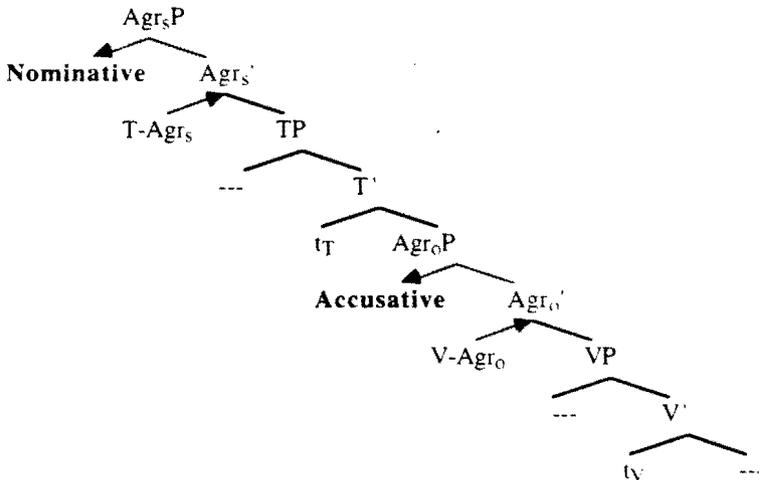
(11) General semantic derivation (activity)



III Case assignment

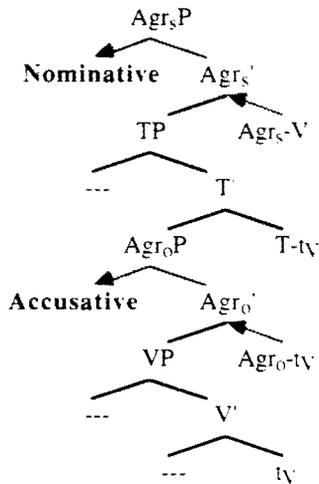
Given the basic mapping of aspect into syntax shown in (10), how then can we account for the correlation between activities and accusative case assignment observed in Japanese? I begin with Chomsky (1992) who assigns case above VP by means of the nodes Agr_s and Agr_o as we see in (12) for English. The actual mechanism involves a verbal element which raises into the relevant agreement node. The resulting conglomeration of verbal and agreement feature checks case in the immediately c-commanding Spec position. While I ultimately reject the notion of Agr in Japanese, I take from Chomsky the notion that case is not determined by the verb low in the syntax, but is determined by some functional element much higher up.

(12) Case assignment in English (Chomsky 1992)



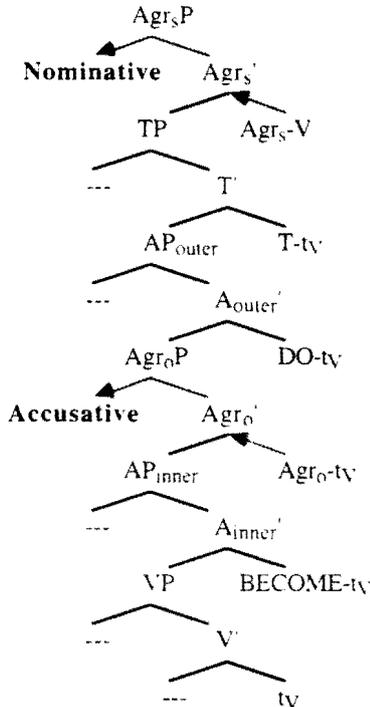
(13) is then the head-final version of (12). It is of course crucial to my analysis that simple proximity to the verb is not enough to license case (accusative or nominative), but it is not at all clear how we might derive the double-*ga* case assignment patterns of Japanese from the structure in (13).

(13) Case assignment in Japanese (à la Chomsky 1992)



Further, it is even less clear how we might combine (10), my proposal for mapping aspect into syntax, with the case-marking mechanism outlined in (13), although a first and somewhat ungainly proposal is to combine the two as we see in (14). Aspectually, the structure in (14) is an activity. Both aspectual nodes are present and both nominative and accusative case are assigned.

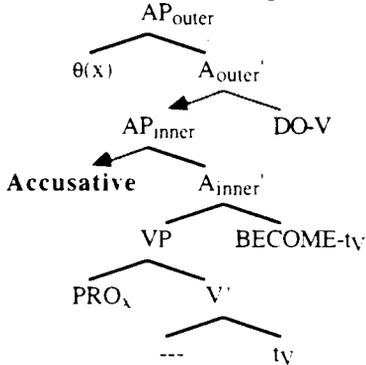
(14) Case marking and aspect (a first proposal)



Recall then that, like negation, the aspectual nodes are both optional. When the aspectual semantics does not require them, they are not manifested. As *o*-marking is restricted to activities in Japanese, this means that we have to stipulate a link between Agr_o and AP_{outer} in order to derive the correct distribution of accusative case. When AP_{outer} is not needed by the semantics, Agr_o must also be absent.

I propose here that we can get the same results by eliminating Agr altogether and giving its functions directly to Tense and AP_{outer} . This parallels proposals by Travis (1991), Noonan (1993), and Laka (1994) for Tagalog, Irish, and Basque, although the technicalities of my proposal are quite different. In (15), accusative case in the Spec position of AP_{inner} is checked by the conglomeration of DO and the Verb in the head of AP_{outer} . Note, however, that accusative case is assigned under government and not under a Head-Spec relationship. My proposal is therefore actually quite different from Chomsky's proposal for case assignment by means of Agr , but it is crucial to my overall analysis that the DO node plays two independent functions: DO licenses both accusative case assignment and the Agent θ -role. Given that arguments move up to get case assignment and given that the Agent is never marked with accusative case, it makes sense to map these two elements as illustrated in (15). Thus, without the DO node, there will be no accusative case. As DO is defined as the set of all activities, the correlation between accusative case assignment and activities in Japanese is automatic.

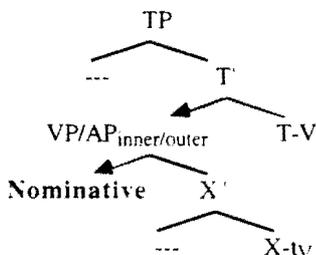
(15) Accusative case assignment (a second proposal)



The structure in (15) also gives us the part of Burzio's Generalization which seems to hold for Japanese: if there is accusative case assignment then there must be an Agent. This follows directly from the fact that DO plays a role both in the mapping of the Agent and the licensing of accusative case. Without DO, both are impossible. With DO, both transitive and intransitive agentive predicates are possible, but all direct objects will be marked with accusative case.

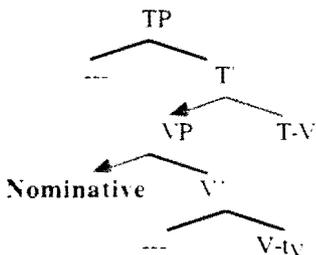
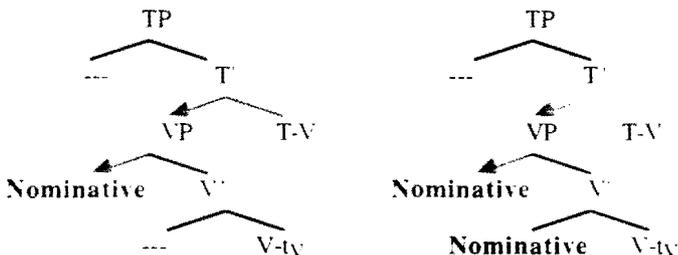
Turning now to nominative case in (16), I propose that nominative case is checked by Tense in whatever position is immediately below it. Again, case is checked under government and not by means of a Head-Spec relationship. While this is obviously different from Chomsky (1992), it is consistent with what I have proposed for accusative case. As Tense is always available in the matrix clause of a Japanese sentence, nominative case is always available, although the aspectual syntax below TP determines where exactly nominative case is checked. As we see in (16), the position governed by Tense can be Spec of VP, AP_{inner}, or AP_{outer}.

(16) Nominative case assignment (a second proposal)



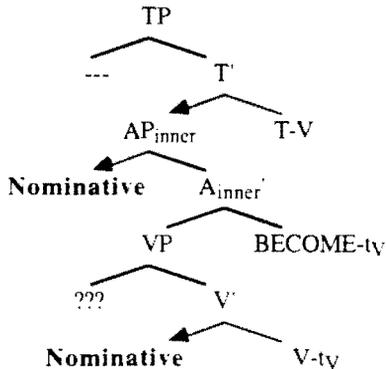
The analysis so far accounts for the basic correlation between activities and accusative case, but how do we account for direct objects with nominative case marking? Let us look first in (17) at the case marking of a simple stative predicate.

(17) Stative case assignment

(18) Stative (double-*ga* case assignment)

From (17), case assignment to the lower position is actually relatively straightforward. Modifying Takezawa (1987), I would argue that double nominative constructions are possible through a straightforward application of Baker's Government Transparency Corollary (Baker 1988, p.64). This Corollary states that a lexical category which has an item incorporated into it, governs everything which the incorporated item governed in its original structural position. The complete case marking properties of (17) are therefore illustrated in (18) where both the trace of the verb as well as the verb itself license nominative case. In this way, then, case is determined above the VP but is licensed in the lower nominal positions. Thus, the fact that a particular direct object is the sister of the verb does not determine what case it will have. Rather, in (18), Tense Phrase licenses nominative case only. As AP_{outer} is missing from the structure, accusative case is completely impossible. Nominative case is then licensed in the lower position by the trace of the verb.

As this application of the Government Transparency Corollary is completely general (and in particular is not limited to stative predicates) the various nouns in an achievement would receive case in an identical fashion, as we see in (19). Note, however, that the structure in (19) actually predicts three nominative locations. There is no reason that the verb trace adjoined to BECOME should not also license nominative case. Is there evidence, then, for three kinds of *ga*-marked positions in an achievement?

(19) Achievement (double-*ga* case assignment)

Interestingly, Japanese has a number of different kinds of *ga*-marked arguments, and in (20), we have examples of three kinds of locative expressions. Locatives in Japanese are typically marked with either particle *ni* or particle *de* as we see in (20a&a'). Some locatives, however, occur just with *ni* as we see in (20b&b') or just with *de* as we see in (20c). At the same time, every locative in (20) may be marked with nominative *ga*. What is important about these examples is that the first members of each pair (i.e. the predicates in (20a, b & c)) are all achievements, while the primed examples (i.e. (20a'&b')) are both statives. The *de*-marked locative of (20c) therefore represents a kind of locative which is found only with achievement predicates. As it may also be marked with nominative *ga*, we have evidence for a kind of *ga*-marked argument which is unique to achievements. I would propose that such an argument might be found in (19) in an achievement structure in the Spec of VP.

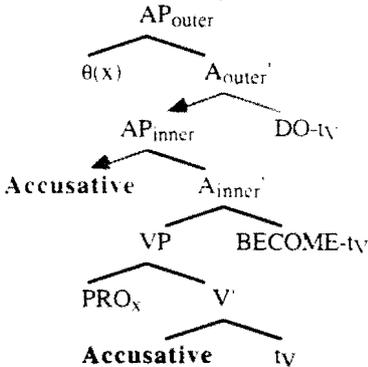
(20) Locative subjects (triple-*ga* case assignment?)

- a. *Ni/de* (achievement)
 Kono hen-**ni/de** inu-ga atumaru
 this area-DAT/LOC dog-NOM gather
 'It is in this area where the dogs gather'
- a'. *Ni/de* (stative)
 Kono hen-**ni/de** kesiki-ga kirai
 this area-DAT/LOC view-NOM is unappealing
 'It is in this area that the view is unappealing'
- b. *Ni* only (achievement)
 Ano hen-**ni**/*de boku-ga sumu
 that area-DAT/LOC I-NOM live
 'It is over there that I live'
- b'. *Ni* only (stative)
 Tookyoo-**ni**/*de Amerika-zin-ga ooi
 Tokyo-DAT/LOC Americans-NOM are many
 'It is in Tokyo that Americans are many'

- c. *De* only (achievement)
 Kono hen-**ni/de* kodomo-ga tuku
 this area-DAT/LOC car-NOM arrive
 'It is in/at this area where the children will arrive'

What then are the consequences of this proposal for an activity such as (21)? The case assignors in an activity are DO and Tense (the latter found above AP_{outer} and omitted in (21)). The verb raises and eventually adjoins to DO. This conglomeration then licenses accusative case in all positions where the verb has left a trace. As the verb continues to raise, nominative case is licensed in all positions where accusative case has not already been assigned. The Case Filter functions simply to prioritize case assignment. This means of course that case is massively over-generated and is simply not used when it is not needed. Thus, in (21), the PRO in Spec of VP does not need case and simply ignores it. Note, however, that in (21) accusative case is nonetheless assigned to two possible positions. Is there evidence in Japanese for two such positions?

(21) Activities (c.f. (17))



Fortunately, there is. Saito (1992) makes such an argument. Basically, when a direct object is adjacent to the verb as in (22a), the case marker is actually optional. In (22b), however, the direct object is not adjacent to the verb and accusative case marking is mandatory. Given that arguments scramble in Japanese, however, is it simply the case that (22b) is derived from (22a) by scrambling? Without going into detail here, the basic answer is no, (22b) is not derived from (22a). Saito's arguments revolve around the fact that the anaphoric properties of scrambled arguments are different from those of non-scrambled arguments, and the direct object in (22b) patterns like a non-scrambled argument. As such, there is evidence for two different accusative case-marked position in Japanese. That they do not co-occur may be attributed to Harada's Double-*o* Constraint (Harada 1973) which looks very much like a surface constraint because it is generally not observed Korean. Alternately, it may simply be that no predicate in Japanese licenses enough arguments to require the use of so many possible case assignments.

- (22) Two kinds of direct objects (Saito 1992)
- a. Adjacent
 W-ga kare-ni Tanaka-o/ | syookai-sita
 W-NOM T-ACC/ | introduce-did
 'W introduced T to him'
 - b. Separated
 W-ga Tanaka-o/* | kare-ni syookai-sita
 W-NOM T-ACC/* | he-DAT introduce-did
 'W introduced him to T'

To conclude, I have given an analysis of the observed correlation between case assignment and inherent aspectual structure in Japanese. Given the number of *ga*-marked arguments possible in a Japanese sentence (three easily), it is surely safe to say that the label 'nominative case' in Japanese refers to something very different from 'nominative case' in a language such as English or Italian. I have argued that case in Japanese is determined by the functional nodes AP_{outer} and Tense high in the syntax, and it is licensed to lower positions by the traces of the verb. While my analysis began as a modification of the Minimalist approach to case assignment, I have ended up with a very different proposal in order to account for the multiple case assignment patterns in Japanese. I have also reverted to case assignment under government to allow a single node (i.e. DO) to play a role both in the licensing of case and in the mapping of a particular θ -role into syntax. In this approach, case in Japanese is available to every position of a syntactic tree, but each position is probably uniquely determined by any number of syntactic and semantic properties. The case assignment mechanism checks that the particular noun in question is appropriate to the syntactic position, but it surely must look at more than just agreement features like gender and person. In Japanese, for example, it checks for different kinds of locative arguments, and it is probably constrained by something like the Double-*o* Constraint. Further, while I have reverted to case assignment under government, this is not a claim that case marking mechanisms are less restricted than they might be under Minimalist assumptions. Rather, in my analysis, allowable syntactic structures are greatly restricted by the semantics of aspect. In fact, I would propose that all basic syntactic structures must be compatible with those outlined in (10) because these are the only structures which can be interpreted by the aspectual semantics. While this is obviously a very different kind of restriction from those found in Chomsky (1992), it is in many ways an even more limited hypothesis, but it is one which I have found useful in the exploration of several unrelated syntactic phenomena (McClure 1993, 1994).

Finally, I have not actually given an analysis of the aspectual ambiguity illustrated in (8), although its outlines should be clear. Individual predicates are aspectually ambiguous. Once the aspectual structure of a particular predicate in a particular instance has been determined, however, the syntax and its characteristic features are determined automatically. Examples of this ambiguity (which is actually rare in Japanese but rampant in English) are found in (23) and (24). What I have not explained here is how this ambiguity is represented. Although I have concrete ideas about what such representations look like, that must be the topic of another paper on these phenomena.

- (23) Achievement/activity ambiguity
- a. *Suru* 'do' [c.f. (10a)]
 nioi-ga suru 'smells, get pungent'
 tennis-o suru 'play tennis'
 - b. *Swim*
 T swam to the island in ten minutes
 T swam in the ocean for a while
- (24) Stative/achievement/activity ambiguity
- a. *Wakaru* 'understand' [c.f. (10b)]
 kore-ga/*o wakaru 'understands this'
 kore-ga wakatte-iru 'has come to understand this'
 kore-o wakatte-iru '?is understanding' or 'has come to understand'
 (c.f. kore-o/*ga wakatte kudasai 'Please understand this')
 - b. *Run*
 The old road ran between Paris and Milan
 T ran to the store
 T ran in the park

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The Possessor that Stayed Close to Home*

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Introduction

In the Minimalist framework of Chomsky 1993, feature checking and the principle of Greed plays an important role: an element can only move to satisfy some featural requirements of its own. In particular, it cannot move to satisfy the requirements of some other element, nor can it move to receive some particular interpretation. The checking theory is designed to be a restricted theory of landing sites for movement, on the grounds that the principle of Greed will rule out movements to inappropriate sites. In this paper I will show how the system works favourably to explain the behaviour of two types of possessive constructions in English. In addition to the regular possessive such as *John's book*, English also has a possessive which acts as an noun modifier, as in *men's clothing*. I will show that both kinds of possessives are syntactic, and their properties can be accounted for given an articulated syntax for the noun phrase (cf. Szabolcsi 1983, 1994, Abney 1987, Giorgi and Longobardi 1991, Kayne 1993 and others). In the regular possessive, the possessor moves to Spec DP while in the modificational possessive, the possessor 'stays close to home' or remains close to the possessed noun because it lacks the features to move higher.

The paper is organised as follows. Section 1 outlines the basic differences between the two types of possessives. Section 2 shows that the modificational possessive is syntactic and not a case of lexical compounding. Section 3 shows how the two structures can be derived syntactically and develops a feature system that predicts their various syntactic differences. Finally, section 4 presents some observations on the larger implications of the analysis with respect to deriving all cases of movement using Greed and feature checking.

1 Two types of possessives

English has (at least) 2 kinds of possessive constructions which involve the possessive marker *-s*, as shown in (1) and (2). I will call (1) a *regular possessive* (RP), and (2) a *modificational possessive* (MP).¹

- | | | | |
|-----|------------------|-----|--------------------|
| (1) | a. Mary's school | (2) | a. a girl's school |
| | b. Bill's shoes | | b. men's shoes |

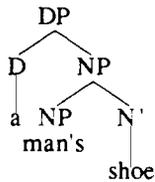
There are a number of properties that superficially distinguish the two type of possessives. First consider the ambiguity of (3):

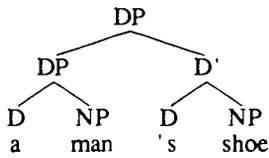
- (3) A man's shoe is on the counter

(3) can either mean that a shoe of the type worn by men is on the counter, or the shoe belonging to some man is on the counter. The ambiguity is clearly structural, as it disappears under *one* substitution, as in (4):

- (4) a. This man's shoe and that one ≠ shoe belonging to that man
 b. This man's shoe and that one's ≠ shoe worn by man

Under a simple DP analysis (e.g. Abney 1987), *one* substitutes for NP, thus *man's shoe* in (3) forms a constituent (say NP) under the MP reading but does not form a constituent under the RP reading. Without elaborating the structure excessively for the moment, we can capture the constituency facts shown in (3) and (4) by positing the following structures for (3):

- (5) a. 

modificational possessive
- b. 

regular possessive

The structures in (5) immediately account for the ambiguity of (3), and the contrast in *one* substitution shown in (4). In (5a) *man's shoe* may be substituted for but in (5b) it may not. *Man* in (5b), on the other hand, may be substituted for yielding (4b), while *man* in (5a) may not be substituted for by *one*.

The structures in (5) also account for the fact that the possessor in an RP is a full DP, as evidenced by the possibility of overt determiners, proper names and pronominal forms, relative clauses and adjectival modifiers. The possessor of a MP, however, may not be a DP, but rather seems to be limited to NPs. Thus the examples in (6) can only be interpreted as RPs rather than MPs.

- (6) a. The large dog's bone
 b. Bill's shoes
 c. his shoes
 d. the man that I like's hat

While most examples of MPs use single nouns as the modifier, it is possible to have phrasal MPs as the examples in (7) show.² Although adjectival modifiers might be interpreted as compounds (as in *tall man* (which often receives compound stress in English)), the presence of *very* in (7b) rules out this possibility. The difference between the compound reading and the phrasal reading can be seen in the contrast between (8a), (8b) and (8c).

- (7) a. A tall man's coat
 b. A very tall man's coat
- (8) a. A [black bird]'s feather (feather from a black bird)
 b. A [blackbird]'s feather (feather from a blackbird)
 c. A black [bird]'s feather (black feather from a bird)

In (8a) (spoken with roughly equal stress on *black*, *bird's* and *feather*), the intended interpretation is a feather from a black bird (say a crow or a starling) rather from the

species *blackbird* (as in (8b) (which is spoken with compound stress on stress on *black*). The contrast between (8c) (with stress on *bird*) and (8a) shows that *black* in (8a) is modifying *bird* and not simply the modificational possessive *bird's feather*, since (8c) could be a black feather from a bird that is largely another colour. For example, the Black Capped Chickadee has black feathers on its head; we could describe one such feather as (8c) but not (8a).

The fact that regular possessors can be DPs but modificational possessors can only be NPs leads to a major interpretive difference between the two constructions: the possessor in an MP acts adjectivally, and is never referential; instead it receives a 'type' interpretation. *A man's shoe* is of the type worn by men; *man* does not refer to any specific man at all. If determiners are the locus of referentiality in noun phrases, as is commonly thought, then this distinction follows naturally if the MP is never a DP.

2 Against a compounding analysis

As far as I am aware, there is almost no discussion of modificational possessives in the literature. Because of their apparent bare noun restriction, (which as we have seen above, does not really exist) Barker 1991 claims that MPs are compounds, and gives as evidence the single example *men's room*, which has an idiomatic interpretation and receives compound stress. Other similar examples can also be found, such as *bull's eye* (centre of a target) and *cat's eye* (reflectors embedded in the roadway to mark lanes). Although these examples are probably compounds, there are substantial reasons to believe that non-idiomatic MPs cannot be, in addition to the presence of NPs inside a compound, which in itself is problematic for a compounding analysis. First, MPs are productive and receive a uniform interpretation; second, MPs show agreement, while compounds do not. This second property also distinguishes them from regular possessives, as we shall see below.

The first observation is straightforward: not all MPs are lexically idiosyncratic. Beside *men's room* we have *men's clothing*, *men's pants*, *men's shoes* etc. which are all transparent in their meaning, so I will take it that there is a productive set of MPs which are not necessarily compounds. This does not show that MPs are not compounds, but the fact that some are idiosyncratic in meaning is not sufficient evidence that all MPs are compounds.

Perhaps the most striking property that distinguishes MPs from other types of possessives (and compounds) is the fact that the possessor in an MP agrees with the noun it modifies. This is most clearly shown using irregular plurals, since a sequence of the regular plural and the possessive morpheme seems to be independently ruled out on (morpho-)phonological grounds (Zwicky 1987).

Beside the idiomatic *men's room*, we find the MP in (9).

(9) This is a real man's room

A man's room is one which is typically "male-ish"; the prototypical 'den' with its dark panelling, pictures of hunting scenes, old sailing ships and the like. Upon entering such a room, one might declare it to be a real man's room, without there being any man to whom it belongs. In this case, the agreement pattern shows up clearly.

If there were two such rooms in the house, we would say (10a) not (10b). Thus, although *men's room*, which does not show agreement, receives only an

idiomatic interpretation, and contrasts minimally with *man's room*, *men's rooms* is ambiguous between being the plural of *man's room* and the plural of *men's room*. The plural of *man's room*, then, is not (10b).

- (10) a. There are two men's rooms in this house (ambiguous)
 b. *There are two man's rooms in this house

The data are not always entirely clear, but a safe generalisation seems to be that if the possessed noun is plural, then the possessor must also be plural. If the possessed noun is singular, the preference is for a singular possessor, although plural possessors seem marginally acceptable in some cases but not others. Consider the data in (11).

- (11) a. *These are man's rooms/shoes
 b. This is a man's room/shoe
 c. ??This is a men's shoe
 d. *This is a men's room ≠male-ish room
 e. These are men's rooms (ambiguous)

Examples such as (11c) are marginal for most speakers. To the extent that speakers accept them, it is possible that they have, in fact, reanalysed them as compounds. Some evidence for this comes from the contrast between (12a) and (12b).

- (12) a. This is a children's book
 b. This is a child's book

There is a subtle difference in interpretation between the two examples. A children's book must be a book whose contents are specifically designed for children. A child's book, on the other hand, could be a book with regular content, but perhaps printed on extra-durable paper. In this sense, *children's book* is idiomatic. The contrast becomes more clear if we replace *book* with *edition*. Consider (13).

- (13) a. This is a child's edition of the Bible
 b. This is a children's edition of the Bible

While (13a) could mean a version of the Bible with large print and pictures, (13b) seems to have an added dimension of having been re-written for children. If one were a literalist interpreter of the Bible, you might be alarmed at the thought of a *children's edition*, even though a *child's edition* might be acceptable.

The agreement facts provide further evidence that MPs are not compounds, since (14a) is not the singular of *men's rooms* (bathrooms). Similarly, *old wife's tale* (14b) is not the singular of *old wive's tale*. As in the case of *children's book*, the more lexically idiosyncratic cases do not show agreement.

- (14) a. *This is a man's room = bathroom
 b. *This is an old wife's tale = apocryphal

That the agreement pattern is linked to idiomaticity is shown clearly in the contrast between (14a) and (11d). Under the non-idiomatic meaning, agreement is obligatory. One might suppose that when the plural form is used idiomatically as in

(14a), the singular would be used for the non-idiomatic meaning. This would predict (11a) to be grammatical and (11e) to be unambiguously referring to bathrooms, neither of which are the case.

Some further examples are given in (15). Under its (idiomatic) interpretation as feminism, *the women's movement* requires a plural possessor. Under its non-idiomatic meaning, the singular form is required if the possessed noun is singular (15b/c) while the plural form is required if the possessed noun is plural (15d/e). Again, although *women* (15d) is plural, it does not have an idiomatic interpretation.

- (15) a. The women's movement changed people's lives
 b. That was a real woman's movement she made
 c. *That was a real women's movement she made
 d. Those were real women's movements she made
 e. *Those were real woman's movements she made

One final piece of data clearly shows the lack of agreement with the idiomatic interpretations. All of the idiomatic interpretations have involved plural possessors. However, as noted for example (11c) above, plural agreement may be marginally available with singular MPs perhaps without any idiomaticity. This might argue that the plural form is simply the unmarked case and is not really showing agreement. We could prove this hypothesis incorrect if we could find an idiomatic possessive with a possessor that is the singular form of an irregular plural. I have found one such example:

- (16) a. We had a real busman's holiday last year
 b. *We had two busmen's holiday's in a row
 c. We had two busman's holidays in a row

Although compounds such as *busman* have irregular forms when used normally (cf. *There were two busmen! *busmans on the tour*), the irregular form is not possible in the idiomatic possessive in (16). (A busman's holiday is a vacation that ends up being the same as work.)

The data above are important for two reasons. First of all, they show that there is a difference between the idiomatic interpretation of the modificational possessive and the non-idiomatic interpretation: the latter shows agreement, while the former does not. Secondly, they provide some evidence that the non-idiomatic MP should be treated syntactically rather than as compounds, since compounds do not exhibit such agreement effects (e.g. *footbaths! *feetbaths*). The lack of agreement in the idiomatic possessives, on the other hand, provides confirmation of their status as compounds.

The agreement facts discussed above also provide more evidence for distinguishing the modificational possessive from the regular possessive. Returning to the regular possessive constructions, we find that no such agreement pattern shows up, as the data in (17) show. Thus, (17b) means "the sisters of more than one child" rather than "the sisters of one child". Given the preliminary structures in (5), this is predicted since the DP specifier is not in any syntactic configuration to trigger agreement with the possessed noun.

- (17) a. One man's/*men's books
 b. *The children's sisters ≠ the sisters of the child

To summarise the facts so far, the modificational possessive forms a constituent with the possessed noun, acts like an adjective, forces a 'type' reading on the possessor (which must be an NP, not a DP) and shows agreement with the noun it possesses. The regular possessive on the other hand shows no such restrictions. These constitute the major differences between the two constructions.

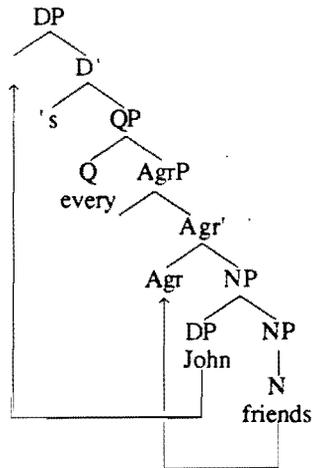
3 Deriving the differences

3.1 The internal structure of DP

We now need to make more explicit the structures given in (5). I will begin with the structure of the regular possessive, i.e. (5b). Semantically, possessives are licensed as arguments of relational nouns (see Barker 1991). Following Szabolcsi 1985, 1994, and Kayne 1993 I will assume that they are external arguments of NP (i.e. subjects) in a position adjoined to NP similar as in Koopman and Sportiche's 1991 analysis of VP internal subjects. Following Abney 1987, I will generate the (regular) possessive *-s* as the head of DP. Because it will be necessary to talk about the interaction of the modificational possessive with quantifiers in the discussion that follows, I give a full representation of the possessive quantified phrase *John's many friends* in (18). The projections QP and AgrP contain quantifiers and (possibly) number features respectively. The AgrP may in fact be NumP, as suggested for Hebrew by Ritter 1991, for example. To derive the correct word order, the DP possessor generated adjoined to NP raises to Spec DP to check strong D features, which I take to be Case, while N raises to Agr at LF.

(18) $[_{DP} [John]_i [_{D'} 's [_{QP} \text{many} [_{AgrP} \text{friends}]_j + Agr [_{NP} t_i [_{NP} t_j]]]]]]]$

(19)



Using the same structure we can immediately account for the modificational possessive with two simple assumptions. First, the possessive marker is generated as head of AgrP rather than of DP, and second, the subject of the whole NP *hats*

interpretation, and forces plural agreement with a mass noun, the idiomatic (23b) does not.

- (23) a. women's work
 b. child's play
 c. *children's play ≠ trivial/simple

This agreement pattern supports the structure in (20) in that it is identical to the pattern of quantifier selection in English. Quantifier selection is not sensitive to the singular/plural distinction, but rather treats mass nouns and plurals as a group separate from singular count nouns. This is shown in (24). The quantifiers *most* and *all*, for example, select NPs that are either plural (24a) or mass (24b), but not singular³. Thus for quantifier selection, mass nouns and plurals behave alike. In contrast, the relation between a demonstrative determiner and the head noun (which I will call demonstrative agreement) treats mass nouns and singulars alike (i.e. as singulars), while only count plurals trigger plural agreement as (25) shows.

- (24) a. Most/all men
 b. Most/all clothing
 c. *most man
 d. *all man
- (25) a. These men are boring
 b. *These clothing are boring
 c. This man is boring
 d. This clothing is boring

The agreement in MPs patterns like (24) rather than (25):

- (26) a. most [men's watches]
 b. most [men's clothing]
 c. *most [man's clothing]

I am purposefully making a distinction here between selection and agreement, which distinguishes the patterns in (24) and (25). I would like to claim that there are two different sets of features necessary to account for the facts in (24) and (25). First of all, it is uncontroversial to assume that the singular/plural feature is a syntactic feature because it is inflectionally marked and enters into agreement relations as shown by the subject/verb agreement in (25) in addition to the demonstrative agreement. Since subjects are never selected, it is also possible that this feature is never selected for.

In order to account for the data in (24), however, we cannot use the singular/plural distinction. Neither can we use the mass/count distinction, since that distinction would incorrectly group plurals and singular counts together with mass nouns separate. Notice also, that the grouping is not syntactically marked. One way of treating mass nouns and plurals alike is to treat them as *homogeneous*. I will take this to be a cover term for mass nouns and plurals. This is a *semantic* rather than a syntactic feature.⁴ Using the two sets of features given in (27), we can then derive a typology of DPs as outlined in (28).

of Greed plays an important role. In particular, Greed largely supplants most of the need for filters in the sense used in e.g. Chomsky and Lasnik 1977 or as conceived in Chomsky 1981. The basic intuition behind the principle of Greed is that an element α may only move to some position to satisfy its own (i.e. α 's) requirements. In particular, it cannot move to satisfy the requirements of some other element. There is at least one desirable consequence of this view: movement to the "wrong" position cannot possibly arise and therefore does not need to be "filtered". This is arguably an advantage over a system that permits massive over-generation of structures as in Chomsky 1981, for example. Over-generation is severely limited under the checking theory incorporating Greed. It is clear that Greed is the important factor here, and not simply the checking theory itself, since one could easily formulate movement to positions where no feature could be checked, with subsequent filtering of the output.

In order to make feature checking and Greed work, we need some condition on feature visibility, which I will state in (32), along with the principle of Greed which I state informally in (33). "Features" here are taken to be syntactic rather than semantic.

(32) Feature visibility

In the structure $\{XP X \{YP Y \{ZP Z \} \} \}$, only features of XP are visible for Spec/Head agreement if XP moves

(33) Greed

- (i) An element α can only move to check some features of α .
- (ii) β can only check features for α only if β bears those features

Now consider the ungrammatical structures in (29). Suppose we generate a DP as the subject (i.e. possessor) of the NP. By the feature visibility condition, number features (i.e. Agr features) will only be visible on NPs but not on DPs. The principle of Greed will then rule out movement of DP to the Spec AgrP position on the grounds that no features can be checked there since the relevant features are not visible. This accounts for the unacceptability of (30a). Independently, we need to assume that the (regular) possessive determiner *-s* has strong features which force movement of the possessor to Spec DP.⁵

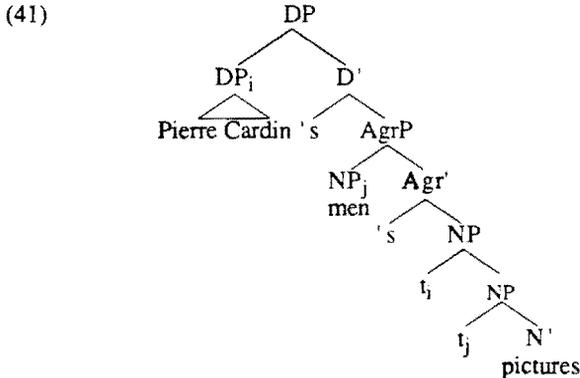
On the other hand, assuming we generate an NP in the subject position, then Greed will force movement to the Spec AgrP position and no further, since the NP will not bear the relevant syntactic features (specifically, Case, which I take to be a D feature.) This will correctly rule out (30b).⁶

There is one further prediction the feature system in (28) makes in conjunction with Greed. I have been assuming that mass nouns are unspecified for number (this amounts to saying that only count nouns can be specified for number.) If this is correct, then mass nouns should have no motivation to move to Spec AgrP. This predicts that mass nouns should never be able to be modificational possessors when Agr is strong (i.e. contains the possessive marker), which is, in fact, the case, as (34) shows.

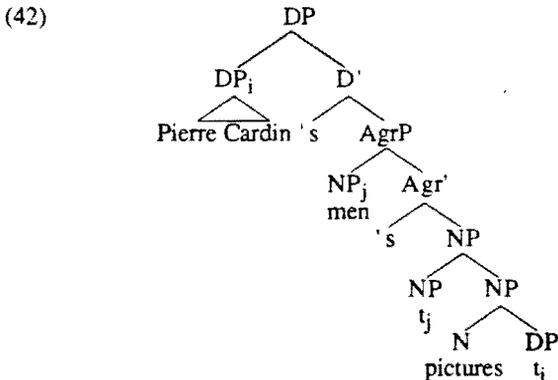
and the theme reading of *Pierre Cardin*, (40) cannot have the theme reading, i.e., it cannot mean "pictures of Pierre Cardin of the type that appeal to men".

(40) Pierre Cardin's men's pictures (unambiguous)

This fact follows directly from the structure we are assuming and the minimalist framework. In Chomsky 1993, Chomsky shows that in a simple transitive clause (i.e. SVO), the object must raise to AgrO while the subject must raise to AgrS. This yields a crossed dependency structure rather than a nested dependency structure and follows from the definitions of minimal domain and the principles of Economy. The structure in (41) exhibits exactly the same properties: the chain of the regular possessor crosses the chain of the modificational possessor on the assumption that both are generated as subjects of the NP.



On the other hand, if we generated the DP *Pierre Cardin* as the complement of the head noun, as in (42) (to get a Theme reading of the possessor), the structure would be ruled out, since the Spec DP position would be too far away.



4 Concluding remarks

In this paper I have given an analysis of both the modificational and the regular possessives by giving them different phrase structural representations. In addition I have accounted for the NP restriction and agreement facts that MPs exhibit by simply using the notion of feature visibility and Greed. I would like to briefly comment on this approach to movement, which I think shows promise for explaining a rather puzzling question to which the theory at the present time has no answer. A standard assumption of the checking theory in the Minimalist programme is that features of heads are checked by head movement while features of XPs are checked by XP movement. In Chomsky 1993, this assumption is partially built into the distinction between V features and N features although that distinction in itself is not sufficient. A priori, if XPs are projections of heads, as is standardly assumed in X-bar-theoretic terms and even more strongly assumed in the Bare Phrase Structure system in Chomsky 1994, there is no reason to think that some features need to be checked by head movement while others can be checked by XP movement. In fact, it may be impossible to state such a stipulation in terms of the framework of Chomsky 1994, and at least non-trivial to state in standard X-bar theoretic terms.

The question is the following: in a given extended projection, why does XP move to some functional projection FP to check its features rather than X^0 moving to F^0 ? To put it more concretely, why does the Verb move as a head to AgrO rather than the VP moving to Spec AgrOP? Our present conception of the theory implicitly assumes that this is what happens in the relevant cases, without providing an explanation for it.

I think that the approach outlined here, using Greed and feature visibility, will allow us to derive most cases of XP vs. X^0 movement without further stipulation. Since feature visibility will rule out checking a feature embedded in a projection XP by moving XP, it will follow that the relevant feature must be checked by head movement within the extended projection. In some cases, either movement will be possible; noun incorporation structures might be one such, and in other work (Munn 1994) I have argued that the optionality of first conjunct agreement may be accounted for in the same way.

Notes

* For comments and discussion, I would like to thank Norbert Hornstein, Dave Lebeaux, Juan Uriagereka and Cristina Schmitt and the audiences of ESCOL and WECOL.

¹ Quirk et al. 1985 is the only reference I have found to the modificational possessive, which they call the *modificational genitive*. Since the term *possessive* seems to be more widely used than *genitive* for the regular possessive, I will simply stick with the more commonly used term *possessive*. I will use the abbreviation *MP* both to mean modificational *possessive* and modificational *possessor*. Context should make the intended usage clear.

² I thank Piroska Csuri for raising this issue.

³ Quantifier agreement is probably sensitive to the plural singular distinction as well, given that quantifiers such as *every* and *many* select singular and plural count

nouns respectively. The exact nature of quantifier/determiner agreement is beyond the scope of this paper at the moment.

⁴ The distinction between syntactic and semantic features that I am assuming is along the lines of Grimshaw 1979 and Williams 1985, for example.

⁵ For convenience of exposition I have generated the possessive markers in the functional head rather than on the possessors themselves.

⁶ The derivation in (29b) assumes that the bare plural is an NP, which, in the case of the modificational possessor is well motivated. Nothing in principle, however, precludes generating a bare plural with an empty D head, and subsequent raising of the DP to check case in the specifier position of a regular possessive DP. This is a possible derivation under my analysis, but even so, such a derivation does not yield an existential reading of the bare plural. In fact, bare plurals can never receive existential interpretations inside noun phrases as the data (i-iii) show. Schmitt 1992, who first noted this fact, attributes it to the non-argument status of elements inside noun phrases. For details, see Schmitt (in progress).

(i) *The destruction of cities took 3 days

(ii) People's houses are small in this town ≠ houses belonging some people

(iii) Actor's pictures were on the restaurant wall ≠ pictures of some actors

Example (ii) above, clearly shows that the type reading of the modificational *possessor* and the generic reading of a DP bare plural *possessor* can be distinguished, since the possessor in (ii) is ambiguous between a generic reading "houses of people" (the preferred reading in this case) and a type reading "houses for people". I thank Cristina Schmitt for discussing this issue with me.

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N-Words, Polarity, and Unselective Binding
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0. Introduction¹

In this paper, I consider the issue of NEGATIVE CONCORD across indicative Wh-clauses. As is well-known, negative concord can generally take place across subjunctive clauses, but not across indicative clauses. However, Bosque (1992) provides an interesting counterexample to this generalization. Namely, Bosque observes that negative concord is possible across indicative clauses, providing that the embedded clause is +Wh. This fact brings up some interesting questions that I will address here. Crucially, my approach to the puzzles raised by Bosque's counterexample provides evidence for treating N-words as indefinite variables with polarity requirements.² Thus, as I will show, the data to be analyzed here turn out to be extremely relevant in settling the present controversy surrounding the nature of N-words in negative concord languages.

The organization of the paper is as follows: in section 1, I offer some general background on negative concord. Specifically, I describe the pattern of negative concord across indicative and subjunctive clauses. In section 2, I point out the specific questions raised by the behavior of negative concord across Wh-clauses. In sections 3 and 4, I present my explanation of the phenomenon at hand. I claim that Berman's (1991) analysis of embedded Wh-clauses is crucial for our understanding of why it is only Wh-clauses that allow negative concord construal across an indicative boundary. Thus, I will operate on the working assumptions that Wh-clauses are open sentences that can be mapped to form the restriction of an operator (Berman 1991) and that Wh-words introduce variables into the restriction (Nishigauchi 1990, Berman 1991, Cheng 1991). I show that treating N-words as indefinite variables with polarity requirements allows both for a simple explanation of the behavior of N-words in the relevant structures and for the accurate interpretation of the obtained readings.

1. The pattern of negative concord

Negative concord arises when two or more morphologically negative elements contribute only one instance of negation to the meaning of a sentence. Consider, for example, the Spanish data below. (1) illustrates the phenomenon of negative concord in a monoclausal structure, whereas (2) illustrates that negative concord is also possible across the clause boundary:

- (1) **Nadie** me dijo **nada**.
 Nobody told me nothing
 'Nobody told me anything.'

- (8) *No se cree [que conoces-IND a ningún artista.]
 S/he doesn't believe that you know no artists
 #'S/he doesn't believe that you know any artists.'
- (9) No se cree [que conoces-IND a Picasso.]
 'S/he doesn't believe that you know Picasso.'

There have been various attempts to explain the subjunctive/indicative contrast seen in (6) and (8) (cf. Rivero 1971, Laka 1990, Progovac 1993). For the purposes of this paper, I will adopt Laka's (1990) explanation. Laka claims that N-word licensing across a subjunctive clause is actually local via an intermediate Negative Comp. She argues that the subjunctive mood in Spanish is an irrealis mood and that the presence of an irrealis mood in embedded structures of the type of (6) above indicates that the embedded clause is under the scope of an intermediate negative Comp that has been selected by the matrix, negative predicate. She provides evidence for the distinction between negative and nonnegative complementizers with data from Basque, where certain negated matrix predicates subcategorize for a type of complementizer which is lexically different from the one that is selected in nonnegative environments. In her view, although there is no overt difference between negative and nonnegative complementizers in languages like Spanish, the mood of the embedded clause provides a clue as to which type of complementizer has been selected in the relevant environments. A negative Comp in the embedded clause acts as an intermediary between the matrix negation and the embedded N-phrase in sentences like (10), where the embedded clause is subjunctive. In (11), the indicative mood of the complement clause signals that no negative Comp has been selected. The matrix negation cannot license the embedded N-phrase locally and, therefore, the embedded N-phrase is left unlicensed:

- (10) No me creo [_{Neg Comp} que conozcas-SUBJ a ningún artista.]
 'I don't believe that you know any artists.'
- (11) *No me creo [_{Comp} que conoces-IND a ningún artista.]
 #'I don't believe that you know any artists.'

Interestingly, although it is clear that an indicative boundary blocks negative concord in declarative contexts, a different picture arises when the embedded clause is interrogative. Thus, as was first pointed out by Bosque (1992) (see also Arnáiz 1993), negative concord is possible across an indicative boundary providing that the embedded clause is +Wh. Consider sentences (12) and (13):

- (12) No recuerdo [qué optativas ha-IND elegido ningún estudiante.]
 I don't remember which electives has taken no student
 'I don't remember which electives any students have taken.'

- (13) **No sé [qué regalo le corresponde-IND a nadie.]**
 I don't know which present belongs to nobody
 'I don't know which present belongs to anyone.'

Both in (12) and in (13), we find a negation in the matrix clause and a negative phrase in the embedded clause. In (12), the N-phrase is the subject of the embedded clause, whereas in (13), the N-phrase is the indirect object. In both cases, negative concord obtains in spite of the fact that the embedded negative phrase and the matrix negation are separated by an indicative boundary. These data contrast sharply with sentences such as (11). The relevant difference between the two types of examples is that the embedded clause in (11) is declarative, whereas the embedded clause in (12) and (13) is +Wh.

There are two obvious questions that arise regarding the discussed contrast. First, how can an embedded N-phrase be licensed long distance, across an indicative boundary in these cases (assuming that the indicative mood of the embedded clause signals that no local negative Comp has been selected)? Secondly, why do only Wh-clauses allow negative concord across an indicative barrier? I will offer an answer to these questions in section 3, but first I will show evidence in section 2 that the phenomenon at hand really involves long distance negative concord.

2. Long distance licensing of N-words across an indicative boundary

As I discussed in the previous section, an N-word contained in an embedded clause can be licensed by a matrix negation across an indicative boundary when the embedded clause is +Wh. But, before I address the question of why negative concord is allowed across an indicative boundary in these types of examples, let me make clear that, in fact, the embedded N-word in sentences like (12) and (13) is licensed by the matrix negation and not by some other element within the embedded clause. After all, one view about N-words is that they are negative polarity items, and, as such, it is conceivable that they might be licensed within their own clause by the embedded Wh-word or by the +Wh Comp of the embedded clause.⁶ That this is not the case is evidenced by the contrast among the sentences in (14) through (17). In all of them there is a N-word contained within an indicative, Wh-complement clause:

- (14) **Nunca sé [qué asiento le corresponde-IND a nadie.]**
 Never I know which seat belongs to nobody
 'I never know which seat belongs to anybody.'
- (15) ***Sé [qué asiento le corresponde-IND a nadie.]**
 I know which seat belongs to nobody
 #'I know which seat belongs to anybody.'

- (16) **Rara vez** me acuerdo de [cuánto me ha-IND costado **nada**.]
 Rarely I remember how much has cost nothing
 'I rarely remember how much anything has cost.'
- (17) ***Siempre** me acuerdo de [cuánto me ha-IND costado **nada**.]
 Always I remember how much has cost nothing
 #'I always remember how much anything has cost.'

Sentences (14) and (15) differ minimally in that whereas (14) contains a negative element in the matrix clause that can arguably license the embedded N-phrase *a nadie*, in sentence (15) no such element is present in the matrix. Note that sentence (14) is grammatical while sentence (15) is not, in spite of the fact that in both cases the embedded N-phrase to be licensed is contained within a Wh-clause. Obviously, the embedded interrogative environment does not provide a licenser for the N-word, or the contrast between (14) and (15) would be unexplained. The contrast between (14) and (15) thus shows that N-word licensing in this case really takes place across an indicative boundary in sentence (14). Sentences (16) and (17) show the same point as (14) and (15). In (16), the matrix clause contains a downward entailing adverb of quantification, *rara vez*, which is the type of operator that can license a negative polarity item (cf. Ladusaw 1979)⁷. (16) differs from (17) only in that the matrix adverb, *siempre*, is not downward entailing. (16) is grammatical, whereas (17) is not. This contrast again shows that the embedded interrogative environment does nothing to license the embedded, postverbal N-word. Rather it is the matrix adverb that does the licensing in (16). In addition, sentences (16) and (17) reveal the polarity nature of N-words, whose licensing depends not just on the presence of negation but, more generally, on the presence of a downward entailing operator. On this basis, I will assume that negative concord is a subcase of N-word licensing in general.

The two main observations that I have pointed out so far are that negative concord (and N-word licensing in general) is possible across indicative Wh-clauses, but not across declarative, indicative clauses, and that the embedded interrogative environment itself does not provide a licenser for an embedded N-word in these types of structures. The core of the problem, which I will address in the next section, is: if the embedded +Wh environment does not, by itself, provide a local licenser for an embedded N-word in the above structures, why is it that only Wh-clauses allow negative concord across an indicative boundary? In addressing this question, I will make two basic claims. The first one is that Berman's (1991) analysis of Wh-clauses as open sentences provides a key to our understanding of why it is only Wh-clauses that allow N-word licensing across an indicative boundary. I will develop this argument in the next section. My second claim, which I will discuss in section 4, is that analyzing N-words as indefinite variables, in the sense of Heim (1982), succeeds over other treatments of N-words in providing the right interpretation of the data under discussion.

3. N-word licensing across Wh-clauses

In this section, I will develop the argument of how Berman's (1991) treatment of Wh-clauses can offer an explanation for the puzzle raised by the phenomenon of N-word licensing across indicative Wh-clauses. In order to do so, I will first review Berman's theory.

3.1. Wh-clauses as restrictive terms

In his analysis of Wh-clauses, Berman adopts Nishigauchi's (1990) basic insight that Wh-phrases are like indefinite NPs in that they introduce a free variable into the logical representation of a sentence. Developing Nishigauchi's idea, Berman argues that Wh-clauses can serve the semantic function of restricting an operator. Thus, in his view, an embedded Wh-clause can be mapped at LF to form the restriction on a matrix adverb of quantification. The Wh-phrase will provide the variable to be bound by the relevant operator, as is represented in (18) below:

- (18) OP I find out [which x cheat]---->
 ----> OP [x cheat] [I find out that x cheats].

Berman's theory of Wh-clauses is based on the Discourse Representation theory developed by Lewis (1975), Kratzer (1978, 1986), Kamp (1981), and Heim (1982). His motivation for analyzing Wh-clauses in the way summarized above derives, first, from the semantic variability of Wh-phrases, whose interpretation varies in the same way as that of regular indefinites does, and, secondly, from the parallel behavior of Wh-clauses and adjunct *if* clauses. In order to understand the relevance of the parallelism between indefinites and Wh-phrases on the one hand, and *if* clauses and Wh-clauses on the other, some background on Discourse Representation theory is needed.

Within the Discourse Representation theory, indefinites are analyzed as variables with no inherent quantificational force. Thus, indefinites may be bound by any operator that has scope over them. The most compelling evidence for treating indefinites this way is the quantificational variability that they display depending on the quantificational context in which they appear. In this regard, consider sentences (19) and (20), where, as the paraphrases in (19') and (20') reveal, the indefinite NP takes on the quantificational force of the adverb of quantification:

- (19) A good car is usually expensive.
 (19') Most good cars are expensive.
 (20) A good car is always expensive.
 (20') All good cars are expensive.

Discourse Representation theory also underlies the idea that sentences are divided at Logical Form into a restrictive term, which determines the domain of quantification of a quantifier, and a nuclear scope, which is the domain of existential closure. Any variables that are free within the restrictive term of a quantifier will be bound by it. In turn, within restricted quantification theory, it is well established that adjunct *if* clauses can function as restrictive terms (cf. Lewis 1975, Kratzer 1978, 1986, and Heim 1982). That explains why any indefinites contained within an adjunct *if* clause can be bound by a matrix adverb of quantification, as can be seen in (21) through (22'):

- (21) The principal always finds out if a student cheats.
- (21') For all students who cheat, the principal finds out that they cheat.
- (22) The principal usually finds out if a student cheats.
- (22') For most students who cheat, the principal finds out that they cheat.

Once the *if* clauses in (21) and (22) are mapped to form the restrictive term of the adverb of quantification, any variables contained in them will be unselectively bound by the adverb. This explains the paraphrases in (21') and (22'), where it is clear that the indefinite *a student* takes on the quantificational force of the adverb. With this in mind, consider now the parallelism between (23) and (24):

- (23) The principal **usually** finds out [**which students** cheat.]
- (23') For most students who cheat, the principal finds out that they cheat.
- (24) The principal **usually** finds it out [**if a student** cheats.]
- (24') For most students who cheat, the principal finds out that they cheat.

As Berman notes, sentences (23) and (24) can have the same paraphrase. Crucially, the Wh-phrase in (23) takes on the quantificational force of the matrix adverb, just like the indefinite in (24) does. On this basis, he argues that Wh-phrases act just like indefinite variables in that they show quantificational variability, and that Wh-clauses act just like adjunct *if* clauses in that they allow an NP contained in them to be bound by an external adverb. Berman then extends the Discourse Representation theory of indefinites and adjunct *if* clauses to Wh-clauses and concludes that Wh-clauses can be mapped, via copy, to form the restrictive clause of an operator. The Wh-phrase introduces a free variable into the restrictive clause. This is represented in (25'):

- (25) The principal usually finds out which students cheat.
- (25') MOST [student'(x) & cheat'(x)][find out'(the principal', [student'(x) & cheat'(x)]]]

Interestingly, Berman's motivation for clause raising is presupposition accommodation. Thus, he predicts that only presupposed Wh-clauses will be

mapped as restrictive terms. I will comment on this in note (9).

To sum up, the striking parallelism between indefinites and Wh-phrases on the one hand and that between Wh-clauses and adjunct *if* clauses, on the other hand, provides evidence, within the framework of Discourse Representation theory, for treating Wh-clauses as serving the semantic function of restricting adverbs of quantification. The consequences that Berman's analysis of Wh-clauses has for N-word licensing will be discussed in the next subsection.

3.2. Consequences for negative concord

In the remainder of this section, I explore the consequences of Berman's analysis for the phenomenon of N-word licensing across Wh-clauses. In particular, I show that treating Wh-clauses as restrictive terms provides an answer to the question of why N-word licensing is possible across indicative clauses when the embedded clause is +Wh. I operate on the assumption that N-words are some type of negative polarity item. As such, they must be within the domain of a licensing operator. For the purposes of this paper, I will adopt Ladusaw's (1979, 1980) theory that downward entailment is the necessary condition that must be met for negative polarity licensing. In addition, as has been pointed out in the literature (cf. Progovac 1988), I assume that negative polarity licensing is subject to certain locality requirements.

The reason why I argue here that Berman's analysis of Wh-clauses is crucial for understanding the phenomenon of N-word licensing across indicative boundaries is the following: if, as I assume, N-words are a type of negative polarity item, they must be within the local domain of a licensing operator at some level (which is, arguably, LF).⁸ As we have seen, an operator that is otherwise capable of licensing an N-word can generally not do so across an indicative boundary (cf. example (11)). Arguably, this is because the locality requirement on negative polarity licensing is not met in such cases (cf. Laka 1990 and Progovac 1993). The puzzle that examples such as (12) and (13) above pose is that the discussed locality requirement on N-word licensing does not seem to be relevant when the embedded, indicative clause is +Wh. The solution that I argue for here is that there is an operation by which an N-word that is contained within a +Wh, indicative complement clause can be brought within the licensing domain of a operator in the matrix clause. Such an operation is none other than restrictive clause formation, an operation that is independently needed and motivated at Logical Form. Thus, recall that according to Berman's theory of Wh-clauses, Wh-clauses can serve the semantic function of restricting adverbs of quantification. An N-word contained within a Wh-clause that is mapped to form the restriction on an quantifier will be brought within the local domain of the operator, where the local domain of an operator is defined as its quantifying domain. Once the locality requirement on N-word licensing is satisfied via restrictive clause formation, licensing will obtain as long as the operator that the

Wh-clause restricts is of the type that can license an N-word, that is, as long as the operator is downward entailing, thereby the contrast between (26) and (27):

- (26) **Rara vez** me acuerdo de [**cuánto** me ha-IND costado **nada**.]
 Rarely I remember how much has cost nothing
 'I rarely remember how much anything has cost.'
- (27) ***Siempre** me acuerdo de [**cuánto** me ha-IND costado **nada**.]
 Always I remember how much has cost nothing
 'I always remember how much anything has cost.'

For both (26) and (27), Berman's theory predicts that the embedded Wh-complement will be mapped to form the restriction on the matrix adverb of quantification at LF. Therefore, in both (26) and (27) the N-word that is contained within the embedded clause will be brought within the local domain of the matrix operator via restrictive clause formation. Note that licensing obtains only in (26), where the operator that quantifies over the Wh-complement is downward entailing. In (27), the adverb of quantification that the Wh-clause restricts is not downward entailing and, therefore, the polarity requirements on N-word licensing are not satisfied.⁹

To sum up, I assume that N-words are subject to the requirement of being within the local domain of a downward entailing operator by LF. The independently needed mechanism of restrictive clause formation accounts for the apparent long distance licensing effect that is observed in cases in which N-word licensing takes place across an indicative boundary. Crucially, Berman's theory of Wh-clauses explains why long distance N-word licensing obtains precisely across Wh-clauses. What remains to be discussed is this: how exactly are N-words interpreted? What is their semantic contribution? And how do the examples examined here bear on the issue of N-word interpretation? I take up on these questions in the next section.

4. N-words as indefinite variables

In the preceding section, I claimed that N-words are polarity items, subject to local licensing requirements. In this section, I further argue that N-words are semantically equivalent to indefinite variables, with no inherent quantificational force. We saw that, as polarity items, N-words must be in the domain of a downward entailing operator. I will claim now that, as variables, they must be locally bound. Here, I show that the structures examined in the preceding sections provide evidence for treating N-words as variables and not as quantificational elements. In particular, we will see that treating N-words as indefinite variables yields the right interpretation of the data. Crucially, the data examined here highlight the fact that N-words behave like semantic variables in that they show quantificational variability and in that they can be unselectively bound.

The idea that the English negative polarity *any* should be analyzed as an indefinite variable has been recently argued for by Lee and Horn (1994). The evidence that I will analyze in this section will reinforce the close semantic similarities that exist between N-words in Romance and negative polarity items in English. Consider now sentence (28), repeated here from section 2:

- (28) **Rara vez** me acuerdo de [cuánto me ha-IND costado **nada**.]
 Rarely I remember how much has cost nothing
 'I rarely remember how much anything has cost.'

As I discussed in section 2, the example above points out that N-word licensing can take place across indicative Wh-clauses. Interestingly, examples like the one above have a peculiar interpretation. Namely, as is discussed in Arnáiz (1993), sentences like (28) can only be interpreted with the paired reading of the Wh-phrase and the N-phrase. What I would like to further note here is that the correct interpretation of the above structure does not just involve the paired reading of the Wh-phrase and the N-phrase. Crucially, both the Wh-phrase and the N-phrase take on the quantificational force of the matrix adverb of quantification. Thus, the exact interpretation of sentence (28) is as in (29):

- (29) For few x,y [such that x has cost y] [I remember that x has cost y]

The above interpretation can be easily captured if we couple Berman's theory of Wh-clauses with an analysis of N-phrases as semantic variables. Thus, recall that, according to Berman's theory, the embedded Wh-clause in (28) is mapped at LF to form the restriction on the matrix adverb of quantification. Consistent with Discourse Representation Theory, any variables contained within the restriction will be unselectively bound by the adverb, thus acquiring the quantificational force of the adverb. If, as I am arguing here, N-words are like Wh-phrases in that they introduce variables into the logical representation of a sentence, unselective binding of both the Wh-phrase and the N-phrase in (28) should obtain, given that both the Wh-phrase and the N-phrase wind up within the quantifying domain of the adverb of quantification via restrictive clause formation. The obtained paired reading that is represented in (29), shows that, in fact, this prediction is borne out. Neither the Wh-phrase nor the N-phrase contribute any quantificational force to the meaning of the sentence. Rather, they both take on the quantificational force of the adverb, thus behaving like variables. The paired reading that is typical of these structures is the standard paired reading effect that is found when one quantifier unselectively binds more than one variable. Thus, two characteristics of semantic variables are highlighted by examples like (28). First, the N-word does not contribute any negative or quantificational force, but rather it takes on the quantificational force of the adverb. Secondly, as the paired readings indicate, N-words can be unselectively bound. Note that these facts cannot be accounted for

by theories that view N-words as fully quantificational elements. In contrast, analyzing N-words as indefinite variables derives the correct interpretation of the data in a rather elegant manner.

In the preceding discussion, we saw how N-words display the ability to be unselectively bound by a quantifier. The point that they show quantificational variability can be reinforced by comparing sentence (28) above to the example in (30), which differs minimally from (28) in that the relevant operator in the matrix clause is here a negative operator. Note how the interpretation of both the Wh-phrase and the N-phrase vary in parallel depending on the quantificational context in which they appear:

- (30) **No** me acuerdo de [**cuánto** me ha-IND costado **nada**.]
 Not I remember how much has cost nothing
 'I don't remember how much anything has cost.'
 For no x,y [such that x has cost y][I remember that x has cost y]

Additionally, the quantificational variability of N-words as well as their similarity to regular indefinites can also be observed in more simple sentences as in:

- (31) **Nunca** se le olvida **ningún chiste**.
 Never s/he forgets no jokes
 'S/he never forgets any jokes.'
NO [joke'(x)] [forget'(s/he, [joke'(x))]]
- (32) **Rara vez** se le olvida **ningún chiste**.
 Rarely s/he forgets no jokes
 'S/he rarely forgets any jokes.'
FEW [joke'(x)] [forget'(s/he, [joke'(x))]]
- (33) **Nunca** se le olvida **un chiste**.
 Never s/he forgets a joke
 'S/he never forgets any jokes.'
NO [joke'(x)] [forget'(s/he, [joke'(x))]]
- (34) **Rara vez** se le olvida **un chiste**.
 Rarely s/he forgets a joke
 'S/he rarely forgets any jokes.'
FEW [joke'(x)] [forget'(s/he, [joke'(x))]]

As can be observed in (31) and (32), the interpretation of the N-phrases in object position varies depending on the quantificational force of the adverb of quantification. Note also that (31) and (32) differ from (33) and (34) respectively in that in the latter pair a regular indefinite, as opposed to an N-word, occupies the object position. Interestingly, (31) and (32) have the same paraphrases as (33) and (34) respectively. These pairs of sentences show that the Discourse

Representation analyses of regular indefinites provide a better understanding of the semantic nature of N-words, which, as I argued, are better analyzed as semantic variables, and not as quantificational elements.

5. Conclusion

To sum up, I have offered an explanation for the puzzles raised by the negative concord effect across indicative Wh-clauses. I argue that N-word licensing in these structures is actually local, via restrictive clause formation. In my examination of the data at hand, I have adopted Berman's (1991) analysis of Wh-clauses as serving the function of restricting adverbs of quantification, and I have explored the consequences of this analysis for crossclausal negative concord. As we saw, Berman's theory of Wh-clauses provides an explanation for why it is only Wh-clauses that allow negative concord (and N-word licensing in general) across indicative clauses. In addition, I have argued that N-words should be analyzed as indefinite variables with polarity requirements. As polarity items, N-words are subject to certain local licensing conditions. As variables they must be bound by a local operator. I have adduced evidence for treating N-words as variables by showing that they display quantificational variability and that they can be unselectively bound. As we saw, treating N-words as indefinite variables in conjunction with Berman's theory of Wh-clauses yields a simple explanation of the data that I analyze in this paper. Importantly, other theories of N-words, in particular those that analyze N-words as negative quantifiers, cannot easily account for the right interpretation of the data. Thus, the puzzles analyzed here contribute to settling the current controversy on the nature of N-words and provide us with a better understanding of the semantic nature of these elements.

Notes

1. I thank Andrew Barss, Molly Diesing, Terry Langendoen, and Chip Gerfen for their input on the issues discussed here. I also thank the audience of WECOL XXIV to whom this paper was presented. All errors are mine.

2. The idea that N-words are indefinite variables with polarity requirements has also been proposed by Ladusaw (1992). See also Lee and Horn (1994) for English *any*.

3. The distribution of N-words in Spanish is very similar to that of negative polarity *any* in English, although there is not a one to one correspondence. Thus, N-words can appear in the domain not only of negation but also in that of other downward entailing operators. They can also appear in conditional clauses and in comparative clauses. See Bosque (1980) and Laka (1990) for a complete description of the distributional pattern of N-words in Spanish.

4. This phonologically null head can actually be overt in languages like Catalan and used to appear overtly in earlier stages of Castilian Spanish.

5. The difference in meaning between (7) and (9) lies in the presuppositionality of the embedded clause. When the embedded complement of believe is in the subjunctive mood, as in (7), the truth of the embedded clause is not presupposed. In contrast, in (9), where the embedded clause is indicative, it is presupposed that the embedded proposition is true.

6. Recall that negative polarity items in English are licensed in some interrogative environments (cf. Higginbotham 1993).

7. According to Ladusaw's (1979, 1980) standard theory of negative polarity licensing, negative polarity items are typically licensed in downward entailing contexts. Where downward entailing contexts are those which make inferences run downward from supersets to subsets.

8. For empirical evidence corroborating the idea that the relevant level at which negative polarity licensing obtains is LF see Uribe-Etxebarria (1994).

9. Berman claims that only presupposed complements undergo raising at LF. Therefore, only the embedded Wh-complement clause of verbs that presuppose their complements will be able to restrict a matrix adverb of quantification. According to this, we should expect that the negative concord effect across Wh-clauses should only happen when the Wh-clause containing the N-word is presupposed. Interestingly, the data found in Bosque (1992), showing the negative concord effect across indicative Wh-clauses, includes only matrix predicates of the factive type. In the data discussed in this paper, I have also used only factive predicates. The negative concord effect across Wh-clauses is not so clear when the N-word is contained within a non-presupposed complement, thus showing that not all Wh-clauses are mapped to restrict a matrix operator. Consider for example sentence (i):

- (i) Nunca me cuestiono qué asignaturas aprobará ningún estudiante.
 Never I wonder which subjects may pass no student
 'I never wonder which subjects any students may pass.'

It seems to me that (i) has a rather deviant status in contrast to the other examples examined in this paper. It is not clear how the N-phrase is to be interpreted, and a paired reading interpretation with the Wh-phrase does not seem to be felicitous. However, a lot of caution is needed in constructing these test case examples, in order to avoid imposing the presupposed interpretation of the embedded clause by the influence of the indicative mood. To avoid this problem, the embedded clause in (i) displays the so called "uncertainty future" tense.

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Negative Islands and Maximality

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1. Introduction

Negative islands have been the topic of quite a lot of debate in the recent literature (see Ross (1984), Rizzi (1990), Cinque (1990), Szabolcsi and Zwarts (1991: 1993), among others). The phenomenon is illustrated in (1) and (2):

- (1) a. I wonder how tall Marcus is.
b. * I wonder how tall Marcus isn't.
- (2) a. I wonder how tall every basketball player is.
b. * I wonder how tall no basketball player is.

The (b) sentences show that sentence negation (*n't*) and 'negative' quantifiers such as *no basketball player* may block *wh*-movement, whereas the affirmative sentences in (1a) and (2a) are unproblematic.

Not all *wh*-phrases are sensitive to negative islands. The extraction of *who* in (3) and (4), for instance, is not blocked:

- (3) a. I wonder who Marcus can beat.
b. I wonder who Marcus can't beat.
- (4) a. I wonder who every basketball player can beat.
b. I wonder who no basketball player can beat.

For this reason, Postal (1992) calls negative islands 'selective islands'. (In the literature the less appropriate term 'weak islands' is also used.)

The negative island effect is not just caused by *not* and NP's of the form *no N*, but by any element that is downward entailing in the sense of Ladusaw (1979). This is illustrated in (5):

- (5) a. * I wonder how tall *no player* is.
b. * I wonder how tall *fewer than ten players* are.
c. * I wonder how tall *at most ten players* are.
d. * I wonder how tall *few players* are.

Though this is not often discussed explicitly in the literature (although it is probably assumed tacitly), the negative island effect is by no means limited to *wh*-questions. It can be observed in other *wh*-constructions as well:

Comparatives

- (6) a. These players weigh more than Lou does(*n't).
 b. Lou runs faster than Marcus can(*not) swim.

Free relative clauses

- (7) a. I don't weigh what these players (*don't) weigh.
 b. Lou can run however fast Marcus can(*not) run.

Pseudo-clefts

- (8) What these players (*don't) weigh is at least 300 pounds.

In this paper I present a relatively simple and straightforward explanation of the negative island effect. This explanation is different from the accounts found in the literature, although it also draws on them, in particular Szabolcsi and Zwarts (1993). My account is similar to theirs in that it takes the negative island effect to be semantic in nature and in emphasizing the role played by algebraic structure. For reasons of space, I will not make explicit comparisons between my account and that of Szabolcsi and Zwarts, however.

The main claims I will make in this paper can be summarized as follows:

- The negative island effect results from a maximality requirement built into the semantics of certain *wh*-constructions.
- Maximality is a more general semantic property of *wh*-constructions which also accounts for the 'exhaustiveness' of questions and free relatives.
- The way maximality manifests itself depends on the algebraic structure of the domain of quantification.

2. Maximality in Comparatives

In presenting my explanation of the negative island effect in terms of maximality, I will start with an analysis of the semantics of comparatives. Von Stechow (1984) has argued that comparative clauses denote maximal degrees. First consider a simple comparative like (9):

- (9) Marcus is taller than Lou is.
 (10) Marcus is taller than [_{CP} *Op*_i [_{IP} Lou is *d*_i-tall]].
 (11) Marcus is taller than *id*[Lou is *d*-tall].
 (12) Marcus is taller than six feet.

I will assume that at the syntactic level that is the input to semantic interpretation, the structure of this sentence is something along the lines of (10), where *Op*_i represents an empty *wh*-operator in the specifier of CP and *d*_i is an empty category corresponding to a degree variable. (My analysis is also compatible with different syntactic assumptions, however.) The most straightforward semantic analysis of (9) would be the one given in (11), where *Op*_i is translated as a iota-

operator which binds the degree variable. Under this analysis the sentence means that Marcus is taller than the unique degree d such that Lou is d -tall.¹ Thus the comparative clause (*i.e.* the complement of *than*) denotes a unique degree of tallness just like the measure phrase *six feet* does in (12).

However, as von Stechow has shown, using the iota-operator to bind the degree variable leads to difficulty in cases where there is no unique degree. This is the case whenever the comparative clause contains an element that functions as an existential quantifier, such as an indefinite NP or a modal like *can*. (13) is an example:

- (13) Marcus was running faster than a shark can swim.
 (14) Marcus was running faster than ιd [a shark can swim d -fast].
 (15) Marcus was running faster than $\max(\lambda d$ [a shark can swim d -fast]).

Since there is no unique degree d such that a shark can swim d -fast, (14) will not do as a semantic representation of (13). What (13) really means is that Marcus was running faster than the *maximal* degree d such that a shark can swim d -fast. To get this interpretation we need an operator that picks out the maximal degree from a set of degrees, as in (15). The semantics of this maximality operator *max* is defined in (16):

- (16) Let D be a set of degrees ordered by the relation \leq , then
 $\max(D) =_{\text{def}} \iota d [d \in D \wedge \forall d' \in D [d' \leq d]]$.

Von Stechow shows that his proposal that comparative clauses denote maximal degrees explains why they exhibit the negative island effect (although he didn't use that term, of course). Consider (17) and (18):

- (17) a. Derek weighs more than Mike weighs.
 b. Derek weighs more than $\max(\lambda d$ [Mike weighs d -much]).
 (18) a. * Derek weighs more than Mike doesn't weigh.
 b. * Derek weighs more than $\max(\lambda d$ [Mike doesn't weigh d -much]).

(17a) is unproblematic: it simply means that Derek weighs more than the maximal degree d such that Mike weighs d -much, as represented in (17b). If we add a negation to the comparative clause, as in (18a), however, the sentence becomes unacceptable. It is not hard to see why if we consider the semantics of this sentence. (18a) should mean that Derek weighs more than the maximal degree d such that Mike doesn't weigh d -much. But there simply is no such maximal degree d . Suppose Mike weighs 150 pounds. Then he doesn't weigh 151 pounds, or 152 pounds, or 160 pounds, or 200 pounds, or 2 million pounds. The set of weights d such that Mike does not weigh d has no maximal member. Hence, (18a) cannot be interpreted, which is why it is unacceptable. Note that this

explanation is not limited to negative island effects caused by simple negation, but extends to all downward entailing contexts.

So far I have left the semantics of comparatives rather unexplicit, focusing only on maximality. Before I go on to discuss maximality and the negative island effect in other *wh*-constructions I would like to present in a little more detail what I take the semantics of comparatives to be, again largely following von Stechow. I assume that degree predicates such as *tall* denote relations between individuals and degrees. Thus, (19a) is translated as (19b). The measure phrase *six feet* denotes a specific degree here indicated as 6ft. The comparative (20a) can then be translated as (20b), meaning that there is a degree *d* which is greater than six feet such that Marcus stands in the tall-relation to *d*. When the complement of *than* is a clause rather than a measure phrase, as in (21a), we can treat the comparative clause as a degree-denoting expression analogous to a measure phrase like *six feet* by means of the *max*-operator (see (21b)):

- (19) a. Marcus is six feet tall.
 b. tall(m,6ft)
- (20) a. Marcus is taller than six feet.
 b. $\exists d[d > 6ft \wedge tall(m,d)]$
- (21) a. Marcus is taller than Lou is.
 b. $\exists d[d > max(\lambda d'[tall(l,d')]) \wedge tall(m,d)]$

One of the nice consequences of the maximality account of the semantics of comparatives is that it explains some important logical properties of the comparative, as was shown by von Stechow (1984). Without going into details (for more discussion, see Rullmann (1994b)), the semantics just sketched accounts for the fact that comparatives are downward entailing, a property which is formally defined in (22). The downward entailing character of comparatives is reflected in the intuitive validity of the entailment given in (23), as well as in the fact that comparatives can license negative polarity items such as *any* (see (24)). As Ladusaw (1979) has argued, negative polarity items need to occur in the scope of a downward entailing expression in order to be licensed.

- (22) A function *f* is *downward entailing* iff for all X, Y in the domain of *f*: if $X \subseteq Y$, then $f(Y) \subseteq f(X)$ (Ladusaw (1979))
- (23) Seymour is richer than a student can be \Rightarrow
 Seymour is richer than a foreign student can be
- (24) Seymour is richer than *any* student can be.

Maximality guarantees that comparatives have an even stronger property, namely that of being anti-additive in the sense of Zwarts (1986) and Hoeksema (1983). Intuitively, this comes down to the fact that a disjunction inside the comparative clause is equivalent to a wide scope conjunction (see (26)):

- (25) A function f is *anti-additive* iff for all X, Y in the domain of f :
 $f(X \cup Y) = f(X) \cap f(Y)$ (Zwarts (1986), Hoeksema (1983))
- (26) Carla is smarter than Sandra or Becky is \Leftrightarrow
 Carla is smarter than Sandra is and Carla is smarter than Becky is

The argument for the role of maximality in the semantics of comparatives is therefore supported by the overall logical behavior of the construction. In the following sections, we will see that there is reason to assume that maximality plays a role in other *wh*-constructions as well.

3. Maximality in Degree Questions

Von Stechow's argument for maximality in comparatives carries over straightforwardly to *wh*-questions involving degrees. Degree questions like (27a) and (28a) can be paraphrased as (27b) and (28b), respectively:

- (27) a. How tall (do you think) Marcus is?
 b. What is the maximal degree d such that Marcus is d -tall?
 c. $?d[d = \max(\lambda d'[\text{Marcus is } d'\text{-tall}])]$
- (28) a. How fast (do you think) Marcus can run?
 b. What is the maximal degree d such that Marcus can run d -fast?
 c. $?d[d = \max(\lambda d'[\text{Marcus can run } d'\text{-fast}])]$

The maximality operator is needed for cases like (28a), because of the presence of the modal *can*. Somebody who asks (28a) only wants to know what Marcus's maximal running speed is. Say Marcus can run at most five miles per hour. Then he can also run four miles per hour, or three, or two. However, in that scenario *four miles per hour* would not be a true answer to (28a). In (27c) and (28c) I have given a quasi-formal representation of the paraphrases in (b), using the operator $?$ to bind the degree variable. The interpretation of *wh*-questions will be spelled out more explicitly in section 5.

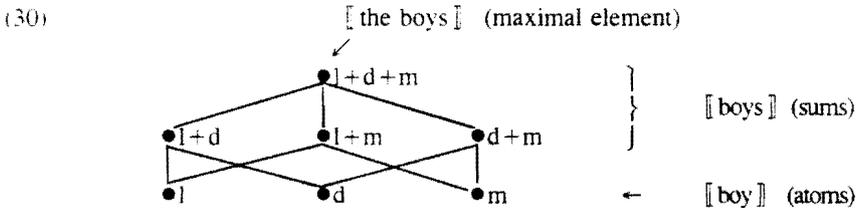
Given that degree questions involve reference to maximal degrees, we can understand why the negative island effect is found here as well. Take for instance (29a). As paraphrased in (29b), and captured slightly more formally in (29c), this question asks for the maximal degree d such that Marcus is not d -tall. Since there is no such maximal degree, the sentence is ungrammatical:

- (29) a. * How tall (do you think) Marcus isn't?
 b. * What is the maximal degree d such that Marcus isn't d -tall?
 c. * $?d[d = \max(\lambda d'[\text{Marcus isn't } d'\text{-tall}])]$

So far we have seen arguments for maximality in two sorts of *wh*-constructions that involve degrees, namely comparatives and degree questions. In the rest of the paper I will argue that maximality is a more general phenomenon that is also found in *wh*-constructions that do not involve degrees but individuals. In such cases maximality takes the form of exhaustiveness. I will discuss free relatives and non-degree *wh*-questions.

4. Maximality in Free Relatives

Jacobson (1990) argues that free relatives denote maximal individuals. She assumes a Link-style semantics for noun phrases in which the domain of individuals *D* contains not just atomic individuals but also sums of individuals. Suppose there are three boys in *D*, say Lou, Derek, and Marcus. Besides those three atomic individuals, *D* then also contains the sums of those individuals, as illustrated in (30). In algebraic terms, the set of boys and their sums forms a complete atomic join semi-lattice ordered by the part-of relation, whose atomic elements are the individual boys and whose top element is the sum of all three boys.



The denotation of the singular noun *boy* is the set whose members are the three individual boys. This set is a subset of *AT*, the set of atomic individuals. The plural noun *boys* denotes the non-atomic individuals whose atomic parts are elements of the set denoted by *boy*. This is stated more succinctly in (31):

- (31) a. $[[\text{boy}]] \subseteq \text{AT}$
 b. $[[\text{boys}]] = \{x \in (\text{D}-\text{AT}) \mid \exists X \subseteq [[\text{boy}]] \text{ such that } x = +X\}$

One of the advantages of this approach is that it allows us to give a unified account of the interpretation of the definite determiner in both singular and plural noun phrases.² The denotation of a noun phrase of the form *the N* will be the maximal element in the set denoted by the noun *N*. Here maximality is defined with respect to the part-of relation (\leq) among elements of *D*:

- (32) a. $\llbracket \text{the } N \rrbracket = \text{max}(\llbracket N \rrbracket)$
 b. $\text{max}(A) = \lambda x[x \in A \wedge \forall x' \in A[x' \leq x]]$

For a plural noun phrase like *the boys*, this means that its denotation ($\llbracket \text{the boys} \rrbracket$) is the maximal individual in the set $\llbracket \text{boys} \rrbracket$, that is, the sum of all the boys in D (compare (30)). The denotation of the singular noun phrase *the boy* will be the maximal individual in the set $\llbracket \text{boy} \rrbracket$. Because $\llbracket \text{boy} \rrbracket$ consists of atomic individuals, it will only contain a maximal individual if it is a singleton set. Therefore $\llbracket \text{the boy} \rrbracket$ is only defined if there is exactly one boy. By translating the definite determiner as the maximality operator we can therefore capture both the universal force of plural definite NP's and the uniqueness requirement of singular definite NP's.

Jacobson (1990) extends Link's semantics for the definite determiner in an interesting way to free relatives. She notes that free relatives can sometimes be paraphrased as singular definites (as in (33)) and sometimes as universal quantifiers (for example (34)):

- (33) a. I ordered what he ordered for desert.
 b. I ordered the thing he ordered for desert.
 (34) a. John will read whatever Bill assigns.
 b. John will read everything/anything Bill assigns.

Jacobson provides evidence that, despite the plausibility of a paraphrase like (34b), free relatives in fact should not be analyzed as universal quantifiers. Free relatives differ from universal quantifiers in that they support cross-sentential anaphora (see (35)), cannot be modified by *almost* (see (36)), and do not license negative polarity items (as in (37)):

- (35) a. John read whatever Bill assigned - although I don't remember what it was, but I do know that it was long and boring.
 b. * John read everything/anything that Bill assigned, although I don't remember what it was, but I do know that it was long and boring.
 (36) a. * For years, I did almost whatever you told me to do.
 b. For years I did almost everything/anything you told me to do.
 (37) a. * I can read whatever Bill ever read.
 b. I can read everything/anything that Bill ever read.

Jacobson argues that free relatives uniformly denote maximal individuals and therefore are more like definite NP's. Evidence for this comes from the 'exhaustive listing' effect found in pseudo-clefts like (38a). (Following Higgins (1973) we may assume that the *wh*-clause in a pseudo-cleft sentence is a free relative.) (38a) differs from (38b) in that it entails that beans, rice and tacos are the *only* things that John ordered:

- (38) a. What John ordered are beans, rice, and tacos.
 b. John ordered beans, rice, and tacos.

The exhaustive listing effect is accounted for if the free relative (39a) is translated as the maximal individual that John ordered, that is, the sum of everything John ordered (see (39b)):

- (39) a. what John ordered
 b. $max(\lambda x[\text{ordered}(j.x)])$

(38a) as a whole then means that the maximal individual that John ordered is the sum of beans, rice and tacos (here I ignore certain typeshifts that play a role in deriving this interpretation; see Jacobson (1990)):

- (40) $max(\lambda x[\text{ordered}(j.x)]) = b+r+t$

Unlike ordinary definite NP's, free relatives are not marked for number. This explains why maximality in free relatives sometimes manifests itself as uniqueness and sometimes as universality, depending on contextual factors. In the former case the free relative can be paraphrased as a singular definite NP as in (33), while in the latter case it may seem more appropriate to translate it as a universally quantified or plural definite NP (see (34)).

Given the role of maximality in free relatives, we can explain the negative island effect in examples (7) and (8), which are repeated here for convenience:

- (7) a. I don't weigh what these players (*don't) weigh.
 b. Lou can run however fast Marcus can(*not) run.
 (8) What these players (*don't) weigh is at least 300 pounds.

The denotation of the free relative *what these players weigh* is $max(\lambda d[\text{weigh}(\text{players},d)])$, that is, the maximal degree d such that these players weigh d -much. However, *what these players don't weigh* should denote $max(\lambda d[\neg \text{weigh}(\text{players},d)])$, the maximal degree d such that these player's don't weigh d -much. Again, such a maximal degree does not exist.

5. Maximality and Exhaustiveness in Questions

I now turn to *wh*-questions that involve individuals instead of degrees. I will show (following a suggestion made by Jacobson (1990)) that maximality can account for a property of questions that was argued for on independent grounds by Groenendijk and Stokhof (1982), namely strong exhaustiveness.

My starting point is the theory of questions proposed by Karttunen (1977).

According to this theory a question denotes the set of propositions that are true answers to the question. So for instance, (41) denotes the set of propositions given in (42). Informally, this set can be characterized as the set of true propositions of the form 'John read x .'

- (41) What did John read?
 (42) $\lambda p \exists x [p(w) \wedge p = \lambda w' [\text{read}(w')(j,x)]]$

(In (42) I use an intensional language with explicit quantification over possible worlds. A formula like $\text{read}(w)(j,x)$ should be read as 'John read x in world w .' p is a variable over propositions. $p(w)$ means that p is true in world w . If the variable w is not bound in a formula, then the world that is assigned to it is assumed to be the actual world.)

Suppose that in the actual world John read three books, namely *Anna Karenina*, *Oblomov*, and *Crime and Punishment*. Then (42) denotes the set containing the following three proposition:

- John read *Anna Karenina*.
 John read *Oblomov*.
 John read *Crime and Punishment*.

This set is given in (43):

- (43) $\{\lambda w [\text{read}(w)(j,a)], \lambda w [\text{read}(w)(j,o)], \lambda w [\text{read}(w)(j,c)]\}$

Now suppose we add maximality to the interpretation of questions. We can do this by replacing (42) as the denotation of (41) by (44):

- (44) $\lambda p \exists x [p(w) \wedge p = \lambda w' [x = \text{max}(\lambda y [\text{read}(w')(j,y)])]]$

This is the set of true propositions of the form ' x is the maximal individual that John read.' Because there is at most one such maximal individual, the set denoted by (44) will contain at most one proposition. In the situation described above, (44) denotes the singleton set that has the following proposition as its only member:

- The maximal individual that John read is the sum of *Anna Karenina*, *Oblomov*, and *Crime and Punishment*.

This proposition in effect says that John read *Anna Karenina*, *Oblomov*, and *Crime and Punishment*, and nothing else. The set that is the denotation of (44) is represented more formally in (45):

- (45) $\{\lambda w [a+o+c = \text{max}(\lambda y [\text{read}(w)(j,y)])]\}$

By adding maximality to Karttunen's theory in this way, we get a theory in which questions denote singleton sets of propositions. Because there is a one-to-

one correspondence between singleton sets and their members, we may as well say that questions denote propositions, rather than singleton sets of propositions. That is, we can take (46) as the denotation of (41):

$$(46) \quad \wp \exists x [p(w) \wedge p = \lambda w' [x = \max(\lambda y [\text{read}(w')(j,y)])]]$$

In the scenario sketched above, (46) denotes the proposition given in (47):

$$(47) \quad \lambda w [a + o + c = \max(\lambda y [\text{read}(w)(j,y)])]$$

We have thus arrived at a theory in which the denotation of the question *what did John read?* is the unique proposition of the form 'The maximal individual that John read is x ,' where x is the sum of everything that John read in the actual world.

Having given this semantics for *wh*-questions involving individuals, we can extend it to degree questions. Earlier I gave (48b) as a quasi-formal representation for the meaning of (48a). This can now be spelled out as (48c), which is completely parallel to (46):

- (48) a. How tall (do you think) Marcus is?
 b. $?d [d = \max(\lambda d' [\text{Marcus is } d'\text{-tall}])]]$
 c. $\wp \exists d [p(w) \wedge p = \lambda w' [d = \max(\lambda d' [\text{tall}(w')(m,d')]]]]$

A theory in which questions denote propositions is not unprecedented. In fact, a theory of this kind has been proposed by Groenendijk and Stokhof (1982). According to them (41) denotes the proposition given in (49):

$$(49) \quad \lambda w' [\lambda x [\text{read}(w)(j,x)] = \lambda x [\text{read}(w')(j,x)]]$$

This formula denotes the set of worlds w' such that the set of things that John read in w' is identical to the set of things that John read in w (the actual world). In the situation described above, (49) denotes the proposition which is true in a world w' iff the set of books that John read in w' consists of *Anna Karenina*, *Oblomov*, *Crime and Punishment*, and nothing else. Note that this is very similar to the proposition given in (47), which was arrived at by modifying Karttunen's theory of questions. In both cases the denotation of (41) in the situation described is in effect the proposition that John read *Anna Karenina*, *Oblomov*, and *Crime and Punishment*, and nothing else. By adding maximality to Karttunen's theory we have ended up with a theory that is very much like the theory of Groenendijk and Stokhof.

Groenendijk and Stokhof argue that their theory of questions is superior to that of Karttunen because it guarantees a strong form of exhaustiveness. They distinguish two types of exhaustiveness for questions. If *weak exhaustiveness* is

satisfied then the following must be the case: if Mary knows what John read, then for any x , if John read x , then Mary knows that John read x . That is, weak exhaustiveness holds if inferences of the following kind are valid:

- (50) *Weak exhaustiveness:*
 Mary knows what John read.
 John read *Crime and Punishment*.
 Therefore: Mary knows that John read *Crime and Punishment*.

Strong exhaustiveness on the other hand is satisfied if, in addition to weak exhaustiveness, the following holds: if Mary knows what John read, then for any x , if John did not read x , then Mary knows that John did not read x . Thus under strong exhaustiveness inferences of the following type will be valid:

- (51) *Strong exhaustiveness*
 Mary knows what John read.
 John did not read *Dead Souls*.
 Therefore: Mary knows that John did not read *Dead Souls*.

Groenendijk and Stokhof give arguments for why we should want our theory of questions to satisfy not only weak, but also strong exhaustiveness. I will not repeat those arguments here for reasons of space. Karttunen's theory does guarantee weak exhaustiveness (albeit by means of a meaning postulate), but it does not guarantee strong exhaustiveness. Groenendijk and Stokhof's own theory guarantees both weak and strong exhaustiveness. The reason is the following. Suppose that John in fact read *Anna Karenina*, *Oblomov*, and *Crime and Punishment*, and nothing else. Then *Mary knows what John read* will be true iff Mary stands in the know-relation to the proposition given in (49), which in this situation is the proposition that John read *Anna Karenina*, *Oblomov*, and *Crime and Punishment*, and nothing else. On the assumption that knowing a proposition implies knowing its entailments, this means that Mary also knows that John read *Crime and Punishment* (weak exhaustiveness) and that she knows that he did not read *Dead Souls* (strong exhaustiveness).³

In the theory of questions we arrived at by adding maximality to Karttunen's theory, weak and strong exhaustiveness are guaranteed for the same reasons as in Groenendijk and Stokhof's theory. In the situation described above *Mary knows what John read* is true iff Mary stands in the know-relation to the proposition given in (47), that is, the proposition that the maximal individual that John read is the sum of *Anna Karenina*, *Oblomov*, and *Crime and Punishment*. Again this implies that Mary also knows that John read *Crime and Punishment* and that he did not read *Dead Souls*.

What we see then is that maximality plays a role not just in degree questions, where it accounts for the fact that degree questions always ask for the

'highest' degree. but also in questions involving individuals, where it gives rise to (strong) exhaustiveness.

6. Conclusion

In this paper I have discussed the different ways in which maximality can manifest itself, depending on the algebraic structure of the domain of quantification. In the domain of degrees, which are ordered linearly, the maximality operator picks out the 'highest' element from a set of degrees. In a set of Linkian individuals which form a complete join semi-lattice, the maximal element is the sum of all the elements of the set. In domains of this type maximality gives rise to exhaustiveness or (apparent) universal quantificational force. In a set of unordered elements (such as the denotation of the singular count-noun *boy*) maximality results in uniqueness.

To conclude this paper I return once more to the negative island effect. In the introduction I observed that negative islands are selective in the sense that they block certain *wh*-phrases (in particular, degree phrases) but not others, such as *who* (cf. (3) and (4)). We can now understand this difference as resulting from the different algebraic structure of the domain of degrees versus the domain of individuals. The denotation of the *wh*-complement *who Marcus can't beat* in (3b), for instance, will be the following proposition:

$$(52) \quad \text{ip}\exists x[\text{p}(x) \wedge \text{p} = \lambda w'[x = \text{max}(\lambda y[\neg \text{can-beat}(w')(m,y)])]]$$

The denotation of $\text{max}(\lambda y[\neg \text{can-beat}(w')(m,y)])$ is the sum of all the individuals that Marcus can't beat in w' . This sum will always be defined, at least if the domain of individuals is finite.

Finally I should say something about the negative island effect in *wh*-questions with adjuncts such as *how* and *why*, which has been the focus of much of the discussion of negative island effects in the literature. (53) is an example:

- (53) a. I wonder how Marcus behaved.
 b. * I wonder how Marcus didn't behave.

I believe the ungrammaticality of cases like (53b) is of a pragmatic nature. Going back to (52), note that in order to form the sum of all the individuals Marcus can't beat we have to take the complement of the set consisting of all people Marcus can beat (cf. Szabolcsi and Zwarts (1993) for discussion of this point). Taking this complement only makes sense against the background of a contextually determined set of individuals, which in this case could for instance consist of Marcus's potential opponents. In the context of a chess tournament we would not want to include Boris Yeltsin or Aristotle in the sum of all the

individuals Marcus can't beat, simply because they are irrelevant. Using negation in a *wh*-question (or other *wh*-construction) therefore only makes sense pragmatically if the *wh*-phrase ranges over a restricted set that is determined by the context. In the terminology of Pesetsky (1987) and Cinque (1990), the *wh*-phrase must be discourse-linked (d-linked). The ungrammaticality of (53b) and other cases of 'adjunct'-extraction⁴ out of a negative island is due to the failure of *wh*-phrases like *how* and *why* to be d-linked. For more discussion of this point the reader is referred to chapter 5 of Rullmann (1994a).

Footnotes

*. This paper discusses some of the issues treated at greater length in my doctoral dissertation *Maximality in the Semantics of Wh-Constructions* (University of Massachusetts at Amherst). I am indebted to the members of my dissertation committee for discussion of these issues, in particular Barbara Partee and Angelika Kratzer.

1. For the sake of argument I assume here that *Marcus is six feet tall* is true iff Marcus is *exactly* six feet tall, and not if he is, say, six feet and two inches. If we made the assumption that *Marcus is six feet tall* is true iff Marcus is *at least* six feet tall, then there would be no unique degree such that Marcus is *d*-tall, and therefore we would need the maximality operator that is to be introduced below even to handle this case.

2. I only discuss count nouns here. Link's semantics for the definite determiner also extends to mass NP's (see Link (1983)).

3. Groenendijk and Stokhof argue that exhaustiveness is only guaranteed for predicates like *know* (which they call extensional), but not for those like *guess* and *wonder* (which according to them are intensional). See Groenendijk and Stokhof (1982) for discussion.

4. In Rizzi (1990) and Cinque (1990) and subsequent literature, it is shown that the distinction between phrases that are sensitive to negative islands and those that are not is actually not the syntactic difference between adjuncts and arguments, but that this distinction must be of a semantic/pragmatic nature.

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Codistributivity and Reciprocals*

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1 Introduction

This paper is concerned with the interpretation of sentences containing more than one plural noun phrase or plural anaphors. It will focus on two topics that were not covered in Sauerland (1994): The syntactic annotation of codistributivity and the pragmatic mechanisms governing the interpretation of reciprocal sentences.

The first topic are the syntax and semantics of cumulative (or codistributive) readings (cf. Scha (1984)) in sentences like (1).

- (1) The women face the men.
- (2) a. The women each face the men.
b. The women face the men each

This sentence can be true in a situation where neither of the singly distributive sentences in (2) is true. Such a situation would be one where the women and men are grouped in couples, and in each couple the woman faces the man. Rather what is needed is an operator that acts on the two-place *face* and gives the desired interpretation. In section 2 I will present an analysis of this phenomenon following that of Sternefeld (1993) but making use of only minimal resources. These are only the independently needed quantifier raising (or another form of LF-movement) and a single polyadic operator that is also the interpretation of the plural morpheme on nouns. I will present new data suggesting that in fact the availability of the cumulative/codistributive interpretation is governed by the same restrictions as the wide scope interpretation of quantifiers. E.g. in (3) the cumulative reading is not available.

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- (3) The fathers heard the rumour that the children succeeded.

In section 3 I will present an analysis of the English reciprocal *each other*. I will show that a complex lexical representation of *each other* can explain all the properties of the reciprocal. Hence there is no need for special *reciprocalization* rules. In particular the reciprocal interacts with codistributivity in the expected way. This gives a straightforward account for Sternefeld's (1993) example:

- (4) Byron and Chandos send these letters to each other.

This sentence posed a problem for the analysis of Heim *et al.* (1991) because on their account only the reading *Byron and Chandos each send these letters to the other* is possible, where all letters go both ways. However the natural reading of the sentence is one where some letters go one way and the others the other way.

The second topic of this paper are pragmatic influences on the interpretation of sentences containing multiple plural noun phrases or reciprocals. Schwarzschild (1991, 1992) established that many of the alleged different readings of sentences containing plurals, should in fact be viewed as differences that are due to pragmatics. I will make the same claim for reciprocal sentences. In particular I will give a pragmatic account of the *strongest meaning hypothesis* of Dalrymple *et al.* (1994a).

The general model this investigation is based on the following assumptions: Semantic interpretation takes as input the logical form of a principles and parameters style syntax, which is a binary branching tree. On the semantic side the possible expressions are given by a functional type theory, where for my purposes the two basic types *e* for individuals and groups and *t* for truth values are sufficient. Each terminal node of the tree is mapped either onto an expression of this type theory, or onto a λ -abstractor. The interpretation of a non-terminal node α is determined by the values of the two daughters β and γ : If one of the daughter-nodes has the appropriate type to function as an argument for the other one, then the mother-node is interpreted by functional application $\beta(\gamma)$ or $\gamma(\beta)$. If both daughter-nodes have an identical type $\langle \delta, t \rangle$ that is a function into truth values, the mother-node is interpreted by intersecting the two as $\lambda x^\delta (\beta(x) \wedge \gamma(x))$, where x^δ is a variable of type δ . If one of the daughter-nodes is an abstractor λt_n , the mother-node derives from the other daughter-node as abstraction over this variable $\lambda t_n \beta$ or $\lambda t_n \gamma$. In all other cases the logical form is semantically ill-formed

The plural ontology I assume is, with some notational differences, the *union theory* that Schwarzschild (1991) argues for extensively. What he concludes is that all plural DPs should be represented sets of individuals, since all the reasons that lead e.g. Link (1991) and Landman (1989) to postulate structured groups seem to be merely pragmatic effects, whereas binding facts

undermine the structured groups approach. I will make one notational simplification of Schwarzschild's system, namely that I write groups as mereological sums, not as sets. In a mereological setting the basic assumption of the union theory can be expressed as the postulate that the mereological sum operation \oplus is associative. Now, calling the type ϵ that of individuals is somewhat misleading because groups are contained within the same type-domain, but I will continue with this usage. In addition I assume that the mereological sum operator also applies to n -tuples of individuals, where $(a_1, \dots, a_n) \oplus (b_1, \dots, b_n)$ is defined as $(a_1 \oplus b_1, \dots, a_n \oplus b_n)$.

2 (Co-)distributivity with Sternefeld's \star -operator

Sentences with single plurals DPs can be interpreted in at least two ways: distributively and collectively. E.g. can sentence (5) be interpreted distributively as the men each weighing 300 lbs. or collectively as the men together weighing 300 lbs.

(5) The men weigh 300 lbs.

Since Scha (1984) it is known that multiple plural noun phrases in a sentence like (6-a) can give rise to codistributive¹ readings, namely the reading paraphrased in (6-b).

- (6) a. The women face the men. (cf. Schwarzschild (1992))
 b. For each of the women there is a man who she faces, and for every man there is a woman who faces him.

As we saw in the introduction these examples cannot be explained using only a one-place distributor. Following Sternefeld (1993) I will subsume the examples (5) and (6-a) under a general distributivity operator that applies to predicates. This operator is defined for sets of n -tuples as follows:²

- (7) For a set M of n -tuples let $\star M$ be the smallest set M' such that $M \subset M'$ and $\forall a, b \in M': a \oplus b \in M'$.

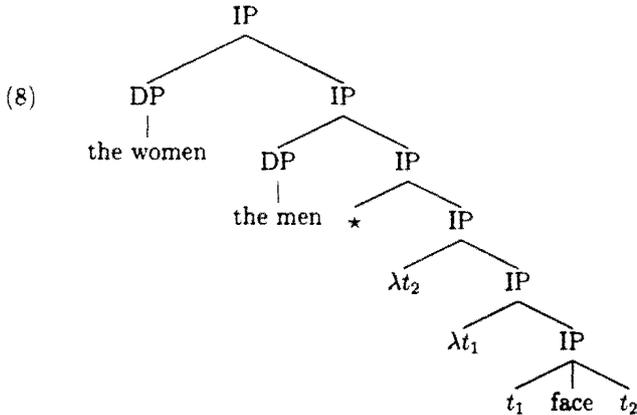
Intuitively this operator can be understood as closing the set under the operation \oplus , the result M' is a collection of all items that can be constructed from elements of the original set M by applying the mereological sum operation \oplus .³

¹Scha actually uses the term *cumulative*, but in my opinion *codistributive* reflects better that these readings involve distribution over two arguments 'in parallel', as explained below.

²Since I use a functional type theory the actual definition would be not the one given here, but its (less transparent) equivalent using one-place functions instead of sets.

³The \star -operator is also the interpretation of the plural morpheme. So for example the interpretation of *students* is \star student. If [student] were {Hubert, Orin} then [students]

Using this operator we can represent the codistributive reading of the sentence in (6-a) as follows:



Before we turn to the derivation of such a logical form, let us check that it is indeed true in a situation where Mary faces John, Carol faces Martin, and Lucy faces Tim, and these are all men and women present. The crucial step of the calculation is the application of the \star -operator given in (9). This adds to the denotation of the two-place predicate *face*, amongst others, the pair where the first component is the group of the women and the second the group of the men. Hence the sentence (6-a) is true in the described situation.

- (9) $\star[\text{face}] = \star\{(\text{Mary}, \text{John}), (\text{Carol}, \text{Martin}), (\text{Lucy}, \text{Tim})\}$
 $= \{(\text{Mary} \oplus \text{Carol} \oplus \text{Lucy}, \text{John} \oplus \text{Martin} \oplus \text{Tim}), \dots\}$

Now we need to describe how the logical form could be derived from the surface structure of the sentence (6-a). For this derivation the following two rules are needed:

- (10) **Quantifier Raising:** Target a segment of a maximal projection XP to which first an abstractor then the raising DP are adjoined.⁴
- (11) **optional \star -insertion rule:** Insert a \star -operator above any predicate.⁵

would be $\{\emptyset, \text{Hubert}, \text{Orin}, \text{Hubert} \oplus \text{Orin}\}$. For plurals as well the star operator with more than one place is needed for

- (i) the six parents of Martha, Heidi, and Danny

⁴Of course QR may apply only if the relevant locality and/or economy conditions are obeyed. The precise formulation of these restriction is however of little concern here.

⁵Instead of having this rule optionally applying, there is a possibility of having the \star as an entry in the lexicon, especially in a system of incremental phrase structure generation as

Two properties of the above rule of quantifier raising are usually not explicitly assumed, but are clearly needed for the generation of the logical form in (8). Firstly, the assumption that, along with the raising of a DP, an abstractor is generated that binds the trace that the raising operation leaves behind. Secondly, that raising cannot only target the topmost segment of a maximal category, but can adjoin to any position between the segments of a maximal category. Or, more generally I claim that QR and maybe covert movement in general doesn't obey a strict cycle condition. Only these two assumptions enable us to generate the logical form (8). The steps of this derivation are the following:

1. Adjoin the abstractor λt_1 to IP and then raise *the women* to the position above it.
2. Now quantifier raising targets the position between the abstractor generated before and *the women*. Between these two, the abstractor λt_2 and then *the men* are adjoined.
3. Insert a star immediately above the two abstractors λt_1 and λt_2 .

The use of quantifier raising for these examples could be described as forming the right predicate – in this case a two place predicate – for \star -insertion.⁶ Note that the quantifier raising between an abstractor and its binder as in step 2 above has no semantic effect unless the \star -operator is inserted.

The obvious question to ask here is about the locality conditions of codistributivity. The prediction is that the availability of the codistributive interpretation obeys the same locality restrictions that quantifier raising in other cases obeys. For quantifier raising the consensus in the literature is that it is largely clause-bound, although not all the judgements are unproblematic. We would hence expect to find the same clause-boundedness with respect to codistributive interpretation. As the example in (12-a) shows this prediction is in principle borne out, although the data is not always so clear. But all speakers agree that some locality restriction obtains, and the example (12-a) is not possible with a codistributive interpretation of *the fathers* and *the children* paraphrased in b):

- (12) a. #The fathers heard the rumour that the children succeeded.
 b. *The fathers each heard the rumour that their child succeeded.*

The contrast between codistributive interpretation and variable binding here between (12-a) and b) is instructive. An otherwise imaginable alternative

described in Chomsky (1994).

⁶The view that distributive interpretation is quantificational whereas collective interpretation is not, was recently supported by the findings of Avrutin & Thornton (1994).

account of codistributive readings would involve a link between the two plurals that is mediated by variable binding of some sort. On such an analysis however we should not expect any locality restrictions, since a c-command relation is enough to allow binding of a variable.

However in the space between the impossible complex NP-island (12-a) and the unproblematic sentence (6-a) with the two plurals in subject and object position, the judgements are far from clear. Another contrast that proves to be quite robust is the minimal pair in (13). If we here imagine a context, where the fathers watch their children playing a game, that only one of them can possibly succeed, the codistributive reading is the pragmatically salient one, as the other reading ascribes contradictory expectations to the fathers. In this context the tensed clause in b) is more odd than the ECM-clause in a) as we expect.

- (13) a. The fathers expected the children to succeed.
 b. #The fathers expected the children would succeed.

At this point the reader may wonder whether quantifier raising is necessary in examples like (6-a) at all, since we would achieve the same interpretation by simply applying the \star -operator to the predicate *face*, which is already the necessary two-place predicate, and moreover that it would be sufficient to always apply the \star -operator to verb-heads.⁷ This works fine for the above example, but for examples like (14-a), such an account cannot generate a reading where distribution takes place twice, over two different argument positions of the verb as for example the reading paraphrased in b):

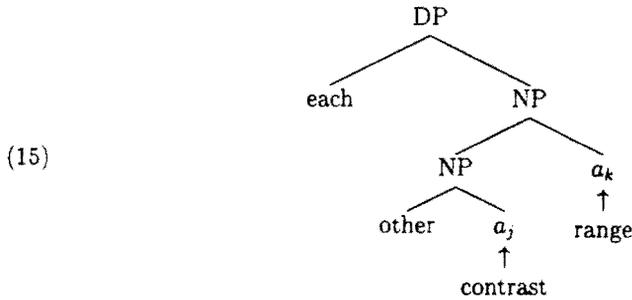
- (14) a. The fathers taught the ten commandments to the eldest sons.
 b. For each pair of a father and his eldest son the father taught each of the ten commandments to his eldest son.

3 The Representation of the Reciprocal

The internal structure I propose for the reciprocal is given in (15). It can be paraphrased as: *each one other than himself_j among themselves_k*. The two arguments of *other* are the contrast argument a_j and the range argument a_k , where a stands for a base-generated empty anaphoric element (like a trace of DP-movement). The question whether this complex is the actual lexical entry of the reciprocal or generated in the syntax from the parts which correspond to lexical entries, is difficult to answer and not crucial for anything I will say. For now I will just assume that it is a grammatical necessity for an item that has the complex referential properties of a reciprocal to have a correspondingly

⁷In Sauerland (1994) I mistakenly claimed this was Sternefeld's (1993) proposal.

complex structure.⁸



The semantic interpretation of *each* and *other* in this structure does not differ from that of *each* or *other* when they are free-standing, namely it is:

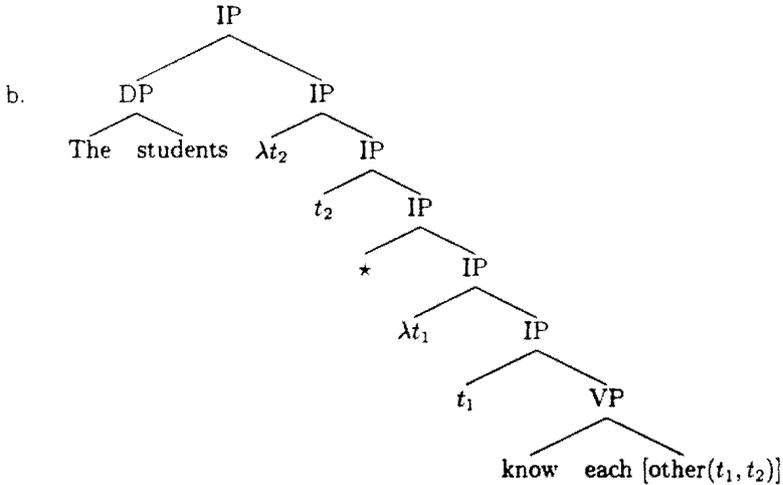
- (16) a. $[\text{other}](x)(y)(z) = 1$ iff z is part of y and z is not part of x
 b. $[\text{each}](X)(Y) = 1$ iff $\forall x(x \text{ a smallest element of } X \Rightarrow x \in Y)$

In the following I will abbreviate the structured representation in (15) with *each* [*other*(a_1, a_2)]. Furthermore I will never represent in the logical forms that the reciprocal, as it is headed by a quantifier, actually might raise to a scope position.

The first example is given to demonstrate the above definition, before we get to the more difficult examples. For the simple reciprocal sentence in (17-a) I assume the simplified logical form in b).

- (17) a. The students know each other

⁸Under this assumption it is not surprising that a reciprocal-anaphor with a radically different surface realization like Chicheŵa *an* shows exactly the same behavior as English *each other* (cf. Dalrymple *et al.* (1994b)). Notice that *each* does not seem to be logically necessary, which might lead us to expect differences relating to this between e.g. Chichŵa, Turkish, where *each* isn't visible, and English.



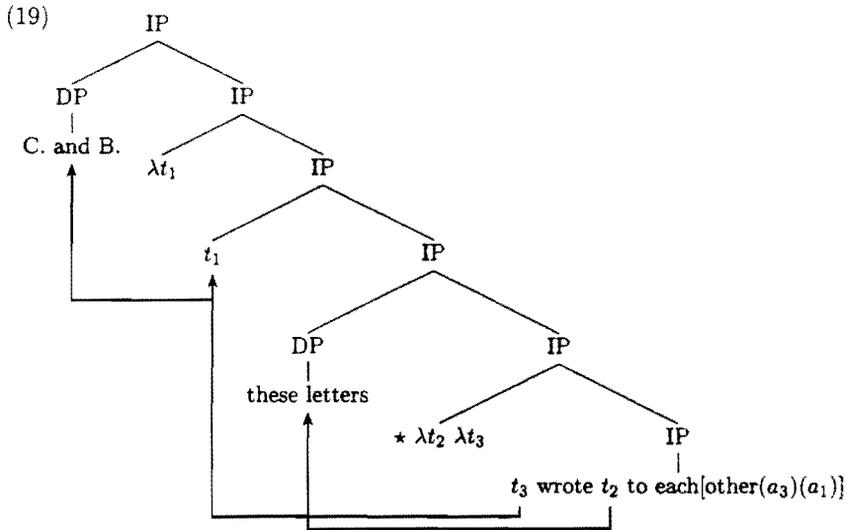
The derivation of this logical form is straightforward. First we apply QR as discussed in the previous section twice to the students. In the first application we generate the lower abstractor λt_1 , which binds the contrast argument of *each other*. In the second application we generate λt_2 , which binds the range argument. Then we adjoin the \star above the predicate λt_1 , which introduces the distributive interpretation of the antecedent of *each other* and the contrast argument.

To account for Sternefeld's example (4) (repeated in (18)) all we have to do now is to put the account of codistributivity from section 2 and the above proposal for the reciprocal together. The logical form that receives the desired interpretation is given in (19).⁹

(18) Chandos and Byron wrote these letters to each other.

⁹Notice that an interpretation that does not involve codistributivity is also available, although it is not the preferred one for (18). This is a reading where all the letters have to go both ways. If the cardinality of the antecedent-group as in (i) exceeds two there are five readings distinguishable. This arises just as in the ditransitive example (14-a), from the different possibilities of codistributivity.

(i) The diplomats sent these notes to each other.



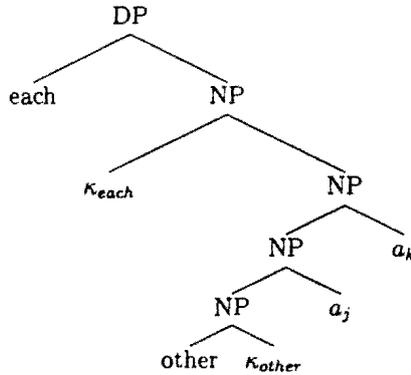
4 Capturing Pragmatic Effects

Schwarzschild (1991) showed the great influence of the context on the interpretation of plural noun phrases in general. To give an example, imagine a context where a dance instructor says (20) (repeated from (6-a)) to his students. What the instructor expects is that the woman of each couple faces her partner, not just some other man in the room. Schwarzschild captures the contextual influence by defining context sensitive operators. I will here employ a simplification of Schwarzschild's account suggested by Heim (p.c.). Instead of complicating the operator definitions with context-sensitive parts, she assumes contextual restrictors that are functions from individuals or tuples of individuals onto truth values. The contextual restrictors are true of the contextually relevant individuals or tuples of individuals. In the logical form the contextual restrictors will be represented as κ_n , that adjoin to the predicates they restrict. Using this idea we can account for the contextual influence on the interpretation of (20) using the logical form in (21-a). If we assume the contextual relevance expressed by the function in (21-b) the desired interpretation arises for the situation in question.

(20) For the next dance, the women face the men, please.

- (21) a. [the women] [the men] $\star\kappa_{12}\lambda t_2\lambda t_1[t_1 \text{ face } t_2]$
 b. $\kappa_{12}(x, y) = 1$ iff x and y are a couple.

Now the question arises in which positions at logical form such contextual restrictors can occur, or rather in which positions we are driven to assume them. I assume here that they can occur above any predicate, but there are only three positions where they are really needed for the following arguments. The first one of these positions is below a \star -operator, as in (21-a). In addition we are driven to assume two contextual slots within the representation of the reciprocal, such that the new structure for *each other* is the following:



The function of the restrictor κ_{each} is to determine what counts as an individual, and is possible with every occurrence of *each*, not just the one in the reciprocal. Such a restriction necessary in view of examples like the following from Moltmann (1992) where *each* can quantify over groups, because *mingle* is only compatible with group arguments:

(22) The cows and sheep mingled with each other.

The need for the restrictor κ_{other} will be discussed below.

The next question is how the value of such a restrictor gets set. I will assume that there are two possibilities for this. One is that, as illustrated with (20), the restrictor reflects what is relevant or prominent in the extralinguistic context. The second possibility to set the value of a restrictor I assume is similar to the mechanism of presupposition accomodation, as it is described in Lewis (1979): In order to keep the conversation going a participant, even though he does not know the relevant contextual restriction, just assumes the existence of an appropriate restriction. I will refer to this mechanism as *restrictor accomodation*.

Restrictor accomodation offers a way to give a pragmatic explanation for the *strongest meaning hypothesis* of Dalrymple *et al.* (1994a). Their generalization is that for a elementary reciprocal sentence of the form "SUBJECT VERB *each other*" the reciprocal can be interpreted using one reading out of

certain finite set of possible interpretations. The possible readings are ordered according to their logical strength – the number of pairs that are required to stand in the relation denoted by the verb to make the sentence true. However, the speaker also knows that some verbs have logical properties like being *asymmetric* that make them incompatible with the strongest readings. The strongest meaning hypothesis now states that from the possible readings the strongest one is chosen that could be true given the independently known logical properties of the verb.¹⁰ An example of how this works is the following: The contradictory feeling that example (23) has in contrast to (24), is explained as the fact that *know* expresses a relation that is not necessarily asymmetric, whereas *follow* expresses an asymmetric relation. Hence for the interpretation of (23) the strongest possible interpretation for the simple reciprocal sentence is chosen; i.e. the one where all pairs of non-identical willow-school-fifth-graders have to stand in the relation *know*. For the interpretation of (24) however a weaker interpretation of the sentence is chosen because the verb *follow* expresses an asymmetric relation. Hence the claim Harry didn't follow any of his classmates does not contradict the preceding claim.

- (23) #The willow school fifth graders know each other, but the oldest doesn't know the youngest.
- (24) The willow school fifth graders followed each other into the class room, and Harry went first.

Since this statement of the generalization involves real world knowledge, a pragmatic account of it is desirable, independently of what my proposal forces me to say. A sketch of how this effect, to the extent that it is correct, can be derived from pragmatic principles, goes as follows: The two pragmatic principles that are relevant are – roughly stated – the following: Firstly, be charitable; try to enable a true interpretation. Secondly, the antagonist of this principle is: Be economical; don't insert pragmatic operators if it doesn't seem necessary. The interplay of these two principles ensures that in a neutral context no restrictor is inserted for example (23), whereas for example (24) the relevant restrictors, especially κ_{other} , are inserted. So example (23) receives the strongest possible interpretation.

To account for the sentence (24) we need yet another pragmatic operator, namely a version of Bach's ENOUGH-operator. Informally the reason that

¹⁰The actual formulation of Dalrymple *et al.* (1994a:p. 73) is:

(SMH) The Strongest Meaning Hypothesis

A reciprocal sentence is interpreted as expressing the logically strongest candidate truth conditions which are not contradicted by known properties of the relation expressed by the reciprocal scope when restricted to the group argument.

the contextual restrictors do not suffice is that whereas all the children have to be the antecedent for the range argument of *each other*, there is actually a child that doesn't follow any other child. The definition of this operator is:

$$(25) \quad \text{ENOUGH}(P)(y) = 1 \Leftrightarrow y \text{ is a big part of some } x \text{ with } P(x) = 1$$

The insertion of this operator into the LF of the example (24), a simplified repetition of (24), results in the logical form (27).

(26) The children follow each other into the room.

$$(27) \quad [\text{the children}] [\lambda t_1 [t_1 \text{ ENOUGH} \star \lambda t_2 [t_2 \text{ follow each [other } \kappa_{\text{other}}](t_1)(t_2)]]]$$

By the process of restrictor accommodation the person hearing (26) will induce that there is a value of κ_{other} such that the logical form is true. This value of κ_{other} will be:

$$(28) \quad \kappa_{\text{other}}(x)(y)(z) = 1 \text{ iff } x \text{ follows } z$$

Even though it superficially looks now as if this restrictor trivializes the truth conditions of (26), this is in fact not the case. The actual value of κ_{other} given above need never be known to the listener of sentence (26). Only the existence of such a restrictor has to be induced.

One argument in favor of a pragmatic account of this observation is that the effect of the *strongest meaning hypothesis* is absent in a 'loaded' context as in (29-a). Another argument is that the asymmetry of *procreate* doesn't rescue example (29-b). On my account if the order is unknown the person accommodates the presupposition that such an order exists, but is not specific. This can also account for the pragmatic oddness of (29-b) since here the order is actually known, and it is odd to state the sentence as if the order wasn't known.

- (29) a. Walking down Mass. Ave. from Arlington to Boston the sociologist found out: The residents on the eastern side of Mass. Ave. know each other.
 b. #My mother and I procreated each other.

5 Conclusion

In this paper we have dealt with two problems having to do with how multiple plurals and plural anaphors in a sentence interact semantically. I have shown how this interaction can be described in a very restricted framework of how semantic interpretation takes place. Together with Sauerland (1994) this paper also supports the assumption of Heim *et al.* (1991) that the reciprocal *each other* has no properties or special grammatical rules referring to it, but all its properties arise from a complex lexical representation.

each other has no properties or special grammatical rules referring to it, but all its properties arise from a complex lexical representation.

Section 2 established that codistributive interpretation is syntactically represented, because it obeys the same locality restrictions as quantifier raising. The explanation I give for codistributive interpretation explains this correlation, because it makes the application of quantifier raising a necessary part of the derivation of the correct logical form for codistributively interpreted sentences.

Once we acknowledge the existence of the codistributive interpretation these mechanism also are available for the interpretation of reciprocal sentences. In 3 I point out how this can be used. In section 4 we saw then that apart from the different readings of reciprocal sentences that are due to the possibility of codistributivity, there are no different readings. What have been called different readings of the reciprocals are in fact just differences of interpretation that arise in different contexts. This result is achieved by generalizing the process of *presupposition accomodation* of Lewis (1979) to a more general pragmatic accomodation process.

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Types, Tokens, AgrO and Aspect*

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In this paper I argue, using the minimalist program of Chomsky (1993), that AgrO is the locus for interpretation of the VP aspect (section 1). I propose that terminative readings are the result of a specifier-head relation between an eventive verb and a complement that has its cardinality specified. All other cases will produce durative readings. Type and token readings of noun phrases with demonstratives produce durative and terminative readings, respectively. Taking Antecedent Contained Deletion (ACD) facts as tests for movement of the DP to specifier of AgrO, I argue that type readings without overt type expressions, which are unacceptable in ACD constructions, are the result of noun incorporation into the verb (section 2). This syntactic explanation will also be responsible for an account of type readings with overt type expressions, which are acceptable in ACD and force durative readings of the VP (section 3). Finally I examine the behavior of definites with overt and non-overt type expressions. The analysis of type readings will be able to capture the intuition that type readings are associated with NPs and token readings with DPs (Vergnaud and Zubizarreta 1992). It has the advantage, however, of not proposing a parametric distinction between languages with expletive determiners versus languages with bare plurals, which I show to be empirically false (section 4).

1 Reducing VP aspect to Spec/Head agreement at AgrO

This section has two goals: first I will lay out the assumptions I am using and second I will make clear the basic proposal for calculating aspect at LF.

Following Verkuyl (1993), I will depart from the assumption that aspect is compositional: a nominal property and a verbal property contribute to build the VP aspect. Verbs can be eventive or non-eventive (*eat* and *know*, for example) and DP arguments can have the cardinality of the head noun specified or not (*the book* and *books*, respectively). The VP will be interpreted as durative or terminative depending on the type of verb and the type of complement. To obtain a terminative reading it is necessary not only that the verb be eventive but also that the object have its cardinality specified. This is exemplified in (1b) and (1d). *A mile* and *a bag of popcorn*, having their cardinality specified, can act as a measure and a boundary to the event. If the VP is terminative, it can be modified by adverbs such as *in X amount of time*.

- (1)
- a. John ran for an hour/#in an hour
 - b. John ran a mile #for an hour/#in an hour
 - c. John ate popcorn/apples for an hour/#in an hour
 - d. John ate a/the bag of popcorn/3 apples #for an hour/in an hour
 - e. John knows the answer
 - f. John knows French

To obtain a durative reading, when the verb is eventive, the object has to have its cardinality unspecified. This is what happens in (1a) and (1c). In this case,

either there is no object or the object is a bare plural and the cardinality of the object is not specified. Thus the event can be extended indefinitely. If the VP is durative and the verb is eventive it can be modified by *for x time* adverbs, without forcing an iterative reading or an oddly stretched reading. If the verb is non-eventive a durative reading arises by default. In this case it does not matter what we have in the object position, as shown in (1e) and (1f).

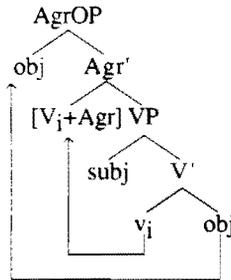
From this rough description of the VP aspect it should be clear that terminative readings are the marked case. Although there are various ways to obtain a durative reading, only a certain combination of features will derive a terminative reading.

In this paper my main concern is with eventive predicates and I will argue that, in addition to the right combination of features, we need the right configuration for an argument to be able to contribute to the terminativity of the predicate. My proposal will rest on three assumptions from the minimalist program of Chomsky (1993).

First, all movement has to be triggered by the feature checking mechanism, i.e., nothing can move just to get a certain interpretation. We cannot force movement for interpretational reasons. This way of viewing syntactic operations allows us to evaluate to what extent aspectual properties have any syntactic bearing. The second assumption I will be taking from the minimalist program is that functional features of lexical items are uninterpretable at the interface levels (e.g., case) and therefore have to be checked in functional projections, since they cannot be formally licensed in a position occupied in the initial representation. Thus, if there are abstract features in an XP or in a X^0 , these elements will have to move to some external functional position. Functional unchecked features are uninterpretable and thus excluded by the Principle of Full Interpretation, which requires that every element of an output representation should provide a meaningful input to the other relevant parts of the cognitive system. Also, and this is the third assumption, in Chomsky the *relation* between a DP argument to the verb is mediated by an AgrP. Case and agreement features are checked by moving the verb to adjoin to the head of the AgrP and by moving the DP to its specifier position. The agreement is determined by the features in the head of a functional projection (AgrP) and case is checked by the complex [V+ Agr] or [T + Agr], for object and subject respectively. Thus nominal and verbal features are checked in spec-head relations in functional projections.

The internal VP aspect, as we have seen, is also a relation between a verbal and a nominal feature. We can assume that they are part of the features to be checked at AgrO, given that these features cannot be checked within their lexical items. Once both verb and object move to AgrO, both the verb and the object are visible for aspect to be calculated. At AgrO the verb checks its ability to take the internal argument as a measure to the event and the complement checks case.

(2)



Once the object checks case in the specifier of AgrO, as illustrated in (2), the head of the internal argument is visible and can be interpreted as either specifying an end point for the event or not. This will depend on what is the head of the object DP. This proposal is summarized in (3). The exact nature of condition (3c) will be further refined in the discussion below.

- (3) *Interpret VP as terminative (bounded) iff*
- a. the verb is eventive and checks its features in AgrOP
 - b. the verb and the object are in a Spec/Head relation at LF
 - c. the object has its cardinality specified (to be refined below)

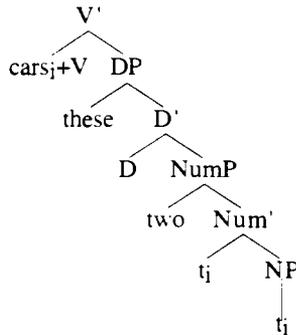
The advantages of proposing AgrO as the locus for checking the "aspectual" features are threefold: first, AgrO is exactly the configuration where the features of the internal argument (and therefore its head) can be checked against the verbal features of the predicate. In fact, in various languages (e.g. Finnish) the distinction between terminative/non terminative is apparently encoded via different case markings. (For discussion of these facts, and further empirical evidence for (3) from clitic doubling constructions, see Schmitt 1994a.)

Second, the terminativity of the VP is independent of the properties of the subject. Thus we need a position in which the verb and the internal argument are in a close relation that excludes the subject. Assuming a VP internal subject hypothesis and a Larsonian analysis of internal arguments as specifiers of VP, there is no other way to capture the relation between the verb and its internal argument in a systematic way, without including the subject in one way or other. As the verb moves to the specifier of AgrO, the subject will be part of the internal domain of the chain [V+Agr].

Third, in various places in the literature, it has been argued that the function of case is to make an argument chain visible for theta-marking.¹ At the same time Szabolcsi (1992), Longobardi (1994) and others have proposed that only DPs can be arguments. If we put these two proposals together, we have indirectly linked case to DPs. By assuming AgrO as the locus for calculating the terminativity of the VP we have a way to encode the relation between DPs and case and their relation to the VP aspect.

Empirically the proposal in (3) makes clear predictions about the VP aspect of different types of predicates. For example, intransitive verbs (not unaccusatives) should be durative, since either there is no internal argument or the internal argument is an empty category (as in Chomsky 1994). In the case of Basque, where intransitive verbs have an internal complement that does not incorporate

- (6) a. these two cars
b.



Motivation for this proposal comes from Antecedent Contained Deletion (ACD) facts. Consider (7):

- (7) a. #John bought that paint that Bill did (TYPE)
b. John bought that painting that Bill did (TOKEN)

(7a) is unacceptable with the reading in which John and Bill bought the same type of paint and it is pragmatically odd with the reading that they bought the same actual paint. In (7b), again the type reading is unavailable and the only way the sentence is acceptable is with a reading in which John and Bill ended up buying the very same painting. A context in which this is plausible is a context of a very disorganized exhibition where two sales people end up selling the same painting to different people.

The lack of type readings in ACD is relevant if we take ACDs as tests for movement to AgrO (Hornstein 1993, 1994; Lasnik 1993) and not as QR movement like in May (1985). According to May, QR provides us with a mechanism that allows us to avoid the infinite regress problem in ACDs since QR moves quantified NPs to adjoined positions at LF altering the domination relations and the scope relations of quantifiers. At the relevant level after QR, the structure would be the following:

- (8) [IP [everyone [that [Sally did [vP e]]]]; [IP Bill kissed t_i]]

The ability of a quantifier to license ACD is, however, independent of its ability to take scope over the subject. Quantifiers such as *all the*, *at least three*, do not show scope interactions (9), yet they license ACD (10).

- (9) a. Two students read all the papers
*for all the papers, each of them was read by two students'
b. Two students read at least three papers
*there are at least three papers and each of them was read by two students'

- (10) a. Mary read all the papers that Bill did
 b. Mary read at least three papers that Bill did

Following Beghelli (1993), I take the lack of scope interactions to be evidence that the quantifiers in question do not undergo QR, contra May (1985). Given that they do license ACD, QR must not be the determinant for ACD.

Hornstein (1994) argues on independent grounds that ACD should be derived by movement to AgrO rather than by QR. If QR exists, according to minimalist assumptions, it cannot move the relative clause along with the quantifier, given the assumption that the restriction is to be minimized in the operator position. If, however, we only move the quantifier, we have no way to avoid the regress problem since the relative clause is left behind. Movement to AgrO, according to Hornstein, is a natural way to recast the ACD problem because (i) it is an A-movement, which takes along the whole NP including the restrictor; and (ii) it is an obligatory LF movement for Case reasons.

Once we separate QR from ACD we can explain the fact that non-interacting quantifiers as in (9) can still license ACD, since they must move to AgrO to receive case, escaping from VP as shown in (11) and we have an explanation for the generalization that type readings and ACDs are in complementary distribution: type readings are the result of noun incorporation to the verb and ACD forces, according to Hornstein (1993), the object to be interpreted at Spec AgrO.⁴

- (11) a. John bought everything that you did [e]
 b. John_i [T [_{AgrO}[everything that you did [^α]]]_i [AgrO [_{VP} t_j [_{VP}] t_{iy} t_j]]

2.2 Against a Mapping Hypothesis explanation

The noun incorporation analysis is a way to deal with type readings in syntactic terms. In this section we make clear that the noun incorporation account, however, is not to be understood as a version of the syntactic-semantic explanation in the line of Diesing's (1992) Mapping Hypothesis. Before that, we need to make clear that there isn't a semantic incompatibility between demonstratives and relative clauses, since demonstratives with restrictive relatives seem unacceptable when associated with pointing. The demonstratives are only possible without pointing, as exemplified in (12). If demonstratives have always to be associated with pointing we could think that the demonstratives with type readings are in fact different elements. Consequently, any comparison should be seen as spurious.

- (12) John bought that car that John really liked (TYPE/TOKEN)

I believe, however, that in both cases (type and token cases) the demonstratives play the same role. Following Bennett (1978), I assume that it is possible to treat the demonstrative in (5) and in (12) as instances of the same element. The basic idea is that deictic nominal expressions consist of a demonstrative determiner and an anaphoric element that is bound either in the discourse (either anaphorically or by pointing), or by a relative clause or an adverb like *here* in English (13) or *là* (14) in French.

- (13) a. This here man (Dialectal)
 b. *?This here man we talked about
- (14) Il y avait une fois *un ogre* qui ne se nourrissait que de chair fraîche.
 #Un beau jour, *cet ogre-là* décida de changer de régime
 (Tasmowski-De Ryck 1990)
 Once upon a time there was *an ogre* that would only eat fresh meat.
 ...#*this ogre here* decided to change his diet

Evidence for this analysis comes from the fact that when these adverbs are present, the deictic expression cannot be used to refer to a discourse antecedent, since the position that would allow this type of binding has been already saturated by the locative *here/là* and cannot undergo further modification by the relative clause.

The discussion so far has shown that we cannot account for the lack of type readings with demonstratives in ACDs as the result of a semantic incompatibility between deictic expressions and relative clauses or a semantic incompatibility of demonstratives and relative clauses and type readings.

Type readings, however, could be taken as unacceptable in ACD constructions because one could analyze type readings as indefinites. Assuming the Mapping Hypothesis (Diesing 1993), one could argue that type readings with demonstratives are impossible in ACD because the complement must be interpreted inside VP and ACD forces the DP argument to be scoped out.

Two pieces of evidence against this way of viewing type readings of demonstratives can be provided: first, if we were to treat type readings of demonstratives as indefinites, we would have to explain why type readings with demonstratives (15c) pattern with definites and specifics (15b) in existential constructions and not with indefinites (15b). Even if we add a relative clause to a demonstrative, (which sometimes improves the acceptability of specific elements in existential constructions as shown in (15e), the demonstrative with a type reading is unacceptable in existential constructions, as the data in (15e) show.

- (15) *there* constructions
- a. There are some/many/no/several books on sale
 b. *There are the/both/most books on sale
 c. *There is that book on sale [TYPE]
 d. ?There was the book we looked for on sale
 e. *There is that book we looked for on sale [TYPE]

Second, treating type readings with demonstratives as indefinites would leave unexplained the fact that they are perfectly acceptable with individual-level predicates, as exemplified in (16a). According to Diesing, the subject of and individual-level predicate is always specific and therefore should always be interpreted outside VP. If demonstratives in DPs that trigger type readings were indefinites, they should sound as odd in individual-level predicates as indefinites (with non-specific readings) are, as illustrated in (16b), but this is not the case.

- (16) a. This apricot is for tarts
 b. #An apricot is for tarts (non-specific)

Other semantic explanations for the lack of type readings in ACD constructions will not work very easily either, given that when the DP complement is *type/sort/kind of*, ACD is possible as shown in (17). Note here that when type expressions are present, the VP is durative:

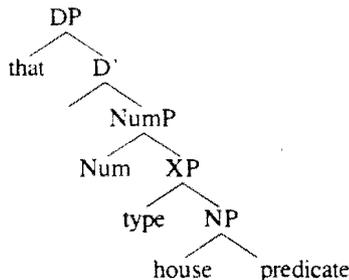
- (17) a. Mary bought that type of car that Bill did
 b. Mary bought that type of car for years

In sum, there doesn't seem to be in principle any semantic incompatibility between type expressions and Antecedent Contained Deletion. For a syntactic account of type readings as noun incorporation, (17) could be seen as a counterexample. How is it that overt type expressions force durative readings in spite of the determiners that precede them and at the same time are possible in ACD constructions?

3 The problem of overt type expressions

Type expressions *kind, sort, type* should be thought of as functional heads. As heads they block the incorporation of the head noun into the verb, forcing movement of the whole DP to AgrO as the only way to get case and obtain visibility at LF. At the same time *type, kind* etc. expressions block the cardinality of the head noun to be specified since the head noun never checks number features at Num⁰ and therefore the cardinality of the selected complement is not to visible at LF. This way it cannot act as a bounding element to the event at AgrO. Thus the result is a durative predicate. The structure we propose is the structure in (18c). *Type* is a head below Number and above the head noun.

(18)



The structure in (18) assumes, moreover, that *type* selects for a small clause and that it is the small clause that is the complement of the verb, since everything else on top of it is functional material. The small clause structure encounters empirical and conceptual support. Empirically, it is crucial to account for the behavior of *type* expressions with definite determiners. (19) shows both in Brazilian Portuguese and in English that *type* preceded by a definite determiner is unacceptable unless it is modified by a relative clause as in (20) or a demonstrative as in (21). With demonstratives, the predicate may be the demonstrative itself (in the predicate position above) or an empty category that can be bound by the demonstrative as we suggested above.

- (19) a. *A Cláudia comprou o tipo de passagem
The Cláudia bought the type of ticket
b. *O tipo de passagem é difícil de vender
The type of ticket is hard to sell
- (20) a. A Cláudia comprou o tipo de passagem que o Pedro mandou
The Cláudia bought the type of ticket that Pedro told her to
b. O tipo de passagem que o Padre tem é difícil de vender
The type of ticket that Pedro has is hard to sell
- (21) a. A Cláudia comprou esse tipo de passagem
The Cláudia bought this type of ticket
b. Esse tipo de passagem é difícil de vender
This type of ticket is hard to sell
c. A Cláudia comprou passagem desse tipo
The Cláudia bought ticket of this type
d. Passagem desse tipo é difícil de vender
Ticket of this type is hard to sell

Conceptually, the idea that *type* words take a small clause is also sound if we recall Jackendoff's (1985) discussion of type and token readings and a more recent discussion from Vergnaud and Zubizarreta (1992). For Jackendoff, the representation of a thing being categorized is what constitutes a TOKEN and the representation of the category is a TYPE. The reference for a *type* is given by a two-place function IS AN INSTANCE OF. This function is similar to the verb BE. In other words, we can only talk about types indirectly by INSTANTIATION as a TOKEN. This indirect instantiation is provided by the relative clause or by the demonstrative. Thus when only a definite article is present it is impossible to instantiate the token element.⁵

4 Type readings and definite determiners

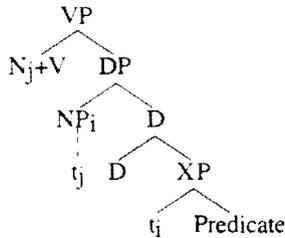
I have accounted for the durativity of the predicates with type readings in two ways: when there is no overt type expression, the head noun incorporates through D, which is empty: when an overt type expression is present, the cardinality of the head noun is not visible in spite of the fact that the whole DP raises to AgrO. An obvious question is then what happens to type readings with definite determiners. If D is filled with a definite determiner, then, as a head, it should block the incorporation of the head noun on to the verb, and a type reading should be disallowed. Only movement of the DP to AgrO will be possible in these cases and consequently only a token reading will obtain. As expected, type readings are in fact disallowed in (22a), where there is a definite determiner, and a terminative reading obtains. Also as expected, type readings with definites are not possible in ACD constructions (22b) since the whole DP will have to move to the specifier of AgrO for ACD to obtain. Thus in ACD only token readings are possible and a terminative reading will obtain.

- (22) a. Mary ate the tart in 5 minutes/ #for years
b. #Mary ate the tart that Bill did (TYPE)
c. Mary ate the tart that Bill made for her for three years

As we can see in (22)c, we should not imply, however, that type readings with definite determiners are always impossible. There are two possible explanations for (c): either a relative clause is sufficient to license type readings or the definite determiner that selects for a relative clause is in a specifier or an adjoined position (and therefore it does not block incorporation of the head noun). That relative clauses are not a sufficient condition to license type readings can be shown by (b) (but see Schmitt 1994b). Then it seems that the determiner is not blocking the incorporation of the head noun into the verb.

It is reasonable to believe that incorporation of the head noun is possible when the D selects for a small clause, because in this situation the specifier position of the DP can act as escape hatch. The NP subject moves to specifier of DP and from there it can incorporate into the head noun:

(23)



Note then that in the case of type readings with definite determiners, the determiner does not specify the cardinality of the head noun complement. In other words it is not visible for aspect calculations. This is reminiscent of Vergnaud and Zubizarreta's (1992) proposal that determiners can play a role as expletive determiners in certain languages. Their proposal is summarized in (24) and the implementation of the Correspondence Law is given in (25):

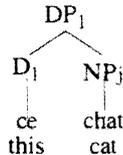
(24)

Correspondence Law

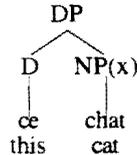
When a DP or an NP denotes, the DP denotes a token and the NP denotes a type.

(25)

a.



b.



(token-index in numbers and type index in lower-case letters)

If the features of D project, then a token reading obtains. If D does not project, then a type reading obtains(b). The D in this case is an expletive. In Vergnaud and Zubizarreta (1992), however, the possibility of expletive determiners is tied to a parametric difference between languages. The basic idea is that if a language has bare plurals, it will not have expletive determiners which are a necessary condition for a language to have inalienable possession constructions.

The parametric distinction proposed is however too strong and the evidence comes from data from Brazilian Portuguese given in (26):

- (26) a. O médico me examinou a garganta e não encontrou nada (B.Port.)
The doctor me examined the throat and (he) didn't find anything
'The doctor examined my throat and didn't find anything'
- b. Médicos examinaram pacientes o dia todo (B.Portuguese)
Doctors examined patients all day long

Inalienable constructions are possible as shown in (26a) and bare plurals are also fully productive with existential and generic readings as illustrated in (26b). Thus whatever explains the existence of expletive determiners in a language cannot be tied to the parametric distinction that the language lacks bare plurals.

What I am proposing, however, follows a similar intuition, namely, that token readings are associated with properties of DP: when the head noun complement raises to AgrO, D is visible and a token reading obtains, if the head noun is its complement. If the D does not raise, then it is as if the D is an expletive, not visible for interpretation. However, I *do* think that expletive determiners are determiners that do not raise to an Agr specifier position. We can now make the proposal in (3) more specific:

- (27) *Interpret VP as terminative (bounded) iff*
- the verb is eventive and checks its features in AgrOP
 - the verb and the object are in a Spec/Head relation at LF
 - the head of the DP object specifies the cardinality of the NP (not any other functional projection) that receives a theta role from the verb

This way we have a way to distinguish type and token readings without overt type expressions from type readings with overt expressions, which force durative readings of the predicate. Note that this proposal differentiates quite clearly type expressions from partitives of the type *two kilos of bread*. Not only they are syntactically different, as we can see by comparing (28b) and (28d), but they also semantically different given that partitives force terminative readings (example (28e)). A detailed investigation of the distinctions between measure expressions and *type/kind* expressions is, unfortunately, beyond the scope of this paper. The point here is that aspectual properties can be used as a tool in the investigation of the internal structure of DP complements (see Schmitt, in progress for an analysis).

- (28) a. John bought two types of bread
b. John bought bread of two types
c. John bought two kilos of bread
d. *John bought bread of two kilos
e. Mary ate two pounds of raisins in an hour / #for an hour

Conclusion

In this paper I have analyzed type and token readings in its relation to aspect. Token readings, which force terminative readings and allow ACD constructions as movement of the whole DP to the specifier of AgrO in order to be

interpreted in a specifier head relation with an eventive verb. We analyzed two types of type readings: DPs with overt type expressions, which undergo movement to AgrO and type readings without overt expressions. Type readings without type expressions are the result of noun incorporation into the verb, a movement that has the same cost as movement to AgrO in case the D head that selects for the head noun is empty or the NP is the subject of a small clause selected by D that can move to the Spec of D and from there incorporate into the verb. The analysis of type expressions as selecting small clauses, if correct, forces us to assume that the internal structure of complements can be quite complex, as the study of possessive constructions (Szabolcsi (1994), partitive constructions (Uriagereka (1993) and references there) and coordinated objects (Munn, 1993) have shown.

Notes

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¹ See Chomsky and Lasnik 1993 and references there, for example.

² The proposal in (3) also allows us to investigate the nature of null objects in different languages and the different types of accusative clitic doubling. See Schmitt 1994a for an analysis of accusative clitic doubling in Spanish.

³ Another option is that there are morphological features in D that the head noun has to check in both cases: the option is then movement of the DP to spec of AgrO and movement of the noun from D into the verb. For this discussion this is, at this point, irrelevant.

⁴ In fact I believe that a more subtle explanation for ACD is required. See Schmitt (1994b).

⁵ Interestingly the definite article, although able to refer back to a discourse, cannot play the role of the function IS AN INSTANCE OF that the demonstrative can.

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NPIs as Focus Barriers: LCC or RM?

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In Korean and Japanese, if a sentence contains both a *wh* phrase and a negative polarity item (NPI, henceforth), that sentence is grammatical only when these phrases are in a specific order. One typical case is illustrated below.

- (1) a. ?**amwuto nwukwu-lul cohahaci ani ha-ni*
 anybody who-Acc like not do-Q
 'Who doesn't anybody like?'
- b. *nwukwu-lul amwuto cohahaci ani ha-ni*
 who-Acc anybody
- c. ?**daremo dare-o suki de nsi no*
 anybody who-Acc like be not Q
 'Who doesn't anybody like?'
- d. *dare-o daremo suki de nai no*
 who-Acc anybody

Notice that the NPI-*wh* order results in a degradation while the *wh*-NPI order is perfect. Two different analyses have been proposed for the above phenomenon. One resorts to the notion of relativized minimality (RM) or economy (Takahashi (1990), Hasegawa (1994)) while the other appeals to the Linear Crossing Constraint (LCC) (Tanaka (1993,1994), Maki (1994)).

The purpose of this paper is two-fold. We first show that LCC is independently needed and explore the nature of this LCC from varied point of views. Secondly, we argue that RM and LCC are not exclusive to each other and both of them are needed to account for the full range of data. This paper is organized in the following way. In the first section, we briefly review two competing proposals. Section 2 shows that NPIs are licensed in overt syntax, drawing on the observation that NPIs behave as focus barriers (Sohn (1994b)). In section 3, crucial data are presented which cannot be accounted for by the RM analysis even in its most extended form. In the fourth section, distinctions are drawn among various types of movement according to whether they induce crossing effects with other *A'*-movement or not. It will be argued that substitution, but not adjunction operations induce crossing effects. In section 5, apparent counterexamples to the LCC are presented and it is proposed that these can be subsumed under the LCC by adopting the analysis proposed in Saito (1993). We also propose that LCC is not an S-structure constraint (contra Tanaka (1993,1994)), but a processing constraint as advocated in Saito (1987) and Maki (1994).

1. Contending Analyses

Let us start our discussion by reviewing two competing analyses for the phenomenon illustrated above. First, the analysis based on the RM is in order. Takahashi (1990), based on the examples such as (1), argues that ECP as formulated in Rizzi (1990) is responsible for the observed contrast. Let us call this RM analysis. [1] He assumes that at LF, both NPIs and wh phrases move to Spec of relevant functional projections, NegP and CP, respectively. Given this assumption, (1a,c) would have the following derivation at LF.

- (2)a. [CP [IP [NegP NPI_j [VP t_j wh ...]]]]
 |_____||
 b. [CP wh_i [IP [NegP NPI_j [VP t_j t_i ...]]]]
 |_____||

First, the NPI moves to NegP spec as in (2a) and then the wh phrase moves to spec of CP, A'-position. In the second operation, the wh phrase moves across the NPI occupying NegP spec, which, he assumes, is an A'-position. This movement is in violation of RM and the trace is marked [-γ] (in the sense of Lasnik and Saito (1984)). [2] On the other hand, (1b) and (1d) can have the following good derivation.

- (3)
 a. [IP wh_i [IP [NegP [VP NPI t_i ...]]]]
 |_____||
 b. [CP wh_i [IP t_i' [IP [NegP NPI_j [VP t_j t_i ...]]]]
 |_____|| |_____||

S-structure movement of the wh phrase is allowed since NegP spec is yet to be occupied. At LF, the NPI moves to NegP spec and the wh phrase moves to CP spec. There is no intervening A'-position in either movement and thus this derivation does not violate RM.

Now, let us consider the alternative analysis. LCC is defined as follows.

(4) Linear Crossing Constraint

Association lines must not cross.

(5) Association lines

An association line is a line connecting a phrase having a feature [F] with a head having the same feature [F].

(adapted from Maki (1994))

Given the definition of the LCC, the association lines drawn for the NPIs and wh phrases in (1a,b) would look like the following.

- (1)a' .? *amwuto nwukwu-lul coahaci ani ha-ni
 |_____|| |_____||

b'. nwukwu-lul amwuto coahaci ani ha-ni

In (1a'), the lines connecting each A'-item to its head are in crossing relation while they are in inclusive relation in (1b'). The same is true with (1c) and (1d). Thus both of the analyses can account for the data in (1). But notice that the RM analysis crucially relies on the assumption that both NPIs and *wh* phrases move at LF. The step in (3a) was allowed since spec of NegP was empty at S-structure. If spec of NegP is filled at S-structure, Takahashi (1990) would predict that there will be degradation.

2. NPIs as Focus Barriers: Overt Checking of NPIs

There have been different views about the level at which NPIs are licensed (Suh (1990), Kato (1991), Kawashima and Kitahara (1992), and etc.). Suh (1990) and Kato (1991) argue that NPI licensing occurs at S-structure (overt syntax) while Kawashima and Kitahara (1992) and Lee (1992) argue that it occurs at LF. I have argued on the basis of various sets of data that NPIs must have their *neg* feature checked at overt syntax (Sohn (1994b)). One of the motivations comes from the so called VP focus construction. This construction is formed by attaching a topic (or focus) marker to VP. As we're interested in the cases where the focus marker is followed by a negation morpheme, we will call this construction negative VP construction. Any item within VP can be a target of this negative focus, giving a reading "It is not [the focused item] that..." Consider (6).

(6) [John-i ecey senmwul-ul saci]-nun ani hayssta
 Nom yesterday present-Acc buy-foc not did
 1 2 3 4

- 1) It was not *John* who bought a present yesterday.
- 2) It was not *yesterday* when John bought a present.
- 3) It was not *a present* that John bought yesterday.
- 4) It was not *the act of buying* that John did yesterday with a present.

(6) can have four different readings according to which of the VP internal items is focused. What is surprising is that the range of possible readings is restricted in a specific way when there is an NPI in the sentence.

(7)a. John-i ecey amwu kes-to saci-nun ani hayssta
 1 2 3 (anything) 4
 'John did something yesterday. But he didn't buy anything'
 (reading 4) ... (reading 1,2,3 not available)

- b. John-i amwu kes-to ecey saci-nun ani hayssta
 1 3 2 4
 'John bought something, but it wasn't yesterday' (reading 2)
 'John did something yesterday. But he didn't buy anything
 (reading 4)' ... (reading 1,3 not available)

(7a) is minimally different from (6a). It contains an NPI object *amwu kes-to* (*anything*) instead of *a book*. Interestingly, out of four theoretically possible readings, only one reading, where focus is directed to the 4th item (verb), is available. If we change the order of the NPI and the time adverbial as in (7b), the reading in which this adverbial is focused becomes possible. The generalization we can draw from these observations is the following.

- (8) Neither an NPI nor anything preceding it can be a target of negative focus.

Suppose that NPIs are licensed at overt syntax through checking as argued in Sohn (1994b). Then (7a) will have the following structure at overt syntax.

- (9) John-i ecey [_{NegP} amwu kes to [_{VP} ... t_i saci]-nun ani]...

In this configuration, neither NPI nor any item preceding it is within the c-commanding domain of the focus marker. Supposing that the scope of a focus marker is its c-commanding domain at overt syntax (Tancredi (1990)), both the NPI and the phrase(s) preceding it are outside of the scope of the focus marker. That is why only those phrases following NPIs can be targets of the negative focus.

This analysis, which we believe is on the right track, poses a problem for Takahashi's (1990) analysis. Although the ungrammaticality of (1a,c) doesn't pose any problem, the grammaticality of (1b,d) does. When the *wh* phrase is scrambled over the NPI, it would violate RM since the NPI is occupying A'-position (NegP spec). This problem can be avoided if we assume following Saito (1991) that scrambling is non-A non-operator movement. As scrambling is different from genuine A'-movement which creates an operator-variable chain, scrambling of a *wh* phrase over genuine A'-spec would not be subject to RM effects. One potential problem for this idea is that scrambling sometimes shows properties of A-movement (Mahajan (1990), Saito (1992)). If the *wh* phrase crossing the NPI undergoes A-movement, there won't be any RM violation and thus the example (1b,d) would not tell us anything about whether A' (or non A) scrambling induces RM effects or not. However, we can remove the interfering factor by looking at long distance scrambling.

- (10)

- a. amwuto [John-i sakwa-lul cohahantako] sayngkakci ani hanta
 anybody Nom apple-Acc like-comp think not do
 'Nobody thinks that John likes apples.'
 b. sakwa-lul_i amwuto [John-i t_i cohahantako] sayngkakci ani hanta

The NPI *amwuto*, the matrix subject in (10a), is already in NegP spec position in overt syntax. What happens when the embedded object is long distance scrambled to the sentence initial position as in (10b)? Although

this movement crosses the NPI in A'-position, there is no degradation. Considering that long distance scrambling cannot be an instance of A-movement (Saito (1992)), this example clearly shows that scrambling does not induce crossing effects. Thus the tripartite distinction of movement seems to be needed to salvage the RM analysis.

3. LCC or RM?

We have seen that simple cases like (1) can be handled by both proposals. In this section, we consider more complicated examples and show that there are examples which can only be accounted for by the LCC. First, let us look at (11) and (12). [3]

- (11)a. *amwuto* [John-i *mwues-ul sassnun-ci*] *mutci ani hayssta*
 anybody Nom what-Acc bought-Q ask not did
 'Nobody asked what John bought.'
 b. **mwues-ul*_i *amwuto* [John-i t_i *sassnun-ci*] *mutci ani hayssta*
- (12)a. John-un [*nwu-ka amwuto mannaci ani hayssnun-ci*] *anta*
 Top who-Nom anybody meet not did - Q know
 'John knows who didn't meet anybody.'
 b. **amwuto*_i John-un [*nwu-ka t_i mannaci ani hayssnun-ci*] *anta*

The grammaticality of (11a) and (12a) doesn't pose any problem for the RM analysis since neither wh phrase nor NPI crosses A' position to get to its associated spec. What concerns us is the status of (11b) and (12b). In (11b), the wh phrase has scrambled over the NPI and just the opposite has happened in (12b). We have seen that scrambling does not interact with other A'-items to induce crossing effects. Then why is it that scrambling affects grammaticality in these cases? Takahashi's original account which includes scrambling in crossing effects would be able to account for these cases. But then, there will be no explanation for the grammatical status of (1b) and (10), which show that a wh phrase can be scrambled over an NPI in A'-position without resulting in any degradation. Notice that LCC has no problem accounting for these examples. In (11a) and (12a), the association lines are in inclusive relation while they are in crossing relation in (11b) and (12b). Thus the LCC seems to be preferable to the RM analysis at this point.

The RM analysis can be saved if we are equipped with certain assumptions. Suppose that a position created by long distance scrambling is not a legitimate LF object (Oka (1989), Sohn (1993,1994a)). Then due to the *economy of representation* (Chomsky (1993)), that position must disappear at LF. In other words, undoing is obligatory in case of long distance scrambling. [4] Suppose that for A'-items, the destination of undoing is the place they are interpreted. For a wh phrase, it is spec of C with a [+wh] feature and for an NPI, it is spec of Neg. As their final landing sites are A'-positions, undoing to these positions would count as A'-movement. Notice that this A'-movement crosses another A'-position in both (11b) and (12b), thus violating RM. [5]

But there is a crucial case which cannot be accounted for even with the revised RM analysis. Consider the following examples.

- (13)a. John-un [*nwu-ka amwuto* mannaci *ani* haysstako] mit-*ni*
 Top who-Nom anybody meet not did-comp believe-Q
 'Who_i does John believe t_i met nobody?'
 b. ?**amwuto*_i John-un [*nwu-ka* t_i mannaci *ani* haysstako] mit-*ni*

Base order (13a) is perfect. NPI is already in NegP spec and the subject wh phrase, being higher than the NPI, will reach spec of [+Wh] C without crossing any A'-spec. But if the NPI is scrambled over the wh phrase to the sentence initial position, the sentence degrades. Nothing is violated at this point. First of all, the NPI doesn't cross any A'-position since the wh phrase is in A-position in overt syntax. Furthermore, as this movement is scrambling, even if there is any A'-spec, it wouldn't matter. Then the ungrammaticality of (13b) must be sought for in the operations occurring at LF. But there is no difference since the position occupied by the wh phrase *nwu-ka* is still A-position. The position in which the wh phrase is licensed, that is, spec of [+Wh] Comp, is even higher than the position the NPI occupies at overt syntax. Therefore, even if undoing is subject to RM, there is no violation here, there being no intervening A'-spec. [6]

The examples in (13) do not pose any problem for the LCC since the association lines would cross in (13b) while there is no crossing in (13a). The existence of an example like (13b) thus supports the LCC analysis rather than the RM (or minimize chain link) analysis. [7]

4. Substitution, Adjunction and the LCC

In the previous section, we have seen the necessity of the LCC. This section aims at exploring the nature of the LCC from a different perspective. First, we show that the so called focus phrases, that is, NPs marked with *-to* (*also*), *-kkaci* (*even*), *-man* (*only*) (*-mo*, *-sac*, *-dake* for Japanese) also exhibit crossing effects.

- (14)a. ?*John-to/kkaci/man nwukwu-lul cohaha-ni
 also/even/only who-Acc like-Q
 'Who does even/also/only John love?'
 b. nwukwu-lul John-to/kkaci/man t_i cohaha-ni
 (15)a. ?**amwuto* sakwa-to/kkaci/man cohahaci ani hanta
 anybody apple-also/even/only like not do
 'Nobody likes even/also/only apples.'
 b. sakwa-to/kkaci/man amwuto cohahaci ani hanta
 'Even/only apples, nobody likes.'
 'Apples as well as other fruits, nobody likes.'

What is interesting is that the order inducing crossing effects is not fixed, but varies depending on the item the focus phrase is cooccurring with. (14) shows that a focus phrase can only follow a wh phrase while (15) shows that it can only precede an NPI. Why is a specific order required between focus phrases and other A'-items? We propose that focus phrases have to

be licensed via checking in spec of a functional projection (Focus phrase (FocP)) which is located between CP and NegP. [8]

(16) [CP [FocP [NegP [VP ...] Neg] Foc] Q]

- (17)a. nwu-ka sakwa-to amwueykeyto cwuci ani hayss-ni?
 who-Nom apple-also to anybody give not did-Q
 'Who didn't give apples (as well as pears) to anyone?'
 b.?*nwu-ka amwueykeyto sakwa-to cwuci ani hayss-ni?
 c.?*sakwa-to nwu-ka amwueykeyto cwuci ani hayss-ni?
 d.?*sakwa-to amwueykeyto nwu-ka cwuci ani hayss-ni?
 e.?*amwueykeyto nwu-ka sakwa-to cwuci ani hayss-ni?
 f.?*amwueykeyto sakwa-to nwu-ka cwuci ani hayss-ni?

(16) is the structure we have proposed. Given (16), the relative order among the A'-items must be a subset of [wh phrase-focus phrase-NPI]. (14a) and (15a) are degraded due to the violation of this ordering requirement. If a sentence contains all three kinds of A'-items as in (17), out of six logically possible orders, only one order [wh phrase-focus phrase-NPI] is allowed.

That focus phrases like *NP-also/even/only* are licensed via checking is supported not only by the crossing phenomenon, but by the fact that the scope of these phrases is sensitive to islands. Consider (18).

- (18)a. John-un [Mary-ka Bill-to cohahantako] mitnunta
 Top Nom also like believe
 'John believes that Mary likes Bill as well.'
 '?(?)As for Bill_i (as well as someone else), John believes that Mary likes him_i.'
 b. John-un [Mary-ka Bill-to cohahantanun somwun]-ul tulessta
 Top Nom also like rumor-Acc heard
 'John heard a rumor that Mary liked Bill as well.'
 '*As for Bill_i (as well as someone else), John heard a rumor that Mary liked him_i.'
 c. John-un [Mary-ka Bill-to cohahantako] soksakiessta
 Top Nom also like-comp whisper
 'John whispered that Mary liked Bill as well.'
 '*As for Bill_i (as well as someone else), John whispered that Mary liked him_i.'

(18a) illustrates that *NP-to* in the embedded clause can have scope either in the embedded or, marginally, in the matrix clause. But when this phrase is inside an island as in (18b,c), it can only have a scope in the embedded clause. In (18b), the focus phrase is located within a complex NP and in (18c), it is located within the complement clause of a non-bridge verb. We take this as evidence for the movement of focus phrases into spec of FocP. The focus phrase *NP-to* cannot have a scope in the matrix clause in (18b,c) since it cannot move to spec of matrix FocP without creating an unlicensed trace.

So far, three types of A'-operations have been observed which are involved in crossing effects; wh movement, NPI movement, and Focus movement. We also have observed that scrambling does not interact with these A'-operations to induce crossing effects. Another type of movement which has been frequently discussed in the literature is topicalization. It is still under debate whether topicalization is an adjunction operation or a substitution (checking) operation. The interaction of topic phrases with other A'-operations seems to shed some light on that issue. Topic phrases do not show any crossing effects with any of the aforementioned three A'-items.

- (19)a. John-i amwueykeyto sakwa-nun cwuci ani hayssta
 Nom to anyone apple-Top give not did
 'As for apples, John didn't give them to anybody.'
 b. John-i sakwa-nun amwueykeyto cwuci ani hayssta
- (20)a. John-i nwukwu-eykey sakwa-nun cwuess-ni
 Nom who-Dat apple-Top give-Q
 'To whom did John give apples (but, not pears)?'
 b. John-i sakwa-nun nwukwu-eykey cwuess-ni
- (21)a. John-to sakwa-nun mekci ani hayssta
 also apple-Top eat not did
 'John (as well as someone else) didn't eat apples
 (although they ate something else).'
 b. sakwa-nun John-to mekci ani hayssta

The above examples show that a topic phrase can either follow or precede any of the A'-items we have considered up to now. Thus topic phrases behave just like scrambled phrases with respect to crossing effects. If there is a topic head which checks the [+topic] feature of a topic phrase, the most natural assumption would be that the association lines drawn between them should be subject to the same kind of crossing constraint as other A'-operations are subject to. That this is not the case seems to suggest that topicalization, at least, is not a checking procedure. [9]

Now we have arrived at the following picture; only checking or substitution operations are involved in crossing effects and non-checking operations (adjunction or non-movement) are not involved in crossing effects. Wh movement, NPI movement, and focus movement belong to the former while scrambling and topicalization (and possibly QR (See Note 9)) belong to the latter.

5. Challenge for the LCC

In this section, we present an apparent counterexample to the LCC and show that the tension can be resolved once we adopt the analysis put forward in Saito (1993). The relevant examples are given below;

- (22)a. *John-un amwu kes-to way saci ani hayss-ni
 top anything why buy not did-Q
 'Why didn't John buy anything?'
 b.?(?)nkwu-ka amwu-kes-to way saci ani hayssni
 who-Nom anything why
 'Who didn't buy anything why?'

(22a) is a typical LCC violation. When an NPI precedes a wh phrase in the same clause, the sentence degrades. Interestingly, if we add another wh phrase in the subject position, the sentence improves. The association lines for the examples in (22a) and (22b) are given in (23). Notice that there is crossing even in the better examples as shown in (23b).

- (23)a. [CP NPI WH neg Q] (=22a)
 |_____|_____|_____|
 |_____|_____|_____|
 b. [CP WH NPI WH neg Q] (=22b)
 |_____|_____|_____|
 |_____|_____|_____|

But it is not the case that an addition of a wh phrase always saves bad examples. Consider (24a,b).

- (24)a. *John-i [amwuto way ttenaci ani haysstako] malhayss-ni
 Nom anybody why leave not did-comp said-Q
 '(lit) Q John said [that no one left why]?'
 b. *nwu-ka [amwuto way ttenaci ani haysstako] malhayss-ni
 who-Nom anybody why
 '(lit) who said [that no one left why]?'

(24a) is degraded due to the violation of LCC. What is to be noted is that even if we add a wh phrase in a higher clause as in (24b), there is no improvement. Let us again look at the association lines for these examples.

- (25)a. [CP [CP NPI WH neg] Q]
 |_____|_____|_____|
 |_____|_____|_____|
 b. [CP WH [CP NPI WH neg] Q]
 |_____|_____|_____|
 |_____|_____|_____|

There is no difference in the association lines between (23b) and (25b). Then it remains unaccounted for why there is improvement only in (22b). We can subdivide this into two questions. First, why is (22b) good at all? Second, why is there no improvement in (24b)? Obviously the key to these questions lies in the nature of the wh phrase added in front of the NPI-wh

pair. To account for this, we resort to Saito's (1993) analysis on multiple wh constructions. Saito (1993) observes that an adjunct wh phrase inside an island can avoid violating the ECP when there is an argument wh phrase in a higher position of the same clause. Consider the examples in (26).

- (26)a. *John-wa [sono hon-o naze katta hito]-o sagasiteru no
 Top that book-Acc why buy person-Acc looking for Q
 'Q John is looking for [a person who bought the book why]'
- b. *John-wa [naze nani-o katta hito]-o sagasiteru no
 Top why what-Acc bought person-Acc looking for Q
 'Q John is looking for [a person that bought what why]'
- c. ??John-wa [nani-o naze katta hito]-o sagasiteru no
 Top what-Acc why bought person-Acc looking for Q
 'Q John is looking for [a person that bought what why]'

(26a) is ungrammatical as the adjunct wh phrase *naze* located within an island leaves an unlicensed trace when it crosses the island at LF, violating the ECP. Furthermore, that unlicensed trace cannot be deleted since it is a member of an already legitimate A'-chain (cf. Chomsky (1992)). The ungrammaticality of (26b), which has another wh phrase below *naze*, can also be attributed to the same reason. What is interesting is the status of (26c), which is much better than (26a) and (26b). The difference between (26b) and (26c) is that (26c) has an additional wh phrase in a higher position than *naze*. Seeing this, Saito argues that *naze* can adjoin to an argument wh phrase and move out of the island together with that phrase without violating the ECP.

Now we are ready to give an account for the contrast between (22a) and (22b). We argue that in (22b) the lower wh phrase can adjoin to the higher wh phrase in a higher position of the same clause. How does the availability of this adjunction affect the grammaticality of (22b)? We have concluded in section 3 that we need the LCC independently. But what is still at issue is whether RM is violated in the examples such as (1a,c). Suppose that (1a,c) violate both RM and LCC. Likewise, (22a) would violate both of these constraints. But adjunction is available in (22b). If Saito (1993) is right in assuming that this adjunction is an instance of A-movement (See Saito (1993) for relevant arguments), crossing of the wh phrase over the NP1 in A'-position would not count as an RM violation since it is an instance of A-movement. Thus the improvement shown in (22b) is attributed to the fact that (22b) doesn't violate RM while (22a) does.

Then naturally, the second question comes to the surface. Why is (24b) worse than (22b)? This can also be answered with recourse to another observation in Saito (1993). Consider the following.

- (27)a. ??John-wa [Sue-ga [dare-ga naze kaetta to] itta to-no
 Top Nom who-Nom why left comp said-Gen
 uwasa]-o kiita-no
 rumor-Acc heard-Q
 '(lit) Q John heard [the rumor that Sue said [who left why]].'
- b. *John-wa [dare-ga [Mary-ga naze kaetta to] itta to-no
 uwasa]-o kiita-no
 '(lit) Q John heard [the rumor that who said [Sue left why]].'

(27a), where both an argument and an adjunct wh phrase are inside of the complex NP, shows only a Subjacency violation effect. *Naze* can adjoin to the argument wh phrase in the same clause, and the movement of the argument wh phrase out of the island causes a mild deviance. On the other hand, there is no improvement in (27b) in spite of the fact that there is an argument wh phrase within the same island. The generalization is that for improvement to show up, the adjunct wh phrase must be a clausemate of the argument wh phrase. In fact, this was the main motivation for the assumption that the adjunction of an adjunct wh phrase to an argument wh phrase is an A-operation. We argue that exactly the same is going on in (24b). As the adjunction of the embedded adjunct wh phrase to the argument wh phrase in the different clause is not allowed, this example violates both RM and the LCC just as (24a) does.

Thus far we have offered an account for the contrast between (22b) and (24b). We crucially relied on the view that both RM and LCC are working in Korean and Japanese and only (22b), but not (24b) is exempt from an RM violation. There are some facts supporting this view. First, there is an argument-adjunct asymmetry in the phenomenon we are looking at. Thus, (22a) containing an adjunct wh phrase is worse than (1a) containing an argument wh phrase. LCC does not predict that there will be any contrast since it is not sensitive to the distinction between adjuncts and arguments. Under the present view that these examples violate RM as well as LCC, the grammatical contrast can be captured by appealing to the deletability of an unlicensed trace. Following the logic of Chomsky and Lasnik (1993), the unlicensed trace created in (1a) can be deleted at LF in the process of creating a legitimate operator-variable chain while that in (22a) cannot be deleted since it is a member of an already legitimate A'-chain [A', A'...A']. The existence of the unlicensed trace at LF causes a severer deviance, accounting for the worse grammatical status of (22a).

Secondly, the same configuration in Chinese provides an indirect support for the view we have adopted. Based on Mandarin Chinese data, Li (1991) draws the following generalization.

- (28) The linking of a wh element with an operator is subject to minimality. The linking of A with B [... A ... B ...] obeys minimality iff there is no intervening C [... A ... C ... B] such that C is linked to another element D, $D \neq B \neq A$

- (29) ta mei gei shei sheme ne?
 he not give who/anyone what/anything Q
 'What didn't he give to whom?'

(28) is very similar to the LCC. (28), applied to the examples such as (29) gives us an interesting result. It has been reported that indefinite expressions like *shei* (*who/anyone*) and *sheme* (*what/anything*) can be interpreted as wh phrases in the question sentence or as NPIs in affective contexts (Huang (1982), Cheng (1991), and Li (1991)). What is interesting is that if there are both question operator and negation in a sentence having two indefinite expressions, as illustrated in (29), it is not possible for one to be interpreted as an NPI and for the other to be interpreted as a wh phrase. In the above particular example, the only available reading is the one where both *shei* and *sheme* are interpreted as a wh phrase. Why does (28) obtain in this language? Notice that LCC cannot fully account for this fact. Even if Mandarin Chinese obeys the LCC, that would account for only one of two bad pairs (who-anything, what-anyone). On the other hand, RM seems to be able to account for both cases. Suppose that NPIs and wh phrases have to move to spec of a relevant functional head at LF. Further suppose that there is a strict cycle at LF as well as in overt syntax. Then the fact observed by Li follows. The movement of a wh phrase at LF will violate RM as the wh phrase would cross the NPI already occupying A'-position, spec of NegP. Given this discussion on Chinese, it seems reasonable to think that R₁A regulates the Korean/Japanese counterparts as well. That is, crossing of an NPI by a wh phrase at LF in such examples as (1a,c) and (22a) induces an RM violation.

Before we end this paper, we would like to briefly address one issue related to the LCC. There have been two different views on the nature of the LCC. Tanaka (1993,1994) argues that LCC is an S-structure constraint while Maki (1994) takes it as a processing constraint. It is hard to distinguish one view from the other, there being no clear diagnostics for that purpose. But from a theoretical point of view, Tanaka's idea (LCC as an S-structure constraint) is incompatible with the minimalist program developed in Chomsky (1993, 1994) and Chomsky and Lasnik (1993) since it is crucially assumed that there are only two interface levels (LF and PF) and hence, no separate level like S-structure. To the extent that this approach is successful, we have a reason to choose the view of LCC as a processing constraint.

6. Conclusion

In this paper, we have argued that both RM and LCC are needed to account for the interactions among A'-items. We have also proposed that LCC is a processing constraint which only applies to the interactions among checking procedures. Although we have considered only Japanese and Korean in this paper, similar kind of crossing effects seem to show up in many other languages. We leave open the issue of whether LCC is a language universal constraint or not.

Notes

1. The definition of Relativized Minimality is given below.
 - X α -governs Y only if there is no Z such that
 - (a) Z is a base generated position
 - (b) Z is α -GT compatible with Y
 - (c) Z c-commands Y and does not c-command X. (Rizzi (1990), p27)

2. He crucially assumes that strict cycle exists not only at S-structure but at LF. Otherwise, the wh phrase can move first without violating the ECP and then NPI can move into NegP spec.

3. We have used italics for A' items and their related heads, to facilitate understanding.

4. By *undoing*, we mean the reconstruction of the scrambled phrase without leaving a trace. Readers are referred to Saito (1991) for arguments for undoing.

5. Hasegawa (1994) gives a similar type of account based on economy. She claims that only operations occurring at LF are subject to economy considerations. Thus undoing of a scrambled phrase would violate *minimal link condition (MLC)*. Our RM analysis is used only for expository purpose and it can readily be translated into MLC. What we would like to point out is that her analysis must be modified in the way we have presented in this paper. If it is the case that only LF operations are subject to economy considerations, it would be hard to account for the fact that scrambling is sensitive to islands. It is well known that scrambling of a phrase out of islands results in a degradation (Saito (1985)). One possible answer to this is to assume that there is no scrambling at all at overt syntax and the allegedly scrambled phrases are base generated in the positions they occupy at overt syntax. Then at LF, for interpretation (or theta identification), they undergo lowering to the place in which they are actually interpreted, without leaving a trace. This idea has been suggested to me by Boskovic (p.c.) and Takahashi (p.c.). One potential problem to this idea is that there are items which have to be licensed at overt syntax, but appear in a position higher than the position where they are actually licensed. An NPI scrambled over NegP in spec of which it is licensed would be one of these cases. The base generation analysis of scrambling needs to say something about these cases.

6. Another thing we want to point out is that the idea of undoing as movement would be incompatible with the copy theory of movement. If undoing is just deletion of traces, it would be hard to say that undoing is subject to RM effects.

7. What is still at issue is the status of RM in examples (1a) and (1c). Independently of the LCC, still the example seems to be in violation of RM or MLC since the *wh* phrase undergoing A'-movement crosses the NPI in A'-position. Either there will be no RM at all, or the example violates both of these constraints. We will not go into the full details in this paper, but suggest that the latter seems to be the case.

8. See Hasegawa (1994) for evidence from Old Japanese that there is agreement relation between focus phrases and agreement morpheme which occurs between negation and Comp.

9. Or it might be that there is no movement involved in topic phrases. Quantifier phrases behave just like topic phrases with respect to crossing effects. Although we cannot discuss in detail the implication crossing phenomena have on Quantifier Raising (QR), due to the limitation of space, the fact that it is not involved in crossing effects seems to support the idea that there is no QR (Kitahara (1992) among others). The idea is that if QR is not a checking operation driven by checking of a morphological feature, the status of QR itself is doubtful. The natural question arising is the status of scrambling under minimalist framework. See Fukui (1993) for relevant discussion.

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Negation and the LF Structural Conditions on Negative Polarity Item Licensing

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Chomsky (1993) argues in favor of an approach that eliminates SS conditions in favor of a system where there are only output conditions, applying at the interface levels PF and LF. Negative Polarity Item Licensing (NPIL) seems to pose a problem for such an approach, since it has been argued that Negative Polarity Items (NPIs) are licensed at SS, and not at LF [Safir 1985; Laka 1990, etc.]. In this paper, I analyze the behavior of NPIs embedded within indefinite NPs and present an analysis of the phenomenon that is consistent with the recent Chomskian approach; in particular, I argue that NPIL takes place at LF and that LF c-command of the NPI by Neg is a necessary requirement for licensing to take place.

1. Indefinites and Tense

1.1. Object NPs

It is usually the case that indefinites in the immediate scope of negation take, or at least can take, a non specific, narrow scope reading. This is the reading of the indefinite object in (1a). However, when asked to compare between (1a) and (1b), examples which are exactly alike from a structural point of view, many speakers find an interesting contrast between these two examples.

- (1) a. I didn't find a speaker who would chair a session in tomorrow's conference
b. I didn't find a speaker who will chair a session in tomorrow's conference

While the indefinite in (1a) is interpreted under the scope of negation, this is not the way in which these speakers interpret the indefinite in (1b). In particular, although the data are subtle, these speakers only get a wide scope interpretation of the indefinite over negation in (1b). Thus, while (1a) is interpreted as "*I didn't find a single speaker who would chair a session in tomorrow's conference*", (1b) is interpreted as "*there is a speaker who will chair a session in tomorrow's conference and I didn't find him/her*". Since (1a) and (1b) are identical except for the choice of the embedded tense, the difference in interpretation between these two examples must follow from the difference in the particular tenses involved in these examples.¹

This difference in interpretation between (1a) and (1b) correlates with another asymmetry. In particular, while NPIs can be licensed in examples like (1a), the presence of a NPI within the relative clause of examples like (1b) yields

ungrammatical results. This is illustrated in (2), where (2a) is the counterpart of (1a) and (2b) the counterpart of (1b).

(2)

- a. I didn't find a speaker who would chair any sessions in tomorrow's conference
- b. *I didn't find a speaker who will chair any sessions in tomorrow's conference

Since (2a) and (2b) are structurally identical, the contrast in grammaticality that results from the presence of the NPI in these examples must be also due to the tense instantiations of the verbs involved.

1.2. Subject NPs

Keeping the contrasts displayed by the examples involving indefinite objects in mind, let us now consider the examples in (3). These examples differ from (1) and (2) above in that here the indefinite NP is not the complement of the verb, but rather the subject of the clause. Another difference is that in this pair the tense of the embedded verb is kept constant and it is the tense of the matrix verb that changes.

- (3) a. A performer who is wearing funny clothes isn't available
- b. A performer who is wearing funny clothes wasn't available

As before, there is a difference in the interpretation of these examples. While the indefinite subject in (3a) can have a narrow scope interpretation with respect to negation, the indefinite subject in (3b) cannot have a narrow scope interpretation and takes necessarily a wide scope reading.

Parallel to what we found with respect to the pair in (1), the difference in interpretation displayed by the pair in (3) correlates with a contrast in the possibility of licensing NPIs. This is illustrated in (4); note that the examples in (4) are exactly like those in (3) except for the fact that we have introduced a NPI within the relative clause modifying the indefinite subject.

- (4) a. A performer who is wearing any funny clothes isn't available
- b. * A performer who is wearing any funny clothes wasn't available

As the grammaticality judgment shows, a NPI can be licensed within (4a), the counterpart of (3a); but the presence of a NPI within the indefinite in (4b), the counterpart of (3b), yields an ungrammatical result.

1.3. Extraposition and Tense

Finally, consider the examples in (5), where a relative clause has been extraposed out of an indefinite subject.

- (5) a. [A linguist] wasn't available [who would deal with these problems]
 b. * [A linguist] wasn't available [who will deal with these problems]
 c. [A linguist] isn't available [who will deal with these problems]

Although these three examples are structurally parallel, there is a contrast with respect to their grammaticality judgement: while (5a) and (5b) are well-formed examples, extraposition yields an ungrammatical result in (5b). Since the good and bad cases only differ from each other in the tense of the predicates involved, the contrast in grammaticality exhibited by these examples must be due once again to the particular instantiation of the tense of the verbs involved. Parallel to this difference, there is also a contrast in NPI-licensing in the counterparts of these examples, given in (6).

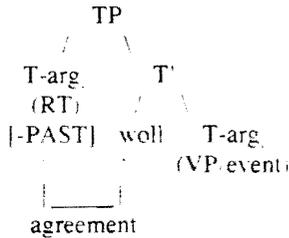
- (6) a. [A linguist] wasn't available [who would deal with any of these problems]
 b. * [A linguist] wasn't available [who will deal with any of these problems]
 c. [A linguist] isn't available [who will deal with any of these problems]

Summarizing, examples which are structurally parallel show a contrast in the interpretation of indefinite NPs, both in subject and object position, which is dependent on the tenses of the predicates involved. Tense also affects the possibility of extraposing relative clauses. There is also a generalization with respect to NPI-licensing that can be drawn from these paradigms: in particular, that NPIs are only licensed in those examples where the indefinite takes a narrow scope reading.

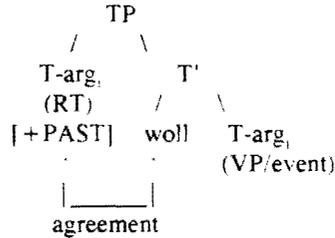
Contrasts like the one in (2) raise an interesting problem for an SS account of NPIL. Since negation c-commands the NPI both in (2a) and (2b) and the examples are identical from a structural point of view, it is not clear under a SS approach to NPIL what this asymmetry follows from. Examples like (4) raise a different type of problem for an SS analysis of polarity licensing. The SS approach could easily account for the ungrammaticality of (4b), given that Neg does not c-command the NPI at SS. But if SS c-command of the NPI by Negation plays any role in NPIL, it is not clear what accounts for the grammaticality of (4a), where Neg does not c-command the NPI within the relative clause at SS. Note also that the mechanism of licensing by a selected [Negative]COMP (see Laka 1990) would not be available in this case either, under the standard assumption that selection of the head of a relative clause by elements in the matrix clause is not possible.

roughly illustrated in (11) and (11'). The form *would*, on the other hand, is an overt morphological indication that the RT in an agreement relation with Tense is identified with a [+past] event-time, as in (12) and (12').³

(11') WILL



(12') WOULD



(11) WILL : [RT [-Past] event] | RT wo'll event]
 |__ = __'

(12) WOULD : [RT [+Past] event] | RT wo'll event]
 |__ = __'

I will also assume that the tense features of a clause, and in particular morphological tense features like those in (11-12) above, are like the Case features of a NP. If a clause appears at LF in a position where its tense features cannot be licensed, the derivation will crash. Thus, just as a NP has to move to get its Case features licensed, I will assume following Stowell (1993) that it is the whole clause that has to move, if necessary, to license its tense features.⁴

With this in mind let us now come back to the contrast displayed by (9) and (10). Recall that in (10) the RT of the embedded clause is identified with the UTT. We can now understand why this is so. If the embedded clause in (10) remains in its base-generated position at LF, the tense licensing requirements imposed on *will*-clauses will be violated, since the embedded RT will be c-commanded by (and, therefore, identified with) the [+past] matrix event-time. In order to avoid this and satisfy its morphological tense features, the embedded CP in (10) has to move at LF to get out of the scope of the matrix [+past] event-time. Once the embedded clause has moved at LF, there will be no event-time that c-commands the embedded RT. The RT of the embedded clause is then identified with the UTT, as in matrix clauses. This is precisely why the embedded clause takes the UTT as its RT. With this background in mind, we are now in a position to return to our paradigms in (1-6).

2.2. LF Structural Conditions on NPI-licensing

2.2.1. Object NPs

Let us first consider the pair in (1). Recall that this pair displays a contrast in the interpretation of the indefinite object: the object takes a narrow scope interpretation in (1a), while it can only take a wide scope interpretation in (1b).

- (1) a. I didn't find a speaker who would chair a session in tomorrow's conference
 b. I didn't find a speaker who will chair a session in tomorrow's conference

In (1a), the embedded clause is a *would*-clause and the verb of the matrix clause is inflected in the past. Recall the morphological tense licensing requirements imposed on *would*-clauses. For the embedded clause in (1a) to satisfy its morphological licensing requirements, it will have to appear in a position where its RT is c-commanded by a [+past] matrix event-time at LF. If the indefinite remains in its base-generated position within VP at LF, the morphological conditions on *would*-clauses will be satisfied. The LF VP-internal position of the object in (1a) is also consistent with the narrow scope reading of this NP.

Consider now (1b). In contrast with (1a), the embedded verbal form surfaces morphologically realized as *will*. The morphological licensing conditions imposed on *will*-clauses require that the head *will* be in an agreement relation with a [-Past] RT. If the object remains in its base-generated position in (1b), the embedded RT will be controlled by the matrix [+past] event-time, violating (11). The only way the morphological tense features of the embedded *will*-clause can be satisfied is if this clause is out of the c-command domain of the matrix [+past] event-time at LF. Consequently, the object will move at LF in (1b). For concreteness, I will assume that it adjoins to IP. In that position the morphological tense features of the embedded clause can be licensed. Notice that the LF-movement of the object gets this indefinite out of the scope of Neg.

At LF, then, the indefinite objects in (1a) and (1b) occupy different positions: within its VP-internal position the object NP is c-commanded by Neg in (1a), while it is out of the c-command domain of Neg in (1b). This structural difference explains the correlation observed between the use of the future tense in the embedded clause and the wide scope reading of the object in (1b).

The difference with respect to the LF position occupied by the object in (1a) and (1b) has important consequences for polarity item licensing. While at LF Neg will c-command NPIs within the relative clause modifying the indefinite object in (1a), it will not c-command NPIs within the relative object in (1b). This accounts for the contrast displayed by the examples in (2).

(2)

- a. I didn't find a speaker who would chair any sessions in tomorrow's conference
- b. *I didn't find a speaker who will chair any sessions in tomorrow's conference

There is thus a structural distinction that teases apart the grammatical and ungrammatical examples: Neg c-commands the NPI at LF in the good example while this structural relation does not hold in the bad example.

2.2.2. Subject NPs

With this in mind, let us move onto the cases of indefinites subjects, exemplified in (3). Recall that while the indefinite subject can have a narrow scope reading with respect to Neg in (3a), it can only take a wide scope with respect to Neg in (3b).

- (3) a. A performer who is wearing funny clothes isn't available
- b. A performer who is wearing funny clothes wasn't available

I will follow Uribe-Etxebarria (1994) and assume that the narrow scope reading of indefinite subjects follows from a reconstruction operation of the preverbal indefinite to its VP internal position at LF.⁵ As a consequence of this reconstruction operation, the indefinite subject is in a position where it is c-commanded by Neg at LF. Let us now consider whether the tense licensing requirements of the embedded clause can be satisfied in (3a) after reconstruction takes place. The embedded verb is inflected in the present progressive form in (3a); consequently, the embedded tense complex can still satisfy its licensing requirements in the configuration that results from reconstruction, where the matrix present event time will be controlling the embedded RT. The situation is different in (3b), however. If the indefinite subject reconstructs, the RT of the embedded CP will be controlled by the matrix [+past] event-time. However, this violates the licensing requirements of clauses with verbs inflected in the present progressive form. Consequently, in contrast with (3a), the indefinite subject cannot reconstruct in (3b) and has to remain in its surface position at LF, where it will be out of the c-command domain of Negation. There is thus a LF structural difference that distinguishes (3a) from (3b): while in the former the indefinite subject occupies its base-generated position within VP after reconstruction takes place, the tense licensing requirements of the embedded clause force the indefinite NP to remain in SPEC/IP in the latter. The different LF configuration of these examples explains the correlation between tense and the contrast in the interpretation of the indefinite subject displayed by (3a) and (3b).

The different LF configuration of these examples also accounts for the

contrast in NPI-licensing exhibited by their counterparts in (4)

- (4) a. A performer who is wearing any funny clothes isn't available
 b. * A performer who is wearing any funny clothes wasn't available

As a consequence of reconstruction, *Neg* c-commands the NPI at LF in the grammatical (4a); in the ungrammatical (4b) *Neg* does not c-command the NPI at LF.

2.2.3. Extraposition and Tense

Let us finally analyze the interrelation between extraposition and tense, illustrated in (5).

- (5) a. [A linguist] wasn't available [who would deal with these problems]
 b. * [A linguist] wasn't available [who will deal with these problems]
 c. [A linguist] isn't available [who will deal with these problems]

In the ungrammatical (5b) the embedded clause is a *will*-clause and the matrix verb is inflected in the past. If the RT of the embedded clause is identified with the [+past] matrix event-time, the morphological licensing conditions on *will*-clauses would be violated. At LF, then, the embedded clause will have to move to satisfy its tense licensing requirements. In the grammatical examples (5a) and (5c), in turn, the morphological tense features of the embedded clause are or can be satisfied if the embedded RT is bound by the matrix event-time; that is, if the embedded clause is interpreted within VP.

What follows from here is that the grammatical examples correspond to those cases where the embedded clause is within VP at LF. This goes along with the characteristic narrow scope displayed by the indefinite NP in these constructions. The ungrammatical example, in turn, is that where the embedded clause cannot remain within VP at LF. If this is correct, it indicates that extraposed clauses must be interpreted and licensed within VP at LF.

This LF configuration can also explain why NPIs are licensed in the counterparts of (5a,c): in (6a,c) the embedded clause remains within VP at LF and *Neg* c-commands the NPI at that level. The grammatical examples where NPIs are licensed conform to the generalization noted above: *Neg* c-commands the NPI at LF. In the ungrammatical (6b), counterpart of (5b), the relative clause cannot appear within VP at LF, but rather has to move at LF to satisfy its tense licensing requirements. As a consequence of this operation, *Neg* does not c-command the NPI at LF. The LF configuration that results from the movement operation accounts for the ungrammaticality of (5b) as well as the impossibility of licensing

the polarity element within the relative clause in (6b).

- (6) a. [A linguist] wasn't available [who would deal with any of these problems]
 b. * [A linguist] wasn't available [who will deal with any of these problems]
 c. [A linguist] isn't available [who will deal with any of these problems]

Summarizing, LF c-command of the NPI by Neg is a necessary requirement for licensing to take place. In addition to provide evidence for a LF approach to NPI-licensing this conclusion provides support in favor of the hypothesis recently advocated by Chomsky in the sense that there are no SS conditions, but only output conditions applying at the interface levels PF and LF. Furthermore, if the analysis I have entertained is correct and extraposed relatives of derived subjects have to appear within VP at LF, this may be interpreted as evidence in favor of the hypothesis that the so-called extraposed clauses do not really involve extraposition of the relative clause, but rather leftward movement of the NP modified by the relative clause (see Johnson 1992, and Kayne 1993).

3. Some Extensions

3.1. Related Paradigms at the CP Level

Although space limitations prevent us from discussing them in detail, it is worth noting that paradigms similar to the ones studied in this paper can also be constructed at the clausal level.

(13) Sentential Subjects and NPI-licensing.

- a. [That anybody would leave the company] wasn't mentioned in the meeting
 b. [That anybody had left the company] wasn't mentioned in the meeting
 c. * [That anybody will leave the company] wasn't mentioned in the meeting
 d. ? [That anybody will leave the company] won't be mentioned in the meeting

(14) Sentential Objects and NPI-licensing.

- a. Mary didn't say [that Ann would read any books tomorrow]
 b. Mary didn't say [that Ann had read any books tomorrow]
 c. * Mary didn't say [that Ann will read any books tomorrow]
 d. Mary won't say/believe [that Ann will read any books tomorrow]

The reader is referred to Uribe-Etxebarria (1994) for detailed discussion.

3.2. Determiners and Tense

There is also a very interesting correlation between the types of determiner and tense. Some illustrative examples, brought to my attention by Ken Hale (p.c.), are given in (15).

- (15) a. I wanted medicine that would cure me
 b. * I wanted medicine that will cure me [cf. (15c), (15d)]

Since the matrix verb is inflected in the past, in (15b) the tense licensing requirements of the embedded clause will not be satisfied unless this clause gets out of the c-command domain of the matrix [+past] event-time at LF; consequently the object, the bare NP, will have to move at LF in (15b). This LF movement operation will not be necessary in (15a), where the tense licensing requirements of the embedded clause are satisfied if the bare noun phrase remains within VP at LF. The correlation between the LF movement of the bare NP and the ungrammaticality of (15b) suggests that the indefinite mass noun interpretation of the bare NP in (15) requires that this NP be interpreted within VP at LF.

The prediction of this analysis is that if the indefinite in (15b) is embedded within a sentence with a [-past] matrix verb, the example will be grammatical. This is so because the morphological tense licensing requirements of the embedded clause will be satisfied in the base-generated position of the object within VP. The grammaticality of (15c) and its contrast with (15b) confirms this prediction

- (15) b. * I wanted medicine that will cure me [cf. (15c), (15d)]
 c. I want medicine that will cure me

Note that the ungrammatical (15b) becomes grammatical if the object is headed by the determiner *the*.

- (15) b. * I wanted medicine that will cure me
 d. I wanted the medicine that will cure me

The basic difference between (15b) and (15d) is that in the latter the use of *the* is compatible with the wide scope interpretation that follows from the LF movement that the object undergoes in order to satisfy the tense licensing requirement of the embedded clause.

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Notes

1. See Abusch (1987), Ogihara (1989) and Stowell (1993) for related discussion.
2. See Stowell (1993) for related discussion.
3. I follow Ogihara (1989) and references therein in assuming that a more abstract form *woll* underlies both *will* and *would*.
4. This approach raises the question what it is that makes the whole clause and not only the head TNS or its projection be involved in checking and licensing tense features. A possible answer to this can be found in Zagona (1990), where it is proposed that -in the same way as other arguments- the external argument of TNS has to move to the specifier of a functional category to be licensed: she takes this position to be SPEC:CP. I will assume that something along this lines is basically correct and that it is precisely this that makes the whole clause be involved in licensing tense. See Ogihara (1989) for a different approach.
5. See Uribe-Etxebarria (1994) for detailed discussion.

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Word Order, Intonation, and Noun Phrase Interpretation in Dutch
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1. Introduction

It has long been known that an indefinite object like *illegalen* 'illegal aliens' in (1), from Dutch, can have two readings.

- (1) De politie arresteert illegalen
 the police arrests illegals
 'The police arrests illegal aliens.'

On one reading, *illegalen* refers to a group of illegal aliens that has not been previously mentioned, and which is introduced in the discourse by the very mentioning of the word *illegalen*. This is the *existential* reading (which will also be referred to as the *weak* reading, following De Hoop 1992).

On another reading, *illegalen* refers to the *kind* of people who are called 'illegal aliens', and (1) describes a general property of this kind in relation to activities of the police ('what happens to illegal aliens is that the police arrests them'). This is a *generic* reading (one of the possible *strong* readings of indefinite noun phrases).

On the existential reading, (1) can be an answer to the questions in (2). On the generic reading, (1) is an answer to the question in (3):

- (2) What happens?
 What does the police do?
 Who does the police arrest?
- (3) What does the police do to illegal aliens?

It has been noticed that the position of the indefinite object in (1) with respect to sentence adverbials forces one of the two possible readings. Consider (4):

- (4) a. De politie arresteert altijd illegalen
 the police arrests always illegals
- b. De politie arresteert illegalen altijd
 the police arrests illegals always

(4a) is considered infelicitous as an answer to the question in (3), whereas (4b) is considered infelicitous as an answer to the questions in (2). Thus, indefinite objects appearing to the right of sentence adverbs receive a *weak* interpretation, whereas indefinite objects appearing to the left of sentence adverbs receive a *strong* interpretation.

Diesing (1990, 1992a) advances the hypothesis that the interpretation of indefinite noun phrases is a function of the position of the noun phrase in the syntactic structure. Assuming a semantic representation à la Heim (1982), consisting of a quantifier, a restrictive clause, and a nuclear scope, Diesing

hypothesizes that the verb phrase in the syntactic representation corresponds to the nuclear scope of the semantic representation. A noun phrase in the VP therefore corresponds to a variable in the nuclear scope. In the absence of a quantifier and a restrictive clause, a variable in the nuclear scope is bound by an existential operator ('existential closure'). A noun phrase outside the VP corresponds to a variable in the restrictive clause of the semantic representation, and is bound by the quantifier. Crucially, Diesing assumes an immediate correspondence between the position of the noun phrase (inside or outside the VP) and the interpretation of the noun phrase (weak or strong, respectively). This is referred to as the *Mapping Hypothesis*:

- (5) *Mapping Hypothesis* (Diesing 1992a:10)
 Material from VP is mapped into the nuclear scope
 Material from IP is mapped into a restrictive clause

The interpretation of the sentences in (4) now follows on the assumption that sentence adverbials like *altijd* 'always' mark the VP boundary. In (4a), then, the indefinite object *illegalen* is inside the VP, it corresponds to a variable in the nuclear scope, and it receives an existential interpretation. In (4b), on the other hand, the indefinite object is not inside VP (hence, inside IP), it corresponds to a variable in a restrictive clause, is bound by a generic quantifier, and receives a generic interpretation.

In this paper, I will present a slight modification of the analysis of (4) discussed above. This modification is necessary because factors of *intonation* seem to play an important (and, I believe, decisive) role in the mapping from syntactic representations to semantic representations. I will adopt Chomsky's (1993:42) suggestion that traces of noun phrase movement are in fact full copies of the moved noun phrase that receive no phonological interpretation. I would like to propose, however, that the 'trace copies' may be relevant for semantic interpretation, and that the intonation provides the cue as to which of the two copies of the noun phrase is mapped onto the semantic representation.

This analysis allows us to maintain both the Mapping Hypothesis and a parsimonious theory of noun phrase movement, in which placement of subjects and objects is to be described in terms of syntactic features only (i.e., the strong/weak features of Chomsky 1993).

2. Indefinite subjects in English

The relevance of intonation for the interpretation of indefinite noun phrases can be illustrated immediately by an example from English, which a naive implementation of the Mapping Hypothesis would force us to describe in an unsatisfactory way. This example involves indefinite subjects:

- (6) Firemen are available

- (10) ..weil Kinder auf der Straße spielen German
 because kids on the street play
 ‘..because kids (always) play in the street’
 ‘..because there are kids playing in the street’
- (11) a. ..omdat kinderen op straat spelen Dutch
 because kids on street play
 ‘..because kids (always) play in the street’
- b. ..omdat er kinderen op straat spelen
 because there kids on street play
 ‘..because there are kids playing in the street’

In the German example in (10), the indefinite noun phrase is ambiguous between a generic and an existential reading, just like (1) and (6). In Dutch, the presence of the expletive *er* has a disambiguating effect: in (11a), *kinderen* gets a generic interpretation, in (11b) *kinderen* gets an existential interpretation.

As expected under the hypothesis in (9), *kinderen* has the nuclear pitch accent in (11b), forcing interpretation of the VP-internal copy of *kinderen* (yielding an existential interpretation), whereas *kinderen* in (11a) does not, forcing interpretation of the VP-external copy (yielding a generic interpretation). The German example in (10) can be disambiguated in the same way (see also Krifka 1991):

- (12) a. ..weil KINder auf der Straße spielen (existential)
 b. ..weil Kinder auf der STRAße spielen (generic)

Accepting (9), there is no need to assume that the overt copy of *Kinder* in (12a) is in a VP-internal position (although it presumably is the case that *Kinder* in (12a) and (12b) are not in the same position, as the parallel facts from Dutch in (11) suggest, where the expletive in (11b) may be taken to occupy the structural subject position; we may assume that an empty expletive is present in (12b), forcing *Kinder* to occupy a position further down).

Evidence showing that *Kinder* in (12a) occupies a VP-internal position is rather thin. First of all, since *Kinder* in (12a) appears to the left of the adjunct *auf der Straße*, *Kinder* presumably does not occupy its *theta* position inside VP (see also De Hoop 1992:186 on Dutch). This makes it unclear what kind of VP-internal position *Kinder* in (12a) would occupy. Furthermore, as Diesing (1992a:32) notes, the standard test for deciding on the position of a noun phrase in Germanic, based on the position of the indefinite subject with respect to adverbials (cf. (4)), is not fully reliable: it is not clear that the relevant adverbs have a fixed position in the structure. Finally, the status of the evidence adduced by Diesing (1992a:32f), involving extraction out of indefinite noun phrases, is not entirely clear either. In Den Besten's (1985) discussion of these *wat voor*-split facts, subextraction was considered to demonstrate that the relevant noun phrase occupies a deep structure object position. Subextraction is then made possible by the verb's governing the noun phrase. Since then, however, it has become clear that (at least in Dutch), subjects of unergative verbs and subjects and objects appearing to the left of

sentence adverbs (albeit in an existential construction) permit subextraction as well (Reuland 1985, De Hoop 1992:182). This makes it less likely that 'government by the verb' is the factor that makes subextraction possible in these cases. Consequently, it is not clear that we are dealing with a clear VP-constituency test here.

The advantage of the hypothesis in (9) is that we no longer need to make pronouncements about the position of the indefinite subject in overt syntax. Whatever its position, the intonation will ensure that the VP-internal copy of the indefinite subject in (12a) gets interpreted, leading to an existential interpretation.

4. The Role of the Adverb

Not only the intonation, but also the position of adverbials serves to disambiguate sentences like (10) (Diesing 1992a:37):

- (13) a. ..weil ja doch KINder auf der Straße spielen
 because PRT PRT kids on the street play
 '..because there are children playing in the street, as you know'
- b. ..weil KINder ja doch auf der STRAÙe spielen
 because kids PRT PRT on the street play
 '..because children are always playing in the street, as you know'

The existential reading is forced in (13a), the generic reading in (13b). The intonation is still as in (12).

On the Mapping Hypothesis in (5), this would imply that *KINder* is inside VP in (13a) and outside VP in (13b), perhaps concomitant with the modal particles *ja doch* 'as you know' marking the VP-boundary.

However, as Diesing (1992b:370) notes, (13a) can have a generic reading "if the subject NP *KINder* is deaccented." What in fact happens in this case is that the stress pattern of (13b) is applied to (13a):

- (14) ..weil ja doch KINder auf der STRAÙe spielen
 '..because children are always playing in the street, as you know'

Diesing (1992b:369) assumes that in this case, the particles *ja doch* have been moved to the left. This makes it possible to analyze the subject *KINder* as a VP-external element, mapping into the restrictive clause, yielding the required generic interpretation. On the hypothesis in (9), however, the placement of *ja doch* is completely irrelevant: it is the absence of nuclear pitch accent on *KINder* which forces the higher copy of *KINder* (i.e. the overt copy) to be interpreted, leading to a strong (generic) reading.

The hypothesis in (9) also predicts that applying the stress pattern of (13a) to (13b) leads to an existential interpretation (..weil KINder ja doch auf der Straße spielen '..because there are children playing in the street, as you know'). This prediction is hard to test, since noun phrases to the left of adverbials are less

likely to be stressed (cf. Diesing 1992b:370). I have no explanation for this generalization, which appears to be correct for German and Dutch.

Nevertheless, it seems to me that in Dutch an indefinite subject preceding the modal adverb *immers* 'as you know' can receive an existential interpretation, provided the subject carries the nuclear pitch accent:

- (15) ? ..dat er *KIN*deren immers op straat spelen
 that there kids PRT on street play
 '..that there are children playing in the street, as you know'

In (15), the pitch accent on *kinderen* tells us that the VP-internal copy of *kinderen* must be interpreted in the mapping from syntax to semantics. Hence, there will be a variable in the nuclear scope, bound by existential closure, leading to an existential interpretation.

5. Indefinite Objects in Dutch

Let us now return to the interpretation of indefinite objects in Dutch (cf. (1)-(4)). As the following facts show, the interpretation of indefinite objects is clearly linked to intonation:

- (16) a. ..dat de politie illeGalen arresteert (existential)
 that the police illegals arrests
 '..that the police is arresting illegal aliens'
 b. ..dat de politie illegalen arrestEERT (generic)
 ..that what the police does to illegal aliens is arrest them'

Adopting (9), we can say that the object has moved out of the VP in both (16a) and (16b), leaving a copy in its base position, the complement of the verb. In (16a), the intonation tells us that this VP-internal copy is the one that is relevant for the semantic interpretation, leading to an existential reading. Similarly, the intonation forces the overt copy of the object to be interpreted in (16b), leading to a generic reading.

As shown in (4), a sentence adverb to the left of the indefinite object forces the existential interpretation, and a sentence adverb to the right of the indefinite object forces the generic interpretation. But notice that in the relevant example the stress pattern could also be held responsible for the interpretation of the indefinite object:

- (17) a. ..dat de politie altijd illeGalen arresteert
 '..that the police is always arresting illegal aliens'
 b. ..dat de politie illegalen altijd arrestEERT
 '..that what the police always does to illegal aliens is arrest them'

What happens if we keep the word order as in (17), but change the stress patterns? As before, destressing the indefinite noun phrase leads to a strong

interpretation, independently of the position of the noun phrase with respect to the adverb:

- (18) ..dat de politie altijd illegalen arresTEERT (generic)
 '..that what the police always does to illegal aliens is arrest them'

Again, it appears to be the stress pattern rather than the word order which forces the interpretation of the indefinite noun phrase.

Applying the stress pattern of (17a) to (17b) as before leads to difficult judgments:

- (19) ? ..dat de politie illeGalen altijd arresteert
 '..that the police is always arresting illegal aliens'

(19) is decidedly worse than (17a). For me, however, the sentence is far from unacceptable (cf. Zwart 1993:313f for further examples). (Notice that all syllables following the nuclear pitch accent must be deaccented in order to obtain the correct result.)

Taken together, (18) and (19) seem to support what we found earlier, namely that the intonation determines the interpretation of indefinite objects, not their position in overt syntax. Possibly, the unclear status of (15) and (19) is the result of some factor interfering with assigning the nuclear pitch accent to the preadverbial indefinite noun phrase. I will leave that issue for further study.

6. Projection of Focus

So far, we have argued for a less naive version of the Mapping Hypothesis, one that avoids ad hoc syntactic operations and takes prosodic factors into account. We agree with Diesing (1992a:50) that "noting the correspondence between focus structure and [interpretation] is not sufficient to dismiss the Mapping Hypothesis."

However, it seems to me that the Mapping Hypothesis should be understood as in (9), rather than in (5), since the overt syntactic position of indefinite noun phrases appears to be less relevant than the intonation that accompanies them.

Arguing against the relevance of prosodic information, Diesing (1992a) notices that sentences like (6) (*firemen are available*) can have interpretations that are exactly the opposite of what the intonation would predict (cf. (8)). That is, there can be a layer of *contrastive* stress that destroys the pattern in (8):

- (20) a. FIREmen are available (generic, contrastive)
 b. Firemen are a VAILable (existential, contrastive)

Consequently, the only way to derive the correct interpretation is to lower *firemen* in (20b) to the VP, feeding an existential interpretation, and by abstaining from such lowering in (20a).

But this conclusion is not warranted, since (20a) and (8a) do not have the same prosodic properties. In particular, (8a) but not (20a) can *project focus*, in the

sense of Selkirk (1984, 1993). By focus projection, an element carrying the nuclear pitch accent ensures that a larger constituent of which that element is a part is in focus. A test for being in focus is association with *only* (inducing an understood contrast).

Thus, in (21a), which incorporates (8a), *firemen are available* is in focus, as it is associated with *only* and contrasts with the alternative in (21b):

- (21) a. I only said that [FIREmen are available]
 b. ...not that [smoking is good for your health]

Crucially, *firemen* in (21a) must have an existential reading, and cannot have a contrastive generic reading. That is, the contrastive generic reading of (20a) is not able to project focus.

This ties in with the observation made by Diesing (1992a:52) that sentences of individual level predication in which the subject is contrastively stressed (ir deviation from the normal stress pattern, in which the predicate has the nuclear pitch accent) do not project focus.

Thus, although (8a) and (20a) on the surface look alike, the two sentences have entirely different prosodic properties. This allows us to maintain (9), provided the pitch accent relevant for the Prosodic Mapping Hypothesis is of the type that projects focus.

This leads to the question whether the pitch accent carrying indefinite noun phrases in (15) and (19) project focus. It seems to me that inasmuch as (15) and (19) are acceptable, they do project focus (the adverb *immers* has been changed into *altijd* in (22)):

- (22) a. Ik zei alleen maar dat [er KINDeren altijd op straat spelen]
 I only said that there are always children playing in the street
 b. ...niet dat de hele straat autovrij moet worden
 ...not that the entire street should be free from motor vehicles
- (23) a. Ik zei alleen maar dat [de politie illeGalen altijd arresteert]
 I only said that the police is always arresting illegal aliens
 b. ...niet dat Nederland in wezen een repressieve samenleving is
 ...not that the Netherlands essentially is a repressive society

(This result contrasts with what Selkirk (1993:fn 10, quoting A. Kratzer, p.c. reports on scrambled objects in German, namely that they do not project focus. It seems to me that this is not true of scrambled objects in Dutch.)

If these judgments hold up, the stress on the indefinite noun phrases in (15) and (19) cannot be purely contrastive. The phenomena are therefore relevant for the Prosodic Mapping Hypothesis, and confirm that intonation, rather than syntactic position, determines the interpretation of indefinite noun phrases.

7. Further Evidence for the Relevance of Intonation

It is a well-known fact that intonation forces reconstruction for purposes of anaphor binding. Thus, whereas the indirect object has to precede the direct object in Dutch, and cannot be an anaphor bound by the direct object, stressing the indirect object creates the possibility for the direct object to bind the indirect object:

- (24) a. * Jan heeft *elkaar de DEELnemers* voorgesteld
 John has each other (IO) the participants (DO) introduced
 'John introduced the participants to each other.'
 b. Jan heeft *elKAAR de deelnemers* voorgesteld
 John has each other (IO) the participants (DO) introduced
 'John introduced the participants to each other.'

We may now assume that the nuclear pitch accent on the indirect object *elkaar* indicates that not the overt copy of *elkaar* is relevant for interpretation, but the covert copy inside the VP (in (25), the noun phrase in boldface is considered to be relevant for the interpretation):

- (25) Jan heeft (*elkaar*)(**de deelnemers**) [_{VP} ... (*elkaar*)(de deelnemers)]

A similar interaction of binding and intonation is apparent in (26) (from Diesing 1992a:25):

- (26) *Firemen* seem to *their* employers to be available

In (26), where *firemen* binds the pronoun *their*, only the generic reading is available. Under our assumptions, the existential reading is not available, since that reading can only be obtained if the VP-internal copy of *firemen* is considered to be the one relevant for interpretation (including now both binding and mapping onto a semantic representation). This would destroy the configuration needed for the bound variable interpretation of *their*, since the VP-internal copy of *firemen* does not c-command the pronoun *their*.

Again, adopting the copy theory of movement, in connection with (9), we do not need a lowering operation to derive this result.

8. Conclusion

It has always been clear that intonation plays a role in the interpretation of indefinite noun phrases. The Prosodic Mapping Hypothesis (9) says that the presence of a nuclear pitch accent on an indefinite noun phrase forces interpretative processes to concentrate on the VP-internal copy of the indefinite noun phrase. This hypothesis appears to be more successful in deriving the possible interpretations of indefinite objects than the naive Mapping Hypothesis (5), in which the overt syntactic position of indefinite noun phrases is taken to be

relevant for interpretative processes. In particular, a proper understanding of the input of prosodic factors allows us to dispense with LF-lowering and other instances of noun phrase adjunction to VP. At the same time, (9) maintains what seems to be the core of the Mapping Hypothesis, namely that clearly delineated syntactic domains map into the various parts of the semantic representation à la Heim (1982).

Moreover, the Prosodic Mapping Hypothesis has certain distinct advantages in the domain of syntax.

First, we are now no longer forced to assume, as Diesing (1992a) does, that subjects of Stage Level Predicates are generated VP-internally, whereas subjects of Individual Level Predicates are generated outside the VP. If we ignore contrastive stress, we can observe that Individual Level Predicates require the nuclear pitch accent to be absent from their subject (perhaps by some link between Individual Level Predication and genericity, cf. De Hoop 1992:191). Adopting (9) this excludes an existential reading in combination with Individual Level Predication (a robust fact, as it seems). Assuming that subjects of Individual Level Predicates are generated outside the VP raises questions concerning the assignment of a theta role to the subject (which Diesing assumes is performed by INFL), and concerning the status of the PRO subject Diesing assumes to occupy the Spec,VP in Individual Level Predication sentences (cf. Diesing 1992a:26 1992b:363).

Second, loosening the relation between syntactic structure and semantic interpretation allows us to maintain an extremely simple syntax of noun phrase movement. In a given language, noun phrases will either remain in their theta position (inside VP), or they will move to their Case position (outside VP). This is a maximally simple instance of parametric variation. If we adopt (9), we need to make no provisos for indefinite noun phrases in combination with their required interpretation.

More concretely, we may now assume that in Dutch, the N-features of Agr are strong (in the sense of Chomsky 1993, cf. Zwart 1993). This is the way to describe that subjects in Dutch move to Spec,AgrSP (barring special cases) and objects move to Spec,AgrOP. The pattern in (4) then points to a certain freedom of adverb placement, not unlike what Diesing (1992b:369) assumes. The interpretation of the indefinite noun phrases follows from independent properties of the prosodic system, in combination with the Mapping Hypothesis.

Finally, this view on the relation between syntax and semantics allows us to maintain, as proposed in Kayne (1994) and Zwart (1994), that the Germanic SOV languages (including Dutch and German) are underlyingly SVO, just like (at least) all other Germanic languages. Taking this hypothesis seriously, we must conclude that *all* sentences of Dutch and German in which an indefinite object appears to the left of the verb in embedded clauses involve object movement. The distribution of indefinite noun phrases with respect to adverbials, and the interpretation of indefinite noun phrases must then be accounted for independently of this general noun phrase movement. It is my hope that the study of prosodic factors, of which the surface has barely been scratched here, will lead to a better understanding of the phenomena involved.

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AspP and Licensing of pro-arb Objects*

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1. The problem.

For a long time, it has been observed that there is a correlation between the aspect of a verb and the syntactic properties of the verb's object. For example, Finnish uses different object Cases to signal a difference in the aspectual interpretation of a verb:

- (1) a. Han rakensi taloa_{PART}.
'He built_{IMPF}/was building a house.'
b. Han rakensi talon_{ACC}.
'He built_{PF} a house.'

English often uses a difference in the definiteness of an object to signal a difference in the aspectual meaning of a verb:

- (2) a. John ate sandwiches. [impf]
b. John ate the sandwiches. [pf]

The Russian verb *zasluživat'* ('to merit, deserve') shows a nice Case variation in object, depending on Aspect:

- (3) a. On zaslužival nagradu/nagrady.
'He deserved_{IMPF} award_{ACC/GEN}'
b. On zaslužil nagradu/*nagrady.
'He deserved_{PF} award_{ACC*GEN}'

It's quite natural to ask: What syntactic mechanism is at work in the tight connection between verbal aspect and the Case of an object?

A slightly different phenomenon connected to aspect involves what in early transformational studies was called "Unspecified Object Deletion" but we now often refer to as "Null Object". It is quite a traditional observation for languages with morphological aspect that "we can use an imperfective transitive verb without an object, whereas this is impossible in the case of the corresponding perfective verb" (Rassudova 1968: 152). For example, in Russian we easily find minimal pairs like the following:

- (4) a. Včera ja pisal.
'Yesterday I wrote_{IMPF}/ was writing.'
b. *Včera ja napisal.
'*Yesterday I wrote_{PF} (down).'

explicitly taken into account by Reichenbach in his model, it is possible to interpret E and R as having a slightly different relationship than S and R. When R coincides with E ($R = E$), imperfective aspect results; while when R and E do not coincide ($R \neq E$), perfective aspect results.²

This interpretation allows the three Reichenbachian variables, S, R, and E, to be represented as two operators which correspond to the relationship between S and R and that between R and E.

This is illustrated by the Russian paradigm in (7).

(7) Past Imperfective	Past Perfective
čítal 'was reading'	pročítal 'read'
$R > S, R = E (R, E > S)$	$R > S, R \neq E$
Future Imperfective	Future Perfective
budet čítat' 'will read'	pročítaet 'will read (through)'
$R < S, R = E (R, E < S)$	$R < S, R \neq E$
Present (Imperfective)	
čítaet 'is reading'	
$R = S, R = E (R = S = E)$	

Unfortunately, Reichenbach does not define the notion of Reference time but uses it intuitively. Since this is important for distinguishing verbal aspect from the aspectuality of a sentence, I will try to make the interpretation of R-time clearer, though still intuitive. I do not define R-time contextually. I propose to distinguish a verb's "world" from the "world" of a sentence. The world of a verb is like a separate room for compositional interpretation, and the morphological aspect of the verb is just one corner in this room. Starting from this image, I would say that in a sentence (situation), we have several observation posts (R-times) and one of them is inside the verb. Figuratively speaking, every speaking person is a God in the space of his/her speech: s/he sees everything, can deliberately change observation posts, or be inside and outside of any event at the time of a speech act. Thus, when I say:

- (8) Džon čítal_{MPF} ètu knigu.
'John was reading this book.'

on the level of the verb, as a speaker or narrator I'm inside the action of reading; my vantage point is in the same place where John reads a book; I'm near him, we are in the same time and place. But when I add:

- (9) Džon čítal_{MPF} etu knigu do polunoči.
'John was reading this book until midnight.'

on the level of the sentence, I'm outside the action, my vantage point is somewhere else in place and time, but probably not very far from John (who was reading a book). However, in the following sentence:

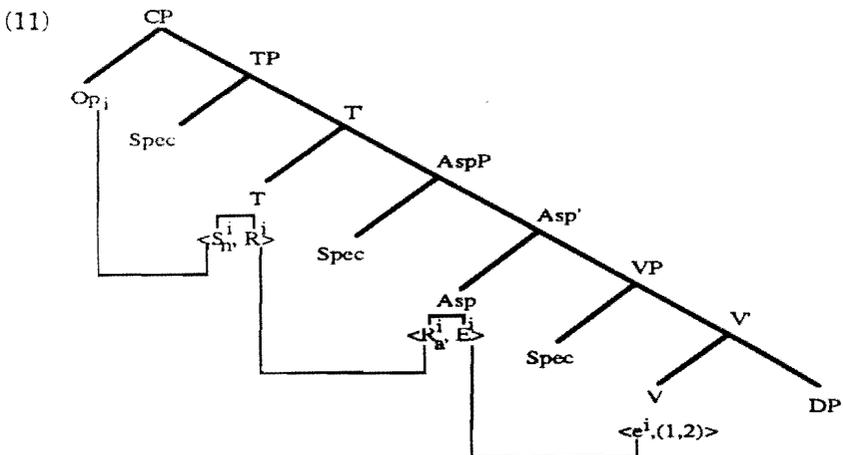
- (10) Džon čital_{MPF} etu knihu do ponoći každyj večer prošloj ošen'ju.
'John was reading this book until midnight every night last autumn.'

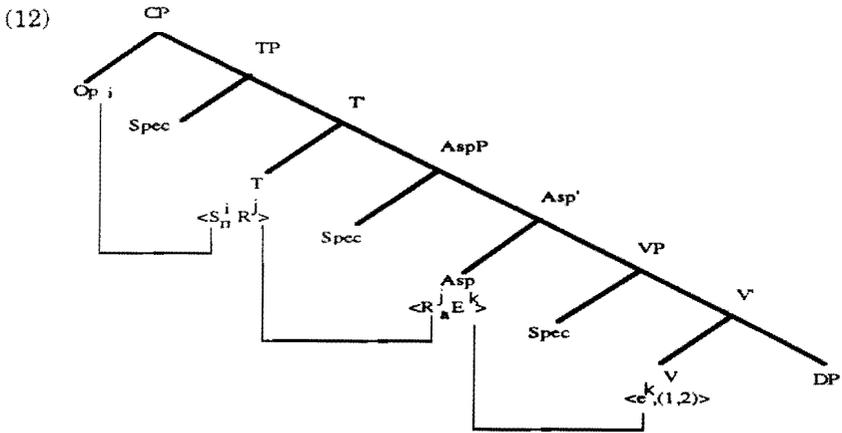
I'm very far in the space and time from John and the event of his reading. However, returning to the world of verb, I'm still inside the event of John's reading.

Returning to R-time, I interpret this Reichenbachian notion for representation of morpho-syntactic verbal aspect as the narrowest point of view, a vantage point from inside a verb.

2.2. Indexation

Aspect in its most general sense is a structuring of the relationship between speech time and event time; in Reichenbach's system, this structuring is accomplished by R, which mediates the relation of S to E. This is syntactically represented by a mediating projection AspP, situated between TnsP and VP (abstracting away from other functional projections).





Let's now take a closer look at the head of AspP.

What does co-/contra-indexation mean for Asp? The indexation of the variables of the Aspectual operator is interpreted as follows: co-superindexation means that these intervals not simply coincide, but, specifically for Aspect, R is inside E (the imperfective); contra-superindexation means that these intervals not only do not coincide, but, specifically for Aspect, R is outside E.³

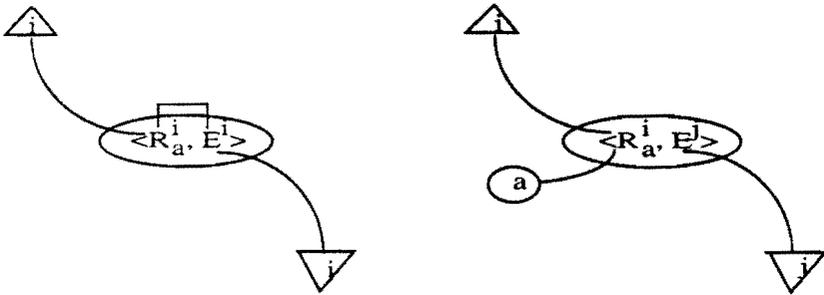
Let's examine the structures in (11) and (12). When we encounter co-indexation going through all the tense-aspectual variables (as in (11)), we get a neat Tense-chain (with an aspectual subchain) between the Tense-operator in COMP and the event argument of the predicate without any breaks (the present imperfective verb in *I'm giving a talk*).

But when we encounter contra-indexation (as in (12)), we get no links ("caps") between the variables inside the Tense and Aspect heads and, thus, we find breaks in the chain (the past perfective verb in *I gave the talk*).

The idea is that the presence or absence of these breaks could account for the syntactic phenomena that are related to Aspect.

So, we have the two situations in the head of AspP illustrated in Figure 1 on the next page:

Figure (1a) shows an imperfective operator with two variables saturated from upstairs (by a Tense operator) and from downstairs (by the event argument of a predicate); a cap links these two variables via co-superindexation. As a result of this linking, the potential for spec-head agreement (SHAg) (sub-a of R) of the imperfective operator is weakly dischargeable through the internal variable (E); thus there is no need to project a specifier position.



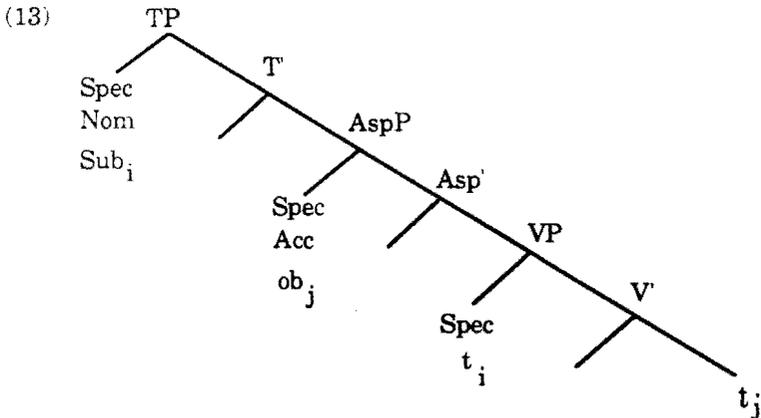
a. The imperfective operator

b. The perfective operator

Figure 1

Figure (1b) shows a perfective operator saturated the same way, but without a cap because these two variables are not linked with each other since they are contra-superindexed. As a result, the SHAG potential of the perfective operator cannot be weakly discharged and, hence, it has to project a specifier position.

In the structure in (13), nominative case is checked in SpecTnsP, to which the subject moves from its base-generated position in SpecVP. This captures the correlation between the checking of nominative case and the finiteness of the verb. In a similar fashion, accusative case is checked in SpecAspP, to which the object moves from its base-generated VP-internal position and where it discharges the SHAG potential of the functional head (in this particular case, the accusative feature).



Case-checking is a subcase of Spec-Head Agreement (SHAg), and formally it looks like index matching: Case is licensed when the subindices of a functional head and DP in Spec-position coincide. In this approach, the noun is inserted with any Case (or with no Case), but the derivation converges only with a licensed option.

3. Empirical consequences

3.1. Imperfectives and Weak Discharging

The simpler case involves null objects in simple sentences (“Unspecified Object Deletion”). Consider the contrast in (14). The imperfective verb in (14a) can occur without an accusative direct object. However, the corresponding perfective verb cannot occur without an object, as seen in (14b).

- (14) a. On risoval_{IMPF}.
 ‘He was drawing.’
 b. *On narisoval_{PF}.
 **‘He drew (down).’

In the imperfective aspectual chain of (14a), the external variable slot of Asp° is discharged indirectly by event variable of the verb through coindexation of the external variable of Asp° with its internal variable in the same variable-grid. This structure is shown in (15). I refer to this as “weak discharging”.

- (15) Asp° V
 <Rⁱ, Eⁱ> <eⁱ, (...)>

In other words, in the variable-grid of Asp° a link is established between the two variables via co-superindexation and, thus, one of them may be discharged through the other.

To return to the contrast in (14), as a result of the availability of weak discharging with imperfective verbs, the object of imperfectives is optional and can be a “weak” null pronoun, for example, existential small pro.⁴

3.2 Perfectives

Why does the perfective transitive verb in (14b), in contrast to the imperfective in (14a), not tolerate the absence of an object? The Tns-Asp chain for (14b) is shown in (16).

- (16) * Tns° Asp° VP
 <Sⁱ_n, R^j> <R^j_a, E^k> <e^k, (...)>
 [Spec DP_n] [Spec ...]

In this chain, the SHAg potential of the external variable of Tns° is discharged by the subject of the sentence, which has raised to SpecTP, where it acquires Nominative Case. However, the SHAg potential of the external variable of Asp° is not discharged in (16) because no object has raised to SpecAspP to check Case. In the aspectual subchain in (16), the SHAg potential of Asp° cannot be discharged, unlike with the imperfective verbs, because there is neither an object in SpecAspP nor coindexation between the two variables of Asp° in the perfective. Thus, this structure crashes.

3.3. Case variation

Some Russian verbs in imperfective aspect permit object Case variation, but not in the perfective aspect:

- (17) a. On zaslužival nagradu/nagrady.
 'He deserved_{IMPF} award_{ACC/GEN}'
 b. On zaslužil nagradu/*nagrady
 'He deserved_{PF} award_{ACC*GEN}'

In the system proposed above, this variation is easy to explain: a definite object in the accusative is the only possible option for a perfective verb because in the perfective, Asp° contains conraindexation and the external variable of Asp° must discharge its SHAg potential. The only way it can do so is to discharge this potential onto an object (in this case, the DP *nagradu*). The imperfective verb allows accusative/genitive variation because Asp° in this case contains coindexed variable slots, and as a result, the SHAg potential of the external variable is weakly discharged through the internal variable. With imperfective verbs, the Spec-position is simply not projected in the first place. It might be projected, but only if the object NP needs to check its accusative Case. Otherwise, the only Case that is licensed (not in the overt syntax, but at LF) in this situation is a genitive Case, because its only available licenser is an existential quantifier at LF.

In the same way we can account for the Case dependent on Aspect in Finnish, where the Accusative is the only option for the perfectives and the Partitive is for imperfective.

3.4. Null Objects as Controllers and Binders

In Section 3.2, I proposed that the projection of Asp° and coindexation of the Reichenbachian variables R and E with imperfective verbs provides a syntactico-semantic explanation for the distribution of pro-arb and thus the apparent asymmetries in the distribution of objects with perfective and imperfective verbs.

However, here we have a problem. If English also has AspP in its clause structure and, as we saw with Russian, can license pro-*arb* objects in this way, why doesn't English permit these pro-*arb* objects to function as syntactically active elements (like those in Slavic or Romance)? That is, why do we have a contrast in (5) and (6) between Italian/Russian and English?

In my view, this illustrates a strong/weak distinction in aspectual features: Slavic and Romance have strong aspectual features, but English has weak aspectual features which are sufficient to license accusative Case, but insufficient to license a null object. However, this statement as it stands is too vague. What does it mean "to be strong/weak"? In the "standard" Minimalist model, "to be strong" means "to be checked in the overt part of a derivation, before Spell Out", and "to be weak" means "to be checked in the covert part of a derivation, after Spell Out". But this too is a vague and theory-internal statement.

Chomsky (1989: 44) suggests that "parameters of UG relate not to the computational system, but only to the functional elements". Rohrbacher (1994), examining the Germanic languages in order to ascertain the difference in inflectional morphology between languages with verb movement vs. those without verb movement, proposes the following implementation of Chomsky's suggestion: he claims that in languages which have strong agreement, each agreement morpheme has its own lexical entry, while in languages that have weak agreement, the morphemes do not have independent lexical entries.⁵ But here again, what is the criterion for deciding which functional element is listed in a lexicon and which one isn't? Pollock (1993) gives the following principle (Pollock's (76)):

- (18) Only morphologically identified ("strong") functional heads can be checked overtly.

And further he defines what it means to be "morphologically identified" (Pollock's (92)):

- (19) An inflectional morpheme [α] is morphologically identified (i.e., "strong") in Language L with respect to paradigm P if it alternates unambiguously in P with at least one distinct morpheme of the same inflectional category.

In any case, we can see that aspect is morphologically present in verbal forms of Slavic and Romance languages, but not in English, where aspectual oppositions are not formally expressed.

If my analysis of the "aspectual" licensing of pro-*arb* objects is on the right track, the following working hypothesis could be proposed:

- (20) Language allows pro-arb objects to be syntactically active (binder, controller, etc.), if and only if the language has aspectual features morphologically expressed.

This prediction seems to be borne out. For example, besides Romance and Slavic, such diverse languages as Finnish,⁶ Hungarian,⁷ Tamil (Authier, 1992), KiNande (Authier, 1988), and Hausa⁸ have morphologically identified aspect and show syntactically active pro-arb objects.

3.4.1. Pro-arb in Dutch and German⁹

The conjecture in (20) is a biconditional and should be valid in both directions. This gives us a diagnostic for checking whether or not a language has strong aspectual features: if in a certain language we encounter pro-arb objects, we expect to find morphologically expressed aspectual features as well. For example, Dutch (21a) and German (21b) admit the following construction:

- (21) a. Het mooie weer nodigt uit tot wandelen
 the nice weather invites to walk
 b. Das schöne Wetter lädt ein zu bleiben
 the nice weather invites to stay

Usually these Germanic languages are characterized as languages with no morphological category of Aspect, but there is a constant aspectual contrast between unprefixed verbs of activity and their prefixed derivatives (e.g., in Dutch: *eten* 'eat', *lezen* 'read', *schilderen* 'paint', *plakken* 'glue', and *opeten* 'eat up', *uitlezen* 'read through', *beschilderen* 'put paint on', *beplakken* 'put glue on'; in German: *kämpfen* 'fight', *essen* 'eat', *trinken* 'drink', and *erkämpfen* 'achieve by means of a fight', *aufessen* 'eat up', *auftrinken* 'drink up').

Interestingly, Dutch and German have no verbal suffixes for expressing aspectual oppositions (and in this respect do not differ from English), but have more systematic ways of expressing aspect through prefixation compared with English postverbal particles. Thus, in our model we can consider the verbal prefixes in continental West Germanic¹⁰ to be a morphological means which makes aspectual features strong (they are listed in Lexicon).¹¹

3.5. Projections without AspP

The hypothesis of "aspectual" licensing of pro-arb objects gives a straightforward explanation why nouns (even deverbal nominals) have no syntactic pro-arb objects: they lack an Asp projection. However,

deverbal nominals in control structures at first glance might seem problematic for the proposed analysis because they sound good:

- (23) a. *prinuzhdenie rabotat' bol'še*
 'compulsion to work harder'
 b. *priglašenie poobedat' vmeste*
 'invitation to have a dinner together'

But this is just a first impression, influenced by the similarity of the NPs in (23) to their verbal counterparts. Under closer inspection, the complex NPs in (23) are not object control structures;¹² they are ordinary complex NPs with infinitival complements, just like the following:

- (24) a. *ideja rabotat' bol'še*
 'the idea to work harder'
 b. *ideja poobedat' vmeste*
 'the idea to have a dinner together'

Another advantage of the aspectual theory proposed here is the assumption that *Asp*^o checks abstract Accusative case, which straightforwardly explains why nouns (universally) have no Accusative case in their complements: they lack an *Asp* projection. Similarly, adjectives cannot license accusative on their objects because they too lack *Asp*^P.¹³ This account provides a clue to another question: why are other "object" (prepositionless, oblique) cases, e.g., genitive, dative, and instrumental, preserved in deverbal nominals and adjectives? Essentially, these cases are not licensed by the functional projections outside VP, but by projections inside VP, and in their turn, these "VP-internal" functional projections are licensed by verb's Θ -roles. In my view, the most plausible candidates for these "mediating" functional elements are prepositions (real or phonologically zero). In nominalizations these VP internal functional projections are preserved, and thus, the oblique Cases in deverbal nominals are preserved.

4. Conclusion

Pursuing and generalizing the idea of semantic selection in Pesetsky 1982, we can conjecture that substantive (lexical) items, including verbs, do not assign/check Case at all (either structural or inherent), but only Θ -roles. Case is checked exclusively by functional categories. Thus, the so-called structural Cases Nominative and Accusative can be checked by *Tns*^o and *Asp*^o, respectively. The Cases formerly considered to be inherent are checked by other functional categories—among others, by Prepositions, which can be taken as a functional category (Riemsdijk, 1990). In such a system it is inevitable

that certain prepositions will be phonologically null. Assuming such a system, we get a unified account for all Cases (including the Cases of oblique prepositionless objects). Thus, we can abandon the distinction "structural/inherent": all Cases are checked in the Spec position of some functional category. The functional categories have their own lexical entries. And the lexical entries of functional categories contain information about Case. It follows that if the functional categories have no individual listings in a lexicon, then there is no information about Case (a good example is English!).

Notes

* I would like to thank the audience of WECOL'94 for comments. The ideas in this paper were discussed with different people in different places and I'm grateful to all of them for comments which have led to significant clarification of these ideas: David Adger, Martin Everaert, Jacqueline Gueron, Teun Hoekstra, David Pesetsky, Maaïke Schoorlemmer, Henk Verkuyl, Joost Zwarts. I'm especially thankful to George Fowler, who inspired my interest in the problems of Slavic aspect and with whom mutual work and discussions have determined my (but not his) approach to the problems.

¹Reichenbach describes the system in the following words: "The position of R relative to S is indicated by the words 'past', 'present', and 'future'. The position of E relative to R is indicated by the words 'anterior', 'simple', and 'posterior', the word 'simple' being used for the coincidence of R and E" (p. 297). In Reichenbach's account it is not clear whether he uses the notion of points or intervals for the three time points. Following Bach (1986), Comrie (1981), Timberlake (1985), and others, I assume interval semantics, although this is tangential to the description.

² Here my approach differs from that of Reichenbach, who does not correlate (im)perfective aspect with the relation of R and E.

³ I should point out that this is quite a traditional view on the aspectual opposition. For example, Comrie (1976: 4) writes: "Another way of explaining the difference between perfective and imperfective meaning is to say that the perfective looks at the situation from outside, without necessarily distinguishing any of the internal structure of the situation, whereas the imperfective looks at the situation from inside, and as such is crucially concerned with the internal structure of the situation." Or, using Reichenbach's points, Timberlake (1985) states that in the imperfective, event time E properly includes the reference time R, while in the perfective the time over which the event occurs is confined to the reference time for that event. However, this is a job for semantic interpretation, the details of which will not concern us here. What is important here is the syntactic side of this phenomenon.

⁴ Here I only consider the formal licensing of null objects. I set aside the recoverability conditions for object pro; so, the contrast between the imperfective in (ia) and that in (ib) is irrelevant for the present purpose.

- (i) a. On čitaet_{IMPF}.
'He reads.'
- b. *On uvažает_{IMPF}.
'*He respects.'

⁵ Naturally, within MP this theory has to be reformulated because the computational component only works with features not affixes themselves. But the main idea remains: strong features are supported by individual listing in the lexicon, while weak features have no such support.

⁶ Cf. (i) Johtasa voi pakottaa tyoskentelemaan kovemmin.
the boss can force work-3-inf-illative harder
'The boss can force [(every)one] to work harder.'

⁷ Cf. (i) Ö mindig arra kér, hogy segítsenek neki.
he always that-onto requests-indef that help-3pl-subjunct him-dat
'He always asks to be helped.'

⁸ Cf. (i) Kullum yam tambaya a taimake shi
always he+imperf ask impers+subjunct help him
'He always asks to be helped.'

I'm grateful to Lawan Yalwa and Philip Jaggar, with whom I discussed Hausa pro-arb objects for several days.

⁹ I'm indebted to Marcel den Dikken, Maaïke Schoorlemmer, and Jan-Wouter Zwart, who brought Germanic data to my attention.

¹⁰ And, thus, we can expect to encounter pro-arb objects in Frisian and Yiddish, but not in Scandinavian languages.

¹¹ It's very interesting that Jacob Grimm was the first to extend the concept of aspect to non-Slavic languages, namely Germanic: "It is not impossible to find in the Germanic languages also the traces of a distinction which so permeates the Slavic languages. Composites with *ver-*, *be-*, *hin-*, *durch-*, etc. (as in Slavic with *po-*, *do-*, *na-*, etc.) perhaps represent perfectives, uncomposed verbs on the contrary imperfectives." (Streitberg, 1891: 77).

¹² The mere grammaticality of the English glosses bears witness to that. The problem of argument positions within NP is too huge to consider in detail here. For example, Giorgi and Longobardi (1991) give an impressive array of evidence in support of PRO in the noun phrase, but they are uncertain about the object pro-arb.

¹³ There are a few deverbal predicative adjectives which license the accusative: *vidno* 'visible', *slyšno* 'hearable', *zametno* 'noticeable'. For the time being I have no explanation as to what is going on here. But I have to note that the accusative object is only possible when these adjectives(?) are used in the predicate (and, thus, with an auxiliary) and have a special predicative form (the so-called short form). In the full form, as modifiers, these adjectives cannot take an accusative object:

- (i) a. Nam bylo vidno bašnju.
US_{DAT} was_{SG,NEUT} visible_{SG,NEUT} tower_{ACC}
'We were able to see a tower.'
- b. Nam bylo slyšno muzyku.
US_{DAT} was_{SG,NEUT} hearable music_{ACC}
'We were able to hear music.'
- (ii) a. *vidnaja bašnju
b. *slyšnaja muzyku

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