

Spelling Spell Out out

A friendly syntactic amendment to dynamic semantics*

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Abstract

This paper contributes to the discussion of whether pragmatic phenomena are sensitive to the syntactic structure. It considers discourse anaphora (an anaphoric relation between an indefinite that introduces a text-level discourse referent and a pronoun) and argues that it is restricted by the syntactic structure, rather than surface linear order. The paper argues that discourse anaphora does not “proceed” from left to right, but rather from any specifier to its sister and from any adjunct to its sister. This is called *the Island Condition*. Specifiers and adjuncts form a natural syntactic class both by definition and empirically, because they are strong islands for movement. The paper assumes the so-called Spell Out theory of specifier and adjunct islands, proposed by Johnson (2003) and developed in Privoznov (2020). According to this theory, all specifiers and all adjuncts must be spelled out, before they are merged with the rest of the sentence. This also means that all specifiers and all adjuncts are interpreted by the semantic interface before their sister. The paper proposes to derive the Island Condition from this fact. The Island Condition can be integrated as a friendly amendment into any theory of discourse anaphora. For concreteness, the paper shows how it could be incorporated into the classical dynamic semantics (Heim, 1982).

Keywords discourse anaphora, dynamic semantics, strong islands, Spell Out

1 Spell Out and discourse anaphora

This paper discusses the question of whether pragmatic phenomena are sensitive to the syntactic structure. In what follows I will argue that at least some of them are. More

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precisely, some pragmatic phenomena are sensitive to the derivational history of a given sentence, that is, to which constituent and when the rule of Spell Out has applied. For most of the paper I will consider data from English, but in Appendix C I show how the same generalizations apply to Russian.¹

The focus of this paper will be on the phenomenon of *discourse anaphora*. By discourse anaphora I will understand the anaphoric relation between an indefinite and a pronoun where the indefinite is not interpreted in the scope of any other operator (no negation, quantifiers etc.), as in (1).

- (1) ^{ok} Rosa saw **a cat₁** on the street and gave **it₂** some fish.

In the sentence in (1) the pronoun *it₂* is to be understood as referentially dependent on the indefinite *a cat₁*. All the existing accounts of discourse anaphora (see Paduceva, 1974; Kamp, 1981; Heim, 1982; Groenendijk and Stokhof, 1991; Chierchia, 1995; Barker and Shan, 2008; Schlenker, 2009, 2011; Mandelkern, 2020; Elliott, 2020, among many others) assume that for this relation to be possible the indefinite must be *interpreted before* the pronoun. In some theories the indefinite introduces a discourse referent that the pronoun later “picks up”, in other theories the indefinite changes the context in such a way that satisfies the presupposition of the pronoun, in yet other approaches the indefinite creates the appropriate local context for the pronoun. Regardless of the terminology and framework, however, all these theories assume that the semantic component must in some sense interpret the indefinite before the pronoun.

The question that this paper will address is what this relation of “being interpreted before” is determined by. To the best of my knowledge, all the existing accounts assume that “interpreted before” is equivalent to “linearly precedes”. That is, they assume that the semantic component has access to the linear order between the terminals in a given sentence and interprets it, accordingly, from left to right. Consequently, for a discourse anaphoric relation to be possible the indefinite must linearly precede the pronoun.

¹The data in sections 1-4 and appendix C were collected by elicitation with four native English speakers and five Russian speakers. Every piece of data (with a couple of exceptions) is a pair of sentences. In each case the speakers were asked to compare the sentences and give a relative grammaticality judgment with the given co-indexations between noun phrases and pronouns. They were also asked to evaluate each member of the pair individually (on the scale from 1 to 5). Sentences evaluated at 4 or 5 are analyzed as acceptable (marked ^{ok}); at 1 or 2 – as unacceptable (marked *); and at 3 – as marginally acceptable (marked [?]).

Apart from implying a non-trivial assumption about the architecture of the grammar (the semantic component has access to the surface linear order), this view faces certain empirical difficulties. There are acceptable cases of cataphora, even with an indefinite antecedent, as was first pointed out by Chierchia (1995).

On the one hand, in a coordinate structure discourse anaphora can only “proceed” from the left conjunct to the right one, and not vice-versa, as is evident from the contrast in (2).

- (2) a. ^{ok} Karl [saw **a cat**₁ on the street] and gave **it**₁ some fish.
b. * Karl saw **it**₁ on the street and gave **a cat**₁ some fish.

Furthermore, in the “classical donkey-anaphoric configuration” (between a specifier and its sister), discourse anaphora also obligatory “proceeds” from left to right:

- (3) a. ^{ok} [A person who saw **a cat**₁ on the street] gave **it**₁ some fish.
b. * A person who saw **it**₁ on the street gave **a cat**₁ some fish.

On the other hand, however, with post-posed *adjuncts* discourse anaphora can “proceed” from right to left (4a). Crucially, discourse cataphora is only possible in the case of a post-posed adjunct, not a post-posed *complement* (4b). Native speakers perceive a reliable contrast between (4a) and (4b).

- (4) a. ^{ok} Rosa informed **his**₁ parents [when she caught **a student**₁ smoking].
b. * Rosa informed **his**₁ parents that she caught **a student**₁ smoking.

In order to account for the acceptability of (4a) existing accounts have to introduce additional assumptions. For example, within the dynamic framework one could say that (4a) contains a (potentially, silent) dynamic quantifier whose first argument (the restrictor) is the *when*-clause and whose second argument (the scope) is the main clause. This quantifier licenses the observed cataphoric relation.

The problem is that there is no difference between (4a) and (4b) in the interpretation of the indefinite. In fact, there seems to be no obvious difference in the interpretation of the indefinite throughout (2-4). All these sentences are episodic, in all of them the

indefinite introduces a text-level discourse referent (it can be “picked up” by pronouns in the following sentences). This means that whatever stipulations can be added to the theory to make (4a) work can also make (4b) work, as well as (2b) and (3b). For example, if there is a dynamic quantifier that licenses cataphora in (4a), why couldn’t it be used in (4b)? Why couldn’t it take the complement clause as its restrictor and the rest of the clause as its scope? It is possible to have such a quantifier and still predict the correct truth-conditions for (4b). The same is true for (3b). Why is there no dynamic quantifier that takes T' as its restrictor and Spec,TP as its scope, which would license cataphora in (3b)? In other words, there seems to be no obvious *semantic* generalization that distinguishes between a-sentences and b-sentences in (2-4). But there might be a *syntactic* one.

The starting observation is that the difference between the bad cases and the good ones is in the syntactic structure, not in the interpretation of the pronoun or the indefinite. In all the good cases the indefinite is inside a specifier or an adjunct that c-commands the pronoun. In (4a) the indefinite is inside an adjunct clause and this adjunct clause c-commands the pronoun. In (3a) the indefinite is inside a specifier and this specifier c-commands the pronoun. In neither (3b) nor (4b) is there a specifier or adjunct that contains the indefinite and c-commands the pronoun. Furthermore, if we assume that coordination has a ConjP -structure (which has been argued for independently, see Ross, 1967; Johannessen, 1993, 1998; Kayne, 1994), this observation covers (2) as well. The first conjunct is the specifier of ConjP , and the second conjunct is the complement of ConjP . The specifier c-commands the complement. In what follows I will state this observation as a generalization called *the Island Condition*.

The Island Condition requires the indefinite to be inside a specifier or adjunct that c-commands the pronoun. As it happens, specifiers and adjuncts do form a natural syntactic class, both by definition (they are maximal projections whose sister is a phrase) and empirically (they are strong islands).

In this paper I will assume the so-called Spell Out theory of specifier and adjunct islands, proposed by Johnson (2003) and developed in Privoznov (2020). The Spell Out theory derives specifier and adjunct islands from two assumptions about Spell Out, presented in (5). From (5a) and (5b), taken together, it follows that all adjuncts and all specifiers must be spelled out before they are merged with the rest of the sentence, be-

cause adjuncts and specifiers are, by definition, maximal projections that merge with a phrase. Crucially, the Spell Out theory *only* applies Spell Out to specifiers and adjuncts, *not* to complements.

- (5) a. Before any two phrases are merged at least one must be spelled out.
b. A spelled out phrase does not project its category.

Spell Out is an operation that takes a piece of syntactic structure and assigns it a phonological and semantic representation (meaning). From this perspective, when some constituent α is merged with some other constituent β to form γ , γ is not assigned semantic interpretation immediately. It receives meaning at the point of Spell Out, as part of a Spell Out domain. In other words, complex syntactic objects do not bear meaning or phonological features at the moment they are constructed. These are assigned at the interfaces at the point of Spell Out.

The result of Spell Out in narrow syntax is opacity for movement. A spelled out constituent is assigned its phonological and semantic interpretation and becomes a terminal, like a lexical item. Hence, from (5) it follows that all specifiers and all adjuncts are opaque. Since Spell Out assigns semantics, it also follows that all specifiers and all adjuncts are interpreted before they are integrated with the rest of the sentence.

From the perspective of the Spell Out theory the Island Condition is not at all surprising. Discourse anaphora does not “proceed” from left to right. It proceeds from a spelled out to a non-spelled out sister. That is, the semantic component interprets any specifier before its sister (2, 3) and any adjunct before its sister (4). The Island Condition, then, can be derived as a consequence of how the semantic component assigns interpretation to a piece of syntactic structure. Given a node $\gamma = \{\alpha \beta\}$, where α has been spelled out (its meaning is “known”) and β has not been spelled out (its meaning is not yet “known”), the semantic component accommodates the already available meaning of α , and only then proceeds to interpret β . Thus, α creates the local context for β .

This contribution can be seen as a friendly amendment to the existing theories of discourse anaphora. All of them make reference to the linear order in some way. The present proposal is to replace this reference by the Island Condition. In what follows I will show how the Island Condition can be integrated into the classical dynamic semantics

(Heim, 1982), but this choice is not essential.

In the remainder of the paper I will, first, introduce and formulate the Island Condition in more precise terms (section 2); second, show how it covers the three basic contrasts introduced above, as well as some other cases of discourse anaphora (section 3); third, propose some basic assumptions about the mechanism of Spell Out at LF that derive the Island Condition, relying on the classical dynamic framework (section 4); fourth, discuss potential extensions of the proposed theory to the phenomena of presupposition projection and temporal iconicity (section 5); and fifth, consider some of the issues faced by the proposed approach (section 6).

2 The Island Condition

2.1 The Island Condition

In this section I will formally introduce the Island Condition and some background assumptions about the Logical Form and the place of the Island Condition with respect to other known restrictions on anaphoric relations.

Let me begin by defining the notion of a *Spell Out domain* (or so-domain) as a constituent that is spelled out as soon as it is built. By this definition and assuming the Spell Out theory, the set of so-domains includes all specifiers, all adjuncts, the whole sentence and *nothing else*. It is important to note that in the Spell Out theory the term “Spell Out” is reserved *only* for specifiers and adjuncts. Spell Out does not apply to complements. The reason is that only specifiers and adjuncts are strong islands.²

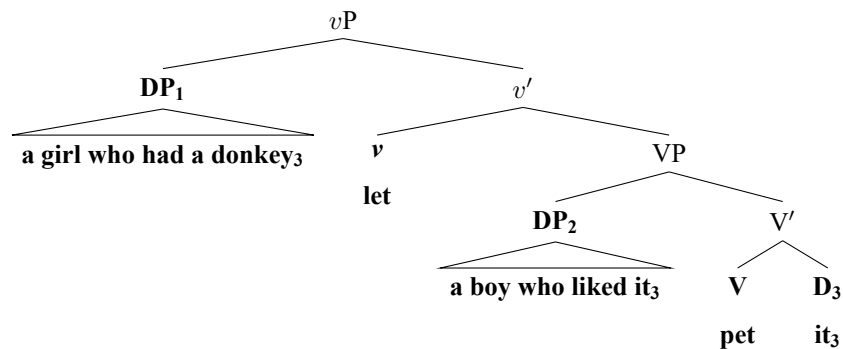
(6) Spell Out Domain (so-Domain)

All specifiers, all adjuncts and the whole sentence are spell out domains.

Consider the following sentence and its structure (for the purposes of this paper I will ignore the contribution of tense and aspect):

²Certain complements, namely, phases, may also restrict movement. But this restriction is different from the restriction on movement out of strong islands. Movement out of a phase is possible through its left edge (Chomsky, 2001; Fox and Pesetsky, 2005). Movement out of a strong island is not possible at all.

- (7)
- ^{ok}
- [A girl who had a donkey
- ₃
-]
- ₁
- let [a boy who liked it
- ₃
-]
- ₂
- pet it
- ₃
- .



According to the Spell Out theory, this sentence is generated in the following way. First, DP_1 and DP_2 are generated and spelled out (in some order). Second, the rest of the sentence is generated with the use of DP_1 , DP_2 and lexical items (*let*, *pet* and *it₃*). Third, the resulting structure, represented by the tree under (7), is sent to Spell Out again. This is the first point of Spell Out when the semantic component “sees” the indefinite *a donkey₃* and the two pronouns *it₃* as parts of the same structure. In other words, the constituent represented by the tree under (7) is the minimal Spell Out domain that contains the indefinite and the two pronouns that are anaphoric to it.

At this point the meanings of all the previously spelled out constituents are “known” (DP_1 and DP_2). In addition, the meanings of all the terminal nodes (*let*, *pet* and *it₃*) are “known”, because they come from the lexicon. What is crucial for the Island Condition is that at this point in the derivation the indefinite is inside an interpreted node that c-commands the pronoun.

The final auxiliary notion that we will need before formally introducing the Island Condition is the notion of so-command (so for Spell Out), which is an extension of c-command (Reinhart, 1976) defined in the following way:

(8) **so-Command**

A node α so-commands a node β if and only if within the *minimal* so-domain XP that contains both α and β , the *maximal* so-domain YP that contains (or is) α (and is not XP itself) c-commands β .

For example, in (7) the indefinite *a donkey₃* so-commands both pronouns *it₃*. The minimal so-domain that includes the indefinite and the pronouns is the whole sentence.

Within it the maximal so-domain that contains the indefinite is DP_1 . DP_1 c-commands both pronouns.

The Island Condition can now be stated as the following requirement:

(9) **Island Condition**

Discourse anaphora is possible between an indefinite and a pronoun if and only if the indefinite so-commands the pronoun.

2.2 Anaphoric relations

Before turning to the discussion of how the Island Condition applies to discourse anaphora, I will briefly introduce some background assumptions about restrictions on anaphoric relations. In what follows I will assume that an anaphoric relation between a noun phrase and a pronoun can be established by two independent semantic mechanisms: *Variable Binding* and *Dynamic Binding*.

A pronoun can be bound as a variable by another noun phrase (see Paducheva, 1974, 1985; Partee, 1975, 1978; May, 1977; Heim, 1982; Haïk, 1984; Chierchia, 1995; Heim and Kratzer, 1998, and numerous others). Variable Binding is possible with quantified, indefinite or definite noun phrases. It is restricted by conditions A, B and C of the classical binding theory (Reinhart, 1976, 1983; Chomsky, 1981). In addition, the noun phrase must take scope over the pronoun.

In the case of Dynamic Binding the pronoun “picks up” the discourse referent introduced by the noun phrase. This mechanism is only available for indefinite noun phrases. Dynamic Binding is also restricted by conditions A, B and C of the classical binding theory. In addition, all the operators that take scope over the indefinite must take scope over the pronoun (see Heim, 1982, 130 and Haïk, 1984). Furthermore, the indefinite must be *interpreted before* the pronoun. It is this “interpreted before” relation that is determined by the Island Condition.

These assumptions are summarized in the table in (10).

(10) Semantic mechanisms establishing anaphoric relations

Mechanism	Participants	Conditions
Variable Binding	$DP_{\text{quantified}} - \text{pro}$ $DP_{\text{indefinite}} - \text{pro}$ $DP_{\text{definite}} - \text{pro}$	A, B, C $DP >^3 \text{pro}$
Dynamic Binding	$DP_{\text{indefinite}} - \text{pro}$	A, B, C $Q > DP \rightarrow Q > \text{pro}$ DP is interpreted before pro

As the result, an indefinite noun phrase can bind a pronoun *either* via Variable Binding or via Dynamic Binding. Crucially, the Island Condition only applies to Dynamic Binding.

In addition, I will assume that noun phrases can take scope via Quantifier Raising (or QR), which is subject to all the standard restrictions on movement. The Island Condition applies at the level of Logical Form (or LF), after all the noun phrases have moved to their scope positions, either overtly or covertly via QR.

Finally, specific indefinites, which take exceptional scope, will not be considered in this paper. The Island Condition only applies to non-specific indefinites.

3 Indefinite anaphora and structure

3.1 The main argument

The main argument for the Island Condition is that it can account for all the three basic contrasts established in section 1 and repeated below as (11-13), without additional stipulations. That is, if we assume independently motivated syntactic structures for the constructions involved, the indefinite so-commands the pronoun in (11a), (12a) and (13a), but not in (11b), (12b) or (13b).

³‘X > Y’ is to be read as ‘X takes scope over Y’.

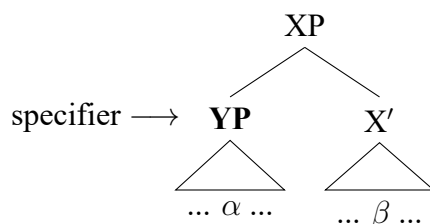
- (11) a. ^{ok} [A person who came in with **a woman**₂] offered **her**₂ drinks.
 b. * A person who came in with **her**₂ offered [**a woman**₂] drinks.
- (12) a. ^{ok} Rosa informed **his**₁ parents [when she caught **a student**₁ smoking].
 b. * Rosa informed **his**₁ parents that she caught [**a student**₁] smoking.
- (13) a. ^{ok} Rosa₁ [came in with **a woman**₂] and offered **her**₂ drinks.
 b. * Rosa₁ came in with **her**₂ and offered [**a woman**₂] drinks.

In what follows I will discuss these three syntactic configurations separately. Anaphora between a specifier and its sister, as in (11), will be discussed in section 3.2, anaphora between an adjunct and its sister, as in (12), will be discussed in section 3.3, anaphora between in a coordinate structure, as in (13), will be discussed in section 3.4.

3.2 Specifiers

A specifier is, by definition, a maximal projection that is merged with a phrase, as is schematized in (14).

- (14) YP is a specifier of XP



The Island Condition predicts that any indefinite inside a specifier can create an accessible antecedent for any pronoun that this specifier c-commands.⁴ In (14) α so-commands β . The minimal so-domain that contains both α and β is either XP or some larger constituent. *Within it*, the maximal so-domain that contains α is YP, which c-commands β . Any so-domain that is larger than YP and contains α also contains β and is thus either the

minimal so-domain that contains both or larger.

This prediction is borne out for discourse anaphora. All the speakers I have consulted perceive a contrast between (15a) and (15b).

- (15) a. ^{ok} [_{DP}A person who came in with **a woman**₂] offered **her**₂ drinks.
 b. * A person who came in with **her**₂ offered [_{DP}**a woman**₂] drinks.

The indefinite *a woman*₂ so-commands the pronoun *her*₂ in (15a), but not (15b). In (15a) the minimal so-domain that contains both the indefinite and the pronoun is the whole sentence. *Within it*, the maximal so-domain that contains the indefinite is the subject DP. There is no larger specifier or adjunct within this sentence that contains the indefinite. The subject DP c-commands the pronoun, the Island Condition is satisfied.

In (15b) the minimal so-domain that contains both the indefinite and the pronoun is the whole sentence again. Within it, the maximal so-domain that contains the indefinite is the indefinite itself. There is no larger specifier or adjunct within this sentence that contains the indefinite. The indefinite does not c-command the pronoun, the Island Condition is not satisfied.

Importantly, the contrast in (15) has to do with the structural configuration and not with the semantic context of the indefinite. For example, it is not due to the fact that in (15a) the indefinite is inside a relative clause that modifies the restrictor of an existential quantifier, and in (15b) it is not. The very same contrast can be observed in cases like (16).

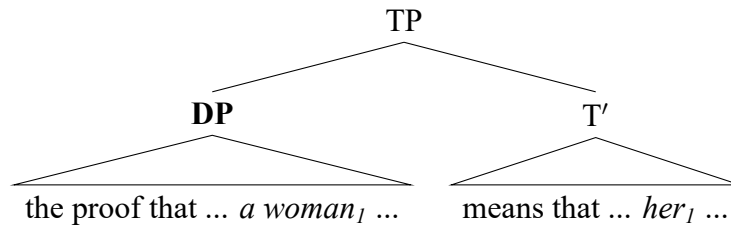
- (16) a. ^{ok} [_{DP}The proof that **a woman**₁ was in the building at the moment of the crime] means that we will have to question **her**₁ in court.
 b. * The proof that **she**₁ was in the building at the moment of the crime means that we will have to question [_{DP}**a woman**₁] in court.

In both (16a) and (16b) the indefinite is embedded under an attitude predicate. Nevertheless, discourse anaphora is possible in (16a), but not in (16b). The reason is that in

⁴Thus, the Island Condition also subsumes as a special case a restriction on donkey anaphora proposed and defended by Büring (2004), according to which the quantified DP that contains the indefinite must c-command the pronoun.

(16a) the indefinite *so*-commands the pronoun, while in (16b) it does not. Here the same reasoning applies, as in the case of (15):

(17) The structure for (16a)



Importantly, these contrasts should not be explained away by some restriction on specific indefinites taking exceptional scope. The indefinites in (15-16) are not specific, or at least, do not have to be specific. The same contrast is replicated in cases when the indefinite is interpreted in the scope of another quantifier, that is, in donkey anaphoric configurations:

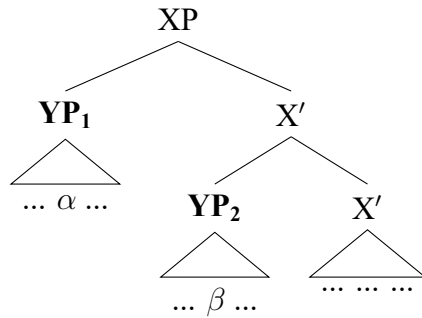
- (18) a. ^{ok} [_{DP}Every professor who supervised **a student₁**] read **her₁** thesis.
 b. * Every professor who supervised **her₁** read [_{DP}**a student₁**]'s thesis.

∀ > ∃

In both sentences in (18) the indefinite is to be interpreted in the scope of *every*. In (18a) the indefinite *so*-commands the pronoun, and the bound reading is fine. In (18b) the indefinite does not *so*-command the pronoun, and the bound reading is not fine.

In the case of multiple specifiers the Island Condition predicts that an indefinite inside a higher specifier will create an accessible antecedent for any pronoun inside a lower specifier, but not vice-versa. As is schematized in (19), a node inside a higher specifier (α) always *so*-commands a node inside a lower one (β). The maximal *so*-domain that contains α , but not β , is YP_1 , which *c*-commands β . The maximal *so*-domain that contains β , but not α , is YP_2 , which does not *c*-command α .

(19) Multiple specifiers



In English it is hard to find a configuration with multiple specifiers. But Russian clauses with the SOV word order may be a good example of that. It has been argued independently that both preverbal subjects and preverbal objects in Russian occupy the Spec,TP position (see Bailyn, 2004; Testelefs, 2006; Kallestinova, 2007 for discussion). If both the subject and the object appear before the verb, we may assume that they are both specifiers of the TP.

With the SOV word order an indefinite inside the subject can create an accessible antecedent for a pronoun inside the object, but not the other way around, as the Island Condition predicts:

(20) RUSSIAN

- a. ^{ok} [_Sženšina, kotoraja vzjala **odnu iz moix knig₁**], [_Oeë₁]
 woman.NOM which.NOM take.PFV.PST one.ACC of my.GEN books.GEN she.ACC
 tak i ne pročitala
 such and NEG read.PFV.PST
 ‘[_SThe woman who took **one of my books₁**] ended up never reading [_Oit₁].’
- b. * [_Sženšina, kotoraja eë₁ vzjala], [_Oodnu iz moix knig₁]
 woman.NOM which.NOM she.ACC take.PFV.PST one.ACC of my.GEN books.GEN
 tak i ne pročitala
 such and NEG read.PFV.PST
 ‘[_SThe woman who took **it₁**] ended up never reading [_Oone of my books₁].’

The Island Condition can be violated if the indefinite is interpreted as specific. In particular, it can be violated, if the indefinite is modified by the adjective *certain* or the PP *of mine*. Thus, in (21) discourse anaphora is possible:

(21) ^{ok} A professor who knows **her**₁ thinks [_{DP}**a student of mine**₁] got a job.

Specific indefinites, however, do not fall under the Island Condition. They may take exceptionally high scope, which can be achieved by a variety of semantic mechanisms proposed in the literature (see Fodor and Sag, 1982; Kratzer, 1998b; Charlow, 2014, 2020, and others). In what follows, I will assume that in cases like (21) the indefinite can bind the pronoun due to the same mechanism that allows it to take exceptional scope, without committing to any particular analysis.

The claim that the Island Condition can only be violated when a specific indefinite is involved could be supported by the following contrast:

- (22) Every professor who knows **her**₁ thinks [_{DP}**a student of mine**₁] got a job.
- a. ^{ok} $\exists > \forall$
 - b. * $\forall > \exists$

Donkey anaphora is only possible in (22) if the indefinite has the highest scope. It is not possible if the indefinite takes scope below the universal quantifier. For example, with the adjective *different*, indicating the surface $\forall > \exists$ scope, that is, with the indefinite *a different student of mine* the sentence in (22) becomes considerably worse. This is easily explained, if we assume that binding in a configuration like (22) is only possible with a specific indefinite.

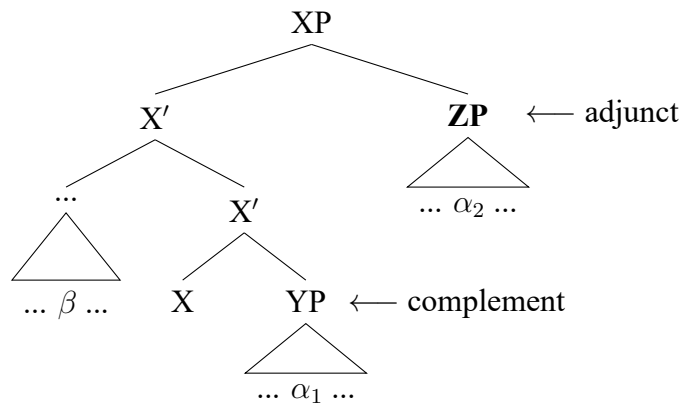
3.3 Adjuncts

3.3.1 Indefinites inside adjuncts

The Island Condition predicts that an indefinite inside an adjunct can be an antecedent of a pronoun inside the main clause, but an indefinite inside a complement cannot.

A complement is, by definition, a maximal projection that is merged with a head, like YP in (23). An adjunct is, by definition, a maximal projection that is merged with a phrase, like ZP in (23).

(23) YP is the complement, ZP is an adjunct



In (23) α_1 does not so-command β , but α_2 does. The maximal so-domain that contains α_1 , but not β , is somewhere within YP. Whatever this constituent is, it does not c-command β . However, the maximal so-domain that contains α_2 , but not β , is ZP, which does c-command β .

This prediction is borne out:

- (24) a. ^{ok} Ms. Brodie₂ informed **his**₁ mother [_{CP}after she caught **an eight-grader**₁ smoking in the bathroom].
- b. * Ms. Brodie₂ informed **his**₁ mother that she caught [_{DP}**an eight-grader**₁] smoking in the bathroom.

Importantly, the contrast in (24) cannot be attributed to condition C. If we replace the indefinite with a definite, for example, a proper name, like *Karl*, the contrast disappears.

But this contrast is predicted by the Island Condition. In (24a) the indefinite so-commands the pronoun. The minimal so-domain that contains both is the whole sentence. Within it, the maximal so-domain that contains the indefinite is the adjunct CP. There is no larger specifier or adjunct that contains the indefinite within this sentence. The adjunct CP c-commands the pronoun.

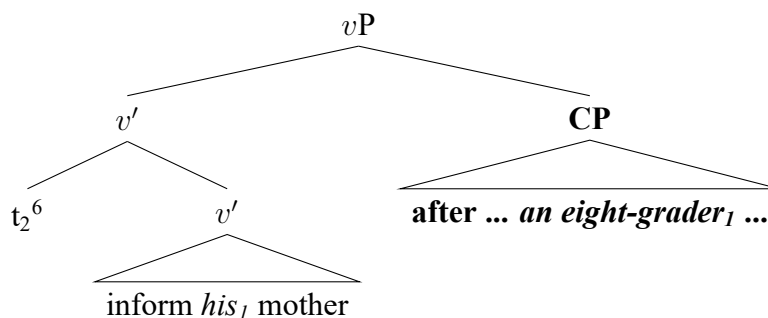
One can show independently that in English postposed temporal adjunct clauses are attached below the subject and above VP-internal arguments (see, e.g., Iatridou, 1991). In particular, in (24a) the adjunct CP is attached above the addressee argument *his*₁ *mother*.

This is evident from the lack of condition C effects in sentences, like (25).

- (25) ^{ok} Ms. Brodie₂ informed **him**₁ that he₁'s on probation [_{CP}after she caught **Karl**₁ smoking in the bathroom].

These independently motivated assumptions lead us to the following structure:

- (26) The structure for the *vP* in (24a)⁵



If (26) is the correct representation of (24a), then in (24a) the adjunct CP, which is the maximal so-domain that contains the indefinite, but not the pronoun, c-commands the pronoun. Thus, the Island Condition is satisfied.

As for (24b), both the complement CP and the addressee DP *his₁ mother* are arguments of the verb *inform*. However, the complement clause is attached below the addressee, which can also be shown independently by the presence of a condition C effect in (27a). The fact that (27b) is better than (27a), shows that the unacceptability of (27a) should be attributed to condition C.

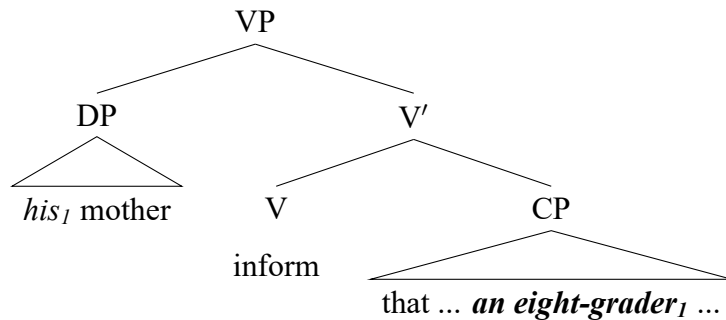
- (27) a. * Ms. Brodie₂ informed **him**₁ that **Karl**₂ is on probation.
 b. ^{ok} Ms. Brodie₂ informed **his**₁ mother that **Karl**₂ is on probation.

Given these assumptions, the VP in (24b) has the following syntactic structure:

⁵For simplicity I will assume that post-posed adjunct clauses are attached at the *vP*-level. The predictions of the Island Condition will not change, if they are attached higher.

⁶Here and throughout I follow the standard assumption for English that the subject is base-generated as a specifier of *vP* and later moves to Spec,TP.

(28) The structure for the VP in (24b)



Given (28), the indefinite does not so-command the pronoun in (24b). The minimal so-domain that contains both is the whole sentence. Within it, the maximal so-domain that contains the indefinite is the indefinite itself. There is no larger specifier or adjunct that contains the indefinite within this sentence. The indefinite does not c-command the pronoun.

As before, the contrast in (24) should not be attributed to some restriction on exceptional scope. The indefinites in (24) do not have to be specific. The same contrast is replicated in the scope of a quantifier:

- (29) a. ^{ok} Each time, Ms. Brodie informed **his₁** mother [_{CP}after she caught **one of the eight-graders₁** smoking in the bathroom].
- b. * Each time, Ms. Brodie informed **his₁** mother that she caught [_{DP}**one of the eight-graders₁**] smoking in the bathroom.

This contrast is not particular to temporal *when/after/before*-clauses. Cataphora is possible with a variety of adjuncts, for example, with an *if*-clause (30a), a purpose clause (30b) and a locative PP (30c).⁷ According to speakers' judgments, (30b-c) are not ideal sentences, but they are definitely better than (24b).

- (30) a. ^{ok} Rosa will send **him₁** to the hospital [_{CP}if **a boy₁** breaks his₁ leg].
- b. [?] Recently Mr. Smith asked me to give him **her₁** father's phone number, [_{CP}in order to discuss the progress of **one of the eight-graders₁**].

⁷For other adjuncts see section 6.1.

- c. ? Peter tells me he screened some of **her**₁ movies [_{PP}at the party of **one of the female directors**₁] a couple of days ago.

3.3.2 Indefinites inside the main clause

The Island Condition predicts an indefinite in the object position inside may not create an accessible antecedent for a pronoun inside an adjunct, contrary to fact:

- (31) ^{ok} Mary₂ wrote about [_{DP}**a witness**₁] after PRO₂ hearing **his**₁ testimony.

In (31) the indefinite does not SO-command the pronoun. The minimal SO-domain that contains both is the whole sentence. Within it, the maximal SO-domain that contains the indefinite is the indefinite itself. There is no larger specifier or adjunct that contains the indefinite within this sentence. The indefinite does not c-command the pronoun.

However, importantly, unlike any of the cases discussed above, this configuration also allows Variable Binding:

- (32) ^{ok} Mary₂ wrote about [_{DP}**every witness**₁] after PRO₂ hearing **his**₁ testimony.

Remember that quantified noun phrases can only establish a referential dependency with a pronoun via Variable Binding (see section 2.2). For Variable Binding the noun phrase must take scope over the pronoun. If this is correct, then the acceptability of (32) shows that a VP-internal object may take scope over a post-posed adjunct and bind a pronoun inside it as a variable.

This means that this scope should also be available in (31). If anything, indefinites are less restricted in their scope taking possibilities, than other quantifiers. As the result, the indefinite in (31) can bind the pronoun as a variable, which makes the sentence acceptable.

Furthermore, if the Island Condition applies at LF (see section 2.2) and scope taking is achieved via QR, then (32) shows that a VP-internal object can undergo QR above a post-posed adjunct. After QR the object will both c-command and so-command the pronoun inside the post-posed adjunct. Thus, Dynamic Binding should also be possible in (31).

One may worry that the proposed QR-movement would violate the Weak Crossover condition. However, it has been established in the literature that Weak Crossover can be violated when binding from the object position into a postposed adjunct is involved

(see Lasnik and Stowell, 1991; Pesetsky, 1995; Chierchia, 2020, and others). A possible explanation for this is that in these cases QR targets an A-position. Perhaps, it is the same position that is targeted by the so-called object shift in some Germanic languages (see Holmberg, 1986 and subsequent work), namely, an A-position above the *v*P, but below Spec,TP. If so, then it is not expected to obey Weak Crossover in the first place, since A-movements in general do not.

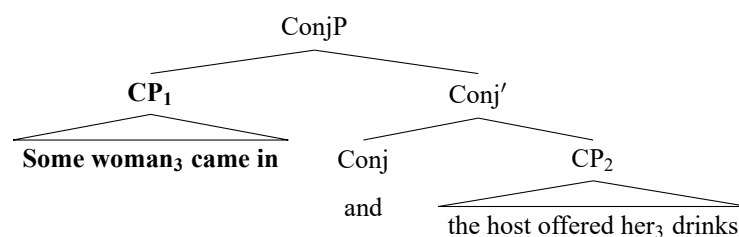
3.4 Coordination

In coordination discourse anaphora “proceeds” from left to right. That is, an indefinite inside the first conjunct creates an accessible antecedent for a pronoun inside the second conjunct, but not vice-versa, as is evident from the contrast in (33). This is the type of example that led most researchers to conclude that discourse anaphora in general “proceeds” from left to right.

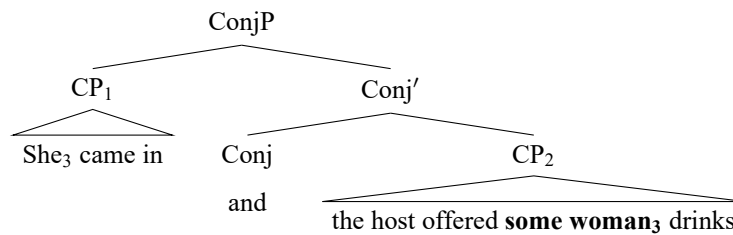
- (33) a. ^{ok} [**Some woman**₃ came in] and the host offered **her**₃ drinks.
 b. * **She**₃ came in and the host offered [**some woman**₃] drinks.

However, the Island Condition may cover (33) as well, if we take into account independently established facts about the syntax of coordination. It has been argued that in a semantically symmetric coordination, as in (33), the connective *and* projects a ConjP structure, taking the second conjunct as its complement and the first conjunct as its specifier (see Ross, 1967; Johannessen, 1993, 1998; Kayne, 1994):

- (34) a. The structure for (33a)



b. The structure for (33b)



The indefinite *so*-commands the pronoun in (34a). The minimal *so*-domain that contains both is *ConjP*. *Within it*, the maximal *so*-domain that contains the indefinite is *CP₁*, which *c*-commands the pronoun.

However, the indefinite does not *so*-command the pronoun in (34b). The minimal *so*-domain that contains both is *ConjP*. *Within it*, the maximal *so*-domain that contains the indefinite is the indefinite itself, which does not *c*-command the pronoun.

The structure in (34), thus, predicts that an indefinite inside the first conjunct can create an accessible antecedent for the pronoun inside the second one, but not the other way around.

Interestingly, cataphora with an indefinite antecedent is sometimes possible even in coordination, contra to what standard theories would expect. This is possible in so-called *concessive and* or *but*:

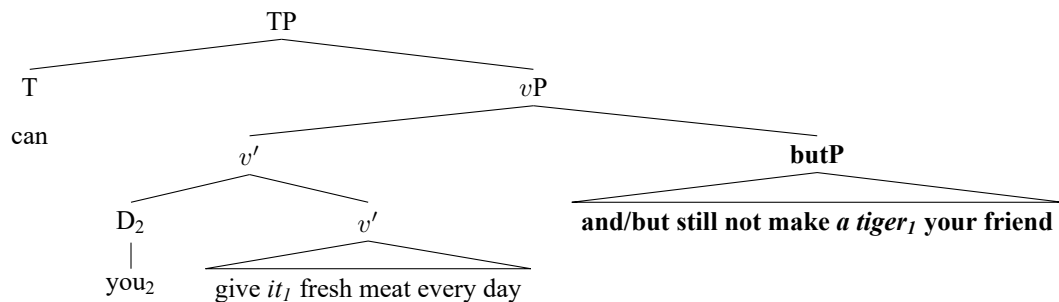
- (35) a. ^{ok} You can give **it₁** fresh meat every day, [and still not make **a tiger₁** your friend].
 b. ^{ok} You can give **it₁** fresh meat every day, [but still not make **a tiger₁** your friend].

Crucially, the possibility of cataphora in coordination correlates with extraction asymmetries. In concessive coordination extraction is possible out of the first conjunct, but not out of the second one (Ross, 1967; Postal, 1998, 77-90):

- (36) a. ^{ok} **How much₁** can you [drink ₁], [and still stay sober]?
 b. ^{ok} **How much₁** can you [drink ₁], [but still stay sober]?
 (37) a. ^{?/*} **What₁** can you [drink a lot of liquor], [and still be able to do ₁]?
 b. ^{?/*} **What₁** can you [drink a lot of liquor], [but still be able to do ₁]?

In other words, in the case of concessive coordination, unlike in the case of semantically symmetric coordination, the second conjunct behaves like an island. Following Postal (1998), I will assume that in concessive coordination the second conjunct is, in fact, an adjunct. That is, there is no ConjP, rather the second conjunct is a maximal projection that is attached at some position within the first conjunct:

(38) The second conjunct as an adjunct (Postal, 1998, 87)



This explains (a) that the second conjunct is opaque for extraction (37), because it is an adjunct; (b) that the first conjunct is transparent (36), because it is the main clause; and (c) that concessive coordination allows cataphora with an indefinite antecedent.

If the structure in (38) is correct, then the indefinite *so*-commands the pronoun. The minimal *so*-domain that contains both is the whole sentence. *Within it*, the maximal *so*-domain that contains the indefinite is *butP*, which *c*-commands the pronoun.

Thus, the Island Condition successfully predicts that the possibility of cataphora with indefinite antecedents in coordination should correlate with the possibility of extraction out of the first and the second conjunct. Namely, cataphora is possible in the case of concessive coordination, but not in the case of semantically symmetric coordination.

3.5 Summary

To sum up, given independently motivated assumptions about the syntactic structure of the constructions involved, the Island Condition successfully derives the three contrasts involving discourse anaphora introduced in section 1:

- (39) a. ^{ok} [A person who came in with **a woman**₂] offered **her**₂ drinks.
 b. * A person who came in with **her**₂ offered [**a woman**₂] drinks.
- (40) a. ^{ok} Rosa informed **his**₁ parents [when she caught **a student**₁ smoking].
 b. * Rosa informed **his**₁ parents that she caught [**a student**₁] smoking.
- (41) a. ^{ok} Rosa₁ [came in with **a woman**₂] and offered **her**₂ drinks.
 b. * Rosa₁ came in with **her**₂ and offered [**a woman**₂] drinks.

4 Spelling Spell Out out

4.1 Semantic framework

In this section I will offer some assumptions about the mechanism of Spell Out at LF that derive the Island Condition. The ultimate proposal is that Spell Out assigns semantics to a piece of syntactic structure in a “top-to-bottom” fashion, proceeding from a spelled out to a non-spelled out sister, which enforces the Island Condition.

All the semantic frameworks that have an account for discourse and donkey anaphora, including indefinites-as-variables accounts (Paducheveva, 1974, 1985, 1989a,b; Heim, 1982; Diesing, 1992), discourse representation theory (Kamp, 1981), dynamic semantics and dynamic predicate logic (Heim, 1982; Groenendijk and Stokhof, 1991; Chierchia, 1995), continuation semantics (Barker and Shan, 2006, 2008), local contexts (Schlenker, 2009, 2011) and pseudo-dynamic theories (Mandelkern, 2020; Elliott, 2020), at some point make reference to the surface linear order. The current proposal is to replace this reference with the Island Condition. Whenever a semantic theory of discourse anaphora makes reference to the “left – to – right” relation, it should be replaced by “spelled out – to – non-spelled out” relation. From this perspective, the choice of the semantic framework does not matter, since all of the existing accounts make reference to the “left – to – right” relation. In other words, the Island Condition can be integrated into every theory mentioned above with minimal changes.

In what follows I will show how the Island Condition can be incorporated into Heim’s

(1982) dynamic semantics. The reason for this particular choice is that in the case of dynamic semantics, we only need to amend one interpretation rule, namely, Dynamic Conjunction, because this is the only rule in this system that makes reference to the surface linear order.⁸ However, for the reasons discussed above, the choice of semantic framework is not essential.

The core proposal concerns the nature of Spell Out. Remember that Spell Out is an operation that takes a syntactic object and assigns it a phonological and semantic representation. The focus of this paper is on the semantic side of this operation.

The input to Spell Out is a piece of syntactic structure, after all the overt and covert movements have occurred. This piece of syntactic structure will be called the Logical Form (or LF). The output of Spell Out is meaning (whatever meaning is assumed to be), assigned by a set of interpretation rules.

In what follows I will, first, discuss some background assumptions about the Logical Form (section 4.2); second, introduce Heim's (1982) interpretation rules with an amended version of Dynamic Conjunction (section 4.3); third, go over a sample derivation (section 4.4); fourth, briefly discuss donkey anaphora and quantifiers (section 4.5); and fifth, discuss how the Island Condition can be derived from the Spell Out theory (section 4.6).

4.2 Logical Form

Let me begin by stating an assumption about the Logical Form, borrowed from Heim (1982), and an observation that follows from the Spell Out theory.

First, following Heim, I will assume that at LF all non-pronominal noun phrases must have moved out of their base argument positions overtly or covertly. In Heim's system this is guaranteed by a special NP-prefixing rule (Heim, 1982, 87). In the present system this is just a filter-principle applied to LF. Non-pronominal phrases may move out of their base positions for different reasons and by different types of movement, overtly or covertly, but at point of LF they must have moved.

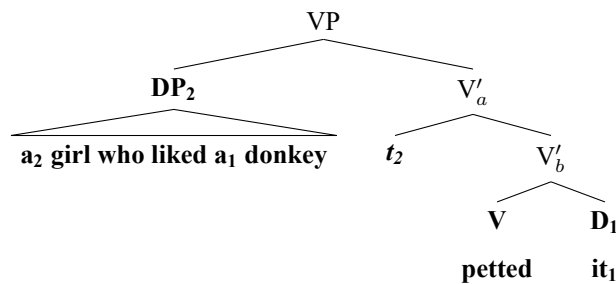
This means that at LF the base argument positions are occupied either by pronouns or by traces. At the bottom of LF there will always be a V' node dominating only the verb

⁸In order to extend the Island Condition to donkey anaphora we will also need to amend the rule for quantifiers.

and all of its arguments, each of which is either a trace or a pronoun.

This results in LFs like the one in (42). Notably, here and throughout this section I will ignore the semantic contribution of tense and aspect (for simplicity) and assume that the root node at LF is always a VP or a *v*P.

(42) The LF for [*A*₂ *girl who liked a*₁ *donkey*] *petted it*₁.



Second, because of the Spell Out theory, every non-terminal node at LF has at most one uninterpreted daughter. Assuming binary branching for simplicity, there are only three logical possibilities. A non-terminal node can be the result of the Merge of (a) a head and a head; (b) a head and a phrase (head-complement configurations); or (c) a phrase and a phrase (*X'*-specifier/adjunct configurations).

In the first case both daughters bear interpretation, because they come from the lexicon. In the second case the head daughter bears interpretation, because it comes from the lexicon. In the third case, because of the Spell Out theory, at least one of the daughters has previously been spelled out and thus bears the interpretation assigned to it at some previous iteration of Spell Out. In fact, if branching is always binary, at LF every non-terminal node has either one interpreted and one uninterpreted daughter or two interpreted daughters.

For example, in (42) the VP node has one interpreted and one uninterpreted daughter (*DP*₂ and *V'*_a respectively); the node *V'*_a also has one interpreted and one uninterpreted daughter (*t*₂ and *V'*_b respectively); finally, the node *V'*_b has two interpreted daughters: *petted* and *it*₁.

4.3 Interpretation rules

In this section I will introduce Heim's (1982) interpretation rules, which take an LF and assign it a context change potential. Only one of them, namely, Dynamic Conjunction, will be amended in order to incorporate the Island Condition.

Leaving aside quantifiers for now, in Heim's system the meaning of every node is a context change potential (or CCP). A CCP is a function from contexts to contexts. A context c is a set of pairs of a world w and an assignment function g . An assignment function g is a partial function from the set of natural numbers \mathbb{N} to D_e (g can also be represented as a sequence of individuals). In the present version of dynamic semantics assignment functions in a given context c can be of variable length. That is, among the world assignment pairs $\langle w, g \rangle$ in a given context c , g may be defined for different sets of numbers.

In what follows, I will say that "a discourse referent" with number i is old (has been introduced) in c if for all the pairs $\langle w, g \rangle$ in c g is defined for i (shorthand: $i \in \text{dom}(g)$). Otherwise "a discourse referent" with number i is new in c .⁹

The meaning of an indefinite DP, then, will be a context change potential that introduces a new discourse referent:

$$(43) \quad \llbracket a_1 \text{ donkey} \rrbracket = \\ \lambda c. \quad \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } 1 \in \text{dom}(g) \text{ and } g(1) \text{ is a donkey in } w \}.$$

After the function in (43) is applied to a context c , the output context c' will only contain those world-assignment pairs $\langle w', g' \rangle$ where the assignment function g' is defined for 1. The general interpretation rule for indefinite DPs is given in (44).

(44) **Interpretation Rule 1. Indefinites**

If a node DP_i immediately dominates an indefinite D_i and N , then $\llbracket DP_i \rrbracket =$

$$\lambda c. \quad \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } i \in \text{dom}(g) \text{ and } g(i) \text{ is in the extension of } N \text{ in } w \}.$$

The meaning of the minimal V' node that dominates the verb and all of its argument

⁹"I find that identifying them (discourse referents – DP) with file cards (indexes in sets of assignments – DP) does away with questions as to their ontological status that are at best uninteresting and at worst confusing." (Heim, 1982, 183)

positions (occupied by traces and pronouns due to our assumption about LF) is also a context change potential, which imposes pronominal and trace presuppositions on its input context:

$$(45) \quad \llbracket t_2 \text{ petted } it_1 \rrbracket = \\ \lambda c. \quad \forall \langle w, g \rangle \in c: 1, 2 \in \text{dom}(g). \\ \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } g(2) \text{ petted } g(1) \text{ in } w \}.$$

The function in (45) is only defined for a context where in all the world-assignment pairs the assignment function is defined for 1 and 2. The general interpretation rule for predicates with pronominal or trace arguments is stated in (46).

(46) **Interpretation Rule 2. Predicates**

If V' is the minimal node that dominates a verb V and all of its argument positions, occupied by pronouns and traces with indexes $i...j$, then $\llbracket V' \rrbracket =$

$$\lambda c. \quad \forall \langle w, g \rangle \in c: i...j \in \text{dom}(g). \\ \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } \langle g(i)...g(j) \rangle^{10} \text{ is in the extension of } V \text{ in } w \}.$$

Rules 1 and 2 correspond to Heim's (1982, 234) rule I for atomic formulas. The new amendment concerns the basic composition rule Dynamic Conjunction (Heim's rule II for cumulative molecular formulas, see Heim, 1982, 234).

(47) **Interpretation Rule 3. Dynamic Conjunction**

If $\gamma = [\alpha \beta]$, where α is spelled out and β is not, then $\llbracket \gamma \rrbracket = \lambda c. \llbracket \beta \rrbracket (\llbracket \alpha \rrbracket (c))$.

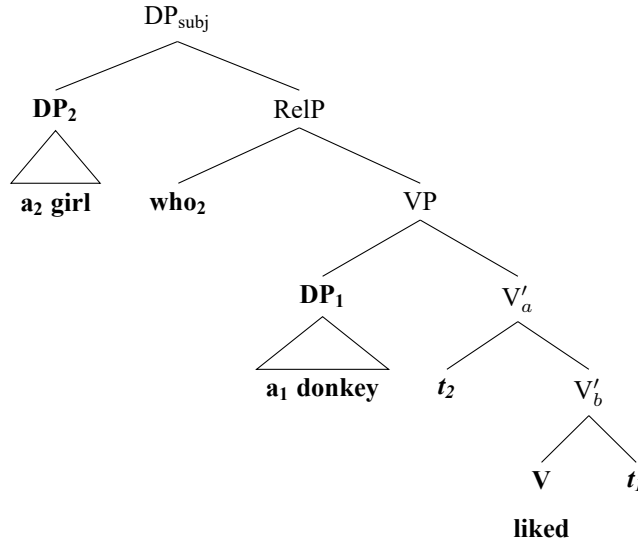
The rule in (47) composes two context change potentials to receive a complex function. Crucially, the order in which the two context change potentials are composed corresponds not to the linear order of the corresponding daughter nodes, but to the “spelled out – non spelled out” distinction.

¹⁰The order in which arguments are fed to the verb is determined by the internal structure of V' .

4.4 Sample derivations

We can now derive the test sentence A_2 *girl* who_2 *liked* a_1 *donkey* *petted* it_1 . The first step is to generate the LF of the subject DP, which looks as follows:

(48) The LF of the subject DP a_2 *girl* who_2 *liked* a_1 *donkey*.



The object inside the relative clause (a_1 *donkey*) has moved out of its base position because of Heim's requirement on LFs. The relative pronoun, corresponding to the subject of the relative clause, has also moved out of its base position, leaving behind a co-indexed trace. For the present purposes I will assume that the relative pronoun is semantically vacuous.

The second step is to spell out the subject DP, that is, assign it a CCP. Given the interpretation rules introduced above, Spell Out assigns the following meanings to the non-interpreted nodes of (48):

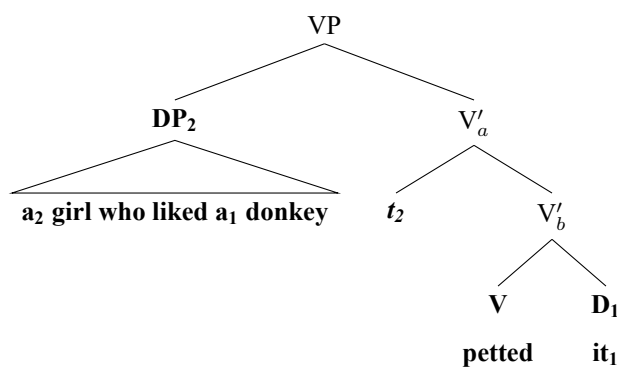
- (49) a. $\llbracket DP_{\text{subj}} \rrbracket = \lambda c. \llbracket \text{RelP} \rrbracket (\llbracket DP_2 \rrbracket (c))$. by Dynamic Conjunction (47)
 b. $\llbracket \text{RelP} \rrbracket = \llbracket \text{VP} \rrbracket$. who_2 is vacuous
 c. $\llbracket \text{VP} \rrbracket = \lambda c. \llbracket V'_a \rrbracket (\llbracket DP_1 \rrbracket (c))$. by Dynamic Conjunction (47)
 d. $\llbracket V'_a \rrbracket =$ by Rule 2 (46)
 $\lambda c: \forall \langle w, g \rangle \in c: 1, 2 \in \text{dom}(g).$
 $\{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } g(2) \text{ liked } g(1) \text{ in } w \}.$

As the result, the meaning of DP_{subj} is a complex CCP, composed of three CCPs: (1) the CCP of DP_2 , (2) the CCP of DP_1 and (3) the CCP of V'_a – *in that order*. The order is fully determined by Dynamic Conjunction, which relies on the “spelled out – non-spelled out” distinction. The CCP of the subject DP, then, introduces two new discourse referents, a girl and a donkey:

$$(50) \quad \llbracket DP_{\text{subj}} \rrbracket = \lambda c. \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and} \\ g(2) \text{ is a girl,} \\ g(1) \text{ is a donkey} \\ \text{and } g(2) \text{ liked } g(1) \}.$$

The third step is to generate the LF for the rest of the sentence:

(51) The LF of the test sentence [a_2 girl who $_2$ liked a_1 donkey] petted it_1 .



The fourth step is to spell this LF out. Given the interpretation rules above, Spell Out assigns the meanings to the non-interpreted nodes in (51) as follows:

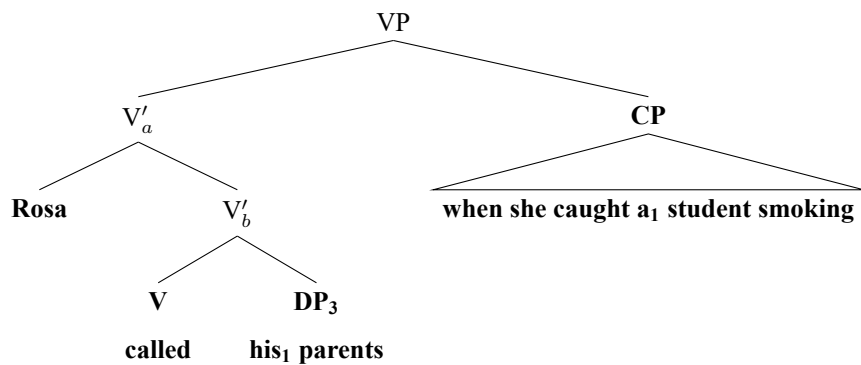
$$(52) \quad \begin{array}{ll} \text{a. } \llbracket VP \rrbracket = \lambda c. \llbracket V'_a \rrbracket(\llbracket DP_2 \rrbracket(c)). & \text{by Dynamic Conjunction (47)} \\ \text{b. } \llbracket V'_a \rrbracket = & \text{by Rule 2 (46)} \\ & \lambda c. \forall \langle w, g \rangle \in c: 1, 2 \in \text{dom}(g). \\ & \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } g(2) \text{ petted } g(1) \text{ in } w \}. \end{array}$$

As the result, the meaning of the VP is a complex CCP, composed of two CCPs: (1) the CCP of DP_2 (the subject DP) and (2) the CCP of V'_a – *in that order*. The order is, again, fully determined by Dynamic Conjunction. The CCP of the VP, then, introduces two new discourse referents: a girl and a donkey. The pronoun it_1 is dynamically bound by the indefinite inside the subject:

- (53) $\llbracket \text{DP}_{\text{subj}} \rrbracket = \lambda c. \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and}$
 $g(2) \text{ is a girl,}$
 $g(1) \text{ is a donkey}$
 $g(2) \text{ liked } g(1)$
 $\text{and } g(2) \text{ petted } g(1) \}.$

Cases of discourse cataphora with adjunct clauses will receive a very similar treatment. For simplicity, I will continue to ignore the contribution of tense and aspect and assume that *when* is semantically vacuous. As the result, a *when*-clause is simply a CCP that is composed with the CCP of the main clause via Dynamic Conjunction:

- (54) The LF for *Rosa called his₁ parents when she caught a₁ student smoking.*



Importantly, the CCP of the main clause will apply to the result of the CCP of the *when*-clause, because Dynamic Conjunction is sensitive to Spell Out:

- (55) $\llbracket \text{VP} \rrbracket = \lambda c. \llbracket \text{V}'_a \rrbracket (\llbracket \text{CP} \rrbracket (c)).$

Because the CCP of the *when*-clause updates the context before the CCP of its sister V'_a , the indefinite inside the *when*-clause can dynamically bind any pronoun inside V'_a (any pronoun that the *when*-clause c-commands).

The Island Condition is enforced in the following way. At LF any non-terminal node has at most one uninterpreted daughter. Dynamic Conjunction (47) updates the context by the CCP of the interpreted daughter first. Between an interpreted and an uninterpreted sister the former will update the context before the latter. As the result, an indefinite inside the interpreted node introduces a discourse referent before any of the pronouns inside the

sister of this interpreted node come into play. Hence, an indefinite inside an interpreted node will introduce a new discourse referent before all the pronouns that this interpreted node c-commands impose their presuppositions on their local input context (the Island Condition).

4.5 Quantifiers

Let me briefly point out that the Island Condition is satisfied in cases of donkey anaphora as well, that is, cases when the indefinite is interpreted in the scope of another quantificational operator. The Island Condition subsumes the structural restriction on donkey anaphora introduced by Haïk (1984) and Büring (2004), namely, that the quantificational DP that contains the indefinite must c-command the pronoun.

In the case of donkey anaphora with adnominal quantifiers the indefinite is inside the NP (called “the restrictor”), and the pronoun is inside the sister of the DP projected by the quantifier (called “the scope”):

- (56) a. ^{ok} [*Every* girl who liked **a₁ donkey**] petted **it₁**. $\forall > \exists$
 b. ^{ok} [*Most* girls who liked **a₁ donkey**] petted **it₁**. $\text{Most} > \exists$
 c. ^{ok} [*No* girl who liked **a₁ donkey**] petted **it₁**. $\text{No} > \exists$

This is in accordance with the Island Condition, since in all the sentences in (56) the indefinite so-commands the pronoun.

In the case of donkey anaphora with adverbial quantifiers the indefinite is inside an adjunct clause (called “the restrictor”), and the pronoun is inside the main clause (called “the scope”):

- (57) a. ^{ok} Rosa *always* calls **his₁** parents, [when **a₁ boy** gets sick]. $\forall > \exists$
 b. ^{ok} Rosa *in most cases* calls **his₁** parents, [when **a₁ boy** gets sick]. $\text{Most} > \exists$
 c. ^{ok} Rosa *never* calls **his₁** parents, [when **a₁ boy** gets sick]. $\text{Never} > \exists$

This is also in accordance with the Island Condition. In all the sentences in (57) the indefinite so-commands the pronoun.

In dynamic theories these data are accounted for by the following assumptions. First,

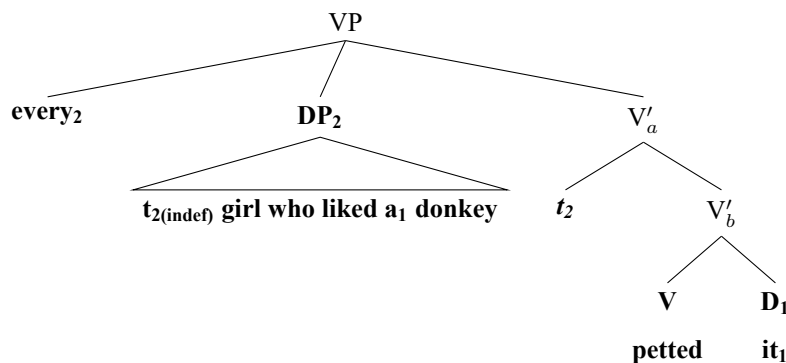
an adnominal quantifier takes its NP as its first argument (restrictor) and the sister of its DP as its second argument (scope). Second, an adverbial quantifier takes an adjunct CP as its first argument (restrictor) and the sister of this CP as its second argument (scope). Third, indefinite anaphora always proceeds from the restrictor to the scope of any given quantifier.

This raises the following explanatory question: Why is this the case? Why is the noun phrase always the first argument of an adnominal quantifier and why is an adjunct clause always the first argument of an adverbial quantifier? Perhaps, in adnominal cases this can be due to the fact that the quantifier forms a constituent with its first argument (the restrictor). But in adverbial cases this is not true, or at least, there are no independent reasons to believe it to be true. There is no independent data that would suggest that *always* forms a constituent with the *when*-clause in (57a) at any point of syntactic derivation.

A principled explanation may come from the Spell Out theory. In a configuration ‘Q(quantifier) α β ’ α serves as the first argument of Q, because α has been spelled out and β has not.

Heim’s (1982) LFs for quantifiers involve ternary branching. Adnominal quantifiers move from their base position leaving a co-indexed indefinite D as a trace:

(58) The LF for *Every₂ girl who liked a₁ donkey petted it₁*.

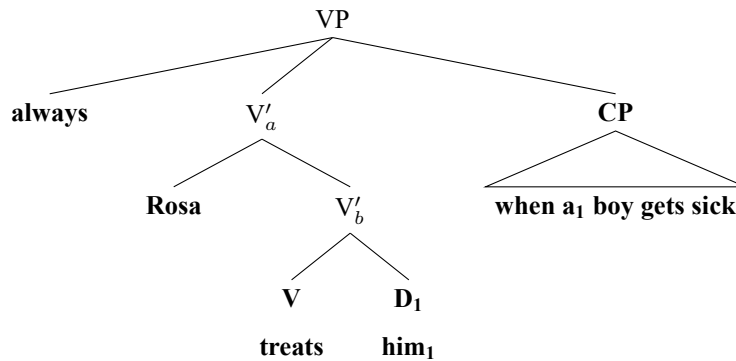


The interpretation rule for adnominal quantifiers treats the left node after *every* as the restrictor and the right node after *every* as the scope. That is, [every DP V'] means something like “for every update by DP a subsequent update by V' does not result in an empty context”.

Adverbial quantifiers are base generated as a third daughter to a node that immediately

dominates the adjunct clause, if there is one:

(59) The LF for *Rosa always treats him₁ when a₁ boy gets sick*.



The interpretation rule for adverbial quantifiers treats the adjunct CP as the restrictor and the main clause as the scope. That is, [always V' CP] means something like “for every update by CP a subsequent update by V' does not result in an empty context”.

In the present system these two facts are not accidental. The first argument is always a spelled out constituent. The interpretation rules for adnominal and adverbial quantifiers can be unified:

(60) **Interpretation Rule 4. Quantifiers**

If $\gamma = [\text{every/always } \alpha \beta]$, where α is spelled out and β is not, then

$$\llbracket \gamma \rrbracket = \lambda c. \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and} \\ \forall \langle v, h \rangle \in \llbracket \alpha \rrbracket (\{ \langle w, g \rangle \}): \exists \langle v', h' \rangle \in \llbracket \beta \rrbracket (\{ \langle v, h \rangle \}) \}.$$

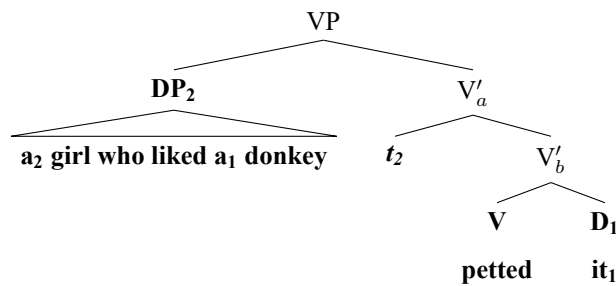
The rule in (60) delivers Heimian truth-conditions for quantificational sentences and, as a consequence, leads to all of the shortcomings of Heim's system, including the famous proportion problem. However, for the present purposes it is important that, thanks to the reference to Spell Out, this rule extends the Island Condition to donkey anaphora.

4.6 Spell Out at LF

The theory presented above begs an explanatory question. Why do interpretation rules (Dynamic Conjunction and the rule for quantifiers) make reference to Spell Out? Why is the spelled out daughter always the first argument for any dynamic connective?

A potential answer to this question comes from an assumption that Spell Out applies to LF “from top to bottom”.¹¹ For example, consider the following LF:

(61) The LF for $[A_2 \textit{ girl who liked } a_1 \textit{ donkey}] \textit{ petted } it_1$.



Spell Out is a function that receives a syntactic object and returns a meaning. When Spell Out receives the LF in (61), it receives a set $VP = \{DP_2, V'_a\}$. It has to assign this set a meaning, which should be calculated based on the already known meaning of DP_2 and the not yet known meaning of V'_a .

Suppose that at this point Spell Out records the meaning of the VP as the already available meaning of DP_2 (a CCP that introduces two discourse referents). After that Spell Out proceeds to interpret V'_a . The meaning of V'_a is calculated based on the interpretation rule for predicates. After that, Spell Out “appends” the already recorded meaning (the CCP of DP_2) by the newly calculated meaning of V'_a . As the result, the CCP of the VP is a composition of the CCP of DP_2 and the CCP of V'_a in that order. The order is determined by the order in which Spell Out interprets LF (“from top to bottom”).

Assume that Spell Out receives LF, a syntactic structure, which is a set $\gamma = \{\alpha, \beta\}$. It starts by creating a vacuous CCP, call it CCP_{root} , and writing it as $\lambda c.c.$ Then Spell Out applies whichever interpretation rule fits γ . Each interpretation rule “appends” CCP_{root} and includes instructions about what to interpret next:

¹¹The question of whether Spell Out applies “from bottom to top” or “from top to bottom” is widely discussed with respect to PF (see Bobaljik, 2000, and subsequent literature), because these two options lead to different predictions. Similarly, it makes perfect sense to ask the same question about Spell Out at LF.

(62) **Interpretation Rule 3. Dynamic Conjunction** (new version)

Given CCP_{root} and $\gamma = \{\alpha \beta\}$, where α is interpreted and β is not and $\llbracket \alpha \rrbracket$ is a CCP, do the following:

- a. Rewrite CCP_{root} as $\lambda c. \llbracket \alpha \rrbracket (CCP_{root}(c))$.
- b. Proceed to interpret β , with the new rewritten CCP_{root} .

(63) **Interpretation Rule 2. Predicates** (new version)

Given CCP_{root} and γ , which is a minimal node that dominates a verb and its arguments that are pronouns and traces with indexes $i \dots j$, do the following:

- a. Rewrite CCP_{root} as $\lambda c. \llbracket \gamma \rrbracket (CCP_{root}(c))$, where

$$\llbracket \gamma \rrbracket = \lambda c. \forall \langle w, g \rangle \in c: i \dots j \in \text{dom}(g).$$

$$\{ \langle w, g \rangle \mid \langle w, g \rangle \in c$$

$$\text{and } \langle g(i) \dots g(j) \rangle \text{ is in the extension of } V \text{ in } w \}.$$
- b. Terminate Spell Out.

(64) **Interpretation Rule 1. Indefinites** (new version)

Given CCP_{root} and γ , which is a node that immediately dominates an indefinite D_i and N , do the following:

- a. Rewrite CCP_{root} as $\lambda c. \llbracket \gamma \rrbracket (CCP_{root}(c))$, where

$$\llbracket \gamma \rrbracket = \lambda c. \{ \langle w, g \rangle \mid \langle w, g \rangle \in c$$

$$\text{and } i \in \text{dom}(g)$$

$$\text{and } g(i) \text{ is in the extension of } N \text{ in } w \}.$$
- b. Terminate Spell Out.

Meanwhile, quantifiers create an auxiliary CCP (CCP_{aux}):

(65) **Interpretation Rule 4. Quantifiers** (new version)

Given CCP_{root} and $\gamma = \{\text{every/always } \alpha \beta\}$, where α is interpreted and β is not and $\llbracket \alpha \rrbracket$ is a CCP, then

- a. Create CCP_{aux} and write it as $\lambda c. c$.
- b. Proceed to interpret β with CCP_{aux} instead of CCP_{root} .
- c. After step b terminates, rewrite CCP_{root} as $\lambda c. \llbracket \gamma \rrbracket (CCP_{root}(c))$, where

$$\llbracket \gamma \rrbracket = \lambda c. \{ \langle w, g \rangle \mid \langle w, g \rangle \in c \text{ and } \forall \langle v, h \rangle \in \llbracket \alpha \rrbracket (\{ \langle w, g \rangle \}): \exists \langle v', h' \rangle \in CCP_{aux} (\{ \langle v, h \rangle \}) \}.$$
- d. Terminate Spell Out.

Every interpretation rule, first, “records” the meaning of the spelled out daughter and only then proceeds to interpret the non-spelled out one. Consequently, any spelled out constituent (any specifier and any adjunct) updates the input context before its sister.

For example, when Spell Out applies to the LF in (61), it begins by creating a vacuous $CCP_{root} = \lambda c. c$.

The input LF is a piece of syntactic structure, a set $VP = \{DP_2 V'_a\}$, where DP_2 is interpreted and V'_a is not and $\llbracket DP_2 \rrbracket$ is a CCP. Given this description, the rule of Dynamic Conjunction (62) applies. According to (62a), CCP_{root} is rewritten as $\lambda c. \llbracket DP_2 \rrbracket (CCP_{root}(c))$, which is equivalent to $\lambda c. \llbracket DP_2 \rrbracket (\llbracket \lambda c'. c' \rrbracket (c))$, which is equivalent to $\lambda c. \llbracket DP_2 \rrbracket (c)$. According to (62b), the next step is to proceed to interpret V'_a .

The node V'_a is the minimal node that dominates a verb V and all of its argument positions, occupied by pronouns and traces with indexes 2 and 1. Given this description, the rule for predicates (63) applies. According to (63a), CCP_{root} is rewritten as $\lambda c. \llbracket V'_a \rrbracket (CCP_{root}(c))$, which is equivalent to $\lambda c. \llbracket V'_a \rrbracket (\llbracket DP_2 \rrbracket (c))$. According to (63b), Spell Out is terminated.

The result is a complex CCP composed of the CCP of DP_2 and the CCP of V'_a *in that order*. The order is fully determined by the fact that the Spell Out rules (the interpretation rules) apply to LF in a top-to-bottom fashion, proceeding from a spelled out to a non spelled out sister.

5 Extensions¹²

5.1 Presupposition projection

One of the key contributions of dynamic semantics is a uniform treatment of presupposition projection and discourse anaphora. The pronoun introduces a presupposition, which can be satisfied by the indefinite, if the indefinite is “interpreted before” the pronoun.

The central prediction of theories that followed dynamic semantics in unifying these two phenomena is that the “direction” of discourse anaphora should match the “direction” of presupposition projection. The presuppositions of an expression α can be filtered out by another expression β , if β is interpreted before α . In other words, β can filter out the presuppositions of α , if α is interpreted in the local context of β . This is to be understood as a necessary, but not sufficient condition.

In the previous sections I have argued that the direction of discourse anaphora is determined by Spell Out, i.e., the Island Condition. In terms of local contexts the same generalization can be stated in the following way:

(66) **The Island Condition** (local context version)

The local context of α includes all interpreted nodes that c-command α .

In the existing theories of presupposition projection (see e.g. Schlenker, 2009, 2011) the local context for any expression α includes all the nodes that linearly precede α . The proposal that this paper advocates for is to replace “precede” by “so-command”. A presuppositions of an expression α can be filtered out by any material inside an interpreted node that c-commands α . That is a necessary, though not sufficient condition.

Indeed, at least, preliminary, it seems that the three basic configurations introduced in section 1 and discussed in section 3 show the same behavior when it comes to presupposition projection, as they do with respect to discourse anaphora.

In coordination the first conjunct may filter out the presuppositions of the second one. Thus, the sentence in (67a) presupposes that Rosa used to smoke, while the sentence in (67b) does not.

¹²The data in sections 5 and 6 were only checked with a couple of speakers.

- (67) a. Rosa **stopped smoking**.
 b. Rosa **used to smoke** and then **stopped smoking**.

First, the proposition ‘Rosa used to smoke’ is entailed by both (67a) and (67b), as is evident from the fact that both (68a) and (68b) are contradictions.

- (68) a. Rosa **stopped smoking**. #But she didn’t use to.
 b. Rosa **used to smoke** and then **stopped smoking**. #But she didn’t use to.

Second, this entailment projects from downward entailing environments for (67a), but not for (67b). If the clause in (67a) is embedded inside the prejacent of a conditional, the whole sentence still entails ‘Rosa used to smoke’. Thus, (69a) is a contradiction. Meanwhile, if the clause in (67b) is embedded inside the prejacent of a conditional, the whole sentence does not entail ‘Rosa used to smoke’. Thus, (69b) is not a contradiction.

- (69) a. If Rosa **stopped smoking**, our anti-smoking campaign was a success. #But she didn’t use to.
 b. If Rosa **used to smoke** and then **stopped smoking**, our anti-smoking campaign was a success. ^{ok}But she didn’t use to.

This is in accordance with the Island Condition. Since the first conjunct is the specifier of ConjP, which c-commands the second conjunct, we expect that material inside it can filter out the presuppositions of the second conjunct.

In conditional sentences the prejacent (the *if*-clause) can filter out the presuppositions of the main clause, *regardless* of the surface linear order. Thus, the sentence in (70a) presupposes that Rosa used to smoke, while the sentence in (70b) does not.

- (70) a. Rosa **stopped smoking**.
 b. Rosa **stopped smoking**, if she **used to smoke**.

In fact, the sentence in (70b) does not even entail that Rosa smokes. The sequence in (71a) leads to a contradiction, while the sequence in (71b) does not.

- (71) a. Rosa **stopped smoking**. #But she didn’t use to smoke.
 b. Rosa **stopped smoking**, if she **used to smoke**. ^{ok}But she didn’t use to smoke.

Finally, with the noun phrase of an adnominal quantifier can filter out the presuppositions of its scope. The sentence in (72a) presupposes that every boy used to smoke, while the sentence in (72b) does not even entail it.

- (72) a. Every boy **stopped smoking**.
 b. Every boy who **used to smoke** **stopped smoking**.

This is evident from the fact that the sequence in (73a) leads to a contradiction, while the sequence in (73b) does not.

- (73) a. Every boy **stopped smoking**. [#]But not every boy used to smoke.
 b. Every boy who **used to smoke** **stopped smoking**. ^{ok}But not every boy used to smoke.

To sum up, in coordination the first conjunct can filter out the presuppositions of the second conjunct; in conditional sentences the adjunct *if*-clause can filter out the presuppositions of the main clause; and a quantified DP can filter out the presuppositions of its scope:

- (74) a. Rosa **stopped smoking**.
 b. Rosa [**used to smoke**], and then **stopped smoking**.
- (75) a. Every boy **stopped smoking**.
 b. [Every boy who **used to smoke**] **stopped smoking**.
- (76) a. Rosa **stopped smoking**.
 b. Rosa **stopped smoking**, [if she **used to smoke**].

These data are in accordance with the Island Condition. Any specifier creates the local context for its sister. In coordination the local context of the second conjunct includes the first conjunct (74). The local context of any X' -projection includes Spec,XP (75). In addition, any adjunct creates the local context for its sister. Thus, an adjunct clause always creates the local context for its sister regardless of the surface linear order (76).

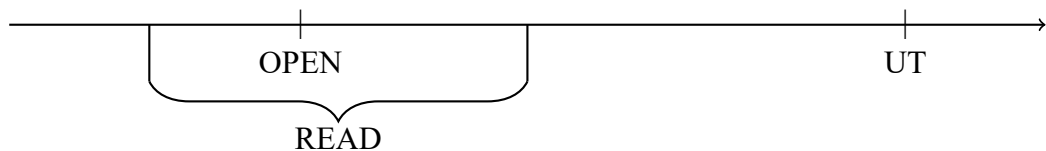
If we assume that the presuppositions of a presupposition trigger α must be satisfied in the local context of α (Schlenker, 2009, 2011) and the Island Condition view of local

contexts (66), then we have a natural explanation for all the contrasts in (74-76) without additional stipulations. In (74a), (76a), (75a) there is an interpreted node that c-commands the presupposition trigger and entails the presupposition. The presupposition is filtered out. In (74b), (76b), (75b) there is no such node. The presupposition is not filtered out.

5.2 Temporal iconicity

Consider the pair of sentences in (77). Both of them contain two clauses, one perfective and one imperfective, one of which is embedded under *when*.

- (77) a. Rosa was reading a book, when Karl opened the door.
 b. Karl opened the door, when Rosa was reading a book.



Where OPEN marks the runtime of the opening event; READ marks the runtime of the reading event; UT stands for the utterance time.

Regardless of which clause is the main clause and which clause is the embedded clause, the imperfective clause introduces a background event, while the perfective one introduces an event temporally included in the runtime of this background event (Dahl, 1985; Klein, 1994). In other words, in both (77a) and (77b) the event of Rosa reading a book temporally includes the event of Karl opening the door, as is illustrated by the scheme under (77).

This fact can be accounted for if we introduce a symmetric conjunctive semantics for *when*. This complementizer simply identifies the Topic Time of the main clause with the Topic Time of the embedded clause.

Aspect (perfective or imperfective) introduces a time interval, standing in a particular temporal relation to the event of the verb phrase (Klein, 1994; Kratzer, 1998a). Imperfective introduces a time interval is included in the event time (78a). Perfective introduces a time interval that includes the event time (78b):

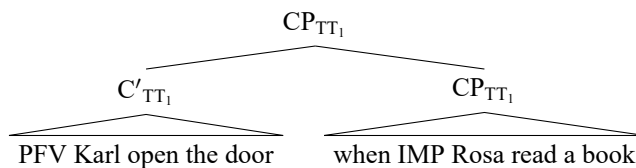
- (78) a. $\text{PFV} \rightsquigarrow \lambda P_{\langle vt \rangle}. \lambda t. \exists e: P(e) \ \& \ \tau(e) \subseteq t$.
 b. $\text{IMP} \rightsquigarrow \lambda P_{\langle vt \rangle}. \lambda t. \exists e: P(e) \ \& \ t \subseteq \tau(e)$.

Assuming the anaphoric theory of tense (Partee, 1973; Kratzer, 1998a), the predicate of time-intervals that the Aspect head returns, after applying to the vP , is predicated over a salient time interval in the past (the Topic Time):

- (79) a. ‘Karl opened the door’ $\rightsquigarrow \exists e: \text{open-the-door-by-Karl}(e) \ \& \ \tau(e) \subseteq \mathbf{TT}$.
 b. ‘Rosa was reading a book’ $\rightsquigarrow \exists e: \text{read-a-book-by-Rosa}(e) \ \& \ \mathbf{TT} \subseteq \tau(e)$.

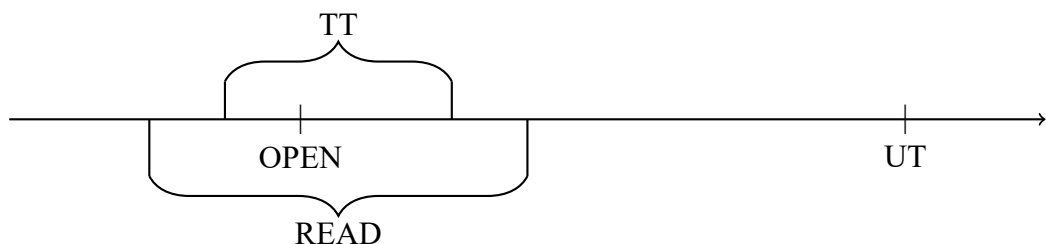
Suppose that *when* conjoins two clauses, while requiring their Topics Times to match:¹³

- (80) Attachment of the *when*-clause:



As the result, the Topic Time of the main clause stands in two different temporal relations to two events:

- (81) ‘IMP when PFV’ = ‘PFV when IMP’ $\rightsquigarrow \tau(e_{\text{open}}) \subseteq \mathbf{TT} \subseteq \tau(e_{\text{read}})$



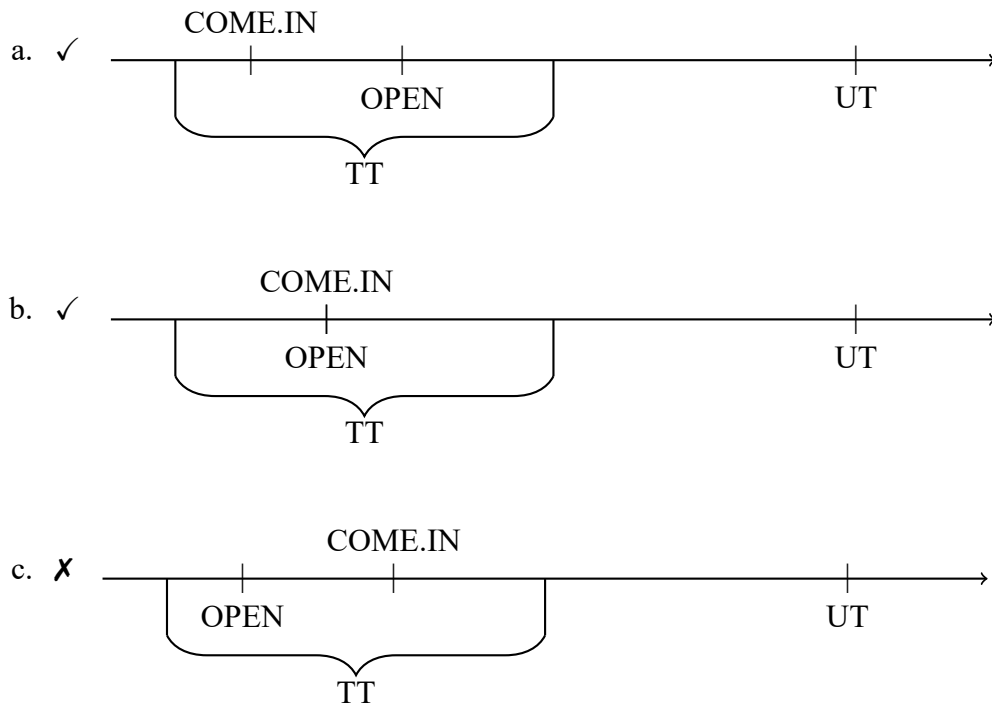
Crucially, because the interpretation of the *when*-clause is “symmetric” (it is combined with the main clause via Dynamic Conjunction or predicate modification), it does not matter which clause is perfective and which clause is imperfective. The temporal relation

¹³In the dynamic semantic framework, presented in the previous section, this could be done via Dynamic Conjunction of two CCPs. In more conservative theories the *when*-clause can combine with the main clause *Asp'* via predicate modification.

will always be as is illustrated in (81): the event described by the imperfective clause temporally includes the event described by the perfective clause.

If both clauses are perfective, the sentence has a precedence inference. The event described by the *when*-clause is either simultaneous with or precedes the event described by the main clause, *regardless* of the linear order between the clauses. Thus, the sentence in (82) can describe a situation when Rosa coming in preceded Karl opening the door (82a), a situation when Rosa coming in happened simultaneously with Karl opening the door (82b), but not a situation when Rosa coming in happened after Karl opening the door (82c).

(82) Karl opened the door, when Rosa came in.



The sketch theory presented above makes no predictions about the temporal relation between two events described by two perfective clauses. Both events should be included in one salient time interval in the past, the Topic Time. The temporal order between them should not be specified:

(83) Predicted truth-conditions (no entailment about the order of events):

- a. 'Karl opened the door' $\rightsquigarrow \exists e. \text{open-the-door-by-Karl}(e) \ \& \ \tau(e) \subseteq \mathbf{TT}.$
- b. 'Rosa came in' $\rightsquigarrow \exists e. \text{come-in-by-Rosa}(e) \ \& \ \tau(e) \subseteq \mathbf{TT}.$

c. ‘a when b’ $\rightsquigarrow \tau(\mathbf{e}_{\text{come.in}}) \subseteq \mathbf{TT} \ \& \ \tau(\mathbf{e}_{\text{open}}) \subseteq \mathbf{TT}$.

There is a way of deriving the precedence inference, however, without changing our assumptions about the meaning of *when*. It crucially relies on the Island Condition view of the semantic side of Spell Out. That is, it crucially relies on the fact the the adjunct clause is interpreted before its sister, regardless of the surface linear order between them.

Suppose that there is a general pragmatic principle of the following form:

(84) **Temporal Iconicity**

The order of context updates introducing new events within an utterance corresponds to the temporal order between these events, unless this contradicts the truth-conditions.

The context update created by the *when*-clause precedes the context update created by the main clause (due to the Island Condition). Hence, if the temporal order between the events described by the two clauses is unspecified, as in the case of two perfective clauses, the temporal order matches the update order. That is, the event described by the adjunct clause precedes the event described by the main clause.

A similar effect has been observed in TP-coordination (Bjorkman, 2013, 2014, among many others), which also leads to asymmetric inferences. There the event described by the first conjunct may not follow the event described by the second conjunct. This is also in accordance with the Island Condition. The first conjunct, being the specifier of ConjP, is interpreted before the second conjunct, which is the complement of ConjP.

6 Issues

In this section I will briefly discuss two potential issues with the presented theory. One concerns discourse and donkey anaphora with non-temporal and non-conditional adjunct clauses (section 6.1). The other concerns disjunction (section 6.2).

6.1 Other adjuncts

The key advantage of the Island Condition is that it accounts for the possibility of cataphora in a principled way. More precisely, it predicts that cataphora will only be possible

to an indefinite in a postposed adjunct.

However, the Island Condition predicts that cataphora is possible to an indefinite inside *any* adjunct, which is not the case. It is possible with postposed temporal *after/when/before*-clauses, *if*-clauses, locative PPs (see section 3.3 above), but not with *because*-clauses, *while*-clauses or *since*-clauses:

- (85) a. * I had to call **his**₁ parents, [since **a boy**₁ got sick].
 b. * Last summer Rosa had to call **his**₁ parents, [because **a boy**₁ got sick].
 c. * I was talking to **his**₁ parents, [while **a boy**₁ was playing in the garden].

In all the three sentences in (85) the adjunct clause is attached higher than the pronoun, which means that the indefinite SO-commands the pronoun. This is supported by the lack of condition C effects in the following sentences:

- (86) a. ^{ok} I had to visit **him**₁, since **Karl**₁ wasn't feeling well.
 b. ^{ok} I had to visit **him**₁, because **Karl**₁ wasn't feeling well.
 c. ^{ok} I had to visit **him**₁, while **Karl**₁ was sick.

Nevertheless, discourse anaphora is not possible. Either we must abandon the Island Condition or discourse anaphora in (85a-c) must be ruled out independently. In the latter case we would have to assume that the Island Condition is a necessary, though not sufficient requirement on dynamic binding. Since the solution may be different for *since*-clauses, on the one hand, and *because*-clauses and *while*-clauses, on the other hand, I will discuss them separately.

Let me begin with *since*-clauses. Iatridou (1991) argues that *since*-clauses are obligatory presupposed and do not participate in any binding relations with the main clause. In particular, while variable binding is possible into a temporal or *if*-clause, it is not possible into a *since*-clause:

- (87) a. * **Every boy**₁ had to go to bed since **he**₁ had to be up by 5. (Iatridou, 1991, 83)
 b. ^{ok} **Every boy**₁ came when I called **him**₁.
 c. ^{ok} **Every boy**₁ will come if I call **him**₁.

While temporal and *if*-clauses can be associated with focus, *since*-clauses cannot:

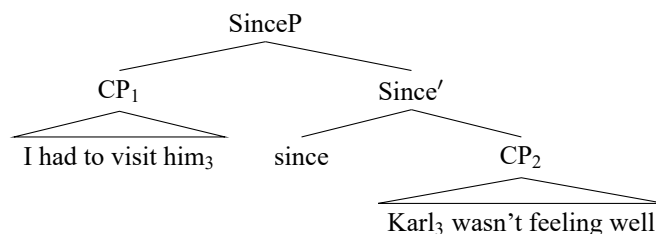
- (88) a. * John left home **only/just** since he was short of money. (Iatridou, 1991, 84)
 b. ^{ok} Rosa came **only/just** when I called her.
 c. ^{ok} Rosa will come **only/just** if I call her.

A *since*-clause necessarily escapes the scope of main clause negation, while a temporal or *if*-clause can be interpreted in its scope:

- (89) a. He did **not** leave since he was sick.
 [#]In fact, he wasn't sick. (Iatridou, 1991, 88)
 b. Rosa did **not** come when I called her.
 ^{ok}In fact, I never did (call her).
 c. Rosa will **not** come if I call her.
 ^{ok}In fact, she will come if I don't.

These data can be accounted for, if we assume that *since*-clauses have the structure in (90). In (90) *since* serves as a connective between two clauses, taking the clause after it as its complement and the “main” clause as its specifier (cf. Frey’s 2016; 2020 analysis of so-called non-integrated adjunct clauses).

- (90) The syntax of *since*-clauses:



If (90) is the correct structure, it is expected that *since*-clauses may not be bound into or focused and that they escape the scope of main clause negation. The same is true for the second conjunct in a semantically symmetric coordination, which has the same structure, as (90), but with *and* instead of *since*:

- (91) a. * **Every boy**₂ went to bed early, and **he**₂ got up at five.
 b. * John left, **only/just** and he was short of money.
 c. He did **not** leave, and he was sick. #In fact, he wasn't sick.

If the structure in (90) is correct, then the impossibility of indefinite cataphora in (85a) is expected. The indefinite in (85a) does not so-command the pronoun. The maximal so-domain that contains the indefinite, but not the pronoun, is the indefinite itself (the *since*-clause is an X'-projection, *Since'*, and thus, is not an so-domain). The indefinite does not c-command the pronoun.

The impossibility of indefinite cataphora with *because* and *while*-clauses can be explained in a different way. Notice, first, that *because*- and *while*-clauses, like temporal and *if*-clauses, are attached above the VP-internal object, as is evident from the lack of condition C effects in the following sentences:

- (92) a. ^{ok} I will have to visit **him**₁, if **Karl**₁ gets sick.
 b. ^{ok} I had to visit **him**₁, when **Karl**₁ got sick.
 c. ^{ok} I had to visit **him**₁, because **Karl**₁ wasn't feeling well.
 d. ^{ok} I had to visit **him**₁, while **Karl**₁ was sick.

At the same time, while temporal and *if*-clauses can attach above the main clause subject, *because* and *while*-clauses cannot. This is supported by the fact that, while (for some speakers) the sentences in (93a-b) are acceptable, the sentences in (93c-d) do not seem to be as good:

- (93) a. ^{ok} Obviously, **it**₁ will eat all the meat, if you leave **the tiger**₁ alone in the enclosure.
 b. ^{ok} Obviously, **it**₁ ate all the meat, when you left **the tiger**₁ alone in the enclosure.
 c. [?] Obviously, **it**₁ ate all the meat, because you left **the tiger**₁ alone in the enclosure.
 d. [?] Obviously, **it**₁ ate all the meat, while you were not watching **the tiger**₁ in the enclosure.

At the same time variable binding is possible between a quantified object of the main clause and all these four types of adjunct clauses:

- (94) a. ^{ok} I will eat **every dish you cook**₁, if you don't put flour in **it**₁.
 b. ^{ok} Rosa asked **every guest who came to our house**₁ to wash their₁ hands, when **they**₁ were about to eat.
 c. ^{ok} Rosa kicked out **every guest who came to our house**₁, because **they**₁ couldn't behave.
 d. ^{ok} Rosa interrogated **every guest who came to our house**₁, while **they**₁ were eating.

Crucially, though, variable binding into a temporal or *if*-clause is not possible, if it is attached above the main clause subject (if it contains a referential expression, co-indexed with a pronoun in the subject position):

- (95) a. * **She**₂ will eat **every dish**₁ you cooked, if you try to put **it**₁ on **the cat**₂'s plate.
 b. * **She**₂ always eats **every dish**₁ you cook, when you put **it**₁ on **the cat**₂'s plate.

The data in (92-95) can be explained, if we make the following two assumptions. First, the only available attachment site for *because* and *while* clauses is above the main clause object, but below the main clause subject. Consequently, there are no condition C effects in (92c-d), but there are condition C effects in (93c-d). The object may undergo Quantifier Raising to a position above the attachment site of *because* and *while*-clauses and, thus, bind into them, which explains (94c-d).

Second, temporal and *if*-clauses can attach either at the same level, as *because* and *while* clauses, or above the main clause subject. Hence, we observe condition C effects in neither (92a-b), nor (93a-b). At the same time, a quantified object can bind into a temporal or *if*-clause, if this clause is attached low, as in (94a-b), but not if it is attached high, as in (95). The reason for this could be that there are no A-positions *above* the main

clause subject, which the object could have raised to in order to bind into a high-attached temporal or *if*-clause.

If these assumptions are correct, a potential explanation for the impossibility of cataphora with *because* and *while* clauses may come from a competition between variable and dynamic binding (cf. the competition based approach to condition C, proposed by Reinhart, 1983). Suppose that whenever variable binding is possible, variable binding must be used:

- (96) If two syntactic positions α and β are intended to be anaphorically related and can be anaphorically related by variable binding, they must be anaphorically related by variable binding.

Whenever the speaker intends to express an anaphoric relation between an expression α inside the main clause and another expression β inside an adjunct clause and variable binding is an option, variable binding must be used.

If this is correct, then all the low attached adjunct clauses (temporal, *if*, *because* and *while*-clauses) do not allow for indefinite cataphora between an indefinite β inside the adjunct clause and a pronoun α inside the main clause. The reason is that for low attached adjunct clauses there is always an option of variable binding, if β is replaced by a pronoun and α is replaced by an indefinite, which undergoes QR above the adjunct clause.

At the same time, high attached adjunct clauses (temporal and *if*-clauses) cannot be “bound into” from the main clause. As the result, dynamic binding is available. Hence, indefinite cataphora is possible, in accordance with the Island Condition. Crucially, because *because* and *while*-clauses cannot be attached that high, this option is not available for them.

One prediction of this account is that indefinite cataphora should only be possible with temporal and *if*-clauses that are attached above the subject. This prediction, however, will have to be left for the future research.

6.2 Disjunction

Another issue with the proposed theory comes from disjunction. Consider the pair of sentences (97a) and (97b), which illustrate the so-called *bathroom disjunction*.

- (97) a. ^{ok} Karl didn't bring **any books**₁, or he hid **them**₁ in his room.
 b. ^{ok} Karl hid **them**₁ in his room, or he didn't bring **any books**₁.

This construction creates two problems for theories of discourse anaphora. First, in order to create an accessible antecedent for the pronoun in another disjunct the indefinite must be negated, compare (97) and (98). This problem concerns the semantics of the indefinite and negation and is, thus, irrelevant for the Island Condition.

- (98) * Karl brought **some books**₁, or he hid **them**₁ in his room.

Second, the order of disjuncts can be reversed: both (97a) and (97b) are acceptable. This fact does create a problem for the Island Condition. If we assume that disjunction has a DisjP structure, parallel to semantically symmetric conjunction (see e.g. Wu, 2021), the Island Condition predicts that indefinite anaphora can only “proceed” from the left disjunct to the right one. That is, the Island Condition predicts (97a) to be acceptable and (97b) to be ungrammatical, contrary to fact.

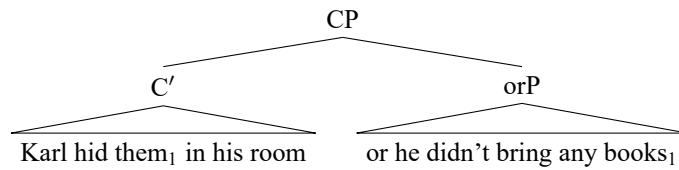
Notice, however, that bathroom disjunctions require an exclusive interpretation of *or*. That is, in (97) each disjunct must contextually entail the negation of the other disjunct. Either Karl didn't bring any books, or else he did, and he hid them in his room.

At the same time, exclusive disjunction seems to behave differently from standard disjunction when it comes to extraction. More precisely, exclusive disjunction does allow extraction out of the first disjunct:

- (99) a. [?] **Which book**₁ do you have to read _1, or you'll fail the course?
 b. ^{ok} **Which book**₁ do you have to read _1, or else you'll fail the course?
 c. ^{ok} **Which book**₁ do you have to read _1, else you'll fail the course?

It is possible that exclusive disjunction is syntactically ambiguous between a DisjP structure and a structure like (100), where the second disjunct is a maximal projection (orP), which merges with the first disjunct as an adjunct.

(100) The second disjunct as an adjunct:



If (100) is a possible structure for exclusive disjunction, this can explain the possibility of indefinite cataphora in (97b). In (100) the indefinite does so-command the pronoun, because the second disjunct is an adjunct.

Suppose that exclusive disjunction is syntactically ambiguous. It may have either a DisjP structure or the structure in (100). The DisjP parse licenses indefinite anaphora in cases like (97a), while the parse in (100) licenses indefinite anaphora in cases like (97b).

7 Conclusion

In this paper I have argued that Spell Out has semantic consequences. More precisely, the fact that certain parts of a sentence are spelled out before the whole affects the way in which the semantic component assigns interpretation to syntactic structure. We can see this effect in discourse anaphora.

From the two core claims of the Spell Out theory, repeated again in (101), it follows that all specifiers and all adjuncts are spelled out. In this paper I have argued that any spelled out constituent is interpreted before its sister.

(101) **The Spell Out theory**

- a. Before any two phrases are merged at least one must be spelled out.
- b. A spelled out phrase does not project its category.

With the notion of so-command, as defined in section 2, the Spell Out theory predicts that, if β so-commands α (β is inside an interpreted node that c-commands α), it creates the local context for α :

(102) **The Island Condition** (local context version)

The local context of α includes all interpreted nodes that c-command α .

The immediate consequence for discourse anaphora is that for an indefinite to dynamically bind a pronoun it has to so-command this pronoun (the Island Condition). In this paper I have argued that the Island Condition correctly restricts both indefinite anaphora and indefinite cataphora in a principled way. Thus, the predictions of the Spell Out theory are confirmed. All specifiers and all adjuncts are spelled out and, as a result, interpreted before their sisters.

A The Island Condition and movement

If the Island Condition is a binding principle, it is important to know how it interacts with different types of movement. A comprehensive research into this question lies beyond the scope of this paper, but in what follows I will lay out some preliminary observations.

Remember that an indefinite inside a complement clause cannot create an accessible antecedent for a pronoun inside the main clause. However, if the complement CP is topicalized, discourse anaphora becomes possible, as is evident from the contrast in (103).

- (103) a. * Ms. Brodie told **his**₁ parents [_{CP}that she caught **an eight-grader**₁ smoking in the bathroom].
- b. ? [_{CP}[_{CP}That Ms. Brodie caught **an eight-grader**₁ smoking in the bathroom]₂, [_{C'}she told **his**₁ parents]].

This can be explained, if CP-topicalization occurs before the Island Condition is evaluated and does not have to reconstruct. The derived position of the fronted clause in (103b) is presumably Spec,CP. If only this position is taken into account, the indefinite does indeed so-command the pronoun. The minimal so-domain that contains the indefinite, but not the pronoun, is the topicalized CP, and it c-commands the pronoun.

The two major types of movement, namely, A and A' (see Chomsky, 1981, among numerous others) differ in how they interact with different binding principles, for example, Conditions A and C of the classical binding theory (see Pesetsky, 2001, and many others).

In English the A vs. A' distinction can be exemplified by raising and question formation respectively, see (104a) and (104b). Both sentences in (104) contain an indefinite

(*a child_i*) and a pronoun anaphoric to it (*her_i*). In both examples the Island Condition is satisfied after the movement, but not before.

- (104) a. ^{ok} [A toy that **a child_i** liked]₂ seemed to [**her_i** parents] ₂ to be too expensive.
 b. ^{?/*} [Which toy that **a child_i** liked]₂ did [**her_i** parents] find ₂ too expensive?

Interestingly, English speakers I have consulted report a slight contrast between (104a) and (104b). If there is indeed a contrast here, it shows that the Island Condition interacts with A and A' movements in different ways. A-movement does not have to construct for the Island Condition (104a), while A'-movement always does (104b). This may be because the Island Condition applies at LF, and at LF only the operator is interpreted in a derived A'-position (e.g. the *wh*-element), while the rest of the phrase has to reconstruct.

A and A'-movement interact differently with variable binding. A-movement, but not A'-movement, can create new possibilities for variable binding. This is usually stated as the Weak Crossover condition (Postal, 1971). A quantifier may bind a pronoun from a derived A position, but not from a derived A'-position:

- (105) a. ^{ok} [**Every girl_i**] seems to [**her_i** parents] ₁ to be a genius.
 b. ^{?/*} [**Which girl_i**] did [**her_i** parents] send ₁ to the Linguistic Olympiad?

The contrast in (105) mirrors the one in (104), which leads us to the following tentative generalization:

- (106) Movement can only create new binding possibilities for dynamic binding, if it creates new binding possibilities for variable binding.

Observe that in (107) discourse anaphora is possible.¹⁴

- (107) ^{ok} Mary₂ [interviewed [the lawyer who called **one of the witnesses_i**]] [after PRO₂ hearing **his_i** testimony in court].

It is easy to see that (107) violates the Island Condition. The indefinite does not so-command the pronoun. Furthermore, this configuration does not allow variable binding either, see (108). This means that a noun phrase in this position cannot take scope over

¹⁴The somewhat degraded status of (107) may be due to the interference from 'the lawyer' as a potential antecedent for the pronoun.

the pronoun. This is as expected, because the quantifier is embedded inside a complex noun phrase, which is a scope island.

- (108) * Mary₂ [interviewed [the lawyer who called **every witness**₁]] [after PRO₂ hearing **his**₁ testimony in court].

If variable binding is not an option, what explains the possibility of discourse anaphora in (107)? A potential solution may come from covert movement. It is possible that the whole complex noun phrase [*the lawyer who called one of the witnesses*₁] in (107) covertly moves to a derived specifier position that c-commands the adjunct. After this movement the Island Condition is satisfied (Holmberg, 1986).

Given the tentative generalization in (106), this analysis presupposes that covert movement of the object to a position that c-commands an adjunct must create new possibilities for variable binding as well. That can be shown independently, because a quantified noun phrase in the object position can bind into an adjunct:

- (109) ^{ok} Mary₂ interviewed **every witness**₁, after PRO₂ hearing his₁ testimony.

If binding in (109) is achieved via the same movement, as in (107), this movement has to be the type of movement that creates new binding possibilities for both variable and dynamic binding. This is not surprising if the movement in question is an instance A-movement, for example, a covert object shift.

B “Backwards” donkey anaphora

The Island Condition allows us to account for the possibility of cataphora in a principled way. In particular, we can now explain Chierchia’s (1995) paradigm of “backwards” donkey anaphora with *if*- and *when*-clauses without additional stipulations.

With postposed *if/when*-clauses Chierchia (1995) reports the following set of judgments:

- (110) a. A **painter**₁ is inspired by a **village**₂ [if **she**₁ finds **it**₂ picturesque].
 b. A **painter**₁ will rent **it**₂ [if **she**₁ finds a **cottage**₂ picturesque].

- c. **A rich, capricious person₁** will buy **it₂** right away [if **a nice car₂** impresses **him₁**].

(Chierchia, 1995, 132)

In (110a) two generic indefinites *a painter₁* and *a village₂* inside the main clause bind two pronouns in the *if*-clause via variable binding (by taking scope over them).

In (110b) the generic indefinite *a painter₁* in the subject position binds the pronoun *she₁* in the *if*-clause via variable binding (by taking scope over it). The indefinite *a cottage₂* in the *if*-clause so-commands the pronoun *it₂* in the main clause, which makes dynamic binding possible.

In (110c) the generic indefinite *a rich, capricious person₁* binds the pronoun *him₁* in the *if*-clause via variable binding (by taking scope over it). The indefinite *a nice car₂* so-commands the pronoun *it₂* in the main clause, which makes dynamic binding possible.

The same three anaphoric configurations are available for the preposed *if*-clause (111), which can be explained if we assume that preposed *if*-clauses can (but does not have to) reconstruct for binding purposes. Namely, in (111) the *if*-clause reconstructs to the same position it occupies in (110), which makes the binding configurations possible.

- (111) a. [If **it₁** enters **his₂** territory], **a pirate₂** usually attacks **a ship₁**. (see 110a)
 b. [If **he₁** lies to **a student₂**], **a teacher₁** loses **his₂** trust. (see 110b)
 c. [If **a boy₁** lies to her₂], **a girl₂** won't trust **him₁** anymore. (see 110c)

(Chierchia, 1995, 130)

Chierchia's (1995, 131) Pronominal Subject Constraint, illustrated by the two examples in (112), can be attributed to condition C of the classical binding theory.

- (112) a. * [When **he₁** spots **a ship₂**], **it₂** is attacked by **a pirate₁**.
 b. * [When **a cat₁** spots **it₂**], **it₁** is attacked by **a mouse₂**.

(Chierchia, 1995, 130-131)

In (112a) the preposed *when*-clause has to reconstruct to a lower position for the indefinite *a pirate₁* to take scope over and bind the pronoun *he₁*. The base position is c-commanded by the subject *it₂*, which leads to a condition C violation, since the *when*-clause contains the indefinite *a ship₂*.

In (112b) the preposed *when*-clause has to reconstruct to a lower position for the indefinite *a mouse*₂ to take scope over and bind the pronoun *it*₂. The base position is commanded by the subject *it*₁, which, again, leads to a condition C violation, since the *when*-clause contains the indefinite *a cat*₁.

C The Island Condition in Russian

The predictions of the Island Condition are not only confirmed in English, but also in Russian. Russian does not have definite or indefinite articles, but it is still possible to distinguish between quantified, indefinite and definite noun phrases, see Paducheva (1974, 1985), among others. Here I will use *odin iz* ‘one of’ and *kakoj-to* ‘wh-PTCL’ as unambiguous markers of indefinite noun phrases.

In Russian, like in English, an indefinite inside a specifier can create an accessible antecedent for any pronoun inside its sister, but not vice-versa:

- (113) a. ^{ok} [_{TP}[_{DP}Učitel’ kotoryj pojmal **kakuju-to iz vos’miklassnic**₁
the teacher who catch.PFV.PST who-PTCL from eight-graders
kurjašej v tualete], [_{T’}razgovarival potom s **eë**₁ **roditeljami**]].
smoking in bathroom talk.IMP.PST later with her parents
‘The teacher who caught **one of the 8-graders**₁ smoking in the bathroom
was later talking to **her**₁ parents.’
- b. * [_{TP}[_{DP}Učitel’ kotoryj pojmal **eë**₁ kurjašej v tualete], [_{T’}razgovarival
the teacher who catch.PFV.PST her smoking in bathroom talk.IMP.PST
potom s roditeljami **kakoj-to iz vos’miklassnic**₁]].
later with parents who-PTCL from eight-graders
‘The teacher who caught **her**₁ smoking in the bathroom was later talking to
one of the eight-graders₁ parents.’

This is true also for indefinites that are embedded under an attitude predicate (114), which indicates that this is a syntactic restriction, not a semantic one.

- (114) a. ^{ok} [TP[DPNaličije svidetel'stv o tom, što **kakaja-to ženšina**₁ byla v existence of.indications of that that which-PTCL woman was in zdanii v moment prestuplenija], [T'značit, što my dolžny budem building in moment of.crime means that we have.to will doprosit' eĕ₁ v sude]].
question her in court
'The existence of evidence that **some woman**₁ was in the building at the moment of the crime means that we'll have to question **her**₁ in court.'
- b. * [TP[DPNaličije svidetel'stv o tom, što **ona**₁ byla v zdanii v existence of.indications of that that she was in building in moment prestuplenija], [T'značit, što my dolžny budem doprosit' moment of.crime means that we have.to will question **kakuju-to ženšinu**₁ v sude]].
which-PTCL woman in court
'The existence of evidence that **she**₁ was in the building at the moment of the crime means that we'll have to question **some woman**₁ in court.'

Like in English, in Russian an indefinite inside an adjunct can create an accessible antecedent for a pronoun inside the main clause, while an indefinite inside a complement may not:

- (115) a. ^{ok} Maria Ivanonva [_{vP}[_{v'}skazala što *pro* soobšit **ego**₁ **roditeljam**],
Maria Ivanovna say.PFV.PST that she inform.PFV.PRS his parents.DAT
[CPkogda *pro* zastala **kogo-to iz vos'miklassnikov**₁ kurjašim v tualete]].
when she catch.PFV.PST who-PTCL from eight-graders smoking in bathroom
'M.I. said that she will inform **his**₁ parents, when she caught **a 8-grader**₁ smoking in the bathroom.'
- b. * Maria Ivanovna [_{vP}skazala što *pro* soobšit **ego**₁ **roditeljam**,
Maria Ivanovna say.PFV.PST that she inform.PFV.PRS his parents.DAT
[CPšto *pro* zastala **kogo-to iz vos'miklassnikov**₁ kurjašim v tualete]].
that she catch.PFV.PST who-PTCL from eight-graders smoking in bathroom
'M.I. said that she will inform **his**₁ parents that she caught **a 8-grader**₁ smoking in the bathroom.'

The same is true in donkey anaphoric configurations:

- (116) a. ^{ok} i každyj raz Maria Ivanovna [_{vP}[_{v'}govorila, što *pro*
and every time Maria Ivanovna say.IMP.PST that she
soobšit **ego**₁ roditeljam], [_{CP}kogda ona zastavala
inform.PFV.PRS his parents.DAT when she catch.IMP.PST
kogo-to iz vos'miklassnikov₁ kurjašim v tualete]].
who-PTCL from eight-graders smoking in bathroom
'Every time M.I. said that she will inform **his**₁ parents, when she caught **an**
8-grader₁ smoking in the bathroom.'
- b. *i každyj raz Maria Ivanovna [_{vP}govorila, što *pro* soobšit
and every time Maria Ivanovna say.IMP.PST that she inform.PFV.PRS
ego₁ roditeljam, [_{CP}što ona zastavala **kogo-to iz vos'miklassnikov**₁
his parents.DAT when she catch.IMP.PST who-PTCL from eight-graders
kurjašim v tualete]].
smoking in bathroom
'Every time M.I. said that she will inform **his**₁ parents that she caught **an**
8-grader₁ smoking in the bathroom.'

Finally, in coordination, discourse anaphora proceeds from the first conjunct to the second one and not vice-versa:

- (117) a. ^{ok} [_{ConjP}[_{CP}Vošla **kakaja-to ženšina**₁], [_{Conj'}i hozjain predložil **ej**₁ vypit']].
come.in.PFV.PST some woman and host offered her to.drink
'**Some woman**₁ came in and the host offered **her**₁ drinks.'
- b. * [_{ConjP}[_{CP}Vošla **ona**₁], [_{Conj'}i hozjain predložil **kakoj-to ženšine**₁ vypit']].
come.in.PFV.PST she and host offered some woman to.drink
'**She**₁ came in and the host offered **some woman**₁ drinks.'

Abbreviations

1	first person	NEG	negation
2	second person	NOM	nominative case
3	third person	PFV	perfective
ACC	accusative case	PL	plural
F	feminine gender	PRS	present tense marker
GEN	genitive case	PST	past tense marker
IMP	imperfective	PTCL	topic particle
LOC	locative case	SBJ	subjunctive
M	masculine gender	SE	reflexive marker
N	neuter gender	SG	singular
NCI	negative concord particle		

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