

Crossover restrictions, A-bar pronouns and discourse antecedents

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The difference between weak crossovers and weakest crossovers is usually derived from a distinction between quantifiers and non-quantifiers (Lasnik & Stowell 1991). In this paper I will derive crossover restrictions from a new example set, long movement constructions with Dutch A-bar pronouns. Besides question *wh*-pronouns and relative pronouns, the set of Dutch A-bar pronouns includes topic *d*-pronouns not available in English. I will argue that A-bar pronouns constitute a uniform set of quantifiers, be it quantifiers with a discourse antecedent. To explain the present analysis, I take Safir (2004) and Ruys (2004) as a starting point. A major difference between these approaches and my own is that my analysis will make a distinction between strong crossovers as binding failures versus weak and weakest crossovers as a matter of discourse dependency, whereas it is more usual to see a related explanation for strong and weak crossovers versus weakest crossovers.

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1. Crossover restrictions

Crossover configurations arise when an operator moves into a sentence-initial A-bar position crossing over a *p(ersonal)*-pronoun. The restriction in these configurations is that the *p*-pronoun cannot have the same index as the operator. The in-between *p*-pronoun is not ungrammatical as such. It is only the interpretation of the *p*-pronoun as coreferent with the operator that is blocked.

The English long *wh*-movements in (1)–(3) illustrate three types of crossover. The crossover in (1) is immediately felt as unacceptable and valued as ungrammatical ‘strong crossover’ (Postal 1971).

- (1) Who_i did he_{+i} think we would invite t_{wh-i}?

The sentence in (1) is ungrammatical when the crossed-over *p*-pronoun *he* has the same index as the *wh*-operator *who*.

The variant in (2) brings the *p*-pronoun in a subconstituent position. The coreference of the *p*-pronoun *his* with the *wh*-operator *who* continues to be ungrammatical, be it less robustly so. The fact was observed by Wasow (1972) and labeled as ‘weak crossover’.

- (2) Who_i did [his_i mother]_k think we would invite t_{wh-i}?

The variant in (3) turns the *wh*-operator into a subconstituent, so-called ‘secondary crossover’ (Postal 1993). It remains as strongly ungrammatical as the example in (1) when the crossed-over *p*-pronoun *he* has the same index as the subconstituent *wh*-operator *whose*.

- (3) [Whose_i sister]_j did he_i think we would invite t_{wh-j}?

The examples in (4) show that all non-crossovers are grammatical. The operator moves from the subject position of *think* into the A-bar position and does not cross over the *p*-pronoun. In (4a) both the *wh*-operator and the *p*-pronoun are major constituents, in (4b), the *p*-pronoun is a subconstituent, and in (4c) the *wh*-pronoun is a subconstituent.

- (4) a. Who_i t_{wh-i} thinks we would invite him_i?
 b. Who_i t_{wh-i} thinks we would invite [his_i mother]_k?
 c. [Whose_i sister]_j t_{wh-j} thinks we would invite him_i?

Lasnik & Stowell (1991) pointed out that the weak crossover restriction in (2) holds for questions, but not for topicalizations and non-restrictive relatives with a subconstituent *p*-pronoun. They valued these grammatical crossovers as ‘weakest crossovers’. See the English topicalization in (5a) and the non-restrictive relative in (5b).

- (5) a. John_p, I think [his_i mother]_k will invite t_i too.
 b. John_p, who_i [his_i mother]_k thinks we will invite t_{wh-i}, is a nice guy.

The grammaticality of (5a) with a topic and (5b) and with a relative pronoun (weakest crossover) is in opposition to the ungrammaticality of (2) with a *wh*-operator (weak crossover).

2. Previous analyses

The analysis I will propose hinges on the following two assumptions.

First, crossover restrictions should follow from independently valid properties of reference-tracking without further construction-specific stipulation. The

reason is that crossover restrictions are prospective universals, but they are fairly intricate and rare. They are unlikely as primary linguistic data for language acquisition. Consequently, the crossovers offer a test on the form of general binding principles (Reinhart 2006).

Second, the in-between *p*-pronoun requires an argument to identify its referential identity. The moved operator is not a reference-identifying element in that sense. It rather offers a range of referential values successively to be chosen for in the empty A(argument)-position left by the operator. It is the trace of the operator that may for each chosen value function as the antecedent for the *p*-pronoun. See Ruys (2000: 535) for a statement in semantic terms. The general question for crossovers then is why the in-between *p*-pronoun, the *p*-pronoun positioned between the operator and its trace, cannot be interpreted as a dependent of the operator trace (Higginbotham 1983).

Crossover phenomena have been much discussed. I will not give an overview of the literature, but take the proposals of Safir (2004) and Ruys (2004) as a starting point. Both account for crossovers by a single principle.¹ Safir's principle *rules out* the ungrammatical crossovers, whereas Ruys' principle *rules in* the grammatical non-crossovers. Safir (2004) argues that the dependency of the *p*-pronoun is blocked by a negative condition, the Independence Principle (INP): a dependent may not c-command its antecedent. Safir's INP derives the strong crossovers and arguably the weak crossovers. For Ruys (2004) only positive licensing holds: the operator trace must variable bind its dependent *p*-pronoun within the scope of the operator. Ruys' positive licensing derives the grammatical non-crossovers and accounts for the strong and weak crossovers as an absence of variable-binding.

I will argue, though, that both analyses need additional assumptions to derive the crossovers with topicalizations. My analysis will make use of both principles, Safir's negative principle and Ruys' positive principle. Although this seems a step backwards, it has the major advantage of not requiring additional assumptions. The negative principle for the *p*-pronoun and the positive principle for the operator seem general rules that are learnable from simple sentences, but additional assumptions considerably complicate the learnability of crossover restrictions.

There is a final point, a notational one. Safir and Ruys follow Higginbotham's (1983) asymmetric linking theory and avoid the use of referential indices. However, I will use referential indices for ease of exposition. Indices need not be part of the

1. As one may be aware, the original solution dealt with strong crossover restrictions as a violation of Condition C of the binding theory (Chomsky 1981). Safir (2004) and Ruys (2004), though, share the ambition to explain all crossover restrictions by means of a general principle that purposely avoids the construction-specific Condition C. See Safir (2004: Ch. 3.1) for an extensive defense of that view.

grammar when merely indicating that a pragmatic option is opened or closed given a syntactic configuration in terms of precedence, c-command or scope. In order to state a disjointness, I add a * to the pragmatic index, since the string as such is a grammatical possibility. My *i*/**i* indices reflect pragmatic decisions constrained by syntactic configurations only.

3. Safir (2004) and Ruys (2004)

3.1 Safir's single condition on dependency

Safir's (2004) central claim holds that binding is about dependent identity interpretations (cf. Bianchi 2001). He proposes that dependency is restricted by a c-command prohibition. This c-command prohibition (from Higginbotham 1983: 402) is formulated as the Independence Principle, see (6).

- (6) Independence Principle (INP) (Safir 2004: 3)
If *x* depends on *y* then *x* cannot c-command *y*

The INP is meant to be the only principle. It rules *out* dependent identity by one single configuration. In all other configurations, dependency is in principle free. There are no licensing conditions needed to rule *in* dependent identity.

If one reads *x* as the dependent *p*-pronoun and *y* as the operator trace, the INP correctly rules out the strong crossovers in (1)/(3). However, the INP does not account for the weak crossover in (2), since the dependent subconstituent *p*-pronoun in (2) is not in a c-commanding position. Safir (2004: 69) accounts for weak crossovers by stretching up dependency, see (7).

- (7) If α depends on β , then any nominal node γ that dominates α also depends on β .

According to (7), the subconstituent *p*-pronoun *his* (α) in (2) depends on its antecedent t_{wh} (β) and therefore the nominal node *his mother* (γ) also depends on t_{wh} . Since *his mother* c-commands the operator trace, the extended notion of dependency coupled with the INP rules out all weak crossovers as wanted. The extended dependency, though, seems not motivated otherwise than that it eliminates the weak crossovers as ungrammatical.

Safir's theory for referential dependency is much more wide-ranging. It is meant to substitute for and to effectively abolish the binding conditions B and C. For the present reanalysis, though, the INP in (6) will suffice.

3.2 Ruys' single condition on Operator binding

Ruys' (2004) central claim is that crossover restrictions should be derived from positive licensing 'ruling *in*' a binding relation, and not from negative configurations 'ruling *out*' a binding relation. Moreover, he argues that crossover effects are to be derived from semantic scope rather than from syntactic binding. Crossover restrictions concern binding in the domain of a sentential operator. In order to variable bind the *p*-pronoun, the trace of the operator must variable bind its dependent *p*-pronoun within the scope of the operator. See (8).

(8) *Scope Licensing* (Ruys 2000:516)

A is syntactically licensed to take scope over B iff

- a. A c-commands B, B an operator; or
- b. A c-commands B from an A-position

Clause (8a) accounts for the relative scope of two quantifiers and I do not deal with that issue in the present paper, but see footnote 5. The scope licensing in (8b) accounts for our present concerns. Clause (8b) covers the non-crossover in (4a,b), where the *wh*-operator is a major constituent, as well as the non-crossover in (4c), where the *wh*-operator is a subconstituent. The subconstituent *wh*-operator in (4c) projects its quantifying effect to the top of the DP. This is what Ruys (1992) calls the 'transitivity' effect. The entire DP c-commands the *p*-pronoun, but the subconstituent *wh*-operator variable binds the *p*-pronoun. The scope extension is motivated by the fact that the entire DP gets a quantifier interpretation. For instance, *every boy's mother* implies a list of mothers matched with a list of boys.

Positive licensing rules *in* all grammatical binding configurations for non-crossovers in (4). In all other configurations, i.e. the crossovers in (1)–(3), there is no binding at all, which accounts for the ungrammatical strong and weak crossovers.

Ruys' positive condition on operator binding and Safir's negative condition on dependency relations are opposite principles. There are, though, similarities. Both principles rely on an elsewhere condition, i.e. "elsewhere dependency is free" for Safir and "elsewhere there is no operator binding at all" for Ruys. Moreover, both principles do not make a distinction between –subconstituent *p*-pronoun, variants (1) and (3), and +subconstituent *p*-pronoun, variant (2). Safir's INP holds for strong as well as for weak crossovers by his extended notion of dependency. Ruys' does not have negative requirements that rule *out* binding relations. There is simply no binding licensing in strong crossovers nor in weak crossovers.

In the next section I will argue that the elsewhere conditions make wrong predictions for certain crossovers with topicalizations and that the distinction between $\pm$ subconstituent *p*-pronoun seems to be crucial.

3.3 Topicalisations and crossovers

Lasnik & Stowell (1991:704) derive the weakest crossover in English topicalizations by postulating two types of operators, quantificational (set-related) operators like question *wh*-elements, and anaphoric (single referent-related) operators like topics. The single referent-related operator involved in (5) would in that view not be a true quantifier and the trace it leaves behind would not relate to a quantifying operator.

Safir (2004) and Ruys (2004) also consider topics to be non-quantifiers, but their analysis is different. In the weakest crossover (5), the *p*-pronoun is not grammatically related to the operator trace, but it may simply corefer with the non-quantifying topic.²

Safir (2004:72) stipulates that the grammatical dependency between *p*-pronoun and operator trace only holds for traces with a *q*-variable. Quantifiers, as the *wh*-operator in (9), leave a copy in situ with a *q*(uantifier)-variable *x*.

- (9) Who_i/[whose_i mother]_j does he_{*i} think we would invite *x_i*/[*x_i* mother]_j?

A topic, by contrast, leaves a copy without a *q*-variable. Therefore, the *p*-pronoun *his* in (10) does not depend on the operator trace and the negative INP does not apply. According to Safir, nothing prevents the codependency of both the copy *John* and the *p*-pronoun on the topic *John*.

- (10) John_i, I think [his_i mother]_k loves John_i

Ruys' licensing condition only holds for the bound-variable relation between *p*-pronoun and operator trace. In crossovers, the A-bar operator itself is not a licensing position. This holds irrespectively whether the moved element is a quantifier or a non-quantifier. Ruys now assumes that for non-quantifiers there is an alternative: coreference. In the weakest crossover in (5), the *p*-pronoun *his* may be coreferent with the topic *John*. By contrast, quantifiers like *wh*-operators do not allow coreference, but only variable binding of the *p*-pronoun. However, the *wh*-operator *who* in the weak crossover (2) is not a licensing position and the sentence is ungrammatical.

Grammatical weakest crossovers arise when the *p*-pronoun is a subconstituent. Consider now the topicalization in (11) with a major constituent *p*-pronoun. The sentence is strongly ungrammatical when the *p*-pronoun has the same index as the topic *John*.

- (11) John_i, I think he_{*i} loves t_i

2. A coreference analysis of weakest crossover is excluded by Lasnik & Stowell (1991:697), but see Ruys (2004:134) for an effective counter-argument.

If coreference explains the grammaticality of the weakest crossover in (5), what about the strong crossover in (11)? Both Safir and Ruys will need additional assumptions to account for (11), since coreference of the *p*-pronoun *he* with the topic *John* should be possible as in (5).

Within Safir's (2004: 81) approach, the topic *John* leaves a copy *John* in trace position. A blocking principle (FTIP, Form to Interpretation Principle) now works in (11). The FTIP regulates the competition between various dependent constituents (reflexive, pronoun, R-expression). It works in a simple sentence like (12) where the dependent reading of *John* is blocked by the more dependent form *himself*.

- (12) He_i loves **John*_i/himself_i

In the strong crossover topicalization (11), the FTIP blocks the dependency of the copy *John* on the pronoun *he*, because the copy does not result in the most dependent form available. See (13a). This contrasts to the copy *himself* in (13b), which is the most dependent form available.

- (13) a. John_i, I think he_i loves (*John*_i)
b. Himself_i, I think he_i loves (*himself*_i)

Within Ruys' licensing approach, the *p*-pronoun *he* in (11) should be able to freely corefer with the non-quantifier topic *John* just as the *p*-pronoun *his* in (5). This prediction is incorrect, but Ruys does not discuss this problem.

In sum, Ruys and Safir explain the various crossover restrictions by making a distinction between $\pm$ quantified operators, and by making no distinction between $\pm$ subconstituent *p*-pronoun. See the light versus dark grey column in Table 1.

Table 1.

	Quantifier no coreference		Non-quantifier coreference	
<i>p</i> -pronoun + <i>c</i> -command	*strong	(Example 1)	*strong	(Example 11)
<i>p</i> -pronoun - <i>c</i> -command	*weak	(Example 2)	√weakest	(Example 5)

Table 1 shows that for quantifiers, the intuitive difference between strong and weak crossovers is played down, since the same analysis is applied whether the *p*-pronoun is a subconstituent or a major constituent. For non-quantifiers, the weakest crossover effect in (5) is predicted, but the strong crossover effect in (11) is NOT predicted.

In the remaining of the paper I will use an example set of Dutch data. The set includes a topic pronoun that will be claimed to be a quantifier. The analysis of the crossover constructions with that set of data will explain the various crossover

restrictions. I will make no distinction $\pm$ quantified operators, but I will crucially make a distinction $\pm$ subconstituent *p*-pronoun. My proposal will be that both principles are needed, Safir's negative principle for the *p*-pronoun and Ruys' positive principle for the operator.

4. A-bar pronouns. A uniform category of quantifiers with an antecedent

The data discussed so far were examples of *wh*-movement and topicalization in English, syntactically and semantically different constructions. Syntactically, the *wh*-operator is fronted to an A-bar position, whereas the topic does not reside in an A-bar position. Semantically, the *wh*-operator is a quantifier, whereas the topic is not.

The grammatical situation in V2 Dutch (and German) is different. I will illustrate this with a set of so-called 'A-bar pronouns' (Van Kampen 1997), which have the following properties.

- (14) A-bar pronouns constitute a uniform category
- a. syntactically: movement to A-bar position.
 - b. morphologically: almost identical *d/w* paradigm.
 - c. semantically: quantifier with a discourse antecedent.

A-bar pronouns form a syntactically, morphologically and semantically uniform category set. Syntactically, all A-bar pronouns are fronted to an A-bar position and related to an argument position. Morphologically, the set of Dutch A-bar pronouns includes question *w*-pronouns (from the *w*-paradigm *wie* 'who', *wat* 'what', *waar* 'where'), topic *d*-pronouns (from the *d*-paradigm *die* 'that', *dat* 'that', *daar* 'there') and relative pronouns. The Dutch relative pronouns are a mixture of *w*-pronouns and *d*-pronouns. Due to the limited space, I will not discuss the relative pronouns here, but the crossover restrictions of relative pronouns can be derived in the same way as the crossovers of the question and topic pronouns.³

3. Example (5b) showed that non-restrictive relatives exhibit weakest crossover. Non-restrictive relatives are quantifiers, but they have a preceding external antecedent like the topic *d*-pronoun. Safir (2004: 84f) and Ruys (2004:ftn. 20) rely on that antecedent to explain the weakest crossover effect. Safir and Ruys need an additional assumption to explain why the strong crossover effect with non-restrictive relatives remains valid in spite of the external antecedent. Safir proposes that the strong crossover configuration (the *p*-pronoun c-commands the operator trace) prevents an external antecedent to get access to the *p*-pronoun. The present analysis derives the strong crossover effect by the disjoint index *i as a general and highly learnable principle.

The topic *d*-pronouns are very common in Dutch and German, but for some reason disappeared from English with the loss of V2 (Van Kampen 2007). See for an analysis Van Kampen (1997, 2010), Wiltschko (1998). An example is given in (15).

- (15) Daar komt Johanna. Die_i hebben ze ook uitgenodigd.
 there comes Johanna. Dpro have they also invited.
 ‘There comes Johanna. They have invited her too.’

Semantically, question pronouns are quantifier-like (choice out of a set) and so are relative pronouns. See Safir (2004: 84–86). Topic *d*-pronouns join the generalization ‘quantifier-like’, since they are the same category as relative pronouns with the same structural context requirements. See Wiltschko (1998), Van Kampen (2007) and Boef (2012), among others. The quantifier status of the A-bar pronoun is further illustrated by its transitivity effect. Just like the regular quantifier (*every*, *some*, etc.), the specifier A-bar pronoun projects its quantifying effect to the top of the DP. Compare the topic pronoun *die* (Dpro ‘that’) in (16a) and the question pronoun *wie* (Wpro ‘who’) in (16b) to the quantifier *ieder* (‘every’) in (16c).

- (16) a. [[[Die_i d’r_i]_i zusje_j d’r_j]_j vriendin_k]_k(+shift topic)
 [[[Dpro her] sister her] friend]
 b. [[[Wie_i d’r_i]_i zusje_j d’r_j]_j vriendin_k]_k(+w-question)
 [[[Wpro her] sister her] friend]
 c. [[[Ieder_i d’r_i]_i zusje_j d’r_j]_j vriendin_k]_k(+set)
 [[[Every her] sister her] friend]

The example set in (16) shows how the regular quantifier and the A-bar pronouns have the same effect when used in a specifier position of a DP. They turn the major DP_k into a set from which a choice has to be made. Hence, they yield a quantifier-like property to the DP_k. In all three examples, there is a set of friends because there is a set of sisters. There is a set of sisters because there is a set of siblings. The entire phrase indexed *k* is thereby quantified. This is the transitivity property of Ruys (1992, 2000). It supports the present category interpretation of A-bar pronouns, including the topic *d*-pronoun. Although the *d*-pronoun in specifier position triggers the function of topic-shifter, it is in (16a) the entire phrase indexed *k* headed by *vriendin* that becomes the shifted topic and thereby a quantifier (offering a choice out of a set).

As is the case for the regular quantifier, the argument dependent from the A-bar phrase, the A-bar trace this time, gets a referential value that fits the range of the quantifier phrase. Although this seems to open a lot of intended referential options for the A-bar trace, the A-bar pronoun quantifiers in (14) differ in that respect from the regular quantifier. Each A-bar pronoun (question, relative, topic) is related to a preceding or following ‘antecedent’ beyond its CP. For the A-bar

pronoun in (16a,b), the true sibling will be revealed in the antecedent. The coindexing of the discourse antecedent *Johanna_i* with the A-bar pronoun *wie_i* or *die_i* does not intend that *Johanna_i* is a set, but rather that the range of possible referential values opened by the A-bar pronoun is after all restricted to the referential value of its discourse antecedent.

The antecedent of the topic *d*-pronoun is the preceding focus (preceding discourse), see the indexing in (15). See Van Kampen (2010) and Broekhuis & Den Dikken (2012: 858) for arguments that the *d*-pronoun takes the focus of the preceding clause as its antecedent. The antecedent of the question *w*-pronoun is the focus in the presupposed answer (following discourse) in (17). The answer to the question *w*-pronoun defines the choice that is to be made from the set of options.

- (17) *Wie_i hebben ze t_i uitgenodigd?* (Presupposed following context: *Johanna_i*)
Wpro have they t invited?
 ‘Who did they invite?’

It is a common assumption that a *wh*-phrase introduces a referent by presupposition (Karttunen 1978). There is a type-shift from a set to an individual, when the antecedent of the *wh*-pronoun enters the interpretation. See for instance Hinterwimmer & Repp (2009) who analyse *wh*-interrogatives as quantifiers that introduce discourse referents whose reference is fixed, like aboutness topics. The *w*-pronoun in (17) gets by the type-shift the status of ‘topic to be identified’. Such a type-shift from a set to an individual holds for all A-bar constructions. The antecedent of the A-bar pronoun is outside the CP and gets a relevance as topic by fitting into the more general CP frame introduced by the A-bar pronoun.

To sum up, all A-bar pronouns are quantifiers, be it quantifiers counterbalanced by a discourse antecedent. The regular quantifiers do not have a discourse antecedent.

5. The crossover data with A-bar pronouns

Crossover restrictions also hold for complex A-bar phrases and short movements, but I will restrict the discussion to the set of long movements with A-bar pronouns. Long movements with A-bar question pronouns belong to standard Dutch. Examples of long movements with topic *d*-pronouns and relative pronouns are discussed in Barbiers (2005), Boef (2012), Van Kampen (2010).

Examples of strong crossovers with question *w*-pronouns are given in (18) and with topic *d*-pronouns in (19). I have labeled the examples A-variant and B-variant. In all strong crossover cases, the dependent *p*-pronoun is a major constituent c-commanding its antecedent, the A-bar trace. In the A-variants, the A-bar pronoun is also a major constituent. In the B-variants, the A-bar pronoun is a subconstituent.

(18) Question *w*-pronouns: strong crossover

- a. *A-variant*. A-bar pronoun $\langle +c\text{-command} \rangle$ and *p*-pronoun $\langle +c\text{-command} \rangle$
 Wie_i dacht ze_{*i} dat wij t_{w-i} zouden uitnodigen?
 Wpro thought she that we t would invite?
 'Who did she think we would invite?'
- b. *B-variant*. A-bar pronoun $\langle -c\text{-command} \rangle$ and *p*-pronoun $\langle +c\text{-command} \rangle$
 [Wie_i d'r vriend]_j dacht ze_{*i} dat wij t_{w-j} zouden uitnodigen?
 Wpro her friend thought she that we t would invite?
 'Whose friend did she think we would invite?'
- Presupposed following context: Johanna_i....

(19) Topic *d*-pronouns: strong crossover

Preceding context: Daar zagen we Johanna_i. (There we saw Johanna.)

- a. *A-variant*. A-bar pronoun $\langle +c\text{-command} \rangle$ and *p*-pronoun $\langle +c\text{-command} \rangle$
 Die_i dacht ze_{*i} dat wij t_{d-i} zouden uitnodigen.
 Dpro thought she that we t would invite.
 'She though that we would invite her.'
- b. *B-variant*. A-bar pronoun $\langle -c\text{-command} \rangle$ and *p*-pronoun $\langle +c\text{-command} \rangle$
 [Die_i d'r vriend]_j dacht ze_{*i} dat wij t_{d-j} zouden uitnodigen.
 Dpro her friend thought she that we t would invite.
 'She thought that we would invite her friend.'

The strong crossover *i (ze_{*i}) restriction holds for both question *w*-pronouns and topic *d*-pronouns in (18)–(19) and there is no difference between the variants A and B.

When the *p*-pronoun is brought into subconstituent position as in (20) and (21), the *p*-pronoun no longer c-commands the A-bar trace. In (20), the coreference of the *p*-pronoun with the question *w*-pronoun leads to an ungrammatical weak crossover. This holds for both the C-variant, with a major constituent A-bar pronoun, and the D-variant, with a subconstituent A-bar pronoun.

(20) Question *w*-pronouns: weak crossover

- a. *C-variant*. A-bar pronoun $\langle +c\text{-command} \rangle$ and *p*-pronoun $\langle -c\text{-command} \rangle$
 Wie_i dacht [haar_{*i} zus]_k dat wij t_{w-i} zouden uitnodigen?
 Wpro thought [her sister] that we t_{w-i} would invite?
 'Who did her sister think that we would invite?'
- b. *D-variant*. A-bar pronoun $\langle -c\text{-command} \rangle$ and *p*-pronoun $\langle -c\text{-command} \rangle$
 [Wie_i d'r vriend]_j dacht [haar_{*i} zus]_k dat wij t_{w-j} zouden uitnodigen?
 [Wpro her friend] thought [her sister] that we t would invite?
 'Whose friend did her sister think that we would invite?'
- Presupposed following context: Johanna_i....

In (21) the coreference of the *p*-pronoun and the topic *d*-pronoun leads to a grammatical weakest crossover. This holds again for both the C-variant (major constituent A-bar pronoun), and the D-variant (subconstituent A-bar pronoun).

(21) Topic *d*-pronouns: weakest crossover

Preceding context: Daar zagen we Johanna_i. (There we saw Johanna.)

- a. *C-variant*. A-bar pronoun ⟨+c-command⟩ and *p*-pronoun ⟨−c-command⟩
 Die_i dacht [haar_i zus]_k dat wij t_{d-i} zouden uitnodigen.
 Dpro thought [her sister] that we t would invite.
 ‘Her sister thought that we would invite her.’
- b. *D-variant*. A-bar pronoun ⟨−c-command⟩ and *p*-pronoun ⟨−c-command⟩
 [Die_i d’r vriend]_j dacht [haar_i zus]_k dat wij t_{d-j} zouden uitnodigen.
 [Dpro her friend] thought [her sister] that we t would invite.
 ‘Her sister thought that we would invite her friend.’

The crossovers in (20) and (21) are structurally identical, since in all examples an operator is fronted to an A-bar position. Nevertheless, the ungrammaticality of (20) with a question *w*-pronoun (weak crossover) opposes to the grammaticality of (21) with a topic *d*-pronoun.

Table 2 schematizes the crossover restrictions with the Dutch A-bar pronouns, question *w*-pronoun and topic *d*-pronoun.

Table 2.

	Strong examples (18)–(19)		Weak/weakest examples (20)–(21)	
	<i>p</i> -pronoun +c-command		<i>p</i> -pronoun −c-command	
	<i>A-variant</i> A-bar pronoun +c-command	<i>B-variant</i> A-bar pronoun −c-command	<i>C-variant</i> A-bar pronoun +c-command	<i>D-variant</i> A-bar pronoun −c-command
question <i>w</i> -pronoun	*strong (18a)	*strong (18b)	*weak (20a)	*weak (20b)
topic <i>d</i> -pronoun	*strong (19a)	*strong (19b)	√weakest (21a)	√weakest (21b)

The ±c-command by the *p*-pronoun (light versus dark grey column) appears to be relevant. When the *p*-pronoun is a c-commanding major constituent, one gets a strong crossover effect. When the *p*-pronoun is a subconstituent and does not c-command the operator trace, the strong crossover effect disappears. The ±c-command by the A-bar pronoun appears to be irrelevant, since there is no difference between variants A and B or between variants C and D.

6. The derivation of the crossover phenomena

The strong crossover variants A and B are excluded by the Independence Principle. The ungrammatically bound-variable reading for the *p*-pronoun will follow from a strong disjoint reference $\ast i$ for the *p*-pronoun. Disjoint reference holds for all straightforward examples and it is learned as a local property given maximally simple sentences as in (22).

- (22) a. $Ze_{\ast i}$ ziet $Johanna_i$
 she sees Johanna
 b. $Ze_{\ast i}$ ziet [$Johanna_i$ d'r_i zusje]_k
 she sees Johanna her sister

The disjoint coindexing of $ze_{\ast i}$ with $Johanna_i$ does not only hold within the CP, it holds at the same time for coreference with a discourse antecedent. I guess that the sentences in (22) are from the beginning understood as $ze_{\ast i}$ is disjoint with $Johanna_i$ and nowhere in the preceding context there will be a “Johanna” intended to be coreferent.⁴

Since the crossover restrictions follow from a relation between A-positions, the actual PF crossing of the A-bar pronoun over the *p*-pronoun should as such not be the offending factor. Example (23) with the topic *d*-pronoun *die* in situ, which is marginally an option in Dutch, illustrates this.

- (23) We ontmoetten [$Johanna_i$]. $Ze_{\ast i}$ dacht dat wij die_i zouden uitnodigen.
 we met [$Johanna_i$] she _{$\ast i$} thought that we Dpro_i would invite.
 ‘We met Johanna. She thought that we would invite her.’

The sentence-initial *p*-pronoun *ze* is in principle a possible dependent of *Johanna* in the preceding discourse. However, the topic *d*-pronoun must obligatorily relate to its discourse antecedent *Johanna*. The *c*-commanding *p*-pronoun *ze* must be disjoint with the in situ *d*-pronoun, and thereby also with its discourse antecedent *Johanna*.

In the weak and weakest crossovers (20) and (21), variants C and D, the *p*-pronoun is a subconstituent and does not *c*-command the A-bar trace. Safir (2004: 52) stretches up dependency to account for weak crossovers, but the present analysis adheres to the Independence Principle in (6), not to the extended dependency in (7). There is, for lack of *c*-command, no longer a disjointness between the *p*-pronoun and the A-bar trace. If ‘elsewhere’ dependency would be free, the in-between *p*-pronoun would be free to enter in a dependency relation with the A-bar

4. The disjoint index $\ast i$ on the *p*-pronoun has the same effect as described by Reinhart’s (2006: 185) Rule I.

trace (Safir 2004: 51). All weak and weakest crossovers would then predicted to be grammatical.

This prediction is correct for the weakest crossovers in (21) (topic *d*-pronouns), but fails for the weak crossovers in (20) (question *w*-pronouns). My claim will be that there is in (20)–(21) no grammatical dependency between *p*-pronoun and A-bar trace. The ungrammaticality in (20) does in fact not indicate a disjointness (*i) with the A-bar trace, but impossibility to find a preceding discourse antecedent. This will be elaborated below.

7. Dependency index and positive licensing

When the *p*-pronoun does not c-command the A-bar trace, as in the weak/weakest crossovers, the INP is not relevant. This does not mean in the present view that ‘elsewhere’ dependency is free. It means that there is no dependency relation between *p*-pronoun and A-bar trace. I still hold on to the Ruys’ idea that the only grammatical relation that positively holds for a bound-variable reading is when the A-bar trace c-commands its dependent *p*-pronoun, as in (24).

- (24) Die_i/[Iedere vrouw]_i t_{d-i} dacht dat wij haar_i/[haar_i zus]_k
 Dpro/[Every woman] t thought that we her/[her sister]
 zouden uitnodigen
 would invite.
 ‘She/Every woman thought that we would invite her/her sister.’

Since no index *i* or disjoint index **i* is given in the weak/weakest crossover cases, the *p*-pronoun remains free to corefer with an antecedent to its left. The *p*-pronoun *haar* in (25) below will not get an index by its grammatical relation with the A-bar trace, but it may get an index from the discourse antecedent *Johanna*. In examples (25)–(27) that index is labeled *j*. The index *j* at the antecedent will get the extension *i=j* when the antecedent is at the same time the antecedent for the A-bar pronoun. In that case, index *j* restricts the referential options opened by the A-bar pronoun indexed *i* and the *p*-pronoun indexed *j* is to be *i*.

- (25) ... Johanna_{i=j}. Die_i dacht [haar_j zus]_k dat wij t_{d-i} zouden uitnodigen.
 ... Johanna. Dpro thought [her sister] that we t would invite
 ‘... Johanna. Her sister thought that we would invite her.’

In sum, when disjoint **i* does not apply (for lack of c-command), the *p*-pronoun may get as antecedent either the preceding A-bar trace for bound-variable readings as in the non-crossover in (24), or the preceding discourse antecedent of the A-bar pronoun for singleton readings as in the weakest crossover in (25).

In the same vein, the *p*-pronoun *haar* in (26), where the A-bar trace follows, must find an antecedent in the discourse.

- (26) Wie_i dacht [haar_{??j} zus]_k dat wij t_{w-i} zouden uitnodigen? (Johanna_{i=j})
 Wpro thought [her sister] that we t would invite
 ‘Who did her sister think that we would invite?’

The question *w*-pronoun *wie* in (26) cannot have a preceding antecedent. The presupposed answer is still to follow and not accessible for the *p*-pronoun *haar* and the *p*-pronoun remains locally uninterpretable, indicated by a double question mark at the index. This leads to weak ungrammaticality.⁵

The positive licensing condition for the non-crossovers in (4) is a parallel with Ruys (2004) and so is the coreference for the weakest crossovers with an antecedent in (5). Ruys, though, explicitly argues against negative constraints and adheres strictly to positive licensing. I maintain nevertheless the Independence Principle as a negative disjointness filter in order to derive the strong crossovers for all operators, including the Dutch topic *d*-pronoun in (19) and the English topic in (11) where an outside DP antecedent is present. Without a negative filter like the Independence Principle, nothing in the analysis by Ruys (2004) seems to prevent a coreference of the *p*-pronoun with that antecedent.

An empirical observation in Wasow (1972) underlines the present idea that weak and weakest crossovers are preferably to be analyzed in a parallel way. The ungrammaticality of the strong crossovers is a clear case, but the ungrammaticality of the weak crossovers can be ‘weakened’ by additional material in the A-bar phrase. For instance, coreference may be improved if the *wh*-phrase is made more specific as in (27). In that case the crossover effect almost disappears. The ‘almost’ grammatical interpretation is indicated with a question mark at the index.

- (27) [Welk meisje]_i dachten [haar_{??j} vriendinnen]_k dat wij t_i uitnodigden?
 [which girl] thought [her friends] that we t_i invited (Johanna_{i=j})
 ‘Which girl did her friends think that we would invite?’

5. One of the reviewers wondered how the present analysis would answer the question why it is possible to get a distributive reading of *someone* in (ib) whereas such a reading of *her* is excluded in (ia). In both cases the quantifier *every* has scope over the subject by QR.

- (i) a. Her sister invites everyone.
 b. Someone’s sister invites everyone.

The answer is straightforward. In (ia) the reference-identifying trace of the quantifier phrase does not bind the *p*-pronoun *her*, and obviously, the quantifier *everyone* cannot have a discourse antecedent for the *p*-pronoun *her* to refer to. In examples (ib)–(ic), by contrast, there are two operators falling under Ruys’ Scope Licensing (8a). See also Ruys (2000:Section 3).

The weakening of a crossover effect may be attributed to the D-linking property of the *wh*-phrase (Wiltschko 1997, Falco 2007). When a *wh*-question asks for answers in which the entities that replace the *wh*-phrase are drawn from a set that is presumed to be salient to speaker and hearer, the *wh*-phrase is D-linked (Pesetsky 1987). The *wh*-question in (27) presupposes already that there is somebody that is a girl and that girl has friends and that those friends thought that we invited the girl. If one can refer to that presupposed context, coreference is possible. The more context is specified, the easier coreference becomes. It seems to me that the present analysis of weak crossovers in terms of a failed coreference with a presupposed antecedent is more apt to explain this than an analysis of weak crossovers in terms of an ungrammatical binding relation.

8. Conclusion

The crossover facts in Table 2 have been derived from the general properties of A-bar pronouns and *p*-pronouns. Plausibly, these properties are acquired early (Van Kampen 1997), independently from each other and in no way guided by the crossover constructions themselves. A *p*-pronoun is a dependent and may not c-command its antecedent (Independence Principle, Safir 2004). It has to be disjoint with referential elements it c-commands. A-bar pronouns are a special type of quantifiers. Each A-bar pronoun (question, relative, topic) functions as a sentence-connecting device and is related to a preceding or following 'antecedent' beyond its CP.

The strong crossovers in Table 2 follow from the Independence Principle. The grammatical weakest crossovers follow from coreference of the *p*-pronoun with the DP antecedent of the A-bar pronoun. The ungrammatical weak crossovers do not follow from the absence of such an antecedent, but from its absence as a preceding DP.

A major difference with alternative approaches is that I make a distinction between strong crossovers versus weak and weakest crossovers, whereas it is more usual to see a related explanation for strong and weak crossovers versus weakest crossovers.

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