



Re-binding and the Derivation of Parallelism Domains

Daniel Hardt
CMOL/Computational Linguistics
Copenhagen Business School

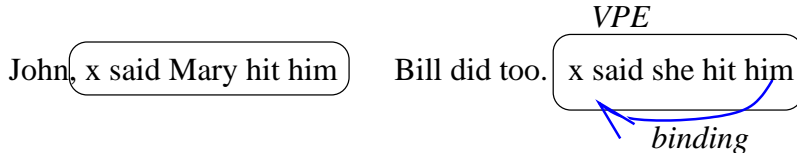
1 The Re-binding Puzzle

Sag's Observation (1976)

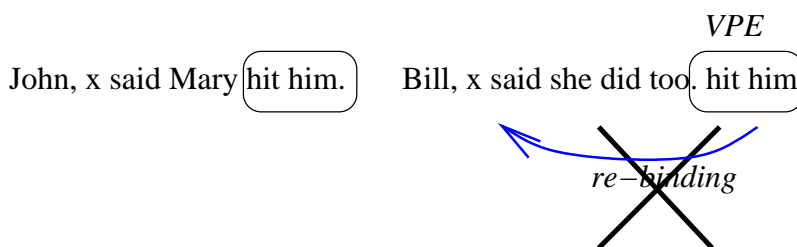
- (1) John said Mary hit him. Bill did too.
 • **Strict:** *said Mary hit John* **Sloppy:** *said Mary hit Bill*
- (2) John said Mary hit him. Bill said she did too.
 • **Strict:** *hit John* **Sloppy:** **hit Bill*
- Why is Sloppy worse in (2)?

Sag's Explanation: No Re-binding

- In (1), sloppy pronoun is bound *within* VPE:

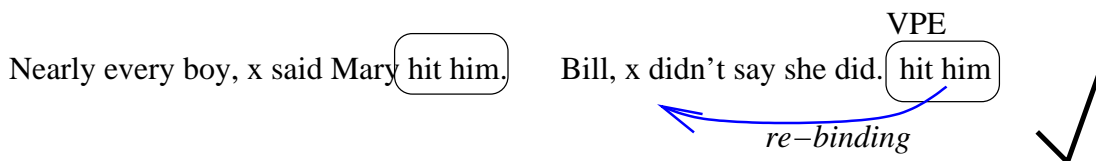


- In (2), sloppy pronoun gets *re-bound* outside of VPE:



But – Re-binding IS Possible

- (3) Nearly EVERY boy₁ said Mary₂ hit him₁. But BILL₃ didn't say she did. (hit him₃)



2 The Plan

- The Re-binding Generalization
- Proposal: Monotonic Derivation of Parallelism Domains
- Focus and Pronouns
- MaxElide: Comparison

3 The Re-binding Generalization

Re-binding is possible only when necessary to satisfy parallelism

Three Cases

1. **Ambiguity (No Re-binding):** John said Mary hit him. Bill did too.

- **Strict:** *x said Mary hit John* **Sloppy:** *x said Mary hit Bill*

2. **Sloppy Blocked:** John said Mary hit him. Bill said she did too.

- **Strict:** *hit John* **Sloppy:** **hit Bill*

3. **Strict Blocked:** Nearly EVERY boy said Mary hit him. But BILL didn't say she did.

- **Strict:** **hit him (bound by every boy)* **Sloppy:** *hit Bill*

Additional Evidence

(4) Bill₁ BELIEVES that Sally₂ will marry him₁, but everyone₃ KNOWS that she₂ WON'T. (Bach and Partee, 1980)

- **Strict:** *marry him₁* **Sloppy:** **marry him₃*

(5) Everyone₁ HOPES that Sally₂ will marry him₁, but Bill₃ KNOWS that she will. (marry him₃)

- **Strict:** **marry him₁* **Sloppy:** *marry him₃*

- In (4), parallelism can be satisfied by strict reading (marry him₁) – the re-binding reading (marry him₃) is not necessary to satisfy parallelism, and is therefore not permitted.
- In (5), strict is not available, because the antecedent pronoun *him₁* is bound by *Everyone₁*, which doesn't have scope over the VPE. The only way to satisfy parallelism is with the re-binding reading, which is therefore permitted.

4 Proposal: Monotonic Derivation of Parallelism Domains

As soon as a Parallelism Domain can be identified during a bottom-up derivation, indexation takes place, and cannot be modified later in the derivation.

Definitions and Background

- **Parallelism Domain (PD):** An (LF) constituent E is a Parallelism Domain if there is an antecedent LF A such that there is a *valid indexing* E' of E such that E' is Parallel to A.
- **Valid indexing:** a pronoun (or other variable) must have an index *i*, such that $i \in \text{Dom}(F)$, where *F* is the File representing the current state of the discourse. (*Familiarity* (Heim, 1982)/*Accessibility* (Kamp and Reyle, 1993))
- **Pronunciation Condition:** Parallelism Domain must contain pronounced material

Determining Parallelism

To determine if two LF's A and B are parallel:

- Lambda-Abstract over Parallel Elements, giving $-\ [P_A, \lambda x.A'], [P_B, \lambda y.B']$
- If A' is identical to B', Parallelism is satisfied
- Identity condition has two "exceptions":
 - Focused elements need not be identical
 - Lambda-bound variable indices need not be identical ("alphabetic variance" condition)
- Lambda-abstraction: substitute lambda-bound variable x for P_A in A. If A contains an element p coindexed with P_A , x may also be substituted for p (Dalrymple et al, 91)

Example

A = *John*₁ said *Mary*₂ hit *him*₁ B = *BILL*₃ did too. *said Mary*₂ hit *him*₃

- **Parallel Elements:** John, Bill
- **Lambda-Abstract:** $[John_1, \lambda x.x \text{ said } Mary_2 \text{ hit } x] [BILL_3, \lambda y.y \text{ said } Mary_2 \text{ hit } y]$
- **Parallelism is Satisfied**
 - John and BILL are non-identical, but BILL is focused
 - Different indices (x and y) are ok, because of alphabetic variance condition

Illustrating the Proposal

Bad Re-binding


(1) *John*₁ said *Mary*₂ hit *him*₁. *Bill* said she did too. *hit him*

- Smallest potential PD: [did *hit him*]
- This is indeed a PD, with valid indexing [did *hit him*₁]
- Strict reading results, and re-binding is not possible.

Good Re-binding


(3) Nearly EVERY *boy*₁ said *Mary*₂ hit *him*₁. But *BILL*₃ didn't say she did. *hit him*

Nearly every *boy*₁ said *Mary*₂ hit *him*₁.

But *Bill*₃ didn't say she did (hit him) *Not a PD* 

...

...

But *Bill*₃ didn't say she did (hit him) *Is a PD* 

- Parallelism is Satisfied:
 - Nearly EVERY *boy*₁, $[\lambda x.x \text{ said } Mary_2 \text{ hit } x]$
 - BILL*₃, $[\lambda y.y \text{ said } Mary_2 \text{ hit } y]$

Pragmatics and Strict/Sloppy Blocking

- The argument so far –
 - re-binding is blocked by strict reading, because strict allows a PD to be determined at an earlier stage in derivation
 - Re-binding becomes possible when the strict reading is structurally ruled out (because of quantifier scope)
 - Could pragmatic factors block strict reading and allow re-binding to emerge? Yes.
- (6) MARY might admit that the criminals had been in contact with her, but SUSAN wouldn't admit that they had (been in contact with Susan/?Mary).
- Strict reading violates presupposition associated with *admit* – if A admits P, P implicates A

What are the Facts, Anyway?

The Linguist-GRID Surveys

- Based on a recent survey, the “bad” rebinding examples receive a mildly degraded status, rather than unacceptable
- Used **Linguist-GRID.org**: web-based tool for interactive linguistic surveys, developed by Matthias Kromann at Copenhagen Business School
- Survey advertised on LINGUIST and elsewhere in Nov/Dec 2004
- 29 subjects rated 30 examples of VP ellipsis, with reading indicated
- Examples presented together with the reading to be evaluated (parenthesized in italics)

Four-point scale:

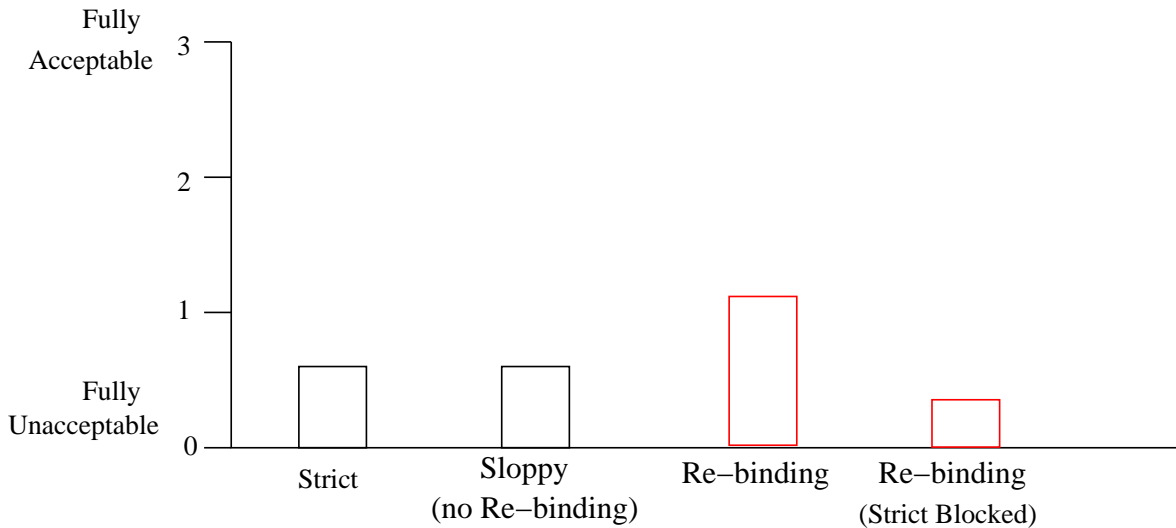
[0] Fully Acceptable [1] Closer to Acceptable [2] Closer to Unacceptable [3] Fully Unacceptable

Categories

- **Strict**: embedded pronoun in antecedent receives same reading at ellipsis site
- **Sloppy (no re-binding)**: embedded pronoun covaries with local subject.
- **Re-binding**: embedded pronoun covaries with something *other* than local subject. Here, strict reading is also a potential reading.
- **Re-binding (Strict Blocked)** strict reading is unavailable (or degraded)

Results

Example Type	Mean Judgment
Strict John said Mary hit him. Harry did too. (<i>said Mary hit John</i>)	.66
Sloppy (no re-binding) John said Mary hit him. Harry did too. (<i>said Mary hit Harry</i>)	.61
Re-binding John said Mary hit him. Harry said she did too. (<i>hit Harry</i>)	1.16
Re-binding (Strict Blocked) Nearly EVERY boy said Mary hit him. But BILL didn't say she did. (<i>hit Bill</i>)	.39



5 Pronouns and Focus

Focused Bound Pronouns

(7) Every boy likes his father, and every TEACHER likes HIS father.

- Why is focus permitted on HIS?

Proposal: Focus Agreement

Agreement Condition: Given a PD A containing a pronoun x with a binder B , focus on x is licensed if focus on B is licensed.

Previous Proposal: Hidden Content

- **Contrast Condition:** given a PD A containing a focused constituent α , we require that A would not be a PD without focus on α (Sauerland, to appear; Schwarzschild, 1999)
- To satisfy Contrast Condition, a focused pronoun must somehow differ from antecedent pronoun
- (Sauerland, to appear) appeals to an E-type mechanism to provide a *silent property* as part of the pronoun representation
- (Jacobson, 2000) argues that pronouns can range over different domains.
- Both accounts appeal to contextually available Hidden Content in the pronoun representations, to account for contrast.
- Sauerland's representation:

(8) Every boy likes [the BOY's] father, and every TEACHER likes [the TEACHER's] father.

- (Sauerland, to appear) and (Jacobson, 2000) consider and reject the Focus Agreement account, because of examples like (9):

(9) Every BOY₁ called his₁ mother before every TEACHER₂ called *HIS₁ mother. (Sauerland, to appear)

- Focus on the pronoun *HIS* is impossible, despite the fact that it has a focused binder (Every BOY₁).

Derivational View Solves Focus-Agreement Problem

- With focused HIS, the index $_1$ is not permitted on the proposed derivational account
[HIS₁ mother] fails to be a PD, because it violates the Contrast Condition – it would be a PD without focus on *his*
- Derivation continues until we construct [every TEACHER₂ called HIS mother] – this is a PD, with the indexing HIS₂
- HIS₁ would violate the Contrast Condition
- So: Agreement Condition can account for the focused bound pronouns facts, similar to the Hidden Content Account. Agreement Condition needed to be combined with the current proposal for Derivation of Parallelism Domains
- Which account is better?

What is the Hidden Content?

...I start with the assumption that the restrictor of the antecedent is identical to the content of the bound pronoun. As we'll see, however, it will be necessary to adjust this assumption and to allow any presupposition that is satisfied in the interpretation of the sentence within the current discourse context. (Sauerland, to appear)

- *Conservative Hidden Content View*: pronoun content identical to antecedent restrictor
- *Liberal Hidden Content View*: pronoun content can be any property presupposed to be true of the relevant individual

Strict and Sloppy Pronouns

- Focus is *never* permitted when there is a strict reading

(10) John₁ likes his₁ father, and BILL₂ likes his₁/*HIS₁/HIS₂ father too.

(11) A man₁ likes his₁ father, and ANOTHER man₂ likes his₁/*HIS₁/HIS₂ father too.

(12) THIS man₁ likes his₁ father, and THIS man₂ likes his₁/*HIS₁/HIS₂ father too.

- In (10) and (11), if the second *his* is interpreted strictly, it must not receive focus.
- Let's look at (11):

[likes HIS father] is not a PD

[likes HIS₁ father] violates Contrast Condition (ie., focus wasn't needed)

[likes HIS₂ father] violates Familiarity (index 2 not yet available)

[ANOTHER man₂ likes HIS₁ father] is not a PD – violates Contrast Condition

[ANOTHER man₂ likes HIS₂ father] *is* a PD – focus on HIS licensed by Agreement

The facts in (10) - (12) are all captured by the Focus Agreement/PD proposal.

Hidden Content: Problems with Strict and Sloppy Pronouns

- Can the facts in (10) - (12) be accounted for with Hidden Content?
- Let's start with the Conservative View – in this case, we can argue that focus is not permitted for the strict reading in examples like (10), since the strict pronoun would presumably inherit the same restrictor as the antecedent pronoun. We need to assume that names have restrictors. Maybe something along the lines of [$\lambda x. x = \text{John}$].
- But this is far too restrictive – we are left with no means to tell the strict and sloppy readings apart for examples like (11) and (12). In (12) the two antecedent have exactly the same lexical material (“this man”).

- What about the Liberal View? Here, we allow the hidden content to be any presupposed property. But then nothing ensures, for example (10), that the strict pronoun has the same hidden content as the antecedent pronoun.
- Consider a context in which it is known that John is both a lawyer and a doctor. Then we could have a strict reading where the representation is:

(13) John₁ likes [the₁ doctor's] father, and BILL₂ likes [the₁ lawyer's] father.

- Even if this is a strict reading, the Hidden Content account would incorrectly permit focus here
- Finally, consider (11), where the two men are completely indistinguishable. The sloppy reading still permits stress – but there is no contrastive Hidden Content, so stress is incorrectly ruled out on the Hidden Content view.
- These problems are all solved by the proposed approach, which simply permits focus agreement for bound pronouns. This account crucially relies on the Derivational PD approach to indexing.

6 Comparison with MaxElide

The Account

MaxElide: Elide the biggest deletable constituent reflexively dominated by PD. (Takahashi and Fox, 2005)

- *MaxElide* – ellipsis must be maximal within some *Parallelism Domain* (PD).
- For an elided constituent C – find the smallest PD containing C.
- If PD contains an *elidable* constituent C' that contains C, the ellipsis violates MaxElide
- If C contains a sloppy pronoun *p*, the minimal PD must contain the binder for *p*
- For strict readings, MaxElide is always trivially satisfied, because elided constituent C itself is always a PD
- MaxElide rules out sloppy reading for (1):

John₁ said Mary₂ hit him₁. Bill said she did too. *hit him*

- Smallest containing PD is [*Bill said she did too. (hit him)*] – the containing VP *said she hit him* could have been elided.

Derivational Perspective

One attractive implementation of our idea relies on the assumption that deletion can apply at the course of the derivation. . . In the Re-binding context, deletion cannot apply until a re-binder is introduced into the derivation, since the parallelism condition is not met before that stage of the derivation. (Takahashi and Fox, 2005)[fn 7]

- In my proposal, it is indexation (rather than deletion) which applies derivationally
- Once this derivational perspective is taken, the relevant facts are captured without any appeal to MaxElide
- Also, strict/sloppy blocking effects are captured – these conflict with MaxElide

MaxElide and Strict/Sloppy Blocking

(3) Nearly EVERY boy₁ said Mary₂ hit him₁. But BILL₃ didn't say she did. (hit him₃)

- Sloppy reading is incorrectly ruled out by MaxElide, since a larger ellipsis was possible within the smallest PD containing ellipsis (namely entire sentence)

MaxElide incorrectly permits sloppy reading in (4):

Bill₁ BELIEVES that Sally₂ will marry him₁, but everyone₃ KNOWS that she₂ WON'T.

This is because the Intervening Focus on WON'T makes it impossible to elide anything bigger.

- So MaxElide makes incorrect predictions in the Strict/Sloppy blocking cases
- I'll briefly look at two other areas where my proposal differs from MaxElide: Intervening Focus, and Large vs Small Ellipsis.

Intervening Focus

MaxElide says to elide the biggest *deletable* constituent dominated by PD. A constituent contain a focused element is not deletable; thus Intervening Focus can allow a smaller ellipsis that would otherwise not be permitted.

(14) John₁ argued that Mary hit him₁, but BILL₂ DENIED that she did. (hit him₂)

- While Takahashi and Fox argue that the sloppy reading is acceptable, because of the Intervening Focus, DENIED.
- To my ear the sloppy reading remains degraded here, just as it is without the Intervening Focus – this is supporting by preliminary survey results

Large vs. Small Ellipsis

- MaxElide predicts that ellipsis of constituent C will in general block ellipsis of a contained constituent C', if the smallest PD contains C.
- This captures the contrast between (15)a and (15)b.

(15) a. John knows which professor we invited, but he is not allowed to reveal which_x one (we invited x)
 b. *John knows which professor we invited, but he is not allowed to reveal which_x one we did. (invited x)

- Here, the smallest PD contains the sluiced IP (we invited x) as well as the contained VP (invited x), since the binder for *x* is which_x.

(16) John won't say who we should hire, but

(17) a. Harry will.
 b. *Harry will say who.

- While (17)b is degraded just as (15)b is, MaxElide doesn't rule it out. Here, the CP "who_x we should hire x" is a PD, and the sluice in (17)b is maximal within that PD.

7 Final Thoughts

Comparison with Cyclic Linearization

... structure is built from "bottom to top"... mapping between syntax and phonology (Spell-out) takes place at various points in the course of the derivation... *information about linearization, once established at the end of a given Spell-out domain, is never deleted in the course of a derivation.*

(Fox and Pesetsky, 2005)

Current proposal is a syntax-meaning mapping with much the same structure:

- Bottom up derivation
- Indexing takes place at various points
- Information about indexing never changes later in a derivation

Perhaps these two processes could be synchronized, so that syntax performs linearization (Spell-out) and indexing (and other semantic operations) at the same points in the derivation. One benefit of this would be that the Pronunciation condition would no longer need to be stated.

References

- [Bach and Partee, 1980] E. Bach and B. Partee. Anaphora and semantic structure. In A. Ojeda, editor, *Papers from the parasession on pronouns and anaphora*, pages 1–28. CLS, Chicago, 1980.
- [Fox and Pesetsky, 2005] Danny Fox and David Pesetsky. Cyclic linearization of syntactic structure. *Theoretical Linguistics*, 31(1-2), 2005.
- [Heim, 1982] Irene Heim. *The Semantics of Definite and Indefinite Noun Phrases*. PhD thesis, University of Massachusetts-Amherst, 1982.
- [Jacobson, 2000] Pauline Jacobson. Paychecks, stress, and variable-free semantics. In *Proceedings of the Eleventh Conference on Semantics and Linguistic Theory*, 2000.
- [Kamp and Reyle, 1993] Hans Kamp and Uwe Reyle. *From Discourse to Logic*. Kluwer, Dordrecht, 1993.
- [Sag, 1976] Ivan A. Sag. *Deletion and Logical Form*. PhD thesis, Massachusetts Institute of Technology, 1976. (Published 1980 by Garland Publishing, New York).
- [Sauerland, to appear] Uli Sauerland. The content of pronouns: Evidence from focus. In Kyle Johnson, editor, *Topics in Ellipsis*. Oxford University Press, to appear.
- [Schwarzschild, 1999] Roger Schwarzschild. Givenness, avoid f and other constraints on the placement of focus. *Natural Language Semantics*, 7(2):141–177, 1999.
- [Takahashi and Fox, 2005] Shoichi Takahashi and Danny Fox. Maxelide and the re-binding problem. In *Proceedings of the Fifteenth Conference on Semantics and Linguistic Theory*, Los Angeles, CA, 2005.