Intervention tracks scope-rigidity in Japanese

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Linguistic Society of America, January 2018[1]

1 Introduction

(1) Hanako-ga *nani-o* yon-da-no?
Hanako-NOM what-ACC read-PAST-Q
'What did Hanako read?'

► *Wh*-in-situ is sensitive to **intervention effects**.

(2) a. * **Dare-mo** *nani-o* yoma-nak-atta-no?
who-MO what-ACC read-NEG-PAST-Q

b. ✓ *Nani-o* **dare-mo** __ yoma-nak-atta-no?
what-ACC who-MO read-NEG-PAST-Q
'What did no one read?' (Tomioka, 2007, 1571–1572)

Intervention effects affect regions of Rooth-Hamblin alternative computation but not (overt or covert) movement (Beck, 2006; Beck and Kim, 2006; Kotek, 2014, 2016; Kotek and Erlewine, 2016)

(3) **Beck (2006) intervention schema:**

a. ✓ [$_{\text{CP}}$ C ... *wh*]

b. * [$_{\text{CP}}$ C ... **intervener** ... *wh*]

c. ✓ [$_{\text{CP}}$ C ... *wh* **intervener** ... *t*]

[1]For comments and questions on this work, we thank participants of the NYU seminar on *wh*-constructions—in particular Lucas Champollion, Chris Collins, Paloma Jeretic, Haoze Li, Anna Szabolsci—and the NUS syntax/semantics reading group, as well as audiences at LENLS 2017 at Tsukuba University, the 2017 Amsterdam Colloquium, Stony Brook University, and at the University of Pennsylvania. For discussion of judgments, we thank Daisuke Bekki, Minako Erlewine, Hiroki Nomoto, Yohei Oseki, and Yosuke Sato. Errors are each other's.

► **Two related questions:**

– What counts as an intervener?

(4) ***Subete* 'all' is not an intervener (cf 2a):**

✓[**Subete**-no	gakusei]-ga	*nani*-o	yon-da-no?
all-GEN	student-NOM	what-ACC	read-PAST-Q

'What did every student read?'

– What causes intervention?

* ∗ Focus semantics (Beck, 2006; Beck and Kim, 2006)
* ∗ Quantification (Beck, 1996; Mayr, 2014)
* ∗ Anti-topic items (Grohmann, 2006)
* ∗ Prosodic mismatch (Tomioka, 2007)

Today:

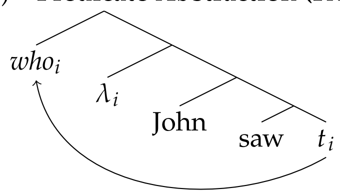
► We consider intervener-hood and scope properties of different quantifiers in Japanese and establish the generalization in (5):

(5) **Generalization: Intervention correlates with scope-taking**
Scope-rigid DP quantifiers above an in-situ *wh* cause intervention. DP quantifiers that allow scope ambiguities with respect to negation — i.e., which can reconstruct below the *wh* — do not.

The problem is not with quantification in regions of alternative computation, but rather with quantifiers in *derived* positions:

(6) **Kotek (2017) intervention schema:**
* LF: C ... $\boldsymbol{\lambda}$ ... *wh*

(7) **Predicate Abstraction (PA):**



Heim and Kratzer (1998): **a $\boldsymbol{\lambda}$-binder is introduced below the landing site of movement**, abstracting over the trace.

PA in regions of alternative computation is not well-defined (Rooth, 1985; Poesio, 1996; Novel and Romero, 2009; Shan, 2004).

Movement can't target a region where focus alternatives are computed.

2 Intervention tracks scope-rigidity

Quantifiers in Japanese vary in their ability to take scope under negation: only Q > Neg, or Q > Neg / Neg > Q.

- ► Shibata (2015a) notes that the scope of different disjunctors correlates with their status as interveners.

Two disjunctions: *ka* and *naishi*[2]

(8) ***ka*-disjunction is scope-rigid; *naishi* is not:**

a. [Taro **ka** Jiro]-ga ko-**nak**-atta.
Taro or Jiro-NOM come-NEG-PAST (Shibata, 2015a:23)
'Taro or Jiro didn't come.' ✓or > not, *not > or

b. [Taro **naishi** Jiro]-ga ko-**nak**-atta.
Taro or Jiro-NOM come-NEG-PAST (Shibata, 2015a:96)
'Taro or Jiro didn't come.' ✓or > not, ✓not > or

(9) ***ka*-disjunction is an intervener; *naishi* is not:**

a. ??? [Taro **ka** Jiro]-ga *nani*-o yon-da-no?
Taro or Jiro-NOM *what*-ACC read-PAST-Q (Hoji, 1985:264)

b. ✓ [Taro **naishi** Jiro]-ga *nani*-o yon-da-no?
Taro or Jiro-NOM what-ACC read-PAST-Q
'*What* did [Taro or Jiro] read?' (Shibata, 2015a:98)

- ► We show that Shibata's correlation extends to other quantificational DPs as well, supporting (5), repeated here:

(5) **Generalization: Intervention correlates with scope-taking**
Scope-rigid DP quantifiers above an in-situ *wh* cause intervention. DP quantifiers that allow scope ambiguities with respect to negation — i.e., which can reconstruct below the *wh* — do not.

[2]Many speakers, including the first author, do not have clear judgments for *naishi* or feel that *naishi* simply patterns together with *ka* in (8–9). The judgments in (8–9) are those reported by Shibata. We have also found one speaker, Daisuke Bekki (p.c.), who allows the 'not > or' reading of *ka* in (8) and for whom *ka* is not an intervener in (9). Despite this speaker variation in these disjunctions in Japanese, what is important here is that there is a *correlation* between scope-rigidity and intervener-hood.

Two universal quantifiers: *wh-mo*[3] and *subete*

(10) ***wh-mo* universal quantifier is scope-rigid; *subete* is not:**

a. **Da′re**-o-**mo** tsukamae-**nak**-atta.
who-ACC-MO catch-NEG-PAST
'*pro* did not catch anyone.' ✓every > not, *not > every

b. [**Subete**-no mondai]-o toka-**nak**-atta.
all-GEN problem-ACC solve-NEG-PAST (Mogi, 2000:59)
'*pro* did not solve every problem.' ✓every > not, ✓not > every

(11) ***wh-mo* is an intervener; *subete* is not:**

a. ?? **Da′re-mo**-ga *nani*-o kai-mashi-ta-ka?
who-MO-NOM what-ACC buy-POLITE-PAST-Q
Intended: 'What did everyone buy?' (Hoji, 1985:270)

b. ✓ [**Subete**-no gakusei]-ga *dono-mondai*-o toi-ta-no?
all-GEN student-NOM which-problem-ACC solve-PAST-Q
'Which problem(s) did every student solve?'

Focus particles: *-mo* 'also' and *-sae* 'even'

(12) **Focus particles are scope-rigid:** (Shibata, 2015b:235)

Taro-**mo/sae** ko-**nak**-atta.
Taro-ALSO/EVEN come-NEG-PAST
'{Even} Taro {also} didn't come.' ✓EVEN/ALSO > not, *not > EVEN/ALSO

(13) ***-mo* 'also' is an intervener:** (Hasegawa, 1995:119)

* Hanako-**mo** *nani*-o ka-tta-no?
Hanako-ALSO what-ACC buy-PAST-Q
Int.: 'What did Hanako$_F$ also buy?' (in addition to other people)

(14) ***-sae* 'even' is an intervener:** (Yanagida, 1996:30)

?* John-wa Mary-ni-**sae** *nani*-o oku-tta-no?
John-TOP Mary-to-EVEN what-ACC send-PAST-Q
Intended: 'What did John send even to Mary?'

[3] *Wh-mo* in Japanese forms universal quantifiers and NPIs/n-words. These forms are distinguishable as (a) universal *wh-mo* but not the NPI series preserve original pitch accents on the *wh*-word and (b) universal *wh-mo* but not the NPI series allow case markers; see e.g. Aoyagi and Ishii (1994). On both counts, the form here is clearly a universal *wh-mo*.

Polarity items: *-shika* and *wh-mo*

We follow Kataoka (2006) in taking the negative-polarity-dependent 'only' *-shika* to be a quantifier which obligatorily takes scope over a local negation.

(15) ***-shika* NPI 'only' is an intervener:** (Takahashi, 1990, 134)

?* John-**shika** *nani*-o tabe-**nak**-atta-no?
John-ONLY$_{NPI}$ what-ACC eat-NEG-PAST-Q
Intended: 'What did only John eat?'

Similarly, Shimoyama (2011) shows that negative-polarity-dependent *wh-mo* is a wide scope universal quantifier. As predicted, it is an intervener; see (2).

Indefinites and numerals:

(16) **Indefinite *wh-ka* is scope-rigid:** (Mogi, 2000:59)

[**Ikutsu-ka**-no mondai]-o toka-**nak**-atta
how.many-KA-GEN problem-ACC solve-NEG-PAST
'*pro* did not solve some problems.' ✓some > not, *not > some

(17) **Indefinite *wh-ka* is an intervener:** (Hoji, 1985, 269)

* **Dare-ka**-ga *nani*-o nomi-masi-ta-ka
who-KA-NOM what-ACC drink-POLITE-PAST-Q
'What did someone drink?'

(18) **Modified numerals are not scope-rigid:** (Shibata, 2015b:66)

[**Go-nin-ijyoo**-no gakusei]-ga ko-**nak**-atta
5-CL-or.more-GEN student-NOM come-NEG-PAST
'Five or more students didn't come.' ✓(≥ 5) > not, ✓not > (≥ 5)

(19) **Modified numerals are not interveners:**

✓ [**Go-nin-ijyoo**-no gakusei]-ga *dono-hon*-o yon-da-no?
five-CL-or.more-GEN student-NOM which-book-ACC read-PAST-Q
'Which book(s) did five or more students read?'

Two positions for *-dake* 'only' with postpositions:

Novel supporting data comes from the position of 'only' *-dake*. *-dake* can occur outside or inside a postposition: DP-P-*dake* or DP-*dake*-P.

(20) **-P-*dake* is scope-rigid; -*dake*-P is not:**[4]

a. Taro-wa Hanako-to-**dake** hanashi-tei-**nai**.
Taro-TOP Hanako-with-only talk-PERF-NEG
lit. 'Taro hasn't talked only with H.' ✓only > not, *not > only

b. Taro-wa Hanako-**dake**-to hanashi-tei-**nai**.
Taro-TOP Hanako-only-with talk-PERF-NEG
lit. 'Taro hasn't talked with only H.' ✓only > not, ✓not > only

(21) **-P-*dake* is an intervener; -*dake*-P is not:**

a. ??? Taro-wa Hanako-to-**dake** *nani*-o tabe-ta-no?
Taro-TOP Hanako-with-only what-ACC eat-PAST-Q

b. ✓ Taro-wa Hanako-**dake**-to *nani*-o tabe-ta-no?
Taro-TOP Hanako-only-with what-ACC eat-PAST-Q
'*What* did Taro eat (only) with (only) Hanako?'

Summary:

	disjunction		universal		also	even	NPI
	ka	*naishi*	*wh-mo*	*subete*	*-mo*	*-sae*	*wh-mo*
scope-rigid?	○ (8a)	× (8b)	○ (10a)	× (10b)	○ (12)	○ (12)	○*
intervener?	○ (9a)	× (9b)	○ (11a)	× (11b)	○ (13)	○ (14)	○ (2b)

	NPI only	indefinite	modified	only	
	-shika	*wh-ka*	numerals	-P-*dake*	-*dake*-P
scope-rigid?	○*	○ (16)	× (18)	○ (20a)	× (20b)
intervener?	○ (15)	○ (17)	× (19)	○ (21a)	× (21b)

* See Kataoka (2006) and Shimoyama (2011) on the rigid wide scope of so-called NPIs.

[4] Futagi (2004) shows this difference with respect to modals.

3 Analysis

❶ All arguments evacuate *v*P in Japanese (Shibata, 2015a,b), moving out of NegP (if present). We adopt the *v*P-internal subject hypothesis for Japanese (see e.g. Fukui, 1986; Kitagawa, 1986; Kuroda, 1988).

❷ Some (but not all) quantifiers can reconstruct into base positions.

❸ Intervention reflects the uninterpretability of (6) at LF:

(6) **Kotek (2017) intervention schema** (repeated)
* LF: C ... $\boldsymbol{\lambda}$ ... *wh*

The logical problem caused by (6) has been discussed by Rooth (1985); Poesio (1996); Novel and Romero (2009); Shan (2004). Kotek (2017) proposes that this is the source of intervention effects.

A quantifier moved above *wh* could lead to (6), but quantifiers that can reconstruct into *v*P can avoid (6) at LF.

(22) **Scope-rigidity in Japanese (Shibata, 2015a,b):**

a. All arguments move out of *v*P:
$[_{CP}$ ... DP ... $[_{vP}$ ... *t* ... V]]

b. Interpretation in surface position ⇒ wide scope over Neg:
LF: $[_{CP}$ ... DP $\boldsymbol{\lambda x}$ ... $[_{NegP}$ $[_{vP}$ ... $\boldsymbol{x}$ ... V] Neg]] DP > Neg

c. Some (not all) quants. reconstruct into *v*P ⇒ narrow scope:
LF: $[_{CP}$ ... $[_{NegP}$ $[_{vP}$ ... DP ... V] Neg]] Neg > DP

(23) **Deriving the generalization (5):**

a. Potential intervener (DP) above *wh*:
$[_{CP}$ C ... DP ... *wh* ... $[_{vP}$ ... *t* ... V]]

b. *LF interpretation in surface position lead to intervention!*
* LF: $[_{CP}$ C ... DP $\boldsymbol{\lambda x}$ ... *wh* ... $[_{vP}$ ... $\boldsymbol{x}$ ... V]]

c. Reconstruction avoids the intervention configuration:
✓ LF: $[_{CP}$ C ... *wh* ... $[_{vP}$ ... DP ... V]]

d. Scrambling *wh* above also avoids intervention:
✓ LF: $[_{CP}$ C ... *wh* λy ... DP $\boldsymbol{\lambda x}$ ... *y* ... $[_{vP}$ ... $\boldsymbol{x}$ ... V]]

This analysis makes a number of predictions...

3.1 Non-intervention through reconstruction

► A "non-intervening" quantifier is interpreted as reconstructed in *v*P.

(24) Taro-wa Hanako-**dake**-to *nani*-o tabe-**nai**-no?
Taro-TOP Hanako-only-with what-ACC eat-NEG-Q

a. * 'What does Taro only not eat with Hanako$_F$?' only > not
Answer: Squid ink pasta (because he gets embarrassed)

b. ? 'What does Taro not eat with only Hanako$_F$?' not > only
Answer: Dimsum (because it's better with more people)

Consider also the collective vs distributive event interpretation of subjects:

(25) [Gakusei **zen'in**]-ga LGB-o ka-tta.
student all-NOM LGB-ACC buy-PAST

a. 'All the students together bought a copy of LGB.' collective

b. 'All the students each bought a copy of LGB.' distributive

(26) [Gakusei **zen'in**]-ga *dono hon*-o ka-tta-no?
student all-NOM which book-ACC buy-PAST-Q

a. ✓ 'Which book(s) did the students all buy together?' collective

b. * 'Which book(s) did the students all individually buy?'
(and they each bought other books too) distributive

3.2 Non-intervention by scoping out

► A "non-intervening" quantifier could "scope out" of the question.

(27) Sensei-wa [[gakusei **zen'in**]-ga *dono hon*-o ka-tta-ka] shiri-tai.
teacher-TOP student all-NOM which book-ACC buy-PAST-Q know-want

a. ✓ 'The teacher wants to know [which book(s) the students all bought together].' collective

b. * 'The teacher wants to know [which book(s) the students all bought individually].' distributive

c. ✓ 'The teacher wants to know [for each student$_i$, which book(s) they$_i$ bought].' pair-list

The pair-list reading can be derived by scoping the universal quantifier out of the question (see e.g. Karttunen and Peters, 1980; Comorovski, 1989, 1996).

3.3 Base-generated quantifiers are not interveners

What we have seen so far is compatible with the interpretation of *wh*-in-situ being interrupted by (a) *any* quantification or (b) λ-binders of quantifiers in *derived* positions.

► Quantifiers that are base-generated high and can be interpreted in their base positions are not interveners.

(28) **Temporal adjuncts base-generated high do not cause intervention:**

✓Taro-wa kayoubi-ni-**dake** *nani*-o tabe-ru-no?
Taro-TOP Tuesday-on-ONLY what-ACC eat-NONPAST-Q
'What does Taro eat only on Tuesdays?'

Recall that -P-*dake* was an intervener above (21). *-dake* in (28) is on a temporal modifier which is base-generated high and can be interpreted in-situ.

Hagstrom (1998, p. 54) similarly shows that *ka*-disjunction of locative adjuncts do not interene, even for speakers for whom *ka*-disjunction of arguments cause intervention.

(29) **Locative adjuncts base-generated high do not cause intervention:**

✓John-ga [ronbun **ka** kougi]-de *dare*-o hihan-shi-ta no?
John-NOM article or lecture-in who-ACC criticize-do-PAST Q
'Who did John criticize either in an article or a lecture?'

4 Conclusion

❶ Intervention effects track the ability of quantifiers to reconstruct:

(5) **Generalization: Intervention correlates with scope-taking**
Scope-rigid DP quantifiers above an in-situ *wh* cause intervention. DP quantifiers that allow scope ambiguities with respect to negation — i.e., which can reconstruct below the *wh* — do not.

❷ Intervention reflects the LF configuration in (6):

(6) * LF: C ... $\boldsymbol{\lambda}$ ... *wh*

Scope-rigid interveners in a derived position above the *wh* necessarily lead to the LF configuration in (6).

❸ (6) can be avoided by...

- scrambling the *wh* above the quantifier;
- reconstructing the quantifier below *wh*; or
- scoping the quantifier out of the question

  . . . for items that allow reconstruction/quantifying-in.

Together with Shibata's proposal for DP scope in Japanese, this derives the generalization in (5).

❹ The idea that an LF configuration like (6) causes intervention is an important aspect of proposals such as Beck (2006).

However, we have seen that the LF configuration (6) leads to intervention *with any quantifier in a derived position* (Kotek, 2017).

Problematic for all previous accounts of intervention effects, which assume that interveners are a *proper subset* of quantifiers.

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Appendix: The problem with abstraction over alternatives

Adding Roothian alternatives to a Heim and Kratzer (1998) system:

(30) **A recursive definition for computing focus-semantic values:**

Terminal nodes (TN):

$$[\![\alpha_\tau]\!]^f = \begin{cases} \{[\![\alpha_\tau]\!]^o\} & \text{if } \alpha \text{ not F-marked} \\ \text{a subset of } D_\tau & \text{if } \alpha \text{ F-marked} \end{cases}$$

Pronouns and traces rule:

$$[\![\alpha_i]\!]^f = \begin{cases} g(i) & \text{if } \alpha \text{ not F-marked} \\ \{[\![\alpha_i]\!]^o\} & \text{if } \alpha \text{ F-marked} \end{cases}$$

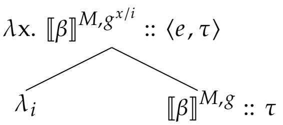
Functional application (FA):

$$\left[\!\!\left[\begin{array}{c} \alpha_\tau \\ \beta_{\langle\sigma,\tau\rangle} \quad \gamma_\sigma \end{array} \right]\!\!\right]^f = \begin{cases} \{b(g) \mid b \in [\![\beta]\!]^f, g \in [\![\gamma]\!]^f\} & \text{if } \alpha \text{ not F-marked} \\ \text{a contextual subset of } D_\tau & \text{if } \alpha \text{ F-marked} \end{cases}$$

How should we define Predicate Abstraction? Let's start with simple PA:
(The discussion below based on Novel and Romero (2009).)

(31) a. Alice saw nobody

b. Nobody λ_i Alice saw t_i



(32) a. $[\![t_i]\!]^{M,g}$ = g(i)

b. $[\![\text{saw}]\!]^{M,g}$ = λx. λy. y saw x

c. $[\![\text{Alice}]\!]^{M,g}$ = Alice

d. $[\![\text{Alice saw } t_i]\!]^{M,g}$ = 1 iff A saw g(i)

e. $[\![\lambda_i \text{ Alice saw } t_i]\!]^{M,g}$ = λx. A saw $g^{x/i}$(i)
= λx. A saw x

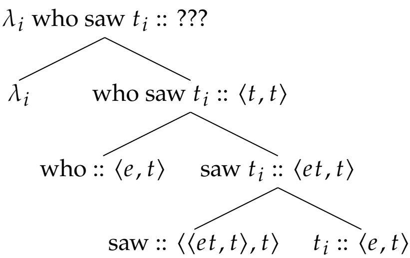
f. $[\![\text{A saw nobody}]\!]^{M,g}$ = 1 iff $\neg\exists$x [A saw x]

Now, in a *wh*-in-situ language, imagine the following:

(33) a. Who saw nobody

b. Nobody λ_i who saw t_i

We want to create an abstraction rule over *sets of alternatives*.



(34) a. $[\![t_i]\!]^{M,g}$ = { g(i) }

b. $[\![\text{saw}]\!]^{M,g}$ = { λx. λy. y saw x }

c. $[\![\text{saw } t_i]\!]^{M,g}$ = { λy. y saw g(i) }

d. $[\![\text{who}]\!]^{M,g}$ =
{ Alice, Barbara, Carol }

e. $[\![\text{who saw } t_i]\!]^{M,g}$ =
{ A saw g(i), B saw g(i), C saw g(i) }

f. $[\![\lambda_i \text{ Alice saw } t_i]\!]^{M,g}$ = ???

The simplest solution won't work: adding a λ-operator outside the abstracted-over expression.

$$\lambda x.\ [\![\beta]\!]^{M,g^{x/i}} :: \langle e,\langle \tau,t\rangle\rangle$$

$$\lambda_i \qquad [\![\beta]\!]^{M,g} :: \langle \tau,t\rangle$$

(35) **What we get isn't what we want:**
$\lambda x.\ \{$ A saw $g^{x/i}$(i), B saw $g^{x/i}$(i), C saw $g^{x/i}$(i) $\}$

(36) $[\![\text{Nobody}]\!]^{M,g} = \{\ \lambda Q_{\langle e,t\rangle}.\ \neg\exists x_e[Q(x)]\ \}$

This gives us something of the wrong type to be the argument of *nobody*. *Nobody* (36) wants to take as sister a set of $\langle e,t\rangle$ expressions — type $\langle\langle e,t\rangle,t\rangle$. But the above expression (35) is not of that type. Specifically, we want something like (37):

(37) **What we want to get:**
$\{\ \lambda x.$ Alice saw $g^{x/i}$(i), $\lambda x.$ Barbara saw $g^{x/i}$(i), $\lambda x.$ Carol saw $g^{x/i}$(i) $\}$

We want a type-shifting rule from type $\langle e,\langle \tau,t\rangle\rangle$ into type $\langle\langle e,\tau\rangle,t\rangle$:

(38) **A procedure for converting [a function into a set of τ-alternatives] to [a set of functions into τ-alternatives]:**
$\lambda Q_{\langle e,\langle \tau,t\rangle\rangle}.\ \{\ f_{\langle e,\tau\rangle} : \forall x_e . f(x) \in Q(x)\ \}$

But as Shan (2004) shows, a function into sets carries less information than a set of functions. If we transpose using (38), we end up with a set that contains both *constant* $\langle e,t\rangle$-functions (39) and non-constant $\langle e,t\rangle$-functions (40). The former describe properties like "to be seen by Alice/Barbara/Carol," which we want. The latter have no meaning in our system and should be excluded.

(39) **Constant $\langle e,t\rangle$-functions (desired):**

$$\left\{ \begin{bmatrix} x_1 \mapsto \text{Alice saw } x_1 \\ x_2 \mapsto \text{Alice saw } x_2 \\ x_3 \mapsto \text{Alice saw } x_3 \end{bmatrix}, \begin{bmatrix} x_1 \mapsto \text{Barbara saw } x_1 \\ x_2 \mapsto \text{Barbara saw } x_2 \\ x_3 \mapsto \text{Barbara saw } x_3 \end{bmatrix}, \begin{bmatrix} x_1 \mapsto \text{Carol saw } x_1 \\ x_2 \mapsto \text{Carol saw } x_2 \\ x_3 \mapsto \text{Carol saw } x_3 \end{bmatrix} \right\}$$

(40) **Non-constant $\langle e,t\rangle$-functions (undesireable):**

$$\left\{ \begin{bmatrix} x_1 \mapsto \text{Alice saw } x_1 \\ x_2 \mapsto \text{Carol saw } x_2 \\ x_3 \mapsto \text{Barbara saw } x_3 \end{bmatrix}, \begin{bmatrix} x_1 \mapsto \text{Alice saw } x_1 \\ x_2 \mapsto \text{Barbara saw } x_2 \\ x_3 \mapsto \text{Carol saw } x_3 \end{bmatrix}, \begin{bmatrix} x_1 \mapsto \text{Carol saw } x_1 \\ x_2 \mapsto \text{Barbara saw } x_2 \\ x_3 \mapsto \text{Alice saw } x_3 \end{bmatrix} \right\}$$

Hagstrom (1998); Kratzer and Shimoyama (2002) and Yatsushiro (2009) define rules along the lines of (38) above, and thus over-generate.[5] Poesio (1996) and later Novel and Romero (2009) type-lift the entire system, such that each expression is now a function from an assignment function to its original denotation.[6] This last solution *does* indeed fix the problem. See Novel and Romero (2009) for details. Shan (2004) uses this problem to motivate a move to a movement-free, variable-free semantics. Another solution, in Ciardelli et al. (2017), based on Inquisitive Semantics, takes propositions to have the basic type of sets. Through redefining the meanings of the basic elements composing up to propositions, the PA problem is avoided. (See also Charlow 2017.)

[5] Rooth (1985) proposes this too, but doesn't spell out the details.

[6] More specifically, Novel and Romero (2009) find a problem with Poesio's (1996) implementation, and fix it by assuming that *wh*-phrases are definite descriptions.