Intervention effects

1 LF intervention effects on *wh*-in-situ

Starting in the 80s, a phenomenon of "intervention effects" has been observed in questions in *wh*-in-situ languages.

When a certain class of operators (called interveners) c-command an in-situ *wh*-word, the result is ungrammaticality, which can be avoided by scrambling the *wh* above the intervener. (Korean data from Beck and Kim 1997.)

(1) **Baseline:**

a. ✓ Suna-ka *mwues*-ul sa-ss-ni?
Suna-nom what-acc buy-past-Q

b. ✓ *mwues*-ul$_i$ Suna-ka t_i sa-ss-ni?
what-acc Suna-nom buy-past-Q
'What did Suna buy?'

(2) **Intervention with *no one*:**

a. ?* **amwuto** *mwues*-ul sa-ci anh-ass-ni?
anyone what-acc buy-comp not-do-past-Q

b. ✓ *mwues*-ul$_i$ **amwuto** t_i sa-ci anh-ass-ni?
what-acc anyone buy-comp not-do-past-Q
'What did no one buy?'

(3) **Intervention with *only*:**

a. ?* **Minsu-man** *nwukwu*-lul manna-ss-ni?
Minsu-only who-acc meet-past-Q

b. ✓ *nwukwu*-lul$_i$ **Minsu-man** t_i manna-ss-ni?
who-acc Minsu-only meet-past-Q
'Who did only Minsu meet?'

(4) **Intervention with *also*:**

a. ?* **Minsu-to** *nwukwu*-lul manna-ss-ni?
Minsu-also who-acc meet-past-Q

b. ✓ *nwukwu*-lul$_i$ **Minsu-to** t_i manna-ss-ni?
who-acc Minsu-also meet-past-Q
'Who did Minsu, too, meet?'

(5) **Intervention with *everyone*:**

a. ?(?) **nwukwuna-ka** *enu kyoswu*-lul conkyengha-ni?
everyone-nom which professor-acc respect-Q

b. ✓ *enu kyoswu*-lul$_i$ **nwukwuna-ka** t$_i$ conkyengha-ni?
which professor-acc everyone-nom respect-Q
'Which professor does everyone respect?'

(6) **Japanese** (Data from Tomioka 2007)

a. ?* **Dare-mo** *nani-o* yom-ana-katta-no?
who-mo what-acc read-neg-past-Q

b. ✓ *Nani-o*$_i$ **dare-mo** t$_i$ yom-ana-katta-no?
what-acc who-mo read-neg-past-Q
'What did no one read?'

These effects are reportedly ameliorated or disappear altogether in embedded contexts:[1]

(7) **Intervention ameliorated in embedded context, no one**

a. ?(?) Kimi-wa [$_{CP}$ **daremo** *nani*-o yom-ana-katta-to] omotteiru-no (Jp)
you-top anyone what-acc read-neg-past-comp think-Q

b. ?(?) Ne-nun [$_{CP}$ **amuto** *mues*-ul ilkci-anh-ass-ta-ko] sayngkakha-ni? (Kr)
you-top anyone what-acc read-neg-past-dec-comp think-Q
'What do you think that no one read?'

(8) **Intervention ameliorated in embedded context, disjunction**

a. ✓ Kimi-wa [$_{CP}$ [**John-ka Bill**]-ga *nani*-o yon-da-to] omotteiru-no (Jp)
you-top John-or Bill-nom what-acc read-past-comp think-Q

b. ✓ Ne-nun [$_{CP}$ [**John-ina Bill**]-i *mues*-ul ilk-ess-ta-ko] sayngkakha-ni? (Kr)
you-top John-or Bill-nom what-acc read-past-dec-comp think-Q
'What do you think that John or Bill read?'

2 Three approaches to intervention

The literature proposes, broadly speaking, three approaches to intervention effects:

- **Syntactic approaches:** Something about the syntax of sentences with intervention goes wrong (Beck, 1996; Pesetsky, 2000).
- **Semantic approaches:** The syntax of these questions may be generated by our system, but their interpretation somehow goes bad (Beck, 2006; Mayr, to appear).

[1] Hagstrom (1998) reports improvement in cases involving syntactic islands. According to Tomioka, the improvement is a much more general phenomenon, as his examples indicate.

- **"Pragmatic" approaches:**[2] The syntax and semantics of these questions can be generated by the system, but there is some other problem in questions with intervention (Tomioka, 2007).

This is by no means an exhaustive list. Intervention effects have drawn much attention recently, and there are more theories out there on the market. To name a few other works that have looks at intervention: Hoji (1985), Tanaka (1997), Hagstrom (1998), Kim (2002), Grohmann (2006), Yang (2008), Miyagawa (2010), Mayr (2010), Haoze and Law (2014).

Although there is a lot of work out there, I am not aware of any work that tries to (or is able to) explain all the data that has been described as subject to intervention. (We will see some of these facts later on.)

- The data is often subtle and disputed.
- Most theories apply to particular languages and cannot easily extend to others.
- Some facts have never been explained.[3]
- It is possible that at least some facts should not be explained as "intervention."

3 Tomioka (2007): A pragmatic/prosodic account

A pragmatic approach to Japanese and Korean intervention.

Two assumptions:

- Questions can be analyzed into two parts: (normally) the non-*wh* part of the question is discourse old (or given), and the *wh* part is new. The question 'what did John read' can only be asked in a situation where the proposition 'John read x' is salient.
- Topics are what is being or has been talked about in the utterance context. They are therefore discourse-old (or given). In Japanese and Korean, topics are overtly marked with *-wa* and *-(n)un* respectively.

Observation: interveners are elements that cannot be topic-marked. Tomioka calls them "Anti-Topic Items."

[2] Though, really, that's a terrible name for these approaches, or at least the one that we will see today.

[3] Notably, the fact that multiple questions sometimes (perhaps always) lose the pair-list reading, instead of becoming ungrammatical.

(9) **Interveners can't be topic marked**

Japanese	**Korean**
**daremo-wa*	**amuto-nun*
anyone-top	anyone-top
**daremo-wa*	**nwukwuna-nun*
everyone-top	everyone-top
**dareka-wa*	**nwukwunka-nun*
someone-top	someone-top
**[John-ka Bill]-wa*	**[John-ina Bill]-un*
John-or Bill-top	John-or Bill-top
**John-mo-wa*	**John-to-nun*
John-also-top	John-also-top

A prosodic account of intervention:

☞ The purpose of scrambling in *wh*-questions is to avoid an impossible prosodic structure of the question.

(10) **Two constraints on Japanese/Korean prosody**

a. FOCUS-LEFT-EDGE
Left edge of focus = left intermediate phrase edge

b. FOCUS-TO-END
No intervening intermediate phrase boundary between focused phrase and the end of the sentence.

The *focus-left-edge* constraint requires that a focused constituent be put at the left edge of an intermediate phrase.

The *focus-to-end constraint*, requires there to be no intermediate phrase boundary between the focused material and the end of the sentence.[4]

Therefore, this constraint in effect enforces that the material that comes to the right of a focused constituent is prosodically reduced (deaccented or compressed).

(11) **Syntactic structure:** ... $[Wh]_1$ [... t_1 ...]

Phonological phrasing:

H*L
|
...] [$_i$ [Wh] .....]
⌣
← *this part prosodically reduced*

[4]Unless there is other focused material (i.e., a case of multiple-foci).

A prosodic account of intervention:

☞ Scrambling the *wh* above the intervener (ATI) puts it in the part of the question whose prosody is reduced.

In this system, pre-focus material constitutes an independent intermediate phrase which most likely gets a secondary stress. Therefore, it cannot be totally prosodically reduced.

☞ Intervention effects arise when ATIs occur in positions that require stress. ATIs resist this stress, leading to conflicting requirements on the prosody of the question. This helps explain the variability in judgments.

In embedded contexts, subjects are not topics.

(12) **-ga marking odd in matrix context**

John-**wa**/??-**ga** *nani*-o yon-da-no
John-top/ -nom what-acc read-past-Q

'What did John read?'

(13) **-ga fine in embedded context**

Kimi-wa [$_{CP}$ John-**ga** *nani*-o yon-da-to] omotteiru-no
you-top John-nom what-acc read-past-comp think-Q

'What do you think that everyone read?'

☞ It'd be good if this somehow correlated with facts about prosody in embedded contexts, but apparently non exist. The exact characterization of why (14) is good is left as an open question.[5]

(14) **Intervention ameliorated in embedded context**

✓*pro* [$_{CP}$ **daremo** *nani*-o yon-da-to] omotteiru-no
anyone what-acc read-past-comp think-Q

'What do (you) think that everyone read?'

[5]Also, (7)-(8) above. (14) is particularly difficult to explain because it contains a pro-dropped subject and hence no material to the left of the embedded clause. Thus, we can't resort to an explanation that relies on the fact that the main stress in (7)-(8) is on the matrix subject.

4 Back to data: Intervention effects in German

Like in Japanese and Korean, we find a similar phenomenon of intervention effects in German questions. Since German (like English) is a *wh*-fronting language, we only observe intervention in multiple *wh*-questions, involving the in-situ *wh*-phrases in the question. (Data from Beck 1996.)

(15) **Intervention in German multiple questions: avoided with scrambling**

a. ✓ *Wer* hat Luise *wo* angetroffen?
who has Luise where met
'Who did Luise meet where'?

b. ?? *Wer* hat **niemanden** *wo* angetroffen?
who has nobody where met

c. ✓ *Wer* hat wo_i **niemanden** t_i angetroffen?
who has where nobody met
'Who didn't meet anybody where'?

(16) **Intervention with *no boy, never***

a. ?? *Wen* hat **kein Junge** *wann* angerufen?
who has no boy when called
'Who did no boy call when?'

b. ?? *Wen* hat der Hans **nie** *wem* vorgestellt?
who has the Hans never whom introduced
'Who did Hans never introduce to who?'

Intervention happens with universal quantifiers, and has the effect of the loss of a reading:

(17) **Intervention with *every* results in loss of narrow scope reading**

Wen hat **jeder Junge** *wann* beobachtet?
who has every boy when observed

a. 'For every boy, who did he observe when?' wide scope ∀
b. * 'Who is such that every boy observed him when?' narrow scope ∀

(18) **Intervention avoided if *wh* is scrambled**

Wen hat *wann* **jeder Junge** t_i beobachtet?
who has when every boy observed

a. 'For every boy, who did he observe when?' wide scope ∀
b. 'Who is such that every boy observed him when?' narrow scope ∀

We find a difference between upward and downward entailing quantifiers: (Beck, 1996; Grohmann, 2006; Mayr, to appear)

(19) **Intervention with upward vs downward entailing quantifiers**

a. ? *Wen* haben **einige Regisseure** in *welchem* Film gesehen?
who have a few directors in which film seen
'Who did a few directors see in which film?'

b. * *Wen* haben **wenige Regisseure** in *welchem* Film gesehen?
who have few directors in which film seen

(20) a. ? *Wen* haben **mindestens zwei Studenten** *wem* vorgestellt?
who have at least two students whom introduced
'Who did at least two students introduce to who?'

b. * *Wen* haben **höchstens zwei Studenten** *wem* vorgestellt?
who have at most two students whom introduced

c. * *Wen* haben **genau drei Studenten** *wann* eingeladen?
who have exactly three students when invited

We also find intervention with focus-sensitive operators (Beck, 2006).

(21) **Intervention with focus-sensitive operators**

a. * *Wen* hat **nur der HANS** *wann* angerufen?
who has only the Hans when called
'Who did only Hans call when?'

b. * *Wen* hat **sogar der HANS** wann angerufen?
who has even the Hans when called
'Who did even Hans call when?'

And we find intervention in separation constructions, in simplex questions.[6]

(22) **Intervention in separation constructions**

a. ✓ *Wen* hat Luise *von den Musikern* getroffen?
whom has Luise of the musicians met
'Which of the musicians did Luise meet?'

b. ?? *Wen* hat **keine Studentin** *von den Musikern* getroffen?
whom has no student of the musician met
'Which of the musicians did no student meet?'

c. ✓ *Wen* *von den Musikern* hat **keine Studentin** getroffen?
whom of the musicians has no student met
'Which of the musicians did no student meet?'

[6]This actually extends to lots of examples where part of a *wh*-phrase is left behind or stranded, beyond what is traditionally considered 'separation constructions.' For example: *was für*, *wen auBer*, *was zum Beispiel*, *was an (Aufgaben)*, *was Schönes*, *was genau/ungefähr*, stranded *alles*. See examples in Beck (1996).

Finally, intervention is also reported with adverbials, e.g. *always* and *often*.[7]

(23) **Intervention with *often***

a. * Luise zählt auf, *welche* Uni **oft** *welche* Linguisten eingeladen hat.
Luise enumerates which university often which linguists invited has

b. ✓ Luise zählt auf, *welche* Uni *welche* Linguisten **oft** eingeladen hat.
Luise enumerates which university which linguists often invited has
'Luise enumerates which university often invited which linguists.'

5 Beck (2006): A semantic account

An informal description of intervention effects: a linguistic structure is ungrammatical if a *focus-sensitive operator* (an **intervener**) occurs between an LF-in-situ *wh*-phrase and the complementizer that must interpret it:

(24) **Intervention schema with in-situ *wh*-phrases (Beck, 2006)**
* LF: [C ... **intervener** ... *wh*]
⟵

Beck (2006, section 3.2) proposes a formal semantic mechanism to predict this observed behavior, borrowing from Rooth (1992); Kratzer (1991), and Wold (1996).

Each logical form α has an ordinary semantic value $[\![\alpha]\!]^g$ and a focus-semantic value $[\![\alpha]\!]^{g,h}$. The usual assignment function is g, and h is used for interpretation of "*distinguished variables*." In the syntactic structure for (25a), the squiggle operator $\sim$ is added, and *ALT* represents a set of alternatives provided by the context.[8,9]

(25) **A simple sentence with focus**

a. **Only** John$_F$ left.

b. [[only *ALT*] [$\sim$*ALT* [John$_{F1}$ left]]]

A two-place semantics for *only* is given in (26).

(26) **A two-place semantics for *only***
$[\![\text{only}]\!](\alpha)(\beta)(\text{w}) = 1$ iff for all p such that $p(w)$=1 and $p \in \alpha$, $p = \beta$
presupposes: β is true

[7] You will notice that the question is embedded under 'enumerate,' which forces a pair-list reading of the question. Beck says (fn 4): *I have chosen to embed the question under the verb 'enumerate' in order to avoid a single-pair interpretation, which may sometimes be possible with such questions. I do not know why that is.*.

[8] You may be upset at this abuse of notation, assigning meaning to the particular choice of variable, but we will nonetheless use this notation without further comment.

[9] I am using the notation "*ALT*" instead of the more common C for the set of alternatives to try and avoid confusion. We will see C again later, and it will be used to denote the question Complementizer.

The alternatives in *ALT* (α in (26)) are computed from the focus-semantic value of the prejacent by replacing the F-marked constituent with other elements provided by the context.

(27) **The meaning of (25a)**

a. Only John_F left.

b. *ALT*: {*John* left, *Mary* left, *Bill* left, ...} "α"

c. Prejacent: John left "β"

d. $[\![$Only John left$]\!] \Leftrightarrow$ 1 iff for all p such that $p(w)$=1 and $p \in \alpha$, $p = \beta$
$\Leftrightarrow$ 1 iff for all p such that $p(w)$=1 and
$p \in$ {*John* left, *Mary* left, *Bill* left, ...}, p = John left.
$\Leftrightarrow$ 1 iff John left and no one else left.

As always, the alternatives in the set *ALT* must be a subset of the focus-semantic value of the prejacent. If defined, the ordinary value of [$\sim$*ALT* Y] is the prejacent.

The focus-semantic value of the proposition is reset to its ordinary value:

(28) **The meaning of a focused sentence**

$$[\![\sim ALT \text{ Y }]\!]^g = \begin{cases} [\![\text{Y}]\!]^g \text{ if } g(ALT) \subseteq \{[\![\text{Y}]\!]^{g,h'} : h' \in \text{H and } h' \text{ is total}\} \\ \text{undefined otherwise} \end{cases}$$

(29) $[\![\sim ALT \text{ Y }]\!]^{g,h} = [\![\sim ALT \text{ Y }]\!]^g$

As part of the distinguished variables system, each focused constituent carries an index. The focus-semantic value of that constituent is set to be whatever the distinguished variable assignment function h assigns for that index. Otherwise, it is set to be the same as the ordinary semantics of the unfocused constituent.

(30) **The semantics of a focused constituent**

$$[\![\text{XP}_{\text{F1}}]\!]^{g,h} = \begin{cases} h(1) \text{ if } 1 \in \text{Dom}(h) \\ [\![\text{XP}_{\text{F1}}]\!]^g \text{ otherwise} \end{cases}$$

The derivation of (25a) is as in (31).

(31) **The derivation of *only John left***

a. $[\![\text{John}_{\text{F1}} \text{ left }]\!]^g = \lambda w$. John left in w

b. $[\![\text{John}_{\text{F1}} \text{ left }]\!]^{g,h} = \lambda w$. $h(1)$ left in w

c. $[\![$ [[only *ALT*] [$\sim$*ALT* [John_{F1} left]]]$]\!]^g = [\![$Only$]\!](g(ALT))(\lambda w$. John left in w)
$\Leftrightarrow$ 1 iff for all p such that $p(w)$=1 and $p \in ALT$, p = John left.
if $g(ALT) \subseteq \{[\![\text{John}_{\text{F1}} \text{ left }]\!]^{g,h'} : h' \in H\}$
if $g(ALT) \subseteq \{\lambda w$. x left in $w : x \in D\}$

d. For all p such that $p(w)$=1 and $p \in \{\lambda w$. x left in $w : x \in D\}$, p = John left.

Next we can turn to the derivation of a question. Beck assumes that *wh*-phrases have a focus-semantic value, but no ordinary semantic value:

(32) **The semantics of *who***
Ordinary semantics: $[\![who_1]\!]$ = undefined
Focus-semantics: $[\![who_1]\!]^{g,h} = \begin{cases} h(1) \text{ if } 1 \in \text{Dom}(h) \\ \text{undefined otherwise} \end{cases}$

Beck also adopts an interpretability principle (see also Beck and Kim (2006)):

(33) **Principle of Interpretability (Beck, 2006, p. 16)**
An LF must have an ordinary semantic value.

Since a *wh*-word only has a focus-semantic value, it requires a question operator, C. C discards the (undefined) ordinary value of its sister and only uses its focus semantic value.

(34) **The question operator and its meaning**
a. $[\![\text{C}_i \text{ Y}]\!]^{g,h} = [\![\text{C}_i \text{ Y}]\!]^{g}$
b. $[\![\text{C}_i \text{ Y}]\!]^{g} = \lambda p \,.\, \exists x \,[\, p = [\![\text{Y}]\!]^{g,h[x/i]} \,]$

Intervention effects happen if another focus-sensitive operator is encountered before the question operator C:

(35) **The LF of a question with an intervention effect**
a. * Only John_{F1} saw *who*?
b. $[_{\text{CP}} \text{C}_i \, [_{\text{IP3}} \text{only } ALT \, [_{\text{IP2}} \sim ALT \, [_{\text{IP1}} \text{John saw } who_i \,] \,] \,] \,]$

Here: the $\sim$ operator (or *only*) is the first operator c-commanding the *wh*-phrase, and therefore it will interpret the focus alternatives in its scope, instead of C.

- The $\sim$ operator refers to both the ordinary and focus-semantic value of its sister.
- As a result, the ordinary semantic value at the level of IP_2 will be undefined, because it contains a *wh*-phrase which, by definition, does not have an ordinary value.
- At this point, the focus-semantic value of IP_2 is set to its ordinary semantic value, which again is undefined.
- Once this step takes place, there is no way for the derivation to recover. Even if a question operator C is introduced later, e.g. above IP_3 in (35b), discarding the undefined ordinary semantic value that has been inherited by IP_3 won't fix the problem, because the focus-semantic value that C will operate on is also undefined.
- The result, then is an uninterpretable structure, which leads to ungrammaticality which we diagnose as an intervention effect.

In more general terms, this system dictates that the first focus-sensitive operator c-commanding a *wh*-phrase must be a question operator, C.[10]

All other focus-sensitive operators in natural language operate on both the ordinary and focus-semantic value of their sister, and as a result will lead to an uninterpretable structure if they apply to a *wh*-phrase, which does not have an ordinary semantic value.

To avoid this problem, *wh* must be scrambled above any intervener.

(36) **The intervention configuration**

a. * [$_{CP}$ C ... **intervener** ... *wh*]

b. ✓ [$_{CP}$ C ... *wh* **intervener** ... t]

This proposal has been very influential in the literature on intervention effects. There are several things that it does well:

- Defines the set of interveners (= focus-sensitive items)
- Ties intervention to the semantics of questions
- Explains why movement is needed to get around intervention

There are also several shortcomings:

- It doesn't really seem like all interveners are focus-sensitive (we end up just assuming that the set of interveners are focus-sensitive, but that isn't an explanation.)
- No explanation for the embedding facts from Japanese, the disappearance of the pair-list reading, the variation in judgments and in interveners cross-linguistically.
- It's unclear whether the data with separation constructions is explained.

Note that if this is a general phenomenon, we expect to find intervention not only in questions, but in any construction that uses in-situ focus.

(37) **Generalized intervention**

a. * [*Op* ... **intervener** ... X_F]

b. ✓ [*Op* ... X_F **intervener** ... t]

Beck discusses this prediction but fails to find intervention in Association with Focus constructions. However Erlewine and Kotek (2014) show intervention in such constructions.[11] Sauerland and Heck (2003); Cable (2010) and Kotek and Erlewine (to appear) show intervention inside *wh*-pied-piping.

[10] Or, in Cable's (2010) Q-based system, C or Q.

[11] More accurately, in covert focus movement inside the pied-piped constituent.

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