Diagnosing covert pied-piping
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1 Introduction
Pied-piping is visible in overt movement:

(1) [PP In which class] C did you get a good grade ?

In-situ wh-phrases move covertly:

(2) [Which student] ...which... C got a good grade in which class?

Does covert movement trigger pied-piping?

Today:

1 We present new data on the distribution of focus intervention effects in wh-questions. We show that, assuming that intervention correlates with focus-alternatives computation (Beck, 2006) the data motivates the existence of covert wh-pied-piping.

2 Having established the use of focus intervention effects as a diagnostic for alternative computation and pied-piping, we discover focus intervention effects in Association with Focus constructions.

2 Background

2.1 Intervention in overt pied-piping
In overt pied-piping, the interrogative complementizer can attract different sized constituents containing the wh-word:

(3) Jim owns a picture of which president
   a. [Which president] does Jim own a picture of C ?
   b. [Of which president] does Jim own a picture C ?
   c. [A picture of which president] does Jim own C ?

Sauerland and Heck (2003); Cable (2007) show that intervention effects occur inside pied-piped constituents:

(4) Cable (2007):
   a. [A picture of which president] ...hanging in Jim’s office?
   b. * [No picture of which president] ...hanging in Jim’s office?
   c. * [Only [PICTURES of which president]] ... hang in Jim’s office?

If an intervener is placed between the wh-word and the edge of its pied-piping constituent, it results in ungrammaticality.

This effect is due to the following structural configuration:

(5) Intervention in pied-piped constituents: (S&H, 2003; Cable, 2007)

[ wh ... ] C ...

Definition: a region is ...INTERVENABLE ... if, when a focus-sensitive operator occurs inside it, the structure becomes ungrammatical with the intended reading.

No intervention when intervener is inside pied-piping, but below wh: (Cable, 2007)

(6) [Which picture containing no presidents] ...hangs behind Jim’s desk?

Intervention can be avoided by choice of pied-piping size: (Cable, 2007)

(7) a. * [No picture of which president] does Jim own C ?
   b. ✓ [Which president] does Jim own [no picture of C ]?

2.2 Covert movement
Generally, all wh-words move to the complementizer (Karttunen, 1977; Huang, 1982; Pesetsky, 1987, 2000; Richards, 1997; Beck, 2006; Cable, 2007, a.o.):

(8) Who ...which... C owns a picture of which president?

Subsequent movements tuck-in. Only the highest wh-phrase is pronounced at the head of its chain; other wh-phrases are pronounced in their base positions. These in-situ wh-phrases move “covertly.”

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3 Covert pied-piping

Does covert movement trigger pied-piping? And if so, how much?

(8) Who owns a picture of which president?
   a. [Who [which president] C owns a picture of ]?
   b. [Who [of which president] C owns a picture ]?
   c. [Who [a picture of which president] C owns ]?

Recall that overt pied-piping leads to intervention effects:

(5) Intervention in pied-piped constituents: (S&H, 2003; Cable, 2007)

Assuming intervention as in (5) is evaluated at LF (Beck, 2006), intervention effects can diagnose the size of covert pied-piping.

(9) Intervention in covert pied-piping:

Different amounts of covert pied-piping predict different regions:

(8) Who owns a picture of which president?
   a. Who owns a picture of [covert pied-piping which president]?
   b. Who owns a picture [covert pied-piping of ] which president?
   c. Who owns [covert pied-piping a picture of ] which president?

3.1 Core data

Contexts are provided here to satisfy the presuppositions of the multiple questions (Dayal, 1996). Note also that some speakers do not get intervention effects with single-pair readings of multiple questions (Pesetsky, 2000), so it is important that these examples have pair-list readings.

Baseline:

(10) Context: Over the break, every student read a book from a local library and submitted a book report. Each book report gave the title of the book and which library it was borrowed from.

(11) ✓ I know [which student read a book from which library].

No:

(12) Context: Over the break, the students were assigned to go read one book each from every library in the area and submit a book report. No student completed the entire assignment; every student went to all but one of the libraries.

(13) * I know [which student read no book from which library].

A ratings study was conducted on Mechanical Turk to confirm this contrast. A summary is in the appendix.

Below is additional data with other potential intereners. Note that these contrasts do not track Szabolcsi’s (2006) findings for intervention effects in superiority-violating wh-questions. However, we believe that they show a clearer correlation with focus sensitivity.

Less than three:

(14) Context: Over the break, the students were assigned to go read three books each from every library in the area and submit a book report. No student completed the entire assignment; every student had one particular library, from which they failed to read three books.

(15) ✓ I know [which student read less than three books from which library].

Only:

(16) Context: At the flea market, a number of collectors are selling pictures and autographs of past presidents. For most presidents, they have successfully sold both pictures and autographs, but according to the records, every collector has one president for which they did not sell any autographs.

(17) * I know [which collector sold only PICTURES of which president].

Very few:

(18) Context: We at McDonald’s are testing three new toppings for burgers: cranberries, jicama, and natto. As a pilot, they were offered at several branches around the world for one week only. At every branch, only two toppings sold thousands while the other sold about a hundred. Culinary tastes vary across the world, so there was no clear overall winner.

(19) ? I know [which branch sold very few burgers with which topping].
3.2 The diagnosis

What does this contrast between (11) and (13) tell us?

(11) ✓ I know [which student read a book from which library].
(13) ✓ I know [which student read no book from which library].

Note that higher negation does not cause such a contrast:

(20) ✓ I know [which student didn’t read a book from which library].

Thus (13) is not a general negative island effect.
The effect only occurs if the intervener c-commands the wh-word.

(21) ✓ I know [which s. read which book containing no princesses].

The effect is limited to a particular region above and near the in-situ wh.

This contrast teaches us that no in (13) is in an INTERVENABLE region.

Moreover, smaller pied-piping options were not available:

(8) Which student read no book from which library?
   a. Which student read no book [pied-piping which library]?  ⇒ predicts no intervention! ✗
   b. Which student read no book [pied-piping from which library]?  ⇒ predicts no intervention! ✗
   c. Which student read [pied-piping no book from which library]?  ⇒ predicts intervention!

3.3 Pied-piping size and the interfaces

Recall that the size of overt pied-piping is variable, with a preference for smaller pied-piping:

(3) Jim owns a picture of which president
   a. ✓ [Which president] does Jim own a picture of__?
   b. ✓ [Of which president] does Jim own a picture__?
   c. ✓ [A picture of which president] does Jim own__?

...but we have shown that covert pied-piping chooses the largest among the options for overt pied-piping.

☞ The preference for smaller pied-piping in overt movement is an artifact of PF constraints on wh-movement, not a general preference of the pied-piping mechanism itself.

☞ Wh-phrases prefer to be near the left edge when pied-piped (Horvath, 2007; Heck, 2008, 2009; Cable, ms, a.o.). ⇒ A PF constraint!

Data from Cable (ms):

(22) a. ✓ [[[Whose brother]’s friend]’s father] did you see__?
   b. ✓ [The father of whose brother’s friend] did you see__?
(23) a. ✓ [ [ How big ] a _ car _ did Bill buy__?

Overt movement feeds PF and LF, while covert movement only feeds LF.

☞ The preference for pied-piping the largest possible constituent is the true preference of Core Syntax and LF.

☞ However, in cases where the movement feeds PF as well, the choice of pied-piping can be overridden by PF constraints.
4 Theory of intervention and pied-piping

A question can be computed through movement and/or Rooth-Hamblin alternative computation (Hamblin, 1973; Karttunen, 1977; Rooth, 1985):

(24) a. Interpretation through movement:
   LF: wh C ⋯
   b. Interpretation through alternative computation:
   LF: C ⋯ wh_i

Beck (2006): Computation of Rooth-Hamblin alternatives can be interrupted by focus interveners Op, such as only, even, focus-sensitive negation, etc.

(25) Intervener blocks interpretation of wh-alternatives by C:
   * LF: C_i Op ⋯ wh_i

Cable (2007) uses this mechanism to explain intervention inside wh-pied-piping constituents, within his theory of pied-piping as QP-movement. A Q-particle joins to a position above the wh-phrase. The complementizer attracts the QP.

(26) Jim owns (Q) a picture (Q) of (Q) which president
   a. [QP Q Which president] does Jim own a picture of _?
   b. [QP Q Of which president] does Jim own a picture _?
   c. [QP Q A picture of which president] does Jim own _?

The wh-word inside the QP is interpreted through focus alternatives.

(27) [QP Q A picture of which president] \( \lambda x \) does Jim own x?

(28) Intervener blocks interpretation of wh-alt.'s by Q: (Cable, 2007)
   * LF: [QP Q; Op ⋯ wh_i ...

(29) Intervener blocks interpretation of focus alternatives:
   * LF: C/Q, Op ⋯ wh_i

5 Pied-piping in focus constructions

- The Beck (2006) theory of focus intervention predicts intervention not just between wh and C/Q, but anywhere where Rooth-Hamblin alternatives are computed.

5.1 Pied-piping in overt focus movement

The pivot in English it-clefts can be considered to be a form of pied-piping movement (Križka, 2006):

(31) Pied-piping in it-clefts:
   John read a book from THIS_F library.
   a. It’s [THIS_F library] that John read a book from ___.
   b. It’s [from THIS_F library] that John read a book ___.
   c. It’s [a book from THIS_F library] that John read ___.

The it-cleft associates with focus inside the pivot (Jackendoff, 1972; Križka, 2006). Therefore it-clefts are interpreted using both movement and alternative computation, much like wh-pied-piping:

(32) It’s [pied-piping a book from THIS_F library] \( \lambda x \) John read x.
We argue that such intervention does occur:

(33) **Intervention in it-cleft pivots:**
   a. *It’s [no book from THIS$_F$ library] that John’s read._
   b. *It’s [from THIS$_F$ library] that John’s read no book._
   c. *It’s [THIS$_F$ library] that John’s read no book from__.

5.2 Pied-piping in in-situ Association with Focus

Rooth (1985, 1992): F-marked constituents stay in-situ and are interpreted through focus alternative computation.

(34) **In-situ Association with Focus:**
   I only _read a book from_ THIS$_F$ library.

Under this approach to Association with Focus, Beck (2006) predicts that the entire region between only and the F-marked constituent is intervenable. However this is not the case:

(35) **Lack of intervention in in-situ focus constructions:**
   *I only didn’t read a book from THIS$_F$ library.

Another approach to Association with Focus argues that it involves covert movement of the F-marked constituent with pied-piping (Drubig, 1994; Krifka, 2006; Wagner, 2006, cf Chomsky 1976).

(36) **Focus association through covert movement:**
   I ... only _read a book from_ THIS$_F$ library.

Moreover, the F-marked constituent is then interpreted through Rooth-Hamblin alternatives, inside the pied-piped constituent (Horvath, 2000; Krifka, 2006; Wagner, 2006). Under this view, we predict an intervenable region right above the F-marked constituent. We argue that that is indeed the case.

(37) **Intervention in in-situ focus:**
   *I only read [covert pied-piping no book from THIS$_F$ library].

The contrast in (38) shows that, like with wh-movement, the largest possible constituent is covertly pied-piped.

We provide the missing data point for Beck’s (2006) prediction that all regions of Rooth-Hamblin alternative computation are intervenable.

(38) *I only read [covert pied-piping no book from THIS$_F$ library].
(36) *I only didn’t read [covert pied-piping a book from THIS$_F$ library].

This parallels the pattern of intervention with covert wh-pied-piping:

(13) *I know [which s. read [covert pied-piping no book from which library]].
(20) *I know [which s. didn’t read [covert pied-piping a book from which 1]].

6 Conclusion

1. We argued for the existence of pied-piping in covert wh-movement:
   - by examining new patterns of Beck’s (2006) focus intervention effects, following work on intervention in overt pied-piping (S&H; Cable).
   - We showed an LF preference for larger pied-piping.

2. We motivated the use of focus intervention effects as a diagnostic for Rooth-Hamblin alternative computation and pied-piping.

3. We presented evidence for intervention in focus constructions:
   - in overt pied-piping, i.e. the pivots of it-clefts;
   - in covert pied-piping, providing an argument for in-situ focus association through covert focus movement (Krifka; Wagner; a.o.).

   This substantiates Beck’s (2006) conjecture that intervention effects occur not only in wh-questions, but also in focus constructions.

References


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Cable, Seth. ms. Pied-piping: two recent approaches. LingBuzz.


Appendix: Intervention in Beck (2006); Pesetsky (2000)

Beck (2006) primarily discusses focus intervention effects between C and an LF-in-situ wh-word. This is observable in English in superiority-violating questions.

Pesetsky (2000); Beck (2006): Both movement and alternative computation strategies are used in English questions. In superiority-violating questions, in-situ wh-words stay in-situ at LF and are interpreted through alternatives.

\[(38)\]
\[
\begin{align*}
\text{(a) Which boy read which book?} & \quad \Rightarrow \text{no intervention} \\
\text{(b) * Which book didn’t read which boy?} & \quad \Rightarrow \text{intervention!}
\end{align*}
\]

Appendix: Ratings study

- 10 items run on Amazon Mechanical Turk with no contexts.
- 4 conditions each: crossed \(a\) / \(n\) with complement/adjunct PPs.

\[(39)\]
\[
\text{Except for John, I know which book read...}
\]
\[
\begin{align*}
\text{(a) a book} & \quad \Rightarrow 60\% \\
\text{(b) no book} & \quad \Rightarrow 7\% \\
\text{(c) a book} & \quad \Rightarrow 56\% \\
\text{(d) no book} & \quad \Rightarrow 7\%
\end{align*}
\]

- Embedded under exceptives to prefer pair-list readings.
- 160 participants, forced-choice task.

\[\iffalse\text{Main effect of intervener, no effect of complement vs. adjunct}\]\[\fi\]

Appendix: clausal pied-piping

Some of the original motivation for proposing that covert focus movement pied-pipes comes from the observation that Association with Focus is apparently island-insensitive. Drubig (1994) and others thus propose that if the F-marking is inside an island, the pied-piping must be at least island size. As is, this predicts larger intervenable regions:

\[(40)\]
\[
\text{I only read [the book that [Mary read at SCHOOL\(F\)].}}
\]

But this does not seem to be the case:

\[(41)\]
\[
\text{I only read [the book that [Mary didn’t read at SCHOOL\(F\)].}}
\]

Following Kotek (upcoming); Nishigauchi (1990), we propose that in clause-sized islands, the in-situ F-marked constituent (or wh-word) can move inside the island, thus predicting a smaller intervenable region.

\[(42)\]
\[
\text{LF: I only read [the book that [SCHOOL\(F\) Mary didn’t read at \_]].}
\]