Focus association by movement: Evidence from binding and parasitic gaps[1]

Michael Yoshitaka ERLEWINE — *National University of Singapore*
Hadas KOTEK — *Yale University*

Abstract. Under the influential Roothian proposal for focus association, focused phrases remain in-situ at LF (Rooth, 1985, 1992). However, a recent line of work has resurrected the idea that focus association involves covert movement: specifically, the associate of English sentential *only* must covertly move to *only*, with the possibility of covert pied-piping (Drubig, 1994; Krifka, 1996, 2006; Tancredi, 1997, 2004; Wagner, 2006; Erlewine and Kotek, 2014, to appear). In this paper we contribute to this emerging consensus view with additional evidence from reflexive binding and parasitic gap licensing.

Keywords: focus association, *only*, covert movement, binding, parasitic gaps

1. Two approaches to focus association

The problem of focus association concerns the relationship between focus-sensitive operators such as *only* and focused constituents such as *Fridays* or *chocolate* in (1). The semantics of *only* quantifies over the focused constituent and its contextual alternatives: for example, (1a) asserts that there is no day other than Friday where John eats chocolate, whereas (1b) asserts that John eats nothing other than chocolate on Fridays (see e.g. Horn, 1969).

(1) a. John only eats chocolate on [Fridays]$_F$.
     b. John only eats [chocolate]$_F$ on Fridays.

How does *only*'s semantics make reference to this focused constituent? One family of approaches posits the existence of *covert focus movement* so that the focused constituent becomes a local argument of the *only* operator at LF. A sample LF for example (1b) under the covert focus movement view is given in (2) below. Here we illustrate the non-quantificational subject *John* in its VP-internal base position. The movement in (2) makes the focus *chocolate* a local argument of a two-place *only* operator.[2]

(2) **Covert movement LF for (1b):**
     only $\big([\text{chocolate}]_F\big)\big(\lambda x \,.\, \text{John eats } x \text{ on Fridays}\big)$

The alternative approach — popularized by Rooth (1985, 1992) and adopted in much contemporary work on focus semantics — assumes that focused constituents remain in-situ at LF. The operator (*only*) makes indirect reference to the choice of focus and its alternatives through a process of *alternative computation*. Each syntactic node α is associated not only with its ordinary semantic denotation $[\![\alpha]\!]^o$ but also with a set of alternatives, $[\![\alpha]\!]^f$, defined recursively as in (3) below. Focused (F-marked) constituents introduce non-trivial alternatives into their focus-

---

[2]The precise geometry of this movement could vary. See footnotes 7 and 8 in Erlewine and Kotek (to appear) for detailed discussion of this movement and alternative formulations.

alternative denotations (3c), which are then propagated up through the process of *pointwise composition* (3b).

(3) **Focus alternative computation:**
   a. <u>For non-focused terminal nodes:</u>
      $\llbracket \alpha \rrbracket^f = \{\llbracket \alpha \rrbracket^o\}$
   b. <u>For non-focused branching nodes (pointwise composition):</u>
      $\llbracket [\alpha\,\beta] \rrbracket^f = \left\{ a \circ b \mid a \in \llbracket \alpha \rrbracket^f,\, b \in \llbracket \beta \rrbracket^f \right\}$
      where $\circ$ is the appropriate composition operation for $\llbracket \alpha \rrbracket^o$ and $\llbracket \beta \rrbracket^o$.
   c. <u>For focused nodes:</u>
      $\llbracket \alpha \rrbracket^f$ is a contextually-determined subset of D_τ where τ is the type of $\llbracket \alpha \rrbracket^o$

The result of this procedure is that the contextual alternatives to *chocolate* in (4b) will be reflected indirectly in the set of alternatives at VP (4c), which is a local argument of *only*.

(4) **Interpreting (1b) with focus in-situ:**
   a. only [$_{\text{VP}}$ John eats [chocolate]$_F$ on Fridays]
   b. $\llbracket [\text{chocolate}]_F \rrbracket^f = \{\text{chocolate, fish, pizza, ...}\}$
   c. $\llbracket \text{VP} \rrbracket^f = \left\{ \begin{array}{l} \text{John eats chocolate on Fridays,} \\ \text{John eats fish on Fridays,} \\ \text{John eats pizza on Fridays, ...} \end{array} \right\}$
   d. [only VP] $\Rightarrow$ John doesn't eat fish on Fridays,
      John doesn't eat pizza on Fridays, ...

As an empirical argument for the in-situ view, Rooth (1985) following Anderson (1972) notes that focus association is apparently insensitive to syntactic islands. For example, in (5) based on an example from Kratzer (1991), *only* successfully associates narrowly with the focused constituent *the Zoning Board* inside a relative clause island. Under the covert movement approach — so the argument goes — covert movement of *the Zoning Board* should be impossible, just as the corresponding overt focus movement in (6) is ungrammatical.[3]

(5) **Focus association is apparently island-insensitive:**
   I only contacted [$_{\text{island}}$ the person who chairs [the Zoning Board]$_F$].

(6) **Corresponding overt focus movement of *the Zoning Board*:** (Kratzer, 1991: 831)
   * It was [the Zoning Board]$_F$ that I contacted [$_{\text{island}}$ the person who chairs ___].

Drubig (1994) however notes that this island-sensitivity problem can be avoided if covert focus movement can trigger *pied-piping*. That is, instead of the logically focused constituent moving alone to become a local argument of *only*, a *focus-containing phrase* can instead move to *only*. This possibility is illustrated schematically for the case of example (5) in (7) below.

---

[3]A possible response may be to say that covert (focus) movement is not sensitive to the same island constraints as overt movement, but this is ultimately incorrect. See Wagner (2006) and Erlewine and Kotek (2016, to appear) for evidence that covert focus movement *is* sensitive to syntactic islands.

(7) **LF for (5) using covert focus movement with pied-piping:**

only $\Big([_{\text{island}}$ the person who chairs [the Zoning Board]$_F])\ \big(\lambda x\ .\ \text{I contacted } x\big)$

The interpretation of the pied-piped constituent in (7) then must utilize Rooth's mechanism of in-situ alternative computation in order to yield the observed sensitivity to the position of focus within the pied-piped phrase. Pied-piping of the constituent in (7) is also independently observed in overt focus movement, as in example (8):[4]

(8) **Corresponding overt focus movement with pied-piping:** (cf 6)

 ✓ It was [$_{\text{island}}$ the person who chairs [the Zoning Board]$_F$] that I contacted ___.

This hypothetical possibility of pied-piping in covert focus movement thus defuses Rooth's argument from island-insensitivity for the in-situ approach to focus association. Independent evidence is then necessary to adjudicate between these two possible options. A series of works in the past decade have introduced new arguments for the idea that focus association with English *only* necessarily involves covert focus movement with the possibility of covert pied-piping.[5] The gist of each of these arguments is summarized here in (9).

(9) **Previous arguments for covert focus movement with pied-piping:**
   a. Krifka (2006): Restrictions on association of *only* with multiple foci is sensitive to islands, in a manner predicted by the covert movement with pied-piping view.
   b. Wagner (2006): The distribution of NPIs licensed by adverb *only* is sensitive to the placement of islands, in a manner predicted by covert movement with pied-piping.
   c. Erlewine and Kotek (2014): The distribution of *focus intervention effects* (Beck, 2006) in focus association is explained by covert focus movement with pied-piping, with intervention affecting just the covertly pied-piped material.
   d. Erlewine and Kotek (2016, to appear): The distribution of so-called *Tanglewood* configurations, where alternatives apparently co-vary between a pronounced focus and within an ellipsis site (Kratzer, 1991), is sensitive to syntactic islands. Tanglewood readings are best explained using covert focus movement with pied-piping.

In this paper, we contribute two new arguments to this growing body of evidence. Following related diagnostics for covert *wh* movement by Nissenbaum (2000a, b), we will show that covert focus movement in English can feed reflexive binding and the licensing of parasitic gaps. These effects too are unexplained by the in-situ approach to focus association.

---

[4]In some cases, however, the pied-piping that we would need to posit for covert focus movement may be larger than what is observed with overt pied-piping. There is however independent evidence that pied-piping can be larger with covert movement than with overt movement: see Kotek and Erlewine (2016).

See also Horvath (2000, 2007) for discussion of pied-piping in overt focus movement.

[5]All of these works in (9) look exclusively at focus association with English sentential *only*. A significant open question is whether this claimed necessity of covert movement in focus association extends to other focus-sensitive operators or languages.

2. Binding

Nissenbaum (2000b: pp. 124ff) shows that covert *wh*-movement in English allows reflexives to be bound by an antecedent outside of their local binding domain: that is, covert phrasal movement feeds reflexive binding. Consider the contrast in (10):

(10) **Covert *wh*-movement feeds reflexive binding:** (Nissenbaum, 2000b: p. 126)
    a.   * Who$_i$ thinks [Mary was looking at a picture of himself$_i$]?
    b.   Who$_i$ thinks [Mary was looking at *which picture of himself$_i$*]?

The masculine reflexive *himself* does not have a local antecedent within the embedded clause, as the ungrammaticality of the baseline (10a) indicates. However, when this reflexive is contained within an in-situ *wh*-phrase, it can be bound by a higher antecedent, as long as the containing *wh*-phrase takes scope under the antecedent. In this case, assuming that movements triggered by the same head (here: matrix C) will "tuck in" (see also Richards, 1997; Pesetsky, 2000), (10) will have a LF representation as in (11).[6]

(11) **Covert *wh*-movement LF for (10):**
    [$_{CP}$ Who$_i$ [which picture of himself$_i$] [$_{TP}$ ___ thinks [$_{CP}$ Mary was looking at ___]]

In this higher LF position, *himself* is close enough to the intended antecedent, *who*. We therefore conclude that Binding Condition A is evaluated at LF.

We can similarly use reflexive binding to test whether or not focused material — or material pied-piped together with focused material — can include reflexives bound by a higher antecedent than regularly possible, as long as it is within the scope of the associating *only*. We begin with the baseline in (12), where the intended antecedent of *myself* is the matrix subject, outside of the relevant binding domain (BD).

(12)   <u>Baseline:</u> *I want [$_{BD}$ the museum to display a picture of myself].

Now consider example (13), which differs minimally from (12) in the addition of *only* above *want*, associating with the F-marked *picture*. The reflexive *myself* is now successfully bound by its intended antecedent, which is outside of *myself*'s local binding domain (cf (12)).

(13) **Covert focus movement feeds reflexive binding:**
    <u>Context:</u> I commissioned many paintings and pictures of myself. The museum is interested in displaying both a painting and a picture that I had made, but in fact,
    ✓ I only want [$_{BD}$ the museum to display [a [picture]$_F$ of myself]].

The grammaticality of the reflexive binding in (13) is explained by the availability of covert focus movement with pied-piping. The proposed LF for (13) is given in (14). Here the overt

---

[6]Following Kotek (2016), this covert *wh*-movement need not always move all the way up to the interpreting complementizer, but it suffices here that, in (10b) but not (10a), attraction of the surface in-situ *wh*-phrase has the option of covertly moving out of the embedded clause.

A-movement of the subject from its predicate-internal position to its surface position, above *only*, is critical and therefore illustrated.

(14) **LF for (13) using covert focus movement with pied-piping:**
I$_i$ λy . only$\big($[a [picture]$_F$ of myself$_i$]$\big)$ $\big(\lambda x$. y want [$_{BD}$ the museum to display x]$\big)$

If a different constituent is focused which will not trigger covert movement of the reflexive, the long-distance binding in (13) is not licensed:

(15)   * I only want [$_{BD}$ the [museum]$_F$ to display a picture of myself].

Notice that the solution here is not to simply say that focused constituents themselves can violate locality in reflexive binding: what is focused in (13) is *picture*, not *myself*. It is necessary for covert focus movement of the F-marked constituent, *picture*, to trigger pied-piping of the whole reflexive-containing DP, *a picture of myself*.

Note too that it is not simply the case that focus on the head noun *picture* in (13) somehow allows *myself* to be bound long-distance, by an antecedent outside of the surface binding domain (BD). This long-distance binding facilitated in (13) is limited to the scope of *only*. If we attach *only* lower, within the surface binding domain of the reflexive, the long-distance antecedent option disappears:

(16)   * I want [$_{BD}$ the museum to only display a [picture]$_F$ of myself].

To summarize, we find that association with *only* feeds reflexive binding, as would be predicted by a theory of covert movement with pied-piping: the F-marked constituent moves (possibly with pied-piping) to become the first argument of *only*. This movement can put this constituent in a local relationship with a binder that is otherwise absent, licensing a binding relation. This result is unexpected under an in-situ account of Association with Focus, which predicts no difference between (12) and (13).

3. Parasitic gap licensing

The literature on parasitic gaps has largely followed Engdahl (1983) in assuming that *wh*-in-situ never licenses parasitic gaps. Engdahl's examples are reproduced in (17) below. Assuming that in-situ *wh*-phrases must or can move covertly (Karttunen, 1977; Huang, 1982; Pesetsky, 2000; Kotek, 2016; a.o.), this claim is commonly (re)interpreted as a claim that covert movements cannot license parasitic gaps.

(17)   **Wh-in-situ does not license parasitic gaps:** (Engdahl, 1983: p. 14)
   a.   * John filed *which articles* without reading _*pg*_ ?
   b.   * Who filed *which articles* without reading _*pg*_ ?

Nissenbaum (2000a, b) shows that Engdahl's generalization is not exceptionless: although it is true that covert movement *alone* does not license parasitic gaps, overt movement together

with covert movement through the same *v*P edge can together license *two* parasitic gaps. An in-situ *wh*-phrase can license a *secondary parasitic gap* (18), which is not simply licensed by the presence of a non-*wh* phrase in the same position (19).

(18)　**Wh-in-situ licenses a *secondary* parasitic gap:** (Nissenbaum, 2000a: p. 542)
　　　Which senator$_i$ did you persuade ___$_i$ to borrow *which car$_j$*
　　　　　　　　[after getting an opponent of ___$_{pg\ i}$ to put a bomb in ___$_{pg\ j}$]?

(19)　＊ *Which senator$_i$* did you persuade ___$_i$ to borrow a Prius$_j$
　　　　　　　　[after getting an opponent of ___$_{pg\ i}$ to put a bomb in ___$_{pg\ j}$]?

It is also possible to license an adjunct with just one parasitic gap bound by the overtly-moved *wh*-phrase (20a), but not with one corresponding to the in-situ *wh*-phrase (20b). The main clauses in both examples here are identical to that in (18). The secondary parasitic gap *pg$_j$* as in (18) is, then, itself parasitic on the first parasitic gap *pg$_i$* which corresponds to the overtly moved *wh*-phrase.

(20)　**Secondary parasitic gap is parasitic on the first parasitic gap:**
　　a.　*Which senator$_i$* did you persuade ___$_i$ to borrow *which car$_j$*　　(*Ibid.* p. 552)
　　　　　　　　[after talking to ___$_{pg\ i}$ for an hour]?
　　b.　＊ *Which senator$_i$* did you persuade ___$_i$ to borrow *which car$_j$*
　　　　　　　　[after putting a bomb in ___$_{pg\ j}$]?

To license the adjunct with two parasitic gaps, both the overt and covert $\overline{\text{A}}$-movement steps must cross the same *v*P edge. This is accomplished in (18) at the *v*P edge associated with *persuade*, as *which senator* is overtly $\overline{\text{A}}$-moved from within it. Subjects which are first A-moved out of *v*P do not license their own parasitic gaps (Engdahl, 1983; a.o.) and similarly do not license secondary parasitic gaps:

(21)　＊ *Which terrorist$_i$* ___$_i$ persuaded the senator to borrow *which car$_j$*
　　　　　　　　[after getting a friend of ___$_{pg\ i}$ to put a bomb in ___$_{pg\ j}$]?

The correct generalization regarding the licensing of parasitic gaps by covert movement is then as in (22). Nissenbaum (2000a, b) gives an explanation for this generalization in terms of the derivational timing of overt vs covert movement and adjunction of the parasitic-gap-containing adjunct. We refer interested readers to those works.

(22)　**The Engdahl/Nissenbaum generalization:**
　　　Covert $\overline{\text{A}}$-movement by itself does not license parasitic gaps. However, covert $\overline{\text{A}}$-movement does license a secondary parasitic gap when it crosses a *v*P edge that is also crossed by an overt $\overline{\text{A}}$-movement step.

We now show that focus association with *only* also licenses secondary parasitic gaps, as predicted by the covert focus movement approach to Association with Focus. Example (23) below is based on the ungrammatical baseline (19) above, but with the addition of an *only* associating with the object of *drive* — here, *a Jaguar*:

(23) **The focus associate of *only* licenses a secondary parasitic gap:**
    ✓ *Which senator$_i$* could you only persuade ___$_i$ to drive [a [Jaguar]$_F$]$_j$
                            [after getting an opponent of _$_{pg\ i}$ to put a bomb in _$_{pg\ j}$]?

Both the overt movement of *which senator* and the covert movement of *a Jaguar* to *only* in (23) will cross through the *v*P edge associated with *persuade*, to which the *after*-adjunct adjoins. If *only* is introduced lower so that the path of covert focus movement does not overlap with the overt *wh*-movement path, as in (24), the secondary parasitic gap becomes ungrammatical, as also predicted by the generalization in (22).

(24) **The position of *only* marks the height of covert focus movement:**
    * *Which senator$_i$* could you persuade ___$_i$ to only drive [a [Prius]$_F$]$_j$
                            [after getting an opponent of _$_{pg\ i}$ to put a bomb in _$_{pg\ j}$]?

Just as we saw with *wh*-movement, parasitic gap licensing by covert focus movement is only possible when crossing a *v*P edge that is also crossed by overt $\overline{\text{A}}$-movement, as per the Engdahl/Nissenbaum generalization (22). The generalization also predicts that a single parasitic gap is not licensed by the covertly moved focus of *only* alone. This prediction is borne out in (25):

(25) **Covert focus movement alone does not license parasitic gaps, as predicted by (22):**
    a.   * I only criticized [[this]$_F$ book] without reading _$_{pg}$.
    b.   * I only want to read [[this]$_F$ book] without buying _$_{pg}$.

We include another set of secondary parasitic gap contrasts, similar to the examples above. Example (26a) shows the ungrammaticality of a secondary parasitic gap with a referential DP, *the placebo*; example (26b) shows the availability of a secondary parasitic gap with a *wh*-phrase in that position; and (26c) shows the parallel licensing of a secondary parasitic gap with an *only* associating with a focused *placebo*.

(26)   a.   * *Which patients$_i$* did the doctors assign ___$_i$ to the placebo$_j$
                           [after showing the families of _$_{pg\ i}$ how to administer _$_{pg\ j}$]?
        b.   *Which patients$_i$* did the doctors assign ___$_i$ to *which drug$_j$*
                           [after showing the families of _$_{pg\ i}$ how to administer _$_{pg\ j}$]?
        c.   <u>Context:</u> Following FDA regulations, patients' families were shown how to administer all the drugs that might be associated with the trial. After some patients began exhibiting unexpected symptoms, the families wrote the FDA and demanded to know:

            Which patients$_i$ did the doctors only assign ___$_i$ to [the [placebo]$_F$]$_j$
                           [after showing the families of _$_{pg\ i}$ how to administer _$_{pg\ j}$]?

In examples (19) and (26a), the secondary parasitic gap is not licensed. The presence of the secondary parasitic gap is not by itself able to force the covert movement necessary to license the gap. Instead, this movement must be independently licensed — covert *wh*-movement in (18) and (26b) and covert focus movement in (23) and (26c).

We conclude that — like in the case of covert *wh*-movement — parasitic gaps on F-marked material are licensed in Association with Focus constructions. This is predicted if association with *only* requires covert focus movement but is unexplained by the common, in-situ association approach of Rooth (1985) and others.

4. Conclusion

Evidence from reflexive binding and parasitic gap licensing shows that the focus associate of *only* is interpreted in a higher position at LF through covert movement. This is predicted under the covert movement theory of *only*, where the F-marked constituent moves (possibly with pied-piping) to become the first argument of a two-place *only* (Drubig, 1994; Krifka, 1996, 2006; Tancredi, 1997, 2004; Wagner, 2006; Erlewine and Kotek, 2014, to appear). It is inconsistent with the influential in-situ analysis of association with *only* (Rooth, 1985, 1992), and hence serves as an argument against this view.

References

Anderson, S. R. (1972). How to get *even*. *Language 48*, 893–905.

Beck, S. (2006). Intervention effects follow from focus interpretation. *Natural Language Semantics 14*, 1–56.

Drubig, H. B. (1994). Island constraints and the syntactic nature of focus and association with focus. *Arbeitspapiere des Sonderforschungsbereichs 340: Sprachtheoretische Grundlagen der Computerlinguistik 51*.

Engdahl, E. (1983). Parasitic gaps. *Linguistics and Philosophy 6*, 5–34.

Erlewine, M. Y. and H. Kotek (2014). Intervention in focus pied-piping. In H.-L. Huang, E. Poole, and A. Rysling (Eds.), *Proceedings of NELS 43*, Volume 1, pp. 117–130.

Erlewine, M. Y. and H. Kotek (2016). *Tanglewood* untangled. In M. Moroney, C.-R. Little, J. Collard, and D. Burgdorf (Eds.), *Proceedings of SALT 26*, pp. 224–243.

Erlewine, M. Y. and H. Kotek (to appear). Focus association by movement: Evidence from Tanglewood. *Linguistic Inquiry*.

Horn, L. R. (1969). A presuppositional analysis of *only* and *even*. In R. I. Binnick, A. Davison, G. M. Green, and J. Morgan (Eds.), *Proceedings of CLS 5*, pp. 98–107.

Horvath, J. (2000). Interfaces vs. the computational system in the syntax of focus. In H. Bennis, M. Everaert, and E. Reuland (Eds.), *Interface strategies*, pp. 183–206. Royal Netherlands Academy of Arts and Sciences, Amsterdam.

Horvath, J. (2007). Separating "focus movement" from focus. In *Phrasal and Clausal Architecture*. John Benjamins.

Huang, C.-T. J. (1982, June). *Logical Relations in Chinese and The Theory of Grammar*. Ph. D. thesis, Massachusetts Institute of Technology.

Karttunen, L. (1977). Syntax and semantics of questions. *Linguistics and Philosophy 1*(1), 3–44.

Kotek, H. (2016). Covert partial *wh*-movement and the nature of derivations. *Glossa 1*(25), 1–19.

Kotek, H. and M. Y. Erlewine (2016). Covert pied-piping in English multiple *wh*-questions. *Linguistic Inquiry 47*(4), 669–693.

Kratzer, A. (1991). The representation of focus. In A. von Stechow and D. Wunderlich (Eds.), *Semantik: Ein internationales Handbuch der zeitgenssischen Forschung*, pp. 825–834. Walter de Gruyter.

Krifka, M. (1996). Frameworks for the representation of focus. In *Conference on Formal Grammar at the 9th European Summer School in Logic, Language, and Information*.

Krifka, M. (2006). Association with focus phrases. In V. Molnr and S. Winkler (Eds.), *The Architecture of Focus*, pp. 105–136. Mouton de Gruyter.

Nissenbaum, J. (2000a). Covert movement and parasitic gaps. In M. Hirotani, C. A., H. N., and K. J.-Y. (Eds.), *Proceedings of NELS 30*, Volume 2, pp. 541–555.

Nissenbaum, J. (2000b). *Investigations of covert phrase movement*. Ph. D. thesis, Massachusetts Institute of Technology.

Pesetsky, D. (2000). *Phrasal movement and its kin*. Cambridge, Mass.: MIT Press.

Richards, N. (1997). *What Moves Where When in Which Language?* Ph. D. thesis, Massachusetts Institute of Technology.

Rooth, M. (1985). *Association with Focus*. Ph. D. thesis, University of Massachusetts, Amherst.

Rooth, M. (1992). A theory of focus interpretation. *Natural Language Semantics 1*, 75–116.

Tancredi, C. (1997). Focus, focus types, and associative operators. Manuscript.

Tancredi, C. (2004). Associative operators. *Gengo Kenkyu 125*, 31–82.

Wagner, M. (2006). Association by movement: Evidence from NPI-licensing. *Natural Language Semantics 14*(4), 297–324.