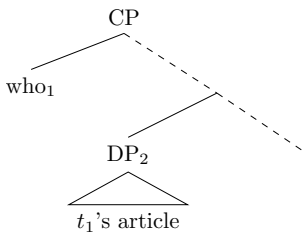
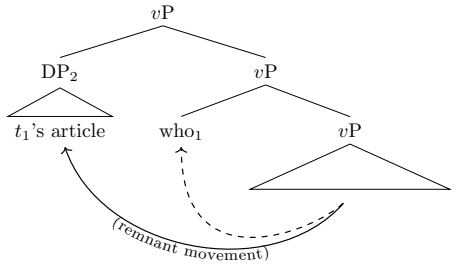
Pied-Piping and Covert Movement: evidence from parasitic gap licensing

Goals:

- To present new evidence from the distribution of parasitic gaps that the **visible form** of "pied-piping" diverges in several important ways from its true underlying structure:

§ pied piping involves covert movement out of the "pied-piped" phrase, so that at LF the small *wh*-phrase and the larger pied-piped phrase are separated; 	§ this covert movement is not an LF repair strategy that takes place after the overt movements, but instead begins at the very first stage of the derivation. 

- To derive the necessary structural descriptions from independently motivated claims about the stacking of multiple specifiers and the distribution of covert movement.

1. What does Pied-Piping look like at Logical Form?

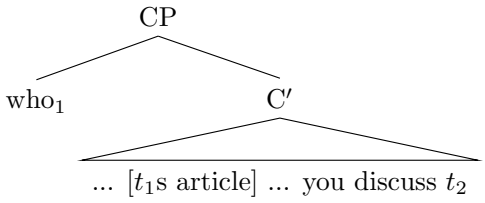
(1) a. [[Whose]$_2$ article]$_1$ did you discuss t_1?
b. [How$_2$ many students]$_1$ did you meet t_1?
c. [How$_2$ many students' papers]$_1$ did you read t_1?

Two approaches:

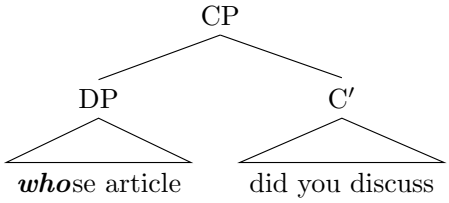
a. **Against LF Preservation of Pied-Piping**: At LF the *wh*-phrase is alone in Spec of the interrogative CP. (The overly moved constituent is reconstructed, von Stechow 1996.)

b. **LF Can Preserve Pied-Piping**: At LF Spec of the interrogative CP can be filled by a constituent dominating the *wh*-phrase (Takahashi, Cable, Sternefeld, Kotek, Charlow)

LF(a)



LF(b)



1.1. von Stechow's Argument against LF preservation

If pied piping remained at LF, as in LF(b), the wrong interpretation would be derived.

- von Stechow's argument was based on Karttunen's theory of the semantics of questions. Given Karttunen's semantics, whatever constituent occupies the specifier of Interrogative C determines what is being questioned. Consequently the pied-piped LF(b) could not derive the right interpretation.

von Stechow's conclusion: Only *wh*Ps can occupy the spec position of C_{int}. Everything else must be interpreted within the scope of C_{int}. ⇒ Pied piping must be "undone" at LF.

1.2. Alternatives to Karttunen/von Stechow

Quite a few. For example, "alternative semantics" (Hamblin 1973, Beck 1996, Cable 2008, Kotek 2014).

- No reconstruction is needed, but arguably a richer semantic machinery (and with no explanation for the ubiquity of *wh*-movement).

1.3. Relative Clauses

The alternative semantic mechanism allows for LF (preservation of) Pied-Piping, but it is specifically geared to deriving question denotations. It is, therefore, not obviously suitable for relative clauses:

(2) The linguist [[whose]$_2$ article]$_1$ Mary discussed t_1

- The relative clause needs to predicate the same individual predicated by *linguist*.
- With pied piping, there is no straightforward way to achieve the right predication.
- If pied piping is "undone" at LF, and <u>only</u> the smaller constituent *who* (the pied piper) is in spec-CP, then the interpretation is derived straightforwardly.

We think this weighs in favor of the "No LF Preservation of Pied Piping" theory. But it is not a settled question and we'd like to find new kinds of informative data.

1.4. The Bottom Line

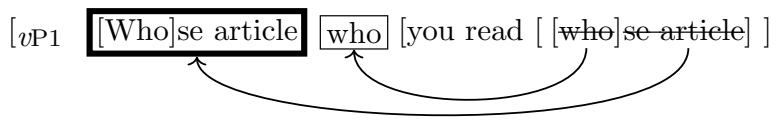
A Syntactic Question: Can we tell if pied-piping is "undone" at LF? In particular,

a. Is there evidence that distinguishes LF(a) from LF(b)?
b. If something like LF(a) is needed, what is the nature of the movement chain(s)? Where is the head of the chain? Where are the traces?

Our Claim: The Distribution of Parasitic Gaps provides evidence for

a. **No LF representation of pied-piping:** the pied-piper (smaller constituent) moves alone (covertly) and binds a trace.

b. **Lower Spec Covert Movement**: the pied piper's first landing site is the lower specifier position of the *v*P that dominates the base position, vP_1. (We will argue that this is where the movement is determined to be covert.)



c. **Outer Spec Overt Remnant Movement**: the pied-piped phrase (embedding constituent), a remnant of covert movement, moves overtly to become the outer specifier of vP_1.

d. **Further Covert and Overt Movement**: the derivation proceeds with *who* moving successive cyclically to [Spec, CP] and *whose article* interpreted in one of the intermediate positions.

Argument in a nutshell: A new set of observations about Parasitic Gaps (together with plausible assumptions about PG licensing) shows that the pied-piper alone is an inner specifier of vP_1 but can be either an inner or an outer specifier of higher projections.

2. Parasitic Gaps – Nuanced Picture

2.1. On the face of it, PG distribution argues against covert movement of the Pied-Piper

(3) a. This is the professor [whose$_2$ article]$_1$ you read t_1 after making a copy of pg_1
b. *This is the professor [whose$_2$ article]$_1$ you read t_1 after talking to pg_2 on the phone

(4) a. [whose$_2$ article]$_1$ did you read t_1 after making a copy of pg_1?
b. * [whose$_2$ article]$_1$ did you read t_1 after talking to pg_2 on the phone?

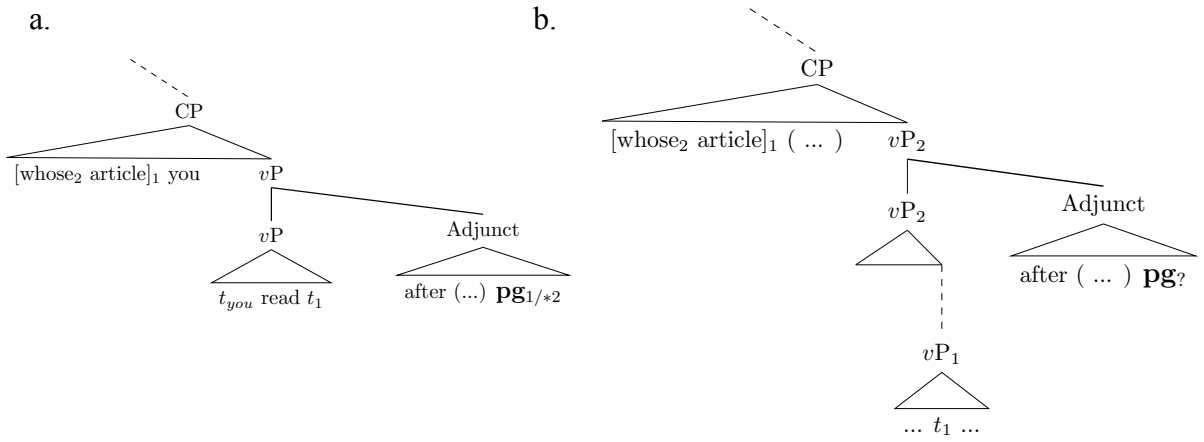
Of course the argument is weakened significantly by the fact that covert movement normally does not license parasitic gaps:

(5) *Who$_1$ read [which article]$_2$ after making a copy of pg_2?

2.2. … But is this generalization based on too limited a class of data?

The examples above of pied piping with PGs have structures like (6)a:

(6) a. b.



What would happen if we looked at bi-clausal sentences, like (6)b?

2.3. Closer scrutiny seems to reverse the argument

(7) a. *This is the person [whose$_2$ article]$_1$ you asked me to read t_1 after introducing myself to pg$_2$

b. This is the person [whose$_2$ article]$_1$ you asked me to read t_1 after introducing yourself to pg$_2$

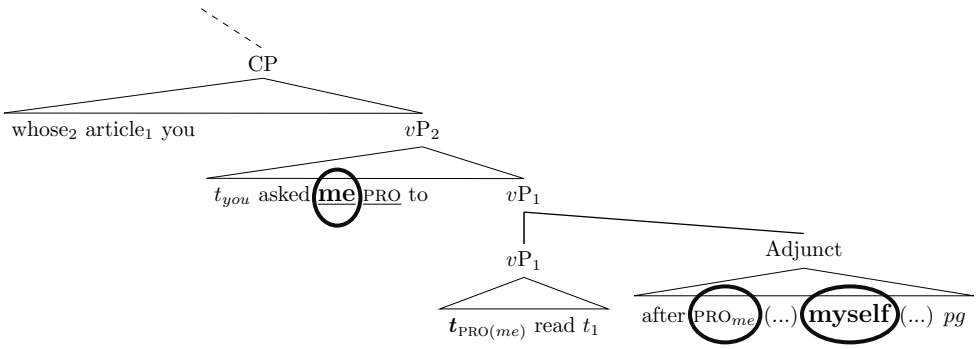
In the context of the earlier facts (e.g. (3)-(4)) this is a striking contrast.

The obvious generalization to draw from facts like (3) and (4) is that parasitic gap cannot be licensed by the pied piper, only by the *larger*, pied-piped constituent. But in (7)b that is not the case. The PG there is licensed by the pied piper.

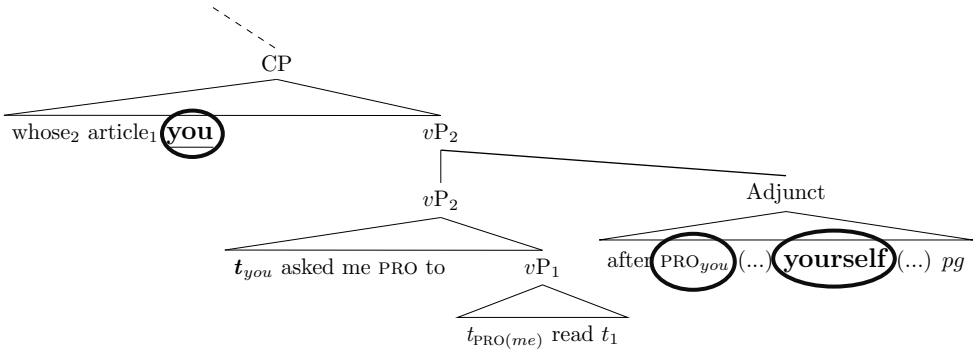
In (7), the relative clause is bi-clausal. Why should that matter? We think that a key to the puzzle lies in the fact that ***only*** (7)b is acceptable; (7)a obeys the usual prohibition.

These and the following bi-clausal examples take advantage of Principle A of the binding theory (combined with locality of control) to disambiguate the attachment site of the adjunct:

(8) **<u>Low attachment</u> (vP_1) is forced (by *myself* in these adjuncts):**



(9) **<u>High attachment</u> (vP_2) is forced (by *yourself* in these adjuncts):**



Condition A forcing Low Attachment (vP_1 modification):

(10) a. The person [whose$_2$ article]$_1$ you asked me$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ making myself$_7$ a copy of pg$_1$]]

b. *The person [whose$_2$ article]$_1$ you asked me$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ introducing myself$_7$ to pg$_2$]]

(11) a. The person [whose$_2$ article]$_1$ Phoebe asked Roger$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ making himself$_7$ a copy of pg$_1$]]

b. *The person [whose$_2$ article]$_1$ Phoebe asked Roger$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ introducing himself$_7$ to pg$_2$]]

Condition A forcing High Attachment (vP_2 modification):

(12) a. The person [whose$_2$ article]$_1$ you$_8$
[$_{vP2}$ [t$_8$ asked me$_7$ PRO$_7$ to t$_7$ read t$_1$] [after PRO$_8$ making yourself$_8$ a copy of pg$_1$]]

b. The person [whose$_2$ article]$_1$ you$_8$
[$_{vP2}$ [t$_8$ asked me$_7$ PRO$_7$ to t$_7$ read t$_1$] [after PRO$_8$ introducing yourself$_8$ to pg$_2$]]

(13) a. The person [whose$_2$ article]$_1$ Phoebe$_8$
[$_{vP2}$ [t$_8$ asked Roger$_7$ PRO$_7$ to t$_7$ read t$_1$] [after PRO$_8$ making herself$_8$ a copy of pg$_1$]]
b. The person [whose$_2$ article]$_1$ Phoebe$_8$
[$_{vP2}$ [t$_8$ asked Roger$_7$ PRO$_7$ to t$_7$ read t$_1$] [after PRO$_8$ introducing herself$_8$ to pg$_2$]]

Condition B forcing Low Attachment (*v*P$_1$ modification):

(14) a. This is the person [whose$_2$ article]$_1$ you$_8$ asked me$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ hearing you$_8$ talk about pg$_1$]]
b. *This is the person [whose$_2$ article]$_1$ you$_8$ asked me$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ hearing you$_8$ talk to pg$_2$]]

(15) a. This is the person [whose$_2$ article]$_1$ Phoebe$_8$ asked Roger$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ hearing her$_8$ talk about pg$_1$]]
b. *This is the person [whose$_2$ article]$_1$ Phoebe$_8$ asked Roger$_7$ PRO$_7$ to
[$_{vP1}$ [t$_7$ read t$_1$] [after PRO$_7$ hearing her$_8$ talk to pg$_2$]]

Condition B forcing High Attachment (*v*P$_2$ modification):

(16) The person [whose$_2$ article]$_1$ you$_8$
[$_{vP2}$ [t$_8$ asked me$_7$ PRO$_7$ to t$_7$ read t$_1$] [after PRO$_8$ hearing me$_7$ talk to pg$_2$]]

(17) **Generalization:** A pied piper (i.e. a *wh*-phrase embedded in a larger moved constituent) can license a Parasitic Gap *only if* the PG is in an adjunct in a higher *v*P (*v*P$_2$ in our trees).

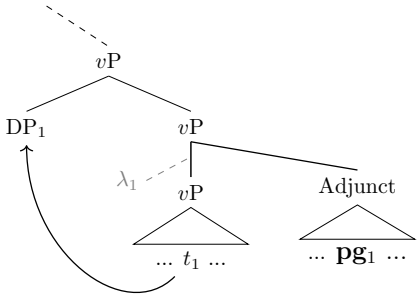
Works the same for *wh*-questions:

(18) a. [Whose$_2$ article]$_1$ did you ask me to read t$_1$ after making myself a copy of pg$_1$?
b. *[Whose$_2$ article]$_1$ did you ask me to read t$_1$ after introducing myself to pg$_2$?

(19) a. [Whose$_2$ article]$_1$ did you ask me to read t$_1$ after making yourself a copy of pg$_1$?
b. [Whose$_2$ article]$_1$ you ask me to read t$_1$ after introducing yourself to pg$_2$?

Why??

(20) **Nissenbaum's configuration for Parasitic Gap licensing** (motivated in various ways, e.g. by the derivation of "Larson's Generalization," by diagnostics for intermediate traces):



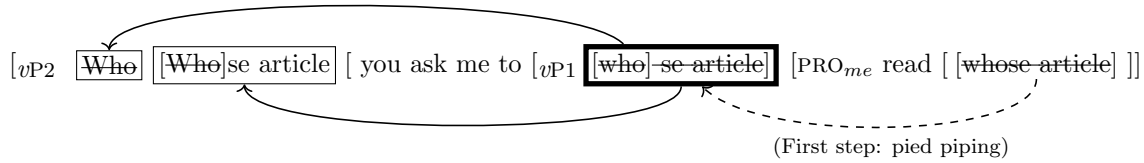
If we assume that this is correct, then it helps us formulate the empirical puzzle in precise terms

2.4. Questions

a. How exactly is the covert movement chain (i.e. the movement of the pied piper/inner constituent) formed?
b. Why does our generalization (17) hold: why is a PG licensed by this movement only at the edge of *ask*P but not at the edge of the more embedded *v*P (only at vP_2 but not in vP_1)?
c. Why is this movement covert?
d. Why can *this* covert movement license a PG (in contrast to other instances of covert movement)?

A straightforward, but incorrect approach to (a) and (b): Covert movement takes place after the first instance of successive cyclic overt movement.

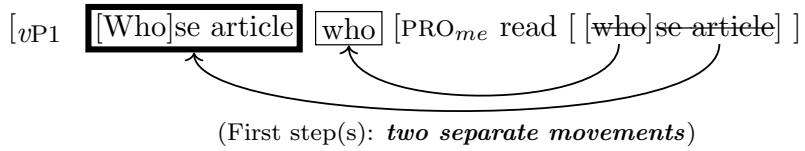
(21) Hypothetical representation of (19) b:



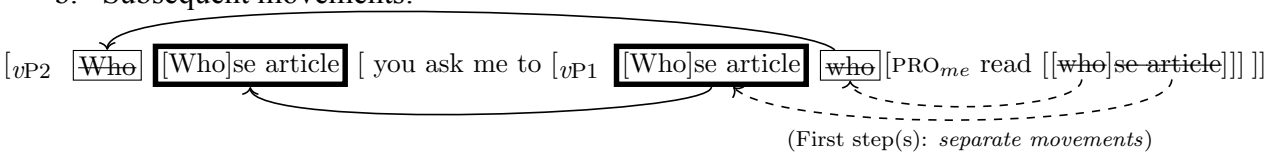
- But why should this be the only option and what should be our approach to questions (c) and (d)?
- In investigating question (d), in particular, we will see that within vP_1, we have the standard signature of covert movement re-PG licensing (section 8.1. below).
- We will see parallel behavior in construction that does not involve pied-piping and favors our alternative perspective (section 6 below).

(22) Correct representation of (19) b:

a. Two separate movements in the lower vP:



b. Subsequent movements:



2.5. Our Strategy

We start with the empirical generalization (17) motivated by the facts that we just reviewed:

Pied-Piping Parasitic Gap Generalization:

In pied-piping constructions, in which *wh*P_2 pied-pipes a phrase that dominates it, XP_1 (i.e., [$_{XP1}$… *wh*P_2…]):

(a) *wh*P_2 cannot license a parasitic gap in an adjunct that modifies the immediately dominating *v*P (*v*P_1), but

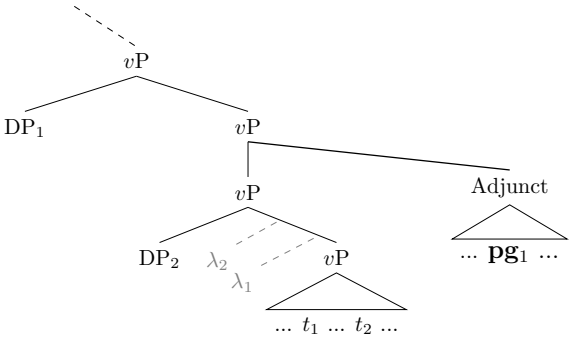
(b) *wh*P_2 can license a parasitic gap in an adjunct that modifies a higher *v*P (*v*P_2).

We think that one important ingredient in explaining this generalization is Nissenbaum's (2000) configuration for PG licensing (20).

But in addition — because of part (b) of our generalization — we think it is crucial to look at what happens when two XPs move to the edge of a given *v*P, forming a higher and a lower specifier.

(23) **Multiple Specifier Single Parasitic Gap Generalization (Nissenbaum 2000):**
In multiple specifier constructions in which XP_H is the highest specifier of *v*P and XP_L is a low specifier of *v*P, only XP_H can license a (single) parasitic gap in an adjunct to *v*P .

- If there are two movements to the edge of a *v*P, and one of the movements *cannot* license a PG, then ***that movement must be to a lower specifier position.***
- If there are two movements to the edge of a *v*P, and one of the movements *can* license a PG, then ***that movement can be to the <u>higher</u> specifier position.***



This suggests a clear desideratum: we should attempt to defend a theory with the following consequence:

(24) **Pied-Piping Multiple Specifier Generalization:** In pied-piping constructions, in which *wh*P_2 pied-pipes a phrase that dominates it, XP_1 (i.e., [$_{XP1}$… *wh*P_2…]),

(a) *wh*P_2 cannot be the highest specifier of the immediately dominating *v*P (*v*P_1), but

(b) *wh*P_2 can be the highest specifier of a higher *v*P (*v*P_2).

3. Movement of nested *wh*-phrases, locality and the overt-covert distinction

Nested *wh*-phrases are a particular form of *wh*-configuration where one *wh*P dominates the other.

(25) **Examples:**
a. [[Which book by [which Russian author]$_2$]$_1$ [t$_1$ is on the table]?
b. [[How many books about [which topic]$_2$]$_1$ [did you read t$_1$]?

Question: How is this type of multiple *wh*-question represented at LF?

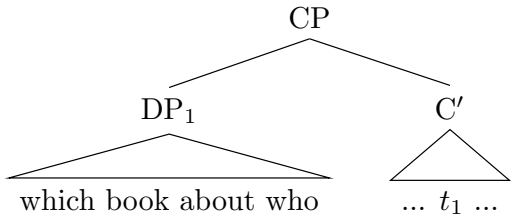
Related Question: What is the structure of parallel questions in Bulgarian (where movement is overt)?

3.1. No Superiority with nested *wh*-phrases in Bulgarian (Richards 2004)

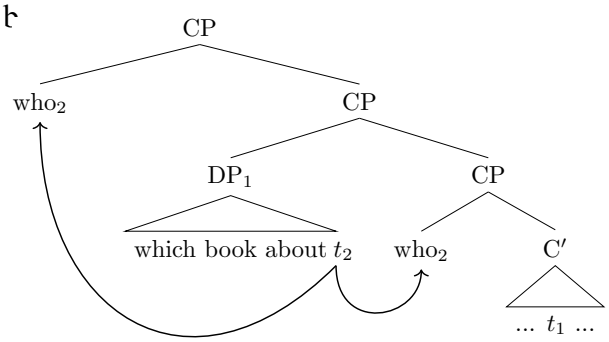
Richards' (2004) answer: both *wh*Ps are in [Spec CP] but there is optionality re-order

(26) **Nested *wh*-Phrases — Multiple Ordering possible (Richards 2004)**

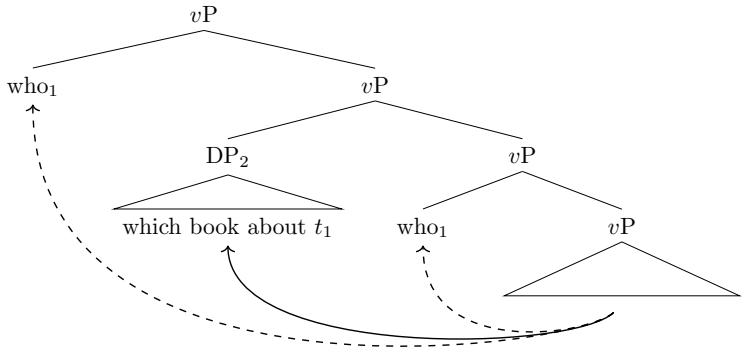
a.



b.



We will adopt Richards' structural analysis, but not his derivational account.
(a) Following Frampton 2004 we will not assume lowering, but raising.
(b) We will assume (and in fact argue) that nesting is undone earlier than CP (at *v*P).



Richards provides a series of arguments for the structural analysis. For example, he observes that the embedded *wh*P (*what* in (26)), cannot be sandwiched in the middle of material that belong to the embedded *wh*P:

(27) **The embedded *wh*P is always a specifier of CP (Evidence from Richards 2004)**

(5) a. *Kolko studenti [*po kakvo*] [ot Bulgaria] vidja?
how-many students of what from Bulgaria you-saw
'How many students of what from Bulgaria did you see?'
b. [*Po kakvo*] kolko studenti [ot Bulgaria] vidja?
c. Kolko studenti [ot Bulgaria] [*po kakvo*] vidja?

(4) a. Vidja studenti [*po matematika*] [ot Bulgaria].
you-saw students of mathematics from Bulgaria
'You saw students of mathematics from Bulgaria.'
b. *Vidja [*po matematika*] studenti [ot Bulgaria].
c. *Vidja studenti [ot Bulgaria] [*po matematika*].

Optionality in movement with nested *wh*-phrases: There is optionality in the ordering of *wh*Ps in nested *wh* phrases, in contrast to the rigidity observed in ordinary multiple *wh* questions (where one *wh*P c-commands the other in base positions).

(28) **Superiority in Bulgarian**

(7) *Bulgarian* (Rudin 1988, 472–473)
a. koj kogo vižda
who whom sees
'who sees whom'
b. *kogo koj vižda
whom who sees

(29) **Contrast between questions with nested and non-nested *wh*-phrases (Richards 2004)**

(9) a. [Ot kakvo] [kolko gord ____] beše Ivan ____?
of what how proud was Ivan
'How proud of what was Ivan?'
b. [Kolko gord _____] [ot kakvo] beše Ivan _____?

(10) a. Koj [ot kakvo] beše gord?
who of what was proud
'Who was proud of what?'
b. *[Ot kakvo] koj beše gord?

3.2. No Superiority in questions with nested *wh*-phrases in English

(30) **Superiority in English**
a. Who read how many books?
b. *How many books did who read?

(31) **Nested *wh*-phrases in English – No Superiority**
a. Who did you read how many books about?
b. How many books about whom did you read?

3.3. Locality – the Generalization

(32) **The Generalization**:
If exactly two phrases *wh*P$_1$ and *wh*P$_2$ move to become multiple specifiers of the same phrase, *wh*P$_1$ must be the highest specifier, if (a) *wh*P$_1$ is higher than *wh*P$_2$ ***and (b) neither whP dominates the other.***
(I.e., if one *wh*P dominates the other they can be stacked in either order.)

3.4. Distribution of Covert Movement in English

The English Bulgarian contrast:
The *whP* that is the outer-specifier in Bulgarian is overtly moved in English; the inner specifiers in Bulgarian move covertly in English (Richards, Pesetsky, Nissenbaum, Fox and Pesetsky).

(33) **Spell-out Generalization:**[1] In English, the highest overt specifier is pronounced based on its highest position (overt movement); Moved inner specifiers are pronounced in situ (covert movement).

3.5. Early Determination

(34) **Early Determination:** If a first step in successive cyclic movement is marked as covert, a second step is going to be covert, even if the position targeted is one that would otherwise be overt.

3.6. A few consequences

- Locality determines that the closest element to the attracting head must end up being the outer-specifier, unless the outer specifier has a "trace" outside the c-command domain of h.
- By the spell-out generalization, it is necessary for the first instance of covert movement to have a landing site in an inner-specifier position.
- By Early determination it is possible for later instances of covert movement to have a landing site in an outer specifier position.

(35) a. Which book about which politician did you read?
b. Which politician did you read which book about?

***v*P for (35)a**:

[vP1 which book about [which politician] which politician [you read [~~wh. book about~~ [~~wh. politician~~]]

***v*P for (35)b**:

[vP1 which politician which book about [which politician] [you read [~~wh. book about~~ [~~wh. politician~~]]

[1] This is a modification of a Pesetsky (2000). See Fox and Pesetsky (2009; http://lingphil.mit.edu/papers/fox/Ben-Gurion-7-09.pdf) for thoughts about the generalization can be derived from linearization principles.

By early determination, what happens in *v*P will determine the phonological status of the operation (whether it is overt or covert).

By Locality, (35)a can be reversed at a higher step of successive cyclic movement and converted to a structure in which *which politician* is the outer specifier.

3.7. Multiple specifiers and parasitic gaps

(23) **Multiple Specifier Single Parasitic Gap Generalization (Nissenbaum 2000):**
In multiple specifier constructions in which XP_H is the highest specifier of *v*P and XP_L is a low specifier of *v*P, only XP_H can license a (single) parasitic gap in an adjunct to *v*P .

Prediction: In (35)a, a pg will not be licensed at the immediately dominating *v*P (vP_1). But it could license a pg higher up in the structure (given the flexibility of ordering when the local *wh*P partially dominates the non-local *wh*P).

4. Parasitic Gaps in questions with Nested *wh*-phrases

Nested *wh*-Phrase Parasitic Gap Generalization (preliminary version):
In movement of nested *wh*-phrases, in which whP_1 dominates whP_2 (i.e., $[_{whP1}\ldots\ whP_2\ldots]$),
(a) whP_2 cannot license a parasitic gap in an adjunct that modifies the immediately dominating *v*P (vP_1), but
(b) whP_2 can license a parasitic gap in an adjunct that modifies a higher *v*P (vP_2).

(36) a. [which article by [which journalist]$_2$]$_1$ did you read t_1 after making a copy of pg_1?
b. *[which article by [which journalist]$_2$]$_1$ did you read t_1 after talking to pg_2?

(37) a. [which article by [which journalist]$_2$]$_1$ did you ask me$_7$ PRO$_7$ to t_7 to read t_1 after PRO$_7$ making myself$_7$ a copy of pg_1?
b. *[which article by [which journalist]$_2$]$_1$ did you ask me$_7$ PRO$_7$ to t_7 read t_1 after PRO$_7$ introducing myself to pg_2?

(38) a. [which article by [which journalist]$_2$]$_1$ did you ask me$_7$ PRO$_7$ to t_7 read t_1 after making yourself a copy of pg_1?
b. [which article by [which journalist]$_2$]$_1$ did you ask me to read t_1 after introducing yourself to pg_2?

The generalization follows from our system of rules. Again,

- From the fact that the dominated *wh*P (*wh*P_2) moves covertly we learn (based on the spell-out generalization) that *wh*P_2 is an inner-specifier of *v*P_1. Hence it cannot license a pg in *v*P_1.
- From the fact that *wh*P_2 moves covertly we cannot learn that *wh*P_2 is an in-specifier of *v*P_2. *Wh*P_2 can become an outer specifier as long as locality allows it to move from inner specifier to outer-specifier position.
- An indeed locality allows this, because one of the *wh*Ps dominates the other.

5. Back to Pied Piping

And now it is not hard to see that we predict what we saw for pied-piping (the Pied-Piping Parasitic Gap Generalization) if we assume that all *wh*Ps can become specifiers of all heads that attract the pied-piped phrase, i.e. if we assume virtually identical structures for pied-piping and for nested wh-questions (with the one difference that in nested *wh* phrases both wh phrases are in spec of C_{int} at LF).

Conclusion: Pied-Piping is undone at LF. More specifically, there has to be covert movement of the pied-piper (on its own) to the edge of every verb phrase that attracts the pied-piped constituent.

6. New Prediction for questions with Nested *wh*-phrases.

Consider examples similar to the ones just considered (Section 4), but in which the **larger** *wh*-phrase remains *in situ* and the embedded *wh*-phrase moves overtly.

(39) Which politician did you [$_{vP2}$ ask me to [$_{vP1}$ read [which article about]]]?

Here the non-remarkable prediction is that only the overt movement will license a PG in *v*P_1.

Adjunct attached at *v*P_1:

(40) a. *(Do you want me to remind you) [which politician]$_2$ you asked me to read [which article about t_2]$_1$ after making myself a copy of pg_1?

b. (Do you want me to remind you) [which politician]$_2$ you asked me to read [which article about t_2]$_1$ after introducing myself to pg_2?

However, we also make a surprising prediction: namely that the *larger wh*-phrase that remains *in situ* **will** be able to license a PG in a higher *v*P (*v*P_2).

Adjunct attached at vP_2:

(41) a. (Do you want me to remind you) [which politician]$_2$ you asked me to read [which article about t_2]$_1$ after making yourself a copy of pg_1?

b. (Do you want me to remind you) [which politician]$_2$ you asked me to read [which article about t_2]$_1$ after introducing yourself to pg_2?

In other words, what we predict is a more general statement of the Nested-*wh*-Phrase PG Generalization as it was stated in Section 4:

Nested *Wh*-Phrase Parasitic Gap Generalization (revised version):

In structures containing nested *wh*-phrases, in which *wh*P$_1$ dominates *wh*P$_2$ (i.e., [$_{wh}$P1… *wh*P$_2$…]),

(a) any *wh*-phrase that moves covertly cannot license a parasitic gap in an adjunct that modifies the immediately dominating *v*P (*v*P$_1$), but

(b) the covertly moved *wh*-phrase can license a parasitic gap in an adjunct that modifies a higher *v*P (*v*P$_2$).

And the clear empirical prediction is, then, that for examples based on (39), while the judgments will be (not surprisingly) reversed for the lower *v*P (*v*P$_1$), they will be ***identical*** to those of section 4 for the higher *v*P (*v*P$_2$):

7. The Relevance of Locality

We've seen that in nested *wh*Ps in Bulgarian order is flexible: *wh*P$_2$ can be either the outer or the inner specifier.

Our Claim: Whatever explains this flexibility is what allows *wh*P$_2$ to become the outer specifier of *v*P$_2$, even if it is an inner specifier of a lower *v*P$_1$ (and indeed our locality condition was stated in such a way so as to have this effect.)

Consequence: This will not be possible in standard multiple *wh* constructions in which superiority is rigid (and for which locality ensures that outer specifiers will remain outer specifiers forever).

(42) **Standard *wh*-movement must be order preserving (as opposed to nested, pied piping)**

a. [Which article by [which journalist]$_2$]$_1$ did you ask me to read t_1 after introducing yourself to pg_2?

b. *[which journalist]$_1$ did you persuade t_1 to read [which article]$_2$ after making yourself a copy of pg_2?

b'. *[Which article]$_1$ did you ask me to review t_1 for [which journalist]$_2$ after introducing yourself to pg_2?

8. Further Predictions – Still need to be investigated systematically

8.1. Multiple pgs in In *v*P$_1$

Key claim: In nested *wh*-phrase constructions in English, when one of the two attracted phrases, XP$_1$, dominates the other, XP$_2$, and XP$_1$ moves overtly

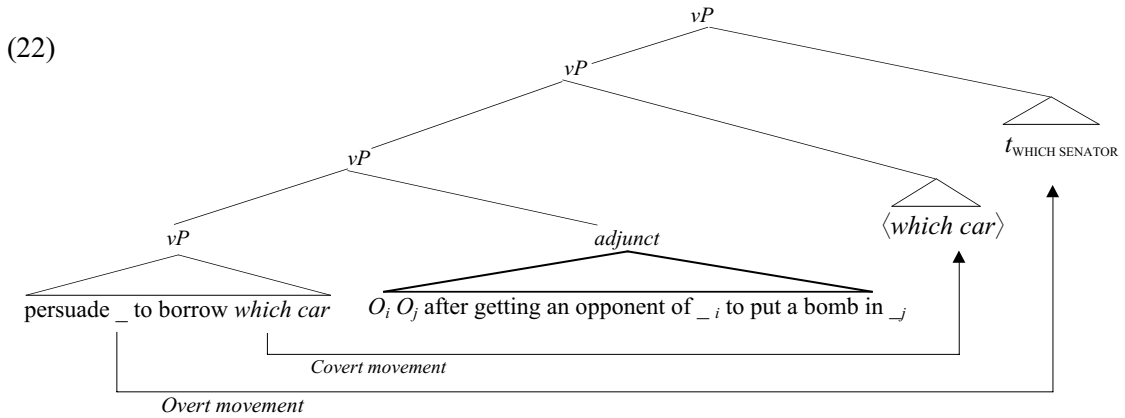
(a) XP$_1$ must be the outer specifier of *v*P$_1$ (else movement will be covert by (33))
(b) XP$_2$ must be the inner specifier of *v*P$_1$ (else movement will be overt by by (33))
(c) XP$_2$ can (but need not) be the outer specifier of *v*P$_2$ (by early determination, (34), and the Bulgarian inspired definition of locality.

Nissenbaum's observation about inner specifiers: Can license parasitic gaps, but only if the outer-specifier also licenses a parasitic gap

(21) a. ?Which senator$_1$ did you persuade _$_1$ to borrow *which car$_2$*
[after getting an opponent of _$_1$ to put a bomb in _$_2$]?

b. ?Which kid$_1$ did you give *which candy bar$_2$* to _$_1$
[before having a word with _$_1$ about the ingredients in _$_2$]?

(22)



(43) **The inner specifier can license a pg if the outer specifier does as well (nested wh-Ps)**:

a. [Which article by [which linguist]$_2$]$_1$ did you review t$_1$ after privately complaining about pg$_1$ to some of your former students?

b. *[Which article by [which linguist]$_2$]$_1$ did you review t$_1$ after privately complaining to some former students of pg$_2$?

c. ?[Which article by [which linguist]$_2$]$_1$ did you review t$_1$ after privately complaining about pg$_1$ to some former students of pg$_2$?

d. *[Which article by [which linguist]$_2$]$_1$ did you review t$_1$ after privately complaining about it$_1$ to some former students of pg$_2$?

(44) **The inner specifier can license a pg if the outer specifier does as well (Pied-Piping)**:
a. This is the dog [whose$_2$ owner]$_1$ I befriended t_1 after talking to pg_1 on my morning walk.
b. *This is the dog [whose$_2$ owner]$_1$ I befriended t_1 after feeding a biscuit to pg_2 on my morning walk.
c. ?This is the dog [whose$_2$ owner]$_1$ I befriended t_1 after trying to convince pg_1 to train pg_2.
d. *This is the dog [whose$_2$ owner]$_1$ I befriended t_1 after trying to convince her$_1$ to train pg_2.

(45) **The inner specifier can license a pg if the outer specifier does as well (Pied-Piping)**:
a. [which dog'$_2$ owner]$_1$ did you befriend t_1 after talking to pg_1 on your morning walk?
b. *[which dog'$_2$ owner]$_1$ did you befriend t_1 after feeding a biscuit to pg_2 on your morning walk?
c. ?[which dog'$_2$ owner]$_1$ did you befriend t_1 after trying to convince pg_1 to train pg_2?
d. *[which dog'$_2$ owner]$_1$ did you befriend t_1 after trying to convince her$_1$ to train pg_2?

8.2. Order of Parasitic gaps in *v*P$_1$ shows that XP$_1$ is indeed the outer Spec.

Background Discussion: Nissenbaum Chapter 3, ex. 21 and 27

(46) a. ?[Which kid's$_2$ candy bar]$_1$ did you confiscate t_1
[without mentioning the ingredients in pg_1 to the parents of pg_2]

b. *[Which kid's$_2$ candy bar]$_1$ did you confiscate t_1
[before talking to pg_2 about the ingredients in pg_1]

(47) a. ?[Which candy bar's$_2$ owner]$_1$ did you penalize t_1
[before talking to pg_1 about the ingredients in pg_2]

b. *[Which candy bar's$_2$ owner]$_1$ did you penalize t_1
[before mentioning the ingredients in pg_2 to the parents of pg_1]

8.3. Order of Parasitic gaps in *v*P$_2$ shows that XP$_2$ can be outer Spec.

(48) [Which kid's$_2$ candy bar]$_1$ did you convince me to confiscate t_1
√ [without asking me to mention the ingredients in pg_1 to the parents of pg_2]
√ [without asking me to talk to the parents of pg_2 about the ingredients in pg_1]

8.4. Extraposition diagnoses intermediate positions (Nissenbaum p. 85)

(49) [Whose$_2$ article]$_1$ did you ask me to read t_1
after introducing yourself to $\boxed{pg_2}$
*that appeared in the last issue of LI (extraposition from INNER)

(50) [Whose$_2$ article]$_1$ did you ask me to read t_1
after introducing yourself to $\boxed{pg_2}$
who studies at MIT (extraposition from OUTER)

(51) [Whose$_2$ article]$_1$ did you ask me to read t_1
after making yourself a copy of $\boxed{pg_1}$
that appeared in the last issue LI (extraposition from OUTER)

(52) [Whose$_2$ article]$_1$ did you ask me to read t_1
after making yourself a copy of $\boxed{pg_1}$
*who studies at MIT (extraposition from INNER)

8.5. Recursive Pied-Piping[2]

It is well-known that pied-piping can be "recursive". Specifically a constituent that can be be pied-piped can serve as a pied-piper (see, e.g. Heck 2008, Cable 2012).

(53) [[Whose$_3$ article's]$_2$ spelling]$_1$ did you ask me to correct t_1?

Prediction #1: any DP that dominates the *wh*P up to the pied-piped constituent can license a pg At vP_2.

(54) a. The person [[whose$_3$ car's] $_2$ front seat]$_1$ you$_8$
[[t_8 asked me$_7$ PRO$_7$ to t_7 clean t_1]
[after PRO$_8$ remembering yourself$_8$ spilling coffee on $\boxed{pg_1}$]]

b. The person [[whose$_3$ car's] $_2$ front seat]$_1$ you$_8$
[[t_8 asked me$_7$ PRO$_7$ to t_7 clean t_1]
[after PRO$_8$ imagining yourself$_8$ driving $\boxed{pg_2}$]]

c. The person [[whose$_3$ car's] $_2$ front seat]$_1$ you$_8$
[[t_8 asked me$_7$ PRO$_7$ to t_7 clean t_1]
[after PRO$_8$ introducing yourself$_8$ to $\boxed{\boldsymbol{pg_3}}$]]

[2] Pointed out to us by Norvin Richards

Prediction #2: Other constituents within the pied-piped constituent cannot license pg.

(55) a. The person [[whose$_2$ book] about Mary$_3$]$_1$ you$_8$
[[t$_8$ asked me$_7$ PRO$_7$ to t$_7$ read t$_1$]
[before PRO$_8$ getting me$_8$ to talk about $\boxed{\text{pg}_1}$]]

b. The person [[whose$_2$ book] about Mary$_3$]$_1$ you$_8$
[[t$_8$ asked me$_7$ PRO$_7$ to t$_7$ read t$_1$]
[before PRO$_8$ getting me$_8$ to talk to $\boxed{\text{pg}_2}$]]

c. *The person [[whose$_2$ book] about Mary$_3$]$_1$ you$_8$
[[t$_8$ asked me$_7$ PRO$_7$ to t$_7$ read t$_1$]
[before PRO$_8$ getting me$_8$ to talk to $\boxed{\textbf{\textit{pg}}_3}$]]

9. Remaining Challenge

To provide an alternative perspective on some of the arguments in favor of LF pied-piping (Cable 2010 and in particular Kotek 2014, Kotek and Erlewine 2016)

10. Conclusions

- We've tried to find evidence for all sorts of covert operations, by looking at their overt manifestations in the domain of Parasitic Gap licensing.
- In general, the possibility of finding overt manifestations of hidden structure is, we think, one of the things that makes the field so exciting.
- We would have been very happy to find something as solid as, say, Miyagawa's evidence for all the hidden structure that exists in SOV languages, on the basis of e.g. scope and floating numeral quantifiers.
- Although we don't think we're there yet, we hope nevertheless that this is a worthy retirement present for a great teacher.