

# CANONICAL AND NON-CANONICAL UNBOUNDED DEPENDENCIES

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## Canonical unbounded dependencies

Canonical unbounded dependencies (the type which researchers have paid most attention to and which textbooks concentrate on) involve a clause-initial filler and a gap somewhere in the following clause.

(1) I wonder [who Kim talked to \_\_\_\_]

Normally filler and gap are mutually dependent and neither is possible without the other.

(2) a. \*I wonder [who Kim talked to him]  
b. \*I wonder [Kim talked to \_\_\_\_]

Filler and gap normally match, having the same category, and, if nominal, the same number.

(3) a. Who does she trust \_\_\_\_?  
b. \*On whom does she trust \_\_\_\_?  
(4) a. On whom does she depend \_\_\_\_?  
b. \*Who does she depend \_\_\_\_?  
(5) a. Which student do you think \_\_\_\_ knows the answer?  
b. \*Which students do you think \_\_\_\_ knows the answer?

In languages with morphological case or grammatical gender they share these properties as well.

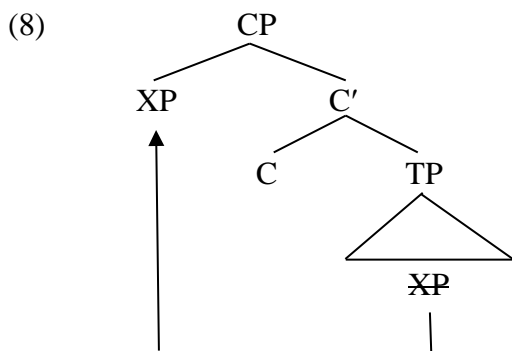
(6) a. Co            dałeś            \_\_\_\_ (NP[ACC]) Janowi?            (Polish)  
      what.ACC    give.PAST.2SGM            Jan.DAT  
      ‘What did you give to Jan?’  
b. Komu        dałeś            książkę \_\_\_\_ (NP[DAT])?  
      who.DAT    give.PAST.2SGM    book.ACC  
      ‘Who did you give a book to?’

A canonical unbounded dependency clause takes the form in (7a) and has a related clause of the form in (7b)

(7) a. XP Y \_\_\_\_ Z  
      b. Y XP Z

## Approaches to unbounded dependencies

One obvious approach to unbounded dependencies assumes that the filler originates in the position of the gap and is moved to its superficial position or that a copy is merged in this position and the original subsequently deleted.



This seems to be able to explain both why neither filler nor gap can occur without the other and why they match.

But there are a number of other approaches to unbounded dependencies.

For HPSG, the SLASH feature links a gap with a higher filler (or some other relevant structure).

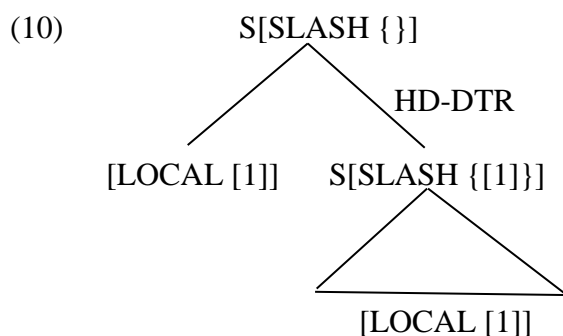
Gaps have the following feature makeup:



The LOCAL feature encodes most but not all of the syntactic and semantic properties of an expression. The SLASH feature is not part of the value of LOCAL. Nor is the WH feature, which is used in the analysis of *wh*-interrogatives.

Principles of grammar ensure that an appropriately valued SLASH features appears everywhere between the gap and the top of the dependency.

Typical unbounded dependencies take the following form:



### Non-canonical unbounded dependencies

#### Cases where no overt constituent can appear in the position of the gap

Welsh identity statements involve a filler which cannot appear in-situ.

(11) Yr athro ydy Emyr \_\_\_\_\_. (Welsh)  
 the teacher be.PRES.3SG Emyr  
 'Emyr is the teacher.'

(12) \*Ydy/Mae Emyr yr athro.  
 be.PRES.3SG Emyr the teacher

Welsh is a VSO language, so the subject is in its normal position here. There are two different forms of the copula that you might expect, but neither is possible.

See Borsley (2015).

Somewhat similar is the English example in (13) from Kayne (1980).

(13) This candidate, they assured me \_\_\_\_ to be reliable.

(14) \*They assured me this candidate to be reliable.

These are cases where movement/copying is (somehow) obligatory or cases with positions where only a gap and not an overt constituent can appear.

Conclusion: Probably both approaches can provide a reasonable account of such examples.

### Cases where a verb takes an unexpected form in the presence of a gap

In Welsh the normal third person singular present tense of the copula is *mae*.

(15) Mae Emyr bron yn barod. (Welsh)  
 be.PRES.3SG Emyr almost PRED ready  
 'Emyr is almost ready.'

When a subject is fronted, the copula is not *mae* but *sydd*.

(16) Emyr sydd \_\_\_\_ bron yn barod.  
 Emyr be.PRES.3SG almost PRED ready  
 'It's Emyr that is almost ready.'

When an adjectival complement is fronted, the copula is not *mae* but *ydy*.

(17) Bron yn barod ydy Emyr \_\_\_\_.  
 almost PRED ready be.PRES.3SG Emyr  
 'Emyr is ALMOST READY.'

See Borsley (2015).

If unbounded dependencies are the result of movement/copying, then either (a) it must be blocked with some forms of the copula and made obligatory with others or (b) it must be possible for forms to be determined afterwards and to be sensitive to the resulting gap.

There is no issue if gaps are not the product of movement/copying.

Conclusion: These examples probably don't differentiate the two approaches.

### Cases where there is no visible filler

There are some examples which look as if they involve an unbounded dependency but where there is no visible filler.

If *who* is the filler in (18), it looks as if there is no filler in (19).

(18) the man [who Kim talked to \_\_\_\_]

(19) the man [Kim talked to \_\_\_\_]

It might be suggested that *man* is the filler in (19) (Kayne 1994). But this suggests that *man* has a different status in the two examples. (See Borsley 1997 for a critique of the idea that *man* in (19) is a filler.)

Within a movement approach the alternative to assuming that *man* in (19) is a filler is to assume that there is an invisible filler (an 'empty operator').

(20) the man [O Kim talked to \_\_\_\_]



Movement of an invisible filler is also standardly assumed in examples like the following:

(21) a. Lee is too important [O for you to talk to \_\_\_\_].



b. Lee is important enough [O for you to talk to \_\_\_\_].



c. Kim is easy [O for anyone to talk to \_\_\_\_].

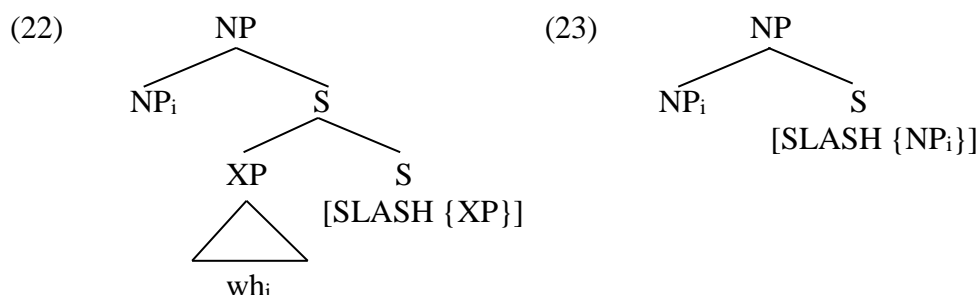


Attempts have been made to provide independent evidence for various empty categories (see e.g. Featherston 2001), but, as far as I am aware, there have been no attempts to provide independent evidence for this empty category.

In the absence of independent evidence for empty operators they are just an ad hoc device to maintain a movement approach.

In the SLASH-based approach, there is no reason why the information made available by the SLASH feature should always be associated with a filler.

A relative clause with a filler containing a *wh*-word can modify a nominal with the same index as the *wh*-word, as in (22). A relative clause with no filler can modify a nominal with the index in its SLASH value, as in (23).



See Sag (1997) for an analysis of English relative clauses along these lines.

Conclusion: Cases where there is no visible filler cast doubt on a movement approach, but are unsurprising on a SLASH-based approach.

### Cases where there is more than one gap

There are some examples which look as if they involve an unbounded dependency but where there are two gaps.

There are two types of example:

- across-the-board (ATB) cases, with gaps in two (or more) conjuncts, where both (or all) seem to be necessary

- (24) a. Who does Kim like \_\_\_ and Lee hate \_\_\_?  
 b. \*Who does Kim like Sandy and Lee hate \_\_\_?  
 c. \*Who does Kim like \_\_\_ and Lee hate Sandy?

- parasitic gap cases, where one gap seems to be impossible without the other.

- (25) a. Which book did you criticize \_\_\_ without reading \_\_\_?  
 b. \*Which book did you criticize *Barriers* without reading \_\_\_?  
 c. Which book did you criticize \_\_\_ without reading *Barriers*?

Within a movement approach, one possibility is to assume that that only one gap is the result of moving the filler while the other is the result of moving an empty operator. This approach is taken to parasitic gap sentences in Chomsky (1986).

Chomsky suggests that reflexives provide evidence that only ordinary, non-parasitic gaps are directly connected to the filler.

- (26) a. Which books about himself did John file \_\_\_ before Mary read \_\_\_?  
 b. \*Which books about herself did John file \_\_\_ before Mary read \_\_\_?

However, as Nunes (2001: fn.35) points out a parasitic gap may behave in this way if it precedes the ordinary gap.

- (27) a. \*Which picture of herself did every boy who saw \_\_\_ say Mary liked \_\_\_?  
 b. Which picture of himself did every boy who saw \_\_\_ say Mary liked \_\_\_?

One alternative is to assume that the filler undergoes ‘sideward movement’ from one gap position to the other before eventually moving to its superficial position (Nunes 2001).

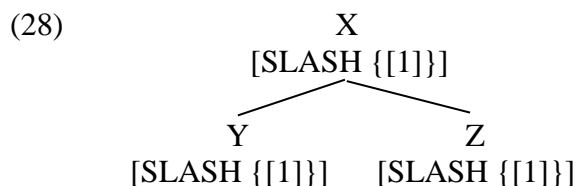
Another is to assume that what is moved is a daughter of two different nodes, which consequently leaves two gaps (Citko 2005).

Whether or not either approach is viable, it is clear that they involve special mechanisms.

The SLASH-based approach does not require any special mechanism.

In the SLASH-based approach there is no reason why the information that SLASH encodes should only be associated with a single gap.

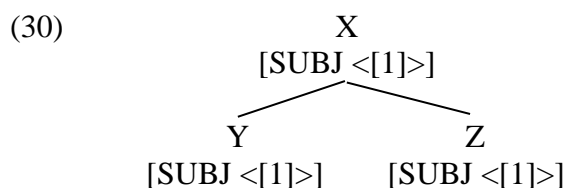
There is no reason why we should not have structures like the following:



If Y and Z are two conjuncts, this will be an ATB case. If one is a head and the other a dependent, the former will contain an ordinary gap, and the latter a parasitic gap.

This is like the situation where two verbs have the same subject, e.g. (29), which involves the structure in (30).

- (29) Kim got out of bed and made a cup of tea.



It would require a special stipulation to rule out structures like (28) (or structures like (30)). Hence examples with two gaps are expected within the SLASH based approach.

See Levine and Sag (2003) for discussion of the full range of cases.

Conclusion: Cases where there is more than one gap pose a challenge for a movement approach but are expected on a SLASH-based approach.

### Cases where filler and gap don't match

There are some examples which look as if they involve an unbounded dependency but where apparent filler and gap do not match.

Auxiliary-stranding relative clauses (ASRCs) (Arnold and Borsley 2010) are relevant here.

- (31) a. Kim will sing, which Lee won't \_\_\_\_.  
 b. Kim has sung, which Lee hasn't \_\_\_\_.  
 c. Kim is singing, which Lee isn't \_\_\_\_.  
 d. Kim is clever, which Lee isn't \_\_\_\_.  
 e. Kim is in Spain, which Lee isn't \_\_\_\_.  
 f. Kim wants to go home, which Lee doesn't want to \_\_\_\_.

Evidence that there is a dependency here:

- (32) a. \*Kim will sing, which Lee won't sing.  
 b. \*Kim has sung, which Lee hasn't sung.  
 c. \*Kim is singing, which Lee isn't singing.  
 d. \*Kim is clever, which Lee isn't clever.  
 e. \*Kim is in Spain, which Lee isn't in Spain.  
 f. \*Kim wants to go home, which Lee doesn't want to go home.

Evidence that the gaps are not nominal:

- (33) a. \*Kim will sing, but Lee won't it/that.  
 b. \*Kim has sung, but Lee hasn't it/that.  
 c. \*Kim is singing, but Lee isn't it/that.  
 d. \*Kim is clever, but Lee isn't it/that.  
 e. \*Kim is in Spain, but Lee isn't it/that.  
 f. \*Kim wants to go home, but Lee doesn't want to it/that.

One response to these data might be to propose that *which* in these examples is not the normal nominal *which* but a pronominal counterpart of the categories which appear as complements of an auxiliary, mainly various kinds of VP.

But ordinary VP complements of an auxiliary cannot appear as fillers in a relative clause, as shown by the (b) examples in the following:

- (34) a. This is the book, which Kim will read \_\_\_\_.  
 b. \*This is the book, [read which] Kim will \_\_\_\_.  
 (35) a. This is the book, which Kim has read \_\_\_\_.  
 b. \*This is the book, [read which] Kim has \_\_\_\_.  
 (36) a. This is the book, which Kim is reading \_\_\_\_.  
 b. \*This is the book, [reading which] Kim is \_\_\_\_.

There is evidence from coordination that *which* is an NP.

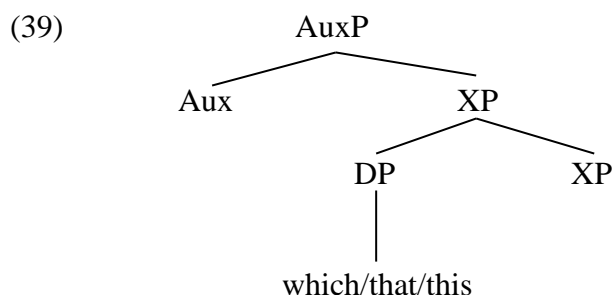
- (37) Kim has often ridden a camel, which most people haven't \_\_\_\_, and some consider \_\_\_\_ too dangerous.

There are similar examples with a topicalized demonstrative pronoun.

- (38) a. They can only do their best and that they certainly will \_\_\_\_.  
 ([http://www.britishcycling.org.uk/web/site/BC/gbr/News2008/200807018\\_Jamie\\_Staff.asp](http://www.britishcycling.org.uk/web/site/BC/gbr/News2008/200807018_Jamie_Staff.asp))
- b. Now if the former may be bound by the acts of the legislature, and this they certainly may \_\_\_\_, ...  
 (Thomas Christie (1792) *The Analytical Review, or History of Literature, Domestic and Foreign, on an Enlarged Plan*, p503 (Princeton University))
- c. It was thought that he would produce a thought provoking chapter, and this he certainly has \_\_\_\_.  
 (J. B. Cullingworth, ed. *British Planning: 50 years of Urban and Regional Policy*, Continuum International Publishing Group, 1999, p13).

ASRCs and related examples where filler and gap do not match pose a serious problem for the movement approach to unbounded dependencies.

One might try to accommodate the data by allowing the complement of an auxiliary to have a DP realized as *which* or a demonstrative adjoined to it, as in (39).



The complement would have to be deleted in this situation. But it is not clear how one could ensure this. Hence, it is not clear how one could exclude the following:

- (40) \*Kim will sing, which Lee won't sing.

It is also not clear how one could ensure that a demonstrative introduced in such a structure is fronted. In other words, it is not clear how an example like (41), with or without *sing*, could be excluded.

- (41) \*Kim will that/this (sing)

Within the SLASH-based approach, there is no reason why the SLASH value of a gap should always match its LOCAL value.

There is no reason why gaps should not under some circumstances be 'dishonest' (Webelhuth 2008) and have a SLASH value which is different from that of LOCAL.

Arnold and Borsley (2010) propose that when an auxiliary has an unexpressed complement, the complement optionally has a certain kind nominal in the value of SLASH, which is realized as relative *which* or a demonstrative.



When the value of SLASH is the empty set, the result is a ‘VP-ellipsis’ sentence (which may involve the omission of any auxiliary complement, not just VP).

When SLASH contains the nominal value, the result is an ASRC or a related example with a demonstrative.

Conclusion: Cases where filler and gap don’t match are problematic for a movement approach, but are no problem for a SLASH-based approach.

### Examples with no gaps

There are some examples which look as if they involve an unbounded dependency but where there is not a gap but a resumptive pronoun (RP).

Welsh is relevant here.

- (42) y dyn [werthodd Ieuan y ceffyl iddo **fo**] (Welsh)  
 the man sell.PAST.3SG Ieuan the horse to.3SGM he  
 ‘the man that Ieuan sold the horse to’

Dependencies with an RP have sometimes been seen as a different kind of dependency not involving movement.

Willis (2000) argues that this is the case in Welsh.

But there is evidence that they involve the same type of dependency.

Welsh does not allow present and imperfect forms of *bod* ‘be’ in affirmative declarative complement clauses.

- (43) a. \*Mae Aled yn credu [y **mae** Elen yn darllen  
 be.PRES.3SG Aled PROG believe PRT be.PRES.3SG Elen PROG read  
 y llyfr].  
 the book  
 ‘Aled believes that Elen is reading the book.’  
 b. \*Mae Aled yn credu [**roedd** Elen yn darllen y llyfr].  
 be.PRES.3SG Aled PROG believe be.IMPF.3SG Elen PROG read the book  
 ‘Aled believes that Elen was reading the book.’

Instead what looks like the non-finite form *bod* appears.

- (44) Mae Aled yn credu [**bod** Elen yn darllen y llyfr].  
 be.PRES.3SG Aled PROG believe be Elen PROG read the book  
 ‘Aled believes that Elen is/was reading the book.’

Unbounded dependencies nullify this ban on present and imperfect forms of *bod*.

- (45) a. Beth mae Aled yn credu [y **mae** Elen yn  
 what be.PRES.3SG Aled PROG believe PRT be.PRES.3SG Elen PROG  
 ei ddarllen \_\_\_]?  
 3SGM read  
 ‘What does Aled believe that Elen is reading?’
- b. Beth mae Aled yn credu [**roedd** Elen yn ei  
 what be.PRES.3SG Aled PROG believe be.IMPF.3SG Elen PROG 3SGM  
 ddarllen \_\_\_]?  
 read  
 ‘What does Aled believe that Elen was reading?’

Examples like the following show that dependencies with an RP nullify the ban on present and imperfect forms of *bod* just as much as dependencies with a gap do.

- (46) y llyfr mae pawb yn dweud [**mae** / **roedd**  
 the book be.PRES.3SG everyone PROG say be.PRES.3SG be.IMPF.3SG  
 Mair yn sôn amdano **fe**]  
 Mair PROG talk about.3SGM he  
 ‘the book that everyone says Mair is/was taking about’

Further evidence that Welsh dependencies with an RP have the same basic properties as dependencies with a gap is presented in Willis (2011) (which abandons the position of Willis 2000) and Borsley (2013).

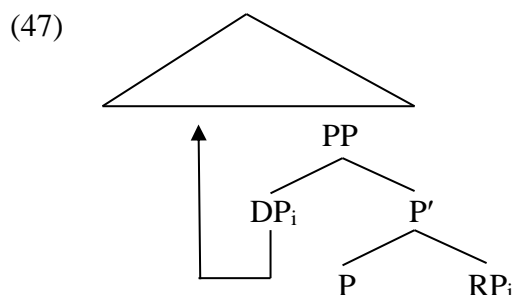
Various attempts have been made to combine an RP with movement.

One suggestion, made e.g. in McCloskey (2006), is that under certain circumstances the copy left by movement is not deleted but somehow converted into a pronoun.

This approach has a problem with McCloskey’s (2002: 192) observation that RPs universally look just like ordinary pronouns. This casts doubt on any analysis which treats them as special pronouns distinct in some way from ordinary pronouns. An analysis in which they are derived from copies left by movement is an analysis of this kind.

Others have suggested that movement is not from the position of the RP but from a nearby position.

Willis (2011) proposes that a PP whose head has an RP as its object may have a coindexed operator in its specifier position which undergoes movement.



In English, examples like the following, seem to provide some support for a Spec PP position.

- (48) a. Who with?  
 b. What about?  
 c. Who for?

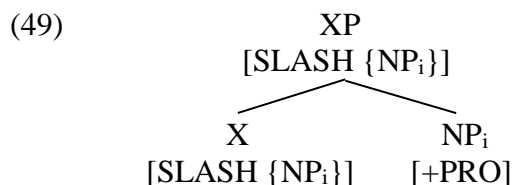
Welsh does not have examples like this.

Thus, Willis's attempt to combine movement with an RP involves a structure that is not independently motivated.

It is not clear how the movement approach can be extended to dependencies with an RP.

Within the SLASH-based approach, there is no reason why there should always be a gap in an unbounded dependency.

We can assume that some languages allow certain heads that are [SLASH {NP}] to have as a sister not a gap but a pronoun coindexed with the value of SLASH.



See Borsley (2013) for a detailed analysis.

Conclusion: Cases where there is not a gap but a resumptive pronoun cast doubt on a movement approach, but are unproblematic for a SLASH-based approach.

General conclusion: A consideration of non-canonical unbounded dependencies suggests that a SLASH-based approach is more flexible and hence preferable to a movement approach.

See Borsley (2012) for further discussion.

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