Multiple-Gap Constructions

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1. Multiple Gap Constructions
1.1. Overview

Much attention has been paid over the years to \textit{wh} constructions\(^1\) in which more than one gap\(^2\) corresponds to the same element. Some examples of such sentences (drawn from Engdahl 1983, Chomsky 1986) are:

\begin{enumerate}
  \item \hspace{1em} a. Which articles did John file ___ without reading ___?
  \item \hspace{1em} b. This is the kind of food you must cook ___ before you eat ___.
  \item \hspace{1em} c. Which boy did Mary’s talking to ___ bother ___ most?
\end{enumerate}

\begin{enumerate}
  \item \hspace{1em} a. Which men did the police warn ___ that they were about to arrest ___?
  \item \hspace{1em} b. Who did you tell ___ that you would visit ___?
  \item \hspace{1em} c. Which girl did you send a picture of ___ to ___?
\end{enumerate}

These constructions are often referred to as “parasitic gap” constructions, a term which is more appropriate to (1) than to (2). In (1), one of the gaps cannot stand alone without the other gap, and in this sense it is parasitic on the other gap.

\begin{enumerate}
  \item \hspace{1em} a. *What/Which articles did John file the book with reading ___?
  \item \hspace{1em} b. What/Which articles did John file ___ without reading the book?
\end{enumerate}

However, in (2) each gap can stand on its own.

\begin{enumerate}
  \item \hspace{1em} a. Who/Which friend did you tell ___ that you would visit your brother?
  \item \hspace{1em} b. Who/Which friend did you tell your brother that you would visit ___?
\end{enumerate}

For this reason, despite terminology dating back to the seminal paper by Engdahl (1983), I will

\(\)\(^{1}\)}Incomplete draft, March 2011. I would like to thank Alex Alsina, Ash Asudeh, Mary Dalrymple, Shira Farby, Nurit Melnik, and Ilona Spector for comments. This research is supported by the Israel Science Foundation (Grant No. 207/07).

\(\)\(^{2}\)}Also known as long-distance dependency (LDD) constructions, unbounded dependency constructions (UDCs), \(\AA\) dependencies, filler-gap constructions, and a host of other names.

\(\)\(^{3}\)}I am using the term “gap” in a pretheoretical sense here, without any commitment to the presence of an empty structural element in the gap position.
use the term “multiple-gap” construction\textsuperscript{3} to refer to the totality of the phenomenon, and restrict the term “parasitic gap” to those cases where one of the gaps is ungrammatical alone. Parasitic gaps will be marked with a subscripted $p$.

Multiple-gap constructions raise several important questions, which have been addressed in the literature from various perspectives. This study brings the syntactic perspective of Lexical-Functional Grammar (LFG) to bear on these issues. Most of the paper is written without presupposing knowledge of LFG; the formal LFG rules and representations that do appear in the paper can be ignored by those who are unfamiliar with the formalism.

The initial question to ask is whether the existence of multiple-gap constructions is expected or surprising within the context of the broader theory of $wh$ constructions. Since multiple-gap constructions exist, I take it that a theory of $wh$ constructions under which their existence is expected is preferable over one in which their existence is surprising. I will address this question in the second subsection of this section of the paper. In §2, I will discuss constraints on multiple-gap constructions, in particular what has come to be known as the anti-c-command constraint. In §§3 and 4, I will turn to the specifically parasitic varieties of the construction and speculate on what makes them possible, first those in adjuncts, and then those in subjects.

1.2. The Status of Multiple-Gap Constructions

What makes multiple-gap constructions interesting is the fact that under fairly standard approaches to the syntax of $wh$ constructions their existence is unexpected. The standard transformational account, in which the fronted element originates in some clause-internal position and then is displaced to its initial position, is based on the assumption of a one-to-one relation between fronted elements and gaps: a single element is moved from its underlying position, thus creating a superficial gap, into some fronted position. With no more machinery than that, all one expects is the same number of fronted elements and gaps. In multiple-gap constructions, any additional gaps are ungenerable under this simple view. Thus, multiple-gap constructions are taken to provide evidence for the existence of additional mechanisms, such as empty operators (Chomsky 1986). However, other theories of $wh$ constructions do not presuppose a one-to-one relation of this kind. For example, as noted by Gazdar, Klein, Pullum, and Sag (1984), Phrase Structure Grammar imposes no such restriction. Since $wh$ constructions are modeled in terms of the percolation of the SLASH feature, as long as one mother is allowed to have more than one SLASHed daughter, there is no bar to multiple-gap constructions.

In LFG, the situation is somewhat more complex. $Wh$ constructions are analyzed as constructions in which a single element bears more than one grammatical function: a discourse-relevant function (standardly, $\text{FOCUS}$ or $\text{TOPIC}$) and an argument or adjunct function. For example, in (5a), $\text{what}$ is both the $\text{FOCUS}$ of the main clause and the $\text{OBJ}$ of $\text{ate}$. This is represented formally in the (simplified) f-structure (functional structure) (5b), where the two

\textsuperscript{3}Although almost all examples that have appeared in the literature involve two gaps, it is possible to have more, as in the following, cited by Engdahl (1983).

\begin{itemize}
\item[(i)] a. The contract which I want to pursue ____ before damaging ____ while filing ____ is written on Peruvian papyrus.
\item[b.] Here is the man who meeting ____ convinced Mary that beginning to love ____ would make her end up hating ____.
\end{itemize}

The term “multiple-gap construction is also used by Alsina (2008)"
Standard LFG notation puts the feature content of what in one of the positions and connects it to the other functional position with a curved line. I believe the notation used here is more perspicuous.

In LFG-speak, the former is referred to as outside-in licensing and the latter as inside-out.

More precisely, what is at stake here is not subjecthood in the conventional sense, but one aspect of subjecthood, pivothood in the sense of Dixon (1994) and Falk (2006). I will abstract away from that distinction in this paper, and simply refer to subjects.

In this paper, I will mark gaps for subjects as well for readability, even though technically there is no empty category in the subject position.

Depending on the version of the theory, this multifunctionality is licensed by a constraint anchored either in the position of the fronted element (Kaplan and Zaenen 1989) or in the position of the gap (Bresnan 1995). If the licensing proceeds from the position of the gap, there can be no restriction on number of gaps associated with a single fronted element; since each gap is generated independently, there is no bar to more than one gap. If the licensing proceeds from the fronted position, only one gap can be licensed by the licensing equation. An alternative approach proposed by Alsina (2008) allows free association of an element bearing a grammaticized discourse function with another grammatical function: this approach also allows multiple gaps.

The version of LFG I will be assuming (described in more detail in the next subsection) is one in which both modes of licensing exist: fronted elements which bear the SUBJ function are licensed from the fronted position while non-SUBJ elements are licensed from the gap position. This position is proposed by Falk (2006) as part of a theory of subjecthood, and confirmed by Falk (2007), where it is demonstrated that constituent structure gaps are present for non-subjects but not for subjects. Under this view, multiple gap constructions should be possible as long as there is no more than one SUBJ gap. As will be seen in §2.1, multiple SUBJ gaps are indeed impossible.

There is, however, another consideration: processing. It has been well known for a long time (at least as early as Wanner and Maratsos 1978) that wh constructions impose a burden on processing. It makes sense that the parser would disprefer multiple gaps, happy to retire a fronted element as soon as it has found one gap in which to place it. This point is reinforced by theories of filler-driven parsing, in which the parser attempts to place the filler as early as possible in the parse (Frazier and Flores d’Arcais 1989). Thus, while the grammar might allow multiple-gap constructions, they might be harder to process and thus be more marginal in

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\( f^\prime = \text{["what"]} \)

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actual language use. This, in fact, seems to be the correct status of multiple-gap constructions. As has often been reported, speakers disagree on how acceptable multiple-gap constructions are, some being more tolerant than others. A theory in which they are essentially grammatical but difficult to process seems to be a solid basis for the kind of uncertainty one finds in the literature.

1.3. Digression: Anatomy of Wh Constructions

Since the nature of wh constructions is essential for understanding multiple-gap constructions, it is important to outline the anatomy of wh constructions in the version of LFG I am assuming. As noted above, LFG models wh constructions as constructions of multifunctionality; i.e. constructions in which an element bears more than one grammatical function. One of these functions is a clause-internal grammatical function (an argument or adjunct function), and the other is a grammaticized discourse function—a discourse function which is represented syntactically. Since Focus and Topic are pragmatic notions, they are represented at the level of information structure; however, they sometimes also have a syntactic representation, such as when they have special structural positions. It is only in situations where their pragmatic status is syntactic as well that they bear grammatical (i.e. syntactic) functions such as focus and topic.

The multifunctionality of wh constructions is licensed by what is known in LFG as a functional equation: a grammatical function-based constraint associated with a syntactic position (or a lexical item). This constraint can be associated with the clause of the fronted element, in which case it states that the fronted element is identical to some element deeper within the sentence, as in (6a). As noted above, in the version of the theory assumed here, this is only possible if the clause-internal function is subj. Alternatively, it can be associated with the gap position, in which case it identifies the gap with a grammaticized discourse function (focus or topic) farther out in the sentence, as in (6b).

\[
\begin{align*}
\text{(6) } & \text{a. } \uparrow = (\uparrow \text{DF}) = (\uparrow \text{GF}^* \text{SUBJ}) \\
& \text{b. } \uparrow = (\text{GF}^* \uparrow \text{DF})
\end{align*}
\]

In either case, the GF* is a sequence of unspecified grammatical functions through which the multifunctionality can pass: the wh-path. Long-distance wh dependencies are thus licensed by local steps through the f-structure. ((6b) does not explicitly state that the lower GF cannot be subj; I will return to this later.)

The distinct treatment of subjects is due to the special nature of subjects. As noted in the typological literature (e.g. Dixon 1994), subjects both express arguments and have a special status involving elements shared across clauses. These two functions are joined in nominative-accusative languages but split between two different elements in other language types, such as syntactically ergative languages. It is the second function, often referred to as pivot, that is

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\(^{4}\)It should be noted that while subject “gaps” are licensed differently, and represented differently at c-structure, there is no difference between subject and non-subject constructions at f-structure. In both cases, a single element bears both a discourse function and a clause-internal function; i.e. is structure-shared. Thus, arguments that have been made in the HPSG literature (e.g. Levine and Hukari 2006: 71–72) that there should be no difference between subject and non-subject wh constructions because they have the same properties (including “parasitic” gap properties) do not hold against this analysis.

\(^{5}\)The up-arrow in these functional equations refers (simplifying somewhat) to the clause within which the constraint is anchored. DF stands for “(grammaticized) discourse function”—focus or topic. While in some of the literature subj is included in df, that is not the intention here. GF stands for any grammatical function.
at stake here. It is the reason, for examples, that only subjects can raise: since the raised element is shared between clauses, it has to be the subject (pivot) of the subordinate clause. In fact, the restriction of (6a) to \textit{subj} completely parallels the fact that the equation licensing raising (technically functional control) is limited to \textit{subj}:

\begin{equation}
(\uparrow \text{subj/obj}) = (\uparrow \text{xcomp subj})
\end{equation}

\textit{Wh}-paths are significant for two reasons. In the first place, some languages have special marking (morphology, word order, tone changes) on the \textit{wh}-path (Zaenen 1983). For this reason, it has been hypothesized that there is a special feature (variously referred to in the literature as \textit{BND}, \textit{LDD}, and \textit{whpath}) in f-structures along the path. Given the variety of markings, it is proposed by Falk (2009) that the \textit{whpath} feature distinguishes between the top of the \textit{wh} path (with the value \([+T]\)) and the rest of the path (\([-T]\)). A well-formed \textit{wh}-path has the feature \([\text{whpath} [+T]]\) at its topmost layer and \([\text{whpath} [-T]]\) elsewhere.

The other reason for the importance of the \textit{wh}-path is that constraints on the path are responsible for island phenomena. According to the approach of Falk (2009), islands are essentially the result of extrasyntactic properties, such as a requirement that fronted elements be pragmatically prominent. In some cases, the syntax enforces the pragmatic requirement, resulting in an inviolable (or at least less easily violable) island constraint. For example, Complex NP Constraint violations are possible (in English) under certain pragmatic conditions when the NP-internal clause is a complement but not when it is a relative clause; this is attributed to the relative clause island, but not the complement island, being enforced syntactically. The syntax enforces such islands by not allowing the \textit{wh} path to pass through a particular element (such as a relative clause). Formally, this is achieved through the \textit{whpath} feature: disallowing a particular layer of f-structure from bearing the feature \([\text{whpath} [+T]]\) renders it an island.

In \textit{wh} constructions of the familiar type, the multifunctional element is realized in the canonical position of the high function (the discourse function); however, there is nothing in principle requiring this. Realization of the multifunctional element in the canonical position of the lower function results in such constructions as in-situ questions and internally-headed relative clauses. (On relative clauses, see Falk 2010.) In most cases, such constructions are also subject to islands, although there appear to be no cases of marking of the path. In addition, in languages with both, there are sometimes differences in the island constraints. For this reason, Falk (2009) proposes that there are two related features: \([\text{whpath}_{\text{high}}]\) for a high realization of the multifunctional element, and \([\text{whpath}_{\text{low}}]\) for a low realization. In the f-structures in this paper, all of which represent English sentences, the feature will simply be called \textit{whpath}.

It is also possible for what appear to be in-situ \textit{wh} constructions to not have the properties of \textit{wh} constructions. For example, English in-situ questions do not obey island constraints, and Choctaw internally headed relative clauses are not islands for \textit{wh} constructions (Broadwell 1985a, Broadwell 1985b).\footnote{Choctaw internally headed relative clauses also show signs of being bare CPs, rather than CPs embedded in nominal phrases; in particular, the use of switch-reference markers and the absence of the nominal marking that is typical of internally headed relative clause constructions.} In such cases, the most natural conclusion is that despite their superficial similarity to \textit{wh} constructions, they are not \textit{wh} constructions. There are no syntactic \textit{focus} or \textit{topic} functions in such constructions, no long-distance dependencies, and no \textit{wh}-path.
2. Constraints on Multiple Gap Constructions

2.1. Anti-C-Command

It has been proposed in the literature that there are several constraints on multiple-gap constructions. The most important of these will be discussed in this section.

As originally proposed by Engdahl (1983), it is generally believed that one of the gaps in a multiple-gap construction cannot c-command the other. This is taken by Culicover (2001) to be one of the “current consensus positions” on multiple-gap constructions. Some examples follow:

(8)  
a. *Who did you tell ___ about ___?  
b. *Who did the story remind ___ of ___?  
c. *Who ___ read a book about ___?

(9)  
a. *Who did you say ___ convinced you [___ should pass the course]?
   b. *Which articles ___ got filed without you reading ___?
   c. *This is the kind of food that ___ must be cooked before you eat ___.
   d. *Who did you say ___ claimed that you should exempt ___ from Introduction to Linguistics?

In each of these cases, the first gap c-commands the second gap; this is alleged to explain their ungrammaticality.

However, as has been noted in the literature, there are good reasons to doubt that what is involved here is a constraint involving c-command. In the examples in (8), the second gap is in a position where a reflexive anaphor would be possible. Engdahl (1983: 24) observes that cases where a reflexive is possible do not allow multiple gaps even if there is no c-command relation.

(10)  
a. I talked to John, about himself.
   b. Who, did you talk to ___ about *___/himself?

She also shows that in Swedish, where the distribution of reflexives differs from English, the correlation is still present.

(11)  
a. Jag talade med Johan, om *sig / honom_i.
   I talked with Johan about *REFL_i/him
   ‘I talked to John about himself.’ (cf. (10a))
   b. Vem brukar du sällan tala med ___ om ___?
   who be.accustomed you seldom talk with about
   ‘Who do you seldom talk to about himself?’ (cf. (10b))

(12)  
   I saw you take John home to REFL_i
   ‘I saw you take John home to himself.’

\[11\] It is usually stated in terms of the real gap not being able to c-command the parasitic gap. However, since not all multiple-gap constructions are parasitic, and anti-c-command is taken to apply even in the non-parasitic cases, I refrain from stating this in terms of parasitism.
b. Johan, har jag ofta sett dig köra ___ hem till *___ / sig.  
John have I often seen you take home to / REFL
‘John, I have often seen you take home to himself.’

Thus, the relevant constraint here appears to be based not on c-command but rather on the availability of a reflexive. I propose that what is involved here is not a constraint on multiple-gap constructions per se, but rather a constraint that renders reflexive anaphors obligatory. Whether this is a primitive syntactic constraint or not is a question I leave open; I suspect that what is involved here is probably a parsing-based phenomenon relating to the usefulness of reflexives in indicating the coreference of (roughly) coarguments. In any case, examples like (8) do not provide evidence for an anti-c-command condition.

Under closer examination, the examples in (9) also do not involve a c-command-based condition. In all of these cases, the offending first (higher) gap is a subject. C-commanding non-subjects do not block multiple gap constructions, as observed by Chomsky (1986: 61f).

(13) a. Which men did the police warn ___ [that they were about to arrest ___]?  
b. Who did you tell ___ [that you would visit ___]?  
c. Who did you say you convinced ___ [___ should fail the course]? (cf. (9a))

In each of these cases, the bracketed clause is an argument rather than an adjunct, and therefore c-commanded by the object; yet the sentences are grammatical. This suggests that the constraint in question refers to higher subjects rather than to c-command. A subject-based constraint will also allow the extension of the constraint to languages with different configurational properties. For example, Kiss (2001) argues that subject and object in Hungarian are not distinguished structurally, yet the same “anti-c-command” effects obtain.

(14) a. Milyen iratokat tettél el ___, mielőtt elolvastál volna ___p?  
what papers.ACC you.put away before you.had.read  
‘What papers did you put away before you had read?’

b. *Milyen iratok vesztek el ___, mielőtt elolvastál volna ___p?  
what papers got.lost away before you.had.read  
‘What papers got lost before you had read (them)’

As we have seen, examples like (9a), with two subject gaps, are already ruled out under my background assumptions. If a subject gap is licensed by a constraint (technically in LFG, a functional equation) associated with the fronted position, only one such gap is possible. However, this will not help us with the rest of the examples in (9).

As Engdahl (1983: 21) points out, the constraint in question cannot simply be one against subjects; non-c-commanding subjects do not block multiple-gap constructions.

(15) a. Which caesar did Brutus imply ___ was no good while ostensibly praising ___?  
b. Who did you say John’s criticism of ___ would make us think ___ was stupid?

Instead, it is subjects in a commanding position (either c-command, or the equivalent at
Alsina (2008) arrives at a similar conclusion. In his approach, the constraint follows from the imposition of the Relational Hierarchy on wh constructions. He views subjects and discourse functions as being at the same level on the hierarchy, and thus disallows subjects from also bearing discourse functions. While his approach does not account for the same range of data as the one I am proposing, the two proposals bear a certain similarity to each other.

From the perspective of the LFG formalism, this can be expressed by adding the following off-path constraint to the wh path expression in the inside-out equation annotated to the gap:

(16) \((\rightarrow \text{SUBJ}) \neq \uparrow\)

What this says is that at each outward step in the path, the structure is checked to ensure that it does not contain a subject which is identical to the wh element. This will correctly rule out the sentences in (9b–d): In each of them, the lower gap is a non-subject, and thus licensed from the gap position. In each of them there is a subject gap licensed from the position of the fronted element. The path outward from the lower gap will in each case pass through a clause of which the subject gap is an element, and thus identical in content to the lower gap. On the other hand, the sentences in (15) are correctly allowed. In (15a) the first step outwards is the clause headed by imply, but the other gap is not the subject of that clause, but the subject of the embedded clause headed by was. Since it is not the subject of the imply clause, the constraint is not violated. In (15b), the subject is the lower gap, and the outward path from the higher gap will not reach the clause of which the lower gap is the subject.

The constraint in (16) has an interesting consequence. It is not a constraint on multiple-gap constructions, but on any gap. It therefore applies any time multifunctionality in a wh construction is licensed from the position of the gap. In particular, any attempt to license multifunctionality from a gap in subject position by (6b) will violate (16): the first outward step will lead to the f-structure of which the gap is the subject. This is the correct result, as the multifunctionality of subject wh elements is licensed from the position of the fronted element because of the pivot nature of the subject. In Falk (2006: 114) the ability to license from the position of a subject gap was ruled out by an ad hoc condition. Under the present proposal, it is ruled out by the same constraint that rules out f-commanding subjects in multiple-gap constructions.

One kind of contrast which this account does not explain is exemplified in the following from Chomsky (1986: 54).

(17) a. *a man who ___ looks old whenever I meet ___
b. a man who, whenever I meet ___, ___ looks old

Since whenever I meet is an adjunct to the clause headed by looks in both versions, the outward path from the gap within that phrase will pass through the clause headed by looks, the subject of which is identical to the gap. Both versions should thus be ungrammatical. This example is presented by Chomsky as evidence of the relevance of c-command. However, given the foregoing evidence that c-command does not play a role, there must be another explanation. A different way of approaching this is to say that the preposing of an adjunct clause makes the subject “less subject-like.” A parallel problem emerges in the analysis of the that-trace effect proposed by Falk (2006), as pointed out by Asudeh (2009): the inability to account for the Adverb Effect (Culicover 1993).

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I propose that (17) and (18) display the same effect. As a preliminary approximation, I would attribute this effect not to the syntax per se, but rather to a parsing effect under which a subject which is significantly far from the beginning of the clause is harder for the parser to identify as a subject. It therefore allows certain violations of grammatical constraints on subjects.

Setting data such as (17) aside, the anti-c-command effect is completely accounted for by reflexive obligatoriness, the constraint in (16), and the inability to license multiple subjects.

2.2. Second Gaps as Pronouns

It has been proposed (Cinque 1990, Postal 1994, Postal 2001) that the second (“parasitic”) gap in a multiple-gap construction is a pronoun. They argue that these gaps are limited to NPs, and are barred from positions in which weak definite pronouns are not permitted. On the other hand, it has been argued by Levine, Hukari, and Calcagno (2001) and Levine and Hukari (2006) that neither of these constraints holds, and that, as in the account proposed here, second gaps are ordinary gaps.

Examples such as the following (from English and Italian) have been presented as evidence that non-NPs cannot be second gaps.

(19) a. *How sick did John say he felt ___ before getting ___ ?
   b. *Unbearable he is ___ even when trying not to seem ___ .
   c. *Abuse my ferret, I refused to accept that he could ___ even after seeing him ___ .
   d. *Quanto importanti si può diventare ___ senza sentirsi ___ ?
      how important REFL can become without to.feel
      ‘How important can one become without feeling?’
   e. *A chi hai lasciato la lettera ___ dopo esserti rivolto ___ ?
      to who you have left the letter after to.be.REFL returned
      ‘To whom did you leave the letter after having returned?’

Similarly, the following are among the examples that have been presented to show that second gaps are excluded from positions excluding weak definite pronouns.

(20) a. *the color that everyone who dyed their sheets ___ praised ___. (cf. Mirabelle
dyed her sheets purple/*it.
   b. *What your saying the Porsche cost ___ led them to try to sell the Jaguar for ___
is amazing. (cf. The Porsche cost $50,000/that much/*it.)
   c. *How long a time did their saying the concert would last ___ make Quentin miss
   work for ___? (cf. The concert lasted for the whole night/two hours/*it/*them.)

(21) a. *Which child did everyone who believed it was ___ that the drug had helped see
   ___ in the hospital? (cf. It was *hér/HER that the drug helped.)
   b. *What several facts that meant ___ led Mary to claim ___ is that he is guilty. (cf.
   These facts may mean that he is guilty but those facts don’t mean that/*it.)
   c. *It was disregard for human rights which the UN criticized ___ after the
dictator’s remarks betrayed ___ . (cf. That remark betray [disregard for human
   rights]/THEM/*thém.)
d. *What everyone who remarked ___ later denied ___ was that it was hot. (cf. Tina remarked [that it was hot]/*it.)

On the other hand, as noted above, Levine, Hukari, and Calcagno (2001) bring counterexamples, both of non-NPs and of second gaps in anti-pronominal contexts.

(22) a. How harshly do you think we can treat THEM ___ without in turn being treated ___ OURSELVES?
   b. That’s the kind of table ON WHICH it would be wrong to put expensive silverware ___ without also putting a fancy centerpiece ___.
   c. THAT DRUNK, it would be impossible for ME to get ___ without ROBIN getting ___ as well.
   d. That Robin is a spy would naturally be difficult to refute ___ without (someone) having first conjectured ___.

(23) a. Mint green is a color that you might paint your CEILING ___ without necessarily wanting to paint the surrounding WALLS ___.
   (cf. *We painted the walls it.)
   b. Anybody can become a bureaucrat, but a doctor one could spend one’s whole life STUDYING to be ___ without ever becoming ___.
   (cf. *Robin wants to be a doctor but I don’t think he’ll ever become it.)
   c. Which countries do you become a citizen of ___ only if you were actually born ___?
   (cf. *Robin thinks the president was born in Argentina, but I know she wasn’t born in it.)

The challenge is to account both for the grammatical examples and the ungrammatical ones.

A perusal of the examples points the general way to an explanation. It is clear that one parameter which influences grammaticality is stress. Stress is related to pragmatics, suggesting that (most of) the examples in question are all well-formed syntactically but some of them are ruled out on pragmatic grounds. This is precisely what Levine, Hukari, and Calcagno (2001: 218 fn 22) suggest as regards the non-NP cases.

This example [How harshly will our treating Robin ___ lead to our being treated ___ ourselves?—YNF] seems to us syntactically impeccable, but it is semantically very odd indeed; we suspect that this oddness is a symptom of why non-NP P-gaps, particularly those involving predicative categories, have struck some investigators as anomalous. The question corresponds to the pseudological translation, For what degree x of harshness will our treating Robin x harshly lead to our being treated x harshly ourselves? The presupposition involved is pragmatically strange, involving as it does the background assumption that, at a particular unique degree of some gradable property, there is an exact reciprocation between action and reaction involving that property. Because P-gaps that involve predicative filler categories, such as [wh-degree] APs, necessarily require that a particular degree of some predicate hold in two different, linked situations, they provide ample opportunity for pragmatic anomaly of this kind.

However, they do not propose an explanation of the anti-pronominal cases.

The anti-pronominal cases are not homogeneous. There are some that are anomalous for the same reason as suggested above for non-NPs. Consider the following from Postal (2001).

(24) a. Nora spent/stayed that week in Bermuda.
   b. Nora spent/*stayed it in Bermuda.
   c. the week that Nora spent/stayed ___ in Bermuda
d. the week that Nora’s planning to spend/*stay ___ in Bermuda made Mike want to spend ___ there

The ungrammaticality of the multiple-gap construction here has nothing to do with pronouns. Rather, it is because Nora and Mike are not spending the same week. In fact, despite Postal’s grammaticality markings, the version with spend is not well-formed either.

Some of the anti-pronominal cases, those in (20), are syntactically ill-formed, but not because these are anti-pronominal contexts. In (20a), for example, the same element is intended as the complement of dye and praise. But these verbs take different kinds of arguments: the relevant argument of dye is a predicative complement (open argument in the terminology of LFG) while the complement of praise is an object, a closed non-predicative complement. An open argument and a closed argument cannot have the same value, since one needs a subject and the other does not. The same thing is true of (20b,c). The reason these are anti-pronominal contexts is related; pronouns cannot stand for predicative NPs. But the anti-pronominal status is not the reason for the ungrammaticality of the multiple-gap constructions.

The more interesting cases are the ones in (21). The clearest of these is (21a). The parasitic gap in this sentence is in a cleft construction. Clefting is a form of focusing. This is why a stressed pronoun is grammatical and an unstressed pronoun is not. Pronouns are typically used for old information (topical, not focal), and therefore are not appropriate in clefts. Contrastive stress allows the pronoun to be used focally. In a multiple-gap construction, only one gap can represent new information: since other gaps are identical to it and thus coreferential with it, they cannot also be new information, and thus must be topical and not focal. Specifically, since a parasitic gap implies the existence of another gap, a parasitic gap cannot appear in a focal position. Therefore, parasitic gaps cannot appear in clefts. The verbs in (21b,c,d) focus their complements, again making them both anti-pronominal and immune to parasitic gaps.

As pointed out by Postal (2001: 227€), it is not only parasitic gaps that are banned from “anti-pronominal” (focus) positions. In some cases, the non-parasitic gap is barred from such a position as well.

(25) a. *Which child did everyone who saw ___p believe it was ___ that the drug had helped ___?
   b. *the kind of soup which everyone who liked ____ said there was ___ on the table
   c. *It was disregard for human rights which the UN’s criticizing ___p indicated that the dictator’s remarks had betrayed ___.
   d. *What your discovering ___p on Tuesday led Tina to remark ___ on Thursday was that apples were toxic.

In these cases the illicit gap is linearly the second gap. As the second gap, it cannot be new information, and thus cannot be focal either. This is true even in non-parasitic multiple-gap sentences.

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13 Of course, this is grammatical without there, in which case it is not a presentational/existential construction.

14 Not all of Postal’s examples involve the second gap, but not all of them involve focal positions either. Again, the set of illicit cases is not homogeneous.
Examples (28a–c) come from Bouma, Malouf and Sag (2001).

As pointed out to me by Mary Dalrymple and Alex Alsina (personal communication), there are some potential counterexamples to the claim that adjunct PPs are always islands. One such set of cases is the following:

(i) a. Where did you order the pegs at?
   b. What do you want to find Homer for?

I conclude from the foregoing that parasitic gaps, and multiple-gap constructions in general, involve neither an NP-only condition nor a ban from anti-pronominal positions. The nature of multiple-gap constructions is such that the existence of another gap, determined either by the other gap preceding the gap in question or by the gap in question being parasitic on another gap, precludes certain gaps from appearing in focal positions. In addition, many of the purported ungrammatical multiple-gap constructions are pragmatically infelicitous, and thus unacceptable, or involve the identification of a non-predicative and a predicative element.

3. Parasitic Gaps 1: Adjunct-internal

While not all multiple-gap constructions involve parasitic gaps, that is, gaps which would not be grammatical without the second gap, it is undoubtedly the case that most examples of multiple-gap constructions that have appeared in the literature are parasitic. More specifically, they usually involve a gap which appears inside an adjunct island. This section will explore those gaps.

In order to understand adjunct-internal parasitic gaps, it is first necessary to understand the nature of the islandhood of adjuncts. As summarized in Falk (2009), the island status of adjuncts is less clear than it first seems. While extraction from adjuncts is sometimes crashingly bad, there are other instances in which it is relatively acceptable.

(27) a. *Which astronaut did you get to the moon [before ___]?
   b. *Which book did you cancel your library card [before reading ___]?
   c. *Which cubicle did you read the file [in ___]? (cf. ✓Which cubicle did you put the file [in ___]? where the PP is an argument)
   d. *Which book did you go to the library [in order to read ___]?

(28) a. Which student is Roger capable of working [independently of ___]?
   b. Which people can Robin run [nearly as fast as ___]?
   c. Who does Kim write letters [more frequently than ___]?
   d. Which book did you go to the library [to read ___]?

As noted in §1.3, I take islands to be primarily the result of extrasyntactic factors, such as the ability to be pragmatically prominent. In the case of adjuncts, the motivation for their islandhood is not directly a matter of pragmatic prominence, but rather the result of the looser connection between a clause and its adjunct. This looser connection makes it more difficult, but not impossible, for an adjunct to be pragmatically prominent. Thus, extractions from adjuncts are, in general, difficult but not impossible. The one case that appears to be categorically unacceptable is extraction from adjuncts which are PPs. Falk (2009) therefore proposes that only PP adjuncts are syntactically designated as islands. Formally:

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15Examples (28a–c) come from Bouma, Malouf and Sag (2001).

16As pointed out to me by Mary Dalrymple and Alex Alsina (personal communication), there are some potential counterexamples to the claim that adjunct PPs are always islands. One such set of cases is the following:
Both of these appear to be idiomatic constructions: *at where* is ungrammatical, and *for what* does not have the same reading as *what…for*.

(ii) a. *At where did you order the pegs? / *You ordered the pegs at where?
b. ??For what do you want to find Homer? / ??You want to find Homer for what?

Another potential counterexample is (iii).

(iii) What language do you want me to write the paper in?

This kind of exception seems to be limited to specialized non-locative uses of *in*. The exceptions exemplified by (i), (ii), and (iii) all seem to be highly lexicalized. It is possible that they involve lexical entries which overrule the specification in the phrase structure rule. I will not pursue the formal consequences of this here. Other potential counterexamples involve elements that may be arguments rather than adjuncts, such as instrumentals:

(iv) What should I write on the whiteboard with ___?
The genitive clitic *doot* does license parasitic gaps, but since it is a relativizer a *wh* construction is arguably involved.

On the other hand, *in situ* *wh* questions, on the other hand, do not. Mooré also has externally-headed relative clauses and *wh*-ex-*situo* questions, both of which license parasitic gaps. It is possible that *in situ* questions are not true *wh* constructions, although further investigation would be necessary to ascertain this.
that heavy-shifted NPs are focal. Rochemont (1978) notes that (36a) can be paraphrased as (36b) but not as (36c).

(36) a. John wants to give to Mary a gift of inestimable value.
   b. It’s a gift of inestimable value that John wants to give to Mary.
   c. It’s Mary that John wants to give a gift of inestimable value.

He also notes that focal stress improves sentences in which the shifted DP is not heavy.\(^{19}\)

(37) a. The preacher sent off to war HIS ONLY SON.
   b. Hitler persuaded to join forces with him, MUSSOLINI.

It is plausible that such NPs bear the focus function at f-structure by virtue of their final position. Similarly, pronouns, by virtue of referring to old information, are at least potentially topical; it is plausible that, at least in some languages, pronominal clitics can bear the topic function syntactically.\(^{20}\) I propose, then, that what causes the islandhood of (PP) adjuncts not to obtain is not a gap but the presence of some other element which bears a grammaticized discourse function. Formally:

\[
(38) \quad \text{VP} \rightarrow \text{VP} \uparrow=\downarrow \quad \text{PP} \downarrow \in (\uparrow \text{ADJ}) \quad -(\text{DF}(\uparrow \text{GF}^+)) \Rightarrow (\downarrow \text{WHPATH}) \neq [-T]
\]

This results in the following f-structure for (1a), repeated here:

(39) a. Which articles did John file [without reading [ ] ]?
   b. \[ \begin{array}{c}
   \text{FOCUS} \quad f \\
   \text{WHPATH} \quad [+T] \\
   \text{SUBJ} \quad \text{“John”} \\
   \text{TENSE} \quad \text{PAST} \\
   \text{PRED} \quad \text{‘file }\langle (\uparrow \text{SUBJ})(\uparrow \text{OBJ})\rangle\text{’} \\
   \text{OBJ} \quad f \\
   \text{ADJ} \quad \left\{ \begin{array}{c}
   \text{WHPATH} \quad [-T] \\
   \text{PRED} \quad \text{‘without }\langle (\uparrow \text{OBJ})\rangle\text{’} \\
   \text{OBJ} \quad f \\
   \end{array} \right. \\
   \end{array} \]

\[ f = \text{“which articles”} \]

\(^{19}\) I am using capital letters to indicate focal stress.

\(^{20}\) Campos also reports that Spanish null objects can license parasitic gaps. Following the usual analysis in the Principles and Parameters tradition, he proposes that null objects are empty operators that undergo wh movement. The equivalent in LFG would be to assign them a grammaticized discourse function. They are thus assimilated to the same analysis.
The bolded \texttt{WHPATH} feature is the one that would normally be blocked by the annotation on the PP adjunct in the phrase structure rule. However, in this case, (↑OBJ), an instance of (↑GF), has the value ["which articles"] (represented as $f$), and an outward path from ["which articles"] through a discourse function (\texttt{FOCUS} in this case) exists. Since the condition that such a path not exist is not met, the constraint blocking [\texttt{WHPATH} [−T]] does not apply.

There is evidence from the dialect of Spanish described by Campos (1991)\textsuperscript{21} that linking the parasitic gap to the presence of a discourse function is correct. According to Campos, the ability of Spanish object clitics to license parasitic gaps is dependent on their being topical; non-topic objects cannot. He claims that object clitics which are coreferential with a higher \texttt{SUBJ} are not themselves topical, and that they do not license parasitic gaps.

\begin{equation}
\text{(40) *Este artículo muestra que lo archivé antes de leer $\text{---p}$}
\end{equation}

\begin{equation}
\text{this article shows that it.ACC I. filed before of to. read $\text{---p}$}
\end{equation}

\begin{equation}
\text{‘This article shows that I filed it before reading (it).’}
\end{equation}

Similarly, Campos (1991) shows that topical empty subjects in Spanish license parasitic gaps, while non-topical ones do not.

\begin{equation}
\text{(41) a. A: ¿Qué pasó con el avión?}
\end{equation}

\begin{equation}
\text{what happened with the plane}
\end{equation}

\begin{equation}
\text{B: Explotó antes de hacer revisar $\text{---p}$}
\end{equation}

\begin{equation}
\text{it.exploded before of to.make to.check $\text{---p}$}
\end{equation}

\begin{equation}
\text{‘What happened with the plane? It exploded before they checked (it).’}
\end{equation}

\begin{equation}
\text{b. *Los restos del avión muestran que explotó antes de hacer revisar $\text{---p}$}
\end{equation}

\begin{equation}
\text{The remains of.the plane show that it.exploded before of to.make to.check $\text{---p}$}
\end{equation}

\begin{equation}
\text{‘The remains of the plane show that it exploded before they checked (it).’}
\end{equation}

In some languages, the adjunct kind of islandhood is extended to more loosely connected arguments, such as obliques. For example, in French an NP embedded in a PP argument is an island (Tellier 1999: 115).

\begin{equation}
\text{(42) a. *un hombre dont vous avez nui [à la réputation ___]}
\end{equation}

\begin{equation}
\text{a man of.whom you have detracted to the reputation}
\end{equation}

\begin{equation}
\text{‘a man who you detracted from the reputation of’}
\end{equation}

\begin{equation}
\text{b. *des gens dont vous venez de parler [avec le fils ___]}
\end{equation}

\begin{equation}
\text{some people of.whom you come from to.talk with the son}
\end{equation}

\begin{equation}
\text{‘people whose son you just talked with’}
\end{equation}

Thus, in addition to parasitic gaps being licensed in adjuncts (43a), they are also licensed in these NPs (43b). Naturally a double-gap construction is also possible when both gap positions are independently allowed (43c).

\textsuperscript{21}Not all speakers of Spanish share these intuitions (Alex Alsina, persona communication).
Falk (2007) demonstrates that such an analysis of contraction is superior to others that have been proposed, including that of Pullum (1997).

(43) a. Voilà quelqu’un dont les opinions ___ sont clairement exprimées
   dans les discours ___p.
   ‘Here is someone whose opinions are clearly expressed in [his] speeches.’

b. la fille dont le père ___ ne parle plus avec la mère ___p
   ‘the girl whose father no longer speaks with the mother’

c. C’est un musicien dont le talent ___ dépasse la popularité ___.
   ‘This is a musician whose talent exceeds [his] popularity.’

The analysis naturally extends to these cases.

An alternative LFG account of parasitic gaps in adjuncts has been proposed by Asudeh (2004). Contrary to the conventional view, Asudeh views the phenomenon as essentially semantic in nature. If this were correct, there would be no empty category in the constituent structure position of the parasitic gap. Following Falk (2007), I assume that an empty category blocks cliticization rules, including (but not limited to) wanna contraction.22 The following suggests that an empty category is present. Although the parasitic gap is less good than most, probably as a result of the extra processing load caused by the extra layer of embedding, the contracted version is decidedly worse.

(44) a. Which student did you fail ___ [after saying that you want her to take the course again]?

b. ?Which student did you fail ___ [after saying that you want ___p to take the course again]?

I take this to be evidence that the phenomenon of parasitic gaps in adjuncts is syntactic in nature.

4. Parasitic Gaps 2: Subject-internal

Another island in which parasitic gaps appear is subject islands (examples from Engdahl 1983, Gazdar, Klein, Pullum, and Sag 1984).

(45) a. Which boy did Mary’s talking to ___p bother ___ most?

b. Kim wondered which authors reviewers of ___p always detested ___.

Falk (2009) attributes subject islands to a different source than adjunct islands. Following up on an idea from Kuno (1973) and Grosu (1981), Falk suggests that the islandhood of subjects is

22Falk (2007) demonstrates that such an analysis of contraction is superior to others that have been proposed, including that of Pullum (1997).
the result of a constraint designed to make processing easier by not allowing clause-internal incomplete constituents. Formally, this is expressed in the syntax in the same way as adjunct islands.\textsuperscript{23}

\begin{equation}
\text{IP} \rightarrow \text{NP} \quad \text{I'}
\begin{align*}
(\uparrow \text{SUBJ}) &= \downarrow \\
(\downarrow \text{WHPATH}) &\neq [-T]
\end{align*}
\end{equation}

Given that the licensing of parasitic gaps in adjuncts was linked to the cause of the islandhood of adjuncts, and that the hypothesized cause of the islandhood of subjects is different, one might expect that the status of parasitic gaps in subjects is different.

It transpires that there is empirical evidence that parasitic gaps in subject islands are different from those in adjunct islands. One of the features of parasitic gaps in adjunct islands is that, aside from the islandhood of the adjunct itself, all island constraints are obeyed. The analysis given above for parasitic gaps in adjuncts accounts for this: the only islandhood that is affected is the islandhood of the adjunct. However, parasitic gaps in subject islands can be contained in relative clauses within the subjects. Engdahl (1983: 17) gives examples in both Swedish and English:\textsuperscript{24}

\begin{enumerate}
\item[(47)]
\begin{enumerate}
\item This is the type of book that [no one [who has read ___]] would give ___ to his mother.
\item Here is the boy who [everyone [who has met ___]] thinks ___ is clever.
\end{enumerate}
\item[(48)]
\begin{enumerate}
\item Kalle är en kille som [ingen [som träffat ___]] kan tåla ___.
\begin{align*}
\text{Kalle is a guy REL no.one REL met can endure}\end{align*}
\item Fattig vill [ingen [som någonsin varit ___]] bli ___ igen.
\begin{align*}
\text{Poor \ REL no.one \ REL ever \ REL was \ REL become \ \ REL again}\end{align*}
\end{enumerate}
\end{enumerate}

Not imposing the islandhood of the subject would not permit a parasitic gap in the relative clause, since relative clauses are themselves islands.

The distinction between parasitic gaps in adjuncts and parasitic gaps in subjects was raised, in a different context, as early as Engdahl (1983: 17f), where it was noted that parasitic gaps in adjuncts can be replaced by pronouns, while those in subjects cannot. Note the following: the examples from (1) with the parasitic gaps replaced by pronouns.

\begin{enumerate}
\item[(49)]
\begin{enumerate}
\item Which articles did John file ___ without reading them?
\item This is the kind of food you must cook ___ before you eat it.
\item *Which boy did Mary’s talking to him bother ___ most?
\end{enumerate}
\end{enumerate}

\textsuperscript{23}Under the standard LFG account (Kroeger 1993), there is a non-X category S distinct from IP. The subject positions in the expansions of both IP and S will carry the same annotations.

\textsuperscript{24}Engdahl notes that the parasitic gap is possible only when the subject NP is indefinite. However, as she and others have pointed out, factors like definiteness and finiteness play a general role in the parasitic gap construction. I will assume here, without argument, that these effects are not syntactic.
Engdahl suggests, plausibly, that this distinction in what she calls obligatoriness of the parasitic gap is a consequence of the weak crossover effect. Following up on this obligatoriness distinction, Engdahl (2001: 144) observes:

One question that remains to be resolved is whether we call parasitic gaps a uniform phenomenon. Engdahl (1983) made a distinction between obligatory parasitic gaps preceding the real gap (essentially those inside subjects) and optional parasitic gaps following the real gap (essentially those in adjuncts). This distinction reflected judgments that it is harder to replace gaps inside subjects with proforms than gaps inside adjuncts. [fn omitted] The same difference showed up in the extended survey I conducted to gather data for this article. If a person gave different judgments on pairs of examples, it was always in the same direction: parasitic gaps inside subjects were more acceptable than parasitic gaps inside adjuncts.

I agree with Engdahl’s suspicion that it is not a uniform phenomenon.

If both Falk (2009)’s account of subject islands and Engdahl (1983)’s account of the impossibility of pronouns instead of parasitic gaps in subject islands are correct, the crucial point is the linear order of subjects. The subject island combined with weak crossover create a situation where an element within the subject cannot be coreferential with a wh element. I propose that the phenomenon of parasitic gaps in subject islands is a way to allow such coreference. Rather than not imposing islandhood, as in the case of adjunct islands, I propose that what is involved in the case of subject islands is a separate wh dependency. Under this proposal, the f-structure of (1c), repeated here, is as follows:

\[
\begin{align*}
\text{(50) a. } & \text{ Which boy did [Mary’s talking to \_\_\_] bother \_\_ most?} \\
\text{b. } & \begin{array}{l}
\text{FOCUS} \\
\text{WHPATH} \\
\text{+T} \\
\text{SUBJ} \\
\text{TENSE} \\
\text{PRED} \\
\text{OBJ} \\
\text{ADJ} \\
\text{\_\_}\end{array} \\
& = \text{Goal}
\end{align*}
\]

Formally, this is achieved by changing the annotation on the subject term in the IP expansion:

\[
\begin{array}{l}
\text{FOCUS} \\
\text{WHPATH} \\
\text{+T} \\
\text{SUBJ} \\
\text{PRED} \\
\text{OBJ} \\
\text{ADJ} \\
\text{\_\_}\end{array} \\
= \text{Goal}
\]

25While this may seem contrived, the fact is that language has constructions that extend the range of what can be expressed, such as pied-piping, which allows sentences that would otherwise be ruled out by island constraints.
In this rule, %ORIG is a local name for an element bearing a grammaticized discourse function either in the same clause or in a higher clause. In the optional line of the NP annotations, the condition checks if this element also bears some argument function either in the same clause or in a lower clause. If it does, then either the subject itself or an adjunct contained within the subject (such as a relative clause) can contain a copy of the original discourse function. In the current example, %ORIG is [“which boy”], which bears the grammaticized discourse function FOCUS in the same clause as the subject. The same element also bears the OBJ function in the same clause, thus licensing the FOCUS in the SUBJ.

5. Conclusion
TBA

References


