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RESEARCH

Revisiting a null pronominal account for parasitic gaps in Japanese

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This paper investigates empty categories in Japanese that show behavior that is apparently similar to parasitic gaps in that they allow bound readings only with movement of the wh-phrase. This obligatory movement, however, is mysterious considering the island-insensitivity of Japanese. The primary aim of this paper is to get a better understanding of the nature of this empty category in Japanese by referring to more general discussions on parasitic gaps in other languages and also exploiting the experimental data. Given the contrasting behavior of parasitic gaps in Japanese and the results of two experiments, I propose that parasitic gaps in Japanese be analyzed as *pro*. On top of that, I will derive obligatory movement from the semantics of questions which allows us to interpret wh-phrases in situ and also show how differences between English and Japanese emerge from different nature of parasitic gaps in each language.

Keywords: parasitic gaps; Japanese; null pronouns; obligatory movement; wh-in-situ

1 Introduction

In this paper, I will investigate some gaps in Japanese that seem to behave similarly to parasitic gaps observed in English or other languages in some respects. In Engdahl (1983: 5), a parasitic gap is defined as a gap that is dependent on the existence of another gap. (1a–b) show that the empty category inside an island can never be bound without another gap (Engdahl 1983: 11).[1] To get the intended bound reading, overt pronouns must occur, as shown in (1), which is from Engdahl (1983: 12).

(1) a. John filed a bunch of articles$_i$ [without reading *e_i/✓them$_i$].
b. [Mary's talking to *e_i/✓him$_i$] bothered John$_i$ a lot.

When there is a legitimate gap in another place, suddenly the empty category can be bound by the wh-phrase which also binds the real gap (Engdahl 1983).

(2) Which article did John file _ without reading _?

Looking at the parallel constructions in Japanese, which allows *pro* in various kinds of places, we get different results. For example, the following sentences in Japanese that correspond to (1) are perfectly grammatical and have bound readings without overt pronouns.

(3) a. Taroo-wa syorui$_i$-o [*pro*$_i$ yom-azuni] tozita.
Taro-TOP document-ACC read-without filed
'Taro filed the document without reading it.'

[1] Throughout this paper, syntactic islands are indicated by square brackets.

b. [Hanako-ga *pro*$_i$ mitsumeru koto]-wa Taroo$_i$-o nayamaseta.
Hanako-NOM staring at NL-TOP Taro-ACC bothered
'Hanako's staring at him bothered Taro.'

The existence of *pro* in Japanese makes it difficult for us to identify the empty category inside the island in the parasitic gap construction. The empty category could be *pro* as well as a trace. However, a close examination of the data suggests that there are cases in which it seems that we cannot treat all empty categories in the same way: there are some instances in which the bound reading cannot be obtained. To begin with, (4) shows that overt extraction from the subject is not allowed in Japanese just as in English, showing the subject DP is a syntactic island in Japanese, too. In contrast to (4), (5) is grammatical. In (5), the wh-phrase bears the accusative case, not the dative, which is required by the verb *au* 'see', and therefore we can tell that this wh-phrase is extracted from the object position of the matrix clause.

(4) *[Hazimete ***e***$_i$ atta hito]-ga Hanako-o kenasita no-wa
for-the-first-time saw person-NOM Hanako-ACC criticized NL-TOP
dare-ni$_i$ desu ka?
who-DAT COP Q
'Who was it that a person who saw *t* for the first time criticized Hanako?'

(5) [Hazimete ***e***$_i$ atta hito]-ga ***t***$_i$ kenasita no-wa **dare-o**$_i$ desu ka?
for-the-first-time saw person-NOM criticized NL-TOP **who-ACC** COP Q
'Who was it that a person who saw *pg* for the first time criticized *t*?'

Looking at the grammatical example (5) more closely, we can find there are two gaps: one is inside the subject relative clause island, and the other is in the object position of the matrix clause. It is possible that the gap inside the island is *pro*, because it can refer to some contextually salient entity. However, this is not the only reading that (5) has. In addition to such a reading, this sentence has a reading under which a single wh-phrase binds both of the gaps. Note that this example is a cleft, which is supposed to involve overt A'-movement in Japanese according to Hoji (1989).[2]

Now comparing (5) to (6), we encounter a problem: (6) does not have the bound reading that (5) has. The difference between (5) and (6) is whether there is overt movement of the wh-phrase or not. In (5), a wh-phrase is overtly moved whereas it is in situ in (6).[3]

(6) *[Hazimete ***e***$_i$ atta hito]-ga **dare-o**$_i$ kenasimasita ka?
for-the-first-time saw person-NOM **who-ACC** criticized Q
'Who$_i$ did a person who saw *pg* for the first time criticize *t*?'

[2] Japanese has two types of cleft. It has been pointed out that only one of them, which is exemplified by (5) involves movement (Hoji 1989). The other type of cleft is different in that the focused element does not have any Case particle, as shown below. With this type of cleft, Hoji (1987a) claims that the focused phrase is base-generated, and there is a *pro* in a gap because no subjacency effect is observed with this type of cleft.

(i) [Hazimete ***pro***$_i$ atta hito]-ga ***pro***$_i$ kenasita no-wa **dare**$_i$ desu ka?
for-the-first-time saw person-NOM criticized NL-TOP **who** COP Q
'Who was it that a person who saw *pg* for the first time criticized *t*?'

This Case-less cleft is also called pseudo-cleft (Hiraiwa & Ishihara 2002: 36). Throughout this paper, cleft only refers to those with Case-marked focus phrases, excluding pseudo-cleft.

[3] Throughout this paper, the ungrammaticality of the parasitic gap sentence is marked under the bound reading. Under the reading in which the empty category refers to some contextually salient entity, the sentence is grammatical.

The contrast between (5) and (6) suggests the following: an empty category in a syntactic island can be bound by a wh-phrase when it is moved, but the bound reading cannot be obtained when the wh-phrase is in situ. Remember that the empty category in the syntactic island can refer to the same entity as the DP in the object position of the matrix clause without any problem in (3). Given that and also considering Japanese questions are island insensitive as shown in (7), it is puzzling that the bound reading is impossible in (6) compared to (3).

(7) Taro-wa [**dare-ga** tabetagatta kara] udon-o tukurimasita ka?
Taro-TOP **who-NOM** want to eat because udon-ACC made Q
'For which person *x*, Taro made udon because *x* wanted to eat?'

If the empty elements in the syntactic island are *pro* in both (3) and (6), we would not expect any difference between them. Therefore, we need to consider why the sentences that have a wh-phrase and an empty category in the syntactic island show an odd behavior concerning the bound reading.

In fact, this paradigm in Japanese looks similar to parasitic gap cases that have been reported in English and other languages. In particular, it has been known that the wh-phrase in situ cannot license a parasitic gap. That is, overt A'-movement is obligatory to get a bound reading as illustrated by the contrast between (8a) and (8b).

(8) Engdahl (1983: 5,14)
a. Which articles$_i$ did John file t_i without pg_i?
b. *I forget who filed which articles$_i$ without reading t_i.

In all, the empty category in (5) apparently looks like a parasitic gap in that it seems to show one of the fundamental characteristics of parasitic gap constructions discussed in Engdahl (1983: 14): a gap in a syntactic island can be licensed by a concomitant legitimate A'-movement. So Japanese apparently has an empty category which shows a surface resemblance to a parasitic gap observed in other languages. This is why Takahashi (2006) and Abe (2011) analyze this construction by comparing it with parasitic gap constructions, rather than considering the gap inside the island as being *pro* as Yoshimura (1992) did. However, as mentioned above, this obligatory movement of the wh-phrase is puzzling at the same time, considering that Japanese is a wh-in-situ language.

The primary goal of this paper is to give a better analysis to this kind of construction in Japanese, solving the puzzle I have just introduced. In order to do so, I will investigate Japanese parasitic gap constructions more carefully by referring to peculiar aspects of parasitic gaps in other languages reported in the literature so as to understand exactly what these empty categories are. Even though Japanese parasitic gap constructions are superficially similar to those observed in English or other languages, what we have just observed is merely a subset of the unique properties of parasitic gap constructions. Furthermore, in this paper I would like to point out that the analyses in the literature are not necessarily supported by the empirical data (i.e. the intuition of native speakers). Therefore, I will exploit the results of experiments I conducted to get a better understanding of this construction and to support my theoretical analysis.

The rest of this paper is structured as follows: In section 2, I will review various characteristics of parasitic gaps in English and other languages, and see if Japanese parasitic gap constructions exhibit similar behavior. I also pay a special attention to the two characteristics discussed in the literature of Japanese parasitic gaps: reconstruction effects and category restriction. In section 3, I propose that all of Japanese parasitic gaps are *pro* in

line with Yoshimura (1992), and provide some pieces of evidence that support my claim. In section 4, I will explain why movement is obligatory to license the bound reading. Specifically, I argue that this is motivated by the semantic composition of questions in Japanese, which allows us to interpret wh-phrases in situ. Section 5 is conclusions.

2 What are parasitic gaps?

In this section, I will review the distinctive characteristics of parasitic gaps[4] to identify what needs explaining in the analysis of this construction. I will pay special attention to the category restrictions on parasitic gaps and reconstruction effects later in this section since they are unique and important properties of Japanese parasitic gaps discussed in the literature.

2.1 General characteristics of parasitic gaps

2.1.1 A parasitic gap is licensed only at S-structure

As mentioned in the introduction, in order for a parasitic gap to be licensed, movement should be overt. In other words, a wh-phrase in situ cannot license a parasitic gap, illustrated by the ungrammaticality of (9).

(9) *I forget who filed which$_i$ articles without reading *pg$_i$*.

We have seen a wh-phrase in situ cannot license a parasitic gap in Japanese either, as shown in (10). This observation was first made in Hoji (1987b) and subsequently discussed in Yoshimura (1992) and brought up again by Takahashi (2006). This suggests that LF movement cannot license parasitic gaps in Japanese.

(10) *[Hazimete ***pg**$_i$ au hito]-ga **dare-o**$_i$ kenasimasu ka?
for-the-first-time see person-NOM **who-ACC** criticize Q
'Who$_i$ do people who see *pg* for the first time criticize *t*?'

Note that in the discussion above, there is a background assumption: there is LF movement in Japanese like in English. However, there is evidence that shows that the wh-phrase should be interpreted in-situ in Japanese, which is called radical reconstruction by Saito (1989). For example, while (11) contains the wh-phrase inside the Complex NP island, this sentence can still be interpreted as a matrix question.

(11) Taro-wa [dare-ga tukutta] udon-o tabemasita ka?
Taro-TOP who-NOM made udon-ACC ate Q
'For which *x*, Taro ate udon such that *x* made it?' [Complex NP]

(11) shows that Japanese is a wh-in-situ language — a wh-phrase can appear inside an island, and the sentence can be interpreted as a matrix question. However, now it is puzzling why wh-phrases in-situ cannot license parasitic gaps in Japanese, as shown in (10), even though this characteristic makes us think Japanese parasitic gaps look like those in English.

2.1.2 Parasitic gaps are licensed only by A'-movement

As Engdahl (1983: 12) observes, parasitic gaps can also be licensed by another kind of A'-movement such as tough movement (12):[5]

[4] For a more detailed review on this topic, see Culicover (2001).

[5] Heavy NP shift also can license parasitic gaps in English. However, whether Heavy NP shift does involve movement of a heavy NP is a controversial topic. I will not go into exactly how heavy NP shift is derived in English, since there is no parallel phenomenon in Japanese and it is beyond the scope of this paper.

(12) These papers$_i$ were hard for us to file t_i [without reading pg_i].

By contrast, A-movement including passive (13a) and subject raising (13b) cannot license parasitic gaps in English (Engdahl 1983: 13).

(13) a. *John$_i$ was killed t_i [by a tree falling on pg_i].
b. *Mary$_i$ seemed t_i to [disapprove of John's talking to pg_i].

In Japanese, movement that licenses a bound reading does not have to be A'-movement. Unlike English, A-movement can also license the bound reading. In the following, I review several kinds of movements observed in Japanese regarding whether they can license a parasitic gap or not.

Besides a cleft, which I introduced in the previous section, clause-internal scrambling also makes the intended bound reading possible, as in (14) (Saito 1992; Yoshimura 1992). Note that in Saito's analysis, Japanese clause internal scrambling can be either A-movement or A'-movement.

(14) **Dare-o**$_i$ [hazimete ***pg***$_i$ atta hito]-ga t_i kenasita no desu ka?
who-ACC for-the-first-time saw person-NOM criticize NL COP Q
'Who$_i$ did a person who saw pg_i for the first time criticize *t*?'

On the other hand, long-distance scrambling is unambiguously A'-movement, according to Saito (1992). (15b) is a sentence derived from (15a). Here the wh-object is scrambled out of the embedded clause, and this sentence is grammatical under the intended interpretation. On the other hand, when there is an another gap inside the subject (i.e. a parasitic gap), as in (15c), it sounds a little degraded compared to (15b), but it is not completely ungrammatical, either.[6] However, this may be just because the long distance dependency makes parsing difficult, for it seems possible to get the intended reading by putting a pause between *Masao-ga* 'Masao-NOM' and *hazimete* 'for the first time'. It has been suggested that it is possible to rescue sentences with invalid syntactic scrambling by employing a particular prosodic pattern. In this paper, I do not discuss the exact status of (15c) since phonological scrambling is beyond the scope of this paper, and rather I only concentrate on syntactic scrambling. For further discussion of syntactic scrambling and phonological scrambling, see Agbayani et al (2015).[7]

(15) a. [Masao-ga [[hazimete Hanako-ni atta hito]-ga dare-o
Masao-NOM for the first time Hanako-DAT saw person-NOM who-ACC
kenasita ka] itta (koto)].
criticized Q said NL
'(That) Masao told who$_i$ the person that saw Hanako for the first time criticized t_i'

[6] An anonymous reviewer mentioned that (15c) sounded ungrammatical to them. They also reported (15b) was degraded, too. I agree that this sentence is marked and therefore a little hard to parse. In fact, as the reviewer also pointed it out, Saito (1992: (33b)), an example that is parallel to (15b) is marked as?. The exact status of this long-distance movement needs further discussion, but a crucial contrast to be noted in this paper is a sentence with a long distance movement without an intermediate A-movement is ill-formed, as discussed in Section 3.3.

[7] Eventually we need to say A'-movement in this case involves A-movement as an intermediate movement. The intermediate movement needs to be assumed in order to remedy WCO violation and make the bound reading available. See a relevant discussion in Section 3.3.

b. **Dare-o**$_i$ [Masao-ga [[hazimete Hanako-ni atta hito]-ga t_i
who-ACC Masao-NOM for the first time Hanako-DAT saw person-NOM
kenasita] ka itta] (koto).
criticized Q said NL
'(That) Masao told who$_i$ the person that saw Hanako for the first time criticized t_i'

c. ? **Dare-o**$_i$ [Masao-ga [[hazimete ***pg***$_i$ atta hito]-ga t_i kenasita]
who-ACC Masao-NOM for the first time saw person-NOM criticized
ka itta] (koto).
Q said NL
Intended: '(That) Masao told who$_i$ the person that saw *pg*$_i$ for the first time criticized t_i.'

Another kind of A'-movement, namely tough-movement, seems to be able to license the bound reading as well. According to Inoue (2004), Japanese "tough" sentences involve A'-movement, just as their English counterparts do. In (16), a *ga*-marked object that is moved out of its base-generated position to an A'-position (a focus position, in this case) licenses the bound reading.[8]

(16) **Dono koosiki-ga**$_i$ [***pg***$_i$ rikaise-zuni-wa] t_i tukai-nikui desu ka?
which equation-NOM understanding-without-TOP use-hard COP Q
'Which equation is hard to use without understanding?'

We have seen that most types of A'-movement can license parasitic gaps in Japanese, just as in English. However, unlike English, A-movement such as passive (17) can also license the bound reading in Japanese.

(17) **Dare-ga**$_i$ [***pg***$_i$ iiyoru dansei-ni-yotte] t_i korosaremasita ka?
who-NOM advancing man-DAT-by be killed Q
'Who was killed by a man advancing to her?'

Just involving movement is not sufficient to license a bound reading, however. In the following sentence in (18), even though the object wh-phrase is supposed to move from the subject position of the small clause to the object position of the matrix clause (Kuno 1976), the bound reading is still hard to get. In the case of (18), adding clause-internal scrambling is necessary to make the bound reading possible (19).

(18) *[Hazimete ***pg***$_i$ atta] hito-ga **dare**$_i$**-o** orokanimo t_i baka da to
for-the-first-time met person-NOM who-ACC stupidly fool COP COMP
omotta no?
thought Q
'Who$_i$ did the person [who met *pg*$_i$ for the first time] stupidly think t_i fool?

(19) **Dare-o**$_i$ [hazimete ***pg***$_i$ atta] hito-ga t_i orokanimo t_i baka da
who-ACC for-the-first-time met person-NOM stupidly fool COP
to omotta no?
COMP thought Q

[8] I feel the example (16) is degraded when the adjunct phrases lack *wa*. Intuitively, the *wa* used in the adjunct phrase is not a thematic topic marker but a contrastive topic marker, but I do not have any formal explanation of what the syntactic contribution of *wa* is.

So we can conclude the bound reading is available as long as the wh-phrase c-commands the two gaps. This also implies that the anti-c-command condition does not hold in Japanese, and that is indeed the case. Unlike English, we do not get ungrammaticality even when a real gap c-commands a parasitic gap, as shown by the contrast between (20) and (21).[9]

(20) Engdahl (1983: 20)
a. *Which articles *t* got filed by John without him reading *pg*?
b. *Who *t* sent a picture of *pg*?

(21) a. ***t***$_i$ Hanako-ni [Taroo-ga ***pg***$_i$ sagasu mae-ni] mitukatta no-wa
Hanako-DAT Taro-NOM look for before got found NL-TOP
dono gakusee-ga$_i$ desu ka?
which student-NOM COP Q
'Which student$_i$ was it $_i$ got found by Hanako before Taro looked for *pg*$_i$?'

b. **Dono gakusee-ga**$_i$ Hanako-ni [Taroo-ga ***pg***$_i$ sagasu mae-ni]
which student-NOM Hanako-DAT Taro-NOM look for before
mitukatta no?
got found Q
'Which student got found by Hanako before Taro looked for *t*?'

2.1.3 The parasitic gap is island-sensitive

As pointed out by Kayne (1983), English parasitic gaps are said to be island-sensitive, suggesting that parasitic gaps are the result of movement. Compared to (22a), the parasitic gap in (22b) is relatively unacceptable, because it is contained in a subject relative clause island that is embedded in an adjunct island.

(22) Kayne (1983: 224)
a. ?the books$_i$ you should read t_i [before it becomes difficult to talk about *pg*$_i$]
b. *the books$_i$ you read t_i [before [talking about *pg*$_i$] becomes difficult]

By contrast, the Japanese counterparts do not seem to show this effect. As reported in Yoshimura (1992: 31), Saito (1992: 72) and Takahashi (2006: 10), Japanese parasitic gaps can be licensed even when they are embedded inside more than one island.

(23) **Dono hon-o**$_i$ Masao-wa [Hanako-ga [***pg***$_i$ kaita hito]-ni au maeni]
which book-ACC Masao-TOP Hanako-NOM wrote person-DAT see before
t$_i$ yonda no?
read Q
'Which book$_i$ did Masao read t_i before Hanako saw the person who wrote *pg*$_i$?'

An experiment was carried out to confirm whether the judgment is shared by non-linguists. In the experiment shown below, I controlled the complexity of the items by including the sentences where proper nouns filled the parasitic gap positions. The question was if there was a contrast in acceptability between (24) and (25).

[9] Note also that in (21b) the wh-phrase is apparently in-situ, which contrasts with the case with an object wh-phrase. Ultimately, I assume there is movement of the subject in (21b). That is, there is vacuous scrambling of the subject. As a result, there will be a trace left, and we can bind the trace and a *pro* in the adjunct by a single lambda operator. Then the interpretation is computed just in the same way as the case where the object is a real gap (see (75)).

(24) Examples with two gaps and scrambled wh-phrases

a. **Dare-o**$_i$ [hazimete ***pg***$_i$ atta hito-ga] t_i kenasita no?
who-ACC for-the-first-time saw person-NOM criticized Q
'Who$_i$ did the person who saw *pg*$_i$ for the first time criticize t_i?'

b. **Dare-o** [[Hanako-ga hazimete ***pg*** atta toiu uwasa]-o kiita hito]-ga *t* kenasita no?
who-ACC Hanako-NOM for the first time saw COMP rumor-ACC heard person-NOM criticized Q
'Who$_i$ did the person who heard the rumor that Hanako saw *pg*$_i$ for the first time criticize t_i?'

(25) Controls (parasitic gap positions are filled with proper nouns)

a. **Dare-o**$_i$ [hazimete **Taro**-ni atta hito-ga] t_i kenasita no?
who-ACC for-the-first-time Taro saw person-NOM criticized Q
'Who$_i$ did the person who saw Taro for the first time criticize t_i?'

b. **Dare-o** [[Hanako-ga hazimete **Taro**-ni atta toiu uwasa]-wo kiita hito]-ga *t* kenasita no?
who-ACC$_i$ Hanako-NOM for the first time Taro-DAT saw that rumor-ACC heard person-NOM criticized Q
'Who$_i$ did the person who heard the rumor that Hanako saw Taro for the first time criticize t_i?'

32 native speakers of Japanese joined this experiment online. The task was a 7-point scale acceptability judgment. There were 16 items and 34 fillers. As for the parasitic gap examples, the sentences were shown with a possible answer, and participants were asked to judge the acceptability of the question sentence. Therefore, technically speaking, the acceptability of parasitic gap sentences is not the acceptability of the sentence per se, but the judgment was about how acceptable a question was given an answer that forces the bound reading.[10]

The results of acceptability judgments are summarized in Table 1 and Figure 1. The results confirmed that parasitic gaps in Japanese are island insensitive. There was a main effect of islands ($p < 0.001$), which showed participants found sentences with two islands less acceptable overall. On the other hand, there was no main effect of the appearance of parasitic gaps, and there was no interaction effect between two factors, either.[11]

If parasitic gaps in Japanese were island sensitive, sentences with parasitic gaps and two island boundaries would have been judged least acceptable. That is, we would get results like those in Figure 2, which do show the interaction effect of two factors.

2.1.4 Case-matching effect

In languages which have rich Case declensions, it is reported that the case of two gaps must match in some way. For example, (26) is ungrammatical because of Case-mismatch (Kiss 1985). Here, a real trace bears the nominative case, while the parasitic gap is supposed to be accusative.[12]

(26) *Hungarian*

*Milyan **iratok**$_i$ vesztek el ***t***$_i$ [mielőtt elovastál volna ***pg***$_i$]?
what **papers** got lost away before you had read
'What papers were lost before you had read?'

[10] I added this complication just because in some cases it was possible for participants to interpret a parasitic gap referring to other arguments in a sentence.

[11] The same result was obtained with z-score ratings.

[12] This is not a whole picture. Even when the case of the real gap and that of the parasitic gap do not match, the sentence can be saved if the real gap has the same case as the parasitic gap in the course of the derivation.

Table 1: Mean and standard deviation (in parenthesis) of ratings of Experiment 2.

1 island, PG	1 island, DP	2 islands, PG	2 islands, DP
4.13 (1.97)	4.12 (2.05)	3.25 (1.82)	3.55 (1.96)

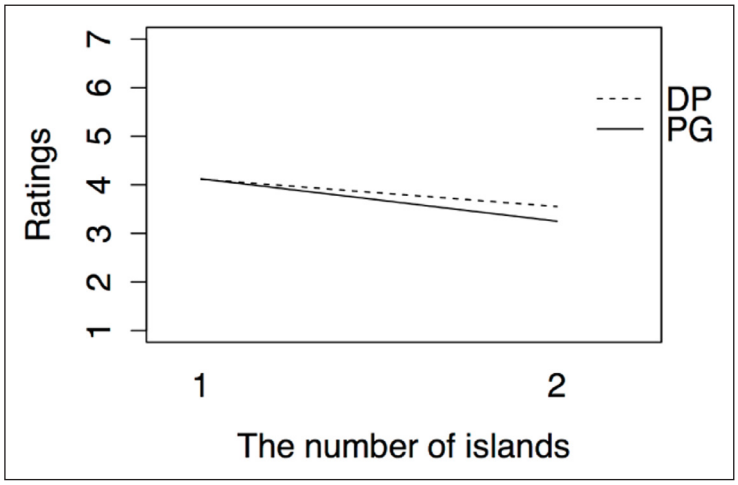


Figure 1: The results of acceptability judgement.

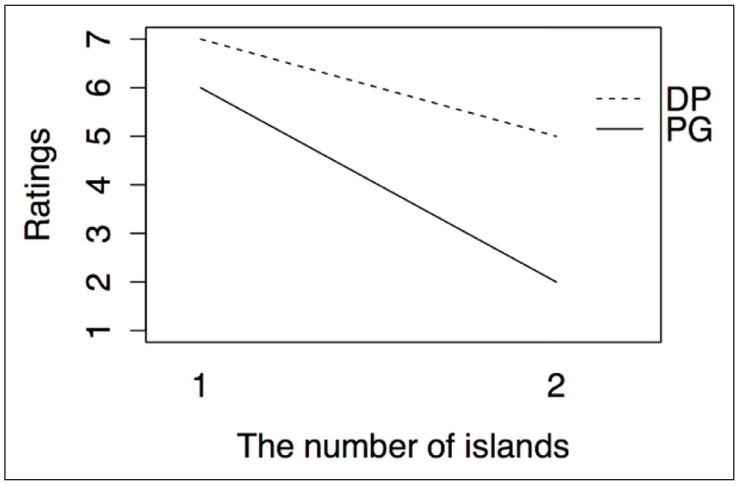


Figure 2: An imaginary plot with an interaction effect.

On the other hand, Franks (1992) reports that the morphological case mismatching can cause ungrammaticality in Russian, as illustrated in (27).

(27) *Russian*

a. mal'čik, ***kotoromu/*kotogoro**$_i$ Maša davala den'gi t_i do togo,
boy who.DAT/who.GEN Masha.NOM gave money until
kak (ona) stala izbegat' ***pg***$_i$, …
she started to-avoid
'the boy who Masha gave money to until she started to avoid him'

b. devuška, **kotoroj**$_i$ Ivan daval den'gi t_i do togo kak (on)
girl who. (DAT/GEN) Ivan.NOM gave money until he
stal izbegat' ***pg***$_i$
started to-avoid
'the girl who Ivan gave money to until he started to avoid her'

The verb *davit'* 'give' demands a dative nominal while *izbegat'* 'avoid' takes a genitive DP as its complement. In (27a), the antecedent is *mal'čik* 'boy', which is masculine. In this sentence, whichever case the relative pronoun bears, the sentence is ungrammatical. On the other hand, (27b) is acceptable since the antecedent is feminine in (27b), and the dative and genitive relative pronouns are morphologically identical in the feminine.[13]

In Japanese, morphological case mismatching does not cause ungrammaticality, as pointed by Yoshimura (1992). In fact, the representative example we have seen repeated here does contain a case mismatch.

(28) [[Hazimete ***pg***$_i$ atta] hito-ga ***t***$_i$ kenasita] no-wa **dare-o**$_i$ desu ka?
for-the-first-time saw person-NOM criticized NL-TOP **who-ACC** COP Q
'Who$_i$ was it that a person who saw *pg*$_i$ for the first time criticized *t*$_i$?'

Here, *au* 'see' takes a dative argument whereas *kenasu* 'criticize' takes an accusative DP. Therefore, there is a morphological and phonological mismatch. However, this sentence is grammatical under the bound interpretation. The grammaticality of this sentence shows that there is no case mismatching effect in Japanese unlike in Russian or Hungarian.

Also, notice that the wh-phrase should bear the case of the real trace. Otherwise, the sentence is ungrammatical, as in (29). Moreover, in Japanese ATB sentences like (30), which are called Left Node Raising by Abe & Nakao (2009: 105), the morphological case of the two gaps must match, which shows that we cannot say parasitic gaps are a subset of ATB instances at least in Japanese.[14]

(29) *[[Hazimete ***pg***$_i$ atta] hito-ga ***t***$_i$ kenasita] no-wa **dare-ni** desu ka?
for-the-first-time saw person-NOM criticized NL-TOP **who-DAT** COP Q
'Who$_i$ was it that a person who saw *pg*$_i$ for the first time criticized *t*$_i$?'

[13] Abe (2011: 203) claims that it is possible to construct a parallel example that shows there is case matching effect in English as in (i: judgments are from Abe's paper). However, English is not a good language to look at in this regard. First of all, English has fewer case declensions. Moreover, the example used in the discussion is ambiguous because *prove* can be transitive or intransitive: it is possible that (ib) is degraded because *prove* is likely to be interpreted as an intransitive, namely, without a parasitic gap. By contrast, (ia) is acceptable presumably because we have a parallel construction with *believe* in the previous sentence.

(i) a. It was John that Mary believed *t* to be a genius before Susan proved *pg* to be (a genius).
b. ?*It was John that Mary believed *t* was a genius before Susan proved *pg* to be (a genius).

When we replace the verb with one that does not bring such an ambiguity, such as *ask*, the contrast does not seem to be clear.

(ii) a. Who did Bill believe *t* to have mowed the lawn before Susan asked *pg* to wash a car?
b. Who did Bill believe *t* mowed the lawn before Susan asked *pg* to wash a car?

So I would rather focus on the languages that show obvious case matching effects.

[14] Two anonymous reviewers noted that (30) sounds OK to them. I agree that this sentence does not sound completely ungrammatical. The original ATB sentences with Case-mismatch below in Abe & Nakao (2009: (13)) sound more degraded at least to me, but I do not have any comments about where the difference comes from.

(i) ??Mary-ni John-ga hana-o okuri, Tom-ga nagusameta.
Mary-DAT John-NOM flower-ACC give Tom-NOM comforted
'(To) Mary, John give a flower and Tom comforted.'

(ii) ??Mary-o John-ga dansu-ni sasoi, Tom-ga rabu retaa-o kaita.
Mary-DAT John-NOM dance-to invite Tom-NOM love letter-ACC wrote
'(To) Mary, John invited to a dance, and Tom wrote a love letter.'

(30) **??Dare-ni** Taro-ga t_{DAT} hazimete atte, Hanako-ga t_{ACC} kenasita no?
who-DAT Taro-NOM for-the-first-time met Hanako-NOM criticize Q
'Who$_i$ did Taro meet t_i and did Hanako criticize t_i?'

2.2 Peculiar characteristics of Japanese parasitic gaps

In this section, I will pay special attention to two properties of parasitic gaps: reconstruction asymmetry and category restrictions. These are two important factors that lead Abe (2011) to conclude that Japanese parasitic gaps are real parasitic gaps in some cases and Takahashi (2006) to argue that they are "apparent" parasitic gaps and are in fact the results of XP ellipsis.

2.2.1 Reconstruction asymmetry

Kearney (1983) pointed out that there is an asymmetry regarding reconstruction effects in sentences with parasitic gaps, as shown in (31–32): reconstruction is possible only into the real gap, never into a parasitic gap.

(31) Condition A
a. Which picture of himself$_i$ did John$_i$ sell *t* [before Mary had a chance to look at *pg*]?
b. *Which picture of himself$_i$ did Mary sell *t* [before John$_i$ had a chance to look at *pg*]?

(32) Condition C
a. *Which picture of John$_i$ did he$_i$ buy *t* [without letting Mary look at *pg*]?
b. Which picture of John$_i$ did Mary buy *t* [without letting him$_i$ look at *pg*]?

For (31b) to be grammatical, the wh-phrase must be reconstructed into the parasitic gap, which is not a possible option. (32a) is out as well because the wh-phrase must be reconstructed into the real gap, which ends up with a Condition C violation.

However, reconstruction into parasitic gap positions is not always prohibited. As Munn (1994) pointed out, reconstruction into parasitic gaps is not only possible but also obligatory when the parasitic gap is inside a subject relative clause island:

(33) a. Which picture of himself did [every boy who saw *pg*] say Mary liked *t*?
b. *Which picture of herself did [every boy who saw *pg*] say Mary liked *t*?

In sum, reconstruction into parasitic gaps is allowed only in subject relative clause islands, but otherwise, it is prohibited.

In Japanese, we have a little more complicated picture. Abe (2011: 206) points out that we can observe a reconstruction asymmetry in Japanese parasitic gap constructions as well.[15] Namely, reconstruction is possible only into the real gap when a parasitic gap is in an adjunct island while reconstruction into a parasitic gap is obligatory when it is in a subject relative clause island, as shown in (34–35).

(34) John-ga [Mary-ga ***pg***$_i$ miru mae-ni] ***t***$_i$ sutetesimatta no-wa
John-NOM Mary-NOM saw before threw away NL-TOP
zibun-no donna syasin-o$_i$ desu ka?
self-GEN which picture-ACC COP Q
'[Which picture of self]$_i$ was it that John threw t_i away before Mary saw *pg*$_i$?'

[15] An anonymous reviewer pointed out that using *dono* 'which' might be problematic because DP might be D-linked (Pesetsky 1987), so I replaced *dono* in the original example with *donna*. *Donna* can be used without any preestablished set of entities (Hirose 2003).

(35) [***pg***$_i$ mita] subete-no hito-ga Mary-ga ***t***$_i$ kiniitteiru to itta
saw every-GEN person-NOM Mary-NOM like COMP said
no-wa **zibun-no donna syasin-o**$_i$ desu ka?
NL-TOP **self-GEN what picture-ACC** COP Q
'[What picture of self]$_i$ was it that everyone who saw *pg*$_i$ said that Mary liked *t*$_i$?'

In (34), *zibun* 'self' can only refer to John. By contrast, a reflexive pronoun in (35) can be co-indexed only with *subete-no hito* 'everyone', which shows that the wh-phrase is reconstructed into the parasitic gap position. Abe & Nakao (2009) argues that *pg* in (35) cannot be *pro*, because if so, the reconstruction would be disallowed.

However, it should be noted that reconstruction into the subject does not always happen in Japanese even when a parasitic gap is inside the subject relative clause island. Abe & Nakao (2009) and Abe (2011) argue that reconstruction into subject is not a possible option when there is a case-mismatch. For example, they argue that in (36), the wh-phrase must be reconstructed into the real gap because this is a case of case-mismatch. That is, *zibun* 'self' can only be interpreted as Hanako, not Taro. In addition, it is not possible to get a sloppy reading.

(36) [Taroo-ni ***pg***$_i$ suteru yoo-ni meezita] hito-ga Hanako-ni ***t***$_i$
Taro-DAT throw away ordered person-NOM Hanako-DAT
kisu-maaku-o tukete-oku yoo-ni meizita no-wa **zibun-no donna syasin-ni**$_i$
lipstick mark-ACC put ordered NL-TOP **self-GEN what picture-DAT**
desu ka?
COP Q
'[What picture of self]$_i$ was it that the person who ordered Taro to throw *pg*$_i$ away ordered Hanako to put a lipstick mark on *t*$_i$?'

The verb *suteru* 'throw away' takes an accusative object while *tukeru* 'put' requires the gap to be dative because what is missing here is where to put a lipstick mark. Note that, the wh-phrase should always bear the case of the real trace, and therefore, it is marked as dative (*-ni*).

Compare the sentence above with the following one without case-mismach:

(37) [Taroo-ni ***pg***$_i$ suteru yoo-ni meezita] hito-ga Hanako-ni ***t***$_i$ totte-oku
Taro-DAT throw away ordered person-NOM Hanako-DAT keep
yoo-ni meizita no-wa **zibun-no donna syasin-o**$_i$ desu ka?
ordered NL-TOP **self-GEN what picture-ACC** COP Q
'[What picture of self]$_i$ was it that the person who ordered Taro to throw *pg*$_i$ away ordered Hanako to keep *t*$_i$?'

In this sentence, both two verbs *suteru* 'throw away' and *totte-oku* 'keep' require the gap to bear the accusative case, and hence the wh-phrase bears accusative. Here it is possible to get a sloppy reading: this sentence has a reading that Taro was ordered to throw away a picture of his and Hanako was ordered to keep a picture of her. In this case, it seems that reconstruction into both gaps is possible.

Even though Abe and Nakao exhibit this phenomenon as one instance of a case-mismatching effect, note that this case-matching effect is different from what is discussed in the literature in that case-mismatching does not lead to ungrammaticality in Japanese. This is because using *pro* is a possible option in Japanese, unlike English. They argue that a gap inside an island can be regarded as a real parasitic gap only when it is inside

a subject island and the two gaps match in their Case since in such cases, we can observe some parallelisms between English parasitic gaps and Japanese ones.

However, there are several problems in their arguments. First of all, the argument by Abe and Nakao is crucially dependent on the interpretation of the reflexive pronoun *zibun*. I find this problematic because the Japanese reflexive pronoun is known to work as a logophoric pronoun, and to show peculiar behavior in terms of binding (Kuno 1972; Sells 1987). For one thing, since *zibun* allows a long distance binding, there is no need that *zibun* be reconstructed into the subject gap. For instance, in the sentence below, *zibun* is in the object position of the embedded clause, but it can still refer to Taro, which is the subject of the matrix clause.

(38) Taro-ga Mary-ga **zibun-no syasin-o** kiniitteiru to itta.
Taro-NOM Mary-NOM **self-GEN picture-ACC** like COMP said
'Taro$_i$ said that Mary$_j$ liked pictures of self$_{i/j}$.'

This sentence suggests that the wh-phrase does not have to be reconstructed into a parasitic gap in (37).

In addition, their claim that there are real parasitic gaps also depends on the assumption that *pro* never allows reconstruction or sloppy readings. However, that is not the case. Yoshimura (1992: 229) argues that *pro* or overt pronouns do allow sloppy readings, and there she also shows the example where the parasitic gap is inside the adjunct island but we can still get a sloppy reading:

(39) Ittai zibun-no dono syasin-o$_i$ John-ga [Bill-ga *pro*/sore-o katta
the hell self-GEN which picture-ACC John-NOM Bill-NOM it bought
toki-ni] t_i nagameteita no?
when was looking Q
'Which pictures the hell of himself was John looking at *t* when Bill bought *e*?

Given the data above, I concluded that the factor which makes it sometimes hard or easy to get sloppy readings is not a syntactic one, but a pragmatic one. As one more piece of supportive evidence, the sentence below contains the subject parasitic gap and case-mismatching, where Abe and Nakao argue that a sloppy reading cannot be obtained. Here, the parasitic gap is supposed to have a dative, while the real trace is supposed to have an accusative. Regardless, I think a sloppy reading is available presumably because there is a kind of parallelism between two events depicted in the sentence.

(40) [Taroo-ni ***pg***$_i$ hi-o tukete moyasu yoo-ni meezita] hito-ga
Taro-DAT fire-ACC put burn ordered person-NOM
Hanako-ni ***t***$_i$ syuredda-ni kaketeru yoo-ni meizita no-wa
Hanako-DAT shredder-DAT put ordered NL–TOPIC
zibun-no donna syasin-o$_i$ desu ka?
self-GEN what picture-ACC COP Q
'[What picture of self]$_i$ was it that the person who ordered Taro to burn *pg*$_i$ ordered Hanako to shred t_i?'

It seems, however, that a clear reconstruction asymmetry is observable with respect to the Condition C effect. (41a) is ungrammatical presumably because the reconstruction should be into the real gap position, where an R-expression is bound by another expression *soitu* 'that guy', which is a Condition C violation. On the other hand, (41b)

is completely grammatical because the R-expression is free in the object position of the matrix clause. A completely opposite thing is happening in (42). (42a) is out under the reading where *Taro* and *sono gakusee* refer to the same individual. This shows that the wh-phrase is reconstructed into the parasitic gap in this case. There is no ungrammaticality in (42b) because inside the subject relative clause island the R-expression is free.

(41) A wh-phrase should be reconstructed into a real gap when a parasitic gap is inside an adjunct island.

a. *__Taroo$_i$-no dono syasin-o__ soitu$_i$-wa [Hanako$_j$-ga *pg* miru
__Taro-GEN which picture-ACC__ that guy$_i$-TOP Hanako-NOM see
mae-ni] *t* utta no?
before sold Q
'[Which picture of Taro$_i$] did that guy$_i$ sell *t* before Hanako saw *pg*?'

b. __Taroo$_i$-no dono syasin-o__ Hanako-wa [soitu$_i$-ga *pg* miru
__Taro-GEN which picture-ACC__ Hanako-TOP that guy-NOM see
mae-ni] *t* utta no?
before sold Q
'[Which picture of Taro$_i$] did that Hanako sell *t* before that guy$_i$ saw *pg*?'

(42) A wh-phrase should be reconstructed into a parasitic gap when an island is a subject relative clause island.

a. *__Taroo$_i$-no dono syasin-o__ [*pg* mita sono gakusee$_i$]-wa Hanako$_j$-ga *t*
__Taro-GEN which picture-ACC__ saw that student$_i$-TOP Hanako-NOM
kiniitta to itta no?
liked NL said Q
'Which picture of Taro$_i$ did that student$_i$ who saw *pg* say that Hanako liked *t*?'

b. __Taroo$_{i/*j}$-no dono syasin-o__ [*pg* mita sono gakusee$_j$]-wa sono
__Taro-GEN which picture-ACC__ saw that student-TOP that
syonen$_i$-ga *t* kiniitta to itta no?
boy-NOM liked NL said Q
'Which picture of Taro$_{i/*j}$ did that student$_j$ who saw *pg* say that
that boy$_i$ liked *t*?'

The data above show that we can notice reconstruction asymmetries regarding Condition C effects in Japanese. However, whether this asymmetry comes from the syntactic configuration is not so clear. For example, there are exceptions such as that epithets that do not obey Condition C. This is why this condition is often regarded as not a syntactic constraint but rather as a pragmatic one (Schlenker 2005). Considering that the only case where a clear reconstruction asymmetry can be observed is Condition C effects, I concluded that no strong supportive evidence shows Japanese parasitic gaps exhibit reconstruction asymmetries as seen in English.

2.2.2 Category restrictions on parasitic gaps

In English or Italian, APs and PPs cannot license parasitic gaps as shown by examples below (Cinque 1990: 102).

(43) *How great$_i$ can one become t_i [without feeling pg_i]?

(44) *[To whom]$_i$ did you leave a packet t_i [after turning pg_i]?

This observation leads us to conclude that categories other than NP cannot be antecedents of parasitic gaps in English or Italian.[16]

As for Japanese, Yoshimura (1992) observes that PP can also license parasitic gaps, as shown by (45a). In addition, Takahashi (2006: 19) reports that APs (45b) and parts of idiom chunks (45c) can also license parasitic gaps (the examples and judgments in (45) are Takahashi's).

(45) a. [***pg***$_i$ kogitte-o moratta hito]-ga ***t***$_i$ genkin-mo moratta no-wa **dare kara**$_i$ desu ka?
check-ACC received person-NOM cash-also received NL-TOP **who from** COP Q
'From whom$_i$ was it that the person who received checks *pg*$_i$ received cash *t*$_i$ as well?'

b. [Zissai ***pg***$_i$ natta hito]-ga Taroo-ni ***t***$_i$ naru-yooni susumeta no-wa **dorekurai hosoku**$_i$ desu ka?
actually became person-NOM Taroo-DAT become-to advised NL-TOP **how slim** COP Q
'How slim$_i$ was it that the person who actually became *pg*$_i$ advised Taro to become *t*$_i$?'

c. [Ano mondai-ni ***pg***$_i$ tuketa hito]-ga tugini kono mondai-ni ***t***$_i$ tuke-yooto siteiru no-wa **donna keri-o**$_i$ desu ka?
that issue-to attached person-NOM next this issue-to attach-to is trying NL-TOP **what end-ACC** COP Q
'What end$_i$ is it that the person who attached *pg*$_i$ to that issue is trying to attach *t*$_i$ to this issue next?'

I find, however, that while DP and PP gaps are acceptable, AP or idiom gaps are degraded. To test this intuition, I carried out a survey with 18 native speakers of Japanese.[17] The experiment was designed to test whether there are differences in acceptability according to category (DP, PP, and AP).[18] The sample items are shown in (46a–c).

(46) a. [Kaigi-de ***pg***$_i$ kooron-sita dansee]-ga ato-de hinan-sita no wa **dare-o** desu ka?
at meeting quarrel men-NOM later criticized NL TOP who-ACC COP Q
'Who$_i$ was it that the person who had a quarrel with *pg*$_i$ criticized *t*$_i$?'

b. [Yoga kyooshitu-de ***pg***$_i$ soodan-o uketa hito]-ga zyogen-mo moratta no wa **dare kara** desu ka?
yoga class-LOC advice-ACC asked person-NOM suggestion-also received NL TOP who from COP Q
'From whom was it that the person who was asked advice *pg*$_i$ accept a suggestion *t*$_i$?'

[16] Not every language behaves like English. According to Engdahl (1983: 17), AP or PP can be antecedents of parasitic gaps in Swedish. However, this peculiarity might come from the fact that Swedish has proforms for those categories. There is also a debate that non NP parasitic gap sentences are grammatical in English (Levine et al. 2001). I will not commit any analysis on English parasitic gaps in this paper, and just use canonical examples to illustrate the characteristics that are broadly acknowledged.

[17] The age varies from 25 to 60 years old, and they claim that they are not specialized in linguistics.

[18] I did not include idiom chunk gaps, which Takahashi says are possible parasitic gaps in Japanese, just for the sake of simplicity. The sentences with idiom chunk gaps are far worse than those with AP gaps according to my intuition. This difference is compatible with the analysis I give in this paper because it is impossible to replace parts of idioms with pronouns.

c. [Zimu-de ***pg***$_i$ natta hito]-ga Taroo-ni naru-yooni susumeta no-wa
at gym became person-NOM Taro-DAT become-to advised NL-TOP
dorekurai hosoku desu ka?
how slim COP Q
'How slim$_i$ was it that the person who became *pg*$_i$ advised Taro to become t_i?'

Participants were asked to judge acceptability on a 7-point scale (1 is completely unacceptable, and 7 is perfect). 24 sets of experimental items were balanced using a Latin Square Design and randomized with 26 fillers. The six sets of questionnaires were distributed in a Google Doc.

The results of this survey corresponded to my intuition: as Table 2 and Figures 3–4 below show, the participants judged AP parasitic gaps less acceptable than DP and PP parasitic gaps.

The difference of the acceptability between DP/PP and AP was statistically significant (Wilcoxon rank sum test: $W = 15826.5, p < 0.0001$).[19] If people could use the same strategy to establish the bound reading across categories, this difference between DP/PP and AP would be unexpected. In addition, there was no significant difference between DP and PP (Wilcoxon rank sum test: $W = 10492.5, p = 0.77$). Therefore, I conclude that parasitic gaps in Japanese can be licensed only by movement of DP or PP wh-phrases.

Table 2: Mean and standard deviation (in parenthesis) of ratings of Experiment 1.

DP + PP	AP
4.08 (2.15)	3.21 (2.20)

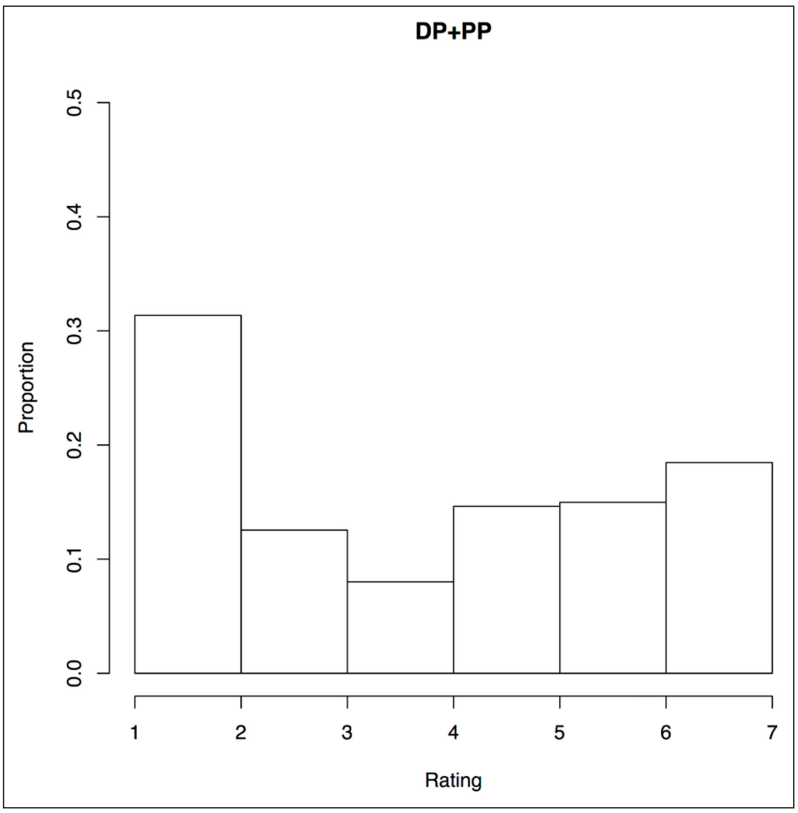


Figure 3: Ratings of the sentences with DP + PPs.

[19] The same analysis with z-score gave the same result: the difference between the mean of DPs and PPs on one hand and the mean of APs on the other was significant.

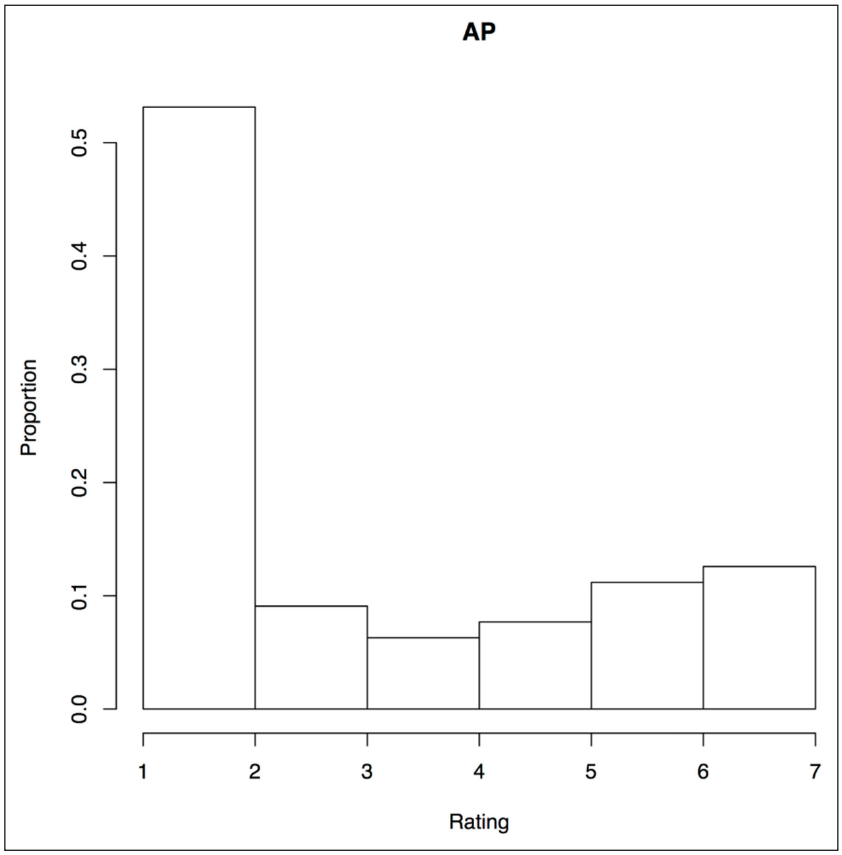


Figure 4: Ratings of the sentences with APs.

Table 3: Characteristics of Japanese parasitic gap constructions.

	Eng	Jp
Must the antecedent be in an A'-position?	Yes	Could be A-position
Can in-situ wh-phrases license pgs?	No	Subject wh does not need movement
Does the anti-c-command condition hold?	Yes	No. The wh must c-command a pg
Is a pg island sensitive?	Yes	No
Is there Case-matching Effect?	–	No
Is reconstruction into subjects obligatory?	Yes	Not always
What category can be a pg?	NP	NP and PP

2.3 Interim summary

So far we have seen how Japanese parasitic gaps behave regarding the well-known characteristics of this construction. The results are summarized in Table 3. In sum, it seems that Japanese parasitic gaps behave very differently from those in English or other languages. Any kind of analysis of Japanese parasitic gaps should be able to explain all of the peculiar behaviors.

3 Proposal

In the previous section, we saw that Japanese parasitic gaps exhibit behavior that is distinct from parasitic gaps in other languages. Any account of Japanese parasitic gaps should explain why they behave so differently. To achieve this aim, we need to address the following two questions in particular: (i) What kind of empty category is the parasitic gap in Japanese? (ii) Why do we need movement to license parasitic gaps, even though

Japanese is otherwise a wh-in-situ language? The first question is important because when there is an empty category, in Japanese we have at least three possible candidates: *pro*, the trace of null operator movement, or the result of ellipsis (argument ellipsis or VP ellipsis). In this section, I will give an answer to the first question: all parasitic gaps in Japanese should be analyzed as *pro*, providing three arguments: (i) Parasitic gaps in Japanese cannot appear in anti-pronominal contexts, (ii) Only DP and PP can be parasitic gaps, (iii) Parasitic gaps are island insensitive. After that, I will look at two other kinds of approaches to parasitic gaps discussed in the literature: one is based on (Argument) Ellipsis proposed by Takahashi (2006) and the other bases on null operator movement (Nissenbaum 2000), and discuss what those analyses would predict regarding the behavior of parasitic gaps.

3.1 Three arguments for pro

3.1.1 Anti-pronominal contexts

In Japanese, parasitic gaps cannot appear in anti-pronominal contexts. Anti-pronominal contexts are certain syntactic environments in which anaphoric pronouns (e.g. English *it*) cannot appear (Postal 1998: 32). For example, in change-of-color environments, a pronoun cannot be used in place of a color term, and a name cannot be substituted with a pronoun in name positions, as illustrated by ungrammaticality of (47a) and (47b).[20]

(47) a. *Hanako painted the wall blue$_i$. Taro painted the chair it$_i$.
b. *Hanako named her son Taro$_i$. Mari named her son it$_i$, too.

In Japanese, too, regardless of whether it is overt or null, a pronoun cannot be used in anti-pronominal contexts, as demonstrated in (48a) and (49a). Note that extracting a wh-phrase is still possible, as shown by grammaticality of (48b) and (49b). As for parasitic gaps, we can observe that they cannot appear at all both in English and Japanese. That is, in English (48c) and (49c) are ungrammatical in the same way as they do not have the bound reading in Japanese. In (48c), we do not get an interpretation in which this is the question of the color that is used to paint both the wall and the chair. The only possible interpretation is the question is asking the color the person painted the chair, and the color of the wall is unspecified. In the same way, from (49c) we do not get the interpretation that the question is about the name of Mari's son and Hanako's. This question is about the name of Hanako's son, and Mari's son's name is unspecified.

[20] Postal also argues that *there*-existentials are an anti-pronominal context. I do not discuss existential construction here because existentials in Japanese behave differently from English ones. First, definite nominals such as proper nouns can appear in the pivot. In addition, it is possible to use a pronoun or a demonstrative expression.

(i) Niwa-ni Taro-ga imasu.
garden-LOC Taro-NOM exists
'There is Taro in the garden.'

(ii) Niwa-ni kare/soitu-ga imasu.
garden-LOC he/that guy-NOM exists
'There is him/that guy in the garden.'

In addition, unlike in English it is possible to topicalize pronouns or demonstrative expressions in the pivot.

(iii) Kare/soitu-wa niwa-ni imasu.
he/that guy-TOP niwa-LOC exists
'(lit.) As for him/that guy, he exists in the garden.'

(iv) *Him/that guy, there is in the garden.

In sum, existentials in Japanese are not anti-pronominal contexts.

(48) Change-of-color environments

a. *Hanako-wa kabe-o ao$_i$-ni nutta. Taro-wa isu-o *pro*/sore-ni$_i$ nutta.
Hanako-NOM wall-ACC blue painted Taro-TOP chair-ACC *pro*/it painted
'Hanako painted the wall blue$_i$. Taro painted the chair *pro*/it$_i$.'

b. Hanako-ga kabe-o t$_i$ nutta no-wa naniiro$_i$-ni desu ka?
Hanako-NOM wall-ACC painted COMP-TOP what color COP Q
'What color$_i$ was it that Hanako painted t_i the wall?'

c. *[Kabe-o ***pg***$_i$ nutta hito]-ga isu-o ***t***$_i$ nutta no-wa
wall-ACC painted person-NOM chair-ACC painted COMP-TOP
naniiro$_i$-ni desu ka?
what color COP Q
'*[What color]$_i$ was it that the person who painted the wall *pg*$_i$ painted the chair t_i?'

(49) Name positions

a. *Hanako-wa musuko-o Taro$_i$-to naduketa. Mari-mo musuko-o
Hanako-TOP her son-ACC Taro named Mari-too her son-ACC
pro$_i$/sore$_i$-to naduketa.
pro$_i$/it$_i$ named
'Hanako named her son Taro$_i$. Mari named her son *pro*/it, too.'

b. Hanako-ga musuko-o t_i naduketa no-wa nan-to$_i$ desu ka?
Hanako-NOM her son-ACC named COMP-TOP what COP Q
'What$_i$ was it that Hanako named her son $_i$?'

c. *[Mari-ga ***pg***$_i$ musuko-o nadukeru mae-ni] Hanako-ga musuko-o ***t***$_i$
Mari-NOM her son-ACC named before Hanako-NOM her son-ACC
naduketa no-wa **nan$_i$-to** desu ka?
named COMP-TOP **what**$_i$ COP Q
'What$_i$ was it that Hanako named her son t_i before Mari named her son t_i?'

In addition, manner adverbials and reason adverbials cannot be replaced by pronouns, as illustrated by (50a) and (51a). These contexts are places in which Takahashi (2006: 21) points out that apparent parasitic gaps cannot appear in Japanese. Note that wh-extraction is still possible from these contexts, as shown by grammaticality of (50b) and (51b).

A sentence with a parasitic gap and a manner adverbial is (50c). Even though this sentence is syntactically grammatical, it is not possible to get a bound reading from this sentence. The judgments on the sentences with parasitic gaps and manner adverbials or reason adverbials are Takahashi's. This sentence cannot be interpreted as a question about a way how the person solved two problems.

(50) Manner Adverbials

a. *Hanako-wa kousite$_i$ sono teiri-o syomeisita. Taro-wa kono
Hanako-NOM in this way that theorem-ACC proved Taro-NOM this
teiri-o *pro*/soosite$_i$ syomeisita.
theorem-ACC *pro*/in that way proved
'Hanako proved that theorem this way. Taro proved this theorem *pro*/in that way.'

b. Hanako-ga sono teiri-o t_i syoomeisita no-wa dooyatte$_i$ desu ka?
Hanako-NOM that theorem-ACC proved COMP-TOP how COP Q
'How was it that Hanako proved that theorem?'

c. *[Sono teiri-o ***pg***$_i$ syoomeisita hito]-ga kono teiri-mo ***t***$_i$
that theorem-ACC proved person-NOM this theorem-too
syoomeisita no-wa **dooyatte**$_i$ desu ka?
proved COMP-TOP **how** COP Q
'How$_i$ was it that the person who proved that theorem *pg*$_i$ proved this theorem *t*$_i$?'

An example sentence with a parasitic gap and a reason adverbial is (51c). This sentence only asks the reason for which the person is trying to fire Hanako. The reason she or he fired Taro is not mentioned in this sentence.

(51) Reason Adverbs

a. *Syatyoo-ga Taro-o kousita riyuu-de kaiko sita. Syatyo-wa
president-NOM Taro-ACC these reason fired president-TOP
Hanako-mo *pro*/sore-de kaikosiyooto siteiru.
Hanako-too *pro*/for that reason trying to fire being
'The president fired Taro for these reasons. He is trying to Hanako *pro*$_i$/for it$_i$, too.'

b. Syatyoo-ga Taro-o *t*$_i$ kaikosita no-wa naze/dooyuu riyuu$_i$ de
president-NOM Taro-ACC fired COMP-TOP why/what reason
desu ka?
COP Q
'Why/For what reason$_i$ was it that the president fired Taro *t*$_i$?'

c. *[Taro-o ***pg***$_i$ kaikosita hito]-ga Hanako-mo ***t***$_i$ kaikosiyooto siteiru
Taro-ACC fired person-NOM Hanako-too is trying to fire
no-wa **naze/dooyuu riyuu**$_i$ de desu ka?
COMP-TOP **why/for what reason** COP Q
'Why/For what reason$_i$ is it that the person who fired Taro is trying to fire Hanako, too?'

Assuming that parasitic gaps are *pro*, we get a straightforward explanation why we cannot get the bound reading in anti-pronominal contexts — parasitic gaps cannot appear anti-pronominal contexts because they are *pro*, anaphoric pronouns.

3.1.2 Nonnominal parasitic gaps

The second piece of supportive evidence comes from a sharp discrepancy in the acceptability of DP/PP parasitic gaps on the one hand and AP parasitic gaps on the other. This matches the possible categories of *pro*, as illustrated in (52). Let us say (52a–c) were uttered in a context in which it is salient that Taro studied math at cram school and became smart. In this situation, we can use a null pronoun in an argument position, as shown in (52a) or an adjunct position, which is a locative phrase in this case, as in (52b). However, it is impossible to use a null pronoun in a predicate AP position, shown by ungrammaticality of (52c). As I mentioned earlier, the results of the experiment I ran showed that people tended to reject the sentences with AP parasitic gaps, but both DP parasitic gaps and PP ones were equally accepted. This contrast is expected if parasitic gaps in Japanese are *pro*.

(52) Taro-wa [$_{DP}$suugaku-o] [$_{PP}$juku-de] benkyoo-site [$_{AdjP}$kasikoku] natta.
Taro-TOP math-ACC cram school-LOC studied and smart became
'Taro studied math at cram school and became smart.'

a. Hanako-wa [$_{DP}$*pro*] gakkoo-de benkyoo-site kasikoku natta.
'Hanako studied *pro*(=math) at school and became smart.'

b. Hanako-wa eigo-o [$_{PP}$*pro*] benkyoo-site kasikoku natta.
'Hanako studied English *pro*(=at cram school) and became smart.

c. *Hanako-wa eego-o gakkoo-de benkyoo-site [$_{AdjP}$*pro*] natta.
Hanako studied English at school and became *pro*(=smart).

3.1.3 Island insensitivity

As I mentioned in the previous section, Japanese parasitic gaps can be licensed even when there is more than one island boundary, which suggests there is no movement involved in parasitic gap constructions in Japanese, unlike in English. A pronominal approach pursued in this paper can straightforwardly account for this property, since it requires no movement.

3.2 Alternative approaches

In the previous section, I introduced some data that support the claim that parasitic gaps in Japanese are *pro*. In this section, I will review two kinds of possible alternative analyses of parasitic gaps in the literature. In the first approach we will look at, apparent parasitic gaps are analyzed as positions rendered silent by argument ellipsis. As for the second possible analysis, I discuss the possibility that parasitic gaps are traces of null operator movement. In each section, I will go through what prediction each approach would make about the behavior of parasitic gaps, and show why a null pronominal analysis is more viable than the other analyses.

3.2.1 XP ellipsis

Takahashi (2006) argues that apparent parasitic gaps are positions elided by argument ellipsis. His analysis of parasitic gaps is schematically illustrated in (53). Here, the apparent parasitic gap is an elliptic position, as illustrated by (53a.) The elliptic position gets its content by copying the trace, which is left behind by A'-movement of the wh-phrase. It is crucial that what is copied onto an elided position is the content of a trace, not the wh-phrase, as shown by (53b). In this way, the parasitic gap ends up with having the same index as the real gap. Otherwise, two gaps would end up with being bound by two different operators.

(53) a. [$_{CP}$ t'_1 [$_{C'}$ [$_{TP}$ [$_{DP}$ hazimete [$_{DP}$*e*] au hito]]-ga [$_{DP}t_1$] kenasu] no]]-wa dare$_1$-o desu ka]

b. [$_{CP}$ t'_1 [$_{C'}$ [$_{TP}$ [$_{DP}$ hazimete [$_{DP}t_1$] au hito]]-ga [$_{DP}t_1$] kenasu] no]]-wa dare$_1$-o desu ka]

It is worth noting that the kind of ellipsis Takahashi argues works here is a generalized version of DP-ellipsis (Kim 1999; Oku 1998), which he calls XP-ellipsis. In addition to DP-ellipsis, there is at least another possible alternative analysis, namely VP-ellipsis (Otani & Whitman 1991). Takahashi discusses this possibility in the Appendix (Takahashi 2006: 28), and concluded that it is hard to analyze an example of a parasitic gap being the subject in the syntactic island under VP-ellipsis approach, as in (54), because the parasitic gap is outside the VP.

(54) [Hanako kara [***pg***$_i$ sigoto-o yameru toyuu]uwasa-o kiita hito]-ga
Hanako from job-ACC quits COMP rumor-ACC heard person-NOM
t$_i$ atta no-wa **dare**$_i$**-ni** desu ka?
saw NL-TOP who-DAT COP Q
'Who$_i$ was it that the person who heard from Hanako the rumor that *pg*$_i$ would quit his job saw t_i?

Another thing to be noted is that Takahashi also claims that DP-ellipsis should be generalized, because this kind of ellipsis happens over various categories. As we have seen, PPs, APs, and parts of idiom chunks can be a target of ellipsis. If ellipsis can be applied to these categories — not only DPs but also PPs, APs, and a part of idiom chunks —, they should be able to be parasitic gaps in Japanese without any problem. However, this is not what was obtained by the experiment, in which we could see the acceptability degraded for AP parasitic gaps. If DPs, PPs, APs and parts of idiom chunks are equal before ellipsis, we cannot explain why people find AP gaps less acceptable.

This XP ellipsis analysis predicts that parasitic gaps can appear in a very wide range of context. However, Takahashi (2006: 21) mentions two exceptions: reason adverbials and manner adverbials, as in (55).

(55) a. *[Sono teiri-o ***pg*** syoomeisita hito]-ga kono teiri-mo *t*
that theorem-ACC proved person-NOM this theorem-too
syoomeisita no-wa **dooyatte** desu ka?
proved COMP-TOP **how** COP Q
'How$_i$ was it that the person who proved that theorem *pg*$_i$ proved this theorem *t*$_i$?'

b. *[Taro-o ***pg*** kaikosita hito]-ga Hanako-mo *t* kaikosiyooto siteiru
Taro-ACC fired person-NOM Hanako-too is trying to fire
no-wa **naze/dooyuu riyuu** de desu ka?
COMP-TOP **why/for what reason** COP Q
'Why/For what reason$_i$ is it that the person who fired Taro *pg*$_i$ is trying to fire Hanako *t*$_i$, too?'

Takahashi argues that this is because adjuncts cannot be subject to ellipsis. However, if adjuncts are the only contexts where apparent parasitic gaps cannot appear, parasitic gaps should be able to occur in change-of-color contexts or name positions, where DPs are arguments in a sense. In this analysis, it is not clear why parasitic gaps are not available in change-of-color environments and name positions, opposed to manner/reason adverbials, while if they are *pro*, we can simply say they cannot appear in anti-pronominal contexts (Postal 1998).

To conclude, the analysis of parasitic gaps based on ellipsis overgenerates possible environments where parasitic gaps can appear. It cannot explain why AP parasitic gaps are degraded or why parasitic gaps cannot appear in some anti-pronominal contexts, where DP positions are arguments.

3.2.2 Null operator movement

The other possibility is that parasitic gaps are traces of null operator movement. This idea is in line with the analysis of parasitic gaps in English by Nissenbaum (2000). In this analysis, a sentence with a parasitic gap in Japanese is supposed to have a structure like that in (56), in which a parasitic gap is a trace left behind by null operator movement (i.e. movement of OP$_2$). According to this analysis, which is designed to account for the behavior of parasitic gaps in English, the bound reading can be obtained as a result of predicate modification, which explains why movement is obligatory for the licensing of a parasitic gap and derives the anti-c-command condition for free.

(56) [OP$_2$ [hazimete *t*$_2$ au hito]]-ga *t*$_1$ kenasu no-wa dare$_1$-o desu ka

If a parasitic gap is a trace of null operator movement, it should be able to appear wherever this kind of movement is possible. Recall that the wh-extraction is possible from

anti-pronominal contexts. This means, an empty category in an anti-pronominal context should be able to work as a parasitic gap if it is a trace of operator movement. In addition, this approach would predict that any category that can appear with operator movement can be parasitic gaps.[21] In addition with nominals (whether DPs or PPs), making a question with an adjective or a part of idiom chunks is possible in Japanese, as in (57) and (58). That both adjective phrases and parts of idiom chunks do appear in sentences with operator movement would suggest that they could equally appear as parasitic gaps. However, this is not what we get. In sum, this approach also overgenerates contexts where parasitic gaps in Japanese can appear.

(57) Dorekurai hayaku Taroo-wa hasitta no?
how fast Taro-TOP ran Q
'How fast did Taro run?'

(58) Donna keri-o Taro-wa sono mondai-ni tuketa no?
what kind of end-ACC Taro-TOP that problem-to attached Q
'lit. What end did Taro attached to that problem?'

This analysis makes another two other important predictions about the behavior of parasitic gaps. First of all, the anti-c-command condition can be automatically derived from the compositional mechanism, which exploits predicate modification. The reason a real gap cannot c-command a parasitic gap is that the configuration induces a type-mismatch. In other words, when the subject itself is a gap, there is nothing with which an adjunct with a gap can be composed. It does work well to explain why English parasitic gaps should follow the anti-c-command condition. However, recall that the anti-c-command condition does not hold in Japanese, but a different restriction is imposed: a wh-phrase must c-command a parasitic gap. Regarding this property, I will show that the semantics of questions in Japanese can correctly derive this characteristic in the next section.

The other important prediction that this theory makes is that a parasitic gap should be island sensitive. Even though again, this prediction is valid as an account for the behavior of parasitic gaps in English, it is not viable in Japanese, where the dependency between a binder and a parasitic gap is island insensitive as discussed in the literature (Yoshimura 1992; Takahashi 2006) and as confirmed by the result of the experiment.

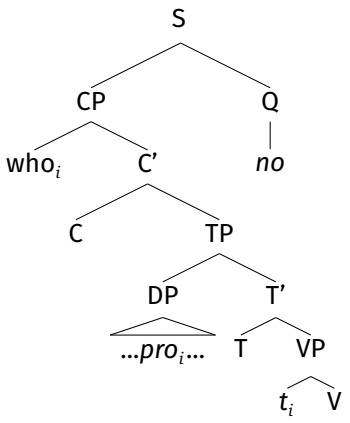
In sum, this type of analysis does not succeed in accounting for the behavior of parasitic gaps in Japanese, either. It over-generates with respect to the range of contexts where we expect parasitic gaps to appear; DPs in anti-pronominal contexts, APs and parts of idiom chunks should be perfect candidates for parasitic gaps, but they are not. Furthermore, it underestimates conditions that can license parasitic gaps. Japanese parasitic gaps can be licensed by a wider variety of contexts than English parasitic gaps, which this approach cannot predict at all.

3.3 On weak crossover effects

The argument that parasitic gaps are *pro* has often been attacked because the whole sentence involves a weak crossover configuration, as in (59), when the wh-phrase is moved from object position of the matrix clause.

[21] Nissenbaum (2000) does not discuss how to exclude non DP parasitic gaps in English. His analysis would be able to handle non DP gaps once we define a particular Predicate Modification that can handle non nominal categories.

(59)



In this section, I will argue that the apparent weak crossover effect is not a real problem, following in part Abe (2011). In all possible parasitic gap examples, potential weak crossover violations can be remedied by clause-internal scrambling, which can be A-movement in Japanese (Saito 1992).

First of all, let me show how weak crossover effects are observed in Japanese. In (60), the wh-phrase is in-situ, and we do not get the bound reading. Note that *soitu* 'that guy' allows a bound variable interpretation in Japanese.[22]

(60) Saito (1992: 73)
?* [Soitu$_i$-no hahaoya]-ga dare$_i$-o aisiteru no?
that guy-GEN mother-NOM who-ACC love Q
'His$_i$ mother loves who$_i$?'

This can be explained once we assume there is covert movement of the wh-phrase in Japanese. At LF, we do get a configuration shown in (59).

In order to get the bound reading, the wh-phrase must undergo clause-internal scrambling, as observed by Hoji (1987b) and shown by (61) below. Saito (1992) argues this is because clause-internal scrambling in Japanese can be A-movement, which is known to be able to "remedy" weak crossover violations.

(61) Saito (1992: 73)
Dare$_i$-o [soitu$_i$-no hahaoya]-ga aisiteru no?
who-ACC that guy-GEN mother-NOM love Q
'Who$_i$ his$_i$ mother loves t_i?'

Recall that parasitic gaps in Japanese can be licensed by clause internal scrambling. Schematically we get a configuration in (59), but thanks to clause-internal scrambling, we do not get weak crossover effect.

This makes another prediction.[23] Even when there is movement and the wh-phrase c-commands two gaps, if the pronoun is crossed by A'-movement (long-distance scrambling), a bound reading is unavailable. The prediction is borne out, as shown in (62).[24]

[22] The literal translation of English *him/her* in Japanese *kare/kanozyo* does not allow a bound variable interpretation.

[23] I appreciate an anonymous reviewer who pointed this out.

[24] If a parasitic gap and a real trace are in the same clause, apparently a bound reading is available with A'-movement (see (15c)). However, in (15c), there can be A-movement before A'-movement, and it is the first A-movement that can remedy WCO.

(62) *$\textbf{Dare-o}_i$ [hazimete $\boldsymbol{pg}_i$ atta] hito-ga [$_{CP}$ John-ga $\boldsymbol{t}_i$ kenasita
who-ACC for-the-first-time saw person-NOM John-NOM criticized
to] itteita no?
COMP said Q
'Who did the person who saw for the first time say that John had criticized?'

In this case, a parasitic gap is inside the subject relative clause island and a real trace is in the embedded complement clause. Therefore, movement that crosses a pronoun must be A'-movement, which cannot remedy WCO violation.

As for a cleft, following Abe (2011), I adopt Hasegawa's (2011) analysis of a cleft, where a cleft sentence is derived via the combination of clause-internal scrambling and remnant movement, as in (63). In this approach, the wh-phrase is firstly clause-internally scrambled, as shown by (63b). Then, the whole remnant CP is moved to the topic position of the matrix clause, as in (63c). Crucially, since the wh-phrase is moved via clause-internal scrambling, which can be A-movement, it is possible to avoid the weak crossover violation. As a result, the bound reading can be obtained without ungrammaticality.

(63) a. [*e*] -wa[$_{TP}$[$_{CP}$ [hazimete pg_i atta] hito-ga dare-o_i kenasita
TOP for-the-first-time saw person-NOM who-ACC criticized
no]desu] ka
NL COP Q

b. [*e*]-wa[$_{TP}$ dare-o_i [$_{CP}$ [hazimete pg_i atta] hito-ga t_i kenasita no] desu] ka

c. [$_{CP}$[hazimete pg_i atta] hito-ga t_i kenasita no]-wa[$_{TP}$ dare-o_i t_{CP} desu ka

3.4 Conclusion

In all, the proposed analysis that parasitic gaps in Japanese are all *pro* predicts the distribution of this item correctly: Parasitic gaps in Japanese cannot appear in anti-pronominal contexts including two adverbial contexts, because they are *pro*. Moreover, only DPs and PPs can be antecedents because they are possible referents of *pro*. The other possible analyses I introduced here, namely XP ellipsis and operator movement, cannot explain the peculiar characteristics of Japanese parasitic gaps. Finally, weak crossover effect is not a real problem here because it is remedied as long as A-movement is involved. However, we still do not understand why overt movement is obligatory to license parasitic gaps in Japanese, which is a wh-in-situ language. I will solve the puzzle in the next section.

4 Deriving obligatory movement

In the previous section, we concluded that parasitic gaps in Japanese should be analyzed as *pro*. Recall that the bound reading cannot be obtained when the wh-phrase is in-situ, as in (64). The bound reading becomes available once we move a wh-phrase via clause-internal scrambling or by clefting it, as illustrated by (65a) and (65b).

(64) *[Hazimete $\boldsymbol{pg}_i$ atta hito]-ga **dare-o_i** kenasimasita ka?
for-the-first-time saw person-NOM **who-ACC** criticized Q
'Who$_i$ did people who saw pg_i for the first time criticize t_i?'

(65) a. [[Hazimete $\boldsymbol{pg}_i$ atta] hito-ga $\boldsymbol{t}_i$ kenasita] no-wa **dare-o_i**
for-the-first-time saw person-NOM criticized NL-TOP **who-ACC**
desu ka?
COP Q
'Who$_i$ was it that a person who saw pg_i for the first time criticized t_i?'

b. **Dare-o**$_i$ [hazimete ***pg***$_i$ atta] hito-ga ***t***$_i$ kenasita no desu ka?
who-ACC for-the-first-time saw person-NOM criticize NL COP Q
'Who$_i$ did the person who saw *pg*$_i$ for the first time criticize *t*$_i$?'

The puzzle is why movement is required in Japanese, in which the wh-phrase can scope over matrix clause even they stay in-situ. In this section, I will derive this obligatory movement of the wh-phrase from the semantics of questions in Japanese. First, I will provide some background on questions in Japanese. In particular, I will show that Japanese wh-phrases do not show island effects, and therefore, wh-phrases must be interpreted in situ. Given that, I will adopt a semantics of questions that involves no movement (Hagstrom 1998; Kratzer & Shimoyama 2002; Shimoyama 2006; Cable 2010) in this paper rather than assuming covert movement of wh-phrases (Nishigauchi 1990). After providing the background, I will show that obligatory movement of wh-phrases in parasitic gap constructions can be obtained for free.

4.1 Questions in Japanese

Wh-questions in Japanese do not show sensitivity to most island constraints; only the wh-island constraint is observed in Japanese. In other words, as long as the wh-phrase stays in situ, we can get an interpretation in which the wh-phrase takes matrix scope over the sentence, shown by (66–68), in which the wh-phrase, though inside a syntactic island, can take scope over the entire sentence.

(66) ✓Taro-wa [**dare-ga** tukutta] udon-o tabemasita ka?
Taro-TOP **who-NOM** made udon-ACC ate Q
'For which person *x*, Taro ate udon such that *x* made?'
[Complex NP island]

(67) ✓Taro-wa [**dare-ga** tabetagatta kara] udon-o tukurimasita ka?
Taro-TOP **who-NOM** want to eat because udon-ACC made Q
'For which person *x*, Taro made udon because *x* wanted to eat?'
[Adjunct island]

(68) ✓[**Dare-o** izimeta hito]-ga sikarareta no?
who-ACC bullied person -NOM be scolded Q
'For which person *x*, the person bullied *x* and was scolded?'
[Subject Relative Clause island]

This said, I adopt a semantics for questions that allows the wh-phrase to be interpreted in situ without movement (Hagstrom 1998; Kratzer & Shimoyama 2002; Shimoyama 2006; Cable 2010). From now on, I will describe and exploit a general version of these accounts. The basic idea here is that wh-phrases introduce Hamblin alternatives (Hamblin 1973) and the semantics of a question particle can be regarded as trivial because the alternative set generated by Pointwise Functional Application and the wh-phrase is already the denotation of an interrogative sentence, namely a set of propositions. Here, I will treat a question particle as an identity function.[25]

[25] This is not the only option for the denotation of a question particle, however. As Shimoyama (2006) mentions, it is possible for a question particle to denote a singleton set in line with Groenendijk & Stokhof (1982). Furthermore, the denotation I used here works at least at the root level, and I take no position on whether we should assume the same semantics for a question particle that introduces embedded questions.

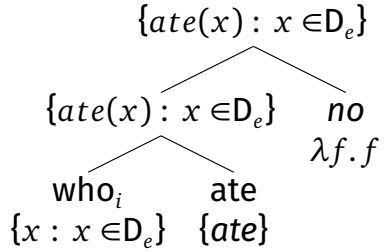
(69) a. Wh-phrases introduce alternatives
$[\![\text{dare}]\!]^g = \{x \in D_e : \text{person}(x)\}$

b. A question particle is an identity function
$[\![\text{no}]\!]^g = \lambda f . f$

Let us look at how this idea works by taking a simple wh-question as in (71a). When the wh-phrase is composed with a verb *ate*, Functional Application is done in a pointwise manner, which is defined as (70) (Rooth 1985). Intuitively, by this type of functional application, we apply functional application in every possible combination and pass up the results as a set to the next stage of computation.

(70) Pointwise Functional Application
If α is a branching node with daughters β and γ, and $[\![\beta]\!]^{w,g} \subseteq D_{<\sigma,\tau>}$ and $[\![\gamma]\!]^{w,g} \subseteq D_\sigma$, then $[\![\alpha]\!]^{w,g} = \{f(x) \in D_\tau : f \in [\![\beta]\!]^{w,g} \,\&\, x \in [\![\gamma]\!]^{w,g}\}$.

(71) An example of a simple wh-question
a. Dare-ga tabeta no?
who-NOM ate Q
'Who ate?'

b.


As illustrated in the derivation in (71b), at the VP level, we get a set of propositions where the subject position of a verb is substituted by all individuals in the domain: {*ate*(*x*) : $x \in D_e$}. A question particle takes a set of propositions and gives back the same set of propositions and stops making alternatives. When our domain only contains three people, namely D_e = {Taro, Jiro, Saburo}, what we eventually get is a set of propositions: {*ate*(Taro), *ate*(Jiro), *ate*(Saburo)}.

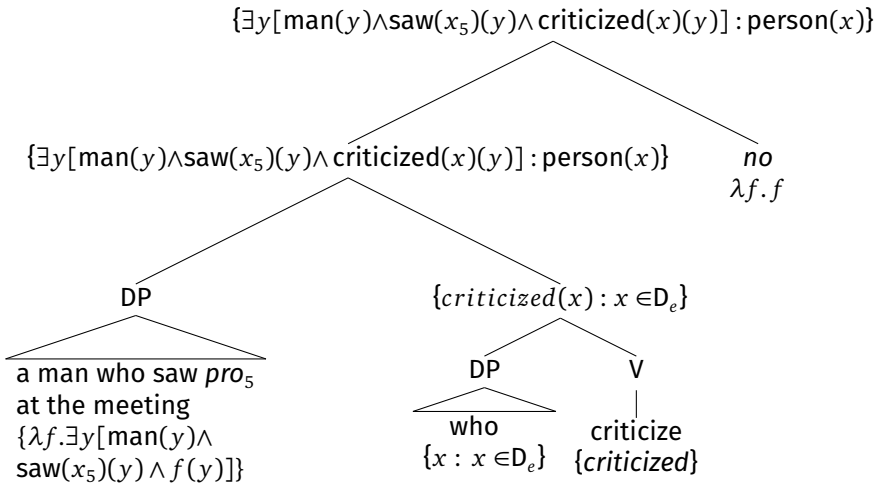
Remember that this compositional mechanism does not involve any movement. Therefore, no island effect would be expected under this approach. Moreover, this computation predicts that the wh-phrase can manipulate alternatives as long as there is no intervening question particle or a universal particle *mo*, assuming that these particles take Hamblin's alternatives as their arguments and give back the singleton set. These are exactly the particles that mark wh-islands in Japanese. Therefore, this theory correctly predicts that there is no island effect in Japanese except wh-islands.

4.2 Obligatory movement in parasitic gap constructions

With this semantics for wh-questions in Japanese, obligatory movement with parasitic gaps comes for free. Let us look at the derivation of the sentence without movement (72), illustrated in (73a). Remember that (72) is ungrammatical only under the bound reading. In other words, it is grammatical on the reading in which *pro* is a free variable. The derivation in (73a) shows why that is the case.

(72) *[Hazimete ***pro***$_i$ atta hito]-ga **dare-o**$_i$ kenasimasita ka?
for-the-first-time saw person-NOM **who-ACC** criticized Q
'Who$_i$ did people who saw *pg*$_i$ for the first time criticize t_i?'

(73) a.



b. ={a man who saw x_5 at the meeting criticized John, a man who saw x_5 at the meeting criticized Mary, …})

The crucial part of the derivation comes when VP is combined with the subject, which contains *pro*$_5$ inside an island. When they are computed via Pointwise Functional Application, the wh-phrase cannot manipulate the value of *pro*$_5$, because the variable in the object position of *criticize* and inside the island are independent. In other words, *pro*$_5$ ($=x_5$) always refers to a contextually salient entity, and only the value of *x* introduced by a wh-phrase is substituted by all individuals in the domain because these two variable are not related to each other in any respect. As a result, what we eventually get is (73b), where the values of two gaps do not covary.

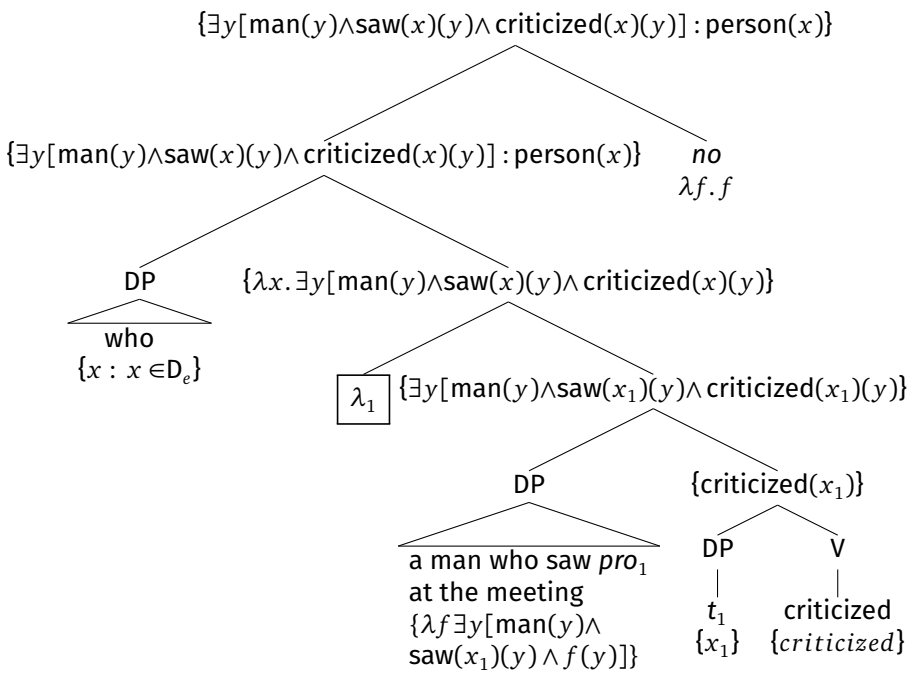
On the other hand, when the wh-phrase is moved, let us say by clause-internal scrambling, as in (74), lambda abstraction over the trace left behind by movement makes covariation possible.[26] (75a) shows the derivation of a sentence with a scrambled wh-phrase. This time, a lambda abstraction is applied after the subject and the VP are composed via Functional Application. It is this lambda binding that makes covariation of two variable possible.[27]

(74) **Dare-o**$_i$ [hazimete ***pro***$_i$ atta] hito-ga t_i kenasita no desu ka?
who-ACC for-the-first-time saw person-NOM criticize NL COP Q
'Who$_i$ did the person who saw *pg*$_i$ for the first time criticize t_i?'

[26] The idea that scrambling leaves behind a trace might seem to be opposed to Saito's argument that scrambling can always undergo total reconstruction at LF (Saito 1992: 86). The reason why Saito and I reached different conclusions would be that his analysis is based on the idea that (i) Scrambling does not affect the semantics, and therefore, it is an operation at PF and (ii) There is LF movement of the wh-phrase in Japanese. My position in this paper is that scrambling does affect the semantic component concerning establishing the binding relationship, and there is no LF movement of the wh-phrase. The proper binding condition will not be a problem in parasitic gap examples either because in any case the wh-phrase c-commands the trace which is left behind by scrambling.

[27] It should be noted that this lambda abstraction should be a particular kind of lambda abstraction because it does not abstract a set of alternatives itself, but the abstraction is actually over variables inside the set.

(75) a.



b. ⟦QP⟧
= {∃y[man(y)∧saw(x)(y) ∧ *criticize*(x)(y)] : person(x)}
= {a man who saw Bob at the meeting criticized Bob, a man who saw John at the meeting criticized John, …}

Looking at the derivation in (75a), this time, a trace with some index occupies the object position of *criticize*, and therefore the VP denotes {*criticized* (x_1)}. After the subject is composed with the VP, the matrix sentence is subject to lambda abstraction. When *pro* inside the subject happens to have the same index as the trace,[28] and two variables with the same index are bound by the single wh-phrase, it can manipulate the value of both variables together. As a result, we get an interpretation in (75b), where the value of *pro* and the trace of the wh-phrase covary.

4.3 Summary and implication

To sum up, the semantics of questions in Japanese, which uses alternatives instead of movement, correctly predicts that covariation between the wh-phrase and the parasitic gap (*pro*) is possible only when the wh-phrase moves, leaving behind a trace and c-commanding a parasitic gap. In other words, the bound reading can be obtained if movement of the wh-phrase introduces a lambda abstraction, which potentially binds the variable inside the syntactic island.

The analysis also accounts for two significant differences between parasitic gaps in English and Japanese: (i) the bound reading is not obligatory in Japanese parasitic gap constructions, and (ii) the anti-c-command condition does not hold in Japanese.

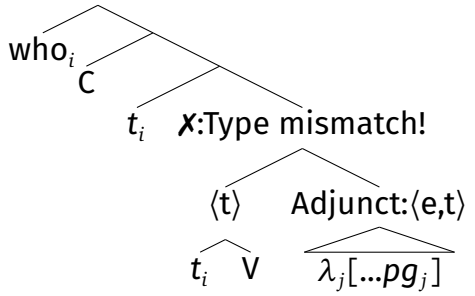
Under the analysis presented in this section, the movement is not motivated by a type mismatch, which motivates movement in English parasitic gap constructions according to the analysis of Nissenbaum (2000). In Nissenbaum's analysis of English parasitic gaps, English parasitic gaps are a trace of null operator movement. Here, the co-binding of two gaps is obligatory because it is necessary to apply Predicate Modification when we compute the

[28] This assumption is necessary because even with movement, the covariation is not obligatory unlike in English parasitic gap constructions. In other words, *pro* inside the subject still can refer to some other contextually salient entity even when there is movement.

semantics of two phrases, both of which have a gap. By contrast, in Japanese, the bound reading is available via Predicate Abstraction if the two variables have the same index, which means in some cases they can refer to different entities and in other instances they are bound by the same wh-phrase and end up referring to the same entity. The analysis presented in this paper correctly predicts optionality of the bound reading in Japanese.

The second point is on the anti-c-command condition. While Nissenbaum's analysis of English parasitic gaps gives us the anti-c-command condition for free, the analysis pursued here predicts that the condition does not hold in Japanese. In Nissenbaum's analysis, English parasitic gap constructions relies on Predicate Modification to make the co-binding possible. This analysis predicts that we would face a problem when the subject is the wh-phrase. In this configuration, in which a real trace c-commands a parasitic gap, there arises type-mismatch as illustrated in (76). This derives a so-called the anti-c-command condition: a real gap cannot c-command a parasitic gap, as in (77).

(76)



(77) *Which articles *t* got filed by John without him reading *pg*?

However, there is no anti-c-command condition in Japanese. Recall that a different constraint governs the bound reading in Japanese: the bound reading is possible as long as the wh-phrase is moved regardless of whether it is A-movement or A'-movement, and the wh-phrase c-commands a parasitic gap. According to this constraint, it is no problem that a wh-subject c-commands a parasitic gap, as shown by grammaticality of (78).

(78) **Dare-ga** [***pg*** iiyoru dansei-ni-yotte] *t* korosaremasita ka?
who-NOM advancing man-DAT-by be killed Q
'Who was killed by a man advancing to her?'

The grammaticality of (78) can be accounted for assuming the subject wh-phrase leaves a trace during A-movement. Just as we saw in the previous section, the trace and *pro* inside an adjunct can be bound by lambda operator in this case, too, and the wh-phrase in the subject position can manipulate the value of both variables together.

5 Conclusions

In this paper, I tried to give a better analysis of Japanese parasitic gaps by answering two questions: (i) What the empty category inside the island is, and (ii) What motivates obligatory movement. To answer the first question, I looked into Japanese parasitic gaps by comparing them with parasitic gaps in English or other languages. Then I concluded that the behavior of parasitic gaps in Japanese is too different from that in English, and claimed that they should be analyzed as *pro*. As supportive evidence, I showed three data points: (i) parasitic gaps should be nominal (DP or PP), (ii) parasitic gaps cannot appear in anti-pronominal contexts, and (iii) parasitic gaps are island insensitive. These three properties would be unexpected if parasitic gaps were traces of movement or results of ellipsis.

To answer the second question, I showed that the semantics of questions in Japanese, which allows us to interpret the wh-phrase and make the alternatives in-situ, could derive obligatory movement for free. The semantics of questions predicts that the covariation of the real trace and the gap inside the island cannot be obtained without movement. In addition, this analysis also derives two important difference between English parasitic gaps and Japanese ones: (i) the co-variation is optional in Japanese whereas it is obligatory in English, and (ii) the anti-c-command condition does not hold in Japanese, unlike in English.

The pronominal analysis of parasitic gaps itself is not new at all. As for English parasitic gaps, Cinque (1990) and Postal (1993) both proposed that they should be analyzed as null pronominals. As for Japanese parasitic gaps, too, Yoshimura (1992) firstly argued that parasitic gaps in Japanese should be analyzed as *pro* in Japanese. A contribution of this paper is to argue for the null pronominal analysis of parasitic gaps in Japanese by looking at a broader range of empirical data that supports this analysis.

Another contribution is that this paper illustrated possible patterns of variation among parasitic gap constructions. Japanese is a wh-in-situ language and also a *pro*-drop language, and therefore, there has been a debate over whether or not this language has a parasitic gap construction in a sense that it is a trace of movement or not. Even though in this paper I rejected the idea that Japanese parasitic gaps are traces of movement, it is still theoretically important to know what is different from English parasitic gap constructions and where the differences come from.

A question that naturally arises from the outcome of this paper is why Japanese does not have a parasitic gap as a null operator movement, unlike English. In other words, it is still necessary to explore what language parameter is related to the typology of parasitic gaps cross-linguistically. One possibility is that Japanese has *pro*, which English does not have. However, it is also true that English parasitic gaps can also behave as if they were *pro* in anti-pronominal contexts. In order to give an answer to this question, thorough cross-linguistic investigations on this construction would be necessary.

Abbreviations

ACC = accusative, COMP = complementizer, COP = copula, DAT = dative, GEN = genitive, LOC = locative, NL = nominalizer, NOM = nominative, Q = question marker, TOP = topic

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Competing Interests

The author has no competing interests to declare.

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