Argument-internal parasitic gaps

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Abstract
We argue that argument-internal parasitic gaps have important consequences for the theory of movement and the licensing conditions for parasitic gaps. In particular, we focus on a previously unexplained restriction on the distribution of parasitic gaps in ditransitive sentences: While a parasitic gap may appear in the leftmost internal argument of the prepositional dative construction, it is not possible in the leftmost argument of the double object construction. Our central claim is that this contrast follows from the operator-movement analysis of parasitic gaps as developed by Nissenbaum (1998*a*,*b*, 2000), in conjunction with an Antilocality condition on movement (Abels 2003). Specifically, the licensing of a parasitic gap in the ungrammatical case requires an intermediate step in the movement of the wh-phrase that violates Antilocality. We argue that this provides further support for the operator-movement analysis. Furthermore, our account has implications for structure of ditransitives and the theory of successive-cyclic movement. One of the arguments that Antilocality is at stake comes from the fact that the ungrammatical double object construction improves when the argument containing the parasitic gap is moved, e.g. in a passive sentence. In this case, the Antilocality-violating movement step is avoided because the parasitic gap is licensed in the derived position of the argument containing it. On the basis of this and other evidence, we argue that moved phrases containing parasitic gaps need not reconstruct, in line with Nissenbaum & Schwarz (2011).

1 Introduction

Parasitic gap constructions have been a topic of long-standing interest in syntactic theory (i.a. Ross 1967, Bresnan 1977, Taraldsen 1981, Engdahl 1983, Kayne 1983, Chomsky 1986, Cinque 1990, Williams 1990, Postal 1994, Nissenbaum 2000, Culicover 2001, Nissenbaum & Schwarz 2011, Davis 2020). While much of the previous literature has focused on parasitic gaps contained in adjuncts, such as (1a), it has also been observed that parasitic gaps can appear inside arguments, e.g. subjects (1b).

(1) a. Who$_1$ did you offend t_1 [without even talking to pg_1] ?
b. Who$_1$ did [some friends of pg_1] offend t_1?

In this paper, we argue that a closer investigation of argument-internal parasitic gaps reveals properties of the construction that are not otherwise apparent, with important consequences for the theory of movement and the licensing of parasitic gaps.

In particular, we focus on a previously unexplained restriction on the distribution of parasitic gaps in ditransitive sentences. We will show that, while a parasitic gap may appear in the leftmost internal argument of the prepositional dative construction (2a), it is not possible in the leftmost argument of the double object construction (2b).

(2) a. *Prepositional dative construction*
Which friend$_1$ did you give [$_{DP}$ some pictures of pg_1] [$_{PP}$ to t_1] yesterday?
b. *Double object construction*
*Which book$_1$ did you give [$_{DP}$ some fans of pg_1] t_1 yesterday?

Our central claim is that this contrast follows from the operator-movement analysis of parasitic gaps as developed by Nissenbaum (1998*a*,*b*, 2000), in conjunction with an Antilocality condition on movement (Abels 2003). Specifically, the licensing of parasitic gaps under Nissenbaum's analysis requires an intermediate step in the movement of the wh-phrase that violates Antilocality in (2b) but not (2a). We argue that this therefore provides support for the empty operator analysis. Furthermore, our analysis of the contrast in (2) has implications for structure of ditransitives and the theory of successive-cyclic movement.

One of the arguments that Antilocality is at stake comes from the fact that (2b) improves when the argument containing the parasitic gap is moved, as the passive example in (3) shows.

(3) Which book$_1$ were [$_{DP}$ some fans of pg_1]$_2$ given t_2 t_1 yesterday?

The Antilocality-violating movement step responsible for the ungrammaticality of (3) can be avoided in (3) if the parasitic gap is licensed in the derived position of the DP containing it. This has consequences for understanding of the licensing conditions on the parasitic gaps. In particular, Nissenbaum (1998*a*,*b*) argued that a moved phrase containing a parasitic gap must reconstruct for the parasitic gap to be licensed. We argue on the basis of (3) and other evidence that moved phrases containing parasitic gaps need not reconstruct, in line with Nissenbaum & Schwarz (2011).

The paper is structured as follows. Section 2 introduces some important generalizations about parasitic gaps and section 3 shows how these are captured under Nissenbaum's (2000) implementation of the null operator movement analysis. Section 4 provides a detailed discussion and analysis of parasitic gaps in ditransitives, including the explanation of the core contrast in (2). Sections 5 and 6 discuss the implications of our analysis for the structure of ditransitives, the theory of successive-cyclic movement, and the interpretation of parasitic gaps.

2 Parasitic gaps

Following initial observations by Ross (1967:192–195) and Bresnan (1977:182), Taraldsen (1981:491–495) and Engdahl (1983) independently identified the phenomenon of what they called *parasitic gaps* (PGs). The main characteristic that distinguishes PGs from other empty positions is their dependence on another gap. This is illustrated in the following paradigm:[1]

(4) *Parasitic gap paradigm*
a. Who$_1$ did you offend t_1 [without even talking to pg_1] ?
b. *Who$_1$ did you offend someone [without even talking to pg_1] ?
c. Who$_1$ did you offend t_1 [without even talking to anyone] ?

Example (4a) shows a typical example of a parasitic gap pg_1 contained in an adjunct clause. This gap is asymmetrically dependent on the trace t_1 in the main clause, which we will refer to as the *licensing gap* (LG). This can be seen by the impossibility of replacing the trace t_1 with *someone* in (4b). The PG, on the other hand, can be readily substituted for another nominal

[1] Throughout, we notate parasitic gaps in examples as *pg*, coindexed with their antecedent and the associated licensing gap.

such as *anyone* (4c), as the trace t_1 is not dependent on it. It is this asymmetric dependence that distinguishes parasitic gaps from ATB-constructions, for example (but see Munn 1992).

Previous literature has uncovered certain empirical generalizations about PGs. In the following paragraphs, we highlight two that will play a central role in our account of the distribution of PGs in ditransitives.

The first generalization is due to observations by Engdahl (1983:20–25) and Taraldsen (1981:493) and has to do with the structural relation between the two gaps. It can be stated as follows:

(5) *Anti-c-command generalization*
The LG cannot c-command the PG.

The generalization can be illustrated with sentences such as the following, in which the PG is in a clausal adjunct and the (attempted) LG is a subject that c-commands the adjunct, contrasting with the object LG in (4a).

(6) *Who$_1$ t_1 offended Sally [without her even talking to pg_1]?

Importantly, Engdahl (1983) showed that subjects *are* possible as LGs, as long as they do not c-command the PG. This can be seen in the minimal pair in (7) (adapted from Nissenbaum (2000:22)), in which the PG in the matrix adjunct cannot be licensed by a matrix subject gap (7a), but can be by an embedded subject gap (7b).

(7) a. *the person who$_1$ t_1 claimed [she was lonely] [in order to get you to visit pg_1]
b. the person who$_1$ I claimed [t_1 was lonely] [in order to get you to visit pg_1]

The second generalization, stated in (8), describes an additional tree-geometric relation between a PG and its LG. This generalization is due to Kayne 1983 and Longobardi 1985 and is therefore sometimes referred to as the *Kayne-Longobardi generalization* (Nissenbaum 2000:26).

(8) *Island generalization*
At most one island boundary can intervene between a PG and its LG.

This condition is met by all grammatical examples above with a PG, and by (9a) below. In all of them, the PG is contained in an adjunct island that does not contain the LG, that is, a single island boundary intervenes between the two gaps. As expected given this generalization, embedding the PG in an additional island that does not contain the LG is not licit (9b).

(9) the book Op_1 that I bought t_1 …
a. [$_{\text{island}}$ after reading pg_1]
b. *[$_{\text{island}}$ because my friend had a revelation [$_{\text{island}}$ after reading pg_1]]

As discussed in the next section, this generalization provides evidence that sentences with PGs involve movement of a silent operator to the edge of a constituent that contains it.

Before we show how the proposal by Nissenbaum (2000) successfully captures these properties of PGs, we briefly describe here three other important generalizations that figure prominently in the literature but do not play an important role in our account of parasitic gaps in ditranstives. First, whereas different A′-movement constructions license PGs (e.g. relativization in (9a) and wh-questions in (4a)), A-movement does not (Engdahl 1983:11–14; see van Urk 2015:37–51, 2017 for an account of this generalization based on the type of analysis adopted here). Second, only overt (A′-)movement licenses PGs; covert movement does not

(Engdahl 1983:14). This generalization has a well-defined set of exceptions discovered by Nissenbaum (2000:95–123), and his account is relevant in the specific context of our analysis of the distribution of PGs in passivized ditransitives, discussed in Section 6. Third, PGs are only licensed by movement of a nominal phrase (NP/DP); gaps of other categories such as PP or AP aren't possible licensers. This generalization is still the subject of some debate; see i.a. Chomsky 1982:55, Pesetsky 1982:584, Engdahl 1983:17, Emonds 1985:91, Cinque 1990:102–105, Postal 1993:736–737, 1994, Levine et al. 2001, and Ershova 2021:20–21.

3 The null operator analysis of parasitic gaps

The most comphrensive and empirically successful theory of PGs to date is Nissenbaum (2000). In what follows, we will show how it can capture the anti-c-command and island generalizations described in Section 2, and also discuss how it can be extended to PGs inside subjects. The analysis consists of two main components: null operator movement and derived predicate formation. We will first discuss each of these in turn.

3.1 Null operator movement

First, Nissenbaum adopts the classic assumption that the PG corresponds to a null operator that moves to the edge of a constituent containing the PG (Contreras 1984, Chomsky 1986:54–68, Browning 1987:146-229), as in the following representation for (4a):

(10) Who$_1$ did you offend t$_1$ [*Op*$_1$ without even talking to *pg*$_1$] ?

Supporting evidence for PGs involving a distinct movement dependency from their antecedent and LG comes both from the claimed lack of reconstruction to the position of the PG (Kearney 1983, Haïk 1985:284–292, Chomsky 1986:60, Munn 1992:51–57, Nissenbaum 2000:30–35) and the fact that a PG can be embedded in at most one island, that is, the island generalization discussed in the previous section. While PGs surface readily inside adjunct islands, the presence of an additional island results in ungrammaticality, as illustrated by the contrast between (9a) and (9b), repeated here:

(11) the book *Op*$_1$ that I bought t$_1$ …

a. [$_{\text{island}}$ *Op*$_1$ after reading *pg*$_1$]

b. *[$_{\text{island}}$ *Op*$_1$ because my friend had a revelation [$_{\text{island}}$ after reading *pg*$_1$]]

This makes sense if PG licensing requires the operator to A′-move to the edge of the maximal island containing it, that is, the single adjunct island in (11a) and the outer adjunct island in (11b). In (11a) this movement does not cross an island boundary, while in (11b) it necessarily does. Furthermore, this view can also explain the fact that the PG in (11b) becomes licit in the presence of an additional PG in the outer island (Nissenbaum 2000:26), as shown in (12).

(12) the book *Op*$_1$ that I bought t$_1$ …
[$_{\text{island}}$ *Op*$_1$ because my friend recommended *pg*$_1$ [$_{\text{island}}$ *Op*$_1$ after reading *pg*$_1$]]

Since PGs involve A′-movement, they can themselves be LGs. In (12), movement from the position of the leftmost PG can license the rightmost PG embedded in the inner adjunct island.

An important part of the analysis of these facts sketched above is that PG licensing requires the operator to move to the edge of the outermost island separating the PG from its LG. For instance, one must ensure that a parse of (11b) with movement of the operator to the edge of the inner island, as represented below, is not sufficient to license the PG:

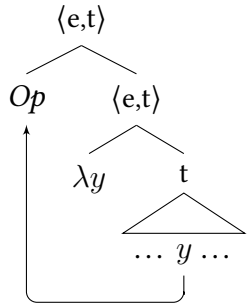
(13) *[$_{\text{island}}$ because my friend had a revelation [$_{\text{island}}$ Op_1 after reading pg_1]]

This does not follow directly from the assumption that PGs involve A′-movement of an operator, but it does when coupled with another aspect of Nissenbaum's analysis, to which we now turn.

3.2 Derived predicate formation

The second component of Nissenbaum's analysis involves how the null operator that corresponds to the PG is linked to its antecedent. While Chomsky (1986:54–68) proposed a rule of *Chain Composition* to interpret these structures, this is a construction-specific stipulation. Instead, Nissenbaum (1998*a*,*b*, 2000) seeks to unify the role of null operators in PG constructions with other constructions in which null operators have been posited, e.g. in relative clauses, *tough*-constructions, purpose clauses, and gapped degree constructions (Chomsky 1977). As noted by Chomsky (1977), Browning (1987:51) and Nissenbaum (1998*a*,*b*, 2000), null operator movement typically gives rise to a *derived predicate*. In other words, movement of a null operator to the edge of an XP turns that XP into a predicate of a higher type, e.g. ⟨e,t⟩. For Heim & Kratzer (1998), this is achieved by a rule of *Predicate Abstraction*. At its core, this rule interprets a constituent that is the sister to a moved phrase as involving λ-abstraction over a variable corresponding to the trace of the moved phrase. Our representation of derived predicate formation by null operator movement and Predicate Abstraction is shown below in (14).[2] The null operator itself has no semantic contribution, that is, it denotes an identity function.

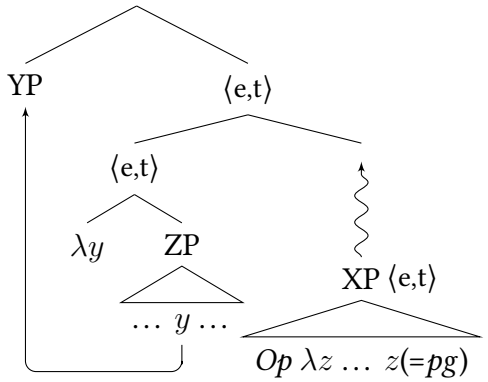
(14) *Derived predicate formation*



In terms of the licensing of PGs, the crucial part of Nissenbaum's analysis is the assumption that a PG-containing XP must be the sister to a derived predicate at LF, that is, a constituent formed by λ-abstraction, as in (15).

[2]Note that we adopt a simplified representation of this interpretational rule for movement dependencies. While Heim & Kratzer (1998:186) assume that the index of the moved item is adjoined below the landing site, we represent this as a λ-binder binding a corresponding variable in the positions of the trace. Nissenbaum (2000:45, fn.20, 46, fn.21) discusses an alternative view, instead assuming that 'predicate abstraction [is] a rule that type-shifts the lowest saturated projection of the head that attracts the moving phrase, from type τ to ⟨e, τ⟩.'

(15) *Nissenbaum's licensing configuration for parasitic gaps*



In other words, the PG-containing XP must externally merge with a node that was previously affected by Internal Merge. Another way of stating this is that it must be the sister to the node created by λ-abstraction. There are different ways of capturing this, and we simply follow Nissenbaum (1998*a*:512; 1998*b*:265–266) in assuming that the PG-containing XP is countercyclically adjoined to a node that is also affected by movement in a previous step. In (15), the moved YP is first internally merged with ZP. We assume that insertion of a λ-binder by Predicate Abstraction applies to the node that was affected by the original Internal Merge operation Merge(YP, ZP), that is, ZP. Subsequently, an XP containing a PG can be countercyclically merged with the mother of ZP and the λ-binder (we represent this countercyclic step with a squiggly arrow, as in (15)). The result is that the late-merged PG-containing XP is sandwiched between the moved phrase YP and its associated λ-binder. This is precisely the configuration in which PGs are licensed.

This property of a constituent taking as its scope the derived predicate created by movement of another constituent is called *parasitic scope* by Barker (2007), a useful term that we adopt here.[3] By adjoining to the derived predicate generated by YP in (15), XP has scope over YP's erstwhile scope, that is, XP's scope is parasitic on YP's.

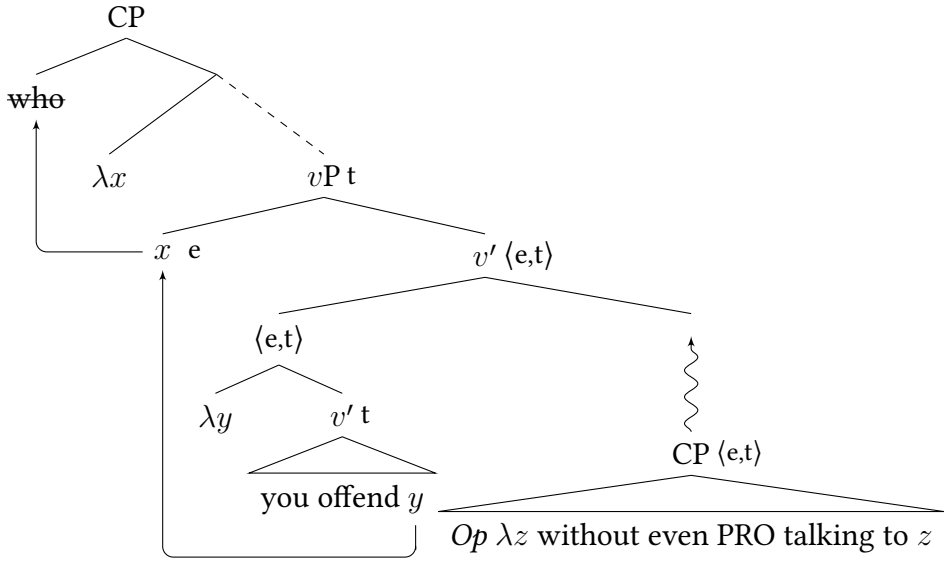
Nissenbaum (1998*a*,*b*, 2000) shows how the PG-licensing configuration follows straightforwardly from how PG configurations are interpreted. Since adjuncts containing a PG are necessarily derived predicates of type ⟨e,t⟩, they must combine with another constituent of type ⟨e,t⟩ via Heim & Kratzer's (1998) rule of Predicate Modification, given in (16).

(16) *Predicate Modification* (Heim & Kratzer 1998:65)
If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!] \in D_{\langle e,t\rangle}$ and $[\![\gamma]\!] \in D_{\langle e,t\rangle}$, then $[\![\alpha]\!] = \lambda x \in D_e.\ [\![\beta]\!](x) \wedge [\![\gamma]\!](x)$.

To see how this works, consider the analysis of (4a) given below.

[3] Although the term 'parasitic scope' is coined in Barker 2007, that work is not about PGs, but about certain readings of *same* that, according to Barker, require a parasitic-scope-based syntax and semantics. Parasitic scope is also a central part of the account of the semantics of *average* in Kennedy & Stanley 2008.

(17) Who did you offend t_1 [without even talking to pg_1] ?



The PG corresponds to a null operator that has moved to the edge of the adjunct CP, leading to abstraction over the variable z. The adjunct CP is therefore a derived predicate of type ⟨e,t⟩, as in the simplified denotation in (18a). In order for this phrase to be able to compose via Predicate Modification, its sister must also be of type ⟨e,t⟩. The predicate derived by intermediate movement of *who*, or its intermediate trace x, to the edge of vP ($\lambda y \ldots$) generates a constituent with the right kind of meaning (18b). Since both of these constituents are ⟨e,t⟩, they compose via Predicate Modification to derive the desired meaning in (18c).

(18) a. $[\![\text{CP}]\!] = \lambda z.$ **not-talk-to**(**you**, z)
b. $[\![\lambda y\ [_{v'}$ you offend $y\ ]]\!] = \lambda y.$ **offend**(**you**, y)
c. $[\![v']\!] = \lambda x.\ [\lambda y.$ **offend**(**you**, y)$](x) \wedge [\lambda z.$ **not-talk-to**(**you**, z)$](x)$
$= \lambda x.$ **offend**(**you**, x) $\wedge$ **not-talk-to**(**you**, x)

Not only does this derive the correct interpretation for PG constructions where the PG and the LG are bound by the same operator, it also follows from independently motivated assumptions about null operator movement and Predicate Modification.

In addition to providing a principled account of the interpretation of PGs, this analysis explains some of their main syntactic properties. In particular, it derives the following corollary:

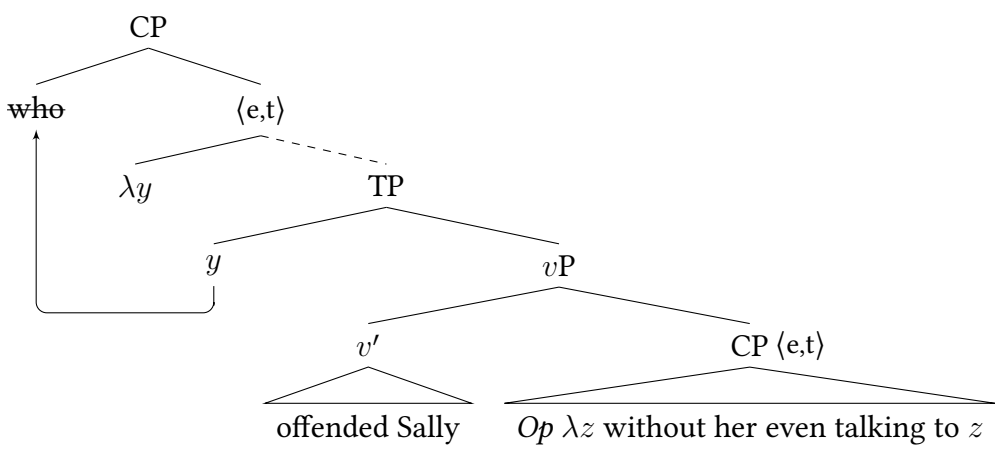
(19) The minimal XP containing the PG and its operator must c-command the LG.

As shown above, successful interpretation of the PG requires that the minimal XP containing the PG and its operator be the sister of a derived predicate created by movement from the LG position. Under the standard assumption that movement is upward, this entails that this XP must c-command the LG. The corollary in (19) explains the anti-c-command generalization discussed in the previous section, which states that the LG cannot c-command the PG. Consider, for instance, example (6), repeated here:

(20) *Who$_1$ t_1 offended Sally [without her even talking to pg_1]?

The structure of this example under this analysis is as follows:

(21) *



In this and all other examples that violate the anti-c-command generalization, the LG (y) asymmetrically c-commands not only the PG (z), but also the minimal XP containing the PG and its operator (in this case, the adjunct CP) and thus violates (19). In terms of conditions on interpretation (which ultimately derive this corollary), the problem with (21) is that the adjunct CP containing the PG and its operator is in a position that is not the sister of the derived predicate formed by movement of *who*, and can thus not be interpreted in that position. In other words, in this position, the adjunct CP does not take parasitic scope with respect to *who*, so the trace of the latter cannot be a LG for the PG in the adjunct CP.

The corollary in (19) also allows for a better understanding of the island generalization. Recall that the hypothesis that PGs involve operator movement was not in itself sufficient to account for sentences such as the following (repeated from (11b)) that illustrate the generalization:

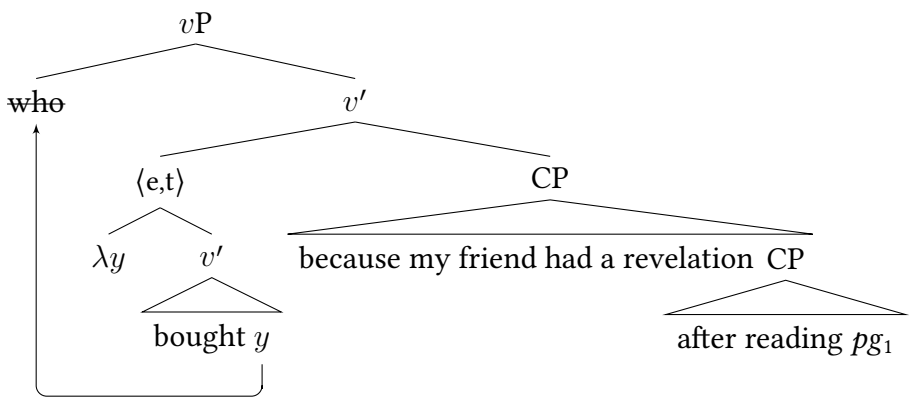
(22) *the book that I bought because my friend had a revelation after reading

a. [$_{\text{island}}$ Op_1 because my friend had a revelation [$_{\text{island}}$ after reading pg_1]]

b. [$_{\text{island}}$ because my friend had a revelation [$_{\text{island}}$ Op_1 after reading pg_1]]

Island constraints explain why movement to the edge of the outer island (22a) is ungrammatical, as it involves movement across the inner island boundary. However, something else must ensure that movement *within* the inner island (22b) is also ungrammatical, that is, not sufficient for PG licensing. Nissenbaum's analysis of the interpretation of PGs explains the ungrammaticality of the parse in (22b). Consider the following representation for the sentence, which abstracts away from movement of the PG operator:

(23)



The outer island (higher CP) c-commands the LG y, but the inner island (lower CP) does not. That means that the outer island can have parasitic scope with respect to *who*, but the inner island cannot. As a consequence, movement of the operator to the edge of the outer island makes the structure interpretable, but movement to the edge of the inner island does not. But the former involves extraction out of the inner island, hence the ungrammaticality of (22) under either parse.

3.3 Parasitic gaps in subjects

As noted in previous literature (e.g. Engdahl 1983), in addition to appearing inside adjuncts, PGs are also licit in certain nominal arguments, such as subjects. This is shown by the following examples:

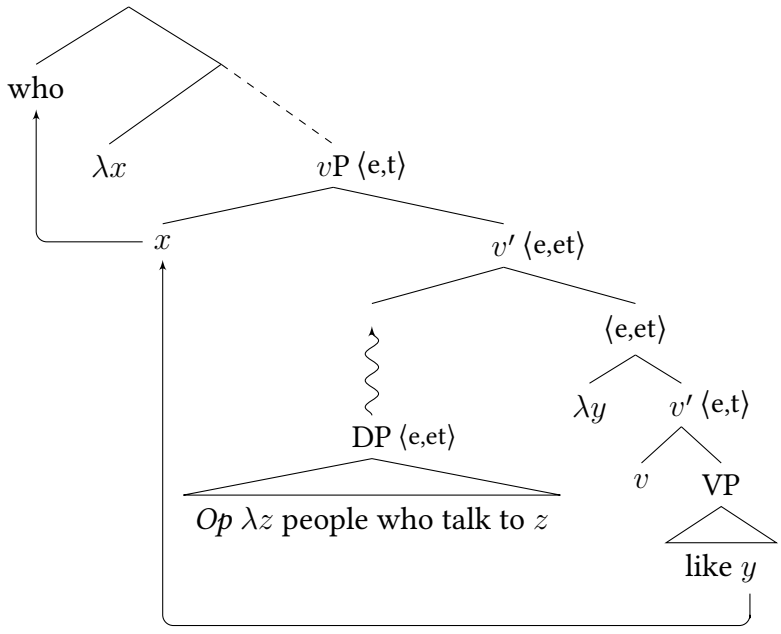
(24) a. Who$_1$ would [a picture of *pg*$_1$] surprise t$_1$?
b. He's a man who$_1$ [anyone who talks to *pg*$_1$] usually likes t$_1$
(Chomsky 1986:57,58)

Nissenbaum (1998*a*,*b*) assumes that PGs are only possible in bare plural subjects, which denote predicates of type ⟨e,t⟩ (following Heim 1982). A PG contained inside a nominal argument will involve null operator movement to the edge of the argument to create a derived predicate. In the case of a bare plural subject such as (25), this creates a higher type meaning of ⟨e,et⟩.

(25) John's a guy who [people who talk to *pg*$_1$] usually end up liking t$_1$
(Nissenbaum 1998*b*:268)

Nissenbaum (1998*a*,*b*) proposes that an interpretable configuration for such PG-containing DPs can be created by intermediate movement targeting the v' node that introduces the external argument. Since this node is already of type ⟨e,t⟩, adding a derived predicate created by intermediate movement of the wh-phrase creates a meaning of type ⟨e,et⟩. The bare plural subject, which is of the same type, then merges with the v' node affected by intermediate movement.

(26)



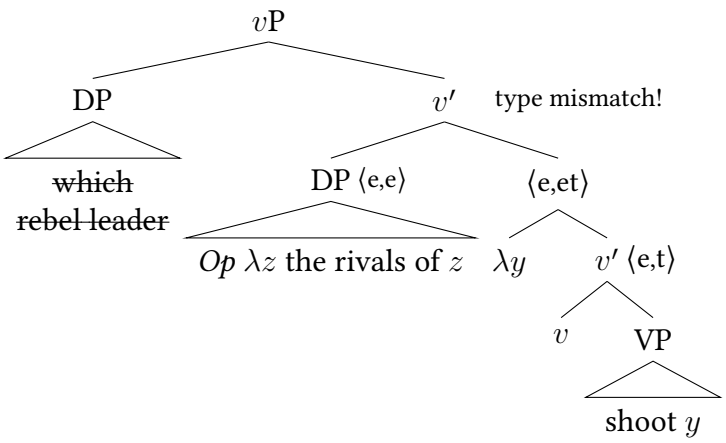
Nissenbaum argues that such structure can be interpretaed by recursive application of (generalized) Predicate Modification applying to two meanings of type ⟨e,τ⟩. We first intersect the outer e arguments, followed by the inner e arguments, to yield another meaning of type ⟨e,et⟩. This can then combine with the trace of intermediate movement (type e) followed by existential closure at the vP edge (Diesing 1992). This allows for the correct interpretation of PGs contained in bare plural subjects.[4]

That said, an analysis relying solely on Predicate Modification for interpreting XPs containing PGs cannot account for the numerous examples in the literature with PGs contained in subjects which are not bare plurals (*pace* Nissenbaum 1998*b*:269). As the examples in (27) illustrate, a PG-containing DP can include a definite article (27a,b), a universal quantifier (27c) or a possessive pronoun (27d).

(27) a. Which rebel leader$_1$ did [the rivals of *pg*$_1$] shoot t$_1$?
b. What$_1$ did [the attempt to repair *pg*$_1$] ultimately damage t$_1$?
(Chaves & Dery 2019:2)
c. Jack, who$_1$ [everyone who likes *pg*$_1$] visited t$_1$ (Frampton 1990:58)
d. the woman who [your attack on *pg*$_1$] enraged t$_1$ (Postal 1994:63)

Crucially, such examples cannot be interpreted by (recursive) Predicate Modification. As the structure for example (27a) in (28) shows, we have a type mismatch between the PG-containing subject of type ⟨e,e⟩ and its sister of type ⟨e,et⟩. However, notice that, if we could somehow ignore the outer e argument, the remainder could compose via regular Function Application.

(28)



To achieve this, Nissenbaum & Schwarz (2011) propose an extended mode of composition (building on Nissenbaum 1998*b*:273, fn.25). They assume that the interpreting of a branching node involves applying a function COMPOSE to the denotation of each daughter:

(29) If α is a branching node with daughters β and γ, then for any assignment g,
$[\![\alpha]\!]^g$ = COMPOSE($[\![\beta]\!]^g$, $[\![\gamma]\!]^g$).

The exact mode of composition that COMPOSE corresponds to varies depending on the semantic

[4]However, note that a problem would arise with the event variable here, which we have omitted for expositional purposes. This would mean that the predicate derived by intermediate movement to v' would actually be of type ⟨e,vt⟩ for PG-internal adjuncts or ⟨e,evt⟩ for PG-internal subjects (where v is the type for events). While this is unproblematic for interpreting PG-containing adjuncts via Predicate Modification, which presumably contain their own event variable, this is far less straightforward for argument-internal PGs. Furthermore, identifying the matrix event variable with that of a relative clause modifying the subject will derive the wrong interpretation (cf. Nissenbaum 1998*b*:272–273).

types of the arguments. The various ways of interpreting COMPOSE are given in (30).

(30) *Modes of composition* (Nissenbaum & Schwarz 2011:21)

a. *Conjunction*: If A and B are truth values, then COMPOSE(A, B) = A ∧ B.

b. *Application*: If A is a function whose domain contains B, then COMPOSE(A, B) = A(B)

c. *Argument Identification*: If A and B are composable functions from the domain of type τ, then COMPOSE(A, B) = λx_τ. COMPOSE(A(x), B(x)).

While Conjunction and Application are familiar operations, Argument Identification is a more specific mode of composition that allows the first argument of two matching types to be 'ignored' by additionally abstracting over it from outside the COMPOSE function. Thus, Heim & Kratzer's (1998) original rule of Predicate Modification in (16) would now consist of COMPOSE with Argument Identification as the first step (31b), followed by β-reduction (31c) and Conjunction of type-t arguments (31d).

(31) *Predicate Modification with COMPOSE*

a. COMPOSE(⟦red⟧, ⟦ball⟧)

$\xrightarrow{\text{Argument Identification}}$

b. λx. COMPOSE([λz. **red**(z)](x), [λy. **ball**(y)](x))

$\xrightarrow{\beta\text{-reduction}}$

c. λx. COMPOSE(**red**(x), **ball**(x))

$\xrightarrow{\text{Conjunction}}$

d. λx. **red**(x) ∧ **ball**(x)

Furthermore, Argument Identification also allows for the interpretation of PG structures such as (28) in which the PG-containing nominal is not a bare plural. The relevant steps are laid out in (32). Since these functions are composable in the domain of type e, Argument Identification applies (32b). After a step of β-reduction (32c), the arguments of COMPOSE are interpretable by Application (32d), which becomes (32e) by β-reduction. The resulting meaning correctly derives cobinding of the PG and LG.

(32) a. COMPOSE(⟦[$_{\text{DP}}$ *Op* λz . the rivals of z]⟧, ⟦λy[$_{v'}$ shoot y]⟧)

$\xrightarrow{\text{Argument Identification}}$

b. λv. COMPOSE([$\lambda z \iota x'$. x' **is a rival of** z](v), [$\lambda y \lambda x$. x **shoots** y](v))

$\xrightarrow{\beta\text{-reduction}}$

c. λv. COMPOSE($\iota x'$. x' **is a rival of** v, λx. x **shoots** v)

$\xrightarrow{\text{Application}}$

d. λv. [λx. x **shoots** v]($\iota x'$. x' **is a rival of** v)

$\xrightarrow{\beta\text{-reduction}}$

e. λv. ιx[x **is a rival of** v] **shoots** v

This gives us a very flexible approach to interpreting PGs inside nominal arguments regardless of the type of the nominal.

While this extension of Nissenbaum's general approach is very successful in deriving both the multifarious properties of PGs in adjuncts and subjects, there are some previously overlooked restrictions on PGs in internal arguments which constitute a challenge for this analysis. In the remainder of this paper, we will show how they can be reconciled with Nissenbaum's general approach to give a more comprehensive theory of PGs within arguments.

4 Parasitic gaps in ditransitives and Antilocality

Engdahl showed that PGs are possible in objects of ditransitives, as in the following example:

(33) Which girl$_1$ did you send [a picture of ___$_1$] [to ___$_1$] ? (Engdahl 1983:5)

It is interesting to note that Engdahl (1983:24) marks the rightmost gap as parasitic. We will argue that this is likely not the case. Other than this, not much attention has been paid to PGs in ditransitives. Examples like (33) have even been reported to be ungrammatical in some of the previous literature on PGs (e.g. Chomsky 1981:203, Koopman & Sportiche 1983, Sag 1983, Steedman 1987), however all the speakers we have consulted find them acceptable in agreement with the original judgment reported in Engdahl 1983.[5]

In this section, we discuss the following novel generalization governing the distribution of PGs:

(34) *Minimal distance generalization*
A PG-containing XP and the LG must be separated by at least one maximal projection boundary.
*$[_{XP} \ldots pg_i \ldots] \ldots [_{\alpha} \ldots t_i$, unless α is a maximal projection.

This generalization manifests itself in ditransitive sentences with PGs, and is illustrated by the following contrast:

(35) a. *Which book$_1$ did you give $[_{DP}$ a fan of pg_1] t_1 yesterday?
b. Which girl$_1$ did you give $[_{DP}$ a picture of pg_1] $[_{PP}$ to t_1] yesterday?

In the double object construction (35a), a PG internal to the structurally higher object cannot be licensed by a gap in the lower object.[6] On the other hand, the prepositional dative construction (35b) allows for PG licensing in this configuration. As we show below, what allows (35b) to follow the minimal distance generalization is the PP projection dominating the LG, which is crucially absent in (35a). In this section, we argue that the minimal distance generalization follows from the integration of Antilocality (Abels 2003) into the analysis of PGs adopted in this paper.

4.1 PGs and the dative alternation

In order to justify the minimal distance generalization, and the analysis it is based on, we must confirm that the distribution of gaps in (35) is indeed as shown, with the PG in the leftmost object. We first establish certain well-justified assumptions about the dative alternation in English. For a ditransitive verb such as *give*, there are two basic frames: the double object construction (DOC) (36a) and the prepositional dative construction (PDC) (36b).

(36) a. I gave Sue pictures of Mary
b. I gave pictures of Mary to Sue

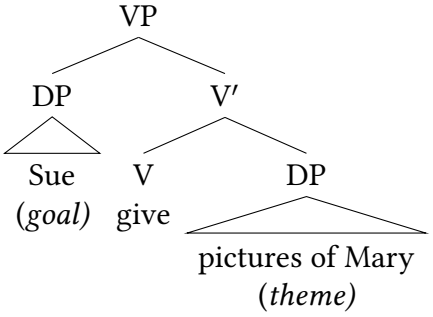
In both frames, the leftmost internal argument is structurally higher than the rightmost one. In the DOC, the goal *Sue* is the structurally-higher argument that c-commands the theme argument *some pictures of Mary*. Evidence for this asymmetric structure comes from binding and scope (Barss & Lasnik 1986, Larson 1988, Bruening 2001). This relation is reversed in the PDC where the theme is the higher argument, commanding the goal inside the lower PP. For

[5]Some speakers claim to also permit 'multiple interrogation' readings, where questions such as (33) can be answered with a single pair or pair-list answer (see e.g. Stowell 1983; Munn 1992:6,fn.3, Vicente 2016). We assume that these readings involve a different syntax and we set them aside here.

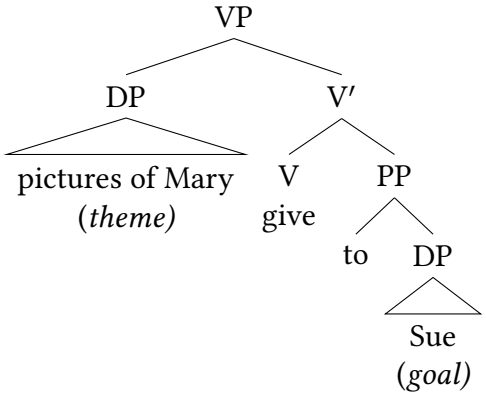
[6]Den Dikken (2018:96, fn.46) also notices the ungrammaticality of a PG embedded in the higher object of the double object construction in the context of the anti c-command generalization, and says it must be due to 'a different kind of restriction that may not be known at this time'.

now, we will adopt the simplified VP structures in (37) for the purposes of establishing our generalizations about PGs.

(37) *Double object construction*



Prepositional dative construction



The implications for various other proposals about the structure of ditransitives will be discussed in subsection 5.2.

With this in mind, consider the possibility of multiple gaps in the objects of ditransitives. In (38a), we have Engdahl's original acceptable pattern of multiple gaps in the PDC. This contrasts with the ungrammatical (38b) where the leftmost gap is not embedded in the object.[7]

(38) *Prepositional dative*

a. Which girl$_1$ did you give [$_{DP}$ a picture of ___$_1$] [$_{PP}$ to ___$_1$] yesterday?
b. *Which book$_1$ did you give ___$_1$ [$_{PP}$ to a fan of ___$_1$] yesterday?

In the DOC, both multiple gap configurations appear to be ungrammatical, regardless of whether the leftmost gap is embedded or not (39).

(39) *Double object construction*

a. *Which book$_1$ did you give [$_{DP}$ a fan of ___$_1$] ___$_1$ yesterday?
b. *Which girl$_1$ did you give ___$_1$ [$_{DP}$ a picture of ___$_1$] yesterday?

In order to understand these patterns, we are first faced with the basic question of which of these gaps is the PG and which is the LG. Engdahl (1983:24) actually marks the rightmost gap in pattern (38a) as the parasitic one, an analysis we will disagree with. Others have suggested that this choice remains arbitrary to some degree (Sternefeld 1991:79; Postal 2001:244,fn.1). We believe, however, that one can provide arguments that the gap in the higher object in both (38a) and (39a) as well as the gap in the lower object in (38b) and (39b) should be treated as the parasitic one.

First, let us consider the general extraction properties of these ditransitive frames (Jackendoff & Culicover 1971, Kuno 1973). In the DOC, subextraction is only possible from the lower object (40).

[7]However, the acceptability status of (38b) seems to be subject to some inter-speaker variation. Assuming that the leftmost gap is the licensing gap, this sentence would be predicted to be ungrammatical by the anti-c-command generalization, as we argue below. For those speakers who accept (38b), this could be accounted for under the assumption that the PDC may optionally also involve an 'ascending' structure in the sense of Janke & Neeleman (2012), in which the PP occupies a structurally-higher position c-commanding the direct object. This position could involve base-generation in a rightward specifier (as assumed by Janke & Neeleman 2012) or extraposition. Crucially, no such ascending structure is available for the DOC according to Janke & Neeleman. We therefore do not expect to find the same variation with (39b).

(40) a. *Which book$_1$ did you give [$_{DP}$ a fan of t$_1$] some money yesterday?
b. Which girl$_1$ did you give someone [$_{DP}$ a picture of t$_1$] yesterday?

In addition, only the lower object can be extracted (41).

(41) a. *Which girl$_1$ did you give t$_1$ a picture of Mary yesterday?
b. Which book$_1$ did you give a fan of *Harry Potter* t$_1$ yesterday?

This is evidence that, as represented below, the LG in the DOC in (39a) must be the one in the lower object position, and that the PG is the one internal to the higher object:

(42) *Which book$_1$ did you give [$_{DP}$ a fan of *pg*$_1$] t$_1$ yesterday?

This is consistent with the fact that extraction of the lower object is grammatical (41b). An alternative analysis with the gaps reversed is not possible, given that subextraction from the higher object is out (40a). The ungrammaticality of (39a)/(42) is in need of explanation, to which we turn to in the next subsection.

The extraction facts also suggest that in the DOC pattern in (39b), the PG is the gap inside the lower object, and accordingly should be represented as follows:

(43) *Which girl$_1$ did you give t$_1$ [$_{DP}$ a picture of *pg*$_1$] yesterday?

Under this parse, the ungrammaticality of the sentence can be attributed to the general ban on extraction of the higher object (41a) (in contrast to subextraction from the lower object, which is possible (40b)). Even if extraction of the higher object in a DOC were grammatical, (39b)/(43) would be expected to be out as a PG-licensing configuration, as it violates the anti-c-command generalization (i.e. the licensing gap c-commands the PG).

Consider next the structure of the PDC examples in (38). For those speakers who observe Kuno's Clause-Final Incomplete Constituent Constraint (Kuno 1973:380), subextraction is degraded from the higher object (44a) (we represent variability in judgments with '%'). Subextraction from the lower object is grammatical (44b).

(44) a. %Which girl$_1$ did you give [$_{DP}$ a picture of t$_1$] to someone?
b. Which book$_1$ did you give some money [$_{PP}$ to a fan of t$_1$] ?

Furthermore, extraction of both objects is possible (45) (in the case of the lower object, stranding the preposition).

(45) a. Which book$_1$ did you give t$_1$ to someone?
b. Which friend$_1$ did you give some money [$_{PP}$ to t$_1$] ?

At least for speakers for whom Kuno's constraint is active, this shows that the PG in the PDC in (38a) is the one in the higher object (46), which is consistent with the grammaticality of extraction of the lower object (45a) and the ungrammaticality (for these speakers) of subextraction from the higher object (44a).

(46) Which friend$_1$ did you give [$_{DP}$ a picture of *pg*$_1$] [$_{PP}$ to t$_1$] yesterday?

Although the conclusion does not follow for speakers without Kuno's constraint, weak crossover effects confirm that (46) is the correct structure for (38a) even for these speakers. A PG cannot be replaced by a pronoun (or a constituent containing a pronoun) bound

by the wh-phrase if this leads to a weak crossover violation.[8] This can be shown with PGs contained in subjects, as in the following pair:[9]

(47) a. Which girl$_1$ would [$_{DP}$ a picture of *pg*$_1$] surprise t$_1$?
b. *Which girl$_1$ would [$_{DP}$ a picture of her$_1$ mother] surprise t$_1$?

Similarly, replacing the gap inside the higher object in (38a)/(46) with a constituent containing a pronoun also results in a weak crossover violation (on weak crossover in ditransitives, see Barss & Lasnik 1986:348, Larson 1988:338):

(48) *Which girl$_1$ did you give [$_{DP}$ a picture of her$_1$ mother] [$_{PP}$ to t$_1$] yesterday?

This is evidence that the gap in the higher object in (38a) is the parasitic one, as represented in (46). Finally, we propose that in the PDC example in (38b), the gap in the lower object is parasitic:

(49) *Which book$_1$ did you give t$_1$ [$_{PP}$ to a fan of *pg*$_1$] yesterday?

The extraction facts above are not helpful in determining this, since both gaps are in extractable positions, as shown in (44b) and (45a). The weak crossover test can also not be used here, as the hypothesized PG does not precede the hypothesized LG. However, once again, we can rely on generalizations about the distribution of PGs as evidence. As represented in (49), (38b) violates the anti-command generalization (t$_1$ c-commands *pg*$_1$), which explains its ungrammaticality.

4.2 The minimal distance generalization

To summarize so far, we conclude that the multiple-gap examples in (38)–(39) have the following representations:

(50) *Prepositional dative construction*
a. Which girl$_1$ did you give [$_{DP}$ a picture of *pg*$_1$] [$_{PP}$ to t$_1$] yesterday?
b. *Which book$_1$ did you give t$_1$ [$_{PP}$ to a fan of *pg*$_1$] yesterday?

(51) *Double object construction*
a. *Which book$_1$ did you give [$_{DP}$ a fan of *pg*$_1$] t$_1$ yesterday?

[8] We assume that linear order is relevant for crossover, following Postal 1971, Wasow 1972, Higginbotham 1980, Williams 1994:197–198, 234–250, Bresnan 1998, Bruening 2010*b*:300–303, 2014, and Barker 2012 (cf. purely hierarchy-based accounts such as Koopman & Sportiche 1983, Safir 1984, and Ruys 2000). Specifically, crossover configurations involve an A′-moved element that binds a pronoun that precedes the trace of the moved element. Furthermore, crossover is strong if the pronoun c-commands the trace, and weak otherwise. The relevance of linear order in the present context has to do with the fact that while a PG in a subject cannot be replaced with a bound pronoun or a constituent containing a pronoun (47), this is in fact possible with PGs in adjuncts, as shown by the following pair:

(i) a. Which girl$_1$ did you offend t$_1$ [without even talking to *pg*$_1$] ?
b. Which girl$_1$ did you offend t$_1$ [without even talking to her$_1$ mother] ?

The pronoun precedes the cobound trace in object position in (47b), but it does not in (ib), which results in a weak crossover violation in the former but not the latter.

[9] Importantly, extraction facts show that the PG in (47a) is the gap in the subject, as extraction from this subject is not possible:

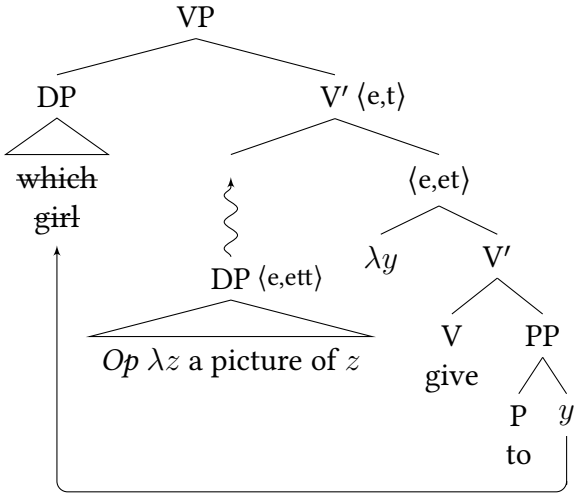
(i) *Which girl$_1$ would [$_{DP}$ a picture of t$_1$] surprise Mary?

b. *Which girl did you give t_1 [$_{DP}$ a picture of pg_1] yesterday?

Furthermore, we have also accounted for the ungrammaticality of (50b) and (51b): In both, the LG is in the higher object position, which asymmetrically c-commands the lower object containing the PG, in violation of the anti-c-command generalization.[10] What we need to account for, then, is the ungrammaticality of (51a), and, in particular, the contrast with grammatical (50a). Both involve (attempted) licensing of a PG embedded in the higher object by a gap in the lower object, and respect all known generalizations governing the distribution of PGs, yet the pattern is ungrammatical in the DOC case (51a). On Nissenbaum's analysis, nothing seems to rule out either example. In particular, both examples are parsable in terms of a structure in which the minimal XP containing the PG and its operator is the sister of a derived predicate created by movement from the LG, as we show below.

First, consider the PDC example in (50a), represented in (52). The LG is created by wh-movement of the lower object, which makes a first intermediate step at the edge of VP, for reasons discussed below.

(52) *Structure of the PDC in (50a)*



The higher object can be merged taking parasitic scope over the derived predicate created by movement of the lower object. The higher object is quantificational and contains a PG, so it is of type ⟨e,ett⟩, and the derived predicate is of type ⟨e,et⟩. They can thus compose given Nissenbaum & Schwarz's (2011) extended mode of composition discussed in subsection 3.3. Recall that the exact mode of composition depends on the types involved. In (53b), this is Argument Identification, given the definition in (30c). After a step of β-reduction in (53c), the two arguments can compose by Application, since their types are ⟨et,t⟩ and ⟨e,t⟩ (53d). Finally, β-reduction applies (53e), so that the higher V′ node is of the correct ⟨e,t⟩ type for composition higher in the tree.[11]

(53) a. COMPOSE($[\![[_{DP}$ *Op* λz a picture of $z]]\!]$, $[\![\lambda y[_{v'}$ give to $y]]\!]$) —Argument Identification→

b. λv. COMPOSE($[\lambda z \lambda P \exists x'.\ x'$ **is a picture of** $z \wedge P(x')](v)$, $[\lambda y \lambda x.$ **give** x **to** $y](v)$) —β-reduction→

c. λv. COMPOSE($\lambda P \exists x'.\ x'$ **is a picture of** $v \wedge P(x')$, $\lambda x.$ **give** x **to** v) —Application→

[10] In addition, (51b) is ruled out because the higher object in a DOC can't be extracted.

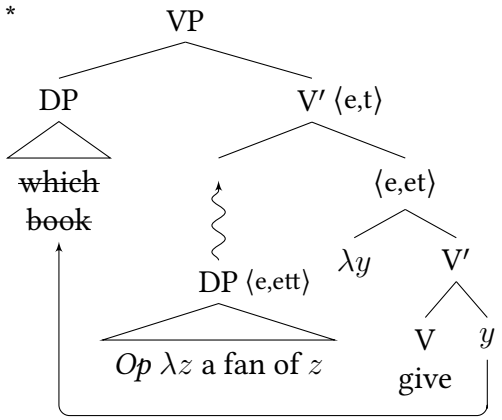
[11] We have omitted the external argument role here. We assume that it is severed from the denotation of the verb and introduced at vP (see Kratzer 1996).

d. $\lambda v.\ [\lambda P \exists x'.\ x'$ **is a picture of** $v \wedge P(x')](\lambda x.$ **give** x **to** $v)$ $\xrightarrow{\beta\text{-reduction}}$
e. $\lambda v \exists x.\ x$ **is a picture of** $v \wedge$ **give** x **to** v

Note that the assumption made in the structures above that wh-movement of the lower object makes a first stop at the edge of VP is important in explaining the grammaticality of (52). Since the DP containing the PG is an argument of V, it must be externally (late) merged within VP, which means that the derived predicate created by movement of the lower object must be within VP. If this step of movement were to a higher position (e.g. vP), the DP containing the PG would have no derived predicate to take parasitic scope over.

The DOC example in (51a) has a parallel structure shown in (54), and should therefore compose in a similar way, yet the sentence is ungrammatical.

(54) *Structure of the DOC in (51a)*



Parallel to (52)/(53), the type of the PG-containing quantificational object is ⟨e,ett⟩, which can compose with its sister of type ⟨e,et⟩ by Argument Identification and Application, yielding type ⟨e,t⟩ for the higher V′ node. The source of its ungrammaticality cannot be due to failure to meet the PG licensing configuration or uninterpetrability of the structure, and must be due to another factor.

We contend that the contrast illustrates the minimal distance generalization in (34), repeated here:

(55) *Minimal distance generalization*
A PG-containing XP and the LG must be separated by at least one maximal projection boundary.
*$[_{XP} \ldots\ pg_i \ldots\ ] \ldots\ [_{\alpha} \ldots\ t_i$, unless α is a maximal projection.

In particular, what makes the DOC in (54) ungrammatical is the absence of a maximal projection boundary between the the PG-containing higher DP and the LG in the lower object. This is in contrast with the PDC in (52), in which the PP boundary in the lower object separates it from the higher object DP. In the following two subsections, we provide evidence that this is the correct interpretation of the facts, by comparing it with other non-hierarchically-based explanations. Our Antilocality-based analysis of the generalization is presented in subsection 4.5.

4.3 The contrast is not due to linear adjacency

A difference between the grammatical PDC in (50a) and the ungrammatical DOC in (51a), repeated here, is that the two gaps are linearly adjacent in the latter but not in the former:

(56) a. Which girl$_1$ did you give [$_{DP}$ a picture of *pg*$_1$] [$_{PP}$ to t$_1$] yesterday?
b. *Which book$_1$ did you give [$_{DP}$ a fan of *pg*$_1$] t$_1$ yesterday?

A plausible account of the contrast might rely on this difference, perhaps as a garden-path effect triggered by the adjacent gaps in (56b). Two types of argument militate against this alternative analysis. First, there is no general ban against a PG adjacent to its LG, as shown in (57). The restriction seems specific to ditranstive structures.

(57) a. This is a note which$_1$ [unless we destroy *pg*$_1$] t$_1$ will ruin our relationship.
(adapted from Haegeman 1984:231)
b. ?a man who$_1$ [whenever I meet *pg*$_1$] t$_1$ looks old (Chomsky 1986:54)

Second, increasing the linear distance between the gaps does not necessarily improve the acceptability of the DOC case. For instance, adding a DP-internal modifier to the right of the PG does not alter the contrast in (56), as shown in (58).

(58) a. ?Which friend$_1$ did you give [$_{DP}$ a picture of *pg*$_1$ with a nice frame] [$_{PP}$ to t$_1$] yesterday?
b. *Which book$_1$ did you give [$_{DP}$ a fan of *pg*$_1$ with long hair] t$_1$ yesterday?

Thus, the ungrammaticality of the DOC pattern in (56b) is not due to adjacency of the two gaps.

4.4 The contrast is not due to θ-roles

Another alternative to consider is that the pattern is θ-related. Specifically, in the ungrammatical DOC case, repeated here as (59a), the PG is embedded in the Goal object.

(59) *Double object construction*
a. *Which book$_1$ did you give [$_{DP}$ a fan of *pg*$_1$] t$_1$ yesterday? (✗ PG in Goal)
b. *Which girl did you give t$_1$ [$_{DP}$ a picture of *pg*$_1$] yesterday? (✗ PG in Theme)

We could thus think of the relevant restricton as banning PGs in Goal arguments. Indeed, a PG is also not possible in the Goal argument in the prepositional dative construction, repeated below in (60b):

(60) *Prepositional dative construction*
a. Which girl$_1$ did you give [$_{DP}$ a picture of *pg*$_1$] [$_{PP}$ to t$_1$] yesterday?
(✓PG in Theme)
b. *Which book$_1$ did you give t$_1$ [$_{PP}$ to a fan of *pg*$_1$] yesterday? (✗ PG in Goal)

Novel data from the *spray/load*-alternation show that the correct generalization is structural, not θ-related. Consider the following paradigm:

(61) *Spray-load alternation (prepositional goal)*
a. Which trucks$_1$ did you load [$_{DP}$ pictures of *pg*$_1$] [$_{PP}$ into t$_1$] yesterday?
(✓PG in Theme)
b. *Which pictures$_1$ did you load t$_1$ [$_{PP}$ into boxes for *pg*$_1$] yesterday?
(✗ PG in Goal)

(62) *Spray-load alternation (prepositional theme)*

a. Which pictures$_1$ did you load [$_{DP}$ boxes for *pg*$_1$] [$_{PP}$ with t$_1$] yesterday?
(✓PG in Goal)

b. *Which boxes$_1$ did you load t$_1$ [$_{PP}$ with pictures of *pg*$_1$] yesterday?
(✗ PG in Theme)

Although the PG in the Goal in (61b) is ungrammatical, this is only the case if the Goal is the lower object, not when it is the higher object (62a). Similarly a PG in a Theme is ungrammatical only when this argument is the lower object, as shown by the contrast between (61a) and (62b), as well as the contrast between the PDC in (60a) and the DOC in (59b). Thus, the generalization cannot be cast in terms of θ-roles. What makes all (b) examples in (59)–(62) ungrammatical is the anti-c-command generalization, not the θ-role of the argument containing the PG.

Closer examination of the entire ditransitive paradigm in (59)–(62) confirms that the minimal distance principle is the correct generalization concerning the ungrammaticality of the DOC in (59a). In all (a) examples, the PG is embedded in the higher object, and the LG is in the lower object position. What distinguishes the ungrammatical DOC pattern in (59a) from all the other (a) examples is that the lower argument is a PP only in the latter, so that this PP boundary intervenes between the PG-containing object and the LG. This maximal-projection boundary is absent in the DOC case (the lower argument is a DP), which is the apparent source of its ungrammaticality.

The effect of a PP boundary is also found with ditransitives verbs such as the following that can have a preposition in the double object alternant (Pesetsky 1995):

(63) a. They provided a new drug to addicts of heroin.
b. They provided addicts of heroin *(with) a new drug.

(64) a. The kolkhoz supplied grain to the villagers.
b. The kolkhoz supplied the villages *(with) grain. (Pesetsky 1995:145)

(65) a. They awarded a prize to the biggest critics of theirs.
b. They awarded the biggest critics of theirs ?(with) a prize.

A PG in the second object is possible in the DOC with these verbs, as long as the preposition is present:

(66) a. Which drug$_1$ did they provide [$_{DP}$ addicts of *pg*$_1$] [$_{PP}$ with t$_1$] ?
b. What did the kolkhoz supply [$_{DP}$ the producers of *pg*$_1$] [$_{PP}$ with t$_1$] ?
c. Which prize$_1$ did they award [$_{DP}$ a critic of *pg*$_1$] [$_{PP}$ *(with) t$_1$] ?

To conclude, the ungrammaticality of a PG in the higher object of a DOC is not θ-related. Rather, the source seems to be the absence of a PP layer in the lower object containing the LG, as expected given the minimal distance generalization.

4.5 Antilocality explains the minimal distance generalization

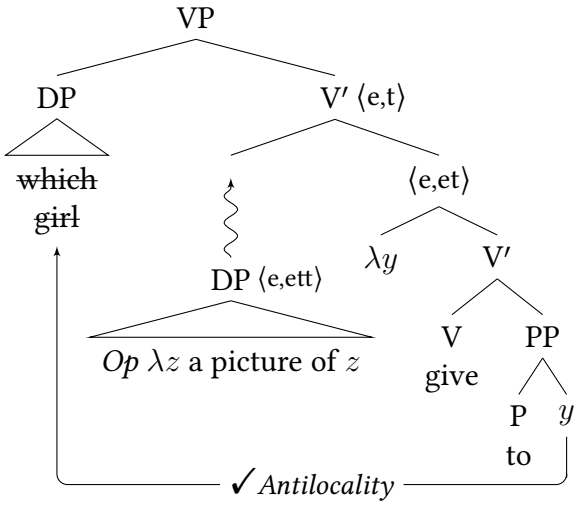
Our proposal is that the minimal distance generalization follows from the analysis of PGs in ditransitives developed here, augmented to incorporate Antilocality, which we define as follows:

(67) *Antilocality* (Abels 2003)
Movement must cross at least one maximal projection.

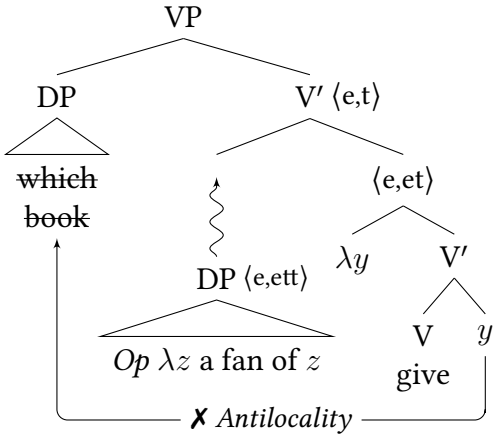
Specifically, licensing of a PG in a ditransitive object necessitates an intermediate step at the edge of VP (see subsection 4.2), but this movement violates Antilocality in the DOCs that do not follow the Minimal Distance Generalization.

Consider the structure of the VPs our core contrastive pair, repeated below:

(68) *Prepositional dative construction*
Which girl$_1$ did you give [$_{DP}$ a picture of pg_1] [$_{PP}$ to t_1] yesterday?



(69) *Double object construction*
*Which book$_1$ did you give [$_{DP}$ a fan of pg_1] t_1 yesterday?



In both cases, the LG is a trace of extraction of the lower object. This extraction must be allowed to make a first stop at the edge of VP for the PG to be licensed in the higher object, as discussed in subsection 4.2. Crucially, grammatical (68) respects Antilocality, but ungrammatical (69) does not. In (68), the lower object is extracted from a PP, enough to satisfy the requirement that it must cross at least one maximal projection. In the absence of this PP layer in the DOC in (69), no maximal projection is crossed.

The explanation of the grammatical pattern in (68) extends to all ditransitive examples with a lower PP object discussed above, including the DOCs with prepositional second objects in (63)–(65) and the grammatical *spray/load* examples in (61)–(62). In addition, all ungrammatical DOC examples have the general pattern depicted in (69). In the rest of this section we argue that this account makes correct predictions beyond the data discussed so far.

4.6 Embedding in any XP is sufficient

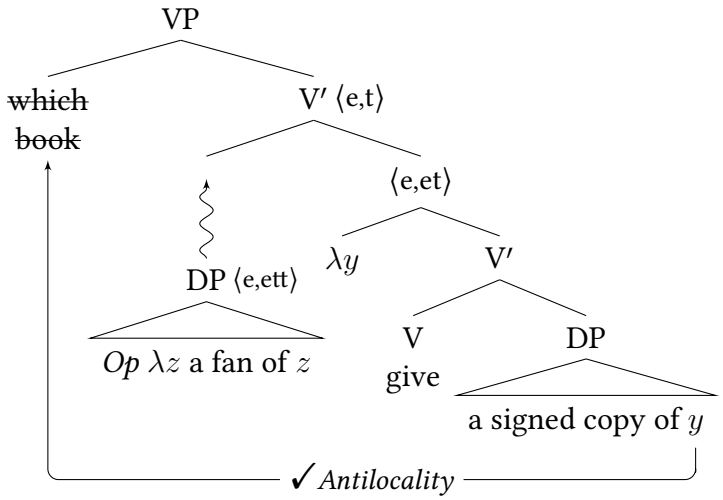
Our account predicts that a maximal projection of any sort (not just PPs) intervening between the PG-containing XP and the LG is sufficient for PG-licensing. This prediction is confimed by embedding the LG further in the lower object in a DOC, as in (70) (cf. (69), in which the LG is not embedded), as well as cases of subextraction from a lower clausal object, as in (71).

(70) Which book$_1$ did you give [$_{DP}$ a fan of pg_1] [$_{DP}$ a signed copy of t_1] yesterday?

(71) a. Which cult leader$_1$ did you persuade [$_{DP}$ followers of pg_1] [$_{CP}$ to abandon t_1] ?
b. Who$_1$ did you tell [$_{DP}$ friends of pg_1] [$_{CP}$ that Mary had met t_1] ?

The effect of the interevening maximal projection is represented here for (70):

(72) *Structure of the DOC in (70)*



In contrast with (69), movement of *which book* in to the edge of VP in (72) satisfies Antilocality, as it crosses a maximal-projection boundary, namely DP. In (71), the crossed maximal projection boundary is clausal. The examples in (71) are also relevant because, in all other grammatical ditransitive examples with PGs, the LG is the complement of a preposition. This is not the case in (71), which shows that this is not a factor in explaining these patterns.

The analysis also explains certain contrasts involving DOCs in which material is added to the right of both gaps. Specifically, adding an adverbial does not ameliorate the effect in the DOC, but adding a particle like *back* does, as shown in the following examples:

(73) a. *Which book$_1$ did you give [$_{DP}$ the owner of pg_1] t_1 yesterday?
b. Which book$_1$ did you give [$_{DP}$ the owner of pg_1] t_1 back?

The ungrammaticality of (73a) is expected, since the adverbial does not add a maximal projection boundary between PG-contatining higher object and the LG in the lower object. On the other hand, the analysis predicts the amelioration effect of the particle in (73b), under the assumption that particles involve a small-clause structure containing both the lower object and the particle, interpreted as a secondary predicate (Kayne 1984, Aarts 1989, den Dikken 1995, Svenonius 1996), illustrated here for (73b):

(74) Which book$_1$ did you give [$_{VP}$ t_1 [$_{DP}$ the owner of pg_1] [$_{SC}$ t_1 back]] ?
✓*Antilocality*

The small clause boundary is a maximal projection (e.g. Bowers's (1993) PredP) that separates the DP containing the PG from the licensing gap, which allows movement of the wh-phrase to the edge of VP to satisfy Antilocality by crossing this maximal projection.

More generally, the prediction is that the ungrammaticality of PGs in the higher object of a DOC is ameliorated by the addition of a secondary predicate on the lower object. The prediction is borne out by the contrasts in (75) and (76).[12]

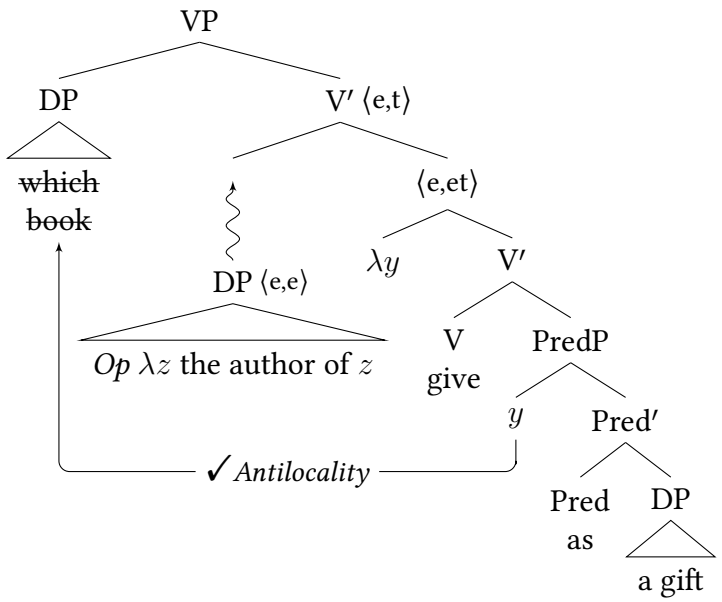
(75) a. (?)Which book$_1$ did you give [$_{DP}$ the author of *pg*$_1$] t$_1$ as a gift?
b. ?*Which book$_1$ did you give [$_{DP}$ the author of *pg*$_1$] t$_1$ as a friend?

(76) a. (?)This is the vaccine$_1$
Op$_1$ that we have to give [$_{DP}$ all intended recipients of *pg*$_1$] t$_1$ in two doses.
b. ?*This is the vaccine
Op$_1$ that we have to give [$_{DP}$ all intended recipients of *pg*$_1$] t$_1$ in two hours.

The clause-final material in (75a) and (76a) involves the object-oriented secondary predicates *as a gift* and *in two doses*, respectively. This contrasts with (75b) and (76b), which are significantly degraded compared to (75a) and (76a), despite the fact that the expressions *as a friend* and *in two hours* are on the surface nearly identical to *as a gift* and *in two doses*. The crucial difference is that the former are not secondary predicates on the lower object, and thus do not introduce a maximal projection that would allow satisfaction of Antilocality.

To see this, consider the analysis of (75a) in (77). We assume that *as* heads a functional projection associated with the small clause (Aarts 1992:113–118; Starke 1995:240–241; Bowers 1993:596–597; den Dikken 2006*b*:34–35; also see Bailyn 2002:38). For convenience, we assume that this is PredP following Bowers (1993) (however, see Matushansky 2019 for recent criticism). Importantly, given the structure in (77), the movement step to Spec-VP required to license the PG in the higher object no longer violates Antilocality, as it crosses the maximal projection boundary associated with the small clause.

(77)



This is different for the examples in (75b) and (76b). In (75b), the *as*-phrase is a secondary predicate on the subject, we assume that it merges at a higher position than in (77) (e.g. v'

[12]Erik Zyman (p.c.) reports a different l-selectional requirement for the preposition in (76), namely *recipients to* rather than *recipients of*. This change does not affect the contrast, however.

following Pylkkänen 2008:24–25). The addition of this material does not increase the structural distance along the movement path of the PG-licensing step. The same is true for the adverb *in two hours* in (76b) that we also assume adjoins to a high position (e.g. vP).

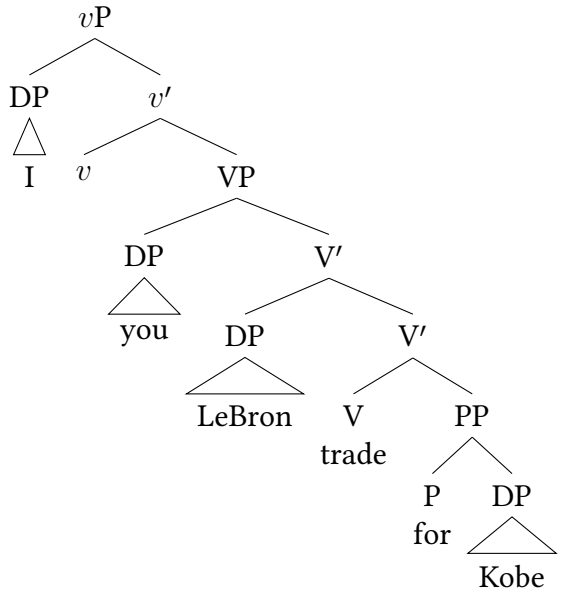
4.7 Predictions for tritransitives

Let us now consider the predictions of our analysis for so-called 'tritransitive' verbs with three internal arguments such as those in (78) (Huddleston & Pullum 2002:219 refer to these as *quadrivalent verbs*).

(78) a. I will trade you LeBron for Kobe.
b. I bet you five bucks that John wins the race.

The verbs *trade* in (78a) and *bet* in (78b) each have three objects. We follow Mita (2009) in proposing the following structure for these verbs:

(79) *Structure of tritransitives* (Mita 2009)



First, consider the fact that extraction from either of the lower two arguments is in principle possible:

(80) a. Which player$_1$ would you trade me t$_1$ for LeBron ?
b. Which player$_1$ would you trade me LeBron for t$_1$?

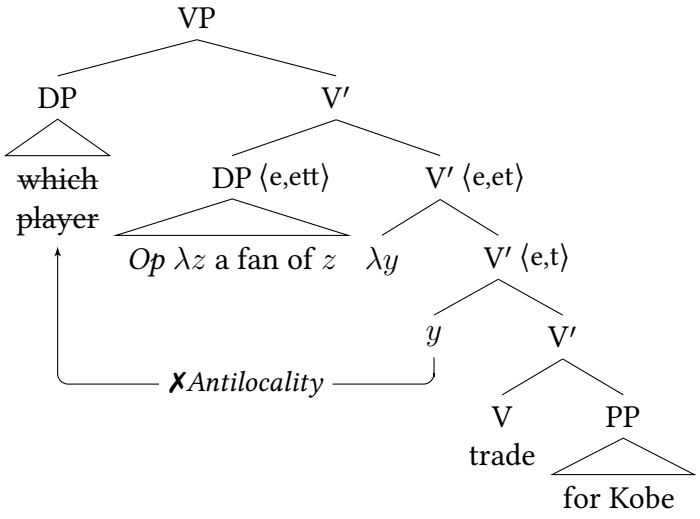
With this in place, the predictions of our analysis are clear. A PG in the highest internal argument of a tritransitive verb should be licensed by extraction from the lowest argument in (80b), but not from the next higher one in (80a), since this is antilocal. This prediction is indeed borne out by the data in (81).[13]

(81) a. I would trade [a fan of the Lakers] LeBron for Kobe.
b. *Which player$_1$ would you trade [a fan of *pg*$_1$] t$_1$ [for Kobe] ?
c. ?Which player$_1$ would you trade [a fan of *pg*$_1$] LeBron [for t$_1$] ?

[13]Thanks to Matthew Hewett for pointing out these data to us.

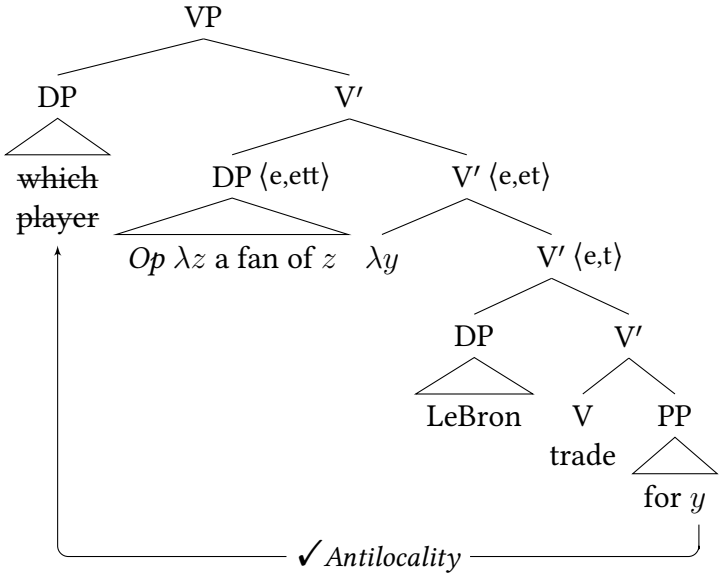
In the presence of a PG in the highest argument, the licensing step must stop at the edge of VP. In (81b), this movement violates Antilocality, as shown in (82).

(82) *Which player$_1$ would you trade [a fan of pg_1] t_1 [for Kobe] ?



Movement from the lowest PP argument, as in (81c) however, crosses a maximal projection and is therefore able to license the PG, as shown in (83).

(83) ?Which player$_1$ would you trade [a fan of pg_1] LeBron [for t_1] ?



Thus, our account can be shown to make correct predictions about licensing of argument-internal PGs with tritransitives verbs, too.

5 Consequences of the analysis

In this section, we explore certain consequences of our analysis. First, contrary to standard assumptions, we argue that successive cyclicity in wh-movement is not necessarily tied to phasehood, as the distribution of PGs in ditransitives shows that wh-movement must be allowed to make intermediate steps at edges of XPs that are crucially not phasal. Second, the analysis allows us to arbitrate among competing hypotheses for the structure of ditransitives.

Specifically, we argue that only theories that posit a greater structural distance between the two DP objects in a PDC than in a DOC can account for the facts regarding the licensing of PGs in these constructions.

5.1 Successive cyclicity and phases

Nissenbaum (2000) and Legate (2003) argue that the licensing of PGs in adjuncts by intermediate movement to the specifier of vP that we illustrated in section 3 provides support for the phasehood of vP. These authors argue that the licensing of PGs in adjuncts at this position as well as other facts discussed in Fox 2000 serve to diagnose this intermediate step, and their conclusion is that it is the phasehood of vP forces successive-cyclic movement to pass through the edge of vP. Our findings stand to contradict this conclusion, however: At least some cases of intermediate movement must target edges of phrases that are not phases.

In our analysis, intermediate wh-movement of the lower object in a DOC must target the specifier of VP in order to license a PG in the higher object. However, this is not possible if this movement is too local. As we have seen, the lack of additional structure in the DOC means that this licensing step is not possible. However, this necessary intermediate step in VP cannot due to this phrase being phasal. If this were the case, then extracting the lower object of a DOC should be generally impossible. We would therefore predict, incorrectly, that Antilocality and the phasehood of VP would jointly rule out examples such as (84) with no PG in the higher object.

(84) What$_1$ did you give [$_{VP}$ (*t$_1$) [$_{V'}$ Mary [$_{V'}$ t$_V$ t$_1$]]] ?

In order for (84) to be compatible with Antilocality, VP cannot be a phase.

The consequence of this for our understanding of successive cyclicity is that intermediate movement steps must also be able to optionally target non-phasal projections such as VP in this case. We assume that such steps are forced not by phasehood, but by the need to create the required licensing configuration for PGs. This line of argument is compatible with more recent claims that certain widely-accepted arguments for phasehood (including the ones mentioned above) are compatible with the assumption of phases, but do not require it (see e.g. den Dikken 2006*a* and Keine 2016:404–415 on vP in particular). Furthermore, it is not just that our analysis is compatible with VP being a phase, it crucially must not be, despite being a potential target for successive-cyclic movement.

5.2 Structure of ditransitives

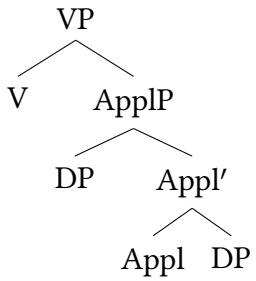
Our analysis of the ungrammaticality of PGs in DOCs relies on the analysis of DOCs in (37), in which the two objects of the ditransitive verb are generated within VP. As shown in section 4, licensing of a PG in the higher object by movement of the lower object necessitates an intermediate step at the maximal projection immediately dominating the higher object (i.e. VP). As shown in the following schematic representation, this movement step does not cross a maximal projection and thus violates Antilocality, which explains the ungrammaticality of this configuration.

(85) [$_{VP}$ DP [$_{DP}$ … PG …] V t]
↑ ✗*Antilocality* ↓

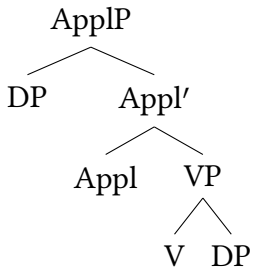
More generally, our account is compatible with any view of the DOC in which the two DP objects are generated as co-dependents of the same head. This is the case, for instance, in

Pylkkänen's (2008) low applicative analysis (86), but not under a high applicative account (87).

(86) *Low applicative analysis of DOC* (Pylkkänen 2008)



(87) *High applicative of DOC* (Bruening 2010*a*)



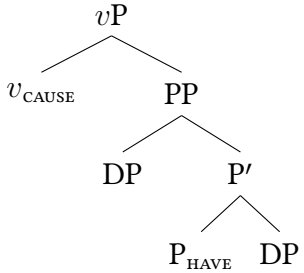
In both structures, the licensing step would be at ApplP instead of VP. This would violate Antilocality under a low applicative account (86), but not under a high applicative one (87). In the latter structure, movement of the lower object DP to ApplP would cross a maximal projection, namely VP. Similarly compatible with our account are analyses in which the two DPs are codependents of an abstract adposition (e.g. Harley 1997, Harley & Jung 2015, Pesetsky 1995).

Furthermore, our account requires that there be a structural asymmetry between the DOC and the PDC, such that the two DP objects in the PDC are not codependents of the same head. In the analysis of the PDC assumed above, this this structural asymmetry is due to the PP dominating the lower DP object but not the higher one, as in (37). Since movement of the lower object DP to VP crosses the PP, it does not violate Antilocality and can therefore license a PG in the higher object, as schematized in the following:

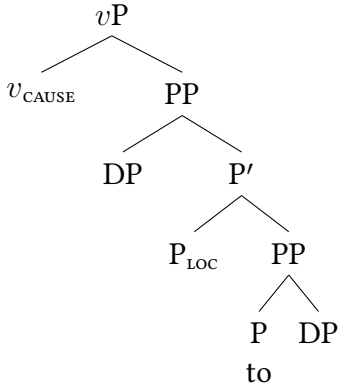
(88) $[_{\text{VP}}$ DP $[_{\text{DP}} \ldots$ PG $\ldots]$ V $[_{\text{PP}}$ t $]$ $]$

Our analysis is therefore also compatible with theories of the ditransitive alternation such as Harley's (2002) where there is an additional PP layer in the PDC, as shown in (89).

(89) a. *DOC* (Harley 2002)

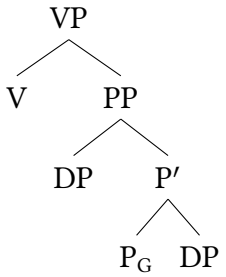


b. *PDC* (Harley 2002)

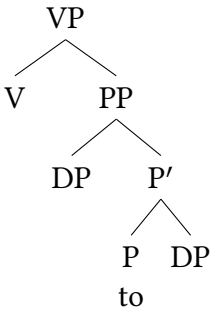


On the other hand, the account developed here is not compatible with symmetrical accounts such as Pesetsky's (1995), according to which the PP headed by *to* in the PDC (90b) dominates both DP objects.

(90) a. *DOC* (Pesetsky 1995)



b. *PDC* (Pesetsky 1995)



The distribution of PGs in ditransitives therefore provides an argument for asymmetric analyses of the dative alternation in English, in which the two DP objects are codependents of the same head in the DOC, but not in the PDC. This structural asymmetry is at the heart of our account of the asymmetric distribution of PGs in ditransitive sentences.

6 Parasitic gaps in moved phrases

The previous section showed that PGs are ruled out in the higher object of the DOC due to antilocal nature of the licensing step. We have seen that this constraint can be circumvented by embedding the LG in additional structure so that the movement step required for PG-licensing is no longer antilocal. If structural closeness is what is at stake here, then we might also expect that Antilocality can be circumvented in other ways, too. For example, a prediction that emerges is that an antilocal licensing configuration such as the one we find with the DOC can be repaired if the PG-containing DP were moved and interpreted in some higher position. In this case, the licensing step would also no longer violate Antilocality. We will argue that this prediction is indeed borne out.

First, consider that the higher object of the DOC can be passivized, as in (91b).

(91) a. Sally gave Mary a book.
b. Mary$_1$ was given t$_1$ a book (by Sally).

Now, recall that a PG in the higher object of the DOC is generally unacceptable, as can be seen in (92a) and (93a). However, when the indirect object is passivized, these examples improve markedly (92b), (93b).

(92) a. *Which book$_1$ did you give [the author of *pg*$_1$] t$_1$ (yesterday)?
b. Which book$_1$ was [the author of *pg*$_1$]$_2$ given t$_2$ t$_1$ (yesterday)?

(93) a. *What rights$_1$ have they finally offered [campaigners for *pg*$_1$] t$_1$ (this week)?
b. What rights$_1$ have [campaigners for *pg*$_1$]$_2$ finally been offered t$_2$ t$_1$ (this week)?

Again, this would seem to argue against any approach that tries to account for the impossibility of the PGs in the DOC in terms of thematic roles, since this restriction is clearly lifted in the passive. Instead, we propose that this is due to the passivized PG-containing DP being interpreted in some higher, derived position. For concreteness, we assume this to be the surface subject position in Spec-TP (though licensing in an intermediate landing site would also be a

possibility). As we have seen, the base configuration of a PG in the higher object of the DOC leads to an Antilocality violation (94a). However, a licensing step to the position directly above the derived subject position in Spec-TP is unproblematic in terms of Antilocality (94b), as the licensing step crosses (at least) one XP boundary, namely VP.

(94) a. [$_{VP}$ which book [$_{V'}$ [$_{DP}$ *Op* λz the author of z] λy [$_{V'}$ give y]]]
✗*Antilocality*

b. [$_{TP}$ which book [$_{T'}$ [$_{DP}$ *Op* λz the author of z] λy λx [$_{T'}$ … [$_{VP}$ x [$_{V'}$ give y]]]]]
✓*Antilocality*

Thus, as long as we allow for a PG-containing phrase to be interpreted in a moved position, then we can straightforwardly account for why passivization can repair the ungrammatical DOC configuration. This has two major consequences for our understanding of the interpretation of parasitic gap constructions. The first involves the semantic composition of PG-containing XPs that have undergone movement. The second is that PG-containing XPs are not required to reconstruct for the purposes of interpretation, contra Nissenbaum (1998*b*). The following sections address each of these points in turn.

6.1 A consequence for the interpretation of multiple specifier structures

The first consequence of the passivization examples presented in the previous section is that the order of multiple λ-binders must be reversed if one specifier contains a PG (see Nissenbaum & Schwarz 2011:22, fn.21 for the same conclusion). In other words, there seems to be a more general requirement for PG-containing XPs to take parasitic scope, even when moved.

To see this, we will discuss the generalization in Engdahl (1983) that PGs are not licensed by covert movement. This can be seen in (95) where the in-situ wh-phrase may not be co-referent with a parasitic gap. Thus, even under the assumption that this wh-phrase moves covertly, this movement does not meet the requirements for PG-licensing.

(95) *I forget who$_1$ t$_1$ filed which article$_2$ [without reading pg_2] (Engdahl 1983:14)

Nissenbaum (2000) shows that there is actually a well-defined exception to this generalization. While covert movement of an *in situ* wh-phrase cannot license a single parasitic gap inside an adjunct (96a), it can serve to license a *second* parasitic gap inside an adjunct (96b).[14]

(96) a. *Which senator$_1$ t$_1$ did you persuade to borrow *which car*$_2$ [after putting a bomb in pg_2] ?
b. ?Which senator$_1$ did you persuade t$_1$ to borrow *which car*$_2$ [after getting an opponent of pg_1 to put a bomb in pg_2] ?

[14]This observation can also be replicated with multiple overt movements (Williams 1990:276–277; Nissenbaum 2000:116–118; Davis 2020:224). As (i) shows, multiple PGs in an adjunct are licensed with multiple overt movements in the kind of *Volvo*-sentences discussed by Pesetsky (1982).

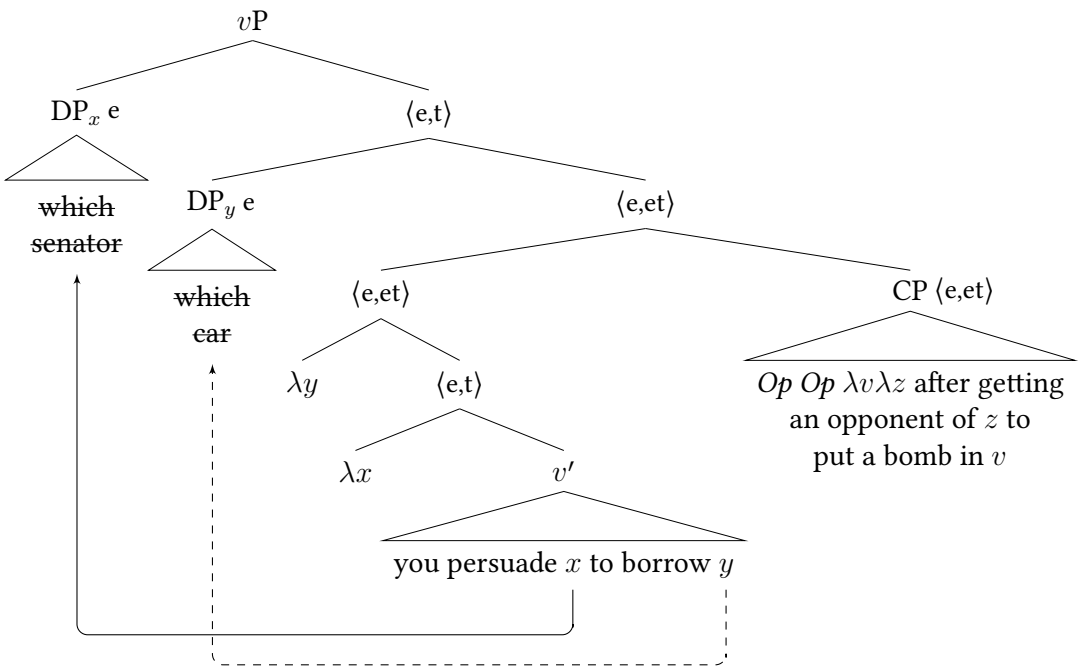
(i) ?This Volvo is one car Op_1 that I know which senator$_2$ we can convince t$_2$ to buy t$_1$
[after getting an opponent of pg_2 to put a bomb in pg_1]
(Nissenbaum 2000:117)

For both Nissenbaum (2000) and Davis (2020), the lower of the moved phrases (i.e. *which senator*) must form the inner specifier of vP.

(Nissenbaum 2000:98)

Without going too much into the details of Nissenbaum's (2000) analysis, he shows that this follows from the assumption that covert movement must tuck in below the outermost overtly created segment of vP (see Nissenbaum 2000:102–103). For the grammatical (96b), this means that covert movement of *which car* (indicated by the dashed line) must tuck in below *which senator*, as shown in (97). These multiple movements create a derived two-place predicate that can compose with an adjunct containing two parasitic gaps via recursive Predicate Modification, given Nissenbaum & Schwarz's (2011) modes of composition in (30).

(97)



The important point to notice is the order of the λ-binders in (98). The highest λ-abstractor (λy) must bind the argument position corresponding to the innermost specifier (the covertly-moved *which car*). In terms of argument linking, the meaning we want for the highest ⟨e,et⟩ node can be stated informally as in (98).

(98) $\lambda y \lambda x$. you persuaded x to borrow y after you got an opponent of x to put a bomb in y

To derive this, we need the outermost type e argument of each of the intersected ⟨e,et⟩ functions to correspond to the thematic position of *which car*. With this in place, we will derive the correct interpretation for the parasitic gap construction containing two PGs in (96b). This seems to be the way in which derived multiple specifier configurations are interpreted in the general case.

Now, let us return to passive examples such as (92b), repeated below, in which the PG-containing DP is interpreted in a derived position.

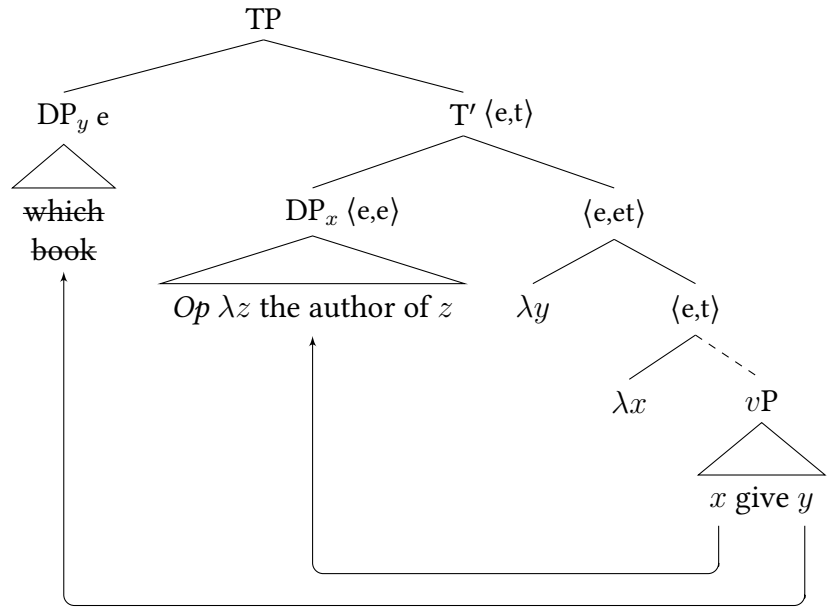
(99) Which book$_1$ was [the author of *pg*$_1$]$_2$ given t$_2$ t$_1$ (yesterday)?

We assume that the PG-containing DP is licensed in Spec-TP. For this reason, the wh-phrase must make an intermediate stop at Spec-TP.

Again, movement of two phrases creates a derived multiple-specifier structure with two λ-binders (100). An important difference to the covert movement example, however, is that the order of the λ-binders must match the order of the specifiers. That is, the highest binder

λy corresponds to the moved wh-phrase in the higher specifier.

(100)



This is the only way that the correct interpretation can be derived. This can be seen by considering the compositional steps in (101) (note that we assume that the external argument in a passive vP involves existential quantification).

(101)
a. COMPOSE($[\![[_{\text{DP}}\ Op\ \lambda z$ the author of $z]]\!]$, $[\![\lambda y \lambda x [_{v\text{P}}\ x$ give $y]]\!]$) —Arg. Ident→
b. λv. COMPOSE($[\lambda z.\iota x'.\ x'$ **is the author of** $z](v)$, $[\lambda y \lambda x \exists y'.\ y'$ **give** y **to** $x](v)$) —β-reduction→
c. λv. COMPOSE($\iota x'.\ x'$ **is the author of** v, $\lambda x \exists y.\ y$ **give** v **to** x) —Appl.→
d. λv. $[\lambda x \exists y.\ y$ **give** v **to** $x](\iota x'.\ x'$ **is the author of** v) —β-reduction→
e. λv. $\exists y.\ y$ **give** v **to** $\iota x.\ x$ **is the author of** v

As noted by Nissenbaum (1998*b*:274–275), assuming the opposite order of λ-binders to (100) would still result in an interpretable structure, albeit one with the wrong interpretation. The moved indirect object would be incorrectly linked to the thematic position of the direct object. One response to problem is, as Nissenbaum (1998*b*) suggests, to assume that moved phrases containing PGs always reconstruct for interpretation. However, this would not explain why movement seems to alleviate Antilocality violations in cases such as (99). If this phrase had to be licensed *in situ*, then there should be no contrast between the active and passive variants of the DOC with a PG in the higher object.

The alternative then, and the position we also adopt here, is to accept that there must be a special interpretive rule which requires that the order of multiple λ-binders is reversed in cases such as (100). This conclusion is shared by Nissenbaum & Schwarz (2011:22, fn.21), who remark that the correct generalization seems to be that 'a moved null operator structure places its lambda-binder just below the lambda introduced by the licensing wh-movement'. In other words, there is a exception to the rule of Predicate Abstraction in multiple specifier structures that is sensitive to whether or not one of the specifiers has a null operator at its edge.

One potential way of understanding this is as the requirement that XPs containing a PG must take parasitic scope. In multiple specifier configurations, a moved phrase normally takes its own scope, as we saw in (97). This seems to be different if the moved phrase contains a PG.

That is, it seems that a PG-containing XP may not take its own scope. We can capture this with (102).

(102) *Parasitic scope requirement for PG-containing XPs*
The minimal XP containing a PG and its operator must take parasitic scope.

As Nissenbaum & Schwarz (2011) note, this constraint remains mysterious, yet necessary. In the remaining sections, we do not attempt to resolve this mystery, but merely point out the previously understated extent to which it does indeed seem to a necessary component of the analysis of argument-internal PG constructions.

6.2 Evidence for PG-licensing in derived positions

It is important to note that this finding runs counter to early claims in Nissenbaum (1998*b*:270ff.) and Nissenbaum (2000:83) that an XP containing a PG must necessarily reconstruct at LF. In other words, PG-containing XPs must be licensed in situ. Although Nissenbaum & Schwarz (2011) reject this assumption and crucially assume that PGs may be licensed within XPs in derived positions, Nissenbaum (1998*b*, 2000) does provide empirical arguments that the addition of a parasitic gap inside an XP forces it to reconstruct.

To give just one example, consider (103) from Nissenbaum (2000). The example in (103a) shows that the universally-quantified DP can be interpreted in its surface position for purposes of variable binding, where it c-commands the bound pronoun *his*. If it were to reconstruct, this would not be possible. Example (103b) shows that raising is also possible with a quantified DP containing a PG (in a relative clause). Since the DP is not co-indexed with a bound variable pronoun in this example, it is unclear whether it reconstructs or not. The crucial example in this regard is the ungrammatical (103c). Here, we have both a raised quantificational DP containing a PG that also binds a pronoun in its derived position. Unlike (103a), however, this configuration is ungrammatical. Since we know from (103b) that a PG-containing DP can in principle undergo raising, Nissenbaum concludes that the ungrammaticality must be because the presence of a PG forces the entire containing DP to reconstruct. From this position, it does not c-command the bound pronoun, hence the ungrammaticality of (103c).

(103) Sue's the kind of person…
a. Op_1 that [everyone I know]$_2$ appears to his$_2$ colleagues to t_2 like t_1
b. Op_1 that [everyone who talks to pg_1]$_2$ appears to my colleagues to t_2 like t_1
c. *Op_1 that [everyone who talks to pg_1]$_2$ appears to his$_2$ colleagues to t_2 like t_1
(Nissenbaum 2000:83)

We do not attempt to reconcile Nissenbaum's reconstruction data with the findings of this paper. It may well be possible to come up with an alternative analysis of these facts, however, it is unclear at present what that could be. One possibility is that the mechanisms for reconstruction for scope/binding must be sufficiently different from those for PG-licensing.

Aside from this issue, there is considerable evidence that the assumption that PG-containing XPs must always be interpreted in their base position cannot be correct. We have already seen one argument involving passivization above and we will show that there are several other constructions in which a PG must be licensed inside a moved phrase in its derived position.

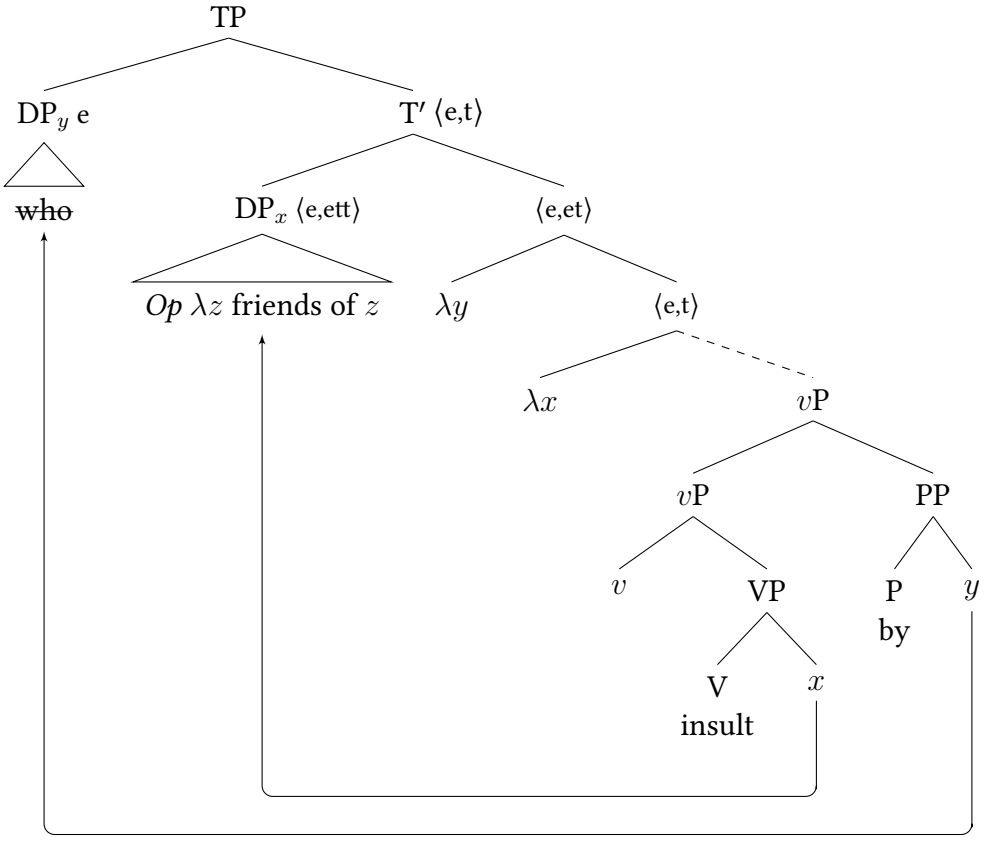
6.2.1 Licensing gaps in *by*-phrases

The first example we discuss involves PGs inside subjects of passive sentences. Consider that extraction from a passive subject is degraded for many speakers (104a) (e.g. Kuno 1973). Extraction from a *by*-phase, however, is perfectly fine (104b). Furthermore, a PG in the subject can be licensed by an LG in the *by*-phrase (104c).

(104) a. *Who$_1$ were [friends of t$_1$]$_2$ insulted t$_2$ by their boss?
b. Who$_1$ were [your friends]$_2$ insulted t$_2$ [by t$_1$] ?
c. Who$_1$ were [friends of *pg*$_1$]$_2$ insulted t$_2$ [by t$_1$] ?

The licensing configuration for the PG in the passive subject can only be created if the DP-containing PG is interpreted in its surface position, as shown by the tree in (105).

(105) Who$_1$ were [friends of *pg*$_1$]$_2$ insulted t$_2$ [by t$_1$] ?



6.2.2 Parasitic gaps in raised DPs

A similar example of a PG licensed in a derived position comes from raising constructions. Given the baseline in (106a), we might expect that a PG can be licensed in the raised subject by an LG in the experiencer PP. The relative acceptability of (106b) supports this expectation. As with the passive example, the subject-internal PG must be licensed in the derived position.

(106) a. The brother of John seemed [$_{PP}$ to his mother] to be having a difficult time.
b. ?Who$_1$ did [the brother of *pg*$_1$] seem [$_{PP}$ to t$_1$] to t$_{DP}$ be having a difficult time?

We can also see this with covertly-raised DPs, too. Consider the example in (107) where the PG is contained in the quantified object of *convince* and the LG is the object of the embedded

infinitival clause.

(107) This is the theory
Op$_1$ that a different person convinced [every proponent of *pg*$_1$] to reject t$_1$
($\forall > \exists$)

Crucially, a wide scope interpretation of the universal quantifier is possible. Assuming that wide scope requires Quantifier Raising, i.e. covert movement of *every proponent of*, then this is further evidence that PG-containing DPs are not required to reconstruct.[15]

Another argument for interpreting PG-containing XPs in a covertly raised position comes from Nissenbaum & Schwarz's (2011) analysis of gapped degree phrases. Consider the data in (108) from Nissenbaum & Schwarz (2011:12, 28) based on observations going back to Faraci (1974). The subject of a verb like *run* may not license a gap in the infinitival clause (108a).[16] If the subject associated with the gap is Ā-moved, however, then the sentence becomes well-formed, as in (108b). This leads Nissenbaum & Schwarz (2011) to treat gapped degree phrases in (108b) on a par with parasitic gaps.

(108) a. Mary$_1$ runs too fast [for me to keep up with {her$_1$/**pg*$_1$}]
b. Mary, who$_1$ t$_1$ runs too fast [for me to keep up with {her$_1$/*pg*$_1$}]

In their treatment of these type of degree phrases, *too* forms an underlying constituent with the extraposed *for to*-infinitive. Since this constituent is of type ⟨⟨d,st⟩,st⟩, it must undergo QR at LF to yield an interpretable structure. The sentence in (108a) would therefore have the LF in (109a). Here, no PG is possible inside the moved degree constituent due to the lack of any licensing movement. In (108b), whose LF is given in (109b), there is such an additional instance of movement and a PG is therefore licensed.

(109) a. [too [for me to keep up with her]] λd [$_{\text{TP}}$ Mary runs d-fast]
b. who [*Op* λz too [for me to keep up with z]] $\lambda x \lambda d$ [$_{\text{TP}}$ x runs d-fast]

Importantly, this involves licensing of a PG in a covertly-moved constituent. Aside from interpretability considerations, it is crucial that the PG is licensed in a derived position in order to not violate the anti-c-command generalization.

6.2.3 Parasitic gaps in complement clauses

A further counterexample to Nissenbaum's claim that PG-licensing XPs must be interpreted in-situ comes from PGs in complement clauses. While such constructions are less frequently

[15] A similar argument is provided by Davis & Elliott (2021). They build on the observation by Sauerland & Elbourne (2002) that plural agreement with certain kinds of 'committee nouns' forces a wide scope (i.e. non-reconstructed) interpretation of that noun. For example, a sentence like *Some Northern team are likely to win* does not allow the subject to scope below *likely* (**likely* > ∃). This interpretation is possible with singular agreement on the verb, however. Davis & Elliott (2021) illustrate that this can be used as a diagnostic for whether or not a PG-containing DP has reconstructed. If plural agreement in British English is incompatible with reconstruction, then we would expect that plural-agreeing DPs may also not contain PGs, assuming that Nissenbaum's assumption is correct. As Davis & Elliott (2021) show, however, the examples in (i) appear to be acceptable for the relevant speakers who allow plural agreement:

(i) a. This is a guy who$_1$ [any team involved with *pg*$_1$] **are** always pleased to talk to t$_1$.
b. Guess who$_1$ [the very same committee that hired *pg*$_1$] now **want** to get rid of t$_1$.

[16] Subjects of predicative clauses behave differently in this regard, i.e. *Mary is too fast for me to keep up with* is acceptable (see Nissenbaum & Schwarz 2011 for discussion).

discussed than adjunct-internal PGs, there are numerous examples in the literature (110).

(110) a. Who$_1$ did you tell t$_1$ [that we were going to vote for *pg*$_1$] ? (Engdahl 1983:11)
b. Who$_1$ did you warn t$_1$ [that the police would arrest *pg*$_1$] ? (Culicover 2001:43)

An immediate consequence of this, originally pointed out by Contreras (1984), is that the examples in (110) should constitute a violation of the anti-c-command generalization. While Contreras views this as evidence against the condition itself, Safir (1987) suggests an alternative view in which the anti-c-command generalization is respected due to string-vacuous extraposition of the complement clause. As (111) shows, the licensing gap, which we assume to be in Spec-VP, does not c-command the PG inside the CP in its extraposed position.

(111) Who$_1$ did you [$_{v\text{P}}$ persuade [$_{\text{VP}}$ t$_1$ [$_{\text{V}'}$ t$_{\text{V}}$ t$_{\text{CP}}$]] [$_{\text{CP}}$ that we should visit *pg*$_1$ next week]] ?

Some supporting evidence for this analysis comes from the observation in Safir (1987) that complementizer drop is degraded when the clause contains a PG (112).

(112) Who did you persuade t$_1$ [??(that) we should visit *pg*$_1$] ?

This makes sense in light of the Stowell's (1981) observation that clauses with complementizers are subject to the Empty Category Principle. He observes that clauses without complementizers must be properly-governed, accounting for the fact that complementizer drop is only possible with complement clauses in situ, but not with sentential subjects or moved complement clauses. If PG-containing CP are obligatorily extraposed, i.e. in a non-complement position, then the absence of complementizer drop can be accounted for.[17]

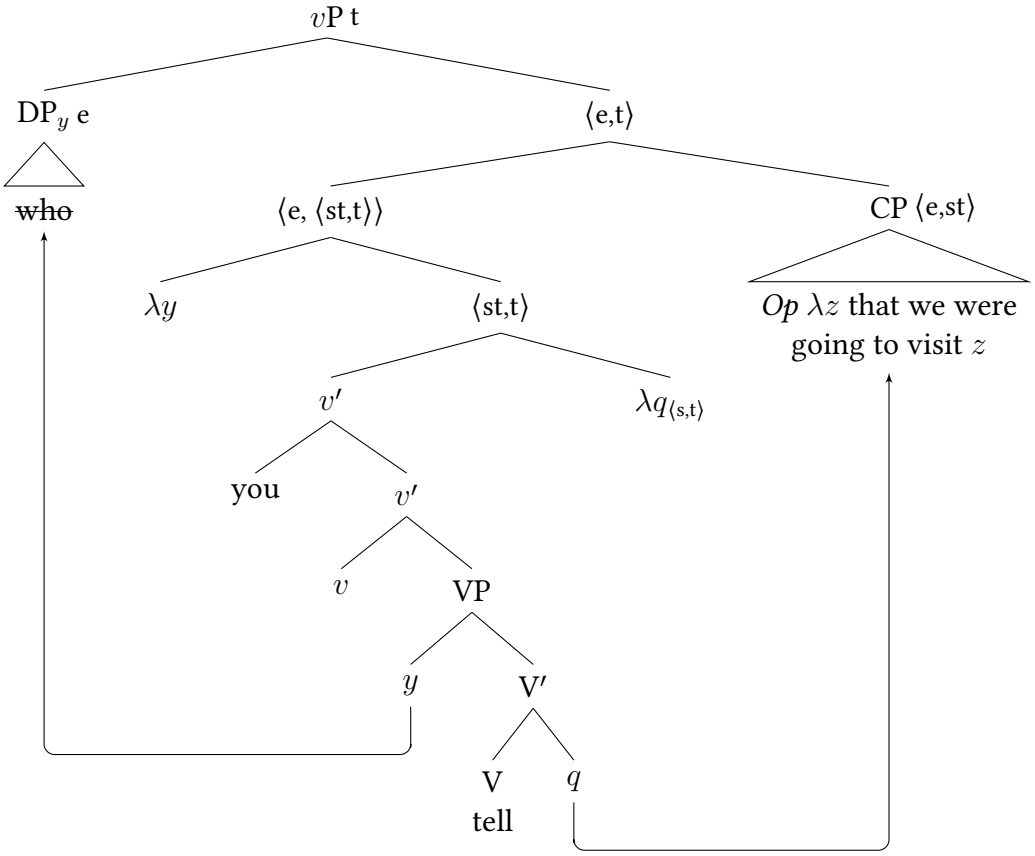
A Nissenbaum-style analysis of PGs actually accounts for why PG-containing complement clauses appear in an extraposed position. This follows simply because the PG-containing CP must take parasitic scope, which is not possible due the anti-c-command violation in the base configuration. A possible compositional analysis of PG-containing complement clauses is given in (113).

[17]This solution does not fully address the puzzle raised by Contreras (1984). Contreras' Puzzle is that, while PG-containing complement clauses do not violate the anti-c-command generalization, they do show Condition C effects. These suggest apparently contradictory c-command relations relative to the arguments in the matrix clause, as can be seen in (i).

(i) a. Who$_1$ did Sally$_2$ convince t$_1$ [that she$_2$ would visit *pg*$_1$ next week] ?
b. *Who$_1$ did she$_2$ convince t$_1$ [that Sally$_2$ would visit *pg*$_1$ next week] ?

One possibility is that extraposition of the CP targets a position above the position of the licensing gap, but below the surface position of subject in Spec-TP. This position could be at the *v*P edge, for example, as in (113).

(113) Who$_1$ did you tell t$_1$ [that we were going to visit *pg*$_1$] ?



As with the previously discussed examples, it is crucial that CP is in a derived position to yield an interpretable structure. For present purposes, we assume that complement clauses are typically of type ⟨s,t⟩ and clause-embedding predicates combine with arguments of this type (114a) (however, see Moulton 2015 and Elliott 2017 for alternative views of the semantics of clausal embedding). A CP containing a PG will therefore be of a higher type, i.e. ⟨e, st⟩ (114b).

(114) a. $[\![\text{tell}]\!] = \lambda q_{\langle s,t\rangle}\lambda x_e.$ **tell**$(x, p) \wedge p = q$
b. $[\![\text{CP}]\!] = \lambda z_e\lambda w_s.$ **will-visit**(**we**, z) **in** w

These two meanings in (114) cannot compose given the compositional principles we have discussed due to a type mismatch. The PG-containing CP is only interpretable in its derived position in (113). Given this structure, the CP can compose with its sister to yield the following correct denotation for the ⟨e, t⟩ node:

(115) $\lambda x.$ **tell**(**you**, x, p) $\wedge$ $p = \lambda w.$ **will-visit**(**we**, x) **in** w

This example provides another example in which a PG-containing XP must be interpreted in a moved position.

6.2.4 Parasitic gaps in comparative clauses

The final case of PG-containing XPs interpreted in derived positions comes from comparative constructions. Previous literature has noted that parasitic gaps are also possible in a comparative clause (116).

(116) a. Chomsky is someone who$_1$ Sue finds it easier to defend t$_1$ [than to emulate *pg*$_1$]

b. Nancy Reagan, Op_1 I've seen more pictures of t_1 [than I've read books about pg_1]
(Napoli 1983:683)

PGs in comparatives also give rise to the same anti-c-command problem we saw for complement clauses. To see this, consider the following examples from Engdahl (1984:96):

(117) a. ?Which famous linguists do you consider
[t_1 smarter [than most friends of pg_1]] ?

b. ?Which painter did John regard
[t_1 as more promising [than most contemporaries of pg_1]] ?

In both examples in (117), the LG is the subject of a small clause and the PG is in the standard clause associated with the comparative adjectival predicate of the small clause. We assume that the standard, e.g. *most friends of*, is the remnant of an elided clause. The reading under which these examples are grammatical is one in which this remnant is understood as the subject of the small clause, rather than the subject of the matrix clause. For instance, the relevant reading of (117a) is 'For which famous linguist x do you consider x to be smarter than you consider most friends of x to be smart?'. We return below to the fact that the matrix-subject reading is absent.

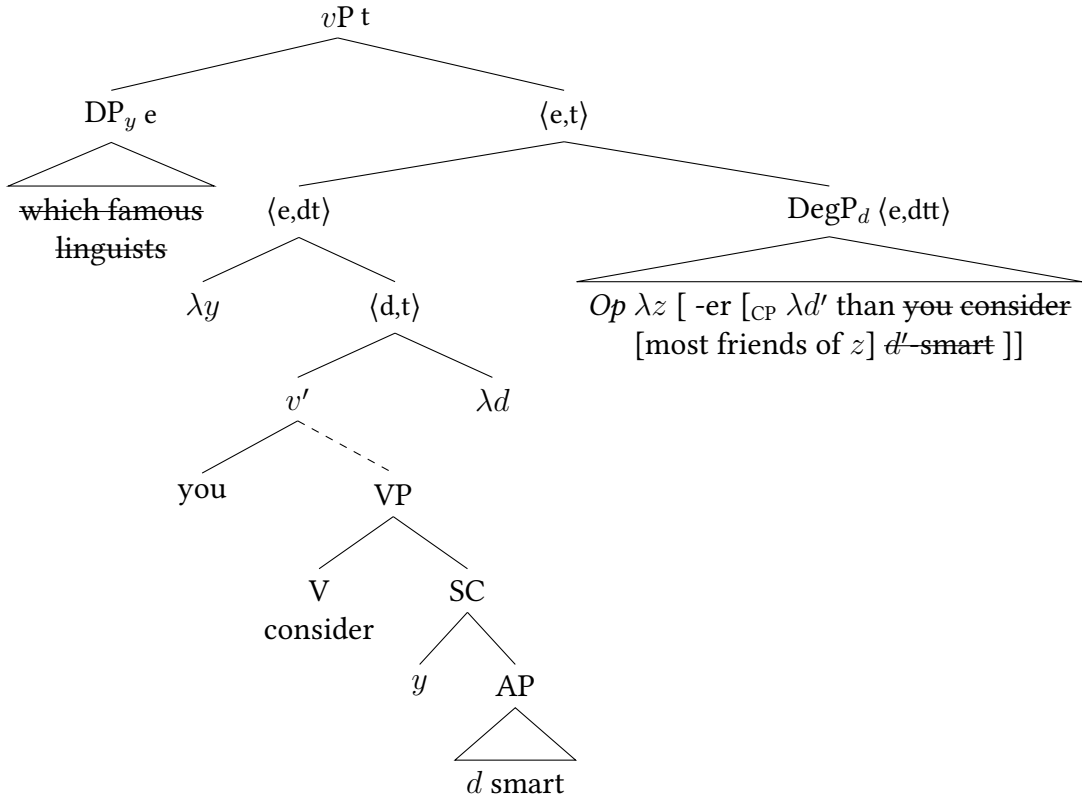
As noted by Engdahl (1984), such examples appear to pose a problem for the anti-c-command generalization (also see Culicover 2001:40). This problem can be easily resolved, as was the case with complement clauses, if the standard moves. Indeed, the literature on comparatives has argued that such movement is necessary for the correct semantic interpretation of comparatives (Heim 2000, Bhatt & Pancheva 2004; see also Bresnan 1973, Carlson 1977, Wold 1995). The basic idea is that a comparative expresses a relation between two degrees. Compositonally, the comparative morpheme *-er* relates two meanings of type ⟨d, t⟩, i.e. sets of degrees, and asserts that the maximal member of one of the sets is larger than the maximal member of the other. The comparative morpheme could then have the following denotation: $[\![\text{-er}]\!] = \lambda D_{\langle d,t\rangle}\lambda D'_{\langle d,t\rangle}.\ \mathbf{max}(D') > \mathbf{max}(D)$. One of the degree predicates is supplied by the *than*-clause by virtue of movement of a degree operator to its edge, followed by ellipsis of everything except the remnant DP.[18] To create the other argument for *-er*, the entire DegP constituent (*-er* plus the *than*-clause) must move via QR to create a derived predicate of type ⟨d, t⟩ (though the comparative morpheme is pronounced in its base position). This can be seen in the structure for (117a) in (118).

[18]For ease of exposition, we represent ellipsis in the standard clause without movement of the remnant (e.g. Ott & Struckmeier 2018, Stigliano to appear). On a 'move-and-delete' approach (e.g. Merchant 2004), we would require an additional movement step for the remnant as in (i).

(i) [*Op* λz -er [$_{CP}$ λd [than most friends of z] ~~λx~~ ~~you~~ ~~consider~~ [~~x~~ ~~d-smart~~]]]

We assume that the parasitic gap operator must be sub-extracted prior to movement of the remnant in order to avoid a Freezing violation (Wexler & Culicover 1980).

(118) Which famous linguists$_1$ do you consider [t$_1$ smarter [than most friends of *pg*$_1$]] ?



Since the DegP contains a PG, it moves to a position just below the moved wh-phrase, taking parasitic scope on its sister. The two relevant meanings corresponding to the DegP (119a) and its sister constituent (119b) can be composed via Argument Identification and Application, as long as the DegP is interpreted in its raised position.

(119) a. $\lambda x \lambda d$. **you consider**(d-**smart**(x))
b. $\lambda z \lambda D$. **max**(D) > **max**($\lambda d'$. **you consider**(d'-**smart**(**most friends of** z)))

The meaning we derive is given in (120). Informally, 'the maximal degree to which you consider x to be smart is greater than maximal degree to which you consider most friends of x to be smart'.

(120) λx. **max**(λd. **you consider**(d-**smart**(x))) > **max**($\lambda d'$. **you consider**(d'-**smart**(**most friends of** x)))

This final example thus provides a further example of a PG-containing XP interpreted in a derived position at LF.

Before we conclude, we would like to come back to another property of the comparatives in (117) alluded to above. Comparatives of this sort are typically ambiguous as to the interpretation of the remnant in the standard. Consider the following example, which does not involve PGs:

(121) Mary is someone I consider smarter than John.
a. 'I consider Mary smarter than John considers her to be.' (matrix reading)
b. 'I consider Mary smarter than I consider John to be.' (embedded reading)

The sentence is ambiguous, as the remnant *John* in the standard can be interpreted as either the subject of *consider* (matrix reading) or the subject of *smart* (embedded reading). As pointed

out above, the matrix reading is absent if the standard contains a PG, as shown in (122b) (cf. (122a), in which the PG is replaced by a pronoun).

(122) a. Jane is someone Op_1 I consider smarter t_1 than most friends of hers.
(ambiguous)
b. Jane is someone Op_1 I consider smarter t_1 than most friends of pg_1.
(not ambiguous)

The ambiguity is a function of the position of the remnant in the elided standard clause, as shown in (123) for (122b):

(123) a. $[_{\text{island}}$ Op_1 -er than ~~I consider~~ [most friends of t_1] ~~smart~~] (embedded reading)
b. $^*[_{\text{island}}$ Op_1 -er than $[_{\text{island}}$ most friends of t_1] ~~consider her smart~~]
(matrix reading)

What derives the ungrammaticality of the matrix reading in (123b) is that it involves subextraction of the operator from a finite subject, in violation of the Subject Condition. That is, (123b) is ungrammatical because of the sland generalization (8). We take this as evidence that the phrasal standard is indeed the remnant of sentential ellipsis.

7 Conclusion

In this paper, we have discussed a restriction on PGs in ditransitives. It was shown a PG can be licensed in the higher object of the PDC, but not the DOC. Examination of a wider range of data reveals that there must be a minimal structural distance (namely an intervening maximal projection) between the PG-containing XP and the LG. We derive this generalization from the combination of Nissenbaum's (2000) theory of PGs and an Antilocality constraint on movement: The licensing of a PG requires the movement creating the LG to target a position immediately above the PG-containing XP, but this movement violates Antilocality in the DOC. This illicit configuration can be avoided either by embedding the LG or moving the PG-containing XP.

We have shown that these findings have a number of important theoretical consequences. First, this analysis is only compatible with some theories of ditransitive structure, namely those in which there is more structural distance between the internal argument positions in the PDC than in the DOC, thereby leading to an Antilocality violation in the PDC, but not the DOC. Second, contra Nissenbaum (2000) and Legate (2003), the positions in which argument-internal PGs can be license diagnose intermediate landing sites, but not necessarily phase edges: The licensing movement required to license a PG must stop at Spec-VP. However, this position cannot be a phase edge, as any movement of a direct object out of VP would be ruled out by Antilocality. This supports the idea that the distribution of intermediate landing sites is not completely determined by phasehood (Keine 2016). Finally, the fact that an Antilocality violation can be avoided by moving the PG-containing XP supports the conclusion in Nissenbaum & Schwarz (2011) that PG-containing XPs can be interpreted in their derived position (contra Nissenbaum 1998*a*,*b*). We provided further evidence in support of this conclusion from distribution of parasitic gaps in *by*-phases, raised DPs, complement clauses, and comparatives.

PGs are a well-established diagnostic in syntactic argumentation. Typically, they have been used to argue for the presence of Ā-movement. However, PGs can also be used to diagnose other aspects of clause structure. In Ershova (2021), the distribution of PGs is used to reveal the correct c-command relations between co-arguments. The present paper makes a similar contribution. We have argued that PG-licensing can diagnoses not only the relative height of

two co-arguments, but also the amount of intervening structure between the two. The general prediction of our analysis is that, for any two argument positions, if a PG can be licensed in the higher argument by movement from the lower argument position, then there must be at least one maximal XP boundary that intervenes between the two positions. This further highlights the potential of PGs as a powerful tool in syntactic argumentation.

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