Varieties of A'-extractions: evidence from preposition stranding[*]

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Abstract

While all English A'-extractions are united in their ability to strand prepositions, some can strand more prepositions than others. In this paper, I argue that these asymmetries in preposition stranding (P-stranding) reflect a basic and fundamental divide among different varieties of A'-extractions. In some but not all instances of A'-movement, the moving element is not fully constructed until after movement takes place. As a consequence, when the base position for this type of extraction is the complement of certain types of prepositions, it lacks material that the preposition requires. I show that the proposal is easily integrated into the theory of 'wholesale late merger' (Takahashi 2006, Takahashi & Hulsey 2009), and in turn, provides support for it. Extending wholesale late merger to account for subtle structural differences among A'-extractions allows us to understand why, even though P-stranding is common to all A'-extractions, extractions can differ according to the restrictions that they place on it.

1   Introduction

It has been widely known since at least Chomsky (1977) that A'-extractions share a number of properties. These include the ability to escape CPs and other phasal domains, while still obeying islands (Chomsky 1977), licensing of parasitic gaps (Engdahl 1983, Chomsky 1982), nested dependency effects (Pesetsky 1982), and strong crossover (Chomsky 1981), among others. In addition, English A'-extractions share an ability to strand prepositions, as illustrated in (1).

(1)   P-stranding in English

    a.   Which haunted bridge did you drive across?   (*wh*-movement)

    b.   Not a single haunted bridge would I ever drive across.   (negative inversion)

    c.   Haunted bridges are scary to drive across.   (*tough*-movement)

    d.   Which bridge did you criticize without having driven across?   (parasitic gap)

When we look more closely at cross-extraction patterns of preposition stranding (P-stranding), however, we see that not all A'-extractions behave identically. All types of A'-extractions can strand prepositions,

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but some can strand more prepositions than others. For example, it is possible to strand temporal 'on' with *wh*-movement (2a) and restrictive relatives (2b), but not negative inversion (2c) or tough-movement (2d).

(2)   Asymmetries in English P-stranding

      a.   Which holiday did you eat lamb on?   (*wh*-movement)

      b.   The holiday we ate lamb on was last Easter.   (restrictive relative)

      c.   *Not a single holiday would I ever eat lamb on.   (negative inversion)

      d.   *Easter is easy to eat lamb on.   (tough-movement)

In what follows, I suggest that the P-stranding asymmetry in (2) is symptomatic of a deep and fundamental divide between different varieties of A'-extractions. I argue that some A'-extractions (e.g. *wh*-movement and restrictive relatives) leave behind fully constructed copies, but others (e.g. negative inversion and tough-movement) do not. This paper, then, contributes to the literature showing that while A'-extractions do behave identically in a number of ways, there are still significant differences among them that need to be accounted for (see e.g. Cinque 1990, Lasnik & Stowell 1991, Postal 1998).

The paper proceeds in several steps. First (§2), I show that an extraction's ability to strand a given temporal or locative preposition (P) is correlated with whether or not that P is pronoun-rejecting. As what is shown is that a class of A'-extractions appears to leave behind pronoun-like elements, this paper builds on work arguing that these extraction sites have pronominal properties (see Perlmutter 1972, Cinque 1990, and Postal 1998). I show that some prepositions, like 'across', accept pronominal complements (3a). Other prepositions, like temporal 'on', reject them (3b).

(3)   Prepositions and pronouns

      a.   I drove across the haunted bridge, and John drove across it too.

      b.   *I ate lamb on Easter, and John ate lamb on it too.

I divide A'-extractions into two classes according to their ability to strand pronoun-rejecting prepositions. Some extractions (like *wh*-movement, in (2a)) can strand pronoun-rejecting Ps, while others (like negative inversion, in (2c)) cannot.

The rest of the paper (§3-9) explains why there is a correlation between a given P's ability to take a pronominal complement and its ability to be stranded. In short, I argue that that pronoun-rejecting Ps require their complements to contain a certain kind of noun (§3). I propose that extractions that cannot strand pronoun-rejecting Ps are extractions that do not leave behind fully constructed copies: what is left behind as P's complement does not contain an NP, and therefore the selectional restrictions of pronoun-

rejecting Ps cannot be satisfied. Extractions that can strand pronoun-rejecting Ps, by contrast, are extractions that leave behind full copies. Because what is left behind as P's complement can contain an NP, the selectional restrictions of pronoun-rejecting prepositions can be satisfied (§4).

I show that this proposal is easily integrated into the theory of 'wholesale late merger' (Takahashi 2006, Takahashi & Hulsey 2009), and in turn, provides support for it. Wholesale late merger (WLM) proposes that countercyclic merger of NPs to their head Ds is an operation allowed by the grammar (see §5). It allows for the possibility that certain extractions leave behind only Ds, while others leave behind full copies, as different types of extractions place different requirements on the point in the derivation at which WLM must occur. While WLM was proposed to account for differences between the larger classes of A- and A'-extractions, here I extend the theory to account for more subtle differences among A'-extractions. I show that this extension allows us to derive the P-stranding asymmetries (§6-7), and provide some additional support for the proposed analysis (§8). I show that the analysis correctly predicts contrasts not only among extractions, but also within extractions: for example, P-stranding with *wh*-pronouns, but not full *wh*-phrases, is sensitive to whether or not a given preposition is pronoun-rejecting.

2   P-stranding asymmetries

This section focuses on P-stranding asymmetries in temporal (§2.1) and locative (§2.2) PPs. I demonstrate that if a given preposition cannot accept a pronoun as its complement, then it can be stranded in only a subset of A'-extractions (see Postal 1998 for similar phenomena).

2.1 Temporals

It is possible to divide temporal DPs into two classes. There are *interval* DPs, referring to points or spans in time (e.g. 'Monday,' 'the last five hours'). There are also *event* DPs, referring to events that occupy certain portions of time (e.g. 'John's party,' 'Sue's talk'). A basic difference between these two types of temporal DPs is that while an interval DP like 'Monday' is identified by its location and extent along a timeline, an event DP like 'John's party' is identified by other properties. Some more examples illustrating this are in (4).

(4)   Interval vs. event DPs

Intervals	Events
Monday	John's party
5:00	Sue's talk
Christmas	Christmas dinner
John's youth	Bill's resignation

This distinction becomes relevant when looking at temporal PPs. In PPs, interval and event DPs differ in a very basic way: event complements to P can be pronominalized with 'it' (5), but interval complements to P cannot (6).

(5)   Event DP complements > ✓it

    a.   I left after John's party and Mary left after it, too.

    b.   I left before Christmas dinner and John left before it, too.

(6)   Interval DP complements > *it[1]

    a.   *I left after 5:00 and Mary left after it, too.

    b.   *My family eats turkey on Thanksgiving, and John's family eats turkey on it, too[2].

A potential line of analysis for the contrasts in (5-6) is that interval DPs, unlike event DPs, have some inherent property that renders them unable to be pronominalized. If this were true, the split between event and interval complements to P in (5-6) would be predicted: if interval complements cannot be pronominalized in general, then their behavior in PPs does not require an independent explanation.

    This line of analysis is incorrect, as demonstrated in (7). 'June', an interval DP, can be pronominalized as the complement of 'spend' (7a)[3] and as a subject (7b), but not as the complement of 'in' (7c).

(7)   Interval DPs can be pronominalized

    a.   I spent June at the pool, but John spent it in his office.

    b.   I spent June at the pool. It is my favorite month.

    c.   *John visited his family in June, and Mary visited her family in it, too.

The contrast between (7a-b) and (7c) suggests that the potential for a given DP to be pronominalized is, at least in part, dependent on the head that selects for it. Intervals can be pronominalized as the complement

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[1] It is possible to replace a temporal PP with 'then', i.e. 'My family eats turkey on Thanksgiving, and John's family eats turkey then, too.' My interest here though is in constraints on pronominalizing the DP, not the entire PP.

[2] Note that replacing 'Thanksgiving' with a demonstrative, 'this' or 'that', is similarly ungrammatical (*'My family eats Turkey on Thanksgiving, and John's family eats turkey on that, too'). Thus the inability of 'it' to replace an interval complement to P cannot be attributed to its status as a 'weak' pronoun (see Cardinaletti & Starke 1994). For an interesting case where the weak vs. strong status of a pronoun does figure into a preposition's complementation properties, see Zribi-Hertz (1984) on French.

[3] Some other verbs that allow interval complements are *waste*, *kill*, *use* (in their temporal senses), and *celebrate*.

to 'spend', for example, because 'spend' accepts pronominal complements. Intervals cannot be pronominalized as the complement to 'in' because 'in' does not accept pronominal complements[4].

The pronominalization contrasts in (5-6), then, do not point to a difference between event and interval DPs per se, but rather a difference between the prepositions that select for them. Prepositions selecting for event DPs are *pronoun-accepting* prepositions (P_A): they can accept either pronouns or lexical nouns as their complements. Prepositions selecting for interval DPs, by contrast, are *pronoun-rejecting* prepositions (P_R): they accept lexical nouns, but not pronouns, as their complements. Examples of pronoun-accepting and pronoun-rejecting temporal Ps are below (8).

(8)   Pronoun-accepting Ps (P_As) vs. pronoun-rejecting temporal Ps (P_Rs)

P_As	P_Rs
after (e.g. after John's talk)	on (e.g. on Christmas)
before (e.g. before Sue's party)	in (e.g. in three hours)
during (e.g. during the movie)	after (e.g. after 5:00)
	before (e.g. before 5:00)

P_As are the group of prepositions that can be stranded under any type of A'-extraction (9), and P_Rs are the group that can be stranded in only a subset of these extractions (10). I illustrate with the prepositions 'after' (in its P_A use) and 'on' (a P_R).

(9)   Stranding P_As: unconstrained
    a. Which talk are we leaving after?   (wh-movement)
    b. The talk we're leaving after should be really good.   (restrictive relative)
    c. John's talk, which we left after, was fantastic.   (appositive relative)
    d. Not a single talk will I ever leave after.   (neg-inversion)
    e. John's talk, we're leaving after.   (topicalization)
    f. Which sad movie did we manage to watch without crying after?   (parasitic gap)
    g. John's talk will be easy to leave after.   (tough-movement)
    h. Which talk will be too crowded to leave quickly after?   (gapped degree phr.)

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[4] It is worth asking whether or not there are other structural positions that display the same interval vs. event pronominalization asymmetry. To the best of my knowledge, there aren't. We have seen that object intervals (7a) can be pronominalized, and so can subject intervals (7b).

(10) Stranding P_Rs: severely constrained[5]

    a. Which holiday do people eat lamb on? (wh-movement)

    b. The holiday that most people eat lamb on is Easter. (restrictive relative)

    c. *Easter, which my family eats lamb on, is in the spring. (appositive relative)

    d. *Not a single holiday will I eat lamb on. (neg-inversion)

    e. *Easter, we ate lamb on. (topicalization)

    f. *Which holiday did John celebrate without eating lamb on? (parasitic gap)

    g. *Easter is easy to eat lamb on. (tough-movement)

    h. *Easter is too joyful to eat lamb on[6]. (gapped degree phr.)

The contrasts in (9-10) document a correlation between the ability of a given preposition P to take a pronominal complement, and the relative ability of that P to be stranded. Some A'-extractions allow P_Rs to be stranded, but others do not. Following Postal (1998)'s divisions among extractions, based on similar phenomena[7], I refer to extractions allowing P_Rs to be stranded as 'A-type extractions' (not to be confused with A-movement). Extractions forbidding P_Rs from being stranded are 'B-type extractions' (11).

(11) Partition of extractions[8]

A-type extractions (stranding P is always okay)	B-type extractions (if P is a P_R, don't strand it)
wh-movement restrictive relatives	appositive relatives negative inversion topicalization parasitic gaps tough-movement gapped degree phrases

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[5] Note that pied-piping, where permitted, can rescue these sentences: compare 'not a single holiday will I ever eat lamb on' to the more acceptable 'on not a single holiday will I ever eat lamb.'

[6] Some speakers report that several of the sentences in (9), e.g. (9h), are degraded, which I attribute to a more general dispreference for stranded temporal prepositions (see Bresnan & Grimshaw 1978: 359, Hornstein & Weinberg 1981: 61). Note however that a general dispreference for stranded temporal Ps cannot explain why temporal P_Rs can be stranded under some extractions (e.g. *wh*-movement) but not others (e.g. neg-inversion).

[7] Postal (1998) shows that some A'-extractions are sensitive to other antipronominal contexts (name positions, change-of-color environments, etc.). His partition differs in several ways from mine; potential reasons for these differences are not explored here.

[8] This partition is identical to the partition discovered by Lasnik & Stowell (1991) for weak crossover effects. Weak crossover effects are present for A-types but absent for B-types.

The partition in (11) suggests an implicational generalization. P_As can be stranded under A-type and B-type extractions, but P_Rs can only be stranded under B-types. Therefore any P that can be stranded under B-type extractions must also be able to be stranded under A-type extraction, but not vice versa (12).

(12)   Generalizing over extractions

 If a given preposition P can be stranded under B-type extractions, P can be stranded under A-type extractions.

A counterexample to the generalization in (12) would be a preposition that could be stranded under B-type extractions (e.g. topicalization) but not A-type extractions (e.g. *wh*-movement). To the best of my knowledge, such a preposition does not exist[9].

2.2 Locatives

Similar to temporal DPs, we can divide locative DPs into two classes. There are *location* DPs, which refer to points in or regions of space (e.g. 'the second balcony,' 'the fourth floor'). There are also *entity* DPs, referring to physical entities that occupy certain portions of space (e.g. 'the box,' 'the car'). Like the difference between interval and event (temporal) DPs, the difference between location and entity (locative) DPs is semantic. A location DP like 'the fourth floor' is defined by its spatial coordinates, while an entity DP like 'the box' is ultimately defined by other properties. Some further examples are in (13).

(13)   Location vs. entity DPs

Location	Entity
the second balcony	the box
the fourth floor	the car
10,000 feet	the forest
the sky	the hut

The distinction between entity and location DPs becomes is relevant to the behavior of locative prepositions. Prepositions taking entity complements are P_As, and can take pronominal complements (14). Prepositions taking location complements are P_Rs, and cannot take pronominal complements (15).

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[9] Note that some temporal prepositions (e.g. since, during) cannot be stranded under any type of extraction (Culicover 1999: 74-76). These are not counterexamples to the generalization in (12) because they cannot be stranded under either A-type or B-type extractions.

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(14)   Entity DP complements > $\checkmark$it

    a. I ate dinner on the wooden table and John ate dinner on it, too.

    b. I climbed to the summit of the mountain and John climbed to it, too.

(15)   Location DP complements > *it[10]

    a. *I ate dinner on the fourth floor and John ate dinner on it, too.

    b. *My airplane climbed into the sky and John's airplane climbed into it, too.

Note that the sentences in (15) are only ungrammatical under the location readings of 'the fourth floor' and 'the sky'. (15a) is grammatical if John is eating dinner on the surface of some floor, which happens to be fourth in a series of floors. In other words, (15a-b) are grammatical only if the locative DP can be interpreted as an entity DP. This is consistent with the generalization that entity DPs, but not location DPs, can be pronominalized as complements to P.

The stranding facts parallel the observations concerning temporals in §2.1. P_{AS} (here, those selecting for entities) can be stranded under any type of A'-extraction (16), while P_{RS} (those selecting for locations) can be stranded under A-type extractions only (17).

(16)   Stranding P_{AS}: unconstrained

    a. Which box was Mari lying in?   (wh-movement; A)

    b. The box that Mari's lying in is really small.   (rest. relative; A)

    c. The Yahtzee box, which Mari likes to lie in, is tiny.   (app. relative; B)

    d. Not a single box should you ever let your cat lie in.   (neg-inversion; B)

    e. The Yahtzee box, Mari likes to lie in.   (topicalization; B)

    f. Which box did you recycle without letting Mari lie in?   (parasitic gap; B)

    g. The Yahtzee box is easy for Mari to lie in.   (tough-movement; B)

    h. The Yahtzee box is too small for a human to lie in.   (GDP; B)

(17)   Stranding P_{RS}: severely constrained[11]

    a. Which floor are we having dinner on?   (wh-movement; A)

    b. The floor we're eating dinner on is pretty fancy.   (rest. relative; A)

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[10] Like temporal PPs and 'then', it is possible to replace locative PPs (or at least, part of them; see Svenonius 2008 for some discussion) with 'there'. Thus 'I ate dinner on the fourth floor and John ate dinner on it, too' is grammatical.

[11] As is true for the temporal examples (see fn. 5), pied-piping, where permitted, can rescue these sentences. Compare 'not a single floor of the airport do I ever want to eat dinner on' to the more acceptable 'on not a single floor of the airport will I ever eat dinner.'

    c.   *The fourth floor, which we ate dinner on, was really fancy.   (app. relative; B)

    d.   *Not a single floor of the airport do I want to eat dinner on.   (neg-inversion; B)

    e.   *The fourth floor, I want to eat dinner on.   (topicalization; B)

    f.   *Which floor did you visit without eating dinner on?   (parasitic gap; B)

    g.   *The fourth floor is tough to eat dinner on.   (tough-movement; B)

    h.   *The first floor is too busy to eat dinner on.   (GDP; B)

Place names, a subclass of locative DPs, are ambiguous between location and entity DPs. A place name like 'Boston' can be interpreted in one of two ways: as an abstract set of coordinates, or as a physical entity. Chomsky (1999: 42) notes that 'if London is reduced to dust, it ... can be re-built elsewhere and still be the same city.' The reason why we can say that London was reduced to dust is because place names, in one sense, refer to a collection of buildings and other physical entities that occupy specific points in space. The reason why we can say that London can be rebuilt elsewhere because, in another sense, place names refer to a set of abstract coordinates, not dependent on their physical contents.

To the extent that place names can be pronominalized as complements of prepositions, the entity reading is preferred (18).

(18)   Pronominalizing place names

    a.   I traveled to France, and John traveled to it too.   ($^{??}$location, ✓entity)

    b.   I ate lunch on the Charles River, and John ate lunch on it too.   ($^{??}$location, ✓entity)

The first conjunct in (18b) has a location reading where John is eating lunch on the banks of the Charles. This reading is absent in the second conjunct: the only licit interpretation here is a bizarre one, in which John is sitting on the surface of the Charles River and eating his lunch. As is true for the sentences in (15), the sentence is only licit if we can interpret the DP as an entity.

We see in (19) that the location reading of 'on the Charles River' is preserved when 'on' is stranded under A-type extractions (19a-b), but not when 'on' is stranded under B-type extractions (19c-h).

(19)   Place names and stranding (* = lack of a location reading)

    a.   Which river in Boston did you eat lunch on?   (wh-movement; A)

    b.   The river in Boston that we ate lunch on was the Charles.   (rest. relative; A)

    c.   *The Charles, which we ate lunch on, is really wide.   (app. relative; B)

    d.   *Not a single river in Boston have I ever eaten lunch on.   (neg-inversion; B)

    e.   *The Charles, we ate lunch on.   (topicalization; B)

f.	*Which river did you swim in after eating lunch on?	(parasitic gap; B)
g.	*The Charles is easy to eat lunch on.	(tough-movement; B)
h.	*The Charles is too busy to eat lunch on.	(GDP; B)

The lack of an available location reading in (19c-h) is consistent with the generalization that prepositions selecting for location DPs cannot be stranded under B-type extractions[12].

2.3 Summary

The previous two subsections demonstrate a link between two things: (1) whether or not a preposition P can accept a pronoun as its complement, and (2) whether or not P can be stranded under B-type extractions. The relevant generalizations are as follows. If P is pronoun-accepting, then P can be stranded under both A-type and B-type extractions:

(20) If ✓[P pronoun], then ✓A-type and ✓B-type.

If P is pronoun-rejecting, P can be stranded under A-type extractions only:

(21) If *[P pronoun], then ✓A-type but *B-type.

Although the empirical focus of this section is on temporals and locatives, we expect the generalizations in (20-21) to hold more widely. Some support for this position comes from (22) and (23). In (22), instrumental 'with' is a P_A, and can be stranded under both A-type and B-type extractions. In (23), circumstantial 'under' is a P_R, and can be stranded under A-type extractions only[13].

(22) John eats his cereal with (that spoon / it).

a.	Which spoon does John eat his cereal with?	(A)
b.	The spoon that John eats his cereal with is really large.	(A)
c.	That spoon, which John eats his cereal with...	(A)
d.	Not a single fork should you ever try to eat cereal with.	(B)
e.	Spoons are easy to eat cereal with.	(B)

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[12] The V+P combination "live in" is a counterexample to the generalizations established here. It is impossible to pronominalize 'Boston', for example, as the complement of 'in' (*'I live in Boston, and John lives in it, too'), but stranding 'in' under B-type extractions is possible ('Boston is easy to live in.'). This is an isolated counterexample, and its status may have more to do with properties of 'live in'. I leave the nature of these properties open, for now.
[13] See also Kuroda (1968: 256), and examples from Ross (1967: 113) attributed to Kuroda (1964), for more examples of problems with pronominalization in other kinds of PPs.

(23)   Mary will only celebrate under (a restricted set of circumstances / *them).

    a.   [?]What set of circumstances will Mary celebrate under?   (A)

    b.   [?]The set of circumstances that Mary will celebrate under is very restricted.   (A)

    c.   *That specific set of circumstances, which Mary will celebrate under...   (B)

    d.   *No circumstance will Mary celebrate under.   (B)

    e.   *That set of circumstances is easy to celebrate under.   (B)


The remainder of this paper seeks to explain why some prepositions are pronoun-rejecting, and why this should have anything at all to do with their potential to be stranded.

3   On antipronominal contexts

We established in §2 that temporal and locative DP complements to P can be divided into two classes, according to their ability to be pronominalized with 'it'. As complements to temporal prepositions, events but not intervals can be pronominalized with 'it'. As complements to locative prepositions, entities but not locations can be pronominalized with 'it'.

Interval and location DPs - the types that cannot be pronominalized as P's complement - are united in that they are *coordinate-denoting* DPs. Coordinate-denoting DPs are predicates that range over either spatial or temporal dimensions; they are defined by the amount of time or space that they occupy. The temporal DPs 'Monday' and 'Friday' for example, denote nothing more than specific positions and lengths along a timeline (24).

(24)   Monday and Friday: interval DPs
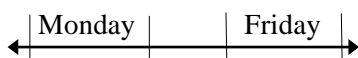
Event and entity DPs - the types that can be pronominalized as P's complement - are both *concrete* DPs, in the sense that they are predicates that range over entities occupying certain portions or temporal or spatial dimensions. The type of space that they occupy determines whether they are treated as locative or temporal DPs, but they are defined by properties other than their spatial coordinates. The event DP 'John's party', in (25), illustrates: John's party takes up a portion of Monday, but its length does not define it.

(25)   John's party: an event DP
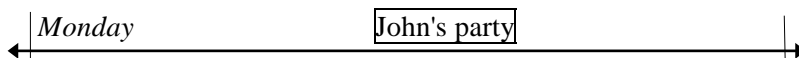
Prepositions selecting for coordinate-denoting DPs are P_Rs. They can take lexical nouns, but not pronouns, as their complements. Prepositions that select for concrete DPs are P_As. They can take either pronouns or lexical nouns as their complements.

What does it mean, though, for a preposition to be pronoun-rejecting? What is the difference between pronouns and lexical nouns, such that a preposition can discriminate between the two? One idea is that pronouns and lexical nouns are not members of the same syntactic category. Pronouns are determiners that do not have an NP complement (see e.g. Postal 1966, Abney 1987), while lexical nouns are Ns. The first argument for this difference in category membership comes from the fact that pronouns and determiners are in complementary distribution, but lexical nouns and determiners are not (26).

(26)   Pronouns and determiners are in complementary distribution (Abney 1987: 281).

    a. *[The she that I talked to] was nice.

    b. [The Mary that I talked to] was nice.

    c. [The woman that I talked to] was nice.

The fact that determiners can co-occur with lexical nouns, but not pronouns, suggests that pronouns (but not lexical nouns) have the same structural position as determiners. Further evidence for this analysis comes from the fact that pronouns can act as overt determiners to lexical nouns (27).

(27)   Pronouns as overt determiners (Postal 1966: 195)[14].

    a. you great ones

    b. we religious ones

    c. us quieter ones

If the analysis of pronouns as determiners is on the right track, then pronouns and lexical nouns, e.g. 'it' (28a) and 'the box' (28b), will be structurally distinct.

(28)   Pronouns vs. lexical nouns

    a. 'it'   b. 'the box'

                                        DP
                D   / \
                                      D   NP

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[14] Others have argued that the nouns in examples like (19c) are really appositive modifiers to a pronoun head. See Delorme & Dougherty (1972), and also Pesetsky (1978) for a criticism.

The basic proposal is that P_Rs are prepositions requiring their complement DPs to contain something more than just a bare D. In essence, it appears that complements of P_Rs must contain NPs. But when we look more closely at the selectional restrictions of P_Rs such as temporal 'in' and 'on,' it becomes clear that it isn't just any NP that P_Rs require: it's a certain type of NP. In the examples below, we see that 'in' (29) and 'on' (30) require interval DP complements, and forbid event DP complements.

(29)   Interval-selecting 'in'
      a.   I'll be there in five hours.   (interval DP)
      b.   *I'll be there in John's party.   (event DP)

(30)   Interval-selecting 'on'
      a.   I'll be there on Monday.   (interval DP)
      b.   *I'll be there on Sue's talk.   (event DP)

We cannot simply say that P_Rs are prepositions requiring their complements to contain an NP, because sentences like (29b) and (30b), where a temporal P_R takes an event complement, are ungrammatical.

Understanding why the complements of temporal P_Rs are restricted to intervals requires us to find some property of intervals that both events and pronouns lack. Following Kayne (2005a), I propose that interval DPs contain the noun TIME. TIME can be either null (as in 'December the 25th *(DAY)*') or pronounced (as in 'the *MONTH* of June'), and it signifies that the DP denotes a length or a point on a timeline. For some evidence that TIME resides in N, consider the alternation in (31)[15].

(31)   TIME as a noun
      a.   the twenty-fifth (DAY) of December
      b.   December twenty-fifth (DAY)

In (31a), we see that DAY acts as a noun, as it has both a determiner and a PP modifier. (31b) is derivationally related to (31a): 'December' has moved into a position structurally higher than D and lost its preposition (perhaps because 'December' is now in Spec, DP and the case-assigning preposition 'of' is no longer necessary). Note that even though 'day' cannot be pronounced in (31b), the presence of the ordinal modifier 'twenty-fifth' strongly suggests that something occupies N.

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[15] For temporals, I assume that 'day', 'month', and other interval-denoting nouns are sub-species of TIME. Similarly, for locatives, I assume that 'city', 'state', and other place-denoting nouns are sub-species of PLACE.

We can say something similar for location DPs. Following Kayne (2005b), I propose that location DPs contain the noun PLACE. Like TIME, PLACE can be either null (as in 'New York *(CITY)*') or overt (as in 'the Charles *RIVER*'). It signifies that a DP occupies coordinates along a spatial plane. Some evidence that PLACE occupies N comes from the alternation in (32), identical to the alternation in (31).

(32)   PLACE as a noun
      a.   the CITY of New York
      b.   New York CITY[16]

Returning now to P-stranding, we can say that interval-selecting temporal P_{RS} are prepositions selecting TIME, and location-selecting locative P_{RS} are prepositions selecting PLACE. Prepositions that require either TIME or PLACE are coordinate-selecting Ps. When a coordinate-selecting P takes a pronominal complement, its selectional restrictions cannot be satisfied, since such DPs do not contain NPs, and therefore do not contain TIME or PLACE[17].

4   Linking complementation and stranding

We can now re-characterize the link between complementation and stranding in light of the previous section. Temporal or locative P_{RS}, Ps that require their complements to contain TIME or PLACE, can be stranded under A-type extractions only. Temporal or locative P_{AS}, Ps that do not require their complements to contain TIME or PLACE, can be stranded under both A-type and B-type extractions.

The question, then, is this: how can we distinguish the A-type extractions from the B-type extractions in a way that allows us to capitalize on the differing selectional restrictions of P_{AS} and P_{RS}?

I propose that the A-type and B-type extractions differ in their sensitivity to selectional restrictions of Ps because they leave behind different kinds of things. A-type extractions (e.g. *wh*-movement) leave behind fully constructed copies (see Chomsky 1993, 1995). It is possible to strand P_{RS} under A-type extractions because the copy in the base position can contain an NP. If the copy in the base position can contain an NP, it can contain PLACE or TIME, and therefore the selectional restrictions of P_{RS} can be satisfied (33).

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[16] An interesting difference between the temporal example in (31b) and the locative example in (32b) is that the presence of 'the' is grammatical in the former (December 25th vs. December the 25th), but less so in the latter (New York City vs. ?New York the city). It is also worth noting using 'the' in temporal DPs is impossible for holidays named by their dates (July 4th vs. *July the 4th). The factors governing the distribution of 'the' are interesting but tangential, and will not be explored further.

[17] Although the only types of PPs I discuss in this section and in what follows are locative and temporal PPs, I anticipate that the analysis proposed here could extend to circumstantial and other types of PPs (see §2.3).

(33) A-type extractions leave full copies

    a. [Which day of the month] does your family eat lamb on$_R$ [~~which day of the month~~]?

    b. [Which floor] are we eating dinner on$_R$ [~~which floor~~]?

In B-type extractions, I propose that what is left behind is something smaller than a full DP - something that does not contain an NP. Because TIME and PLACE occupy N, in examples like (35), the selectional restrictions of P$_R$s cannot be satisfied.

(34) B-type extractions do not leave Ns.

    a. *No holiday will I ever eat lamb on$_R$.

    b. *The fourth floor is fun to eat dinner on$_R$.

    The link between complementation and stranding, then, is structural. The reasons why P$_R$s cannot take pronouns as their complements, or be stranded under B-type extractions, are one and the same. Neither of these configurations allows P's complement to contain an N, where TIME and PLACE reside[18].

    To make sense of this idea, we need a theory allowing for the possibility that some A'-extractions leave behind full copies, while others do not. This is where the theory of 'wholesale late merger' (WLM; Takahashi 2006, Takahashi & Hulsey 2009) becomes relevant. In short, WLM proposes that certain extractions (i.e. A-movement constructions) permit countercyclic merger of NPs to their head Ds, while other extractions (i.e. *wh*-movement) do not. I provide some necessary background on WLM (§5), and then extend the theory to account for the differences among A'-extractions discussed here (§6-7).

5   Wholesale late merger

WLM addresses a well-known problem for the copy theory of movement (see Chomsky 1993, 1995): extractions appear to differ in whether or not they leave a contentful copy behind. Takahashi (2006) and Takahashi & Hulsey (2009) (hereafter T(&H)) focus on the difference between A- and A'-movement: this basic distinction will be the focus of this section's discussion, though later there will be reason to look more closely at differences within the class of A'-extractions.

    The presence of reconstructed bound variable readings in both A- and A'-extractions suggests that it is possible for both types of movement to leave behind a full copy. In the examples below (35), 'every professor' binds the variable 'his', suggesting that a copy of the variable is c-commanded by the QP at LF.

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[18] The idea that some extraction sites behave like pronouns because they are, in some sense, pronouns, builds on previous work drawing the same conclusion (see e.g. Perlmutter 1972, Cinque 1990, Postal 1998), as noted in the introduction. While the idea has antecedents, the proposed formalization is novel. See §8.2 for a brief comparison with Postal's (1998) approach.

(35)   Reconstructed bound variable readings (T&H 2009: 391, 390)

    a. Someone from his$_i$ class seems to [every professor]$_i$ to be a genius.   (A-movement)

    b. Which of his$_i$ students did [every professor]$_i$ talk to?   (A'-movement)

The facts in (35) suggest that leaving a full copy behind is at least optional for both types of movement. But is it obligatory? For A'-movement, the answer seems to be yes: A'-movement does not bleed Condition C. Sentences where an R-expression in the moving NP is c-commanded by a coindexed pronoun at LF are ungrammatical (36a). For A-movement, however, the answer appears to be no: A-movement does bleed Condition C (36b).


(36)   Differences in Condition C effects

    a. *[Which corner of John$_i$'s room] was he$_i$ sitting in?   (T&H 2009: 391)

    b. [John$_i$'s mother] seems to him$_i$ to be wonderful.   (Lebeaux 1998: 23)

    The A-movement facts pose a problem for the copy theory of movement. While it appears that A'-extractions must always leave a copy behind, A-extractions do so only optionally. The presence of reconstructed bound variable readings for A-extractions suggests that leaving a full copy in the base position is possible. The absence of Condition C effects suggests that leaving a full copy behind is only a possibility, not an obligation.

    To solve this problem, T(&H) propose that it is possible for NP restrictors to countercyclically merge with their head Ds (they name this operation 'wholesale late merger'). Their proposal builds on work by Fox (2002), who proposes that late merge is possible whenever the output representation can be interpreted at LF. Fox's (2002) proposal differs from Lebeaux's (1988, 1998) theory of late merge because it does not limit the operation to adjunct phrases. It allows for the possibility that NPs can merge late with their head Ds, because the result is semantically interpretable (see T(&H) for details).

    For a demonstration of WLM, consider the schematic derivation in (37).

(37)   Application of WLM
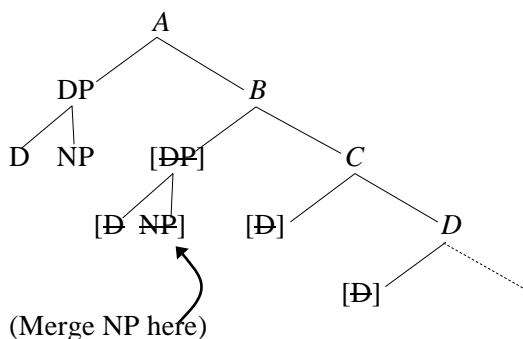
The bare D is externally merged in its base position, Position D. It then moves to Position C, and again to Position B. Position B is the site of WLM: here, the NP merges with D. The entire DP then moves to Position A, where it is pronounced.

 (37) shows how WLM allows for A-extractions to bleed Condition C. If an NP containing an R-expression does not merge with D until D is outside the c-command domain of a co-indexed nominal, Condition C effects will be absent.

The simple mechanism of WLM, however, does not yet allow us to explain why the reconstruction properties of A- and A'-movement should differ. Why, for example, is it possible for A-extractions to bleed Condition C through WLM, while this option is not available to A'-extractions? In other words: if WLM is an option available to the grammar, what constrains it?

T(&H)'s answer to this question is that WLM is constrained by the case requirements of DPs. To move towards an explanation of the differences between A- and A'-movement, T(&H) advocate an approach in which 'DPs as a whole demand Case because both determiners and nouns, which constitute DPs, must receive case' (T&H 2009: 401)[19]. Thus WLM is blocked when an NP would merge outside the domain of its case-assigner.

The appeal to Case allows T(&H) to capture the difference between A- and A'-movement. A-movement, which is movement from a non-case to a case position, permits the application of WLM. This means that the restrictor NP can merge outside of the c-command domain of a coindexed pronoun. In the examples below (38), Condition C is bled because there is no R-expression in the base position.

(38)   WLM permitted in A-movement
    a.   [The corner of John$_i$'s room] seems to him$_i$ [the] to be very dusty.
    b.   [Every argument that John$_i$ is a genius] seems to him$_i$ [every] to be flawless. (T&H 2009: 402)

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[19] Some support for the idea that both determiners and nouns receive case comes from languages like Greek, both Ancient (Smyth 1956) and Modern (Sabine Iatridou, p.c.), where determiners and nouns bear case morphology.

A'-movement, by contrast, is movement from a case to a non-case position. T(&H) propose that WLM is blocked in this context because the NP must merge in the base position to get case. In the examples in (39), Condition C effects are present because 'he' c-commands co-indexed 'John' at LF.

(39)   WLM blocked in A'-movement
   a. *[Which corner of John$_i$'s room] was he$_i$ sitting in [~~which corner of John$_i$'s room~~]?
   b. *[Which proof that John$_i$ is a genius] did he$_i$ believe [~~which proof that John$_i$ is a genius~~]?

   In sum, the reconstruction properties of A- and A'-movement differ because they place differing restrictions on the application of WLM. A-extractions permit WLM because an NP can merge outside of its base position and still receive case. A'-extractions block WLM because the NP must merge in its base position to receive case. What is important to keep in mind is that, depending on extraction type, the size of copy that a DP leaves behind can differ.

6   Relating WLM to P-stranding

Although the only A'-extraction that T(&H) consider is *wh*-movement, they implicitly assume that all varieties of A'-movement exhibit Condition C effects. Looking more broadly across the variety of A'-extractions discussed in relation to P-stranding, we see that this assumption is mostly well-founded (40).

(40)   Condition C effects in A'-movement
   a. *Which criticism of Mary$_i$'s proposal did she$_i$ reject?   (wh.)
   b. *The student whose criticism of Mary$_i$'s proposal she$_i$ rejected...   (rest. rel.)
   c. *That student, whose criticism of Mary$_i$'s proposal she$_i$ rejected...   (app. rel.)
   d. *Not a single criticism of Mary$_i$'s proposal has she$_i$ ever rejected.   (NI)
   e. *The harsh criticism of Mary$_i$'s proposal, she$_i$ rejected.   (top.)

P-gaps, tough-movement and GDPs behave differently, however: like A-extractions, they fail to exhibit Condition C effects (41).

(41)   Condition C absent
   a. Which criticism of Mary$_i$'s proposal did John endorse after she$_i$ rejected?   (P-gap)
   b. The criticism of Mary$_i$'s proposal is hard for her$_i$ to accept.   (TM)
   c. The criticism of Mary$_i$'s proposal is too harsh for her$_i$ to believe.   (GDP)

Crossing the presence/absence of Condition C effects with a given extraction's ability to strand P_Rs yields the table in (42). We can now distinguish among three different types of extractions. The A-type extractions (e.g. *wh*-movement) are extractions that exhibit Condition C effects and permit stranding of P_Rs. The B_1-type extractions (e.g. neg-inversion) exhibit Condition C effects, but ban stranding of P_Rs. The B_2-type extractions (e.g. tough-movement) fail to exhibit Condition C and ban stranding of P_Rs.

(42)   Condition C effects and stranding

	Condition C: Present	Condition C: Absent
✓[P_R t]	**A-type extractions** *wh*-movement restrictive relatives	
*[P_R t]	**B_1-type extractions** topicalization negative inversion appositive relatives	**B_2-type extractions** tough-movement gapped degree phrases parasitic gaps

If we allow for the possibility that WLM can occur in A-movement and A'-movement alike, WLM can help us understand why A-type, B_1-type, and B_2-type extractions (all types of A'-movement) differ according to the properties in (42). I sketch this analysis below.

For A-type extractions (e.g. *wh*-movement), the NP merges maximally early, in the base position. Because the NP merges maximally early, in (43a) the pronoun 'she' c-commands the 'Mary' at LF, and Condition C is violated. Because merging the NP in the base position means that a full copy is left behind, a P_R can be stranded (43b): because its complement can contain an NP, it can contain TIME or PLACE.

(43)   Deriving the properties of A-types (here: *wh*-movement)
         a.   *Which criticism of Mary$_i$'s proposal did she$_i$ reject [which criticism of Mary$_i$'s proposal]?
         b.   Which holiday does your family eat lamb on$_R$ [which holiday]?

In the B_1-type extractions (e.g. negative inversion), WLM must occur early, but crucially not too early. We know from the presence of Condition C effects (44a) that the site of WLM cannot be maximally late, as in A-movement, because the R-expression 'Mary' must be merged within the c-command domain of the coindexed pronoun 'she'. We also know from the ban on stranding P_Rs (44b) that WLM is not blocked entirely: the fact that B_1-type extractions are sensitive to the distinction between P_As

and P_Rs suggests that their complements do not contain NPs. Thus the site of WLM must be above the base position, but within the c-command domain of a coindexed pronoun.

(44)   Deriving the properties of B_1-types (here: negative inversion)

       a.   *Not a single criticism of $Mary_i$'s proposal has she_i ever rejected.

       b.   *Not a single holiday have I ever eaten lamb on_R.

The analysis of B_2-type extractions adopted here (see §8.1 for some justification) assumes that all B_2-type extractions involve movement of a null operator (see e.g. Chomsky 1977, 1981 for TM, Brillman 2013 for GDPs, and Nissenbaum 2000 for P-gaps). Because null operators do not contain lexical material, this approach correctly predicts that Condition C effects are absent (45a) and that P_Rs cannot be stranded (45b). The selectional restrictions of P_Rs can't be satisfied because their complements do not contain TIME or PLACE[20].

(45)   Deriving the properties of B_2-types (here: tough-movement)

       a.   The criticism of $Mary_i$'s proposal is tough for her_i to accept [∅].

       b.   *Easter is easy to eat lamb on_R [∅].

There are no extractions that can both bleed Condition C and strand P_Rs. This gap is significant, and predicted from a WLM-style analysis of the patterns in (42). An extraction that can bleed Condition C is by definition an extraction where there is no NP in the base position. An extraction that can strand P_Rs is an extraction where the NP must merge in the base position, in order to satisfy the selectional restrictions of P_Rs. A WLM-style analysis of this type of extraction would be impossible, as the NP would need to merge both very late (to bleed Condition C) and very early (to strand P_Rs).

7   **Deriving the patterns**

What we need, at this point, is an explanation for why WLM is tightly constrained in B_1-type extractions and blocked in A-types. What motivates WLM, and why does its application vary across A'-extractions[21]?

    The core of the proposed analysis is that WLM is not just an option, but rather a violable preference, in the sense of Optimality Theory (Prince & Smolensky 1993/2002)[22]. WLM is constrained in B_1-type

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[20] An alternative would be to assume an improper movement analysis of tough-movement and GDPs (see e.g. Hartman 2009), and say that WLM occurs maximally late. This analysis, however, runs us into problems with data presented in §8.1.

[21] Recall that I will account for the properties of B_2-type extractions by appealing to the presence of a null operator, not late application of WLM. I discuss these constructions further in §8.1.

and A-type extractions because there are conflicting constraints that take priority over the preference for WLM. Following T(&H), one such conflicting constraint is the requirement for NPs to receive case. The constraint requiring NPs to receive case (GETCASE, defined in 43) dominates the constraint enforcing the general preference for WLM (LATEMERGE, defined in 44).

(46)   GETCASE: one * if NP is caseless.

(47)   LATEMERGE: if NP is merged at x, one * for each available merge site that c-commands x.

The interaction between GETCASE and LATEMERGE is modeled schematically in (48). A boxed letter (here, C) indicates the case-assigning position, and 'x' indicates the site where the NP is merged. I assume that successive cyclic movement occurs from positions D to A. The tableau in (48) and all others that follow should be read from the top down. Note that the constraints and tableaux in this section are presented as a way of formalizing and visualizing the pressures governing the application and location of WLM. Presumably, there are deeper reasons why these constraints exist, as well as reasons why they interact in the way that they do.

(48)   GETCASE >> LATEMERGE

	a. A
	x⟍ B
	 ⟍ C
	  ⟍ D
		b. A
		 ⟍ B
		x⟍ C
		  ⟍ D
			> c. A
			 ⟍ B
			  ⟍ C
			x⟍ D
				d. A
				 ⟍ B
				  ⟍ C
				  ⟍ D
				   x⟍

GETCASE	*!	*!		
LATEMERGE		* (A)	** (A, B)	***! (A, B, C)

Both (48a) and (48b) incur fatal violations of GETCASE because the NP is merged above C, the last position where case can be assigned. The decision between (48c) and (48d) is made by LATEMERGE. (48d) incurs three violations of LATEMERGE, as there are three potential landing sites (A, B, and C) that c-command D, the location where the NP is merged. (48c) incurs only two violations of LATEMERGE, as

---

[22] Conceiving of WLM as a violable preference, rather than an option, provides us with a slightly different interpretation of the interaction between variable binding and WLM discussed for A-movement by T(&H). T(&H)'s claim is that WLM is optional in A-movement, allowing for the possibility that A-movement can exhibit both reconstruction and anti-reconstruction effects (variable binding and Principle C, respectively). If WLM is a preference, then the account is slightly different: WLM *always* occurs unless there is something to constrain it (in this case, variable binding). My reinterpretation of the conditions under which WLM applies does not prevent us from capturing any of the generalizations made by T(&H).

there are two potential merge sites (A and B) that c-command the site of WLM. Between (48c) and (48d), (48c) best satisfies the general preference for WLM, and is selected as optimal.

This analysis predicts that, all else being equal, WLM will occur at the latest possible step in the derivation at which an NP can receive case. §7.1 discusses case assignment in PPs, and show that the schematic analysis sketched in (48) derives the properties of B_1-type extractions. In §7.2, I suggest that the moving DP in A-type extractions is embedded within an additional layer of functional structure, Cable's (2007, 2010) QP (see also Hagstrom 1998), and propose that WLM is blocked in these extractions because it would be in a sense, *too* countercyclic. While WLM is by definition a countercyclic operation, there are constraints on just how countercyclic it can be (as argued first by Tada 1993: 63-70 and Sauerland 1998: 2.2).

7.1 Deriving B_1-type extractions

In prepositional phrases, what assigns case to DPs? I assume here that PPs have a *p*P shell, and that *p* is what assigns case to P's complement (49). Arguments for a little *p* projection have been made by a number of different authors, on a number of different grounds (see van Riemsdijk 1990; Manninen 2003: 117 and references there; Ramchand & Svenonius 2004; Svenonius 2003, 2008, 2010; Levinson 2011; Oxford 2011; and many others).

(49)   *p*P shell

```
        pP
       /  \
   p[Case]  PP
          /  \
         P    DP[uCase]
```
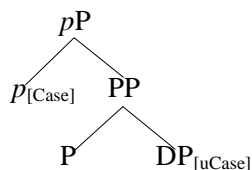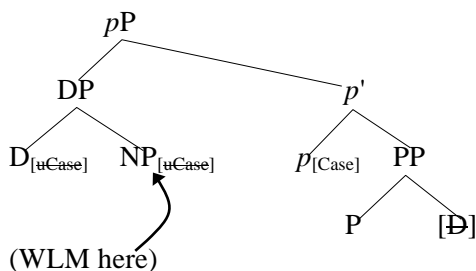
For pure A'-extractions (that is, extractions demonstrating movement from a case position to a non-case position), the last possible landing site where an NP would be able to receive case is Spec, *p*P[23]. The analysis sketched in §7 then predicts that, for pure A'-extractions out of *p*P, WLM should take place in Spec, *p*[24]. This is because Spec, *p* is the last possible landing site at which an NP can receive case (50).

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[23] This analysis then implies that case can be assigned in a specifier-head relationship, after WLM takes place. In the diagram in (51) I assume the following sequence of operations: p agrees with D, D moves to Spec pP, NP is merged to D, and then the entire DP receives case. Note that this is not equivalent to a claim that case *must* be assigned in a Spec, head relationship. All that is necessary is that it *can* be.

[24] Note that the incorporation of a *p*P shell makes it possible for a DP to move successive cyclically through spec, *p*P without violating Abel's (2003) stranding generalization.

(50)   WLM in Spec, pP

```
                    pP
            _____|_____
          DP                 p'
       ___|___          _____|_____
      D[uCase] NP[uCase]  p[Case]    PP
                ↑                 ___|___
           (WLM here)            P      [D]
```

This simple proposal is sufficient to derive the Condition C and P-stranding facts for B_1-type extractions. No conceivable pronoun can intervene between P's complement and Spec, pP. Thus Condition C effects are present, just as if the NP were merged in the base position. But because what is left in the base position is just a D, P's complement does not contain an NP, and P_Rs cannot be stranded.

An obvious question arises here: if WLM can be constrained for reasons of case, why can't it be blocked entirely to satisfy the selectional restrictions of P_Rs? Here, we must distinguish between syntactic and semantic constraints. The requirement for NPs to receive case is syntactic, but the requirement for P_Rs to have a TIME- or PLACE-containing complement is more semantic in nature. P_Rs demand a DP complement endowed with a certain kind of meaning, not a certain structural configuration: there is no reason to believe that interval and event DPs, for example, are structurally distinct. It seems that while the OT system can regulate interactions among purely syntactic constraints, it cannot regulate interactions among syntactic constraints and those that interface with the semantics.

This statement, though, will ultimately, need to be qualified. While it is impossible to overrule WLM in order to satisfy the selectional restrictions of P_Rs, it is possible to overrule WLM to bind a variable, as suggested by the possibility of bound variable readings in A-movement (§5). This suggests that some semantic constraints, but not others, can overrule syntactic ones. I do not have an explanation for why this partition might exist, but it is worth noting that the same asymmetry - that variable binding is somehow different and more important than other semantic constraints - shows up in work by Fox (1998) on scope economy and variable binding.

7.2 Deriving A-type extractions

A-type extractions pose an interesting problem for the current analysis. The fact that A-type extractions permit stranding of P_Rs (51) suggests that some factor blocks WLM entirely. For a P_R's selectional restrictions to be satisfied, the NP must merge as part of its complement.

(51)   A-type extractions can strand P_Rs

    a.   Which floor are we eating dinner on$_R$ [~~which floor~~]?

    b.   Which phase of his life did John study linguistics in$_R$ [~~which phase of his life~~]?

To explain why the examples in (51) are good, we must identify another constraint (specific to A-type extractions) that overrides the preference for WLM. To identify this constraint, we need to find some property that the A-types share. More than this, it must also be some property that all B-types lack.

One possibility is that the moving DP in A-type extractions is embedded within an additional layer of structure: a QP, in Cable's (2007, 2010) sense. Though the bulk of Cable's (2007, 2010) discussion focuses on *wh*-movement, he notes that restrictive relatives and *wh*-movement in English abide by similar constraints, and posits that the moving constituents in both extractions are embedded within a larger QP shell[25]. He speculates (2007: 369-375) that a Q-based analysis could be extended to all other types of A'-extraction. My proposal is more restrictive: wh-movement and restrictive relatives have a QP layer, to the exclusion of the other extractions under study here[26].

Some evidence that this is a promising line of analysis comes from a difference in acceptable pied-piping size between the A-type extractions and appositive relatives (a B-type extraction). English is an example of what Cable terms a 'limited pied-piping' language: in *wh*-movement, very little material can be pied-piped along with the *wh*-phrase. This limitation is illustrated in (52). The sentence in (52a), where the *wh*-phrase is embedded within a larger DP, is much less acceptable than (52b), where it is not.

(52)   Pied piping in *wh*-movement[27]

    a.   ??Pictures of who do you display in your home?

    b.   Who do you display pictures of in your home?

Cable (2007: 279) argues that these restrictions are due to the fact that Q-wh agreement is obligatory in limited pied-piping languages. Lexical categories, like N, cannot intervene between Q and a wh-word. In (53) we see that Q-*wh* agreement is impossible in (52a) but possible in (52b).

---

[25] The Qs involved in wh-questions and restrictive relatives are presumably slightly different kinds of Q. Cable dubs them Q_Q (for questions) and Q_{REL} (for relatives), but this distinction is not important here. What is important is that the moving constituent in both cases is embedded within an extra layer of structure.

[26] Cable does provide a Q-based analysis of free relatives (2007: 375-379), to explain certain similarities between free relatives and matrix interrogatives. It is perhaps revealing that free relatives pattern with *wh*-movement on one additional parameter: they can strand P_Rs. ('Whatever Easter we ate lamb on, it was really cold.')

[27] Some speakers report that the contrast in (52) is not particularly strong. What's important here is that there *is* a contrast in (52), whatever its strength may be, and that this contrast disappears in (55). It also seems relevant that the most natural pronunciation of (52a) is one where the *wh*-word is focused ('pictures of *who*...?'), like it would be if it were a *wh*-in-situ question ('you displayed pictures of *who*...?'). Without focusing the *wh*-word, as is usual for *wh*-questions with movement, (52a) is much less natural.

(53)   Q-wh agreement
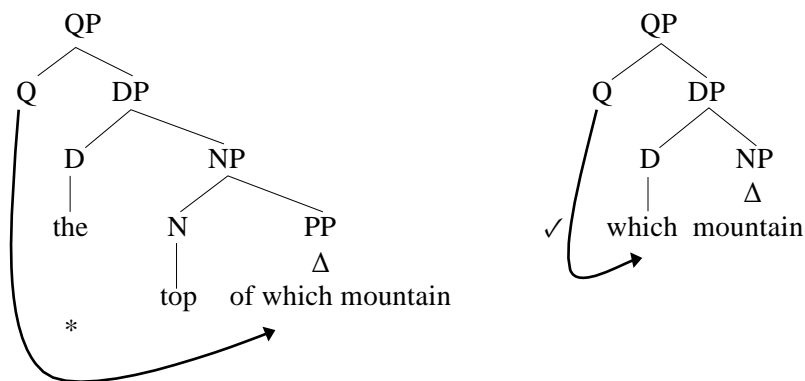
The generalization that lexical material cannot intervene between a Q and a *wh*-word is also true for restrictive relatives (54).

(54)   Limited pied piping in restrictive relatives
    a.   *The scientist pictures of whom I display in my home won a Nobel Prize.
    b.   The scientist who I display pictures of in my home won a Nobel prize.

Appositive relatives, however, allow what Heck (2004) terms 'massive pied piping' (see also Bresnan 1976, Emonds 1976, Jackendoff 1977, and other more recent work cited by Cable 2007: 341). While pied piping in *wh*-movement and restrictive relatives is limited, pied piping in appositives is not (55).

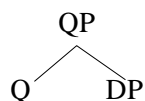(55)   Massive pied piping in appositive relatives
    a.   Marie Curie, pictures of whom I display in my home, won a Nobel Prize.
    b.   Marie Curie, who I display pictures of in my home, won a Nobel Prize.

The grammatical sentence in (55a) blatantly violates Q-wh agreement. Rather than trying to explain why the A-type extractions appear to require Q-wh agreement and appositives do not, it is perhaps simpler to say that the DP moving in wh-movement and restrictive relatives, but not appositive relatives, is embedded within a QP shell (though see Heck 2004, 2008 and Cable 2007: 341-348 for alternatives). Under this account, Q-*wh* agreement appears to be violated in appositive relatives because there is no Q; movement and apparent pied piping in appositive relatives must then happen for other reasons.
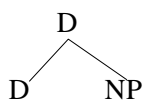
The proposal, in sum, is that A-type (and only A-type) DPs are surrounded by a QP shell. The two different structures are illustrated in (56).

(56)   Structure of A-type and B-type DPs

    a. QP in A-type extractions   b. DP in B-type extractions

```
        QP                              D
       /  \                           /   \
      Q    DP                        D     NP
```
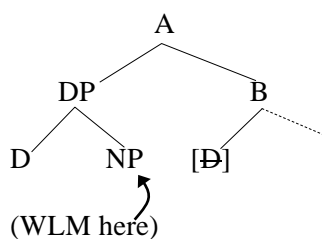
Why, though, would the presence of a QP shell block WLM? In line with Tada's (1993: 63-70) modification of Lebeaux's (1988) theory of late merge, I propose that WLM cannot happen in A-type extractions because it would be *too* countercyclic. WLM is permitted when the NP merges to the daughter of the current root node, but banned when its application would modify the internal structure of an embedded constituent.
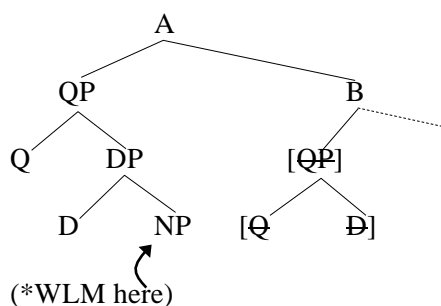
In (57a), WLM is permitted because the NP merges with D, the daughter of the current root node. In (57b), WLM is forbidden, because the NP merges inside a DP embedded within a QP shell, thereby modifying the internal structure of an embedded constituent.

(57)   WLM in A-types: too countercyclic

    a. ✓WLM inside DP   b. *WLM inside QP.

```
           A                              A
          / \                            /   \
        DP   B                         QP     B
       /  \   ·...                    /  \     ·...
      D    NP  [D]                    Q   DP   [QP]
          ↑                              / \    / \
      (WLM here)                        D   NP [Q   D]
                                           ↑
                                       (*WLM here)
```

This restriction on WLM bears a striking resemblance to restrictions on late adjunction described by Sauerland (1998: 2.2). Sauerland shows, in brief, that there is an ordering effect among relative clauses, predicted by Tada's (1993: 63-70) modification of Lebeaux's (1988) theory. While it is possible to force reconstruction of an inner modifier without forcing reconstruction of an outer modifier, the reverse is not possible: forcing reconstruction of an outer modifier forces reconstruction of an inner modifier as well. This suggests that it is impossible for an inner modifier to merge countercyclically between a noun and its modifier, i.e. the inner modifier must merge derivationally prior to the outer modifier. Merging the inner modifier inside the outer modifier is bad for the same reason that WLM within a QP is bad (57b): both modify the structure of an embedded constituent.

Returning to P-stranding, the A-type extractions show us that the constraint penalizing excessive countercyclicity (TOOLATE!) dominates LATEMERGE. WLM is blocked when it would result in a violation of TOOLATE! (58).

(58)   TOOLATE! ≫ LATEMERGE

	a. pP QP p' Q DP p PP D NP P [Q̶P̶] (WLM here) [Q̶] [D̶]	a. pP QP p' Q DP p PP D NP P [Q̶P̶] [Q̶] [D̶P̶] [D̶] [N̶P̶]
TOOLATE!	*!	
LATEMERGE	n	n+1

(58a) incurs a violation of TOOLATE!, as the NP merges with D, which is not the daughter of the current root node. Even though (58b) incurs more violations of LATEMERGE, it is selected as optimal. The NP must merge with the head D before the DP merges with Q; otherwise, the derivation violates TOOLATE![28].

We have now derived the Condition C and stranding properties of A-type extractions. WLM is blocked, so the NP merges in the base position. A-extractions leave behind a full copy, so Condition C effects are present. Because P's complement can contain an NP, P_Rs can be stranded.

8   Further support: B_2-type extractions, and some more pronouns

The analysis proposed in §7 suggests that the link between a P's selectional restrictions and its potential to be stranded is structural. Temporal and locative P_Rs reject all DP complements, pronounced or not, that do not contain TIME or PLACE. This approach predicts that if P's complement can never contain an NP, stranding P_Rs should be impossible, regardless of the extraction in question.

Here I provide evidence from two domains that this prediction is correct. In §8.1 I return to the properties of B_2-type extractions, and argue that their behavior is best explained as the result of null

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[28] David Pesetsky (p.c.) points out that the restriction imposed by TOOLATE! helps explain why WLM does not appear to occur within stationary DPs, which would incorrectly obviate standard Condition C effects. As proposed earlier, it is impossible for WLM to occur when D is not the daughter of the current root node. This is necessarily the situation when we try to apply WLM within stationary DPs: once the DP merges with a phrasal head, WLM is blocked. Therefore, for DPs that do not move, the NP must merge maximally early.

operator movement. Because P's complement never contains an NP, P_Rs cannot be stranded. In §8.2 I show that the analysis correctly predicts contrasts *within* extractions. When *wh*-movement involves movement of *wh*-pronouns, *wh*-movement acts like a B-type extraction: it is sensitive to whether or not a given P is pronoun-rejecting.

8.1 B_2-types and null operators

If we assume that the B_2-type extractions (tough-movement, gapped degree phrases, and parasitic gaps) are structurally similar - that is, they all involve movement of a null operator - then the fact that they bleed Condition C and cannot strand P_Rs is predicted by the current analysis. There is no reason to believe that null operators contain lexical material (i.e. NPs), so there is nothing in their structure that could satisfy the selectional restrictions of P_Rs, or drive a Condition C effect. But the assumption that these three extractions all involve null operator movement is not universally accepted. Below I briefly sketch the basis of the controversy, and provide some evidence in favor of the null operator style analyses.

While it is common to assume that P-gaps involve movement of a null operator or some other null pronominal element (see Nissenbaum 2000: 24-29 for an overview), the analysis of tough-movement, and by extension GDPs, is more controversial. The existence of defective intervention effects (see Hartman 2009, also Brillman 2013) and the presence of reconstructed bound variable readings is supportive of an improper movement analysis, in which the moving constituent originates in the embedded clause. The absence of scope reconstruction from the TC subject into the embedded clause (see Postal 1974, Epstein 1989, Fleisher 2013) and the absence of Condition C effects, however, supports an account where the DP originates in the matrix clause, like Chomsky's (1977, 1981) null operator analysis.

It is beyond the scope of this paper to provide a conclusive argument for either improper movement or null operators, nor do I attempt to further differentiate within these classes of analyses. When we look at interactions between the B_2-type extractions and *wh*-movement, however, some evidence for a null operator analysis of the B_2-type extractions emerges. Stranding P_Rs using a combination of *wh*-movement and a B_2-type extraction is impossible (59a, 60a) and these extractions bleed Condition C (59b, 60b). In short, hybrids of A-type and B_2-type extractions behave like B_2-types.

(59)   Hybrid type 1: tough- and *wh*-movement

      a.   *Which holiday is easy to eat lamb on?

         (cf: Which holiday did we eat lamb on?)

      b.   Which criticism of Mary$_i$'s proposal is hard for her$_i$ to accept?

         (cf: *Which criticism of Mary$_i$'s proposal did she$_i$ reject?)

(60)   Hybrid type 2: GDPs and *wh*-movement

        a.   *Which holiday is too joyous to eat lamb on?

           (cf: Which holiday did we eat lamb on?)

        b.   Which criticism of Mary$_i$'s proposal is too harsh for her$_i$ to accept?

           (cf: *Which criticism of Mary$_i$'s proposal did she$_i$ reject?)

These differences between the hybrid extractions and *wh*-movement are predicted by the null operator analysis. If the matrix subject never occupies any position in the embedded clause, then it follows that P_Rs cannot be stranded, because their complements cannot contain TIME or PLACE. Similarly, in (56b, 57b) Condition C is bled because 'Mary' is never within the c-command domain of co-indexed 'she'.

An improper movement style analysis, where the QP originates in the embedded clause, would face some problems in accounting for (59-60). Because the hybrid extractions are *wh*-interrogatives, I assume that the fronted DP is embedded within a QP shell. An analysis assuming that the QP originates in the embedded clause would need to explain why it is apparently acceptable for WLM to violate TOOLATE! in the hybrid extractions, but not in pure *wh*-movement.

8.2 Wh-pronouns

We saw in §8.1 that if a given extraction never allows a P_R to have a complement containing TIME or PLACE, that extraction will never allow P_Rs to be stranded. What I show here is related, but different. The analysis outlined in §7 suggests that the ability to strand P_Rs is linked to the structural configuration of the gap, not to the extraction that creates it. Given this, we would expect, under certain conditions, to find contrasts within extractions. Extractions that are capable of leaving behind full copies should be sensitive to P_Rs if the full copy is pronoun-sized, i.e. a D.

One way to assess this prediction is to compare the behavior of *wh*-movement with *wh*-pronouns and full *wh*-phrases. It is plausible to assume that *wh*-pronouns like 'who' and 'what' do not contain NPs, like their non-*wh* counterparts 'her' and 'it'. If this analysis is correct, then *wh*-movement with *wh*-pronouns should be sensitive to whether or not a preposition is a P_A or a P_R, while *wh*-movement with full *wh*-phrases should not discriminate. This is because A-type extractions leave behind a full copy, but the full copy of a *wh*-pronoun does not contain an NP, and therefore cannot contain TIME or PLACE.

This prediction holds. The examples in (61) demonstrate that movement of both *wh*-pronouns and *wh*-phrases is grammatical when stranding P_As; the examples in (62) demonstrate that movement of *wh*-phrases is grammatical when stranding P_Rs, but movement of *wh*-pronouns is not[29].

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[29] Note that in-situ wh-pronouns are bad in the same environment, as predicted ('I know that some people will go hiking on Friday, and others will go hiking on Saturday, but I don't know who will go hiking on which day/*what').

(61)   Stranding a P_A

    a.   My family eats dinner on the green table (and John's family eats dinner on it too).

    b.   What table does your family eat dinner on?

    c.   What does your family eat dinner on?

(62)   Stranding a P_R

    a.   My family eats turkey on Thanksgiving (*and John's family eats turkey on it too).

    b.   What holiday does your family eat turkey on?

    c.   *What does your family eat turkey on?

Note that the ungrammaticality of (62c) cannot be attributed to a more general restriction on the types of DPs that *wh*-pronouns can replace. 'Thanksgiving' can be pronominalized with 'it' when it is the complement of 'celebrate' (63a). In this context, movement of both *wh*-pronouns and *wh*-phrases is permitted (63b-c).

(63)   Interval DPs and *wh*-pronouns

    a.   My family celebrates Thanksgiving (and John's family celebrates it too).

    b.   Which holiday does your family celebrate?

    c.   What does your family celebrate?

The analysis proposed in §7 bears some resemblance to Postal's (1998) account of antipronominal contexts, but the contrasts in (61-62) reveal that the WLM-style analysis makes accurate predictions that Postal's (1998) analysis cannot. Postal proposes that certain extractions are sensitive to antipronominal contexts because they leave behind null resumptive pronouns. Because his account proposes that extractions themselves are linked to certain types of null categories, it is unable to predict contrasts within extractions, like the contrast between *wh*-pronouns and *wh*-phrases documented in (61-62). Postal's analysis fails here because it attributes the pronominal behavior of certain extraction sites to the extraction in question, rather than the structural configuration of the gap.

My earlier claim that the ability to strand P_Rs is extraction-dependent, then, is not exactly true. The ability to strand a temporal or locative P_R depends on whether or not its complement contains TIME or PLACE. Specific extractions only appear to play a role because their independent properties (e.g. presence of a QP shell) regulate the application and location of WLM.

9 Conclusion

The P-stranding asymmetries and Condition C facts discussed in this paper demonstrate a need to divide A'-extractions into three groups. I have argued that the differences between these groups arise because they leave different kinds of things behind. There are extractions (A-types) that leave behind full copies, there are extractions (B_1-types) that leave bare Ds, and there are extractions (B_2-types) that involve movement of a null operator. The extractions that leave full copies behind (A-types) can strand pronoun-rejecting prepositions, but the extractions that do not leave full copies behind (B-types) cannot.

All English A'-extractions are united in that they can strand prepositions, but differing properties of individual extractions lead to distinct constraints on which Ps can be stranded. Thus while it is true that all A'-extractions share the same set of basic properties, asymmetries within a single property can point to subtle, but fundamental, differences among them.

References

Abels, Klaus (2003). *Successive Cyclicity, Anti-locality, and Adposition stranding.* PhD thesis, UConn.

Abney, Steven Paul (1987). *The English Noun Phrase in its Sentential Aspect.* PhD thesis, MIT.

Bresnan, Joan (1976). On the Form and Function of Transformations. LI **7.** 31-40.

Bresnan, Joan & Jane Grimshaw (1978). The Syntax of Free Relatives in English. LI **9.** 331-391.

Brillman, Ruth (2013). Too tough to see. Handout from Syntax Square (MIT).

Cable, Seth (2007). *The grammar of Q: Q-particles and the nature of Wh-fronting, as revealed by the Wh-questions of Tlingit.* PhD thesis, MIT.

Cable, Seth (2010). *The Grammar of Q: Q-Particles, Wh-Movement, and Pied-Piping.* Oxfod: Oxford University Press.

Cardinaletti, Anna & Michal Starke (2004). The typology of Structural Deficiency: On the Three Grammatical Classes. Ms., MIT.

Chomsky, Noam (1977). On wh-movement. In Peter Culicover, Tom Wasow, & Adrian Akmajian (eds.), *Formal Syntax*, 71-132. New York: Academic Press.

Chomsky, Noam (1981). *Lectures on government and binding: The Pisa lectures*. Dordrecht: Foris.

Chomsky, Noam (1982). *Some concepts and consequences of the theory of Government and Binding.* Cambridge: MIT Press.

Chomsky, Noam (1993). A minimalist program for linguistic theory. In Kenneth Hale and Samuel Jay Keyser (eds.), *The view from Buliding 20: Essays in linguistics in honor of Sylvain Bromberger*, 1-52. Cambridge, MA: MIT Press.

Chomsky, Noam (1995). *The Minimalist Program*. Cambridge, MA: MIT Press.

Chomsky, Noam (1999). Powers and prospects: reflections on human nature and the social order. London: The Electric Book Company Ltd.

Cinque, Guglielmo (1990). *Types of A'-Dependencies*. Cambridge, MA: MIT Press.

Culicover, Peter W. (1999). *Syntactic nuts: hard cases, syntactic theory, and language acquisition.* Oxford: Oxford University Press.

Delorme, Evelyne & Ray C. Dougherty (1972). Appositive NP constructions: we, the men; we men; I, a man; ETC. *Foundations of Language* **8.** 2-29.

Emonds, Joseph (1976). A Transformation Approach to English Syntax. New York: Academic Press.

Engdahl, Elizabet (1983). Parasitic Gaps. *Linguistics and Philosophy* **6.** 5-34.

Epstein, Samuel David (1989). Quantification in null operator constructions. *LI* **20.** 647-658.

Fleisher, Nicholas (2013). On the Absence of Scope Reconstruction in Tough-Subject A-chains. *LI* **44.** 321-332.

Fox, Daniel J. (1998). Economy and Semantic Interpretation - A study of scope and variable binding. PhD thesis, MIT.

Fox, Danny (2002). Antecedent-contained deletion and the copy theory of movement. *LI* **33.** 63-96.

Hagstrom, Paul (1998). *Decomposing Questions*. PhD thesis, MIT.

Hartman, Jeremy (2009). Intervention in Tough Constructions. In *NELS* 39.

Heck, Fabian (2004). A Theory of Pied Piping. Doctoral dissertation, Universität Tubingen.

Heck, Fabian (2008). *On pied-piping: Wh-movement and beyond*. Berlin: Mouton de Gruyter.

Hornstein, Norbert & Amy Weinberg (1981). Case theory and preposition stranding. *LI* **12.** 55-91.

Jackendoff, Ray (1977). X-bar syntax: A Study of Phrase Structure. Cambridge, MA: MIT Press.

Kayne, Richard S. (1981). On Certain Differences between French and English. *LI* **12.** 349-371.

Kayne, Richard S. (2005a). Silent Years, Silent Hours. *Movement and Silence.* Oxford: Oxford University Press.

Kayne, Richard S. (2005b). Here and There. *Movement and Silence.* Oxford: Oxford University Press.

Kuroda, Sige-Yuki (1964). A note on English relativization. Ms., MIT.

Kuroda, S.-Y. (1968). English Relativization and Certain Related Problems. *Lg* 44. 244-266.

Lasnik, Howard & Tim Stowell (1991). Weakest crossover. *LI* **22.** 687-720.

Lebeaux, David (1988). *Language acquisition and the form of grammar*. PhD thesis, UMass Amherst.

Lebeaux, David (1998). Where does binding theory apply? Technical report. Princeton, NJ: NEC Research Institute.

Levinson, Lisa (2011). Possessive WITH in Germanic: HAVE and the role of P. Syntax **14.** 355-393.

Manninen, Satu Helena (2003). Small Phrase Layers: A study of Finish Manner Adverbials. Amsterdam: John Benjamins Publishing Company.

Nissenbaum, Jonathan W. (2000). *Investigations of covert movement*. PhD thesis, MIT.

Oxford, Will (2011). The syntax of Innu-aimun locatives. In *UBCWPL 31: Proceedings of WSCLA 16*.

Perlmutter, David M. (1972). Evidence for shadow pronouns in French relativization. In Paul M. Peranteau, Judith N. Levi & Gloria C. Phares (eds.), *The Chicago which hunt*. CLS: University of Chicago.

Pesetsky, David (1978). Category switching and so-called so-called pronouns. *CLS* **14.** 350-361.

Pesetsky, David Michael (1982). *Paths and categories.* PhD thesis, MIT.

Postal, Paul M. (1966). On so-called 'pronouns' in English. *Monograph series in language in linguistics,* **19.** 177-206.

Postal, Paul M. (1974). *On raising*. Cambridge, MA: MIT Press.

Postal, Paul M. (1998). *Three investigations of extraction*. Cambridge, MA: MIT Press.

Prince, Alan & Paul Smolensky (1993/2002). Optimality Theory: Constraint Interaction in Generative Grammar. http://roa.rutgers.edu/files/537-0802/537-0802-PRINCE-0-0.PDF.

Ramchand, Gillian & Peter Svenonius (2004). Prepositions and External Argument Demotion. In Torgrim Solstad, Benjamin Lyngfelt, & Maria Filiouchkina Krave (eds.), *Demoting the Agent: Passive and other Voice-related Phenomena*, 93-99. University of Oslo.

Ross, John Robert (1967). Constraints on variables in syntax. PhD thesis, MIT.

Sauerland, Uli (1998). *The meaning of chains.* PhD thesis, MIT.

Smyth, Herbert Weir (1956). *Greek Grammar*. Cambridge, MA: Harvard University Press.

Svenonius, Peter (2003). Limits on p: *filling in holes* vs. *falling in holes*. *Nordlyd* 31: 431-445.

Svenonius, Peter (2008). Projections of P. In Anna Asbury (ed.), *Syntax and Semantics of Spatial P*, 63-84. Philadelphia: John Benjamins Publishing.

Svenonius, Peter (2010). Spatial P in English. In Guglielmo Cinque & Luigi Rizzi (eds.), Cartography of Syntactic Structure. Oxford: Oxford University Press.

Tada, Hiroaki (1993). A / A-bar partition in derivation. PhD thesis, MIT.

Takahashi, Shoichi (2006). *Decompositionality and Identity.* PhD thesis, MIT.

Takahashi, Shoichi & Sarah Hulsey (2009). Wholesale Late Merger: Beyond the A/A' Distinction. *LI* **40.** 487-526.

Van Riemsdijk, Henk (1990). Functional Prepositions. In Harm Pinkster & Inge Genee (eds.), *Unity in Diversity: Papers Presented to Simon C. Dik on his 50th Birthday.* Berlin: Walter de Gruyter.

Zribi-Hertz, Anne (1984). Orphan Prepositions in French and the Concept of 'Null Pronoun'. Bloomington, IN: Indiana Linguistics Club.