The Unextractability of English Possessive Pronouns: On Portmanteau Formation and the Syntax-Morphology Interface*

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Abstract: This paper examines a constraint on the extraction of possessors in English, which previous research has shown to be acceptable in the colloquial language of some speakers. While such speakers allow extraction of full DP possessors, here I investigate the further fact that such speakers reject extraction of possessive pronouns. I argue that this syntactic fact, as well as certain morphological details about English possessors, are explained by the hypothesis that English possessive pronouns are portmanteau morphemes, which are immobile due to corresponding to a non-phrasal unit. I also argue that this result leads to the further conclusion that morpho-phonological evaluation via phase *spell-out* applies to entire phases at once, not only to phase complements. These results clarify English-specific puzzles about possession, provide further support for the proposal that one morpheme can correspond to multiple syntactic nodes, and deepens our understanding of how the syntax-morphology interface functions.

Keywords: syntax, morphology, possession, extraction, portmanteau, spell-out

1 Introduction

In this paper, I examine new facts about English possessive pronouns and their interaction with syntactic movement, which are of significance for several topics in morpho-syntax. I argue that these findings clarify English-specific puzzles about the morpho-syntax of possession, and deepen our understanding of the general principles that govern the relationship between the syntactic and morphological components of the grammar.

This paper extends research by Davis (2020, 2021), who shows that many English speakers are capable of a form of possessor extraction in colloquial speech. This extraction separates the possessor from the Saxon genitive morpheme [*'s*] and the rest of the possessed DP, which are stranded in a lower clause as in (1) below.

(1) *English possessor extraction* (Davis 2021:295–296, ex. 9)

a. *Main clause question*
Who$_1$ do you think [[t_1**'s kid**] ate the most cake]?

b. *Embedded question*
I can't remember [**who**$_1$ I said [[t_1**'s friend**] is coming over]].

c. *Relative clause*
This is the student [**who**$_1$ they suspect [[t_1**'s answers**] were copied]].

d. *Free relative*
I'll speak to [**whoever**$_1$ you suggest [[t_1**'s idea**] is the best]].

e. *Cleft*
It's Michelle [**who**$_1$ we heard [[t_1**'s cat**] is the cutest]].

*Thanks to [redacted for review].

Davis describes and analyzes a number of restrictions on this extraction, such as the fact that it must be cross-clausal as in (1), but demonstrates that it is nevertheless fully productive. Above we see that such extraction can be achieved by all forms of *wh*-movement. Additionally, Davis reports that many speakers also accept possessor extraction by topic/focus fronting, but does not investigate it further. The subject of this paper is a deeper investigation of topic/focus possessor extraction, and certain important limitations of it.

The research reported in the present paper examined this phenomenon further by identifying speakers who corroborate the judgments reported in Davis (2020, 2021), and using a questionnaire containing a list of relevant test sentences to elicit additional judgments from those speakers about possessor topic/focus fronting. Ultimately, of 17 speakers who accept possessor extraction via *wh*-movement as in (1), 14 consulted in this research judged possessor topic/focus extraction as in (2) to be acceptable. These test sentences are designed to set up a clear sense of contrast in order to make use of topic/focus fronting as natural as possible.

(2) *Possessor topic/focus fronting*

a. I don't think John's cat is particularly cute, but **Mary**$_1$, I've always said [t_1's cat] is really adorable.
b. My dog is always well behaved. But [**that guy**]$_1$, I think [t_1's dumb noisy dog] should get kicked out of the park.
c. Your mom is, unfortunately, not a great cook. [**My mom**]$_1$, however, I suspect [t_1's cooking] could win prizes.

Importantly in contrast, these 14 speakers judged fronting of possessive pronouns to be degraded, as we see in (3) below.[1] Analogously, the remaining 3 speakers who rejected possessor topic/focus fronting as in (2) reported that such extraction is possible in cleft sentences, but importantly not for possessive pronouns, thus replicating the contrast between (2) and (3). See footnote 9 below for further discussion.

(3) *No extraction of possessive pronouns by topic/focus fronting*

a. *Your cooking is, unfortunately, not great. **My**$_1$, however, I suspect [t_1 cooking] could win prizes.
b. *I don't think John's cat is particularly cute, but **our/your**$_1$, I've always said [t_1 cat] is really adorable.
c. *My dog is always well behaved. But **his/her/their**$_1$, I think [t_1 dumb noisy dog] should get kicked out of the park.

However, all the examples in (3) are acceptable if modified to involve movement of the entire possessum with the possessor in the usual way, as (4) shows.

(4) *Movement of entire possessive DP containing pronoun*

a. Your cooking is, unfortunately, not great. **[My cooking]**$_1$, however, I suspect t_1 could win prizes.

[1] 2 of the 14 speakers who corroborated the core contrast between (2) and (3) rated the configuration in (3) as marginally acceptable, though worse than (2). Since the majority of speakers do not have this judgment, I will not analyze this point of variation here.

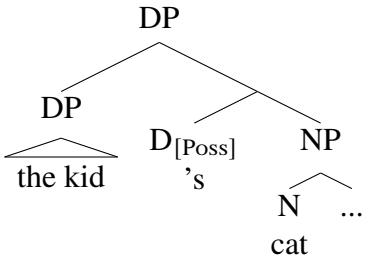
b. I don't think John's cat is particularly cute, but **[our/your cat]**$_1$, I've always said t_1 is really adorable.
c. My dog is always well behaved. But **[his/her/their dumb noisy dog]**$_1$, I think t_1 should get kicked out of the park.

The main goal of this paper is to analyze the unique unacceptability of possessive pronoun extraction. I argue that the investigation of this fact sharpens our understanding of English possession, and clarifies the nature of the syntax-morphology relationship. These findings also show how non-standard grammatical phenomena, even in a well-studied language like English, can provide a unique window into the grammar which enriches our understanding of it. Next, I summarize the two main proposals of the paper.

1.1 Proposal #1: English possessive pronominal morphemes correspond to non-phrases

The first main proposal of this paper is about the morpho-syntax of English possessive pronouns. I will assume following previous literature (Abney 1987; Corver 1992; Chomsky 1995b; Munn 1995) that English possessors are externally merged in the specifier of D, and that in the presence of typical possessive phrases this D is realized as [*'s*]. The structure in (5) below demonstrates this:

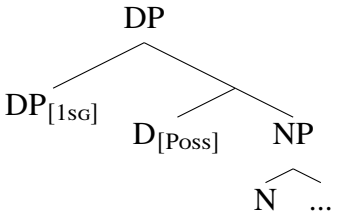
(5) *Possessor DP in specifier of* [*'s*]



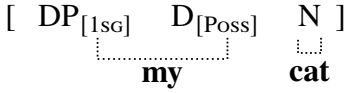
In contrast, building on Hudson (2003) and Deal (2006) I argue that English possessive pronouns like *my*, *our*, *your*, etc. are portmanteau morphemes, which simultaneously express multiple syntactic nodes. Specifically, I argue that these morphemes simultaneously express both the possessive D and the possessor in its specifier, as previewed in (6) below:

(6) *Possessive pronoun portmanteau*

a. *Structure*



b. *Corresponding morpho-phonological form*



I formalize this proposal using Distributed Morphology (Halle and Marantz 1993; Harley and

Noyer 1999; Embick and Marantz 2008; Arregi and Nevins 2012, a.o.). In this morpho-syntactic framework, syntactic structures originate as abstract representations that lack morpho-phonological information, which is assigned after the structure is built. This assignment is achieved by a list of language-specific Vocabulary Insertion (VI) rules, which state when a given morpheme is assigned to a given syntactic node, as we'll see. It is usually assumed that VI rules may only assign a morpheme to a single node. There are, however, situations where a single morpheme appears to express multiple syntactic nodes, in 'portmanteau' fashion. This paper discusses precisely such a case. The analysis of portmanteau formation is, however, a subject of debate.

Research in Distributed Morphology often analyzes portmanteau morphology as the result of a mechanism termed *fusion*, which unites multiple terminals into one before the application of VI rules. In contrast, some recent works instead achieve portmanteau formation by allowing a VI rule to express multiple adjacent terminals, via an operation termed *spanning* (Bye and Svenonius 2012; Merchant 2015; Haugen and Siddiqi 2016; Svenonius 2016). I will argue that either of these analyses of portmanteau formation correctly predicts the English facts under examination. Both of these analyses for portmanteau formation can create a representation where a possessive pronoun like *my* expresses both the D of the possessum ($D_{[Poss]}$), and the possessor in its specifier, as shown in (6) above. Importantly, notice that the possessor and the $D_{[Poss]}$ whose specifier it is in do not form an exclusive syntactic phrase: the only constituent that contains both of those elements is the possessive DP as a whole, though this node also contains NP. I argue that since possessive pronouns like *my* do not correspond to a phrase, they are incapable of independent phrasal movement. The details of this account differ depending on whether we analyze portmanteau formation as the result of fusion or spanning, as I will show, but I argue that the correct predictions emerge either way.

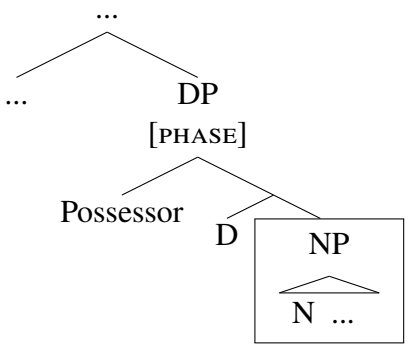
1.2 Proposal #2: Simultaneous spell-out of whole phases

The second main proposal of this paper is about how syntactic derivations relate to the morphological component of the grammar. Much recent work has argued that the derivation of a sentence proceeds in cycle-by-cycle fashion. A great deal of evidence for this hypothesis comes from findings about the punctuated ('successive-cyclic') nature of movement processes (Chomsky 1973, 1986; McCloskey 2000; Nissenbaum 2000; Wiland 2010; Abels 2012; van Urk and Richards 2015, and many more). Recent research in this vein largely follows Chomsky (2000, 2001) in attributing such effects to *phases*, a set of special phrases generally taken to include CP, vP, and often DP. Phases have the unique characteristic of triggering the operation *spell-out*. This operation causes the structure built so far to be evaluated by the morpho-phonological and semantic components of the grammar (PF and LF), and also establishes certain limitations on the length of syntactic operations. Through phase-by-phase applications of spell-out, the meaning and pronounced form of a given structure are incrementally established. Research in Distributed Morphology has advanced this proposal, arguing that spell-out and thus morpho-phonological processes like stress assignment, allomorphy, and VI rule application are indeed triggered phase-by-phase (Marvin 2003; Embick and Marantz 2008; Newell 2008; Embick 2010; Newell and Piggott 2014; Moskal 2015; Moskal and Smith 2016). However, the exact nature of spell-out is still a topic of debate in current research. In this paper, I adjudicate between two competing theories about spell-out.

The widely-adopted version of phase theory in Chomsky (2000) hypothesizes that once a phase is built, spell-out applies to its complement. In this paper I will assume that DP is a phase (Bošković 2005, 2016; Newell 2008; Newell and Piggott 2014; Syed and Simpson 2017; Simpson and Park

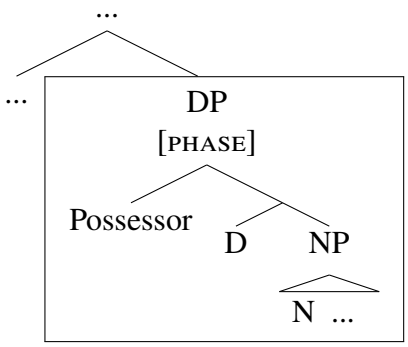
2019, a.o.). For Chomsky (2000), if DP is a phase, then when a DP is built its NP will spell-out as in (7) below, and be subjected to VI rules. Notice that the D head and a possessor in spec-DP are not subject to spell-out at this time. Here and in subsequent trees I occasionally use boxes to demarcate where spell-out applies:

(7) *Phase theory #1: When DP is built, only NP spells-out*



There is, however, another proposal about phase spell-out. Primarily based on facts about word order and its interaction with movement, a number of works argue that spell-out applies to each phase in its entirety as soon as it is completed, including its head and specifier (Fox and Pesetsky 2005a,b; Ko 2014; Sabbagh 2007; Medeiros 2013; Overfelt 2015; Erlewine 2017, a.o.). This is commonly called the *Cyclic Linearization* theory, due to its empirical emphasis on word order phenomena. This theory thus makes the prediction that as soon as a DP is built, all of its content will be assigned morphological form—including D and a possessor in its specifier, if present:

(8) *Phase theory #2: Simultaneous spell-out of the entire DP*



I argue that the English facts under examination in this paper provide new evidence in favor of the second of these two theories. Specifically, I propose that under the full-spell-out theory, we accurately predict that portmanteau formation applies to D and the possessor in its specifier before there is a chance for extraction to occur. In contrast, I will argue that the theory in which only phase complements undergo spell-out incorrectly predicts the possibility of extracting the possessor before portmanteau formation. As I will discuss, this would presumably yield default morphology for the pronoun and possessive D, though such examples are impossible, as previewed below:

(9) *Attempted possessor pronoun fronting with default morphology*

a. *Your cooking is, unfortunately, not great. Me_1, however, I suspect [t_1 ('s) cooking] could win prizes.

b. *I don't think John's cat is particularly cute, but us/you$_1$, I've always said [t_1 ('s) cat] is really adorable.
c. *My dog is always well behaved. But him/her/them$_1$, I think [t_1 ('s) dumb noisy dog] should get kicked out of the park.

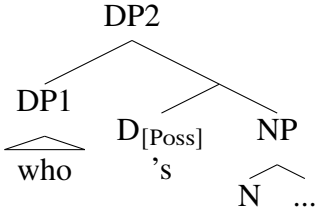
1.3 Contents of the paper

Next, section 2 provides background on the syntax of possession and the extraction of possessors. Section 3 provides additional background data and discussion about why the portmanteau analysis is justified. Section 4 shows in detail how this analysis can be implemented under either an analysis of portmanteau formation using fusion or spanning. Section 5 builds on that analysis with additional data that support the proposal that spell-out applies to whole phases. Section 6 concludes.

2 Background on the syntax and extraction of possessors

As mentioned above, I follow previous work in assuming that a possessor DP sits in the specifier of a possessive D, whose usual form is [*'s*]. Under this analysis, the word *whose* consists of the *wh*-phrase *who*, and the possessive D which it is in the specifier of (10):

(10) *'Who' in the specifier of* [*'s*]



Since at least Ross (1967), it has been well-known that *whose* cannot be extracted from the possessum DP, as shown in (11) below:

(11) *No extraction of 'whose'*
a. * **Whose**$_1$ do you like [t_1 **car**]? (Corver 2006, ex. 8a)
b. * **Whose**$_1$ did you say we should buy [t_1 **cookies**]?
c. * Mary is the author [$_{CP}$ **whose**$_1$ they said [[t_1 **new book**] is good]].

Ross proposed that a variety of facts of this sort fall under the *Left Branch Condition*, which bans sub-extraction of a constituent from the left edge of a nominal phrase. However, Ross showed that some languages do not obey this condition. Such 'left branch extractions' are quite common in the Slavic languages, for example, as (12) illustrates with possessor pronoun fronting in Russian:

(12) *Pronominal possessor extraction in Russian*
(adapted from Bondarenko and Davis (2023) ex. 31)

Eë/ego$_1$ Lena ne vzjala s soboj [t_1 otkrytku]
her/his Lena NEG took with self card

'Lena didn't take [her/his card] with her

Subsequent literature has attempted to reduce the Left Branch Condition, and its exceptions, to independent grammatical principles.[2] For example, Corver (1990, 2006) points out that the unextractability of *whose* as in (11) above can be explained as a constituency problem: this word corresponds to two elements that do not form an exclusive constituent—the possessive D and its specifier. Since only phrases are capable of phrasal movements like *wh*-movement, we therefore expect *whose* to be immobile. For the same reason, any other possible combination of possessor DP and [*'s*] cannot be extracted, as (13) shows:

(13) *No extraction of DP+*[*'s*]

a. * [**Which kid's**]$_1$ should we buy [t_1 **cookies**]?

b. * **Timmy's**$_1$ we should buy [t_1 **cookies**].

While a possessor DP and [*'s*] do not form a constituent, we predict the possibility of extracting a possessor DP, which is a constituent, from the specifier of [*'s*]. We saw in section 1 above that in the colloquial register of some English speakers this prediction is verified, as (14) shows again.

(14) *English possessor extraction stranding* [*'s*]
Who$_1$ do you think [[t_1**'s kid**] ate the most cake]? =(1a)

Davis (2020, 2021) argues that such extraction is truly what it appears to be using a variety of diagnostics, including islands, and applies several tests to demonstrate that this is not an illusion caused by use of DP-internal parentheticals, which are illicit in English regardless (Emonds 1976). Possessor extraction is also known to be available in languages like Hungarian (Szabolcsi 1984) and Tzotzil (Aissen 1996) as well as the Slavic languages, as mentioned above. It has generally been taken for granted that possessor extraction is impossible in English, and this is indeed so for some speakers. Previous research has argued that the typical absence of possessor extraction in English is due to a phonological requirement which rejects movement that separates a possessor from the possessive D (Chomsky 1995b; Radford 1997; Gavruseva 2000; Gavruseva and Thornton 2001, a.o.). Indeed, Gavruseva argues that adjacency requirements of this sort play an important role in limiting possessor extraction cross-linguistically. Davis argues that this requirement has a weaker effect in possessor-extracting English grammars, which makes extraction possible but restricted. One restriction Davis discusses is that such possessor extraction must cross a clause boundary (see Davis 2021b, page 296). I have controlled for this in the possessor extraction sentences analyzed in this paper, including the examples we have already seen in section 1 above.

As we saw in (2/4) above, possessor-extracting English speakers allow such movement to be achieved by topic/focus fronting. However, such speakers do not allow the same for possessive pronouns, as (15) below shows again:

(15) *No extraction of possessive pronouns by topic/focus fronting*

a. *Your cooking is, unfortunately, not great. **My**$_1$, however, I suspect [t_1 cooking] could win prizes.

b. *I don't think John's cat is particularly cute, but **our/your**$_1$, I've always said [t_1 cat] is really adorable.

[2]This debate has been especially active in Slavic linguistics. See Bošković (2005, 2016) and Bondarenko and Davis (2023) for contrasting views on the complexities of left branch extraction in Slavic.

c. *My dog is always well behaved. But **his/her/their**$_1$, I think [t_1 dumb noisy dog] should get kicked out of the park.

This would not be a puzzle if English pronouns were generally incapable of topic/focus fronting, but this is not so, as (16) demonstrates:

(16) *Topic/focus fronting usually possible for English pronouns*

a. I don't like you, but **him**$_1$, I like t_1.
b. Mary is very well-groomed, but **you**$_1$, I think should t_1 bathe more often. You stink!
c. I don't care how you talk to other people, but **me**$_1$, you gotta respect t_1! I'm the boss!

Therefore the unextractability of English possessive pronouns stands as a puzzle. In the next section, I argue that this fact is correctly predicted by the hypothesis that English possessive pronouns are portmanteau morphemes that correspond to non-phrases, and thus are immobile.

Of course, *who* is arguably a pronoun, and we have seen above that a possessor *who* can be extracted. Thus, more precisely speaking, it is only necessary to rule out the extraction of non-*wh* possessive pronouns. Indeed, the account I will propose does not predict that possessive pronouns should be generally unextractable: this constraint should only hold for possessive pronominal morphemes that express a non-phrasal unit. Since *who* is not a portmanteau, its extractability is correctly expected. As we'll see, since it happens to be the case that non-*wh* possessive pronouns in English correspond to non-phrasal portmanteau morphemes, they are immobile.

3 Justifying the portmanteau analysis

A telling fact about the morpho-syntax of English possession is that while full DP possessors are immediately followed by [*'s*], most possessive pronouns clearly occur without this morpheme.[3]

(17) *English possessive pronouns*

a. my(*'s) food
b. our(*'s) food
c. your(*'s) food
d. his food

[3]The only possessive pronouns for which the absence of [*'s*] is unclear are *his* and *its*. We might decompose these into *he* + *'s* and *it* + *'s*. If this is the case, then we should be able to extract *he* or *it*, stranding [*'s*] below. As (i) shows, this is in fact impossible:

(i) a. * I don't think Mary's cat is particularly cute, but take a look at John's. **He**$_1$, I've always said [t_1 's cat] is really adorable.
b. * Your computer is slow, but mine is very fast. **It**, I think [t_1 's processor] costs more than your car.

In the context of the analysis presented here, this fact indicates that *his* and *its* are not synchronically decomposable, but rather are portmanteau forms just like the rest of the possessive pronouns under consideration here. Consistent with this analysis is the fact that *his* and *its* cannot be fronted. For the first of these elements, we have seen this fact in (3c) above. For the latter, see (ii):

(ii) * Your computer is slow, but mine is very fast. **Its**, I think [t_1 processor] costs more than your car.

e. her(*'s) food
f. its food
g. their(*'s) food

Deal (2006) discusses two potential analyses of this fact: morphological merger of [*'s*] with the pronoun (Hudson 2003), or deletion of [*'s*] in the presence of a pronoun (Huddleston and Pullum 2002). Next I discuss the predictions of these proposals, rephrasing them slightly to be compatible with the hypothesis that [*'s*] corresponds to D. As previewed above, I will argue for a version of a morphological merger analysis, which I will show can be properly implemented in Distributed Morphology via either fusion or spanning.

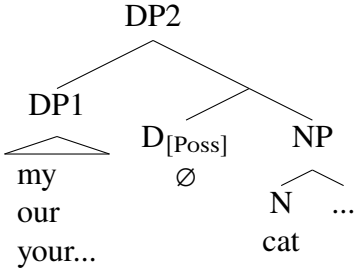
First I will discuss why an [*'s*]-deletion analysis does not make the correct predictions. The hypothesis that [*'s*] deletes in the presence of a pronoun can be re-cast as a contextual allomorphy proposal. In Distributed Morphology, rules of contextual allomorphy are described using VI rules that are specified to assign a particular morpho-phonological form to a given node only when it is in a particular context. When that context is not present, a default ('elsewhere') VI rule applies instead. The relevant VI rules for the [*'s*]-deletion hypothesis under consideration are shown in (18) below. The rule in (18a) states that the possessive D receives the null realization /∅/ when to the right of a pronoun, and the rule in (18b) states that the possessive D is expressed as [*'s*] otherwise:

(18) *VI rules for possessive D in English assuming pronouns trigger use of null D*

a. $D_{[POSS]} \leftrightarrow \varnothing$ / [Pronoun __] (context-sensitive allomorphy rule)
b. $D_{[POSS]} \leftrightarrow$'s / elsewhere (applies by default if the above rule fails)

If the disappearance of [*'s*] in the presence of a pronoun is due to a rule like (18a), then the morpho-syntactic representation for a DP containing a possessive pronoun would be as in (19) below. Here we see a possessive pronoun sitting in the specifier of DP, whose head is silent due to the above allomorphy rule.

(19) *Possessive pronoun and silent D (An analysis I do not adopt)*



I argue that this analysis does not make the right predictions. Notice that if English possessive pronouns simply correspond to constituents sitting in the specifier of a coincidentally silent D, there is no syntactic or morphological reason why such possessors should not be extractable. However, we have seen that unlike other possessors, these possessive pronouns are unextractable:

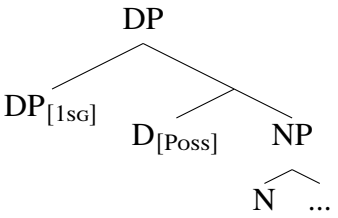
(20) *No extraction of possessive pronouns by topic/focus fronting* =(3a)
* Your cooking is, unfortunately, not great. **My**$_1$, however, I suspect [t_1 cooking] could win prizes.

Therefore I will instead pursue a version of the portmanteau analysis, under which we can correctly predict the unextractability of English possessive pronouns. I will first describe the general form of argumentation that this analysis will take, and then in the next section go on to show how this analysis can be more precisely implemented.

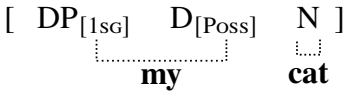
Deal (2006) cites Hudson (2003) for the proposal that English possessive pronouns and [*'s*] are united via a process like contraction or morphological merger. I argue that an analysis in this vein which treats English possessive pronouns as portmanteau morphemes makes the correct syntactic predictions.[4] Given the precedent for considering [*'s*] a realization of possessor-selecting D, it is necessary to state that the relevant morphological merger operation creates a portmanteau form that expresses a non-phrasal syntactic unit, consisting of a possessive D and the possessor in its specifier. A derivation involving such a portmanteau is provided in (21) below, which contains a first person singular possessor. First the abstract structure in (21a) is built, after which spell-out will apply and assign morpho-phonological form to the possessor and D, yielding their joint form *my*, as in (21b):

(21) *First person possessive portmanteau derivation*

a. *Build structure*



b. *Spell-out*



Since under this analysis the possessive pronominal morpheme corresponds to a non-phrasal unit, we accurately predict its immobility. The exact reasons for this unextractability will differ depending on whether portmanteau formation is implemented by fusion or spanning, as I will discuss shortly in the next section.

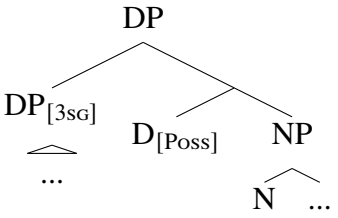
Before proceeding to the implementation, however, note that an analysis in this vein makes both correct syntactic and morphological predictions. While this portmanteau analysis of possessive pronouns in English predicts their unextractability, it also predicts the fact that the morpheme [*'s*] is absent from these possessive forms, as shown in (17) above (though see footnote 3 above

[4]Deal (2006) argues that a deletion analysis captures the fact that some speakers permit forms like *your all's*, which she suggests involve the pronoun being assigned genitive case morphology by [*'s*], with the intervening *all* bleeding the rule that would normally delete [*'s*]. Deal notes that not all speakers allow such forms, and thus posits that speakers vary between using deletion or morphological merger. Since I have not had the opportunity to explicitly test examples using *your all's*, I would like to leave this puzzle for future work. However, I will note what we predict. If the extraction ban I focus on here also holds for speakers who are capable of possessor extraction and who allow forms like *your all's*, this would suggest that the morphological merger analysis is universally correct, and that the forms Deal observes are the result of a separate effect, such as exceptional multiple exponence of the possessive D (Harris 2017). If such speakers do not show the extraction constraint, then this would indicate that those speakers truly have a different analysis for possessive pronominal morphology, as Deal proposes.

about *his* and *its*, which also behave as predicted). If a given syntactic node can typically only be morpho-phonologically expressed one time (Halle and Marantz 1993; Bobaljik 2000; Arregi and Nevins 2012; Coon and Keine 2020), then when a portmanteau possessive form realizes both D and a possessor, it will not be possible for D to be expressed independently. This fact could also be understood as an effect of the *Minimize Exponence* principle (Siddiqi 2009; Haugen and Siddiqi 2016), which prefers derivations that realize a given structure with the smallest possible number of morphemes. Further, when the possessor and possessive D are morphologically expressed separately as shown in (22) below, we correctly expect extraction of the possessor to be licit:

(22) *Typical possessive structure*

a. *Build structure*



b. *Spell-out*

[DP[3SG] D[Poss] N]

Mary/who **'s** **cat**

In the above diagram we see that when the possessor is a typical DP or the pronoun *who*, the possessive D is expressed on its own as [*'s*], and no portmanteau is involved. We have seen in section 1 that in this situation possessors are indeed extractable, as shown again in (23):

(23) *Extractability of typical possessors*

a. **Who**$_1$ do you think [t_1's kid] ate the most cake? =(1a)

b. **Mary**$_1$, I've always said [t_1's cat] is really adorable. =(2a)

Thus this portmanteau analysis makes the desired predictions about the syntactic (im)mobility and morphology of English possessors. In the next section, I will discuss in detail how this analysis can be implemented.

4 Implementing possessor portmanteau formation

Neither Deal nor Hudson discuss in detail how the morphological merger analysis should be implemented. As previewed above, I will do this with Distributed Morphology, in which syntactic structures originate as abstract representations that lack morpho-phonological information, which is assigned after the structure is built. This assignment is achieved by a list of language-specific Vocabulary Insertion (VI) rules, which state when a given morpheme is assigned to a given syntactic node. In most implementations of Distributed Morphology, it is an axiom that VI rules apply only to terminal nodes, and one morpheme cannot correspond to more than one node. There are, however, situations where a single morpheme appears to express multiple syntactic nodes, in 'portmanteau' fashion. The theory of portmanteau formation is, however, a subject of debate.

As previewed in section 1, here I will consider two theories of portmanteau formation. Since the origination of Distributed Morphology, circumstances where one morpheme appears to express multiple syntactic nodes have often been taken to involve a fusion mechanism, which unites two terminal nodes into one at PF, before the application of VI rules. On the other hand, some recent works argue for a weakening of the assumption that VI rule application only applies to single terminal nodes, and thus allow VI rules to express adjacent sequences of terminals—an operation termed spanning. I will show that either of these mechanisms of portmanteau formation can derive the English facts discussed above.

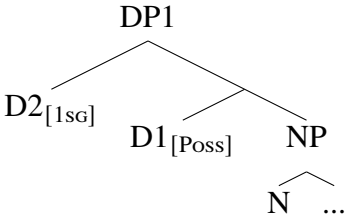
4.1 A note about the reduced structure of pronouns

Before getting into the implementation, it is necessary to make a note about pronoun structure. In diagrams illustrating possessive pronoun pormanteau forms like that in (21b) above, I have diagrammed the pronominal morpheme as subsuming two syntactic pieces: the possessor DP, and the D whose specifier it is in. However, both the fusion and spanning mechanisms are defined as applying only to terminal nodes. While we might choose to loosen this restriction, there is precedent for a hypothesis that resolves this tension. Since pronouns are a closed class of functional items that plausibly lack a lexical core (NP), it may be that (English) pronouns are usually non-projecting determiners. This is precisely what a number of authors have argued (Postal 1969; Abney 1987; Baltin 2012; Stanton 2016).[5] Analyzing pronouns as non-projecting D heads in this way removes the difficulty in applying fusion or spanning as a means of deriving English possessive pronominal morphemes as portmanteau forms. I will describe this analysis in detail next.

4.2 The fusion analysis

Let's consider a fusion analysis first. Given the above discussion about pronouns, the underlying structure for a DP with a 1st person singular possessor would be as in (24) below. Specifiers are typically occupied by phrases (though see Matushansky 2006, who allows heads to fill specifiers). Thus the structure in (24) is unconventional since the possessor, a bare determiner ($D2_{[1SG]}$), sits in the specifier of the D that heads the possessum ($D1_{[Poss]}$). However, note that this is not a problem under a *bare phrase structure* theory of labeling (Chomsky 1995a,b, a.o.), in which non-projecting heads are equivalent to phrases due to being trivial maximal projections.

(24) *Initial structure*

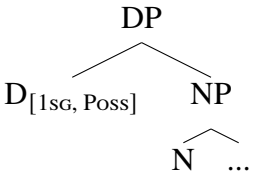


[5]See also Wiltschko (1998), who argues similarly that personal pronouns spell-out a functional head that lacks an NP complement. While my analysis necessitates a proposal of this variety for English (at least in the basic case), there is likely cross-linguistic variation in pronoun structure (Déchaine and Wiltschko 2002).

It is also possible that English possessive pronouns originate as full DPs, but are reduced to bare D heads via a process like *impoverishment* (Halle and Marantz 1993; Harley and Noyer 1999). Baltin (2012) argues for a deletion analysis of essentially this sort.

Post-syntactically, but before the application of VI rules, fusion will apply in this structure. If portmanteau formation is mediated by fusion, then it is necessary for $D1_{[\text{Poss}]}$ and $D2_{[1\text{sg}]}$ to be fused into a single node, which contains the union of their features. This is shown in (25) below:

(25) *Fusion of possessor pronoun and possessive D*



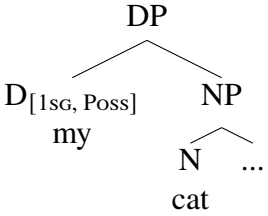
Next, this structure will receive its morpho-phonological form when PF references its list of VI rules. The following set of VI rules describes English possessive pronominal morphemes, given the portmanteau analysis under discussion:

(26) *VI rules for English possessive pronominal morphology*

a. $[\ D_{[1\text{sg}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ my
b. $[\ D_{[1\text{pl}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ our
c. $[\ D_{[2\text{sg/pl}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ your
d. $[\ D_{[3\text{sg}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ its
e. $[\ D_{[3\text{sg, m}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ his
f. $[\ D_{[3\text{sg, f}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ her
g. $[\ D_{[3\text{pl}]}\ D_{[\text{poss}]}\ ] \leftrightarrow$ their

All of the forms described by the above rules are unextractable, as we have seen. In the case under consideration, the rule in (26a) will apply to the fused node in the above tree, as diagrammed below:

(27) *Morpho-phonological assignment*

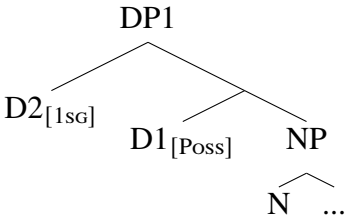


Since the constituent in question presumably continues to be labeled DP post-fusion, here we are in a situation where DP is headed by a D that is the result of fusion of multiple terminals. Since this fused D realized as *my* is the head of the DP, that head should be incapable of phrasal movement like topic/focus fronting, since projecting heads are only capable of strictly local head-to-head movement (Travis 1984, a.o.). In contrast and as discussed above, under a *bare phrase structure* theory a non-projecting head is its own maximal projection, and is thus capable of phrasal movement. Therefore if pronouns are non-projecting determiners, pronominal forms that are not produced by fusion are correctly predicted to be capable of phrasal movement, as in (16) above. Furthermore, possessive pronouns like *who* as in (1) above are also correctly expected to be capable of extraction from possessor position. However, since the fused D in (27) above does project, we correctly predict that the possessive pronominal morphemes expressing such a fused D cannot undergo topic/focus fronting. Thus we predict the immobility of such possessive forms.

4.3 The spanning analysis

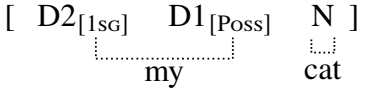
The core intuition that this paper defends is not dependent on a fusion analysis, as I show here by demonstrating it with a spanning analysis. As previous literature has noted, fusion has the problematic property of requiring the grammar to know which terminal nodes to fuse prior to the application of the relevant VI rule—in other words, a 'look-ahead problem' (Chung 2007a,b; Caha 2009, 2018). Fusion is designed in this way in order to maintain the axiom that every morpheme corresponds to a single terminal node. However, another possibility is to simply deny this axiom, and allow a VI rule to express multiple terminals that bear appropriate features. This is spanning. Both fusion and spanning are argued to apply to adjacent/local terminal nodes, so an analysis assuming a spanning derivation can begin with the same abstract tree structure we saw above, where the possessor pronoun is a non-projecting D:[6]

(28) *Initial structure*



If spanning is permitted, then the VI rules I provided in (26) above can be applied to such structures as-is. The rule in (26a) is defined to express $D_{[1SG]}$ and $D_{[POSS]}$. This rule can thus be invoked in (28) without further qualification, since here we have adjacent nodes bearing those features:

(29) *Portmanteau formation by spanning*



After this, we expect it to be impossible to generate a sentence where *my* is extracted from the possessed DP. This is because *my* corresponds to a non-constituent—the possessive D and possessor in its specifier—which is incapable of phrasal movement. We thus make the desired prediction.

4.4 Against a Nanosyntactic analysis

Another way of allowing one morpheme to correspond to multiple terminals is hypothesized in the Nanosyntax theory (Caha 2009; Starke 2009, a.o.), which allows VI rules to apply to non-terminal nodes (that is, X′ and XP nodes). Nanosyntax frequently posits movement to derive morpheme ordering, in combination with a hypothesis that traces are ignored by PF. In Nanosyntax, a portmanteau analysis of an English structure like *my cat* could be implemented by a derivation

[6] Since both fusion and spanning apply to local terminals, we predict that a pronoun which is separated from $D_{[POSS]}$ by additional structure will be unable to be expressed with it as a portmanteau. The facts in (i) below fit this description:

(i) a. **The picture of** ?**them's/*their** frame is really ugly.
b. You don't seem like yourself today. **The real** ?**you's/*your** cooking is much better.
c. Won't you submit **little old**?**me's/*my** cake to the baking contest?

involving the steps in (30) below. Step 1: Move NP to the edge of DP, thus creating another D′ (D′2 below) containing just the possessor DP and possessive D (30a). Step 2: Move D′2 to the top of the DP, thus creating a third D′ (30b). Step 3: Assign the morpheme *my* to the moved D′2, which now lacks NP, and assign *cat* to N (30c).

(30) *A Nanosyntactic analysis of a possessor portmanteau*

a. $[_{DP}\ \underline{[_{NP}\ \text{N}]_1}\ [_{D'2}\ \text{DP}_{1\text{SG}}\ [_{D'1}\ \text{D}_{\text{Poss}}\ t_1]]]$

b. $[_{DP}\ \underline{[_{D'2}\ \text{DP}_{1\text{SG}}\ [_{D'1}\ \text{D}_{\text{Poss}}\ t_1]]_2}\ [_{D'3}\ [_{NP}\ \text{N}]_1\ t_2]]$

c. $[_{DP}\ \underline{[_{D'2}\textbf{(=my)}\ \text{DP}_{1\text{SG}}\ [_{D'1}\ \text{D}_{\text{Poss}}\ t_1]]_2}\ [_{D'3}\ \underline{[_{NP}\ \text{N}\textbf{(=cat)}]_1}\ t_2]]$

There is no independent evidence for the possibility of such movements within the English DP. Also, such short movements are expected to be impossible anyway given *anti-locality* (Abels 2012, a.o.), unless we posit a much richer DP structure. More importantly, in the context of this analysis the morpheme *my* corresponds to the constituent D′2, which must be mobile since the derivation just outlined vitally depends on movement of D′2. However, this wrongly leads us to predict that extraction of D′2 (and thus the morpheme *my*) from this structure should be legal, contrary to fact. A Nanosyntactic analysis is thus likely insufficient.

To conclude this section, I have argued that a portmanteau analysis of English pronominal possessors correctly predicts their unextractability, regardless of whether we implement portmanteau formation by fusion or spanning.[7] In the next section, I will argue that this analysis has implications for our understanding of phase spell-out.

5 Clarifying the timing of spell-out

As summarized in section 1, much research on the locality of syntactic and morpho-phonological operations has been gathered in support of the theory of phases. CP, vP and often DP are widely considered to be phases. Among other properties, these constituents trigger evaluation of the structure built so far by the components of the grammar that establish interpretation and morpho-phonological form. This process is termed *spell-out*. I argue that the English facts under examination clarify the nature of spell-out.

[7]We would also predict the immobility of English possessive pronouns, as well as their mutual exclusivity with [*'s*], if they are expressions of the head of the possessed DP as in (i):

(i) $[_{DP}$ D(=my) $[_{NP}$ N(=cat)]]

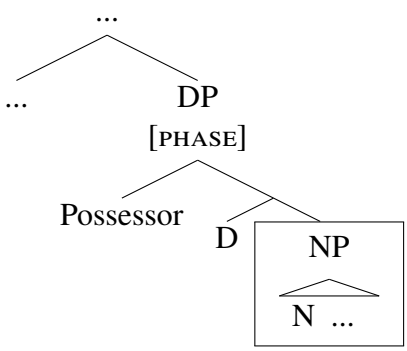
In this case, the extraction of such pronominal forms would simply be ruled out because projecting heads cannot undergo phrasal movement. If this were really the right structure for these constituents we would expect the ϕ-features of the possessive D to be inherited by the DP node, and thus affect the agreement morphology that this possessive DP triggers. However, it is clear that a possessed DP does not inherit the possessor's ϕ-features. As (ii) below shows, subject agreement with a noun containing a 1st person possessor must result in 3rd person morphology, not 1st person:

(ii) [My cat] is/*am very cute.

If in (i) *my* does not project, the result would be a structure in which it is the specifier of NP. In this case, we would wrongly predict the possibility of the extraction of *my*, given the expected mobility of non-projecting non-portmanteau pronouns. The analysis adopted in this paper avoids all of these issues, however.

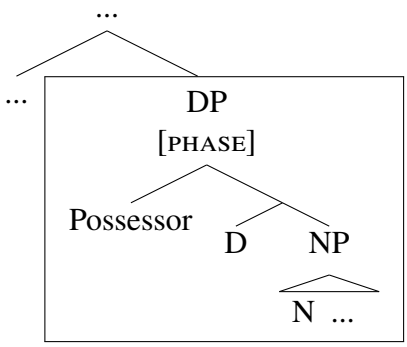
Above I described two variants of phase theory. Chomsky (2000) and much following work argues that when a phasal phrase is built, only its complement is spelled-out. For this theory, if DP is a phase then when a DP is built only NP is subject to spell-out, as diagrammed in (31) below. By hypothesis, after this process occurs only NP will have been assigned morpho-phonological form. The rest of the material in DP, including any possessor that happens to have been merged into spec-DP, will not be spelled-out until the next highest phase (presumably a vP or CP) spells-out:

(31) *Phase theory #1: When DP is built, only NP spells-out*



In contrast, work in the Cyclic Linearization theory following Fox and Pesetsky (2005a,b) argues that when a phase is built, all of its content spells-out and is thus evaluated by the morpho-phonological component of the grammar, as diagrammed in (32) below. This theory makes the prediction that as soon as a DP is built, all of its content will be assigned morphological form—including D and a possessor in its specifier, if present:

(32) *Phase theory #2: Simultaneous spell-out of the entire DP*



My analysis of the immobility of possessive pronouns in English adjudicates between these two phase theories. I have proposed that the possessive pronominal forms under discussion are portmanteau morphemes which express both a possessor pronoun and possessive D. In phase theory, and Distributed Morphology more generally, it is argued that morpho-phonological form is not assigned to syntactic material until it spells-out. This means that the portmanteau morphology that expresses D and the possessor will not be assigned until the time that spell-out applies to them. Recall that under the first version of phase theory described above, when a DP is built, only NP spells out. If this is so, D and its specifier will remain un-spelled-out until the completion of a higher phase (vP, CP). Notice that under this analysis, we expect the possibility of extracting the possessor before portmanteau morphology is assigned. If movement separates the possessive D and possessor before they spell-out, we would expect them to both be realized with alternative

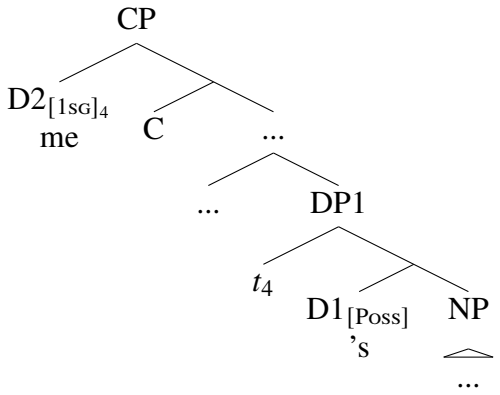
morphology—presumably their default forms. For the possessive D, this is [*'s*]. For the extracted pronoun, this would be accusative morphology, which has been argued to be the default form that English pronouns take when no other form is available (Marantz 1991; Schütze 2001; Preminger 2014). Schütze, for instance, points out that there are many heterogeneous environments in English where accusative case arises, evidently by default. Schütze shows that different languages use different cases as their morphological default, nominative being a common choice, though in English accusative is clearly required:

(33) *Default accusative in English* (From Schütze 1997, p. 54, ex. 65)

a. Him/*he liking beans surprised them.
b. It was us/*we.
c. Everyone but them/*they gets on John's nerves.
d. Who did it? — Me/*I.

The schema in (34) below illustrates this prediction about possessor pronoun extraction with default morphology. It turns out that examples of this form are degraded.

(34) *Prediction of phase theory #1:*
Separated pronoun and possessive D receive default morphology



In reality, 12 of 14 speakers who accept topic/focus extraction of full DP possessors (2) report that sentences matching the schema in (34) are unacceptable, as shown in (35) below.

(35) *Attempted possessor pronoun fronting with default morphology*

a. *Your cooking is, unfortunately, not great. Me_1, however, I suspect [t_1 ('s) cooking] could win prizes.
b. *I don't think John's cat is particularly cute, but us/you_1, I've always said [t_1 ('s) cat] is really adorable.
c. *My dog is always well behaved. But him/her/them_1, I think [t_1 ('s) dumb noisy dog] should get kicked out of the park.

Recall once more that typical possessive pronouns are immobile, as repeated in (36):

(36) *No extraction of possessive pronouns by topic/focus fronting*

a. *Your cooking is, unfortunately, not great. My_1, however, I suspect [t_1 ('s) cooking] could win prizes.

b. *I don't think John's cat is particularly cute, but our/your$_1$, I've always said [t_1 ('s) cat] is really adorable.
c. *My dog is always well behaved. But his/her/their$_1$, I think [t_1 ('s) dumb noisy dog] should get kicked out of the park.

In both (35) and (36), [*'s*] is placed in parentheses to show for the sake of completeness that such sentences remain unacceptable whether this morpheme is included, or omitted. Several speakers note that the configuration in (35) when including [*'s*] is less degraded than that in (36), though still unacceptable.[8] While the sentences in (36) should indeed be illicit due to the syntactic issues described above in section 4, the sentences in (35) involve movement of the possessor alone. These sentences thus should not violate any syntactic rule, since they would involve no fusion or non-constituent movement.[9] I argue that the sentences in (35) are unacceptable due to the nature of the timing of spell-out.

Recall that under the second version of phase theory mentioned above, when a DP is constructed it is entirely spelled-out. Under this theory, we predict that there will be no chance for the possessor pronoun to extract alone into a higher part of the clause before being spelled-out, and thus circumvent portmanteau assignment. Rather, the possessive D and the possessor pronoun in its specifier will be assigned their combined portmanteau form immediately when the containing possessed DP is built (either via immediate fusion, or portmanteau realization via spanning). I argue that this is why the extraction configuration in (36) cannot be repaired by using an alternative version with default morphology as in (35) above—spell-out applies too soon for sentences like (35) to be generated. The complement-only theory of spell-out, in contrast, does provide the opportunity for the possessor to move away before portmanteau formation, and thus incorrectly predicts that examples like (35) should be perfectly legal.

In summary, full-phase spell-out correctly predicts that portmanteau formation will occur before extraction of the pronominal possessor can succeed. As described in section 4, the pronoun and $D_{[Poss]}$ are either immediately fused and then form an immobile head, or they receive a portmanteau form via spanning, which expresses an immobile non-constituent. In the latter case, there is no free morpheme expressing the pronoun that could be displaced by the pronoun's syntactic movement.

[8]While 12 of 14 speakers who accept (2) rated the sentences in (35) as unacceptable, 6 of those 12 suggested that the violation in (35) is slightly less severe than that in (36). The remaining 2 of those 14 speakers judged that the examples in (35) are marginally acceptable. See footnote 10 below for further discussion.

[9]Gary Thoms (p.c.) points out that though for him possessor topic/focus fronting is somewhat degraded in the first place, possessor extraction via clefting is not (ia). He also points out that while clefting a full DP possessor as in (ia) is not degraded, it is impossible to cleft either a typical possessive pronoun (ib) or an accusative possessor pronoun (ic):

(i) a. It's [my MOTHER]$_1$ that I suspect [[t_1's cooking] could win prizes].
b. *It's MY$_1$ that I suspect [[t_1('s) cooking] could win prizes].
c. *It's ME$_1$ that I suspect [[t_1('s) cooking] could win prizes].

Of the 3 speakers mentioned in the introduction who do not accept topic/focus fronting for full DP possessors, 2 of them share the contrasts shown in (i) above, while the third accepts the contrast between (ia) and (ib), but states that (ic) is acceptable with [*'s*]. This speaker thus patterns like the 2 speakers mentioned above who marginally accept extraction of the form in (35). This pattern of contrasts for possessor extraction in clefts has the same distribution as the judgments for sentences involving non-clefting topic/focus extraction. These clefting facts can therefore be taken as additional evidence for the proposals of this paper.

5.1 On the Phase Impenetrability Condition and post-spell-out movement

In Chomsky's phase theory, the syntactic material that spell-out has applied to is inaccessible for the rest of the derivation. This constraint is termed the *Phase Impenetrability Condition*, and is argued to motivate phenomena such as successive-cyclic movement. In contrast, the Cyclic Linearization theory, in which spell-out applies to entire phases all at once, does not posit a Phase Impenetrability Condition. If it did, it would wrongly predict the impossibility of movement from phases. Instead, this theory derives effects like successive-cyclic movement from considerations of word order determination. See Ko (2014) for a thorough explanation of how this theory functions, and Martinovič (2019) for independent evidence that post-spell-out movement is possible in principle. Note that since the Cyclic Linearization theory lacks a Phase Impenetrability Condition, it does not by itself ban extraction of a possessive pronoun that has undergone spell-out within the containing DP. The arguments of sections 4 and 5 above fill this explanatory gap.

Under a fusion analysis, the fused D that is spelled-out as the pronominal possessor is simply immobile regardless of whether there is a Phase Impenetrability Condition or not, because projecting heads are incapable of phrasal movement. However, this issue is more complex from the perspective of the spanning analysis. If there is no Phase Impenetrability Condition, we must carefully consider what exactly goes wrong if a possessor pronoun is extracted from spec-DP after its joint portmanteau morphology with $D_{[Poss]}$ has been assigned. As mentioned above, this should be possible from a purely structural perspective since the pronoun is a (trivial) maximal projection.

Under the spanning analysis, after spell-out and portmanteau assignment, we have established that the possessive pronoun *my*, for instance, has been mapped to a sequence of nodes [$D_{[1SG]}$, $D_{[Poss]}$], as illustrated in diagrams like (29) above. There are at least two things that plausibly go wrong if we break that sequence by moving the possessor after spell-out. Recall that spanning requires adjacency between nodes subject to simultaneous realization, which in this situation movement is breaking. On one hand, rendering $D_{[1SG]}$ and $D_{[Poss]}$ non-adjacent by post-spell-out movement removes the configuration that use of the portmanteau *my* requires: since this morpheme has already been assigned during the derivation, but is then no longer in an appropriate configuration for its use, the result would be a crash. Alternatively, possessor movement in this context may create a linearization ambiguity. The morpheme *my*, for example, corresponds to $D_{[1SG]}$ and $D_{[Poss]}$, but if these nodes become non-adjacent due to movement, a question arises about where to place *my*. Should it end up in the higher position corresponding to the moved possessor, or the lower position corresponding to the un-moved D? Either way, the position of *my* would be faithful to only one of the two nodes it is supposed to realize. Since there is no independent reason to favor one over the other, the result is an unresolvable ambiguity.[10]

The fusion analysis avoids these issues since it predicts the immobility of the resulting portmanteau for a straightforward syntactic reason. Therefore the arguments of this paper can be maintained even if a spanning analysis proves to be untenable. However, since portmanteau formation is a debated issue, it is productive to discuss the consequences of multiple analytic options.

[10]Recall that, as stated in footnote 8 above, 2 of 14 relevant speakers find the extraction configuration in (35) marginally acceptable. The fact that this configuration is less degraded for some speakers and accepted by 2 of them suggests that the problem in (35) is less severe than the structural issue in (36). The movement in (36) should be impossible due involving syntactically illegal movement of a projecting head or non-constituent unit. However, the sentences in (35) could be generated by somehow delaying spell-out in DP, and thus achieving movement before portmanteau formation. See Bobaljik and Wurmbrand (2013) for discussion of other possible effects along these lines.

6 Conclusion

Usual DP possessors in English can be extracted by some speakers, and co-occur with [*'s*] (which they strand under extraction). In contrast, English possessive pronouns do not co-occur with [*'s*], and cannot be extracted even by English speakers usually capable of possessor extraction. I argue that these facts emerge from the portmanteau-hood of English possessive pronouns, whose morphology simultaneously expresses the possessive D and possessor in its specifier.[11] This result clarifies the nature of English possessive pronouns, while providing new evidence for the possibility of expressing multiple nodes with one morpheme. Taking this analysis to its logical conclusion also gives us reason to argue that DPs are phases, and that phases spell-out entirely all at once. This finding adjudicates between two competing phase theories in current research, and thus deepens our understanding of the syntax-morphology interface.

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[11] I have argued that [*'s*] is absent from possessive pronominal forms because it and the possessor are realized together with one morpheme. However, in a post-nominal possession construction (ia) and an ellipsis configuration of similar form (ib) we see potential co-occurrence of possessive pronouns and [*'s*]:

(i) a. a cat of mine / ours / yours / his / hers / theirs (Post-nominal possession)
b. Q: Is that a cat? A: Yes, mine / ours / yours / his / hers / theirs (Possessor-stranding ellipsis)

Regular phonological reduction will block the form *his's* by reducing the final sibilant cluster to a single [s], though the status of the irregular *mine* is not clear. An anonymous reviewer states that the forms in (i) come from genitive inflections which diachronically predate the Saxon genitive [*'s*], which later was grammaticalized from *his*. If this is so, then these morphological patterns may not be synchronically related in any case, and thus only bear some resemblance in the synchronic grammar by coincidence.

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