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The verb phrase and its ingredients

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# 1 Meta-restrictions on subcategorization

This paper starts with a familiar observation, which is that the range of subcategorization patterns that we find across verbs (within and across languages) is much smaller than the range of imaginable ones. Though we could, in principle, imagine building verb phrases that contain any number of arguments, of varying categories and interpretations, actual verb phrases appear to be much more restricted. The extended projection of the verb typically has somewhere between 0-4 arguments (before having to add additional verb roots; Hale and Keyser 1993, 2002; Marelj 2002; Juarros 2003), and usually looks something like (1) (ignoring TAM particles and the fact that verb placement changes from language to language).

(1) (DP) V (DP) (XP) (XP)

The schematic in (1) subsumes several restrictions on subcategorization. The first is that the standard functional structure ascribed to the verbal domain licenses at most two DPs before having to add additional material. Beyond two DPs, verb phrases need prepositions, applicative heads, embedded clauses, VP shells, etc. in order to introduce additional DPs. Even though there is no overt morphology on the indirect object in (40b), I follow (Baker, 1988; den Dikken, 1991; McGinnis, 2001; Pylkkänen, 2008, among others) in assuming that there is a covert head accompanying it, such as a K head or an applicative head, causing its distribution to be that of a non-DP rather than a DP.

(2) Clauses with 2 or fewer DPs don't need extra functional structure:
    a. <u>Jo</u> laughed. (1 DP)
    b. <u>Jo</u> enjoys <u>fruit</u>. (2 DPs)

(3) Clauses with more than 2 DPs need extra functional structure:
    a. Amy gave $[_{ApplP}$ Jo $]$ a book. (2 DPs + 1 ApplP)
    b. Beth showed the painting <u>to Laurie</u>. (2DPs + 1 PP)
    c. Meg wants Amy <u>to eat carrots</u>. (2 DPs + 1 TP)
    d. Amy told Beth <u>that Marmie likes carrots</u>. (2 DPs + 1 CP)

Though it is less often discussed, the number of non-DP arguments is similarly restricted: a single verb can co-occur with at most two non-DP arguments. In (4) and (5), we see some verbs that can take one or two non-DP arguments, such as prepositional phrases, applicative phrases, adjectival phrases and clauses. In (6), however, observe that there are no verbs that select for more than two non-DPs.

<center>1</center>

More strikingly, trying to combine some of the possible non-DP arguments for these verbs in a number greater than two is ruled out.[1] In sum, the verbal domain can contain at most four arguments, at most two of which are DPs and at most two of which are non-DPs.

(4) Some clauses with 1 non-DP:
    a. Amy turned <u>blue</u>. (1 DP + 1 AP)
    b. Beth depends <u>on Laurie</u>. (1 DP + 1 PP)
    c. Meg wants <u>to go camping</u>. (1 DP + 1 TP)
    d. Marmie thinks <u>that Amy should eat carrots</u>. (1 DP + 1 CP)

(5) Some clauses with 2 non-DPs:
    a. Jo relies <u>on Laurie</u> <u>for support</u>. (1 DP + 2 PPs)
    b. Meg counted <u>on Jo</u> <u>to help</u>. (1 DP + 1 PP, 1 TP)
    c. Amy heard <u>from Beth</u> <u>that Marmie likes carrots</u>. (1 DP + 1 PP, 1 CP)
    d. Jo bet <u>against Laurie</u> <u>for a new bike</u>. (1 DP + 2 PPs)
    e. Laurie bet $[_{ApplP}$ Jo $]$ his allowance <u>that Amy would want to come</u>. (2 DPs + 1 ApplP, 1 CP)

(6) Can't have 3 (or more) non-DPs
    a. *Meg counted <u>on Jo</u> <u>for support</u> <u>to help</u>.
       intended reading: Meg counted on Jo for support and help
    b. *Lauri bet <u>against Jo</u> <u>for a new bike</u> <u>that Amy would want to come</u>.
       intended reading: Laurie bet Jo a new bike that...

The restriction in (6) is especially surprising because it doesn't obviously follow from anything. There are verbs with only non-DP internal arguments (4,5). There are also verbs that select for four arguments. Why are there no verbs that select for four arguments, where all of the internal arguments are non-DPs?

In the search for an explanation, two criteria can distinguish a more compelling analysis from a less compelling one: 1) whether the analysis makes use of independently necessary tools and principles, or needs to invent domain-specific ones, and 2) whether it makes good predictions outside of the immediate pattern under consideration.

In this paper, I suggest an account of (1-6) that meets both of these criteria. The account takes as a starting point the common assumption that the grammar makes use of at least two ingredients to build structure: 1) categorial Merge-inducing features, and 2) principles of combination that instruct the derivation on how to use these

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[1]When discussing the distribution of non-DPs, it can sometimes be tricky to determine whether they are arguments or adjuncts. The ungrammaticality of (6a,b), however, argues in favor of treating these non-DP phrases as arguments, given how much more surprising these facts would be if they were adjuncts.

features to build structure. I propose that a limited set of inputs into such a system should produce a limited set of outputs. In other words, by limiting the number of features in the system in the right way, the principles of combination should produce structures like (1) and no others.

Importantly, this theory only makes use of category features and general principles of combination to explain the restrictions. It does not appeal to other imaginable features, such as theta features or principles of correspondence between different features and thematic roles, which are arguably domain-specific. In what follows, I will illustrate some common Minimalist assumptions about feature-checking as a means of structure-building, and show how they can be constrained to produce a limited set of subcategorization frames if we limit the inventory of category-selecting features. Because the features themselves are independently motivated, as are the principles of combination, this explanation of meta-restrictions on subcategorization meets criterion one for a compelling analysis.

I will then show that this same system, with these same features, makes several other desirable predictions about the verbal domain as well. We will see that in addition to restrictions on subcategorization, it also produces restrictions on word order, and explains long-puzzling binding and A-movement facts in the dative and passive alternations. The proposal therefore also meets criterion two.

Central to the analysis is the idea that not every kind of argument is merged in response to a specific category feature. Some arguments will be argued to merge in response to an *unspecified* category feature, which can license anything (cf. Chomsky's 2005 unspecified edge features). The introduction of this feature reduces the overall number of distinct features that we need to characterize the verbal domain, which, as we will see, also limits the number of possible structures produced by the combinatorial system. To foreshadow, the proposed introduction and distribution of unspecified features will be shown to explain the following six facts about verb phrases.

(7) Main results

    a. An explanation for why DPs behave as though they are c-selected but other arguments behave as though they are s- or l-selected rather than c-selected (Grimshaw, 1979; Pesetsky, 1982; Elliott, 2017).

    b. An explanation for why, when a head selects for both a DP and a non-DP argument, the DP always surfaces to the left of the non-DP.

    c. An explanation for why clauses have a maximum of four arguments cross-linguistically, without adding additional lexical verbs.

    d. A small typology of verb phrases that captures the various argument configurations that we find.

    e. An explanation for why some ditransitive constructions permit backwards binding in many languages where it is not generally possible.

f. An explanation for why many languages' double object constructions permit either object to raise to subject in a passive clause, where non-local raising is not generally possible.

An outline of the paper is as follows. In §2, I outline my framework assumptions about structure-building, and motivate an inventory of Merge-inducing features. The first four results in (7) follow from these proposals. §3 introduces the predicted typology of verb phrases, which leads us to the other results. In §4, I discuss additional motivation for the overall approach to leverage category features instead of other imaginable features (e.g. theta features) to describe facts about subcategorization. §5 explores extensions of the proposal to other domains.

Among the predictions outlined in §3 is that UG provides two ways to build a ditransitive clause. In one, there is an asymmetric c-command relationship between the two internal arguments. In the other, there is no c-command relationship between the two internal arguments. We will see that one of these structures promotes raising of either internal argument due to the lack of c-command between them, thus accounting for symmetric passives (result (7f)). To account for backwards binding in ditransitives (result (7e)), I argue that binding relations can be established under m-command when there is no c-command relation between two arguments, which is discussed in §5.1.1.

# 2 Subcategorization in a feature-driven syntax

Since Chomsky (1995), it has been common to treat syntactic objects as bundles of features, where features are used by the combinatorial system to generate structure. The combinatorial system has a set of conditions and principles that determine how it uses the feature inputs to derive structure.

This paper takes as its starting point the proposal that all Merge is feature-driven (Chomsky, 1995). In other words, for DP to merge with V in (9), there must be some corresponding feature on V that gets checked under sisterhood with a DP. I adopt the feature notation from Müller (2010), shown in (8), who develops a theory of feature-driven Merge. Replacing [$\alpha$] with, for example, [D], [wh], [V], etc. yields Merge features that drive structure-building of various kinds. Whether these features contain any other machinery, such as the capacity to agree with elements before they merge (as in theories where agreement is a precondition for movement), will be irrelevant for our purposes.

(8)  [·$\alpha$·] = an instruction to Merge with an element bearing [$\alpha$] (Müller, 2010)

(9)  Merge is feature-driven

Before moving on, I want to first clarify that this paper is primarily about the kind of Merge that takes place between heads and arguments and that which builds the clausal spine (i.e. *Set-Merge* in Chomsky (2004) terms). I will not discuss adjunction (or *Pair-Merge*) in detail, and leave it as an open question whether the properties of Merge discussed here extend to adjunction. In what follows, we will examine some properties of argument-selection to determine what features are necessary, and how they interact with the combinatorial system to produce structure.

## 2.1 Taking inspiration from c-selection

Granting that we have features that drive Merge, to understand what structures the system can produce, we need to be explicit about what features are present in the system. On the principle that category features are a necessary part of any theory, I'll focus on what category features we could use to explain the facts in (1-6).

In this section, I present evidence that the category D is important to explaining the distribution of DPs. By contrast, it is much harder to find evidence that we ever have to reference non-D categories like P and C in order to explain the distribution of PPs and CPs. As such, I propose that the inventory of Merge-inducing features includes $[\cdot D \cdot]$, but not $[\cdot C \cdot]$ or $[\cdot P \cdot]$. More concretely, I propose that there are two argument-introducing heads, V and $v$, and the following Merge-inducing features in the verbal domain.

(10) Proposed heads and features:
    a. Two functional heads in the verb phrase: V and $v$ (Larson, 1988; Hale and Keyser, 1993; Chomsky, 1995; von Stechow, 1995, a.o.)
    b. Three (non-Ā) features: $[\cdot D \cdot]$, $[\cdot X \cdot]$ (for introducing arguments), $[\cdot V \cdot]$ (for encoding the functional hierarchy)

$[\cdot D \cdot]$ licenses the introduction of DPs, $[\cdot V \cdot]$ licenses VP-Merge, and $[\cdot X \cdot]$ is a Merge-inducing feature that can be checked by an element of any category. The introduction of this unspecified feature takes inspiration from Chomsky (2005), who proposes a similar feature to describe edge positions that attract any kind of element.

The idea that there are only two features involved in argument Merge, $[\cdot D \cdot]$ and $[\cdot X \cdot]$, produces several results. In a first result, this explains why the profile of selection for DPs looks like c-selection in the standard sense, while the profile of selection for other categories does not Grimshaw (1979); Pesetsky (1982); Elliott (2017). In (11), we see that verbs that take DP complements are often not particular about which D head is used, so long as the complement is *some* kind of DP. The internal argument position in (11) is therefore best defined by the category D, given that all and only DPs are permissible there.

(11) C-selection for category D
    a. Sue devoured **the** cake.

b. Sue devoured **a** cake.

c. Sue devoured **three** cakes.

d. Sue devoured **cake** (for three minutes).

e. Sue devoured Sally**'s** cake.

f. Sue devoured **every** cake.

Clausal and prepositional complements, by contrast, do not exhibit this profile. We don't find verbs that select for a PP/CP, which care *only* about their complement being *some* kind of prepositional phrase/clause. Verbs that select for clausal complements can alternatively take nominal or prepositional complements (12-13).

(12) Elliott (2017), example 150

a. Sam promised/said/explained/thought that he would give an extra lecture.

b. Sam promised/said/explained/thought something.

(13) Grimshaw (1979); Pesetsky (1982)

a. Sue asked whether Bill likes carrots.

b. Sue asked the time.

c. Sue asked for the salt.

There are verbs that are only compatible with prepositional complements, as in (14), which might lead one to think we need a feature $[\cdot P \cdot]$. However, these verbs are picky about the particular preposition that heads their complement (Pesetsky, 1995, p. 246, fn. 86, citing Donca Steriade p.c.), showing that they l(exical)-select, rather than c(ategory)-select their complements (Pesetsky, 1982). In sum, there are no verbs with the profile of (11) for clausal or prepositional arguments. Without positive evidence for a feature $[\cdot P \cdot]$ or $[\cdot C \cdot]$ that can be checked by *any* PP or CP, it would be ad hoc to propose that verbs ever bear such features.

(14) L-selection for particular P-heads

a. Sue relies **on/*to/*of/*for** the bus.

b. Sue bristled **at/*to/*of/*for** Sally's insult.

In sum, I propose that argument-introduction is only mediated by features $[\cdot D \cdot]$ and $[\cdot X \cdot]$. I will now show how replacing non-D Merge features with $[\cdot X \cdot]$ makes several surprising predictions, when we take into account how the combinatorial system uses these features to instruct the derivation.

## 2.2 Multiple feature-checking

Here I take up an assumption from previous literature about how Merge-features are used to build structure, namely that multiple features can be checked at a time (15).

This condition, called Feature Maximality, makes it so that every instance of Merge checks the maximal number of features that it can. If an element merges that can check one feature, only one feature is checked. When an element merges that can check multiple features, however, multiple features must be checked.[2]

(15)   Feature Maximality/Free Rider condition: Given a head H with features $[F_1]...[F_n]$, if XP discharges $[F_i]$, XP must also discharge each $[F_j]$ that it is capable of (Chomsky, 1995; Pesetsky and Torrego, 2001; Rezac, 2013; van Urk and Richards, 2015; Longenbaugh, 2019)

When (15) is considered in the context of feature-driven Merge, limiting argument-introducing features to $[\cdot D \cdot]$ and $[\cdot X \cdot]$ has significant consequences. First, because Merge must be driven by an available Merge feature, having only two argument-introducing features predicts that a single head can only possibly host two arguments: one DP and one non-DP. In addition, (15) entails that those two elements must merge in a particular order. Each of these predictions will be discussed in turn.

To illustrate the first prediction, because multiple features can be checked at a time, multiple features of the same type do not lead to multiple instances of Merge. If a head had n-many instances of $[\cdot D \cdot]$, they would all be simultaneously checked by the first DP that merged (illustrated in (16)). By a similar logic, all instances of $[\cdot X \cdot]$ will be checked by the first phrase that merges, prohibiting multiple non-DPs from being selected by the same head.

(16)   Only one DP per selecting head
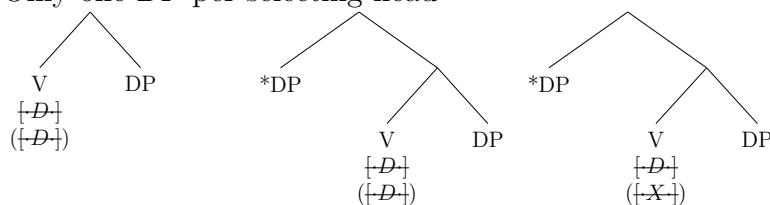


As a result, a single head can merge with at most two arguments, one DP and one non-DP. If there were other argument-introducing features, like $[\cdot C \cdot]$, $[\cdot P \cdot]$, $[\cdot A \cdot]$, etc., we would expect there to exist verbal heads that select for all of them, contrary to what we find. There are no verbs that simultaneously select for an argument of every category. This follows if we replace those non-D Merge features with $[\cdot X \cdot]$.

This predicted interaction between number of arguments and number of argument-introducing heads can be leveraged to explain why we need multiple verbal heads to build a transitive clause. Many theories of the verbal domain suggest we need at least two verbal heads to build a transitive clause (Larson, 1988; Hale and Keyser, 1993; Chomsky, 1995; von Stechow, 1995, a.o.): V and $v$, where V hosts the verb root and

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[2]Note that Feature Maximality is not a global economy condition – it does not tell a head which operation to do first. Whatever operation a head happens to choose, Feature Maximality merely requires it to maximize the number of features checked by the operand.

$v$ introduces the external argument. Feature Maximality, combined with the present inventory of features, predicts the second head to be crucial to the introduction of a second DP – a single head cannot license multiple DPs given only the features $[\cdot D\cdot]$ and $[\cdot X\cdot]$, since the first DP that merges will check every feature it can.

By a similar logic, two verbal heads are predicted not to be able to host a third DP without additional argument-introducing heads. Therefore, if the only two verbal heads are V and $v$, we need prepositions, applicative heads, or embedded clauses to introduce additional DPs. This explains the first restriction on subcategorization, which is that more that two DPs can only be licensed with additional structure.

(2) Clauses with 2 or fewer DPs don't need extra functional structure:
 a. <u>Jo</u> laughed. (1 DP)
 b. <u>Jo</u> enjoys <u>fruit</u>. (2 DPs)

(3) Clauses with more than 2 DPs need extra functional structure:
 a. Amy gave $[_{ApplP}$ Jo $]$ a book. (2 DPs + 1 ApplP)
 b. Beth showed the painting <u>to Laurie</u>. (2DPs + 1 PP)
 c. Meg wants Amy <u>to eat carrots</u>. (2 DPs + 1 TP)
 d. Amy told Beth <u>that Marmie likes carrots</u>. (2 DPs + 1 CP)

Feature Maximality also makes a surprising prediction about word order, when we consider that a single head may introduce multiple arguments. We know that some verbs are capable of hosting two internal arguments, as in (3b), for example. To capture this, there needs to be a possible feature bundle for V with two features to license these arguments. The only two features available to us are $[\cdot D\cdot]$ and $[\cdot X\cdot]$, so let's imagine the following feature bundle for some V.

(17) A feature bundle for a V that selects for two arguments: $\{[\cdot D\cdot],[\cdot X\cdot]\}$

The fact that DP is itself a kind of XP induces restrictions on the relative order in which DPs and non-DPs are merged with this V head. If a DP is merged first, no other arguments are licensed in that projection due to the fact that the DP checks both $[\cdot D\cdot]$ and $[\cdot X\cdot]$. However, if a non-DP is merged first, it checks only $[\cdot X\cdot]$, allowing a DP to be merged later. Thus, a single head can potentially host two arguments, so long as only the second one is a DP. For convenience, I will call this ordering restriction *the non-DP first theorem*.

(18) *The non-DP first theorem*: if V merges with a non-DP, the non-DP must merge first.
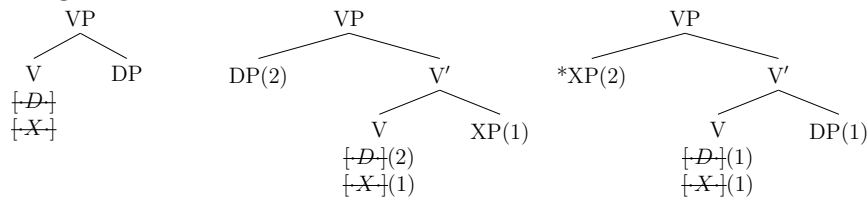
This ordering restriction explains the fact that when a DP and a non-DP are selected by the same head, the non-DP routinely appears to the right of the DP, regardless of the whether the VP is head-initial or head-final: specifiers always appear to the left of complements.[3]

(19)  DP precedes non-DP in a head-initial context (English)

    a.  I told (*about syntax) Lauri's favorite poet's cat (about syntax).

    b.  I promised (*to eat a carrot) Marmie's mother's friend Ed (to eat a carrot).

    c.  I told (*that the world is round) Beth's nephew's stuffed animal (that the world is round).

(20)  DP precedes non-DP in a head-final context (Dutch) (Stowell, 1981, ex. 27, from Koster 1978b)

    a.  ... dat  Peter [John] [naar Amsterdam] stuurt
       ... that Peter John   to      Amsterdam  sends

       'that Peter sends John to Amsterdam'

    b.  ... dat  John [Peter] [ziek] maakte
       ... that John Peter   sick   makes

       'that John makes Peter sick'

I therefore conclude that there are no argument-introducing features beyond $[\cdot D \cdot]$ and $[\cdot X \cdot]$ on verbal heads. In addition to there not being strong evidence for features like $[\cdot P \cdot]$ and $[\cdot C \cdot]$, the distribution of non-DP arguments is better explained by $[\cdot X \cdot]$. As we saw, replacing features like $[\cdot P \cdot]$ and $[\cdot C \cdot]$ with $[\cdot X \cdot]$ correctly predicts the relationship between the number of arguments and argument-introducing heads, and also the relative word order of DP and non-DP arguments in VP. We will now discuss how argument-introducing features are expected to interact with clause-building features, like those that represent the functional hierarchy, which paves the way for understanding the typology of verb phrases.[4]

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[3]Stowell (1981) argues that we can explain the ordering restriction in English by appealing to case assignment requirements. He suggests that the position immediately adjacent to the verb is a case position. Since DPs need case, but PPs/CPs do not (or can't have case), the only available word orders for DP and non-DP arguments are those in which DPs are adjacent to the verb in their clause, and other arguments show up further to the right. While this explanation could cover the word order facts in English, it cannot explain Dutch, where the non-DP intervenes linearly between the verb and the DP it assigns case to.

[4]A reviewer raises the interesting point that some languages might not have DPs, but instead use NPs in the contexts where other languages would use DPs. The present proposal predicts that NPs must merge in response to $[\cdot X \cdot]$, since they cannot check $[\cdot D \cdot]$, which predicts that NPs should generally have a different distribution cross-linguistically compared to DPs. Significant additional investigation is needed to determine whether this is true of those languages without DPs. On a promising note, however, some languages which appear to have both NPs and DPs do seem to subject each kind of phrase to different processes: e.g. NP-incorporation applies only to NPs and object shift seems to apply only to DPs. These sorts of facts would support the overall approach here to treat NPs and DPs as merged and moved in response to different features.

## 2.3 Building the verb phrase

So far, we have seen some motivation to limit the set of argument-introducing features to $[\cdot D\cdot]$ and $[\cdot X\cdot]$. We have also seen that the conditions on feature-checking limit verbal heads to the selection of maximally two arguments, given these two argument-introducing features. This was because adding more $[\cdot D\cdot]$ and $[\cdot X\cdot]$ features could not license more DPs and XPs on a single head, since the first XP would check all instances of $[\cdot X\cdot]$, and so forth.

I therefore assume that we have two verbal heads, V and $v$, which are both crucial for the formation of transitive clauses. The second head, $v$, must have a function that V doesn't have, however. In addition to introducing arguments, $v$ must also merge with VP for the purposes of building the clause. To capture this additional function, I propose to endow $v$ with a $[\cdot V\cdot]$ for the purpose of capturing the functional hierarchy.

(21)   A feature bundle for a $v$ that selects for two arguments: $\{[\cdot D\cdot], [\cdot X\cdot], [\cdot V\cdot]\}$

These features enable $v$ to merge with three kinds of phrases, as illustrated in (22). It can host a DP such as the external argument in (22b) or the expletive subject in (22a) (Deal, 2009; Wu, 2018; Longenbaugh, 2019). It can host a non-DP argument such as the experiencer subject in (22a), the applied argument in (22b) or the *by*-phrase in (22c) (Collins, 2005). In every case, it can also host the VP.

(22)   $v$ can host an XP argument as well as VP
    a.  It seems to Beth that Jo likes writing.
    b.  Meg bet Amy.APPL a day's pay that Jo would lose her scarf.
    c.  A book was given to Meg by Jo.

Importantly, $[\cdot X\cdot]$ on $v$ has the same consequences for the order of operations as it did before, but with a more surprising result. When $v$ takes a VP complement, merging VP necessarily checks not only $[\cdot V\cdot]$ but also $[\cdot X\cdot]$, because anything can check $[\cdot X\cdot]$. As a result, whenever $v$ takes a non-DP argument that needs to be licensed by $[\cdot X\cdot]$, VP must merge as a *specifier*.

(23)   $v$Ps: a non-DP/non-VP must merge first → makes VP a specifier.
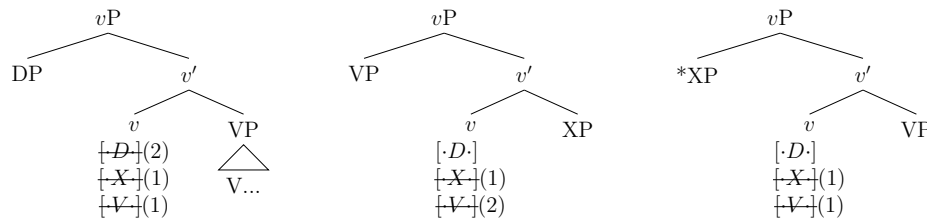


Though it is not common to represent VP as a specifier, I will argue that this prediction is borne out: when $v$ selects for a non-DP argument, we will see evidence from binding and locality in movement/agreement that VP is indeed a specifier in these contexts. These effects will be the focus of §5, following discussion of how these heads and features produce the observed restrictions on subcategorization.

# 3 The space of $v$Ps

If the only possible argument-introducing features are $[\cdot D \cdot]$ and $[\cdot X \cdot]$, then the only possible feature bundles associated with V and $v$ heads are in (24) and (25).

(24)  Possible features bundles for V:

    a. V: {}

    b. V: {$[\cdot D \cdot]$}

    c. V: {$[\cdot X \cdot]$}

    d. V: {$[\cdot D \cdot], [\cdot X \cdot]$}

(25)  Possible features bundles for $v$:

    a. $v$: {$[\cdot V \cdot]$}

    b. $v$: {$[\cdot D \cdot], [\cdot V \cdot]$}

    c. $v$: {$[\cdot X \cdot], [\cdot V \cdot]$}

    d. $v$: {$[\cdot D \cdot], [\cdot X \cdot], [\cdot V \cdot]$}

The proposed inventory of functional heads and Merge features produces a small space of possible verbal structures, which can license no more than four arguments per verb root. If a clause wants to project more than four arguments, it must use one of the available $[\cdot X \cdot]$ features to merge another verb phrase or clause. The space of possible verb phrases, varying the number and types of arguments selected by each verbal head, are shown in (26). As we can see, the table in (26) captures the basic restrictions on subcategorization introduced in §1: verb phrases contain maximally four arguments, at most two of which are DPs and at most two of which are non-DPs.

(26)  Possible numbers/types of arguments in $v$P

| arguments in V→ <br> arguments in $v$ ↓ | $\varnothing$ | DP | XP | DP+XP |
|---|---|---|---|---|
| $\varnothing$ | | 1DP | 1XP | 1DP,1XP |
| DP | 1DP | 2DPs | 1DP,1XP | 2DPs,1XP |
| XP | 1XP | 1DP,1XP | 2XPs | 1DP,2XPs |
| DP+XP | 1DP,1XP | 2DPs,1XP | 1DP,2XPs | 2DPs,2XPs |

Though I won't look at examples from every quadrant in (26), it is worth highlighting that the predicted typology produces both familiar and unfamiliar structures. Familiarly, the fact that there are two verbal heads, V and $v$, each of which can in principle host a DP, straightforwardly predicts unaccusative, unergative, and transitive clauses. If V merges with a DP, but $v$ does not, the result is an unaccusative clause; the reverse yields an unergative clause; if both heads introduce DPs, the result is a transitive clause. This is not a new result, of course, but just shows that the predicted typology includes many of the structures that we commonly take for granted.

We saw some examples from §2 of different verbal heads hosting non-DP arguments, showing that the same range of patterns arises for non-DPs, giving analogous "unergative", "unaccusative" and "transitive" non-DP frames. §5 argues more concretely with movement and binding diagnostics that these patterns arise for non-DPs.

(27)  "Transitive" with respect to non-DPs: both V and $v$ select for a non-DP
    a. It seems <u>to Beth</u> <u>that Jo likes writing</u>.
    b. Meg bet <u>Amy.APPL</u> a day's pay <u>that Jo would lose her scarf</u>.

The table in (28) provides suggested names for every predicted structure. Beyond unaccusatives, unergatives and transitives, some more exciting results follow when we consider that category features represent a broader kind of syntactic requirement beyond just argument selection. We will explore some different raising patterns before moving on to the dative alternation in §5.[5]

(28)  Ascribing names to each structure.

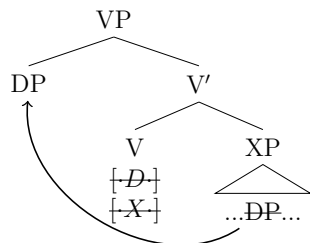| args in V→ / args in $v$ ↓ | $\varnothing$ | DP | XP | DP+XP |
|---|---|---|---|---|
| $\varnothing$ | *weather* verbs | unaccusatives | raising verbs | ditransitive unacc. |
| DP | unergatives | transitives | ECM verbs | **ditransitives** |
| XP | raising verbs | *puzzle/delight* | *seem/appear* | *find* |
| DP+XP | *wager* | **ditransitives** | *hear* | *bet* |

Category features are used more generally to represent a requirement for a head to host a particular category of specifier, even if that head doesn't "select" for an argument in the standard sense. Some examples of this include EPP positions that only tolerate DPs. Since the Merge features described here are generic, i.e. they can be checked by any kind of Merge, we expect a feature bundle of the form $\{[\cdot D\cdot], [\cdot X\cdot]\}$ to be consistent with multiple possible derivations: one in which both features are checked via external Merge, and one where $[\cdot D\cdot]$ is checked via internal Merge.

(29)  $\{[\cdot D\cdot], [\cdot X\cdot]\}$ checked via external Merge

```
          VP
        /    \
      DP      V′
             /  \
            V    XP
          [·D·]
          [·X·]
```

---
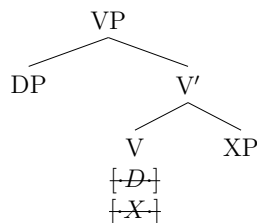
[5]The table in (28) tentatively lists *weather* verbs as verbs that might select for no arguments in some languages. This is a face-value judgment – pro-drop languages like Spanish don't pronounce any DP arguments (e.g. *Llueve* = "It's raining."), so it is plausible to imagine there aren't any. As the question of whether *weather* verbs have arguments is controversial, I leave it as a matter for future research to determine whether verb phrases with zero arguments are attested or represent a gap in the paradigm.

(30)   $\{[\cdot D\cdot], [\cdot X\cdot]\}$ checked via mixed Merge

```
              VP
           /      \
        DP          V'
                  /    \
                 V      XP
               [·D·]    /\
               [·X·]  ...DP...
```

As a result, the feature bundle in (29) and (30) can be used to describe two different kinds of selectional patterns. It could describe a ditransitive verb (e.g. *Jo gave a book to Amy.*) or it could describe an ECM verb. In sum, two verbs that are not distinguishable in their syntactic representation might be compatible with different syntactic derivations, provided that they differ in their semantic representation (according to how many thematic roles they discharge, etc.).

(31)   ECM results from raising to check V's $[\cdot D\cdot]$ feature
   a.   Amy believes Jo to be talented/it to be raining.
   b.   Jo was believed to be talented.                                    *passive*

The same ambiguity arises for feature bundles associated with $v$. A $v$ head with $[\cdot D\cdot]$ might introduce an external argument or it might attract an internal argument to its edge, as in a passive or unaccusative clause. Legate (2003), Sauerland (2003), and Longenbaugh (2019) have argued that A-movement is successive cyclic through the edge of $v$P in passives and unaccusatives, which can be characterized as a response to a $[\cdot D\cdot]$ on $v$.

As we will discuss more extensively in §5, if $v$ also selects a non-DP, i.e. it also has $[\cdot X\cdot]$, then another raising pattern becomes available, illustrated in (32). When $v$ selects for a non-DP, we saw that VP must become a specifier in this context – the non-DP must merge first as $v$'s complement or else it would be bled by VP-complementation. A DP from inside this non-DP argument might therefore raise to the edge of $v$P in a passive context, as we see for *wager*-class verbs. This DP can only raise to Spec $v$P, not Spec VP, because the landing site for movement must presumably c-command the base position of the moved element. These verbs are therefore distinguishable from ECM verbs by the fact that their objects can only raise in a passive (or a wh-question Postal 1974).

(32)   A $v$ with $[\cdot D\cdot]$ and $[\cdot X\cdot]$ (XP is $v$'s complement so VP is a specifier)
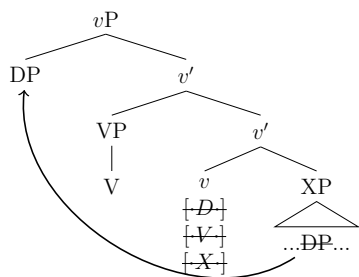
(33)  *Wager*-class verbs
    a.  *Amy wagers Beth to be the best pianist.
    b.  Beth was wagered to be the best pianist.
    c.  *Jo alleged Meg to be the best actress.
    d.  Meg was alleged to be the best actress.

Lastly, clauses with two DPs and one non-DP occupy two quadrants in the table in (26), which will form the basis of our discussion of ditransitive clauses in §5.1. In sum, we have seen some preliminary support for the predicted typology of verb phrases. It not only produces the restrictions on subcategorization that we started with, but also captures variation in raising profiles, and as we will see, puzzling facts about the dative and passive alternations.

# 4   The case for categories

I have motivated a reduction in the number of category features needed to characterize argument introduction, and have shown how they capture restrictions on subcategorization. Before moving on to the extensions of the proposal, I want to pause to consider potential alternative analyses and clarify the scope of the proposal.

In seeking an explanation for the facts in §1, I made the choice to examine category features rather than other features that have been proposed to license arguments, such as theta features. This was for several reasons. First, while every syntactic theory appeals to some notion of a category, the inventory of non-category features in syntax remains controversial. Second, existing views of selectional restrictions grounded in theta features do not capture the facts we have seen so far.

Starting with the first point, whether we need features corresponding to thematic role assignment (that are visible to the syntax) is a matter of serious debate. While some argue that thematic role assignment is a kind of feature-checking mechanism (see e.g. Bošković 1994; Reinhart 2002; Marelj 2004; Rodrigues 2004 for discussion of this view), others treat thematic role assignment as entirely semantic (as on many approaches based in Distributed Morphology (DM)).

To illustrate the present proposal, take the DP in (34). I assume that DPs in general have a bundle of features, including its category feature, and potentially other

features like $\varphi$-features or Ā-features. These features on DPs are used to identify them as targets for syntactic operations of various kinds.

(34)  DP: $\{[D], [\varphi], [wh]...\}$

On the present theory, a predicate that wants to select this DP employs a categorial Merge feature, $[\cdot D \cdot]$, which can be checked by the corresponding [D] on the DP in (34). If there were a head with a $\varphi$-probe, it could find the $\varphi$-bundle on DP, and so forth.

This DP eventually gets interpreted as having a thematic role, at which point the question arises: what is thematic role assignment and how does it arise? I am following in the DM tradition to treat thematic role assignment as a semantic rather than a syntactic process. On that view, DPs look like (34) and predicates select them according to their category – there are no theta features on either the DP or the selecting head that need to be checked in the course of the syntactic derivation. When the structure is sent to the semantics for interpretation, the DP composes with the predicate via functional application, where a neo-Davidsonian representation of the predicate results in an interpretation in which that DP receives a theta role. As a result, arguments come to be associated with thematic roles due to the meanings of their selecting predicates.

(35)  Syntactic representation:

```
          /\
         /  \
      Pred    DP
      [uD]   {[D], [φ], [wh]...}
```
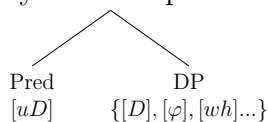
(36)  Semantic representation:
   a. Pred s-selects for an entity: $\lambda e.$ theme$(e)$...
   b. If the DP denotes an entity, Pred and DP compose via functional application:
      Pred(DP) = theme(DP)...

As foreshadowed, this is not the only imaginable theory of theta role assignment. One could imagine introducing other features into the representation of the DP or the predicate (or both) corresponding to thematic role assignment, which could be used to instruct the syntactic derivation just as category features are. Such a proposal has a conceptual disadvantage, namely that theta features are domain-specific, necessary only for argument introduction and not more generally for other kinds of operations. However, if there were strong empirical motivation for them, they should of course be considered. I will argue that restrictions on subcategorization, at least, do not provide such motivation.

Marelj (2002) argues that the theta system outlined in Reinhart (2002, 2016) can produce restrictions on selection, such as the fact that verbs can maximally select for four arguments. Since this is part of the empirical domain discussed here, I'll outline

some of the details of the proposal and show why a theory based on categories has more empirical coverage.

The argument here is somewhat subtle, so we need to unpack what is meant by a "theta feature" on the Reinhart/Marelj approach. They propose that what we refer to as "theta features" are really clusters made up of two semantic primitives, each with two binary specifications: $\pm$c (cause change) and $\pm$m (mental state). In other words, every theta role, on this view, is some combination of specifications of these two more primitive concepts. Restrictions on combinations of these features can produce restrictions on the range of thematic roles that predicates can select for.

Importantly, these clusters of feature specifications, which define a verb's selectional requirements, are semantically rather than syntactically defined. That said, Reinhart proposes that the syntax has access to these clusters insofar as they can be used to instruct how many instances of Merge should take place to satisfy a predicate's selectional requirements.

For these feature clusters to instruct the syntactic derivation, however, the theory needs to be supported by principles of correspondence that tell the syntax what kind of phrase to merge. Selection for a particular thematic role does not by itself tell the syntax whether to merge a DP vs. some other category phrase. Given that many roles can be realized as multiple categories, it isn't obvious that there are such rules, in which case it is hard to imagine how a theory of theta role specifications could be used to make predictions about phrase structure.

(37)   Roles realized as multiple categories
    a.  Agent: DP or *by*-phrase
        i.  Sue ate a strawberry.
        ii. The strawberry was eaten by Sue.
    b.  Propositional arguments: CP or DP
        i.  Laurie said that Amy likes carrots.
        ii. Laurie said something.
    c.  Recipient: *to*-phrase or ApplP
        i.  Meg gave Marmie a present.
        ii. Meg gave a present to Marmie.

The restrictions on subcategorization that we have been looking at make it clear that category is important: the DP vs. non-DP distinction matters when considering the quantity and form of arguments selected by a verb. This distinction is not captured by the theta-system.

From this perspective, a theta-theoretic version of facts like (1) faces several disadvantages: it makes use of controversial features, and it would require additional mapping principles to attempt an explanation of the kinds of restrictions we have been discussing.

By contrast, the present theory of category features not only captures restrictions on subcategorization, but can also produce constraints on s-selection. In other words, it does more than the theta system in terms of explaining constraints on selection. If the syntax can only generate clauses with at most four arguments, due to restrictions on structure-building, any lexical item that s-selects for more is unrealizable, and thus ruled out. As such, a syntactic theory of restrictions on subcategorization is stronger than a semantic one: syntax can produce constraints on interpretation without added mapping principles. In what follows, I show how the category features outlined in this paper also constrain other aspects of verb phrase syntax, accounting for long-puzzling facts about the dative and passive alternations.

Before moving on, I want to first highlight that this paper takes inspiration from the program laid out in Hale and Keyser (1993, 2002) and some recent work by Wood and Marantz (2017). Though the details of this approach are substantially different from the ideas presented in those works, this paper shares a common goal with those works, which is to identify which properties of the syntactic component of grammar are responsible for the observed behaviors of verbs. While the the theta-theoretic system proposed by Reinhart (2002, 2016) offers hypotheses about how the interface between phrase structure and concept might constrain the behaviors of verbs, this paper isolates the syntactic contribution to restrictions on argument structure.

# 5 The dative and passive alternations

## 5.1 The dative alternation

In this section, we investigate a puzzling interaction between word order and binding possibilities in the dative alternation, and show that such an interaction is predicted by the typology of verb phrases in §3. The interaction is shown in (38): when the indirect object (XP) *follows* the direct object (DP) in (38a,b), the direct object can either bind or be bound by the indirect object. When the indirect object (XP) *precedes* the direct object (DP) in (38c,d), however, the indirect object can bind the

direct object but not vice versa.[6]

(38)  a.  Jo showed [$_{DP}$Lauri and Amy$_i$] [$_{XP}$to each other's$_i$ parents] in the mirror. (DP binds XP)

  b.  Jo showed [$_{DP}$each other$_i$'s parents] [$_{XP}$to Lauri and Amy$_i$] in the mirror. (XP binds DP)

  c.  Jo showed [$_{XP}$Lauri and Amy$_i$.DAT] [$_{DP}$each other$_i$'s parents] in the mirror. (XP binds DP)

  d.  *Jo showed [$_{XP}$each other$_i$'s parents.DAT] [$_{DP}$Lauri and Amy$_i$] in the mirror. (*DP binds XP)

We will see that this pattern is not unique to English, but is also observed in Japanese, Greek and Spanish. I propose that the interaction in (45) can be explained if we adopt two proposals: 1) the typology of verb phrases in §3, and 2) if we assume that arguments of $v$ can generally bind arguments of V (to be elaborated on in Section 5.1.1). I'll begin by stating what the typology of verb phrases predicts about the possible structures and linear orders associated with ditransitive clauses.

On the present approach, there are only two verbal categories, V and $v$, each of which could have a $[\cdot D\cdot]$ feature. If a clause wants to introduce a third DP argument, it must therefore also have a third argument-introducing head, which can be merged in the main clause by checking an $[\cdot X\cdot]$ feature on V or $v$. Depending on whether that extra phrase merges with V or $v$, two possible clause structures are predicted, shown in (39). Importantly, because the element that checks $[\cdot X\cdot]$ must be the complement of whatever phrase it merges in, one of these structures forces VP to merge as a specifier.
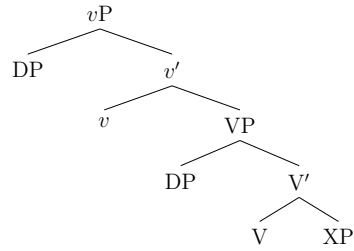
(39)  Two ditransitive structures

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[6]It should be noted that there is some disagreement in the literature about whether backwards binding is possible in ditransitives. Larson (1988) originally claimed that there is no backwards binding in any ditransitive construction, because (i) is typically judged ungrammatical in English (he also suggests that backwards bound variable anaphora is impossible in all ditransitives, a claim which has been contradicted in more recent literature, see especially Bruening (2001); Harley and Miyagawa (2017) for discussion). However (Burzio, 1986, p.199-203) and (Pesetsky, 1995, p.222) both report examples like (38) to be grammatical in English, a judgment which I have confirmed with $\approx$ 10 native English speakers. Notice that the example in (i) is not a minimal pair with the backwards binding cases in (38) on account of the anaphor being unembedded in (i).

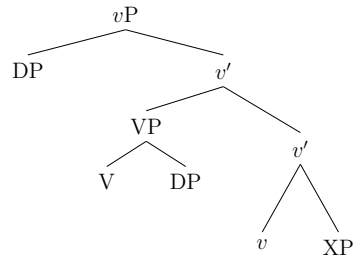(i)  *I presented/showed herself to Mary. (Larson, 1988)

It is unclear why embedding the anaphor should make a difference here, but it clearly does in other contexts where we would expect binding to be possible as well. Jackendoff (1990), for example, claims that even in forwards binding cases, anaphor binding is sensitive to embedding in surprising ways.

(ii)  ??I showed John and Bill to themselves/each other. (Jackendoff, 1990, ex.13)

a. XP is V's complement

```
                vP
         ┌──────┴──────┐
        DP            v′
                ┌──────┴──────┐
               v             VP
                       ┌──────┴──────┐
                      DP            V′
                              ┌──────┴──────┐
                             V             XP
```

b. XP is $v$'s complement

```
                vP
         ┌──────┴──────┐
        DP            v′
                ┌──────┴──────┐
               VP            v′
            ┌───┴───┐    ┌────┴────┐
           V       DP   v         XP
```

The fact that VP merges as a specifier in one of these contexts raises the immediate question of where the verb is pronounced. I will largely put aside discussion of verb position, referring the reader to Newman (2021) for arguments from ellipsis that verbs in ditransitive clauses are pronounced in a higher position than $v$P. For the sake of having a rule of verb placement in the present theory, I adopt the proxy pronunciation rule in (41) for languages like English, which requires pronunciation of the verb in its leftmost position (i.e. to the left of both internal arguments). The main focus of this section will be on the distribution of internal arguments in the dative alternation rather than the position of the verb, however.

(40)  English Dative alternation
      a. Elmer gave a fake present to Bugs.
      b. Elmer gave Bugs.DAT a fake present.

(41)  **English verb pronunciation rule**
      Pronounce the verb in either V or $v$, whichever is further to the left.

Before discussing the structures in (39), we must also address the pronunciation of the indirect object. I assume that the selection of a recipient is a property that could be held by a morpheme of category V or $v$ – it does not belong to any one category (cf. Pylkkänen's 2008 high vs. low applicative structures). As such, the same recipient phrase could in principle merge with either a V or a $v$, depending on which one selects it, without necessarily having to alter its form or interpretation.

Nonetheless, English indirect objects have two different morphological realizations – the prepositional phrase in (40a) or the unmarked indirect object in (40b) (labelled with dative case for expository purposes). Recall that even though there is no overt morphology on the indirect object in (40b), I follow (Baker, 1988; den Dikken, 1991;

McGinnis, 2001; Pylkkänen, 2008, among others) in assuming that there is a covert head accompanying it, such as a K head or an applicative head, causing its distribution to be that of a non-DP rather than a DP. I propose that the pronunciation of this head is conditioned by word order, following Levin (2015); Branan (2021), who argue that inherent case is subject to adjacency conditions. The rule in (42) states that the head which introduces indirect objects can only be pronounced as a covert dative if it is linearly adjacent to the pronounced verb. Otherwise it must be pronounced as an overt preposition.

(42)   **English inherent case rule**: covert inherent case is licensed for XPs that are linearly adjacent to a pronounced verb or preposition

With the two pronunciation rules in (41) and (42), I argue that the dative alternation as we know it reduces to two facts about ditransitive clauses: 1) their structural ambiguity (on account of the two positions available to non-DPs), and 2) the word order flexibility introduced by VP-specifier-hood. I propose that when VP is a specifier, it can be projected either as a rightward or leftward specifier. The fact that VP is a more clause-like specifier than a DP might account for its more flexible linear distribution, depending on whether a language has a mechanism for linearizing heavy specifiers differently than lighter ones (for example by simply projecting VP as a rightward specifier, or by extraposing it like a clausal argument). VP linearization affects pronunciation – when VP is on the right, the verb is pronounced in $v$, which licenses covert dative case on the adjacent indirect object.

(43)   VP linearization affects word order
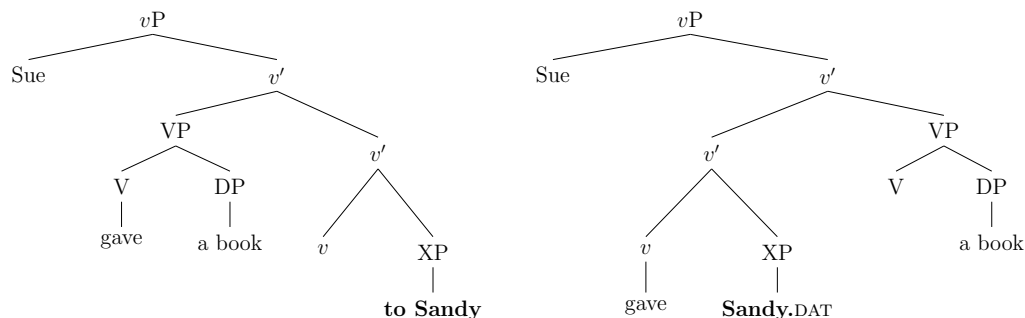


In sum, if the indirect object is an argument of V (as in (39a)), it can only be linearized to the right of the direct object; if the indirect object is an argument of $v$ (as in (39b)), it can be linearized either to the left or the right of the direct object, depending on how the VP-specifier is linearized. As a result, (40a), repeated in (44a), is proposed to be structurally ambiguous[7] (the indirect object can merge with V or $v$) but (40b) is not (the indirect object must merge with $v$).

---

[7]Janke and Neeleman (2005) also propose a theory of ditransitives in which PP indirect objects are structurally ambiguous, though their proposed structures are different.

(44) English Dative alternation
    a. Elmer gave a fake present [$_{XP}$to Bugs].    (XP is complement of V or $v$)
    b. Elmer gave [$_{XP}\varnothing$ Bugs] a fake present.    (XP is complement of $v$)

When the indirect object XP phrase is the complement of V, it is asymmetrically c-commanded by the direct object. When the indirect object XP phrase is the complement of $v$, however, neither argument c-commands the other. This proposal therefore makes a clear prediction about binding possibilities in ditransitive clauses. When the direct object linearly precedes the indirect object, there are two structures available, one in which DP may bind XP and one in which it may not.

If we add to this the proposal that arguments of $v$ can *always* bind arguments of V (see §5.1.1), the predictions match the facts in (38): when the direct object linearly precedes the indirect object, either argument can bind the other. By contrast, when the direct object linearly *follows* the indirect object, the direct object cannot bind the indirect object. The pattern is summarized in (45).

(45) Observed interaction between word order and binding possibilities
    a. DP V DP XP. (✓DP binds XP; ✓XP binds DP)
    b. DP V XP DP. (✓XP binds DP; *DP binds XP)

To clarify the predictions of this account, the English-like word order/structural ambiguity interaction is predicted to be the baseline behavior for ditransitive clauses across languages: DP-XP order is structurally ambiguous while XP-DP order is not. To the extent that languages' dative alternations diverge from this pattern, they should do so in a *more restricted* fashion. For example, Spanish only permits one of these word orders for some reason, namely DO-IO, which shows the same structural ambiguity that we find in the other languages. First we will look at some other languages that pattern like English.

Throughout this discussion, I primarily make use of binding as a diagnostic for structure and avoid using NPI-licensing and bound variable anaphora, though those diagnostics are sometimes employed in other literature in the context of ditransitives. As discussed extensively in Barker (2012); Barker and Shan (2014) (with predecessors including but not limited to Postal 1971; Wasow 1972; Jacobson 1977; Higginbotham 1980; Gawron and Peters 1990; Bresnan 1994; Safir 2004 and others), NPI-licensing and bound variable anaphora pattern differently from binding in a number of respects: NPI-licensing has been shown to have a linear order requirement and bound variable anaphora is sometimes insensitive to structure entirely, in which case neither is a reliable structural diagnostic.

Starting with the baseline pattern, observe that Japanese ditransitives are like English relative to binding diagnostics (Hoji, 1985; Takano, 1998; Yatsushiro, 2003; Miyagawa and Tsujioka, 2004). Japanese uniformly marks its indirect objects with dative case, and the dative argument can appear to the right or to the left of the accusative argument. When the dative argument follows the accusative argument, it

can bind or be bound by the accusative argument. When it precedes the accusative argument, however, the dative argument must bind the accusative one.

(46) *Japanese* binding in DO-IO order: forwards and backwards Miyagawa and Tsujioka (2004), ex. 61

    a. (?)John-ga [Hanako-to  Mary]-o$_i$   (paatii-de) otagai$_i$-ni
       John-NOM [Hanako-and Mary]-ACC (party-at) [each.other]-DAT
       syookaisita.
       introduced

       'John introduced Hanako and Mary to each other (at the party).'

    b. John-ga    [otagai$_i$-no    sensei]-o     (paati-de) [Hanako-to
       John-NOM [each.other-GEN teacher]-ACC (party-at) [Hanako-and
       Mary]-ni$_i$   syookaisita.
       Mary]-DAT introduced

       'John introduced each other's teachers to Hanako and Mary (at the party).'
       (p.c. Shigeru Miyagawa)

(47) *Japanese* binding in IO-DO order: only forwards Miyagawa and Tsujioka (2004), ex. 61

    a. John-ga    [Hanako-to  Mary]-ni$_i$  [otagai$_i$]-o     syookaisita.
       John-NOM [Hanako-and Mary]-DAT each.other-ACC introduced

       'John introduced Hanako and Mary to each other.'

    b. *John-ga   [otagai$_i$-no    sensei]-ni   [Hanako-to  Mary]-o$_i$
       John-NOM [each.other-GEN teacher]-DAT [Hanako-and Mary]-ACC
       syookaisita.
       introduced

       intended: 'John introduced Hanako and Mary to each other's teachers.'
       (p.c. Shigeru Miyagawa)

Greek ditransitives exhibit the same pattern as English and Japanese. Greek ditransitives are English-like in having both a prepositional variant for indirect objects (48a) as well as a non-prepositional variant (48b). Greek is also like Japanese in using overt inherent case to mark the non-prepositional variant. Greek is unlike English and Japanese, however, in that it also has optional clitic doubling (48c). Importantly, Greek exhibits the same word order/binding interaction: when the indirect object follows the direct object, binding is flexible; when the indirect object precedes the direct object, binding is rigid (Anagnostopoulou, 2003, Sabine Iatridou, p.c.).

(48) *Greek* ditransitives (Anagnostopoulou, 2003, ex. 5-7)

    a. O Gianis    estile   to grama   s-tin  Maria.
       the Gianis.NOM sent.3SG the letter.ACC to-the Maria.ACC

       'John sent the letter to Mary.'         *prepositional indirect object*

b. O Gianis     estile    tis Marias    to grama.
the Gianis.NOM sent.3SG the Maria.GEN the letter.ACC

'John sent Mary the letter.'                       *genitive indirect object*

c. **Tu**    edhosa   tu Giani    to vivlio.
cl.GEN gave.1SG the Gianis.GEN the book.ACC

'I gave John the book.'                        *with clitic doubling*

(49) *Greek* binding in DO-IO order: forwards and backwards (Sabine Iatridou, p.c.)

a. O Gianis     edhikse [ton Maria]$_{DP}$ [s-ton eafton    tis]$_{XP}$ s-ton
the Gianis.NOM showed the  Maria.ACC to-the REFL.ACC GEN   in-the
kathrefti.
mirror.ACC

'John showed Mary to herself in the mirror.'

b. O Gianis     edhikse [ton eafton    tis]$_{DP}$ [s-tin Maria]$_{XP}$ s-ton
the Gianis.NOM showed the  REFL.ACC GEN   to-the Maria.ACC in-the
kathrefti.
mirror.ACC

'John showed herself to Mary in the mirror.'

(50) *Greek* binding in IO-DO order: only forwards (Sabine Iatridou, p.c.)

a. O Gianis     edhikse [tis Marias]$_{XP}$ [ton eafton    tis]$_{DP}$ s-ton
the Gianis.NOM showed the Maria.GEN the  REFL.ACC GEN   in-the
kathrefti.
mirror.ACC

'John showed Mary.gen herself in the mirror.'

b. *O Gianis     edhikse [tu eaftu    tis]$_{XP}$ [tin Maria]$_{DP}$  s-ton
the Gianis.NOM showed the REFL.GEN GEN   the Maria.ACC in-the
kathrefti.
mirror.ACC

intended: 'John showed herself.gen Mary in the mirror.' (speaker intuition: extreme word salad)

In sum, we find that three different languages, each with slightly different morphosyntactic realizations of direct and indirect objects, all show the same interaction between binding and word order in their ditransitive clauses. When the indirect object follows the direct object, both forwards and backwards binding are possible, but when the indirect object precedes the direct object, only forwards binding is possible.

Not every language patterns like English, Japanese, and Greek. Spanish, for example, only makes use of one word order for its ditransitives. In Spanish, direct objects always *precede* indirect objects. Like Greek, Spanish indirect objects may

be optionally clitic doubled (as can certain direct objects). The indirect object also always appears with a preposition/case marker *a*.

(51) *Spanish* (Anagnostopoulou, 2003)

Miguelito (le) regaló [un caramelo]$_{DP}$ [a Mafalda]$_{XP}$.
Miguelito cl.DAT gave a candy *a* Mafalda

'Miguelito gave Mafalda a piece of candy.'

Even though Spanish does not have variable word order, the word order available to it is in principle predicted to be structurally ambiguous: when the direct object precedes the indirect object, we have seen that binding should be variable. This prediction is born out, as argued by (Demonte, 1995; Cuervo, 2003). What we find is that clitic doubling disambiguates the structural ambiguity of direct object-indirect object word order. Clitic doubled indirect objects are arguments of $v$, while non-clitic doubled indirect objects are arguments of V.

(52) *Spanish* binding: clitic-doubled IOs are arguments of $v$; non-clitic-doubled IOs are arguments of V (Demonte (1995), ex. 9)
  a. El tratamiento psichoanalítico reintegró [a María]$_{DP}$ [a sí-misma]$_{XP}$.
     the therapy psychoanalytic gave-back to Mary.DO to herself.IO
     'The psychoanalytic therapy helped Mary to be herself again.'
  b. *El tratamiento psichoanalítico reintegró/devolvió [a sí-misma]$_{DP}$ [a
     the therapy psychoanalytic gave-back to herself.DO to
     María]$_{XP}$.
     Mary.IO
     intended: 'The psychoanalytic therapy helped Mary to be herself again.'
  c. *El tratamiento psichoanalítico **le** devolvió [a María]$_{DP}$ [a la
     the therapy psychoanalytic CL-DAT gave-back to Mary.DO to the
     estima de sí-misma]$_{XP}$.
     esteem of herself.IO
     'The psychoanalytic therapy helped Mary to be herself again.'
  d. El tratamiento psichoanalítico **le** devolvió [a la estima de
     the therapy psychoanalytic CL-DAT gave-back to the esteem of
     sí-misma]$_{DP}$ [a María]$_{XP}$.
     herself.DO to Mary.IO
     'The psychoanalytic therapy helped Mary to be herself again.'

Presumably, the position of the indirect object affects clitic doubling because of locality principles. When the indirect object merges with V, the direct object c-commands it, and thus blocks the relevant probe from clitic doubling the indirect object. When the indirect object merges with $v$, however, neither argument

c-commands the other. Moreover, if the clitic doubling probe is on $v$ (as suggested by Longenbaugh 2019, e.g.), the only argument in its c-command domain is the indirect object, making minimality irrelevant to clitic doubling.

(53)  Spanish XPs don't change form – IO bears an overt P-like head, clitic doubling tracks position
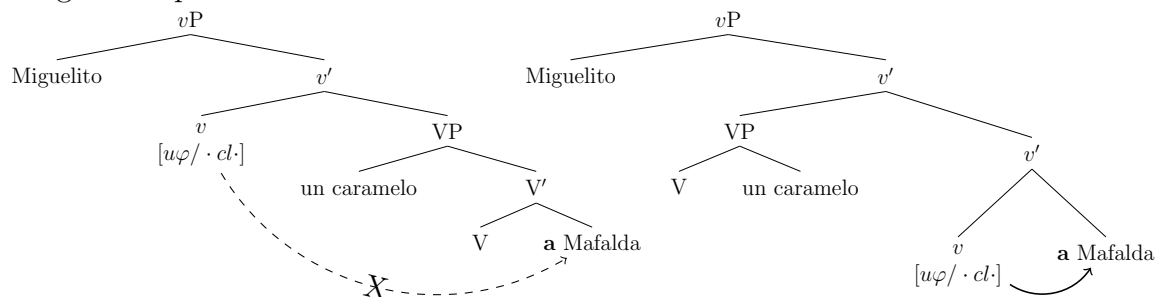


In sum, we have seen binding evidence from several languages whose ditransitive clauses all have different surface properties, which motivate two different ditransitive structures. All of these languages exhibited a particular interaction between word order and structure: indirect objects that follow direct objects are structurally ambiguous, but indirect objects that precede direct objects are not. This pattern is expected on the present account, but not on alternative approaches to the dative alternation.
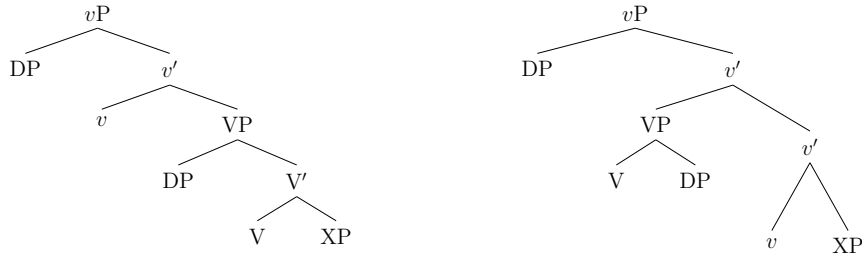
On the present account, the word order DO-IO can be achieved through either structure in (54), where the indirect object is a complement of V in one case but a complement of $v$ in the other. The word order corresponding to IO-DO word order, however, has only one structure corresponding to it, in which the indirect object is a complement of $v$ (55).[8]

(54)   Two ditransitive structures corresponding to DO-IO word order

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[8]As a reviewer notes, in one of the these proposed ditransitive structures, the direct and indirect objects do not form a constituent. Nonetheless, coordination can target the internal arguments to the exclusion of the verb, which would normally indicate that they should be represented as a constituent.

(iii)   a.  John should have sent Sue a letter and Mary a book.
        b.  Jo showed photos of each other to Lauri and Amy and drawings of each other to Bill and Sue.

As alluded to before, Newman (2021) argues that the verb moves to a higher position in ditransitives like these, in which case it is possible to identify a constituent containing the two internal arguments to the exclusion of the verb. Assuming that there is no phase boundary between the verb's landing site and the indirect object (perhaps because the verb defines the phase boundary), the adjacency requirement on case licensing should not be affected by verb movement.
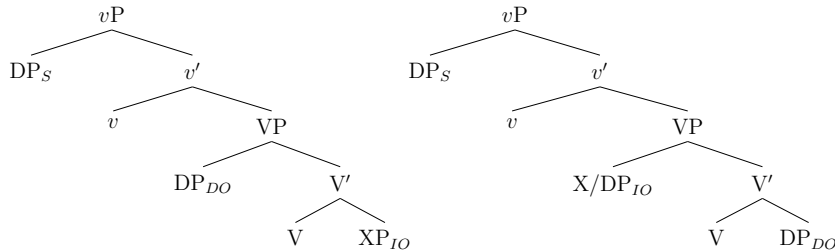
vP
├─ DP
└─ v'
   ├─ v
   └─ VP
      ├─ DP
      └─ V'
         ├─ V
         └─ XP

vP
├─ DP
└─ v'
   ├─ VP
   │  ├─ V
   │  └─ DP
   └─ v'
      ├─ v
      └─ XP

(55)   VP-specifier-hood+VP-extraposition required for IO-DO word order

vP
├─ DP
└─ v'
   ├─ v'
   │  ├─ v
   │  └─ XP
   └─ VP
      ├─ V
      └─ DP
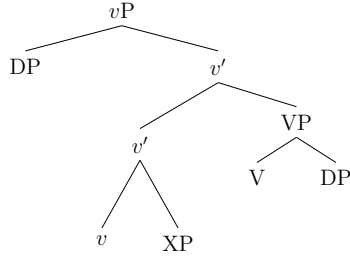
On other views of the dative alternation, the mapping between structure and pronunciation is typically one to one. The word order DO-IO is usually assigned a structure like (56a), called the prepositional dative construction, in which the direct object asymmetrically c-commands the indirect object. The word order IO-DO, is usually assigned a structure like (56b), called the double object construction, in which the indirect object c-commands the direct object. Theories differ regarding whether one of these structures is derived from the other (e.g. *Dative shift*, as in Larson (1988), (Baker, 1997, 91)), or whether they are just independently generated options (as in Harley (2002); Harley and Jung (2015); Harley and Miyagawa (2017)).

(56)   Classical prepositional dative vs. double object construction (putting aside labels of functional heads)

vP
├─ $DP_S$
└─ v'
   ├─ v
   └─ VP
      ├─ $DP_{DO}$
      └─ V'
         ├─ V
         └─ $XP_{IO}$

vP
├─ $DP_S$
└─ v'
   ├─ v
   └─ VP
      ├─ $X/DP_{IO}$
      └─ V'
         ├─ V
         └─ $DP_{DO}$

Empirically, however, we find that sentences described with the tree on the left cooccur with optional backwards binding, while sentences described with the tree on the right do not. In the context of backwards binding data, the transformational theory is attractive for languages like Japanese, which independently has scrambling. Supposing that Japanese had just one ditransitive structure, with word order IO-DO, if the direct object scrambles above the indirect object to yield DO-IO order, we would expect the profile of binding that we find. DO-IO word order has two

binding possibilities (surface vs. reconstructed), while IO-DO should reflect the base generated structure, where IO asymmetrically c-commands DO.

The problem is that not every language that shows this pattern has scrambling. Moreover, Miyagawa and Tsujioka (2004) argue that Japanese actually has two ditransitive structures instead of just one, so the asymmetric word order/binding interaction is still surprising. The puzzle is why so many languages, irrespective of whether they have object movement, have the identical word order/binding interaction that we find (see Jackendoff 1990 for additional arguments against dative shift).

On the present approach, languages are proposed to have the dative alternation because UG makes two structures available for ditransitive clauses, where one of these structures is compatible with two different word orders, predicting backwards binding. We can therefore understand word order and binding interactions in ditransitive clauses without positing language specific transformational strategies.

### 5.1.1 A binding theory

So far, we have seen that the logic of feature driven Merge, combined with the proposed features $[\cdot D \cdot]$, $[\cdot V \cdot]$, and $[\cdot X \cdot]$, jointly predict two available positions for non-DP arguments of the verb: Comp V and Comp $v$. I proposed that we could diagnose these two positions with binding and word order on the following assumption: the complement of $v$ can bind into the contents of VP but not vice versa.

However, given that the complement of $v$ does not c-command the domain of VP, I require a slightly modified binding theory that makes use of *m-command* in order to explain these facts. The modified binding theory is in (57).
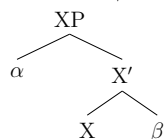
(57)  Binding theory:

    a.  $\alpha$ binds $\beta$ iff $\alpha$ and $\beta$ are coindexed, and (i) and (ii):

        i.  $\alpha$ m-commands $\beta$

        ii.  $\beta$ doesn't c-command $\alpha$

(58)  M-command: $\alpha$ m-commands $\beta$ iff every *maximal projection* that dominates $\alpha$ dominates $\beta$

(59)  C-command: $\alpha$ c-commands $\beta$ iff every *node* that dominates $\alpha$ dominates $\beta$

(60)  a.  If $\alpha$ and $\beta$ m-command each other, but $\alpha$ asymmetrically c-commands $\beta$, $\alpha$ binds $\beta$ and not vice versa



    b.  If $\beta$ asymmetrically m-commands $\alpha$, $\beta$ binds $\alpha$ and not vice versa

```
              XP
           /      \
         YP        X'
        /  \      /  \
       Y    α    X    β
```
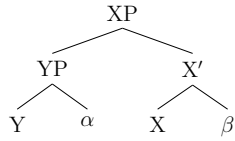
Treating $\beta$ as an indirect object explains the binding patterns observed in Section 5.1.[9] When the indirect object is an argument of V, it is c-commanded by the direct object and cannot bind it, and the only possible word order is DO-IO. When the indirect object is an argument of $v$, it asymmetrically m-commands the direct object and can bind it, and there are two available word orders: DO-IO or IO-DO, depending on how VP is linearized. As a result, DO-IO word order can result in both forwards and backwards binding, but IO-DO order is only compatible with forwards binding.[10]

Importantly, this version of binding theory makes additional correct predictions about when the *subject* of a clause may be backwards bound by an internal argument. Since subjects are assumed to be specifiers of $v$P at some point in the derivation (by either external or internal Merge, see §3), there is a point in the derivation when the contents of a subject stand in the same structural relationship relative to an XP argument of $v$ that the contents of a VP specifier do: the XP argument of $v$ m-commands the contents of *all* specifiers of $v$P. As discussed extensively in Pesetsky (1995) and predecessors, causees and experiencer arguments of psych verbs may backwards bind a subject (61a,b). In addition, it appears that the indirect object of a double object construction can do the same (61c). These other cases of backwards binding can be explained by the present theory if we assume that the binders in each case are XP arguments of $v$, which asymmetrically m-command the contents of the subject (DP specifier of $v$P) reconstructed in Spec $v$P.

(61)   Backwards binding of a subject (Pesetsky, 1995)

    a. These rumors about himself$_i$ worry [$_{XP}$∅ Gianni$_i$] more than anything else. (p.43)

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[9]I assume throughout this investigation that a DP inside a prepositional phrase can bind another DP if the *entire prepositional phrase* m-commands the other DP. The intuitive description of the phenomenon is that arguments of a verb, regardless of category, can bear indices and engage in binding relations. However, a technical explanation for this property of XP arguments in a Minimalist framework is elusive (see for example Pollard and Sag 1994 for discussion and a solution from HPSG).

[10]This approach to binding theory takes some inspiration from Bruening (2014), who proposes that we abandon c-command and m-command altogether and take up a different notion, namely phase-command. On his proposal, DPs inside PPs can bind elements that they don't m-command so long as they phase-command them, on the assumption that P is not a phase head.

(iv)   Phase-command: $\alpha$ phase-commands $\beta$ iff every *phase* that dominates $\alpha$ dominates $\beta$

His approach, however, is not restrictive enough to account for the profile of anaphor binding, which leads him to propose additional processing conditions on anaphors that undergenerate in cases of backwards binding. The present approach with m-command doesn't require additional principles and straightforwardly captures backwards binding.

    b. Pictures of each other$_i$ caused [$_{XP}\varnothing$ [John and Mary]$_i$] to start crying. (p.44)

    c. Those books about himself$_i$ taught [$_{XP}\varnothing$ Bill$_i$] the meaning of caution. (p.201)

Lastly, while we have only discussed anaphor binding up to this point, the same profiles of forwards and backwards binding in ditransitives can be replicated for Conditions B and C as well. Conditions B and C jointly rule out (62a): on the structure where the indirect object m-commands the direct object, we get a Condition B violation, and on the structure where the direct object c-commands the indirect object, we get a Condition C violation. Embedding the R-expression as in (62b) rescues the sentence by allowing one structure to avoid a Condition B violation. We will see additional examples of Conditions B and C in backwards binding in §5.2.3, when we discuss binding in passives of ditransitives.

(62)    a. *Sue showed him$_i$ to John$_i$ in the mirror.

       b. ?Sue handed him$_i$ to John$_i$'s mother. (context: John is a baby)

In sum, I have offered a theory of binding that makes use of m-command to capture both forwards and backwards binding in different structural contexts. This theory makes very similar predictions to theories of binding based on c-command, except in the particular situation where the binder and bindee do not c-command each other, and the binder is an argument of the minimal projection containing them both. Though I have not developed this idea further, it may be possible to reconcile this kind of approach to binding with those that source binding principles to properties of agreement or the interpretive system (Rooryck and Wyngaerd, 2011; Reuland, 2011). As we will see in §5.2.1, Béjar and Rezac (2009)'s theory of cyclic Agree predicts that the complement of $v$ should be targeted for a dependency before its specifier can be, despite the fact that the complement does not c-command the specifier. A theory of binding predicated on some notion of agreement between two DPs might make use of such a mechanism to capture the relevance of m-command here, for example.

We will now look at what these two ditransitive structures predict for A-movement in passives. When the indirect object is merged as a complement of $v$, we expect either object of a double object construction to be able to raise to subject position without violating relativized minimality. However, we will see that the relative position of indirect vs. direct objects still introduces a derivational asymmetry between them, which makes the indirect object an earlier target for agreement.

## 5.2   Passives of ditransitives

As discussed briefly in §3, passive clauses can be derived from the same feature bundles as active clauses, if the [·$D$·] feature on $v$ is checked via internal rather than

external Merge. Passive clauses, however, differ from active clauses in another respect, which is that they may optionally host an additional non-DP, the *by*-phrase. The predicted typology of verb phrases makes predictions about both of these factors that distinguish passives from actives, namely the promotion aspect and the distribution of non-DPs aspect. Both will be discussed separately in the coming sections. To foreshadow, we will see that the distribution of indirect objects just examined correctly predicts the distribution of symmetric passivization and binding between *by*-phrases and *to*-phrases.

### 5.2.1 Promotion to subject position

Assuming A-movement is constrained by relativized minimality (Rizzi, 1990), a passive $v$ with $[\cdot D \cdot]$ should attract the closest DP. What counts as the "closest" DP depends on the presence and position of any other XPs in the clause. §5.1 motivated two positions for XP arguments in a ditransitive: the complement of V (low) or the complement of $v$ (high). Looking at each possibility separately, we see that clauses with a low XP argument unambiguously promote the DP argument of V in a passive, since the DP asymmetrically c-commands the XP. Clauses with high XP arguments, by contrast, should optionally promote either the complement of X or the DP argument of V, since neither c-commands the other.

(63)   Passive where IO is in Comp V: only the theme can raise due to locality.
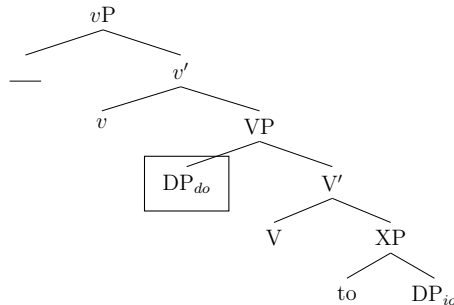


(64)   Passive where IO is in Comp $v$: either the theme or the recipient can raise.
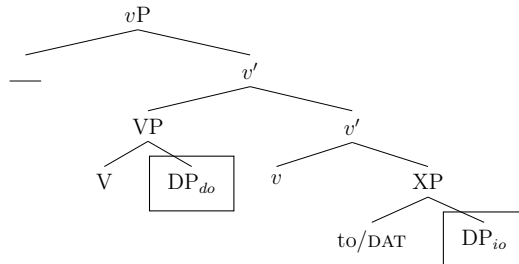


We therefore expect direct object passives to be structurally ambiguous but indirect object passives to be structurally unambiguous: direct objects can raise to Spec $v$P in either (63) or (64), but indirect objects can only raise to Spec $v$P in (64). The

predictions of this approach to the dative alternation are different from those of standard approaches. Traditionally, ditransitive structures always establish a c-command relationship between the direct and indirect objects, so each structure should only promote one argument. On the present view, by contrast, one ditransitive structure asymmetrically promotes one but not the other argument, while the other structure promotes either one. In order to test the predictions of this theory compared to others, we crucially need to determine whether direct objects can raise from both (63) and (64). If direct object passives can be shown to be structurally ambiguous, such evidence would support the present theory and be unexpected on alternative views.

Starting with English, notice in (65) that both direct and indirect object passives are possible. We expect indirect object passives to only be derivable from (64), while the direct object passive should be derivable from either (63) or (64). Most varieties of English prefer to use the prepositional form of the indirect object when the direct object raises (65a). On many other theories, the requirement for the preposition in (65a) is taken to indicate that direct object passives are only possible from a structure like (63). We saw in §5.1, however, that morphology is not always a good indicator of structure in ditransitive clauses, but may instead reflect conditions on inherent case licensing.

(65)    a.  A book was given %(to) Jo.
        b.  Jo was given a book.

In English, prepositional indirect objects could appear in either structure (63) or (64), which is why they participate in both forwards and backwards binding. Because the structure in (64) is compatible with either pronunciation of the indirect object, we need some other structural diagnostics to determine whether (65a) with the preposition can be derived from (64). If it can, the fact that many varieties of English require the preposition in (65a) would not be a strong indication of the *raising* possibilities of direct objects, but rather (64)'s possibilities for pronunciation. We will see in §5.2.3 that there is evidence from binding for the structural ambiguity of the prepositional indirect object in (65a), thus showing that both raising possibilities predicted for (64) are found in English – either object can raise, but the indirect object takes its prepositional form when the direct object raises.[11] Before discussing this evidence, however, I want to first show that this result is unsurprising given the profile of raising in ditransitives cross-linguistically.

There are many languages that permit the direct object to raise, even when the indirect object is pronounced with inherent case rather than a preposition (see Holmberg et al. 2019 for a recent survey). Here we will discuss data from Greek and Norwegian, whose passives behave differently from one another in certain respects, but which both have direct object passives in their double object constructions. (48 and (66) show the dative alternation in each language as a baseline. We see that Greek and

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[11]If this is right, it would indicate that in English, passive morphology intervenes for inherent case licensing, by blocking adjacency between the indirect object and the relevant verbal morpheme.

Norwegian are like English in having both prepositional and dative/genitive indirect objects, each of which occurs in a different linear position in the clause. Norwegian, like English, has no overt exponent for dative case, but Greek has an overt genitive marker on its high indirect objects. We also saw binding evidence for Greek that genitive arguments are always high, i.e. complements of $v$, just like English. The same is argued for Norwegian by Holmberg et al. (2019) and references there.

(48)   *Greek* ditransitives (Anagnostopoulou, 2003, ex. 5-7)

    a.  O Gianis      estile     to grama     s-tin  Maria.
        the Gianis.NOM sent.3SG the letter.ACC to-the Maria.ACC

        'John sent the letter to Mary.'                *prepositional indirect object*

    b.  O Gianis      estile     tis Marias     to grama.
        the Gianis.NOM sent.3SG the Maria.GEN the letter.ACC

        'John sent Mary the letter.'                *genitive indirect object*

(66)   Norwegian ditransitives (Anderssen et al., 2014, ex.2)

    a.  Jon ga    en bok   til Marit.
        Jon gave a  book to Marit

        'Jon gave a book to Marit.'                *prepositional indirect object*

    b.  Jon ga    Marit en bok.
        Jon gave Marit a   book

        'Jon gave Marit a book.'                *dative indirect object*

Both Greek and Norwegian permit raising of the direct object when the indirect object is in its prepositional variant (67), just like English. Unlike English, they both also permit the direct object to raise when the indirect object is in its case-marked variant. In other words, direct objects are permitted to raise even when the morphology indicates that the indirect object must be high. Thus Greek and Norwegian provide support for the structure in (64) – high indirect objects do not block direct objects from raising, because they do not c-command the direct object.[12]

(67)   Direct object passives with prepositional indirect objects

    a.  To vivlio      charistike     s-tin  Maria.
        the book.NOM award.NACT to-the Maria.ACC

        'The book was awarded to Mary.' (Greek; Sabine Iatridou, p.c.)

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[12]This proposal for direct object passives bears some similarity to Collins's (2005) *smuggling* account of passives, in which one argument may A-move past another if a phrase containing it moves first. On his view, VP-movement smuggles the direct object past the subject, which licenses A-movement of the object in a passive without violating relativized minimality. On my view, ditransitive clauses are base generated with pre-smuggled direct objects, in a sense, so they can move 'past' the indirect object.

  b. En bok ble git  \_ til Marit.
    a  book was given to Marit

   'A book was given to Marit.' (Norwegian; Johannes Norheim, p.c.)

(68) Direct object passives with inherent case marked indirect objects

  a. To vivlio  *(**tis**) charistike  tis Marias.
    the book.NOM cl.GEN award.NACT the Maria.GEN

   'The book was awarded to Mary.' (Greek; Anagnostopoulou 2003, ex. 33)

  b. Boka  ble gitt Jon \_.
    the.book was given Jon

   'The book was given to Jon.' (Norwegian; Haddican and Holmberg 2015, 145)

Some might object to the treatment of Greek as justification for the structure in (64) due to the profile of clitic doubling. The direct object can only raise in (68a) if the indirect object is clitic doubled (the clitic in (68a) is in bold). The requirement for the clitic in (68a) is often called a *dative intervention effect* (Anagnostopoulou, 2003) – even if the indirect object doesn't raise[13], it still acts as an intervener for direct object raising, in that it must be clitic doubled in order for the direct object to be able to raise to subject position (clitic doubling is otherwise optional in Greek).

I propose that Greek dative intervention effects are easy to capture without c-command between the internal arguments. On the present theory, indirect objects do not c-command the direct object, and thus don't really cause relativized minimality violations if the direct object A-moves. However, there is a complement-specifier asymmetry among the objects, which according to Béjar and Rezac (2009), should affect which one controls agreement first. Assuming that clitic doubling is mediated by Agree (Anagnostopoulou, 2003; Béjar and Rezac, 2003; Preminger, 2009, 2014), Greek dative intervention effects can be understood through the locality of agreement rather than A-movement.

### 5.2.2 Clitic doubling and the locality of Agree

According to Béjar and Rezac (2009), agreement-controlling heads are able to access features on either their complements or their specifiers, *but they must probe their*

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[13]Another difference between Greek and Norwegian is that Greek *indirect* objects are not permitted to raise to become the passive subject, a fact which deserves more investigation. However, for the present discussion, I will simply assume that some languages' indirect objects behave like PPs, which are not accessible for raising to check a $[\cdot D\cdot]$ feature, while others' indirect objects behave like DPs, which are accessible for raising to check a $[\cdot D\cdot]$ feature. Greek is such a language whose indirect objects cannot check $[\cdot D\cdot]$ features but Norwegian's indirect objects can. A language with PP-like indirect objects could presumably still license raising of the indirect object if the DP inside it could strand its prepositional shell. However, Greek is not a preposition-stranding language, so its indirect objects should remain obligatorily in situ, unless attracted by a non-D feature.

*complements first.* As a result, if the complement has an accessible $\varphi$-goal, that element will always control agreement. If there is no $\varphi$-goal in the complement, or if that goal does not value all of the features on the probe, the probe may *cyclically expand* and search a domain of the head that includes its specifier. They propose that this pattern results from a particular view of feature projection.

Bejar and Rezac assume firstly that $\varphi$-probes can only search material that they dominate. As such, a probe must project from the head it was born on to a bar-level node in order to search at all (69). If it doesn't find anything to agree with, it may project again to the maximal projection to probe into a specifier (70). Because the probe must probe before it may project, it always has to search a smaller domain first, accounting for the complement-specifier asymmetry.

(69)  If the domain of Agree is based on dominance: $[u\varphi]$ searches and fails in situ
      – $[u\varphi]$ must project to H′ before H′ can search XP
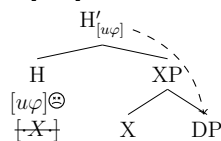


(70)  $[u\varphi]$ may project again to probe a specifier
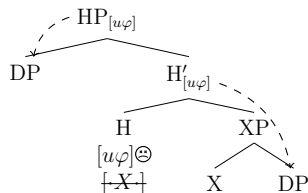


We can now explore how this framework for Agree is expected to interact with the framework of Merge established thus far. Let us suppose that Merge features are checked under sisterhood, in which case $[\cdot D\cdot]$ must also project to a bar-level node to license Merge of a DP specifier (71).
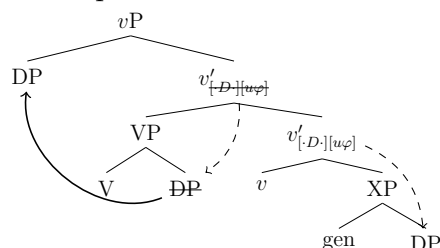
(71)  **Feature-driven Merge**: a constituent $\alpha$ may only merge with a constituent Y if Y bears an unsaturated feature $[\cdot\alpha\cdot]$ such that the resulting structure makes the bearer of $[\cdot\alpha\cdot]$ sister to $\alpha$.
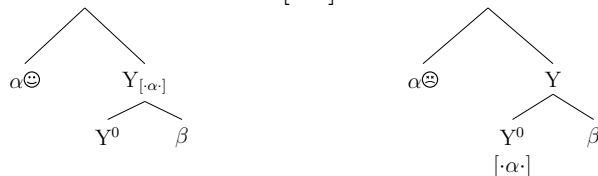


In a structure like (64), according to the rules of $\varphi$-agreement and feature checking just laid out, the features $[\cdot D\cdot]$ and $\varphi$ need to project to different positions in $v$P in order to agree with the indirect object vs. internally merge the direct object as a specifier. The $\varphi$-probe only needs to project once to agree with the indirect object,

but $\varphi$ and $[\cdot D\cdot]$ need to project twice to agree with/A-move the direct object. As such, we expect $\varphi$-agreement with the indirect object, which licenses clitic doubling, to precede direct object raising.

(72)  Greek passives:

```
                  vP
          ┌────────┴────────┐
         DP              v′[·D·][uφ]
          ↑          ┌──────┴──────┐
          │         VP          v′[·D·][uφ]
          │       ┌──┴──┐     ┌──────┴──────┐
          │      V    DP     v           XP
          └──────┘                    ┌───┴───┐
                                    gen      DP
```

In sum, with Bejar and Rezac's proposal, the locality of Agree constrains the timing of agreement relative to Merge in such a way as to require agreement (+clitic doubling) to precede A-movement in Greek passives. We don't see the same effects in Norwegian because Norwegian has no object agreement/clitic doubling, and thus presumably lacks a $\varphi$-probe on $v$. In the absence of such a probe, the locality of Merge makes no distinction between satisfaction by the indirect vs. direct object – the $[\cdot D\cdot]$ feature may license raising to subject position from the same $v'$-node, regardless of where the A-moved element originated.[14] With a $\varphi$-probe, by contrast, feature projection becomes constrained by the locality of Agree, which can apply in different sized domains depending on where the $\varphi$-goal is located.

### 5.2.3  The position of *by*-phrases

Having discussed how the position of XPs should affect raising to subject position, we now discuss diagnostics for the position of the *by*-phrase. There are in principle two XP positions in which to posit a *by*-phrase, just as there were two possible positions in which to posit a *to*-phrase, which I propose are both utilized. It could merge in response to $[\cdot X\cdot]$ on either V or $v$.
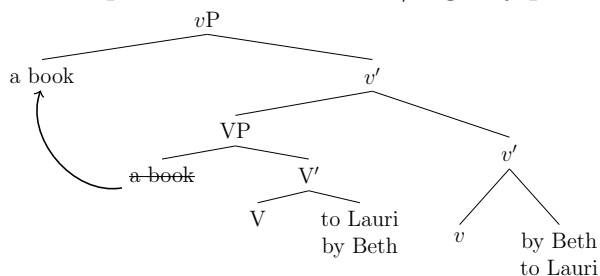
The reason the *by*-phrase must be able to occupy either position is because it often co-occurs with other XPs, as in ditransitive clauses. The position of the *by*-phrase must therefore be able to shift according to the positional requirements of the other phrase. If the lower hosts the indirect object, a higher head must license the *by*-phrase, and vice versa.[15] As we saw, the direct object can raise from any

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[14]Technically, there is a stage in the derivation where $[\cdot D\cdot]$ could attract the indirect object but not the direct object, namely before VP merges as a specifier. Assuming nothing requires the derivation to check $[\cdot D\cdot]$ before $[\cdot V\cdot]$, however, the system always leaves open the possibility that raising can take place from either $v$'s complement or specifier.
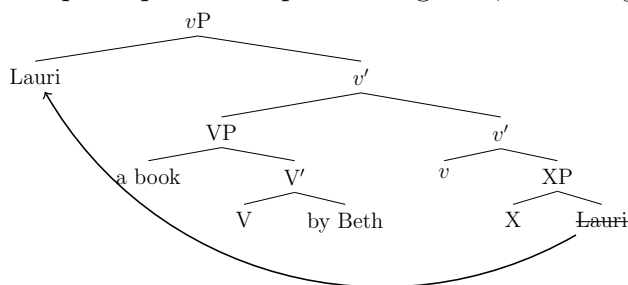
[15]A passive $v$ must therefore either select for the *by*-phrase directly, or must select for a passive VP, which itself can host the *by*-phrase. The fact that only two XPs are proposed to be licensed raises the immediate question of whether clauses with two non-DP arguments in the active can be passivized (and thus turned into clauses with 3 non-DPs). It appears that at least some such examples can be

ditransitive structure, so the *by*-phrase is predicted to have an ambiguous position in direct object passives. By contrast, indirect objects can only raise if the indirect object is the complement of $v$, in which case the *by*-phrase must be the complement of V in indirect object passives.

(73)   Theme-passive with a low IO/high *by*-phrase and vice versa.

```
                        vP
            ┌───────────┴───────────┐
        a book                      v'
            ↑            ┌───────────┴──────────┐
            │           VP                      v'
            │      ┌─────┴─────┐            ┌────┴────┐
            └── a book         V'           v      by Beth
                          ┌────┴────┐              to Lauri
                          V      to Lauri
                                 by Beth
```

(74)   Recipient-passive requires a high IO, so the *by*-phrase must be low.

```
                        vP
            ┌───────────┴───────────┐
        Lauri                       v'
            ↑            ┌───────────┴──────────┐
            │           VP                      v'
            │      ┌─────┴─────┐            ┌────┴────┐
            │    a book        V'           v        XP
            │             ┌────┴────┐            ┌────┴────┐
            │             V     by Beth          X      Lauri
            └────────────────────────────────────────────┘
```

I propose (73) and (74) account for binding facts that have long eluded theories of the passive. In direct object passives of ditransitives, it is basically impossible to diagnose a c-command relationship between the *by*-phrase and the indirect object.

(75)   T-passives: Embedded anaphors can be bound in any XP by any XP in any word order
a.   ?The books were given to Jo and Marmie$_i$ by each other$_i$'s parents.
b.   ?The books were given by each other$_i$'s parents to Jo and Marmie$_i$.
c.   The books were given by Jo and Marmie$_i$ to each other$_i$'s parents.
d.   ?The books were given to each other$_i$'s parents by Jo and Marmie$_i$.

---

passivized, contrary to what we would expect if only two non-DPs were ever licensed in a clause.

(v)   John was bet [$_{XP}$ $t$] 4 dollars [$_{XP}$by Mary] [$_{XP}$that she could eat fifty eggs].

Taking inspiration from Collins (2005), however, it is possible that *by*-phrases are not typical prepositional phrases, but rather contain a Voice/$v$ head themselves. If that is right, they may have an additional [·$X$·] feature, which would license the extra XP in (ii), though the status of examples with too many non-DPs will need to be more fully investigated in future research.

The data in (75) pose a problem for any theory in which the *by*-phrase has a fixed position. If the *by*-phrase is high (as argued by Collins 2005), we should not expect an indirect object to be able to bind into it as in (75a,b). If the *by*-phrase is low (as argued by Bowers 2010), we should not expect it to bind an indirect object, as in (75c,d). The binding profile in (75) is also observed for Principles B and C. In (76a), no matter where the two phrases are projected, there will either be a principle B or a principle C violation. Further embedding either the R-expression as in (76b), or the pronoun as in (75) will always remedy the situation, because there is always an available structure in which the relevant condition is obviated.
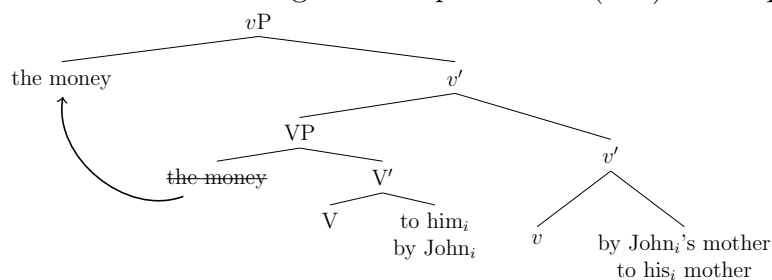
(76) Principles B and C
 a. *The money was sent to him$_1$ by John$_1$.
 b. ?The money was sent to him$_1$ by John$_1$'s mother.
 c. The money was sent to his$_1$ mother by John$_i$.

(77) Principles B/C rule out (76a)
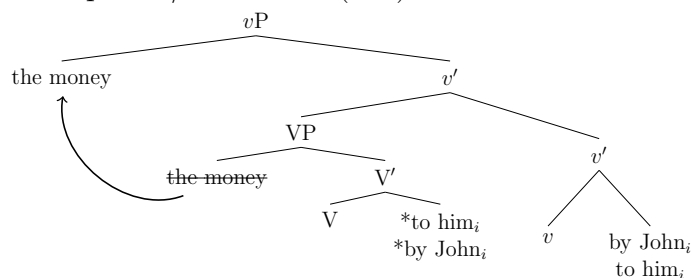


(78) Rescue via embedding the R-expression in (76b) or the pronoun in (76c)



As expected, the same principle B/C behavior cannot be replicated when the *indirect* object raises. Indirect object passivization is only permitted for high XP indirect objects, so the *by*-phrase must be low. Principle C therefore blocks (79a,b), regardless of how much we embed the R-expression. Only embedding the pronoun in (79d) avoids a Principle C violation.

(79) Replicating the Principle B/C effect in indirect object passives
 a. *Lauri was shown them$_i$ by Jo and Marmie$_i$.
 b. *Lauri was shown them$_i$ by Jo and Marmie$_i$'s illustrations.
 c. Lauri was shown Jo and Marmie$_i$ by their$_i$ illustrations.

d. Lauri was shown their$_i$ illustrations by Jo and Marmie$_i$ (themselves).

In sum, a direct object passive of a ditransitive, like a passive of a monotransitive, is predicted to be structurally ambiguous: the *by*-phrase can be low or high. An indirect object passive of a ditransitive is *not* predicted to be structurally ambiguous: the *by*-phrase can only be low. We have seen two kinds of evidence for this distinction between direct and indirect object passives, from morphology and binding. We found that direct object passives in some languages are possible with either pronunciation of the indirect object, suggesting that the indirect object can be either low or high in a direct object passive. This was not the case in English, but English provided evidence from binding that the indirect object had a flexible position relative to the *by*-phrase, suggesting that the same structural ambiguity arises. By contrast, indirect object passives showed rigid forwards binding between the direct object and *by*-phrase, suggesting that no structural ambiguity arises for indirect object passives.

# 6   Conclusion

In this paper, I have entertained the hypothesis that the inventory of argument-introducing Merge features is limited to just $[\cdot D \cdot]$ (which can be checked by DPs) and $[\cdot X \cdot]$ (which can be checked by anything). I showed that this proposal yielded a very restrictive theory of verb phrase syntax that was flexible enough to capture verb phrases with different numbers and categories of arguments.

I proposed that the co-occurrence of both specific and non-specific features on a head constrained the positions of elements checking each kind of feature by imposing conditions on the order of operations. For example, if V bears both $[\cdot D \cdot]$ and $[\cdot X \cdot]$ features, non-DPs must merge in VP before any DPs do, accounting for word order requirements between DP and non-DP arguments of the same head.

This feature-checking logic was shown to interact with the functional hierarchy in a particular way; the same logic that forced DPs to be specifiers in the context of a non-DP argument also forced VP to become a specifier whenever $v$ selected for a non-DP argument. This theory makes it possible for verb phrases to contain more than two arguments without a rich functional hierarchy, while still accommodating the space of derivational morphemes known to introduce arguments. For example, ApplP (in languages that have applicative morphology) doesn't need to be explicitly selected in a functional hierarchy, but rather may be merged with V or $v$ in response to $[\cdot X \cdot]$, which disrupts DP and VP-complementation.

The predictions of this theory were explored primarily in the context of active and passive ditransitive clauses. We saw that the availability of two $[\cdot X \cdot]$ features in $v$P (one on V and one on $v$) offered two options for merging an indirect object. Each choice had different consequences for word order and c-command between the two internal arguments, which were proposed to explain the distribution of backwards binding in ditransitives and the availability of symmetric A-movement in many lan-

guages' passives of ditransitives. With evidence from binding in direct object passives, I argued that English also has symmetric A-movement in passives, contra standard treatments – either internal argument may raise to subject position in a passive, but conditions on the pronunciation of inherent case may independently require a preposition on the indirect object in some cases.

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