Pulling up grounds and holding figures back

On the syntax and semantics of ground promotion and figure retention particle verbs

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Chapter 1

Introduction

Particle Verbs are a common construction Germanic languages, composed of a verb and a particle (often taking the form of a preposition) and seemingly interpreted and classified as a single lexical item. Examples (1-5) show sentences with Particle Verbs (PVs) in various Germanic languages, with particles in bold.

(1) Yiddish (Svenonius, 2003)

Ix hob **arayn**-geschtoxn a dorn in ferd.
I have R.in-stuck a thorn in horse

"I have stuck a thorn in a horse."

(2) English
Doug looked the movie **up**

(3) German[1]

Ich habe die Pfanne **ein**-geöllt
I have the pan in-oiled

"I oiled the pan."

(4) Afrikaans (Svenonius, 2003)

. . . die hef van 'n mes **uit**steek.
the handle of a knife out.stuck

". . . the handle of a knife stuck out."

[1]Unless otherwise cited, German data is the result of my elicitation.

(5) Norwegian (Svenonius, 2003)

Handtaket på en kniv stakk **ut**.
the.handle on a knife stuck out

"A knife handle stuck out."

The goal of this paper is to provide a structural analysis of PVs in English and German which accounts for the unique word-order effects associated with them in each language. Specifically, this paper will investigate a specific subset of PVs, ground promotion PVs, which have a particular argument structure, and attempt to answer the question asked by McIntyre (2007): "Are direct arguments arguments of verbs or particles?" I will argue, based on argument structure alternations and semantic compositionality, that ground promotion PVs are best analysed as the combination of verbs and defective prepositions, and that the object of these PVs is an argument of that prepositional element. Having shown this, I will then propose a structural account for the syntactic phenomena associated with English and German PVs described in the following section.

1.1 Syntactic properties of PVs in English and German

There are a few well known syntactic behaviours of PVs in English and German that any syntactic theory of PVs must to account for. This section will lay out what those phenomena are, beginning with English particle shift in section 1.1.1. After discussing English PVs, I will describe how PVs interact with German word order and inflectional prefixes in section 1.1.2.

1.1.1 English Particle Shift

A well known fact about English PVs is that their particles and objects show a word order alternation. This alternation, known as particle shift, has been studied within the Generative enterprise almost since its inception (Chomsky, 1957, 1975). Generally speaking, transitive PVs in English freely alternate between Verb-Particle-Object and Verb-Object-Particle.

(6) a. Kulap turned the music **up**.
b. Kulap turned **up** the music.

(7) a. Howard put the jacket **on**.
b. Howard put **on** the jacket.

The only apparent restriction on particle shift is that if the object is a pronoun, it must intervene between the verb and the particle.

(8) a. Scott shut the computer **down**.
b. Scott shut **down** the computer.
c. Scott shut it **down**.
d. *Scott shut **down** it.

There is also a preference for larger DPs to surface after particles, as seen in (9) below.

(9) a. Graham turned the steak down.
b. ?? Graham turned the beautifully cooked steak that Dave cooked for him down.

An analysis of English particle verbs must, then, be able to account for both the alternation itself and the restrictions on it.

1.1.2 German PVs: word order and intervening morphemes

Grammars of German (Hall and Scheiner, 2001; Priebsch and Collinson, 1958) refer to PVs as "separable" verbs because, although standard German orthography represents German PVs as single words, they can be separated into particles and verbs either when the verb moves, or when some other morpheme intervenes between the two parts.

1.1.2.1 Particle stranding in V2 order

German shows what is referred to as matrix verb second (V2) word order, meaning that in matrix clauses finite verbs are always the second constituent in the sentence. Non-finite verbs appear on the right edge of the clause. The choice of first constituent is free, as shown by the examples in (10).

(10) V2 word order
a. Finite Lexical Verb
i. **S-V-O-Adv**

Die Frau **isst** einen Apfel heute.
the.NOM woman eats an.ACC apple today.

ii. **O-V-S-Adv**

Einen Apfel **isst** die Frau heute.
an.ACC apple eats the.NOM woman today.

iii. **Adv-V-S-O**

Heute **isst** die Frau einen Apfel.
today eats the.NOM woman an.ACC apple.

"The woman eats/will eat an apple today."

b. Finite Auxiliary Verb

i. **S-Aux-O-V**

Die Frau **möchte** einen Apfel **essen**.
the.NOM woman would.like an.ACC apple eat.

ii. **O-Aux-S-V**

Einen Apfel **möchte** die Frau **essen**.
an.ACC apple would.like the.NOM woman eat.

"The woman would like to eat an apple."

When PVs are finite in matrix clauses, however, the verbal stem appears in V2 position, while the particle appears clause-finally. In cases where a PV is not in second position (e.g. with a finite modal auxiliary), the particle and the verb appear together in the clause final position

(11) a. Finite PV

Die Frau **isst** einen Apfel **auf**.
the.NOM woman eats an.ACC apple PRT

"The woman is finishing the apple."

b. Non-finite PV

Die Frau **möchte** einen Apfel **auf-essen**.
the.NOM woman would.like an.ACC apple prt-eat

Particle stranding in German is problematic because PVs in German are considered to be single lexical items, but frequently surface separately. This phenomenon must be accounted for in any syntactic analysis of PVs.

1.1.2.2 Intervening Morphemes

There are two morphemes in German which intervene between the particle and its verbs. The first intervener is *ge-*, the common participle prefix, which appears in perfect constructions. When the participle is that of a particle verb, the prefix *ge-* surfaces between particle and its verb.

(12) a. Die Frau möchte einen Apfel **essen**.
the.NOM woman would.like an.ACC apple eat
"The woman would like to eat an apple"

b. Die Frau hat einen Apfel ge-g-**essen**.
the.NOM woman AUX an.ACC apple PTPL-*g*-eat
"The woman ate/has eaten an apple"

(13) a. Die Frau möchte einen Apfel **auf-essen**.
the.NOM woman would.like an.ACC apple PRT-eat
"The woman would like to finish an apple"

b. Die Frau hat einen Apfel **auf**-ge-g-**essen**
the.NOM woman AUX an.ACC apple PRT-PTPL-*g*-eat
"The woman finished/has finished an apple"

The second intervener is *zu*, which serves a similar function to the English infinitive marker *to*. That is, it appears with non finite verbs in control and raising constructions. When *zu* appears with a PV, it surfaces, like the participle morphology, between the particle and its verb.

(14) Die Frau beabsichtigt, einen Apfel zu **essen**.
the.NOM woman intends an.ACC apple to eat
"The woman intends to eat an apple"

(15) Die Frau beabsichtigt, einen Apfel **auf**-zu-**essen**.
the.NOM woman intends an.ACC apple PRT-to-eat
"The woman intends to eat an apple"

German does not otherwise exhibit infixation, yet these two morphemes, one a prefix, the other a free morpheme, are seemingly able to appear word-internally. This presents a puzzle which an account of PVs must solve.

1.2 Preview

This paper is organized as follows: In chapter 2 I will review the argument structure classes of PVs that McIntyre (2007) defines with a more in-depth look at the ground promotion class, and discuss some of the previous analyses for the underlying structure of PVs. Chapter 3 lays out my analysis of ground promotion PVs, followed by chapter 4 which ties up loose ends left by my analysis, and extends it to other classes of PVs, and concludes the paper.

Chapter 2

About the PVs

This paper contributes to two debates within the PV literature, which I will outline in this chapter. The first debate, discussed in section 2.1, is about the argument structures of PVs. In order to properly frame the debate, I will describe the common argument structure alternations associated with PVs, before discussing the debate itself. The second debate, discussed in section 2.2, concerns the underlying syntactic and lexical structure of PVs. Throughout the paper I will show that the two debates are in a position to inform each other.

2.1 Argument Structure

The argument structure of certain PVs differs from that their simplex counterparts. Based on their argument structural effects, PVs can be divided into three major classes: *a*) resultative, *b*) aspectual, and *c*) ground promotion McIntyre (2007), which are discussed in sections 2.1.1, 2.1.2, and 2.1.3, respectively. Section 2.1.4 introduces the debate surrounding the argument structures of PVs, as discussed by McIntyre (2007), and reframes it in terms which are more amenable to a rigorous investigation. I argue that some of the puzzles which give rise to the debate surrounding the argument structure of PVs persist because of differences between the classes of PVs that McIntyre describes. Therefore, I argue, it is more fruitful to analyse a single class of PVs. This paper will focus on ground promotion PVs because, unlike many of the other PVs, they have a relatively transparent meaning, which is that of spatial prepositions, a relatively well studied part

of syntax and semantics. Section 2.1.6 describes ground promotion PVs in greater depth.

2.1.1 Resultative PVs (McIntyre, 2007)

There is a class of PVs whose particles express the result of the action expressed by their verbs. These PVs also tend to select internal arguments which are not selected by their simplex counterparts.

(16) a. We voted the party out.
b. *We voted the party.

(17) a. The button tore off.
b. *The button tore. (with the intended meaning)

In example (16a), there is a "voting" event, the result of which is that *the party* is *out* (of office). In its simplex form, however, *vote* is intransitive or takes a PP complement (e.g.*for the party, in favour of the motion, etc.*) Resultative particles can be said to transitivize simplex verbs.

2.1.2 Aspectual PVs (McIntyre, 2007)

Aspectual particles are a subclass of verbal particles which affect the *Aktionsart* of the verbs with which they are associated. Consider the simplex/PV pairs in (18) and (19).

(18) a. John fought the battle in an hour.
b. *John fought on in an hour.

(19) a. *Emily thought about the idea in an hour.
b. Emily thought the idea over in an hour.

The pair in (18) shows a telic simplex verb with an atelic PV counterpart, while (19) shows the reverse alternation: an atelic simplex verb and a telic PV.

With respect to argument structure, these PVs form two classes: atransitive and non-atransitive. Atransitive PVs are transitive simplex verbs which become intransitive with the addition of particles. Non-atransitive PVs are those that do not become intransitive, meaning they are transitivized simplex verbs or transitive simplex verbs which remain transitive.

(20) Atransitive PVs

a. fight (*the battle) on.

b. Sie hat (*ein Lied) los-gesungen.
she AUX (a song) away-sing.PTCPL
"She started to sing"

(21) Non-atransitive PVs

a. eat the chicken up

b. think the matter *(over).

c. eine Theorie *(aus)-arbeiten.
a theory out-work
"work out/write up a theory"

McIntyre argues that the atransitive and non-atransitive PVs have been wrongly grouped as a single class because they show different alternations with respect to argument structure.

2.1.3 Ground Promotion (McIntyre, 2007)

The term *ground* in ground promotion refers to one of the arguments of spatial prepositions, the other being figure. Spatial prepositions describe the spatial relation between a figure and a ground. For example, in the phrase, "the car near the building," the figure ("the car") is described as being in close proximity to ("near") the ground ("the building").

According to McIntyre, in ground promotion PV constructions the ground is expressed with the figure optionally expressed in an adjunct PP, while in their simplex verb counterparts, the obligatory argument of the verb is more likely to be the figure, with the ground in an optional PP.

(22) **German** (McIntyre, 2007)

Er hat den Tee (mit heißem Wasser) **auf**-ge-gossen.
He AUX the.ACC tea (with hot water) auf-PTPL-pour

"He poured (hot water) on the tea."

(23) **Dutch** (Svenonius, 2003)

Ingrid smeert haar haar **in** (met henna).
Ingrid smears her hair in (with henna)

"Ingrid greases her hair (with henna)."

(24) I dumped the bucket out.

Ground promotion PVs differ from resultative and aspectual PVs, which seem only to affect the number of arguments a verb takes. Instead, ground promotion PVs select a different type of internal argument from their simplex counterparts.

2.1.4 Objects of PVs: Arguments of the verbs or the particles?

McIntyre (2007) divides hypotheses about the argument structures of PVs into two classes. The first hypothesis, Verb-Dependency, says the non-agent argument of a PV is an argument of verbal component, while the second, Anti-Verb-Dependency, says that the internal argument of a PV is not an argument of the verb, and therefore must be an argument of the particle. He illustrates the distinction between the two hypotheses by looking at the exmaples below in (25)

(25) a. I pushed the car in.

b. They voted the government *(in).

Both hypotheses would argue that the direct objects in these examples are arguments of the resultative particle *in*. The Verb-Dependency hypothesis would say that the particles' arguments are also arguments of the verb, while the Anti-Verb-Dependency hypothesis would say that they are only arguments of the particles.

After framing the debate, McIntyre reviews some arguments in favour of either side. First, he discusses an argument based on the VP *push the car out*. The argument is that, because *push the car out* entails car-pushing, the object *the car* must be semantically an argument of the verb. He counters this argument, suggesting that car-pushing is not entailed but "an implicature based on direct causation" (McIntyre, 2007). He notes that the same intuition can be gotten with the VP *get the car out by pushing*. McIntyre concludes that since there is not necessarily any entailment, this is not an argument in favour of the Verb-Dependency hypothesis.

Next, he presents the argument that if the object of a PV is the argument of the particle, we should be able to derive a copula+particle construction from it. According to this argument we would expect the phrase

bash me up to entail the copular clause **I am up*, which it does not. McIntyre argues that this lack of entailment is actually due to the selectional requirements of the particle. The aspectual particle *up*, in *bash me up*, cannot productively be used with all verbs, and the copula is one of the verbs it can't be used in. McIntyre that there are some resultative particles that do allow a copula+particle construction, and that all of these seem to have idiosyncratic meanings. Consider the copular clause *He's down*. It can be used to describe the result of *drag him down* with an idiosyncratic meaning (i.e. "make him depressed") but not a literal meaning (i.e. "drag him downstairs). From this, McIntyre argues that, since the restriction on copula+particle constructions is unrelated to argument structure and the restriction does not apply to all PVs, it does not represent a convincing argument in favour of the Verb-Dependency hypothesis.

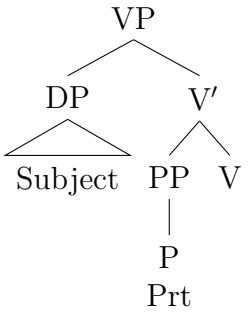
The final argument in favour of the Verb-Dependency compares *rip* with *rip up* and *rip out* (Carrier and Randall, 1992; Neeleman and Weerman, 1993). According to this argument, *rip* is subcategorized for a certain type of internal argument (e.g. *bag*) as are its PV forms.

(26) a. I ripped *(the bag).
b. *I ripped the water.
c. I ripped the bag up.
d. *I got the water bag and ripped the water out

McIntyre then shows clear counterexamples to this argument, where obligatorily intransitive verbs become transitive PVs (e.g. *think*∼*think over* in (21b) or obligatorily transitive verbs become intransitive PVs (e.g. *singen*∼*los-singen* in (20b) (**?**). Note that the PVs used to argue in favour of the Verb-Dependency side are resultatives, while those used to dispute the argument are aspectual particles.

After reviewing the arguments in favour of the Verb Dependency hypothesis and their counterarguments, he looks at the arguments in favour of the Anti-Verb-Dependency hypothesis. The first argument for the Anti-Verb-Dependency hypothesis he looks at is the assertion that it provides a natural explanation of atransitivity as in (20). For example, Zeller (2001) argues that particles merge in the argument position of verbs and thus block a direct object from being merged. The structure, Zeller assumes for the VP of an atransitive PV is below in (27).

(27)

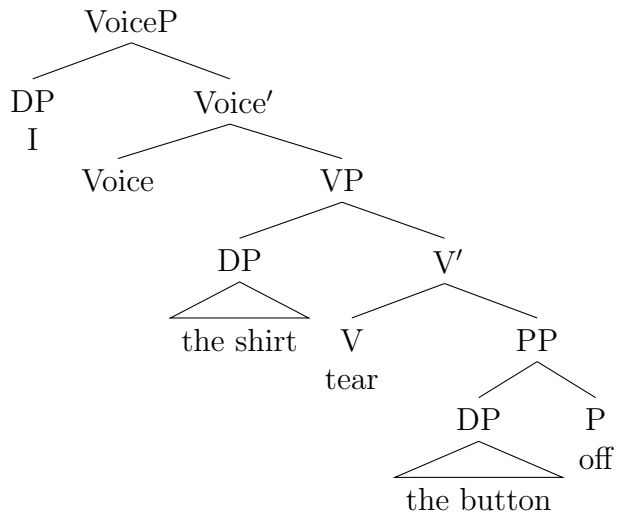


McIntyre (2007) argues that the fact that the Anti-Verb-Dependency hypothesis can provide a good analysis of atransitivity is only a good argument in its favour as long as the Verb Dependency hypothesis is unable to provide a similarly good analysis.

He then discusses arguments that are based on counterexamples to arguments in favour of the Verb Dependency hypothesis, but says that these have the same weakness as the arguments they are meant to counter: the presence of a counter example. For example, one could cite the non-atransitive PVs *think over* and *ausarbeiten* as evidence in favour of the Anti-Verb-Dependency hypothesis because they are transitive while their simplex forms are intransitive as shown in (21), above. But, one would then need to explain the pattern in (26), which is given as an example in favour of the Verb Dependency hypothesis.

The final concern McIntyre expresses regarding the Anti-Verb-Dependency hypothesis is the difficulty in theoretically enforcing it. If we assume, that transitive verbs on their own must take an internal argument, how can that requirement be satisfied by a particle? Consider the stucture in (28), argued for by Zeller (2001), adapted to assume the split-vP hypothesis.

(28) **I tore the shirt the button off.*



There is no structural reason that V cannot introduce its selected DP argument in its specifier, so Zeller's (2001) attempt to structurally enforce the Anti-Verb-Dependency hypothesis does not hold.

McIntyre points to a few attempts to enforce the Anti-Verb-Dependency hypothesis, including one of his own (McIntyre, 2004), but concedes that none approach the ease with which the Verb Dependency hypothesis is able to account for the various argument structure alternations and idiosyncrasies of PVs.

McIntyre (2007) is unable to make a clear claim in favour of either of the camps for two reasons. First, he attempts to apply both hypotheses to all PVs. Although PVs may form a single class withe respect to purely morphosyntactic behaviour (i.e. English particle shift, German particle stranding, etc.), his discussion suggests that they cannot be analysed as a single class with respect to argument structure. Testing the hypotheses for a single class or sub-class of PVs, however, may be possible and, as such, this paper will focus on the ground promotion class of PVs.

The second flaw in McIntyre's (2007) discussion of the competing hypotheses, is that the question that the hypotheses are attempting to answer is deeper than the evidence which is brought to bear on it. McIntyre asks of PVs "Are direct arguments arguments of verbs or particles?" but never explains what it means to be an argument of one item and not the other.

In the next section, I will address the latter flaw, by providing criteria for

argumenthood. In the section after that, I will describe, in greater detail, the class of PVs that this paper will concern itself with: ground promotion

2.1.5 What does it mean to be an argument?

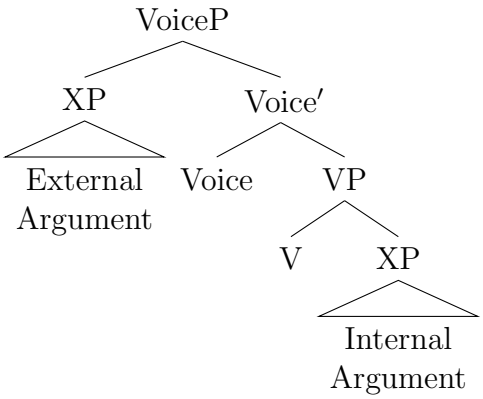
In this section, I will reframe the debate discussed in the previous section in structural terms so that I may more rigorously address the McIntyre's (2007) question.

While studies of argument structure, like McIntyre's, tend to focus on argument alternations between surface forms, there has been a significant body of research into the syntactic underpinnings of argument structure (Borer, 2005; Pylkkänen, 2008; Bruening, 2010; Kratzer, 1996, inter alia). All of this reasearch assumes the Theta Role Assignment Principle (TRAP) as defined below in (29).

(29) *Theta Role Assignment Principle (TRAP)* (Hornstein et al., 2005)
Θ-roles can only be assigned under a Merge operation.

Syntactically, then, an argument of a given function-denoting item merges directly with a projection of that item. As schematized below in (30), the external argument of a verb is the XP that merges in Spec-Voice, while the internal argument of a verb is the (non-adjunct) XP that merges directly with the lexical Verb.

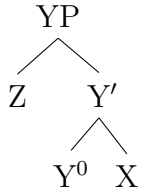
(30)

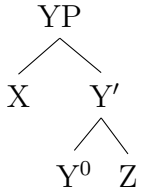


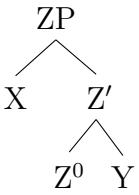
According to this structure, the internal argument of a verb is, in fact, the sole argument of the verb, while the external argument is the argument of Voice.

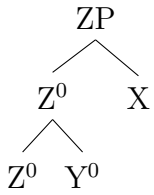
If arguments of a head must merge directly with a projection of that head, then they must be in the head's specifier or complement Consider the relation between X and Y in the structures in (31), below.

(31)

a.


b.


c.


d.


In (31a) and (31b), X is an argument of Y because it merges with a projection of Y, while in (31c) and (31d), X does not merge with a projection of Y and therefore is not an argument of Y. In (31c), X and Y merge with projections of Z, and as such are arguments of Z. In (31d), Y forms a complex head with Z and does not project a phrase, which means X cannot merge with a projection of Y and cannot be an argument of Y

We can then rephrase McIntyre's question as follows:

(32) *McIntyre's question - syntactic version*
Does the direct object of a particle verb merge with a projection of the verb or of the particle?

The verb-dependency hypothesis then, would state that the direct object merges with a projection of the verb, while the anti-verb-hypothesis would state that it merges with a projection of the particle.

This paper will address the question asked by McIntyre (2007) with a more constrained breadth and a greater depth. To that end, the discussion and analysis that follows will focus on the ground promotion class of PVs, and beyond the surface argument alternations, it will investigate the syntax and semantics of these PVs.

2.1.6 More on ground promotion PVs

This paper will focus on ground promotion PVs because of their relatively transparent semantics and comparability to V + PP constructions. PVs which allow ground promotion in English and German, also tend to allow the inverse situation, as shown below in (33) and (34a), where the figure is expressed and the ground is not. This inverse situation of ground promotion, which I will refer to as figure retention, shows the same surface properties as other PVs (Particle Shift in English, and Separability in German). Although ground promotion has been fairly well researched (McIntyre, 2007; Oya, 2009; Svenonius, 2003; Levin and Sells, 2007), figure retention has received little attention. Studies that do mention figure retention PVs, tend to classify them as resultatives (McIntyre, 2007; Levin and Sells, 2007).

(33) *rinse out*

a. **Full Expression**
I rinsed the coffee out of the urn.

b. **Ground Promotion**
I rinsed (out) the urn (out).

c. **Figure Retention**
I rinsed (out) the coffee (out).

(34) *eingießen* ("pour in")[1]

a. **Full Expression**

i. Sie gieß-t das Bier in dein Glas.
she pour-3SG the.ACC Beer in your.ACC glass.
"She is pouring the beer in your glass."

ii. Sie hat das Bier in dein Glas ge-goßen.
She AUX the.ACC Beer in your.ACC glass PTPL-pour
"She poured the beer in your glass."

iii. Sie plan-t das Bier in dein Glas zu gieß-en
she plan-3SG the.ACC Beer in your.ACC glass to pour-INF
"She is planning to pour the beer in your glass."

[1]There is some variation between my consultants as to which PVs allow both ground promotion and figure retention. Where both are acceptable, however, the same syntactic and semantic patterns are found.

b. **Ground Promotion**

i. Sie gieß-t dein Glas ein.
she pour-3SG your.ACC glass in
"She is filling your glass."

ii. Sie hat dein Glas ein-ge-goßen
She AUX your.ACC glass in-PTPL-pour
"She filled your glass."

iii. Sie plan-t dein Glas ein-zu-gieß-en.
she plan-3SG your.ACC glass in-to-pour-INF
"she is planning to fill your glass."

c. **Figure Retention**

i. Sie gieß-t das Bier ein.
she pour-3SG the.ACC beer in.
"She is pouring the beer."

ii. Sie hat das Bier ein-ge-goßen.
She AUX the.ACC Beer in-PTPL-pour
"She poured the beer."

iii. Sie plan-t das Bier ein-zu-gieß-en
she plan-3SG the.ACC beer in-to-pour-INF
"She plans to pour the beer."

Although both English and German have ground promotion/Figure Retention PVs, the two languages differ with respect to which particles can combine with verbs to form them. In English, ground promotion/Figure Retention particles are restricted to *off* and *out*, while in German, particles meaning "into" and "onto" can also form ground promotion/Figure Retention PVs. In addition to explaining how ground promotion and figure retention occur, an analysis of these PVs should be able to explain why they are restricted to certain particles.

2.1.7 Summary

In this section I have given an overview of various argument structure alternations associated with PVs and introduced the Verb-Dependency/Anti-Verb-Dependency debate that this paper aims to contribute to. I argued that the debate as framed by McIntyre (2007)is inherently unresolvable,

because it lacks a precise theory of argument structure and attempts to address all PVs. I outlined a theory of argument structure which provides a definition of argument and restricted my domain of inquiry to a single class of PVs (i.e. ground promotion/Figure Retention PVs). Before providing an analysis, though, I will review another debate regarding the underlying syntactic structure of PVs.

2.2 The Underlying Structure of PVs

There have been two general analyses of the structure of particle verbs, which can be called the Complex Head and Small Clause approaches. The Complex Head analysis states that the particle and verb enter the derivation as parts of a complex head, while in the Small Clause analysis, the two parts are independent projections.

(35) a. **Complex Head** b. **Small Clause**

Another analysis, which, although it is not prominent, addresses an interesting theoratical issue, is the Late Adjunction hypothesis argued for by Newell (2005, 2008). According to this hypothesis, particles are adjoined late in the derivation, which means they are not subject to strict cyclicity (Lebeaux, 1988; Chomsky, 1993). In section 2.2.1 I will discuss some of the arguments for and against the complex head analysis. Section 2.2.2 looks at the strengths and weaknesses of a small clause analysis. Finally, in section 2.2.3, I will review the late adjunction analysis.

2.2.1 PVs as complex heads

Dehé (2002) discusses four arguments that PVs are introduced into the syntactic derivation as complex heads, a hypothesis argued for by Johnson (1991). One of these arguments is based on the argument structure facts

(as discussed above in section 2.1). In particular, Dehé cites examples from Johnson (1991) and Olsen (1997), reproduced below in (36) and (37)

(36) a. We can't **make out** [$_{CP}$whether he's lying or not].
b. **fill in** [$_{CP}$whether you're married or not].

(37) a. **let** someone **in** [$_{PP}$on something].
b. **fix** someone **up** [$_{PP}$with something].

(Dehé, 2002)

She argues that, in these cases, neither the particle nor the verb on its own would select a CP or PP object, and therefore the combination of the two must be responsible for the selection. These examples, however, represent a relatively small and idiosyncratic segment of English PVs, and an analysis of all PVs based on them would be problematic. The claim that the particle on its own would not select a PP or CP complement is, also, not entirely true. Consider the PV constructions in (38) below.

(38) a. Andrew is **in** [$_{PP}$on the plan].
b. The friends **went in** [$_{PP}$on a gift].
c. **in** for a penny, **in** for a pound.

The *in*+PP construction is clearly licit with other verbs, or, in the case of (38c), without a verb at all. The examples in (38) suggest that the particle *in* is more important than the verb for introducing these PPs. To salvage this argument for the Complex Head analysis, one could argue that the particle *in* does select a PP complement, but only when it is part of a complex head with certain verbs. This suggests a generative lexicon, which forms complex heads pre-syntactically, a hypothesis which is controversial within generative syntax (Marantz, 1997; Harley and Noyer, 1999; Halle and Marantz, 1993).

Dehé also argues that the morphosyntactic behaviour of PVs suggests that they form a single constituent, which she assumes to be a complex head. First, she demonstrates that PVs can readily undergo the same morphological derivations that verbs do, such as nominalization, adjective formation, and middle constructions

(39) a. Mikey's *looking up* of the reference.
b. Their *calling out* of the names.

(40) a. John seemed *broken up* about the loss.

b. the *dusted off* table

(41) a. Bridges *blow up* easily.

b. His car *breaks down* easily.

(Dehé, 2002)

Dehé argues that, since they are able to undergo these derivations, they must be complex heads.

Third, PVs behave like simplex verbs in gapping constructions, as in (42) Finally, PVs can be coordinated with simplex verbs as in (43)

(42) a. Betsy looked up the address quickly and (*up) the phone number slowly.

b. Gary looked up Sam's number, and Mittie, (*up) my number.

(43) a. She *picked up* and *threw* the ball.

b. He *put up* and *entertained* his friends.

(Dehé, 2002)

Since only verbal heads are elided in gapping constructions, and only like constituents can be coordinated, the fact that PVs are elided in gapping constructions and can be coordinated with simplex verbs suggests that they are complex heads.

The morphosyntactic arguments put forth by Dehé are far from conclusive. Most problematic about the arguments is that they only apply to PVs in the continuous order, which means that they only provide evidence that, when in the continuous order, PVs are complex heads. It does not necessarily follow from this that PVs enter the derivation as complex heads though. In fact, the gapping facts change when we look at the discontinuous order

(44) a. Betsy looked up the address quickly and (*up) the phone number slowly.

b. Betsy looked the address up quickly and the phone number ($^{?}$up) slowly.

c. Betsy put the ball down and the dishes away.

Supposing, though, that we accept this data as evidence that the continuous order is the spellout of a PV as a complex head, we then have two possible analyses of the relationship between the continuous and discontinuous orders. If, as Dehé argues, the continuous order represents the lexical structure of a PV, then the discontinuous order must be derived by

excorporation of part of the PV. On the other hand, if PVs are completely separate heads, then the continuous order is derived by incorporation of the particle into the verb. Incorporation being a well known operation in the languages of the world, and excorporation being, at best, controversial, the complex head analysis of PVs has a significant burden to overcome.

2.2.2 Particles as small clause heads

One prominent hypothesis regarding the syntactic structure of PVs is that a particle and object combination forms a small clause (SC) (den Dikken, 1995; Kayne, 1985; Svenonius, 1996). Small clauses are constituents which have predication without inflection, like the bracketed parts of the sentences in (45), below.

(45) a. Doug considered [$_{SC}$Pete disruptive]
b. Charlotte judged [$_{SC}$Marissa wise]

Early small clause type analyses of PVs argued that PVs are formally identical to Small clauses because they share a distribution. PVs, like small clauses, are resistant to nominalization, as shown in (46) and (47), below. Also, in both small clauses and PVs, post-verbal DPs cannot be wh-extracted from, as can be seen in (48) and (49), below.

(46) Small clause - nominalization
a. Doug considered [$_{SC}$Pete disruptive]
b. *Doug's consideration of [$_{SC}$Pete disruptive]

(47) PV - nominalization
a. Kulap looked the information up.
b. *?Kulap's looking of the information up

(48) Small clause - wh-extraction
a. Scott considered [$_{SC}$the step-father of Marissa strange].
b. *Who$_i$ did Scott consider [$_{SC}$the step-father of t$_i$ strange]?

(49) PV - Wh-extraction
a. Graham tied the pet of Dave up.
b. *Who$_i$ did Graham tie the pet of t$_i$ up?

Dehé (2002), however, notes that these parallels between PVs and small clauses only hold for PVs in the discontinuous order. When in the continuous order, PVs can readily be nominalized and Wh-extracted from.

(50) PV - nominalization (cf. 39)
  a. Kulap looked up the information.
  b. Kulap's looking up of the information

(51) PV - Wh-extraction
  a. Graham tied up the pet of Dave.
  b. Who did Graham tie up a pet of?

Dehé (2002) goes on to point out that, while small clauses can be rephrased as full clauses, as shown below in (52), the same is not true of PVs, as seen in (53).

(52) Small clause - Paraphrasing (Dehé, 2002)
  a. I considered [$_{SC}$John a fool].
  b. I considered[John to be a fool].

(53) a. I turned the radio down.
  b. *I turned the radio to be down.

Perhaps the strongest evidence put forth by Dehé (2002) that PVs are not formally identical to small clauses is that the binding properties of the two constructions are different from each other. While preverbal DPs in small clause constructions do not bind postverbal anaphors, as seen in (54), subjects of PVs, like those in (55) can bind postverbal anaphors.

(54) Small clauses - binding (Dehé, 2002)
  a. i. *Mary$_i$ considered [$_{SC}$the medicine good for herself$_i$].
    ii. Mary$_i$ considered [$_{SC}$the medicine good for her$_i$].
  b. i. *The boys$_i$ made [$_{SC}$the towers taller than themselves$_i$].
    ii. The boys$_i$ made [$_{SC}$the towers taller than them$_i$].

(55) PVs - binding
  a. i. The firemen$_i$ pulled [the equipment up to themselves$_i$].
    ii. ?The firemen$_i$ pulled [the equipment up to them$_i$].
  b. i. She$_i$ peeled [the sticker off herself$_i$].
    ii. ?She$_i$ peeled [the sticker off her$_i$].

This distribution is strong evidence against the strict small clause analysis because, unlike much of the other evidence, it is independent of the word order of the PVs.

Small clauses, though, are a particular construction with a specific theoretical analysis. As such, if we accept Dehé's (2002) argument that PVs and small clause constructions are not formally identical, we do not necessarily have to reject the notion that particles project phrases and take arguments. There are other possibilities, aside from small clauses, for secondary predication. In chapter 3 I will describe one such possibility.

2.2.3 Particles as late adjuncts

Newell (2005) investigates so-called "bracketing paradoxes," which are cases where the morphological and semantic structures of words are misaligned. Specifically, Newell (2005) cites the nominalized German PV, *herumgerenne* ("act of aimless running") as an example. Although the morphological structure of *herumgerenne* suggests that the participial and nominalizing morphemes (*ge-* and *-e*, respectively) are more local to the root than the particle is, as shown in (57a), Newell argues that *ge-* and *e* must semantically scope over the particle, as shown in (57b).

(56) herum- ge- renn -e
around PART run N
"act of aimless running"

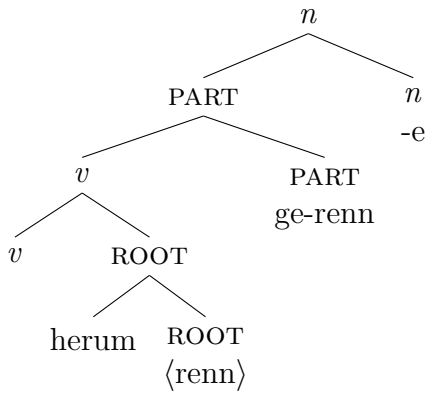
(57) a. Morphological bracketing
[herum [ge [renn] e]]

b. Semantic bracketing
[ge [herum [renn]] e]

(Newell, 2005)

Newell's (2005) analysis, like that of Dehé (2002), assumes that particles do not project a phrase, or at least do not take arguments. She argues that particles adjoin to traces of verbal roots post-syntactically.

(58)



Particles must adjoin to the verbal roots in order to be interpreted low, but must adjoin late in order to attach outside the participial morphology. While the general availability of late adjunction has been argued to exist (Lebeaux, 1988; Chomsky, 1993; Stepanov, 2001), the availability of such an approach relies on the proposal that particles are adjuncts and don't project a phrase. If particles are adjoined late in the derivation, we would not expect them to affect the argument structures of the verbs in the ways they have been shown to in section 2.1.

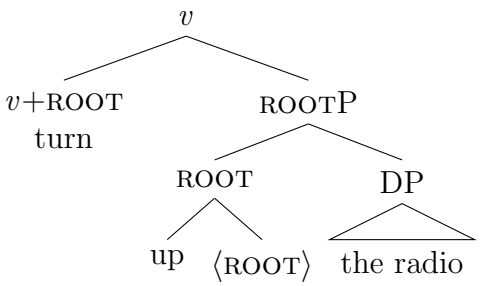
If Newell (2005) is correct, and particles are adjuncts which do not project a phrase, then they cannot take arguments. This implies that she tacitly assumes the Verb-Dependency hypothesis. But even if particles can be shown to take arguments, the late adjunction analysis could still, in principle. be salvageable, as PPs are often adjuncts. This move, however, raises further problems. If object-particle combinations represent PP adjuncts, then we would not expect an object to be able to be extracted out of it. Transitive PVs, however, can be passivized by raising objects raise to subject positions.

(59) [The radio]$_i$ was turned up t_i.

So, if we accept that particles are adjuncts, then they cannot take arguments. The late adjunction analysis of PVs, then, must assume the Verb-Dependency hypothesis.

Although Newell (2005) shows that late adjunction can explain German PVs, it cannot be straightforwardly adapted to English. Suppose particles in English are adjuncts which attach to the roots of verbs, and that direct objects are the arguments of roots. As the structure in (60) demonstrates, we would only expect the continuous order to surface.

(60) "turn up the radio"



If we assumed instead that direct objects are the arguments of v, we would expect only the discontinuous order to surface.

Although the late adjunction hypothesis is problematic, the bracketing paradox that leads to it is not to be ignored in any analysis of PVs.

2.2.4 Summary

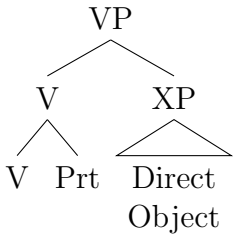
Each of the three types of analyses of the underlying structure of PVs has a set of facts that it can readily explain. Analyses which assume that PVs enter the derivation as complex heads predict that PVs in the continuous order undergo many of the morphological processes available to simplex verbs and behave identically to simplex verbs under coordination. While, strictly speaking, analysing PVs as involving small clauses is not a tenable position, analyses that take particles to be heads which project phrases can account for the fact that in the discontinuous order, PVs do not behave like simplex verbs. Finally, analysing particles as late adjuncts accounts for a bracketing paradox in German PVs where the surface order of the morphemes in PVs contradicts their interpretation, but makes incorrect predictions regarding word order in English PVs.

2.3 Connecting the two debates

In this chapter, I have discussed two debates about PVs. One debate, discussed in section 2.1, is about the source of argument structure alternations in PVs, while the other, discussed in section 2.2, concerns the underlying syntax of PVs. The two debates, as framed in this paper, are inherently connected. Take, for example, the connection between the Verb-Dependency

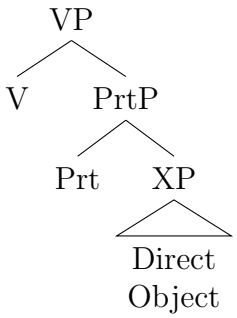
hypotheses and the Complex Head analysis. According to TRAP, defined in (29), an argument X of a head Y must merge with a projection of Y. If particles are part of a complex verb head, then they do not project a phrase and, therefore cannot take arguments, as shown below in (61).

(61) Complex Head analysis → Verb-Dependency



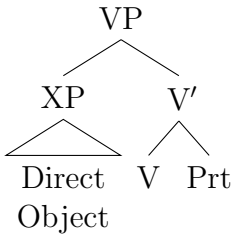
Hence, if PVs can be shown to be complex heads, then their direct objects must be arguments of the verb. It also follows from this that, if the Anti-Verb-Dependency hypothesis can be confirmed, then particles must project a phrase and, therefore cannot be part of a complex verb.

(62) Anti-Verb-Dependency → Small clause analysis



Note that these implications are one-way, meaning that if it can be demonstrated that the small clause analysis is correct, then the Verb-Dependency hypothesis can still be true, and vice versa.

(63) Small clause analysis & Anti-Verb-Dependency



In the next chapter I will argue in favour of the Anti-Verb-Dependency hypothesis, and therefore a Small-Clause-like analysis of ground promotion PVs.

Chapter 3

The structure of PVs

In this chapter, I will argue in favour of an Anti-Verb-Dependency analysis for ground promotion PVs, and I will argue that the syntax and semantics of these PVs is closely related to those of spatial PPs. In section 3.1, I argue that grounds are semantically arguments of ground promotion particles, after which I provide a structural analysis of these PVs. I begin the structural analysis in section 3.2 by reviewing and adapting a syntactic theory of prepositional argument structure put forth by Svenonius (2003). Next, I will discuss the semantics of spatial prepositions in section 3.3 with the intention of discerning how spatial PPs might compose with verbs to form PVs. Finally, in section 3.4 I show how the syntactic phenomena of English and German PVs can be accounted for.

3.1 Ground Promotion objects as arguments of a spatial preposition

While the simplex forms of German and Dutch ground promotion PVs tend to take figure-type themes, the simplex forms of English ground promotion PVs tend to take ground-type themes. Consider the pairs of simplex and ground promotion PVs in (64) below.

(64) a. i. rinse the pot
ii. rinse the pot out
b. i. wash the cloth
ii. wash the cloth out

c. i. wipe the table
ii. wipe the table off

Since there is no argument alternation, there is no obvious reason to argue that the objects are arguments of the particle. If we look at the interpretation of the object, we can see differences in its thematic properties depending on whether it is the object of a simplex verb or of a PV. The sentences below in (65) illustrate the difference of interpretation.

(65) a. I rinsed the pot, but only the outside.
b. *I rinsed the pot out, but only the outside.

The sentence in (65a) is acceptable because the object is interpreted as a theme or patient. The PV sentence in (65b) is contradictory, because the object is not being interpreted as a theme or patient, but as a ground. Both *rinse* and *rinse out* describe a "rinsing" event, but only *rinse out* describes the spatial configuration of that event. Specifically, part of the "rinsing" event must involve coming out of something, which cannot occur if the "rinsing" only applies to an exterior surface.

Furthermore, items which have no interior surface (i.e. are solid rather than hollow) cannot be interpreted as ground arguments of the V+*out* type PVs. Similarly, objects in sentences with the V+*off* PVs can only be interpreted as grounds if they have some sort of external surface. Consider the examples in (66), below.

(66) a. rinse the marbles out
Interpretation: *rinse the internal surface of the marbles
b. wipe the fingerprints off
Interpretation: *wipe the external surface of the fingerprints

For example, the phrase *rinse the marbles out* can only be interpreted as *the marbles* leaving some ground due to a "rinsing" event.

Consider, also, the examples in (67), with *squeeze/squeeze out*.

(67) a. i. squeeze the cloth
ii. squeeze the cloth out
b. i. squeeze the plastic sheet
ii. *squeeze the plastic sheet out

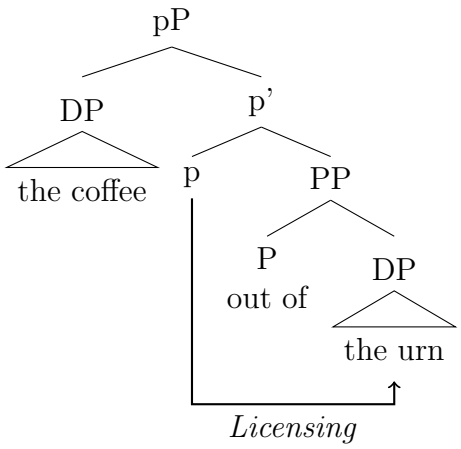
Both *the cloth* and *the plastic sheet* are acceptable themes for *squeeze*, but *the plastic sheet* not being absorbent has no interior and therefore is not an acceptable ground for *out*.

Because of the direct objects of simplex verbs and ground promotion PVs differ with respect to their thematic properties, I argue that direct objects of ground promotion PVs are ground arguments of the particles rather than themes of the verbs and that those particles define a spatial configuration. In the next sections I will argue that they are also syntactic arguments of the particle.

3.2 The pP

The syntactic theory of argument structure for spatial PPs assumed here is adapted from Svenonius (2003), who argues for an articulated PP roughly analogous to the articulated vP (Kratzer, 1996). In this version of the PP, the ground argument is introduced by P, which also contains the lexical (semantic and phonological) information of the preposition. The figure is introduced by a little-p head, which also assigns Case to the ground. In (68) below, we can see the structure of a full pP.

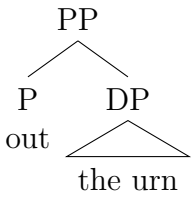
(68) (rinse) the coffee out of the urn.



Ground Promotion, then, occurs when the little-p head neither introduces a figure nor licenses the ground DP. According to Svenonius, little-p doesn't serve these functions in ground promotion because it is not in the deriva-

tion.[1] A ground promotion particle, then has the structure below in (69) *per* Svenonius (2003).

(69) (rinse) out the urn.



This is analogous to passives and unaccusatives, in which there is no external argument introduced, and the internal argument is not licensed *in situ*.

Svenonius (2003) does not, however, treat figure retention, which has no obvious treatment given the structure he proposes. Assuming figure retention occurs when the ground argument is not introduced into the derivation, in Svenonius' system, this would occur when the head which introduces the ground (P) is not part of the derivation. P, however, is also the locus of the particle's semantic and phonological content, and therefore must be in the derivation.

Figure Retention becomes explicable if, instead of assuming that it arises when the ground Argument is absent, we take the ground argument to be present but implicit. Figure Retention, then, would be nearly structurally equivalent to the full expression pP as shown above in (68).

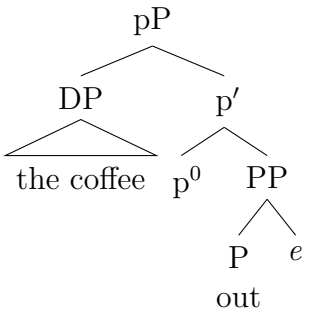
[1] Svenonius argues that most West Germanic languages (e.g. German, Dutch, Afrikaans) have ground promotion PVs, while North Germanic languages (e.g. Swedish, Icelandic, Danish) and English are completely lacking in this class of PVs. He identifies the ability of West Germanic to not project little-p as the parameter responsible for this variation. While he acknowledges the English PVs that I have been discussing here, he says that they are only superficially ground promotion PVs. He argues that because the PVs that seem to allow ground promotion are cleaning verbs, their objects are "affected surfaces" and therefore represent figures. Consider the following two VPs.

(1) brush the table off

(2) brush the table off the ledge.

The DP *the table* is interpreted very differently between the two sentences above. In (1), *the table* remains stationary and something is moved off of it, while in (2), *the table* does move off of the ledge. In (2), *the table* is a figure, but in (1), *the table* is a ground.

(70) (rinse) the coffee out.



There is evidence in favour of the hypothesis that grounds in figure retention constructions are implicit rather than absent. As Levin and Sells (2007) note, while ground promotion requires no contextual support for interpretation, figure retention requires a contextually salient ground for proper interpretation. This can be seen in (71).

(71) The maid said that whenever she goes in to clean a room, (Levin and Sells, 2007)

a. #she has to wipe the fingerprints off.

b. she has to wipe the mirrors off.

This, however, does not completely describe the interaction of figure retention and context. If any possible ground is contextually available to a figure retention construction, it is interpreted as the ground of the PV. For example, consider the sentences in (72) and (73), which are examples of ground promotion and figure retention respectively in context. The contextual availability of a figure has no effect on the interpretation of ground promotion PVs,

(72) ground promotion

a. Whenever Sheila sees fingerprints, [she brushes her blazer off.]
Interpretation: She brushes something off her blazer.
Not: She brushes **fingerprints** off her blazer.

b. Whenever Tom finds oatmeal, [he rinses the coffee pot out]
Interpretation: He rinses something out of the coffee pot.
Not: He rinses **oatmeal** out of the coffee pot.

c. *German*

Sobald Sheila Fingerabdrücke sieht, bürstet sie
as.soon.as Sheila fingerprints sees brushes she
ihre Hose ab.
her.POSS.ACC trousers PRT

"Whenever Sheila sees fingerprints, she brushes her trousers off."
Interpretation: She brushes something off her trousers.
Not: She brushes fingerprints off her trousers.

In the figure retention sentences, though, the salient objects (*the blazer* and *the coffee pot*) are interpreted as the ground arguments of the PVs.

(73) figure retention

a. Whenever Jim wears his blazer, [he wipes the fingerprints off.]
Interpretation: He wipes the fingerprints off **his blazer**.

b. Whenever Karen uses the coffee pot, [she rinses the oatmeal out.]
Interpretation: She rinses the oatmeal out of **the coffee pot**.

c. *German*
Sobald Jakob seine Jacke trägt, bürstet er die
as.soon.as Jakob his.ACC jacket wears, brushes he the.PL.ACC
Schmutzflecken ab.
smudges PRT

"whenever Jakob wears his jacket, he brushes the smudges off."
Interpretation: He brushes the smudges off his jacket.

Ground Promotion sentences, like those in (72), tend to give rise to an "OCD" reading, wherein the sight of a certain thing (e.g. fingerprints or oatmeal) triggers a compulsive response in the person (brushing off clothes or rinsing out a coffee pot) .[2] This data makes the asymmetry noticed by Levin and Sells (2007) stronger. Not only do unexpressed grounds require

[2] Six native English speakers were presented with figure retention and ground promotion sentences which included a "Whenever ..." context, and were asked a question about the unexpressed argument. For example, a participant who is presented with the sentence in (1a) would be asked the question in (1b)

(1) a. Whenever Brigid opens the fridge, she clears the gadgets out.
b. Were the gadgets cleared out of something specific? If so, what?

contextual support for interpretation, but the contextually salient grounds are always interpreted as unexpressed grounds, while unexpressed figures reject contextual support. Compare the asymmetry between ground promotion and figure retention, as demonstrated in (72) and (73), with the interpretations of optionally transitive verbs below in (74) and (75), below.

(74) Intransitives

a. Whenever Ellie sees a chair, she fights.
Interpretation: She fights
Not: She fights the chair.

b. Whevever Oliver sees a plant, he eats.
Interpretation: He eats (something)
Not: He eats the plant.

(75) Transitives with pronouns

a. Whenever Ellie sees a chair, she fights it.
Interpretation: She fights the chair.

b. Whevever Oliver sees a plant, he eats it.
Interpretation: He eats the plant.

Just as the interpretation of pronouns is dependent on context, so is the interpretation of unexpressed grounds, even if that interpretation is strange or surreal. This similarity suggests that there is an empty category in the ground argument position.

The split-PP hypothesis provides an excellent analysis for the argument structure of ground promotion and figure retention particles. It makes these phenomena comparable to more thoroughly studied constructions such as passives and unergatives, which also bear on argument structure and implicit arguments, and it provides a natural explanation for the pragmatic effects of figure retention (Contextually determined grounds). The hypothesis does not, however, speak at all to the relationship between the particle and verb. The following section will approach this relationship from the perspective of their compositional semantics.

3.3 The Semantics of figure/Ground PVs

This section will focus on how the pP, described in the previous section, which encodes the figure-ground relation, composes with a verb in a PV

construction. Semantically composing the parts of a ground promotion PV is not straightforward, because the particle encodes a spatial relation, while verbs describe eventualities. Section 3.3.1 contains a non-formal discussion of the aspects of spatial meaning. In section 3.3.2, I discuss the formal predicates and their compositionality. Finally, in section 3.3.4, I show the implications of the semantics for the possible argument structures proposed above.

3.3.1 The basics

As mentioned above, in section 2.1.6, the prepositions with which this paper is concerned describe a relationship. More specifically they describe the spatial orientation of a figure with respect to a ground. As described by Jackendoff (1983) (also Zwarts and Winter, 2000; Svenonius, 2010, *inter alia*), there are two types of spatial prepositions: locative and directional. Locative prepositions describe static positions, or PLACEs, which are relatively simple conceptually. Directional prepositions, on the other hand, describes trajectories, and are more complex than locatives.

Directional expressions come in three basic flavours: SOURCEPATHs, GOALPATHs, or ROUTEPATHs. A SOURCEPATH describes the start-point of a trajectory, a GOALPATH describes its end-point, and a ROUTEPATH describes an arbitrary portion of the the trajectory. For example, PPs with the prepositions *out of*, *into*, and *through* represent SOURCEPATHs, GOALPATHs, and ROUTEPATHs, respectively. The trajectories described by *out of* must originate inside the ground, those described by *into* must end inside the ground, and those described by *through* must have at least one portion inside the space occupied by the ground. Unlike PLACEs, however, PATHs are not directly relative to grounds, but rather are relative to PLACEs. The trajectories described by the prepositions above (*out of*, *into*, *through*), are relative to the PLACE, *inside*, which is relative to the ground.

With the basics of PATHs and PLACEs in mind, I will describe a formal system for encoding them in the next section.

3.3.2 The semantic system

The formal semantic system I assume uses a limited class of atomic types, and principles of composition. As a starting point I will assume six atomic types: entities (e), truth-values (t), eventualities (s) (Heim and Kratzer,

1998; Kratzer, 1996), points (p), vectors (v), and indices (i)(Zwarts and Winter, 2000). The system, then, can be described as follows

(76) a. e, s, t, p, v, and i are all semantic types.

b. If α is a semantic type and β is a semantic type, then $\langle \alpha, \beta \rangle$ is a semantic type.

c. Nothing else is a semantic type.[3]

The relevant principles of composition for this analysis are Functional Application and Predicate Modification, which are defined in (77) and (78) respectively.

(77) Functional Application (Heim and Kratzer, 1998)
If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ is a function whose domain contains $[\![\gamma]\!]$, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$.

(78) Predicate Modification[4] (adapted from Heim and Kratzer, 1998).
If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ and $[\![\gamma]\!]$ are both in $\mathrm{D}_{\langle s,t \rangle}$, then $[\![\alpha]\!] = \lambda e_s[[\![\beta]\!](e) \wedge [\![\gamma]\!](e)]$

This system will provide the basis for the formal semantics of spatial expression as described in the following section. It will also be sufficient to show how the spatial semantics can compose with the events sematics of a verb in PV constructions.

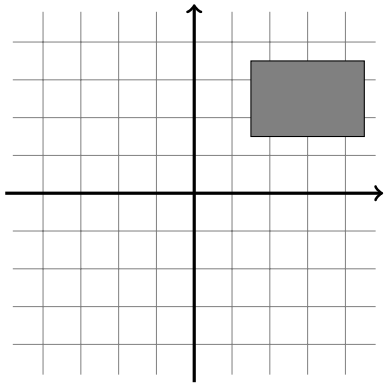
3.3.3 Formalizing Space: Points, Vectors, and Paths

Zwarts and Winter (2000) propose an analysis of prepositions which formalizes the spatial notions discussed by Jackendoff (1983). For Zwarts and Winter, the ground is represented as a set of points (i.e. a function of type $\langle p, t \rangle$), or a region in three-dimensional space. (For ease of exposition, however, space will be represented as two-dimensional here) A prototypical ground is presented below, in (79), as a grey rectangle.

[3] I have excluded times and worlds from this set of types for reasons of relevance

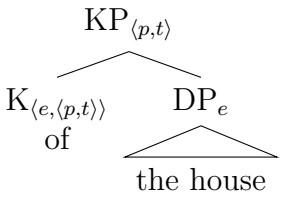
[4] The version of Predicate Modification that I assume in this paper is specific to event semantics. This differs from Predicate Modification as defined by Heim and Kratzer (1998), which only applied to properties of individuals (type $\langle e, t \rangle$).

(79) The Eigenspace of a ground.



This set of points occupied by the individual referred to by the ground DP is called the *eigenspace* of that individual (Wunderlich 1991 cited by Zwarts and Winter 2000). The *eigenspace* of a DP, is defined by *loc*, which is a function from entities to sets of points ($\langle e\langle p,t\rangle\rangle$). This *loc* function is part of the denotation of a head K which sometimes is pronounced as *of* and takes a DP as a complement (Svenonius, 2010), as shown below in (80).

(80) *(outside) of the house*

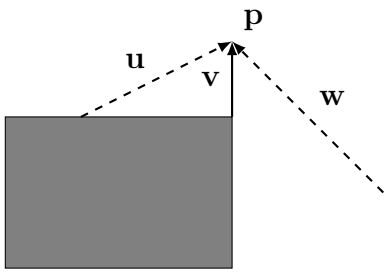


The points which define a ground are situated relative to some deictic origin (perhaps representing the speaker). The spatial configuration of figure, however, is not defined deictically, but rather relative to the ground.

Zwarts and Winter use the notion of *vectors* from linear algebra to formalize spatial semantics. Strictly speaking, a vector is an ordered pair of points (e.g. for three-dimensional space $\langle\langle x_0, y_0, z_0\rangle, \langle x_1, y_1, z_1\rangle\rangle$), with the first point (e.g. $\langle x_0, y_0, z_0\rangle$) as the start-point of a vector, and the second (e.g. $\langle x_1, y_1, z_1\rangle$) as its end-point. For Zwarts and Winter, vectors in natural language semantics are limited to those whose start-points are on the boundary of the ground (called *boundary vectors*). Furthermore, there is a restriction to the *closest* boundary vectors, meaning each possible end-point has only one vector associated with it. The diagram below in (81)

shows a number of logically possible vectors (**u**, **v** and **w**) given a single end-point (**p**). The vector **w** is not a boundary vector, and therefore is not a valid vector in natural language. Both **u** and **v** are boundary vectors, but **v**, having the smallest magnitude, is the *closest boundary vector*, making it the only valid vector with the end-point, **p**.

(81) Valid and Invalid vectors.



In the rest of this discussion, I will use the term *vector* to refer to *closest boundary vectors*.

Vectors, in Zwarts and Winter's (2000) system, are used to describe PLACEs, the simplest of which are **inside** and **outside**, which are defined by the predicates $int(\mathbf{v}, A)$ and $ext(\mathbf{v}, A)$ respectively. $int(v, A)$ is true iff the end-point of the vector, **v**, is contained by the *eigenspace* of the ground A, and $ext(v, A)$ is true iff the end-point of **v** is not contained by A.

(82) $[\![\text{outside}]\!] = \lambda A_{\langle pt \rangle}.\lambda \mathbf{v}_v.ext(\mathbf{v}, A)$ (Zwarts and Winter, 2000)

Zwarts and Winter, argue that all PLACEs have either *ext*, or *int* in their definition. Take, for example, the preposition *on*, which describes a PLACE outside the ground, and therefore, uses the *ext* predicate in its denotation. The denotation must be more restrictive, though, because to say a figure is *on* a ground, it must be within a certain proximity to the ground (often in physical contact with it). To encode this proximity requirement, Zwarts and Winter propose the lengths, or magnitude, of the vectors defined by *on* must be smaller than some infinitesimally small positive number, r_0. The denotation of *on* is shown below in (83), where $|\mathbf{v}|$ is the length of a vector.

(83) $[\![on]\!] = \lambda A_{\langle p,t \rangle}.\lambda \mathbf{v}_v.ext(\mathbf{v}, A) \wedge |\mathbf{v}| < r_0$

So, the preposition *on* takes the eigenspace of the ground Argument (A) and a vector (v), and evaluates to true iff the vector is external to the ground and has an infinitesimally small length.

Turning to directional prepositions, Zwarts and Winter argue against the natural assumption that their meaning can be represented by vectors, the start-points and end-points of which would represent the beginnings and endings, respectively, of the trajectories they describe. Since vectors are, essentially pairs of coordinates, representing start-points and end-points, the can be described by SOURCEPATHs and GOALPATHs, which describe start-points and end-points respectively. Vectors do not, however, define any points between their start- and end-points and as such cannot be described by ROUTEPATHs. Furthermore, allowing vectors with arbitrary start-points, undermines the restriction that vectors must be boundary vectors, which they argued for in their analysis of locatives. Instead, Zwarts and Winter argue that PATHs are represented by sets of *sequences* of vectors. A *sequence* is an ordered list, meaning each of its elements has a unique index. These indices are represented as objects of type i.

Formally, Zwarts and Winter represent trajectories as functions Θ from indices to vectors ($\langle i, v\rangle$). For Zwarts and Winter these indices are real numbers from 0 to 1, the index 0 marking the beginning of a trajectory, and the index 1 marking its end. So, for example, directional prepositions which describe SOURCEPATHs (PATH_0) can be represented by sets of sequences of vectors, all of which have as their 0-element a vector which can represent a particular PLACE. The formal denotation (following Zwarts and Winter, 2000) is given below in (84).

(84) $[\![\text{PATH}_0]\!] = \lambda P_{\langle\langle p,t\rangle,\langle v,t\rangle\rangle}.\lambda A_{\langle p,t\rangle}.\lambda\Theta_{\langle i,v\rangle}.[P(A)(\Theta(0))]$

So, a PATH_0 function takes a locative preposition ($P_{\langle\langle p,t\rangle,\langle v,t\rangle\rangle}$), a ground ($A_{\langle p,t\rangle}$) and a Θ function as arguments and evaluates to true iff the first vector of Θ (i.e. $\Theta(0)$) is a member of the set of vectors described by the locative preposition (P) relative to the ground (A). So, a PATH_0 function adds a restriction to the vector argument of the PLACE function that it takes as an argument. The vectors evaluated by the PLACE function must be 0-elements of trajectories.

The meaning of the particle, *off*, is composed of PATH_0 (see (84)) and PLACE_{ON} (see (83)) and has the denotation given in (85)

(85) $[\![\text{off}]\!] = [\![\text{PATH}_0]\!]([\![\text{PLACE}_{\text{ON}}]\!])$
$= [\![\text{PATH}_0]\!](\lambda A_{\langle p,t\rangle}.\lambda\mathbf{v}_v.ext(\mathbf{v}, A) \wedge |\mathbf{v}| < r_0)$
$= \lambda A_{\langle p,t\rangle}.\lambda\Theta_{\langle i,v\rangle}.[ext(\Theta(0))(A) \wedge |\Theta(0)| < r_0]$

The particle *off*, then, takes a ground argument ($A_{\langle p,t\rangle}$) and a trajectory argument ($\Theta_{\langle i,v\rangle}$) and is evaluated as true iff the 0-element of the trajectory is *on* the ground. That is, a trajectory can be described as *off* iff its 0-element is a vector external to the ground and has an infinitesimally small length. The denotation is arrived at by replacing $\textsc{Path}_0$ with its denotation (given in (84)) which takes, as its first argument, $\textsc{Place}_{\textsc{on}}$ which has been replaced with its denotation (given in (83)). This gives us the final denotation of *off*, with the denotation of *on* replacing P and $\Theta(0)$ replacing the vector argument of P. Given the predicates discussed so far, we can give a denotation to the PP "off the table" in (86), below.

(86) $[\![\text{off the table}]\!] = \lambda\Theta_{\langle i,v\rangle}.[ext(\Theta(0))(loc(\textbf{the table})) \wedge |\Theta(0)| < r_0]$

The *eigenspace* of *the table* ($loc(\textbf{the table})$) has now saturated the ground argument (A) of *off*. According to this denotation, a trajectory can be described as *off the table* iff the 0-element of that trajectory is a vector outside the *eigenspace* of the table and the length of that vector is infinitesimally small. The type of the PP is, then, $\langle\langle i, v\rangle, t\rangle$, or a property of trajectories. Syntactically, the PP combines with little-p, which introduces the figure

The predicate Zwarts and Winter propose as responsible for introducing the figure argument (loc^- defined below in (87)), however, is of type $\langle\langle v, t\rangle, \langle e, t\rangle\rangle$, and as such applies only to locative PPs.

(87) $loc^- \stackrel{def}{=} \lambda W_{\langle v,t\rangle}.\lambda x_e.\forall \mathbf{p} \in loc(x)\, \exists \mathbf{v} \in W[\textit{e-point}(\mathbf{v}) = \mathbf{p}]$

The function *e-point* is a predicate from vectors to points, which defines the end-point of a vector.

Adapting loc^- would not be as simple as changing the type of its first argument from $\langle v, t\rangle$ to $\langle\langle i, v\rangle, t\rangle$, as in (88), below.

(88) $loc^-_{dir} \stackrel{def}{=} \lambda W_{\langle\langle i,v\rangle,t\rangle}.\lambda x_e.\forall \mathbf{p} \in loc(x)\, \exists \mathbf{v} \in W[\textit{e-point}(\mathbf{v}) = \mathbf{p}]$

While this would be able to compose with the directional PP, the denotation would be contradictory. The argument representing the directional expression (W) is of type $\langle\langle i, v\rangle, t\rangle$, meaning it denotes a set of trajectories (type $\langle i, v\rangle$). If $\mathbf{v}$ is a member of the set W, it must be of type $\langle i, v\rangle$, and is therefore not an appropriate argument for the function *e-point*, which takes a vector (type v) and returns its end-point (type p). The expression *e-point*($\mathbf{v}$) will therefore be undefined, rendering the expression [*e-point*($\mathbf{v}$) = $\mathbf{p}$] false in all cases and therefore contradictory.

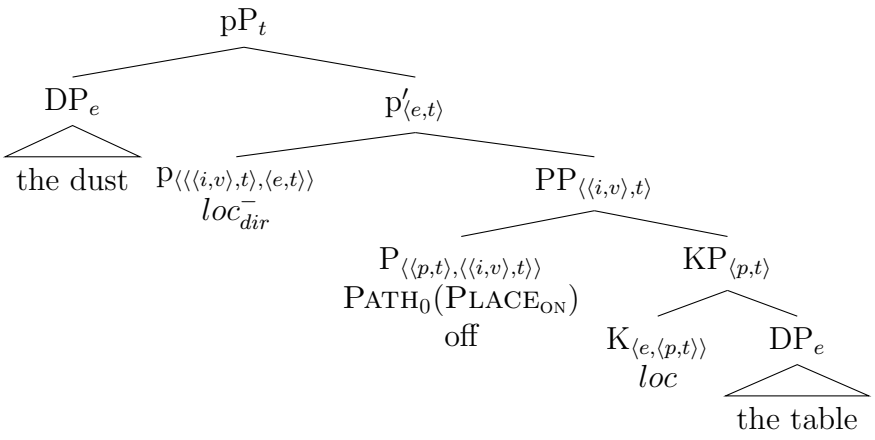
A proper loc^{-}_{dir} predicate would take as arguments the set of trajectories described by a PATH and an entity (the figure). The figure would have to follow a trajectory described by the PATH, meaning for any given index, the end-point of the vector described by the trajectory at that index coincides with a point in the *eigenspace* of the figure. As I have described it, the denotation of the figure introducing predicate is given below in (89)

(89) $loc^{-}_{dir} \stackrel{def}{=} \lambda W_{\langle\langle i,v\rangle,t\rangle}.\lambda x_e.\exists\Theta \in W.\forall i \in [0,1].\exists \mathbf{p} \in loc(x).[e\text{−}point(\Theta(i)) = \mathbf{p}]$

The directional PPs in PVs describe trajectories that extend over time[5]. The denotation I have given does not include any temporal information. Perhaps the temporal aspect of these directional expressions requires additional specification in the denotation, or perhaps some of the types or predicates used can be rethought to include notions of time. I will set aside the full definition of the figure introducing predicate for directional pPs for the purposes of this paper and assume a black box predicate loc^{-}_{dir} of type $\langle\langle\langle i,v\rangle,t\rangle,\langle e,t\rangle\rangle$ is responsible for figure introduction.

Putting these denotations together, we get the pP structure decussed in section 3.2, as shown below in (90).

(90) ⟦the dust off the table⟧



As the above structure demonstrates, the denotation of a full pP, as I have described it in this section, is a proposition. Since the verbs of ground

[5] As Jackendoff (1983) notes, not all directional expressions describe trajectories that extend over time. For example, in the sentence *The road runs along the riverbank*, does not describe a road moving over time, but rather, only through space.

promotion and figure retention do not take propositions as arguments, we must alter the structure to allow it to compose with the verb. The following section will provide those alterations.

3.3.4 Composing the pP and Verb

With a firm grasp on the semantics of spatial prepositions, I will now turn to the combination of V and PP, as in *wipe the dust off the table*. First, though I will show how a verb might combine with a PP that does not introduce a figure (e.g. *wipe off the table*) I will then show that the function allowing for the composition of a verb with a PP must be part of the denotation of the figure-introducing head.

From the discussion above, it can be said that the denotation of *off the table*(before the introduction of the figure), is a property of paths (type $\langle\langle i, v\rangle, t\rangle$). Following Ramchand (2013) and Zwarts (2006), I will use a predicate which defines the spatial manifestation of an eventuality, so that a relation between it and the spatial configuration denoted by the PP can be expressed. I will use the function SHAPE, which takes an eventuality and returns a set of PATHs (type $\langle s, \langle\langle i, v\rangle, t\rangle\rangle$). The set of PATHs denoted by the SHAPE of a given eventuality, must be a subset of that denoted by the PP[6].

(91) $\left[\!\left[\begin{array}{c} \text{VP} \\ \diagup\ \diagdown \\ \text{V} \quad \text{PP} \end{array} \right]\!\right] = [[\![\text{V}]\!] \wedge \textsc{shape}(e) \subseteq [\![\text{PP}]\!]]$ (Ramchand, 2013)

Incorporating this SHAPE into our semantic derivation requires that it be part of the denotation of a syntactic head. In order not to prejudge the syntactic structure of this putative head, I will refer to it as Ω. Since Ω describes a relation between SHAPE and the denotation of the PP, it must take an event argument and function of type $\langle\langle i, v\rangle, t\rangle$.

Supposing, for now that there is some syntactic head, Ω, which bears the semantics described thus far, there are two possible syntactic relationships

[6] Sentences with sequential directional PPs, like those in (1) suggest the relation between the SHAPE of an event and the directional expression is more complicated than a simple subset.

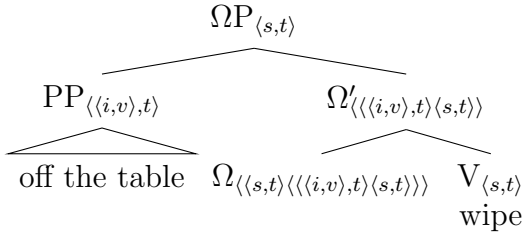
(1) Declan his the ball over the fence, across the street, and into the window.

Since only compositionality is crucial to this paper, I will use the simpler relation

that it could have with the PP: either a SPEC-HEAD relation, or a HEAD-COMP relation. The structures for these relations along with the denotation of Ω that follows from each structure are shown below in (92) and (93).

(92) SPEC-HEAD

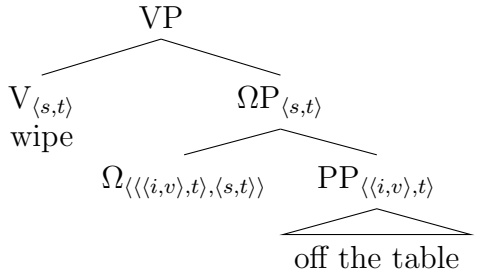
a.



b. $[\![\Omega]\!] = \lambda F_{\langle s,t\rangle}.\lambda P_{\langle\langle i,v\rangle,t\rangle}.\lambda e_s.[F(e) \wedge \textsc{shape}(e) \subseteq P]$

(93) HEAD-COMP

a.



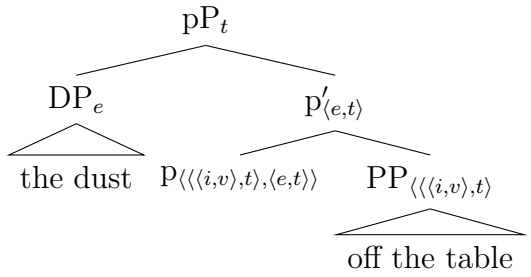
b. $[\![\Omega]\!] = \lambda P_{\langle\langle i,v\rangle,t\rangle}.\lambda e_s.[\textsc{shape}(e) \subseteq P]$

In order for Ω to combine with a PP ($P_{\langle\langle i,v\rangle,t\rangle}$) in its specifier, as in (92), it must take the verb ($F_{\langle s,t\rangle}$) in its complement as an argument. If Ω combines with the PP in its complement, as in (93), the resulting item is of type $\langle s,t\rangle$ and can combine with a verb under Predicate Modification. Although each structure requires a different denotation for Ω, both are semantically tenable if all that is needed is the composition of the PP with the Verb. The structure in (92) requires that Ω take the verb as an argument, a stipulation that the structure in (93) does not make. If we add the requirement that a figure be introduced, the two structures can be further distinguished.

In the previous section, I looked at semantic approach to figure introduction which links the figure directly to the spatial semantics. Regardless of how the function required is structured, it must take at least two arguments: the figure (type e), and the function denoted by the PP

(type$\langle\langle i, v\rangle, t\rangle$). The semantic type of little-p, as discussed in section 3.3.3 above, is $\langle\langle\langle i, v\rangle, t\rangle, \langle e, t\rangle\rangle$, which means that, in the pP shown in (94), it will combine with a PP, returning an object of type $\langle e, t\rangle$, which will the combine with the entity-denoting figure argument, to return a proposition.

(94)



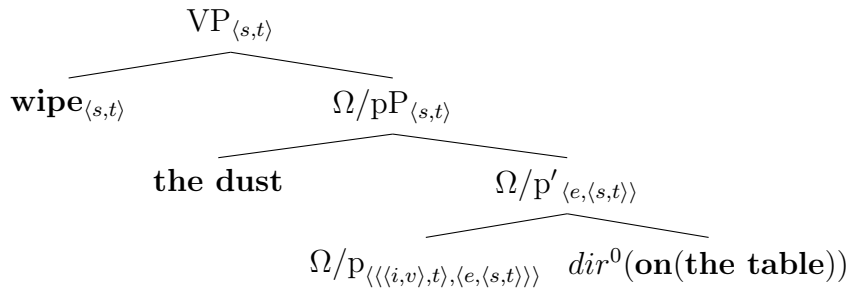
This leaves no possibility for the pP to combine with any verbal structure in the ways shown in (92) and (93). Similarly, given that ΩP is of type $\langle s, t\rangle$, neither little-p nor a figure argument is able to combine semantically with it.

If the loc^{-}_{dir} predicate and the denotation of Ω were to be combined into a single semantic object, as defined below in (95), that object could both introduce the figure argument and allow the phrase it heads to combine with the verbal structure.

(95) $[\![\Omega + p]\!] = \lambda W_{\langle\langle i,v\rangle,t\rangle}.\lambda x_e.\lambda e_s.\textsc{Figure}(x)(W) \wedge \textsc{shape}(e) \subseteq W]$

This new semantic object, of type $\langle\langle\langle i, v\rangle, t\rangle, \langle e, \langle s, t\rangle\rangle\rangle$, would take the place of little-p in (94). the Ω+p function first takes a function (W) denoting a set of Θs, followed by an entity (x) which it interprets as the figure, and finally an eventuality, making the denotation of a pP an object of type $\langle s, t\rangle$, which could combine with verbal structure by Predicate Modification. So, the Logical Form of a full expression PV is shown below in (96)

(96) [[wipe the dust off the table]]



The Ω/p head combines with the directional expression (type $\langle\langle i, v\rangle, t\rangle$ by Functional Application. The resulting function combines with the figure (type e) by Functional Application and returns a function of type $\langle s, t\rangle$ which combines with the verb by Predicate Modification.

Recall that Svenonius (2003) argued that ground promotion occurred when little-p was not projected. Since his version of little-p was only responsible for introducing the figure, he was able to argue this. As I have argued above the figure-introducing head must also encode the semantic information which allows the spatial expression to combine with the event semantics. As such, a ground promotion PP must have some head intervening between it and the Verb. I take this head to be another flavour of little-p.

3.3.5 Summary

In this section I have discussed the semantics of the spatial V+PP constructions that I argue are the basis of figure/ground PVs. After describing the key notions of spatial semantics, I presented a formal semantics of space adapted from Zwarts and Winter (2000), which is based on a vector space. I have shown how the vector semantics introduces figures and grounds, how it combines with the event semantics of verbs. In this discussion I argued that the little-p introduced in section 3.2, is responsible both for introducing the figure and allowing the spatial expression combine with the verb. I further argued that Svenonius (contra 2003) ground promotion particles must project a little-p. In the next section I will discuss the syntax of PVs further.

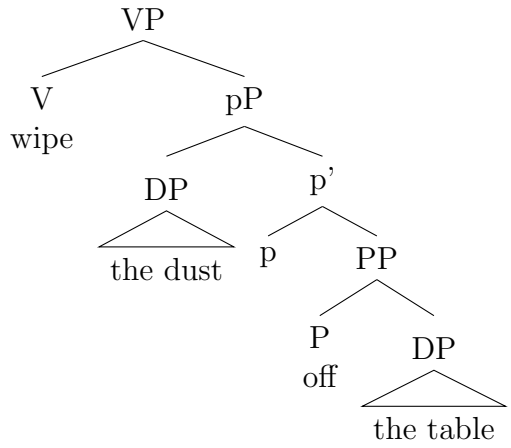
3.4 The Syntax of PVs

As discussed above, there are four possible configurations for full expression pPs which give the correct semantic interpretation. In this section, I will evaluate these putative structures from a syntactic standpoint. The correct structure must be able to derive the surface forms described in Section 1.1: specifically, English particle shift and German separable prefixes.

3.4.1 English Particle Shift

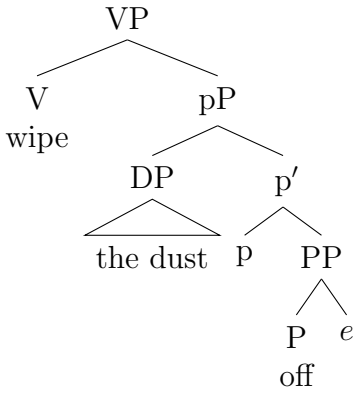
Based on the semantic discussion above, it is clear that in their base generated positions figures c-command prepositions/particles, which, in turn, c-command grounds as shown in (97) below.

(97) Full expression pP (*wipe the dust off the table*)

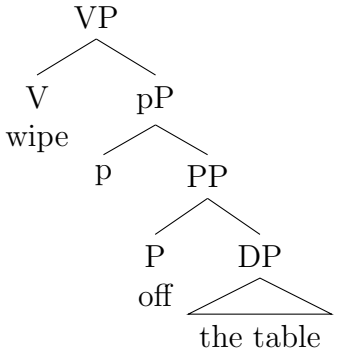


If we assume that in English heads precede their complements, this base generated structure surfaces in the correct order. As described in section 1.1.1, though, the internal argument of a PV in English can just as readily surface to the left of a particle as it can to its right, regardless of whether it represents a figure or a ground. The base-generated structures that I have argued for so far, however, predict that figure retention constructions will surface in discontinuous order, while ground promotion constructions will surface in continuous order. This can be seen in the structures in (98) and (99).

(98) figure retention (Wipe the dust off)



(99) ground promotion (Wipe off the table)



The specific structure of PVs must allow for a derivation which results in an instance of the ground argument dominating the particle and one which results in the particle c-commanding the figure.

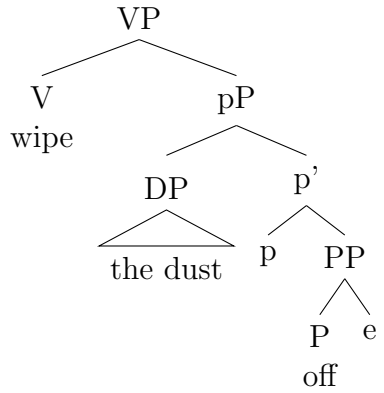
(100)

	ground promotion	figure retention
V Prt Obj	Base generated	????
V Obj Prt	????	Base generated

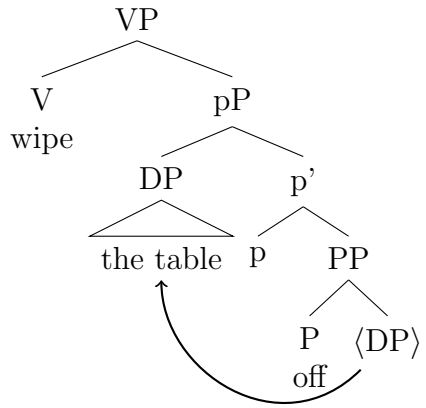
To begin, I will show how both figure retention and ground promotion PVs can surface in the discontinuous order. As noted above, and shown below in (98), figure retention PVs will surface in the discontinuous order in their base-generated structures, so no additional movement is required. In a ground promotion PV, however, the ground Argument must raise to the specifier of p, the base generated position of figures. The ground raises

because, just as passive v/Voice does not license Case on the theme argument (Chomsky, 1995; Kratzer, 1996), the non-figure-introducing little-p does not license Case on the ground argument.

(101) figure retention PV (*wipe the dust off*)



(102) ground promotion (*wipe the table off*)



The base generated position of the figure, and the movement of the ground to spec-p in ground promotion gives us the discontinuous order.

While movement for Case gives us the discontinuous order for ground promotion, movement of this type (i.e. to satisfy formal features) is generally assumed to be obligatory, so we now must explain the apparent optionality of particle shift for ground promotion. Also, if ground raising is obligatory for ground promotion PVs, we can no longer get the continuous order from the base generated structure (shown above in 99)), as that

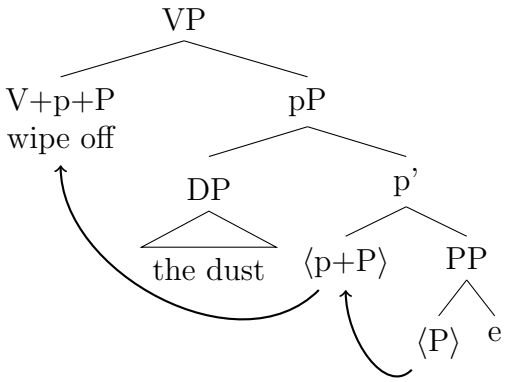
structure will never surface.

(103)

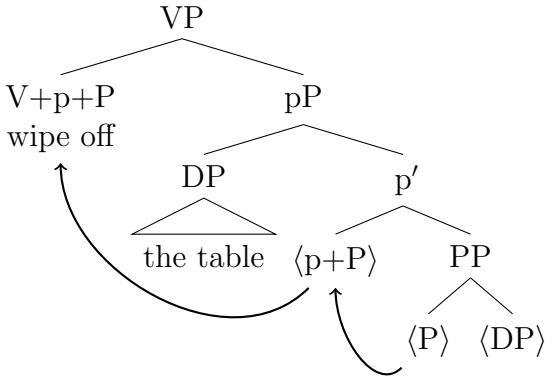
	ground promotion	figure retention
V Prt Obj	????	????
V Obj Prt	Raise DP to Spec-p	Base generated

In order to get the continuous order in figure retention, and now also for ground promotion, P must head-move to V.

(104) figure retention PV (*wipe off the dust*)



(105) ground promotion (*wipe off the table*)



As further evidence of the syntax of PVs, it can be shown that the particle does head-adjoin to the verb. As demonstrated in (106-108), an adverbial adjunct may appear immediately preceding the preposition in a full expression pP, but not in either ground promotion or figure retention with the continuous order (Elizabeth Cowper, p.c.)

(106) full expression

a. I wiped the dust quickly off the table.

(107) Discontinuous Order

a. I wiped the dust quickly off.

b. ?I wiped the table quickly off.

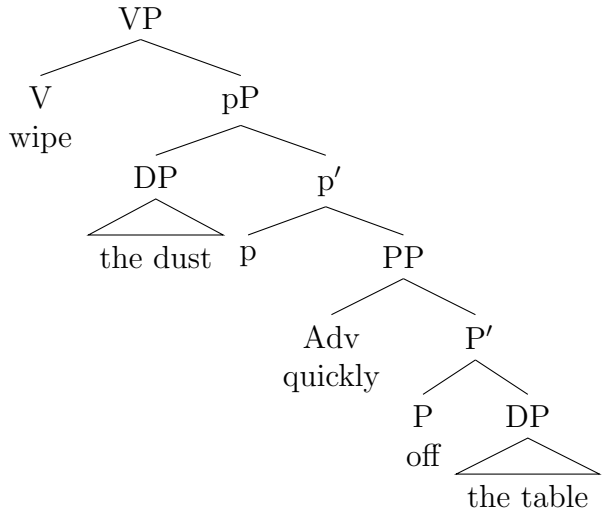
(108) Continuous Order

a. *I wiped quickly off the dust.

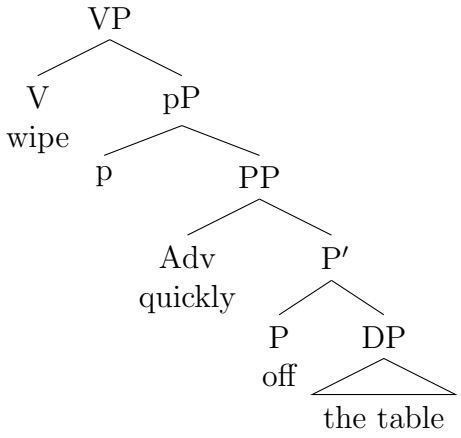
b. *I wiped quickly off the table.

If the continuous order in ground promotion arose from its base-generated structure, as shown below in (110), we would expect adjunction to be as acceptable as in the full expression construction, as shown below in (109). As demonstrated in (108b), though, such adjunction is not allowed in the continuous order of the ground promotion PV.

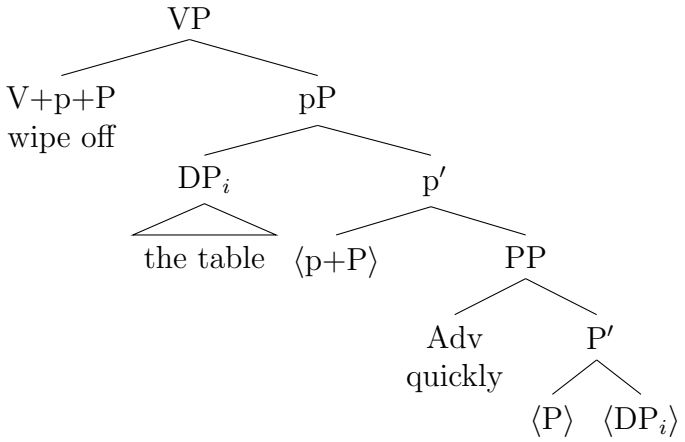
(109) Full Expression with adjunction



(110) *Ground Promotion in situ



(111) Ground Promotion with head movement



To sum up, two syntactic operations are needed to explain the facts of English PVs. One operation, ground raising, is required for ground promotion PVs, while the other, p-to-V movement, applies to figure retention and ground promotion PVs alike.

(112) A summary of the operations in PVs

	ground promotion	figure retention
V Obj Prt	Raise DP to Spec-p	Base Generated
V Prt Obj	Raise DP to Spec-p p-to-V movement	p-to-V movement

This ability to head-adjoin to verbs seems to be the main syntactic hallmark of particles in English. As such, we would expect the optionality

of particle shift to arise from optionality in p-to-V movement. That p-to-V movement may or may not occur suggests that, unlike ground raising, it does not occur to check formal features.[7]

3.4.2 German PVs

In section 3.4.2.1, I will show how particle stranding can be accounted for syntactically. Section 3.4.2.2 presents a syntactic account of the intervening morphemes *zu* and *ge-*.

3.4.2.1 Particle Stranding

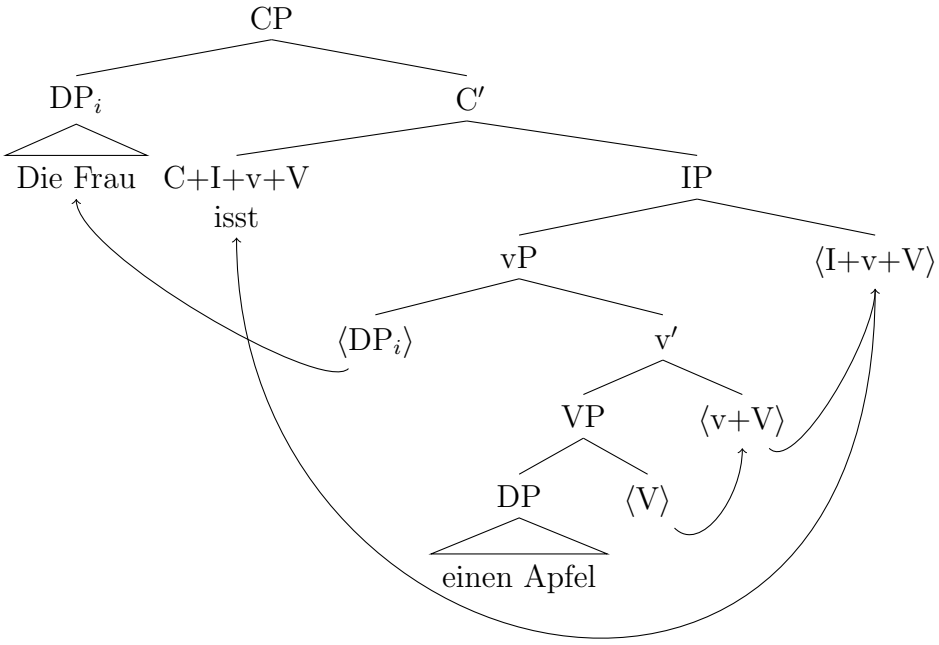
As shown in section 1.1.2.1, German has V2 word order, which means that, in a matrix clause, the finite verb is the second constituent and all other verbs are clause final. Standard syntactic representations of German V2 word order derive it by assuming that the German IP is head-final, and the finite verb undergoes both V-to-I movement and, when not blocked by an overt complementizer, I-to-C movement.

(113) Finite lexical verb (≈10a-i)

a. Die Frau isst einen Apfel.
the.NOM woman eats an.ACC apple.
"The woman is eating an apple."

[7] The motivation of p-to-V movement is unclear, but this is the case of head movement in general within minimalist syntax.

b.



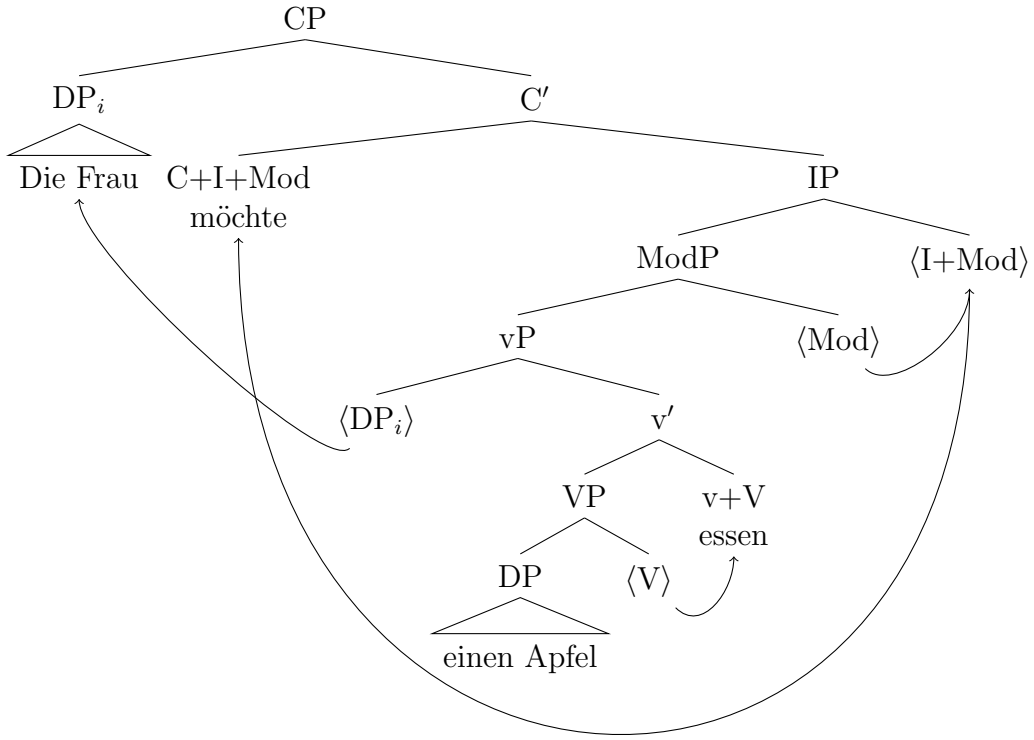
Verbs surface clause-finally when another verb (e.g. a modal) occupies I and blocks V-to-I movement. The modal, merged above v, moves to I and then moves to C and appears in second position.

(114) Finite modal (≈10b-i)

a. Die Frau möchte einen Apfel essen.
the.NOM woman would.like an.ACC apple eat.

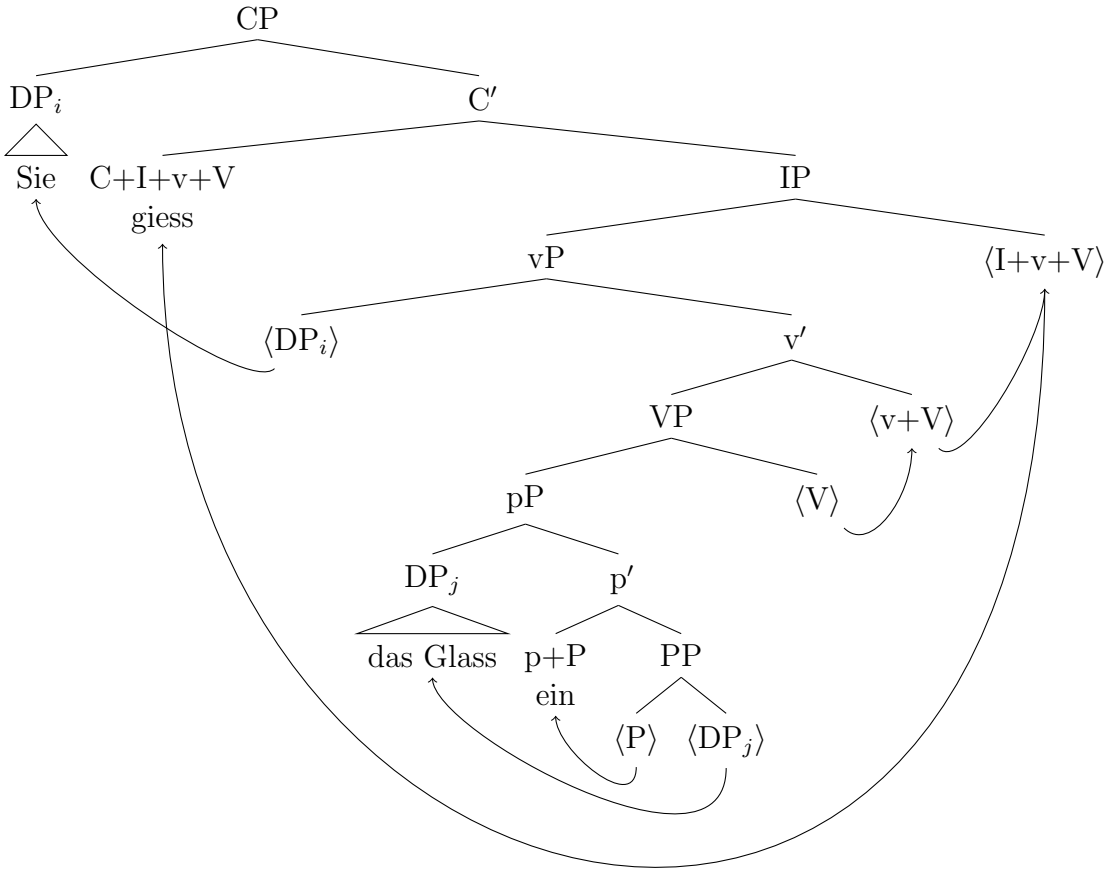
"The woman would like to eat an apple."

b.



This basic syntactic structure of the German clause, combined with an assumption that verbal particles, unlike those in English, do not move to V, predicts that particles be stranded in final position as shown in (115).

(115)



This variation suggests that p-to-V movement is one of the parameters that English and German differ with respect to.[8] Just as English differs from French and German with respect to V-to-I movement, English and German differ with respect to p-to-V movement. Note also that, as in

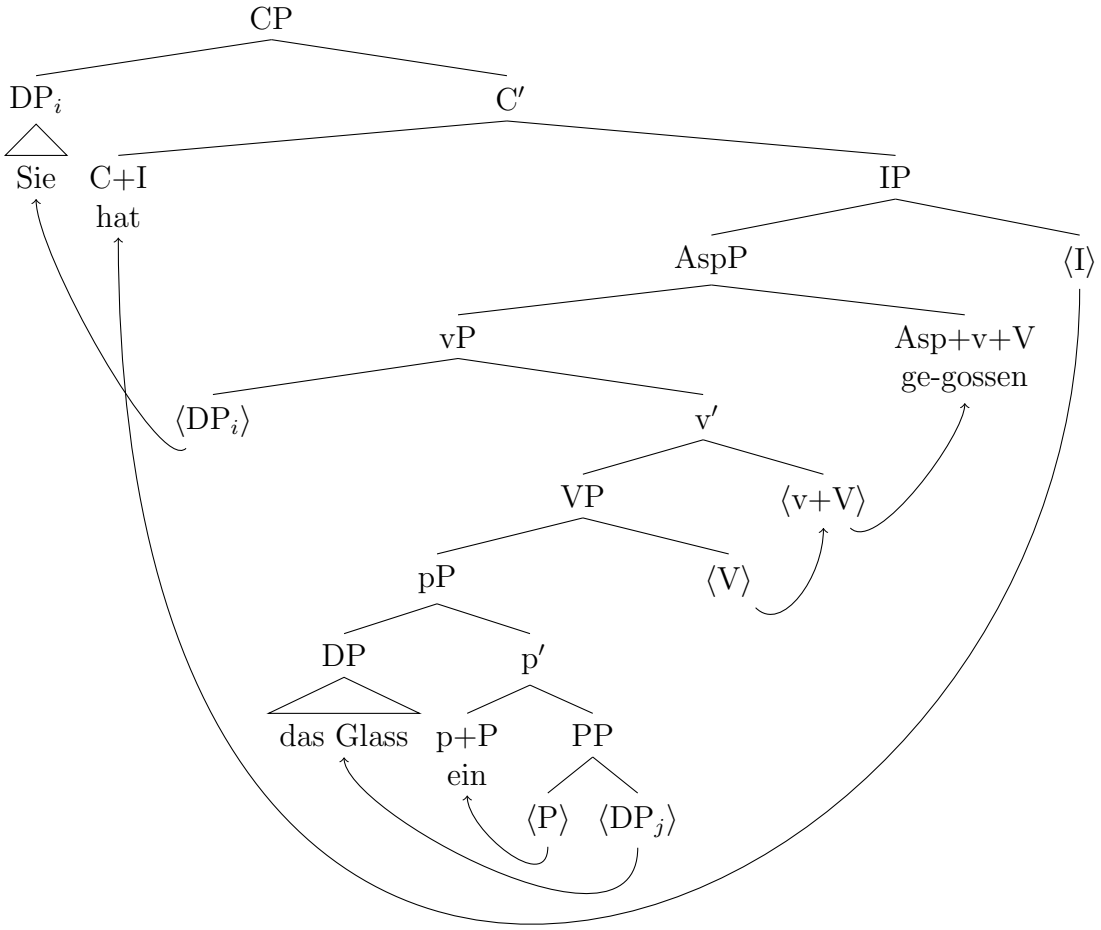
[8]Pinpointing how this parameter is instantiated in the grammar is beyond the scope of this paper.

English, it is crucial that the ground argument move to Spec-p, because the pP in German, unlike the IP, is head-initial.

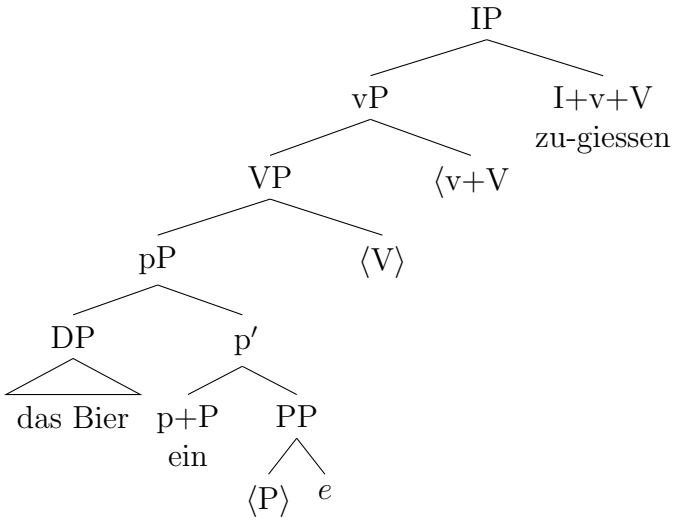
3.4.2.2 Intervening morphemes

The intervening morphemes, participial *ge-* and infinitive *zu*, can be explained in this system. If we assume *ge-* is the spellout of a perfect Asp head, which merges between v and I, and *zu* is the spellout of non-finite I, then the relevant PV constructions can be derived as shown below in (116) and (117)

(116)


CP
DP$_i$
C′
Sie
C+I
hat
IP
AspP
⟨I⟩
vP
Asp+v+V
ge-gossen
⟨DP$_i$⟩
v′
VP
⟨v+V⟩
pP
⟨V⟩
DP
p′
das Glass
p+P
ein
PP
⟨P⟩
⟨DP$_j$⟩

(117)



That *ge-* is an inextricable part of the participle is uncontroversial, as it is traditionally analysed as a prefix. The Infinitive *zu*, however, being a cognate of and having a similar function to English *to*, is generally seen as a free morpheme. In the above analysis of German *zu*-infinitives, *zu* must form a complex head with the non-finite verb. Empirical support for this comes from the restriction on "split infinitives," which seems to be a grammatical, rather than a prescriptive one.

(118) German *split-infinitive.

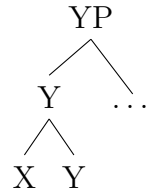
a. Ich plane morgen ein Buch schnell zu lesen.
I plan tomorrow a book quick to read
"I plan to quickly read a book tomorrow."

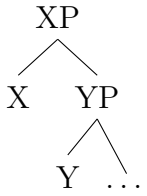
b. * Ich plane morgen ein Buch zu schnell lesen.
I plan tomorrow a book to quick read

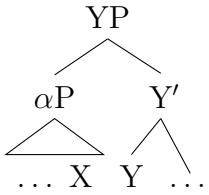
If we accept this structure and assume that PVs, when not split for V2 order, surface as single words, we must adopt a non-standard theory of word formation. The standard assumption is that, in order for two syntactic heads to surface in the same morphological word, they must be part of the same complex head at PF (Baker, 1996). According to this standard assumption, if there is a word, *XY*, consisting of two morphemes, it can only arise from the a structure like that in (119a). In our structures for German PVs, however, particles and verbs never form complex heads, yet they can surface as morphological words If we assume, however that

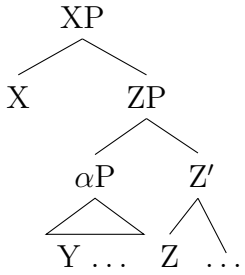
the morphological word, XY, can surface from any structure in which X and Y would surface as linearly adjacent (Julien, 2007), then the PVs in the structures in (116) and (117) can surface as single morphological words. So, allowing for specific word formation rules in a given language, XY can surface from any of the forms in (119). The structures of German PVs are approximately isomorphic with the structure in (119b).

(119) Possible syntactic configurations for the surface form XY (Julien, 2007)

a.


b.


c.


d.


Alternatively, It may be the case that German PVs are never morphological words, and their apparent woordhood is purely an artifact of German orthography. This would be the reverse of the situation in English, where, as I argue in section 3.4.1, PVs in the continuous word order are formally complex heads even though they are orthographically represented as separate words.

Chapter 4

Residual Issues, Implications, and Conclusion

In this chapter I will discuss a few problems with my account of figure retention and ground promotion constructions and offer possible solutions for these problems before concluding the paper. In section 4.1, I will discuss how my analysis can be constrained such that it only predicts that attested PVs behave like PVs. Section 4.2 will discuss how the apparent optionality of English particle shift can be accounted for. I will also review Newell's (2005) bracketing paradox in light of my account in section 4.3. I then discuss Aspectual PVs and *Aktionsart* in 4.4, and look at idiomaticity among PVs in section 4.5. Finally, in section 4.6 I provide some concluding remarks.

4.1 Restricting the analysis to PVs

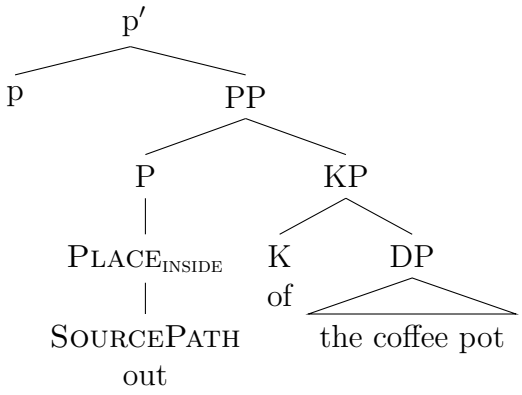
Not all spatial prepositions that take figures and grounds show the behaviour under investigation in this paper. In fact, figure retention and ground promotion are the exception rather than the rule. In English, ground promotion/figure retention seems to be restricted to the prepositions *out* and *off*

(120) *pour the glass in
Intended: "pour something into the glass"

(121) *put the table on
Intended: "put something onto the table"

The structure of particles I have argued for is one in which the directional and locative content is encoded on a single head as shown in (122).

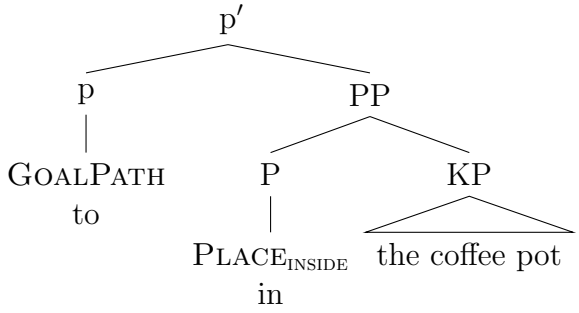
(122) out of the coffee pot



In this structure, different flavours of little-p can be projected without altering the core spatial semantics, as encoded on P. Depending on which little-p is in the structure, the resulting pP will be a full expression pP or, when merged with a verb, a ground promotion or figure retention PV.

Other directional prepositions)(e.g. *into, onto*) have their meaning split onto two heads as shown in (123)

(123) into the coffee pot



In structures such as this, little-p encodes spatial semantics and, as such, cannot be replaced by a different flavour of little-p without altering the core spatial semantics. Since a different flavour of little-p is required for the preposition to become a particle, these bipartite prepositions cannot form PVs with verbs.

The bipartite nature of *into* (as well as *onto*) is morphologically transparent, with *in-* being the exponent of P_{PLACE}, and *-to* being the exponent of p_{PATH}[1].

A bipartite directional preposition has further empirical support from Lestrade et al. (2011), who show that in many of the world's languages, directional meaning can be expressed by inflection on a spatial preposition. Finnish is one such language, as demonstrated in example (124), where the directional meaning is expressed by the Allative morpheme, *-lle*, which attaches to the spatial preposition *pää*.

(124) Finnish (Lestrade et al., 2011)

Keitä mausteliemi tarkista maku ja kaada kuumana sien-ten
cook marinade, check taste and pour while.hot mushroom-PL.GEN
pää-lle.
on-ALL

"Prepare the marinade, check the taste and pour it while still hot on the mushrooms."

4.2 The Optionality of p-to-V movement

The most notable property of English particle shift is its apparent optionality. If we wish to give particle shift a syntactic explanation, it must have a way of accounting for the optionality. In the analysis put forth here, particle shift is caused by the movement or non-movement of little-p to V. Operations like movement in minimalist syntax, however, must have a motivation (e.g. EPP, strong features), and if an operation is motivated, it must occur. In other words, syntactic operations are deterministic in that a given input structure will always have the same output. This means that the two surface orders of PVs must be substantially different in some way

Dehé (2002) provides an account for the choice of the continuous or discontinuous order motivated by pragmatics. Specifically, the focus-background structure of a sentence determines which order surfaces. The focus-background

[1] Svenonius (2010) argues for a bipartite structure for all directional. The cartographic theory he works in, however, assumes one head per feature, which would predict that *off* and *out* are also bipartite prepositions. Without the possibility of a structural distinction, it is unclear how such an approach would explain the fact that not all directional prepositions can form ground promotion/figure retention PVs.

structure is a type of information structure which depends on the novelty of the information provided by a given syntactic item. New information is the Focus of a sentence while old information is the Background.[2] For example, in responses to Wh-Questions, the constituent which is targeted by the Wh-word in the question represents new information, and therefore, bears Focus.

(125) **Situation:** Rosie hit Declan.

a. Maximal focus
Q: What happened?
A: [$_{Foc}$ Rosie hit Declan.]

b. Non-minimal focus
Q: What did Rosie do?
A: Rosie [$_{Foc}$ hit Declan.]

c. Minimal Focus
Q: Who did Rosie hit?
A: Rosie hit [$_{Foc}$ Declan.]

Dehé uses the intonation patterns associated with focus to test, experimentally, whether focus and particle shift are correlated. From her findings, she concludes that the discontinuous order (V-Obj-Prt) is associated with contexts in which the object of the PV is not focused (i.e. the Background).

(126) **Situation:** Peter threw away the milk.

a. Maximal focus
Q: What happened?
A: [$_{Foc}$ Peter threw away the milk.]

b. Non-minimal focus (Background Subject
Q: What did Peter do?
A: Peter [$_{Foc}$ threw away the milk.]

c. Minimal Focus (Object focused)
Q: What did Peter throw away?
A: Peter threw away [$_{Foc}$ The milk.]

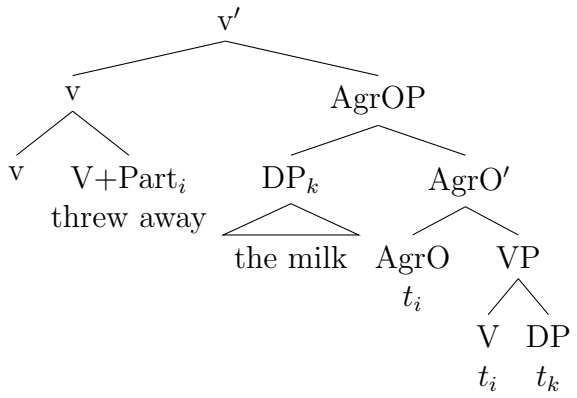
[2] It should be noted that the term, Focus, has multiple meanings within the field of pragmatics. In addition to "new information" focus, which is important here, there is also contrastive focus, which highlights information that is contrary to the context, and verum focus, which highlights the truth of some information in the context.

d. Background Object
Q: What happened to the milk
A: [$_{Foc}$ Peter threw] the milk [$_{Foc}$ away.]

The restriction on continuous ordered PVs with pronoun objects, and the preference for continuous order with large DPs as objects can easily be included in Dehé's generalization. Pronouns require a contextually salient referent in order to be used felicitously, and, therefore, necessarily represent background information, while increased modification of a DP (e.g. by Adjectives or relative clauses)tends to increase that DP's *news value* (Dehé, 2002), meaning it is more likely to bear focus.

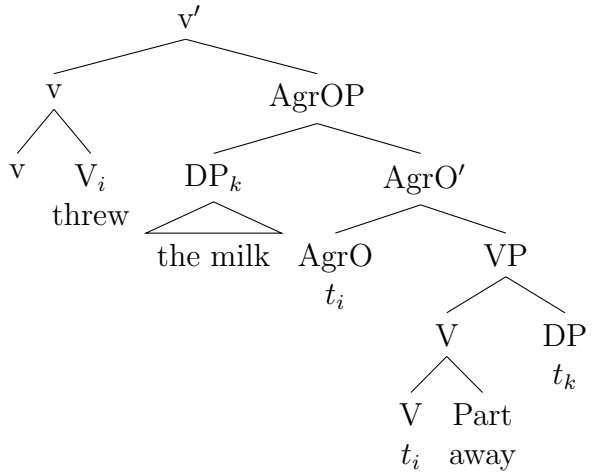
To understand how Dehé formalizes her generalization, I must first describe her analysis of the structure of PVs. She takes PVs to be underlyingly complex heads that project a theme argument in their complement and form a VP. She assumes an AgrO projection, merged directly above the VP which triggers movement of the theme to its specifier for Case. She further assumes a little-v above AgrOP which introduces the agent. Verbs, in the general theory that Dehé assumes, move to little-v, stopping in AgrO first. The discontinuous order surfaces when only the verbal component raises to AgrO and little-v. The surface structures of the two orders of PVs are given below in (127a) and (127b), below.

(127) a. Continuous order (Dehé, 2002)
threw away the milk



b. Discontinuous Order (Dehé, 2002)

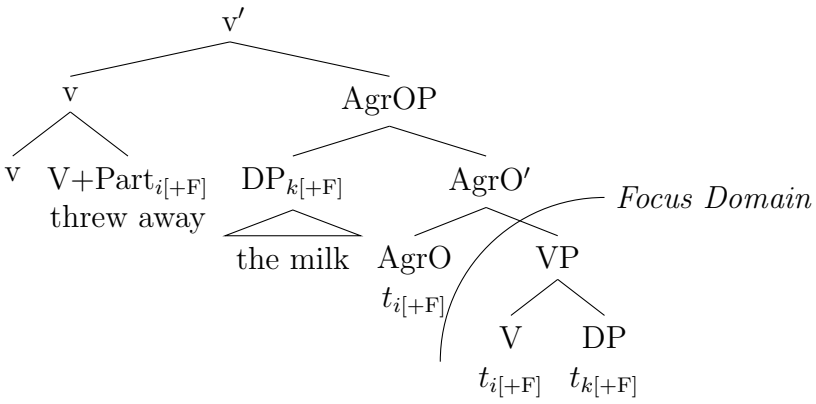
threw the milk away



Dehé argues that Focus is represented syntactically by a binary feature, [±F][3] which is placed on every head in the syntax. Also important to her analysis is the notion of a "Focus domain," which is the maximal projection that dominates the base generated positions of all of the [+F] nodes, as shown in the trees in (128) below.

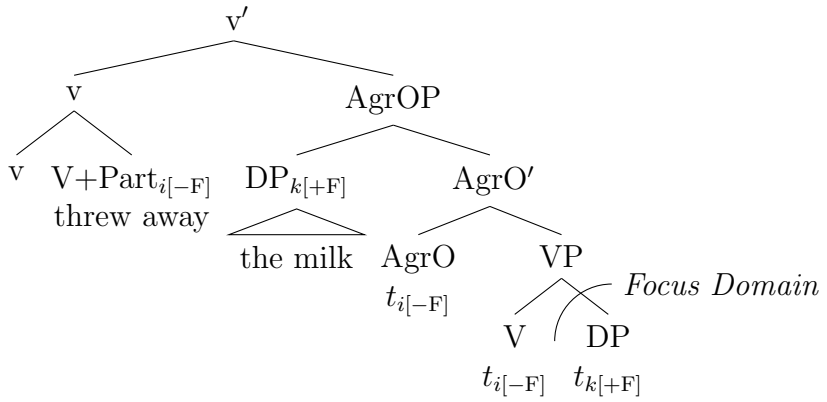
(128) English particle shift (per Dehé, 2002)

a. Non-minimal focus
Q: What did Peter do?
A: He threw away the milk.

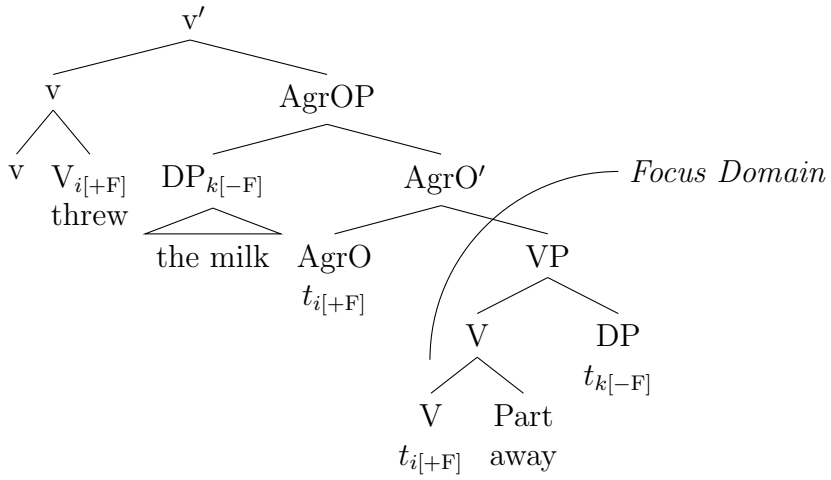


[3] Dehé (2002) notes that this feature is not a formal feature and as such does not require checking to avoid crashes.

b. Minimal focus
Q: What did Peter throw away?
A: He threw away the milk.



c. Non-minimal focus, Background object
Q: What did Peter do with the milk?
A: He threw the milk away.



The tree in (128c) shows the structure which surfaces in the discontinuous order. Note that it is the only structure whose focus domain contains a [−F] element, a fact that Dehé exploits in her final analysis. To explain the facts of English particle shift Dehé formulates a "condition on focus domains," reproduced below in (129).

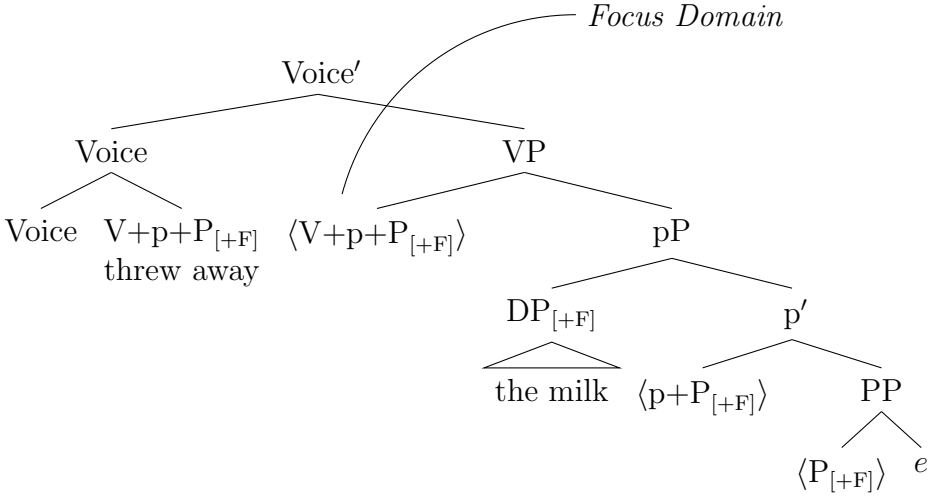
(129) *Condition on Focus Domains:* (Dehé, 2002)
Within a focus domain, a [+F] focus feature must be bound by some kind of verbal affix if there is a mismatch with regard to focus features.

As it is stated, Dehé's condition is an interface condition. Rather than being a restricting an operation (like Island Constraints on movement), it represents a criterion for the derivation's convergence at an interface (PF in this case). Given her complex head analysis, this condition allows Dehé to derive the information structure facts of particle shift.

The insight behind Dehé's condition, that the discontinuous order results from a focus feature mismatch, is also able to derive the information structure facts in the analysis I have argued for above. When there is no mismatch in the focus domain, as in (130a), the particle may surface with the verb on Voice, outside the focus domain. The structure in (130b), however, shows a clash in the focus domain, which leads to the discontinuous order.

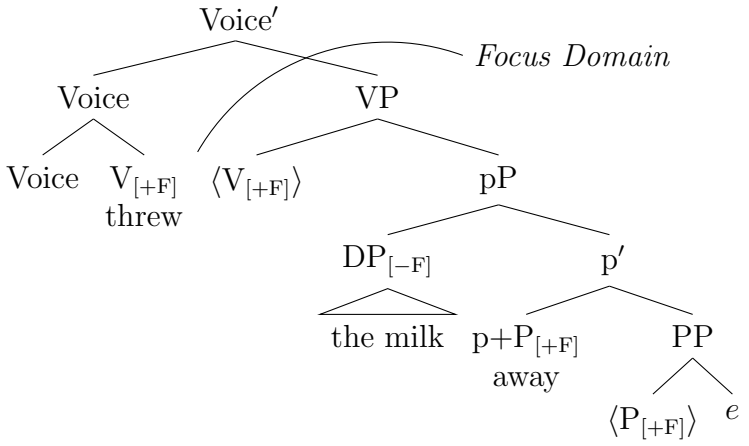
(130) Focus Domains in a pP analysis

a. Non-minimal focus[4]
Q: What did Peter do?
A: He threw away the milk



[4] Since Peter's agency, which is encoded by Voice, is included in the question, I take Voice to be outside the focus domain.

b. Non-minimal focus, Background object
Q: What did Peter do with the milk?
A: He threw the milk away.



Unlike in Dehé's structure, the operation responsible for determining which word order sufaces, p-to-V movement, does not move the p+P complex out of the focus domain. As such, the condition on particle movement, as defined in (129), can place no restrictions whatsoever on the initial move. It is not until V-to-Voice movement that the condition can restrict movement. At this point, however, p-to-V movement has already occurred, so we should expect to see only the continuous order surface.

With the copy theory of movement, however, the condition can be reformulated to require that the lower copy of the particle be pronounced when there is a mismatch. This would mean that p-to-V movement always occurs when it can in the syntax, effectively rendering the optionality of particle shift a phonological phenomenon.

Relegating choice of word orders to a PF operation is not explanatory though. Lacking a syntactic explanation for the optionality, a morphophonological one is needed. This, however is beyond the scope of this paper, and further research would be necessary to determine what morphophonological motivations drive this choice.

4.3 The bracketing paradox - revisited

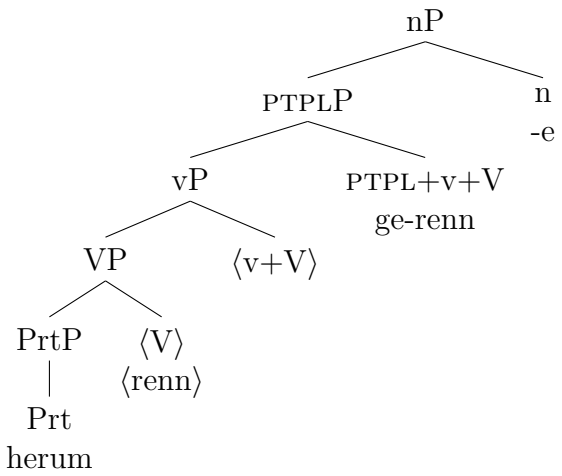
Recall in section 2.2.3, I discussed the hypothesis, proposed by Newell (2005, 2008), that particles in German are late adjuncts. The central observation that this hypothesis was designed to explain was a bracketing paradox in the nominalized participles of German PVs, demonstrated below in (131).

(131) a. Morphological bracketing (=57a)
[herum [ge [renn] e]]
b. Semantic bracketing (=57b)
[ge [herum [renn]] e]

According to Newell, the particle is interpreted as being local to the verb despite the fact that other morphology intervenes between the two.

The analysis I have argued for is able to capture this paradox, provided the verb is interpreted in its base generated position. Consider structure for *herumgerenne*, below in (132).

(132)



In the above tree (cf. example (116)), the particle merges in the complement of V rather than as an adjunct. The verb then raises cyclically through little-v to PTPL where it is pronounced without the particle adjoined to it. The c-commanding nominalizing head is pronounced as the suffix $-e$. Although the verb root *renn* is pronounced in its higher position, the base generated copy (i.e. in V) is the one interpreted at LF. Not only is this structure capable of explaining the bracketing paradox, it exploits the same displaced interpretation of the verb that Newell does. In fact, with the

caveat that *herum* is the complement of V rather than an adjunct, the structure I argue for is very nearly identical to the one Newell argues for, as reproduced in (60).

4.4 Aspectual PVs

In chapter 2, I argued that McIntyre was able to find counterexamples to almost every argument in favour of either side of the verb-dependency/anti-verb-dependency debate only because he was comparing across the different types of PVs. To avoid this issue, I have only focused on one class of PVs: ground promotion. In this section, I will return to one of the other PV classes that McIntyre identified: aspectual PVs.

While figure/ground PVs were amenable to analysis due to their similarity to full expression spatial pPs, aspectual PVs have no such counterpart to be compared with and can be either transitive or intransitive as shown below.

(133) a. sing (*the entire song) along
b. think the matter *(through/over)
c. Gabi will das Problem *(an)-denken
Gabi wants the problem at-think
"Gabi wants to start thinking about the problem."

Given the variability of the argument structure of aspectual PVs, it is not immediately clear that a unified account can be given. Just as ground promotion/figure retention PVs became more transparent when we compared them to figure/ground pPs, investigating aspectual PVs with special attention to their *Aktionsart* may yield results. Consider the examples below with respect to their *Aktionsart*.

(134) a. sing the entire song [for an hour/in an hour] (telic/atelic)
b. sing along [for an hour/*in an hour] (atelic)

(135) a. think [for an hour/*in an hour] (atelic)
b. think the idea through [for an hour/in an hour] (telic/atelic)

The function of aspectual particles is to alter the *Aktionsart* of the verbs with which they appear. Investigating *Aktionsart* can shed light on the argument structure of aspectual PVs because it is often linked to the internal

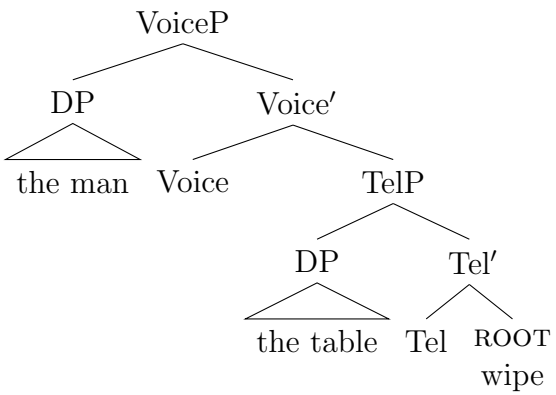
argument (or lack thereof) of a verb (Levin and Rappaport Hovav, 2005; Borer, 2005). Consider the sentences in (136).

(136) a. *telic*
We ate **a loaf of bread** in 20 minutes.
b. *atelic*
*We ate **bread** in 20 minutes.

In the two clauses above, the difference between a mass and a count noun as the internal argument translates to a difference of telicity. In general, the telicity of transitive verbs is dependent on the boundedness of their themes.

Borer (2005) proposes a theory of argument structure in which all arguments are introduced by functional heads. In her system, lexical verbs are inherently unspecified for argument structure, and themes are introduced by a head that specifically relates the *quantity* (cf. boundedness) of the theme to the quantity of the eventuality described by the verb. That is to say, the functional head that introduces the theme also defines the telicity of the verb (For a similar proposal, see Kratzer, 2004). A transitive VoiceP, assuming this part of Borer's theory,[5] would have the structure below (where Tel is the theme-introducing telicity head).

(137) The man wiped the table.



This notion that aspect-determining heads are responsible for argument introduction, combined with the notion, argued for in this paper, that particles can introduce arguments, suggest a possible link between the argu-

[5] The proposals that all arguments are introduced by functional heads and that the theme-introducing head encodes telicity are part of a full theory of syntax which Borer (2005) outlines in a three-volume work.

ment structure of figure/ground PVs and that of aspectual PVs. Given their aspect-determining function, it is possible that aspectual particles are realizations of Borer's telicity heads. The fact that aspectual PVs show variability with respect to argument structure, then, would follow from the fact that aspectual particles are responsible for the introduction (or non-introduction) of the internal argument.

Although ground promotion PVs and aspectual PVs differ significantly with respect to argument structure, they have the same syntactic behaviour (i.e. particle shift in English and separability in German), so it is reasonable to expect they show some commonalities in their syntactic structures. Crucial to my syntactic analysis of figure/ground PVs was that particles merge in the complement of the verbs with which they appear. According to Borer's theory, however, the telicity head merges above the verb. If the proposal that aspectual particles are overt telicity heads is to be pursued, Borer's framework will have to be adapted to allow telicity heads to merge in the complement of the verb.

4.5 Idiomaticity

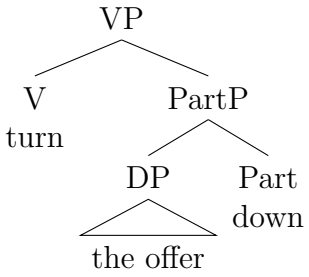
In English and German, many PVs have idiomatic meaning. Some PVs are partially idiomatic, meaning one component (either the particle or the verb) retains its canonical meaning, but the combination is not interpreted compositionally. Take, for example, *look up*, whose meaning ("consult; seek information") is related to that of its verbal component, but is not recoverable by merely combining the meanings of both components. Other PVs, however are completely idiomatic. For example, as shown below in (138), the German PV, *anfangen*, has a meaning completely unrelated to that of its constituent parts.

(138) an- fangen
at- catch/trap
"begin/start"

Idiomaticity would be easy to account for given a Complex head analysis; one would simply need to stipulate that idiomatic PVs are stored as such in the lexicon. According to the theory of PVs argued for in this paper, not only are PVs not stored as single lexical items, they don't even form syntactic constituents. Each component of an idiomatic PV projects its

own phrase and, in the case of transitive PVs, the particle introduces an argument which is not interpreted idiomatically. For example, the PV, *turn down* (="reject") is transitive and idiomatic, meaning its VP would have a structure like that in (139), below.

(139) *turn the offer down*



Constituency, however, is not a requirement for idiomatic interpretation. Bruening (2010) gives several examples, some of which are given below in (140), that show idioms which, like idiomatic PVs, do not form constituents.

(140) a. Get X's goat
b. a little bird told X
c. pull {some discreet/a few/yet more} strings

(Bruening, 2010)

Bruening formulates a principle of idiom interpretation, defined below in (141), based on selection rather than constituency.

(141) *The Principle of Idiom Interpretation* (Bruening, 2010)
X and Y may be interpreted idiomatically only if X selects Y.

It is reasonable to assume that, since verbs and particles are in a Head-Comp relationship, one head selects the other. Therefore PVs may be interpreted idiomatically.

4.6 Conclusion

In this paper, I have endeavoured to answer the question asked by McIntyre (2007): "Are direct arguments arguments of particles or verbs?" I have argued here that, in the case of ground promotion and figure retention PVs, the direct objects are arguments of particles. More accurately, the particles

in question are actually defective prepositions which project an extended prepositional phrase (pP) and take the direct object as an argument. I discussed the fact that there is an asymmetry between ground promotion and figure retention PVs with respect to their interpretation and argued that this asymmetry is reflected in an a structural asymmetry in the pP that introduces the figure and ground arguments I have provided a semantic and account of the relevant PVs that explains the semantic underpinnings of the pP, and a syntactic account which explains the fact that, despite their structural asymmetry, figure retention and ground promotion PVs show identical syntactic behaviour in English (particle shift) and German (separability)

There are a number of puzzles that have been identified by my analysis of ground promotion PVs While I argued that the choice between word orders in English PVs, though triggered by information structure, is a function of morphophonology, I did not explore possible morphological or phonological factors in the choice. Also, I argued that ground arguments are present, though unexpressed, in figure retention PVs, but did not fully identify the nature of these implicit arguments Lastly, I was unable to precisely define the semantic function responsible for introducing a figure argument into a directional expression.

More generally, my hope is that this study might inspire further research into the other classes of PVs. I have shown that starting from explicit assumptions regarding the relationship between syntax, semantics and argument structure, and limiting my inquiry to one natural class of PVs can yield much better results than treating all PVs as a monolithic class.

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