A taxonomy of successive cyclicity effects

Introduction

Since Chomsky (1973), much evidence has accrued for the idea that long-distance dependencies are successive-cyclic, and thus are decomposed into a series of shorter dependencies. However, there is a wealth of proposals about how successive cyclicity effects actually arise, such as through feature percolation (e.g. Gazdar 1981; Pollard and Sag 1994; Neeleman and Van de Koot 2010), feature-driven intermediate movement (Chomsky 1995; McCloskey 2002; Abels 2012a), or intermediate movement triggered by an alternative mechanism (Heck and Müller 2000, 2003; Bošković 2002, 2007; Chomsky 2013). Also, different researchers have come to different conclusions about which domains evidence successive cyclicity effects. In some approaches, all phrases on the path of movement are implicated, but, in other theories, successive-cyclic dependencies are punctuated paths, because only some phrases constitute phases (e.g. CP and *v*P). Even in the context of a punctuated path approach, it has been questioned whether CP and *v*P have the same status (e.g. Rackowski and Richards 2005; Den Dikken 2009, 2010; Keine 2016), as well as whether PPs and DPs may also constitute phasal units (and possibly also *n*, *a*, etc.).

This paper attempts to shed light on these questions by investigating the question of which reflexes of successive cyclicity are attested crosslinguistically and whether all such effects are found in all domains. From the resulting survey, a consistent picture emerges. We can create a predictable taxonomy of successive cyclicity effects that accords exactly with the predictions of a view in which long-distance dependencies involve successive steps of feature-driven movement that leaves copies (Chomsky 1995; McCloskey 2002; Abels 2012a). In contrast, theories that do away either with intermediate movement or with a featural component to intermediate movement have trouble accounting for the full range of successive cyclicity effects. In addition, I demonstrate that there is clear evidence for at least two phasal boundaries in the clausal domain, one associated with the clause edge and one with the verbal domain (Chomsky 1986 et seq.). These domains display symmetry, in that they show the same range of successive cyclicity effects (contra, for instance, Rackowski and Richards 2005, Den Dikken 2009, 2010, and Keine 2016). Finally, I review the question of whether similar evidence can be found for the PP/DP domain, ultimately concluding that these too are phasal domains, even though some key effects appear to be absent.

1 Three views of successive cyclicity

Most theoretical approaches to syntax acknowledge that long-distance dependencies display successive cyclicity effects, but there is a great deal of variation as to how these are implemented exactly. I start by drawing a distinction between three basic types of theories of successive cyclicity: feature percolation, feature-driven movement, and what I will refer to as "featureless" movement.

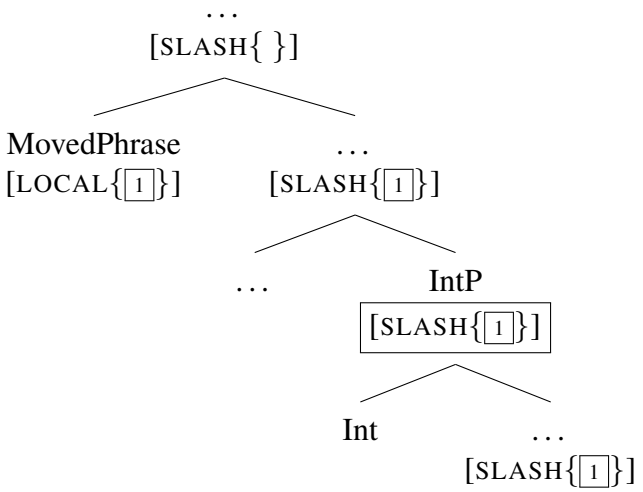
1.1 Feature percolation

In a feature percolation approach, long-distance dependencies do not involve intermediate movement steps. Instead, long-distance dependencies are established by a mechanism of feature percolation that links the gap site to the antecedent. This type of approach is commonly adopted in syntactic frameworks that do not make use of movement, like Head-Driven Phrase Structure Grammar or

Lexical-Functional Grammar (e.g. Pollard and Sag 1994; Bouma, Malouf, and Sag 2001; Dalrymple 2001). A minimalist version can be found in Neeleman and Van de Koot (2010).

In HPSG, for example, long-distance dependencies are often modelled with the feature SLASH, which can carry information up the tree (e.g. Pollard and Sag 1994; Bouma, Malouf, and Sag 2001). A SLASH feature carries information about missing phrases up the tree, which is then connected to the dislocated phrase through feature unification, as represented in (1).[1] Here and throughout IntP represents an Int(ermediate) node.

(1) *Feature percolation using* SLASH*:*



Feature percolation makes clear predictions about what successive cyclicity effects should look like crosslinguistically. Since such an approach denies the existence of any intermediate movement, there should be no evidence of the syntactic presence of the moved phrase in any intermediate location. But intermediate nodes, like IntP in (1), might morphologically reflect the value of SLASH, in the same way that other morphosyntactic features can affect realization.[2]

It is important to note that, technically speaking, classic feature percolation proceeds from daughter to mother, leaving Int itself unaffected, as in Pollard and Sag (1994). But many implementations of percolation allow for IntP to dictate the shape of the head Int (in HPSG, see Bouma, Malouf, and Sag 2001 or Vaillette 2002, for instance), so I abstract away from this issue in what follows.

[1] I will not discuss different implementations of feature percolation in detail, since the crucial point here is only that such approaches make the prediction that successive cyclicity effects should be limited to the realization of extraction features on intermediate heads.

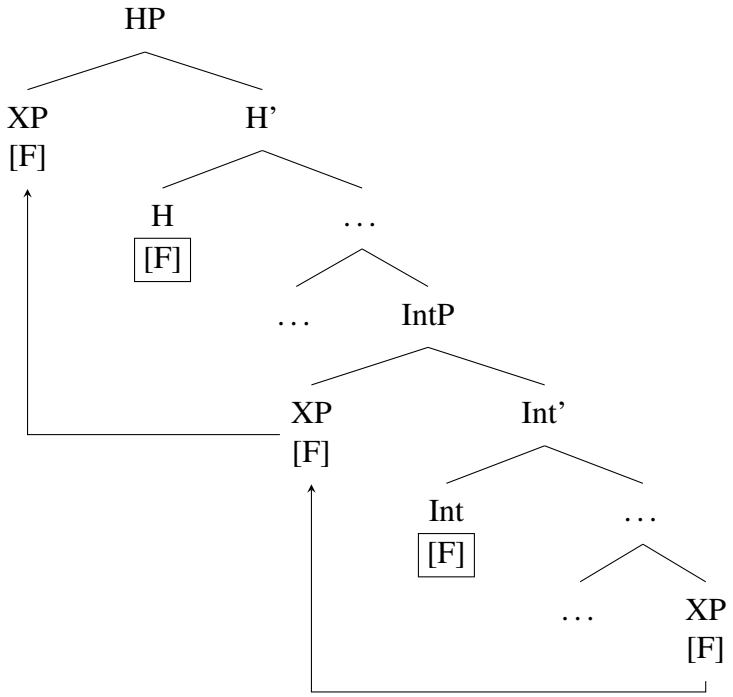
[2] It is worth noting that the implementation of long-distance dependencies in LFG is quite different, such that it may even be somewhat misleading to label it as feature percolation. In LFG, the relationship between the antecedent and gap site is handled through functional equations and not through percolated features. However, the way successive cyclicity effects are handled is ultimately the same, since LFG handles successive cyclicity effects like the Irish complementizer alternations by placing constraints on intermediate nodes. As a result, these approaches appear to make the same predictions for the typology of reflexes of successive cyclicity.

1.2 Feature-driven intermediate movement

Feature percolation is often contrasted with approaches that assume successive cyclicity effects arise because of intermediate movement steps (Chomsky 1977 et seq.). Within movement-based approaches, we can distinguish at least two theories of intermediate movement, depending on whether intermediate movement involves a featural trigger.

In the first type of movement-based approach, intermediate movement, like the final movement step, is assumed to be feature-driven (e.g. Chomsky 1995; see also McCloskey 2002; Abels 2012a; Georgi 2014). The representation of a long-distance dependency is then something like (2). An XP bearing a feature [F] moves to a head H bearing the same feature. Movement to an intermediate position Int is driven by the same movement trigger [F].[3]

(2) *Feature-driven intermediate movement:*



As in a feature percolation approach, this type of theory predicts that there are successive cyclicity effects which reflect the realization of a feature signalling extraction on an intermediate head Int. But a movement-based approach also predicts another class of successive cyclicity effects. Such a view posits intermediate copies, and so the effects of these should be detectable. For example, we expect to find cases of multiple copy spell-out, or stranding of material in intermediate positions, as well as semantic effects associated with the intermediate copy.

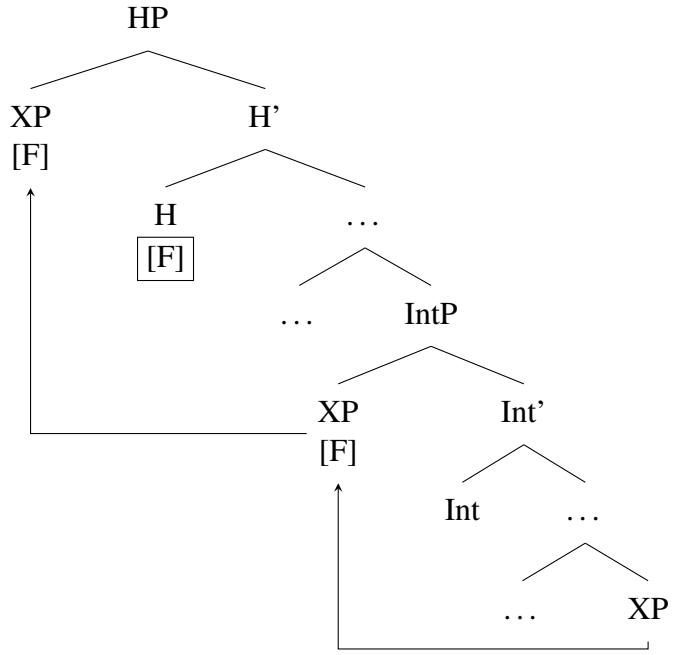
[3] Or a version of [F]. In a feature-driven theory, it is conceivable that the feature driving intermediate movement is not quite identical to the feature driving final movement, for example in whether it is interpretable/uninterpretable or in whether it is flat or articulated, if probing features are part of a feature geometry (Rizzi 1990; Abels 2012b). See in particular Georgi (2014).

1.3 "Featureless" intermediate movement

An issue that arises within a theory that makes use of feature-driven intermediate movement is how to regulate the distribution of intermediate featural triggers. As a consequence, a variety of movement-based approaches to successive cyclicity have been developed that eliminate the need for intermediate featural triggers (e.g. Heck and Müller 2000, 2003; Bošković 2002, 2007; Chomsky 2013). I will refer to these as "featureless" intermediate movement theories.

Featureless approaches ensure that intermediate movement takes place in a variety of ways. In Heck and Müller's (2000, 2003) OT approach, the constraint PHASEBALANCE prevents phrases with uninterpretable features from remaining in Spell-Out domains. In this type of approach then, intermediate movement is not accompanied by any dedicated features on intermediate heads, while the final movement step may still be driven by a featural trigger.[4] This is represented in (3).

(3) *"Featureless" intermediate movement:*



Other featureless approaches result in the same configuration. Bošković (2002, 2007) derives the need for intermediate movement by proposing that the XP moves in order to establish the c-command configuration appropriate for Agree. Although the impetus for movement is different, this proposal results in the same representation (3). Similarly, Chomsky's (2013, 2015) recent work on successive cyclicity also assumes long-distance dependencies have the structure in (3), although the distribution of intermediate movement is regulated only by wellformedness constraints resulting from labeling requirements.

Again, this approach to successive cyclicity makes different predictions about what the reflexes of successive cyclicity should look like crosslinguistically. Like a feature-driven intermediate movement approach, this perspective on successive cyclicity predicts intermediate copies along the

[4]It is conceivable in a free Merge approach that no movement is ever accompanied by feature-sharing (in Chomsky's free Merge theory, however, the requirements of labeling still force feature-sharing in the terminal position). The same empirical problems that I identify for featureless intermediate movement would arise for such a proposal.

path of movement. In contrast to the other two approaches, however, featureless approaches do not predict morphological realizations of features signalling extraction on intermediate heads.

An important caveat to this picture is that there is a type of morphological effect that a featureless approach could predict. As Preminger (2011) notes, an intermediate copy could act as a trigger for allomorphy of Int, if allomorphy can be triggered in such a configuration (contra Bobaljik 2012, Bobaljik and Harley 2017). In section 2.1.1, I discuss in more detail how such allomorphy could be distinguished from a "genuine" morphological effect.

We have seen then that there are at least three broad categories of approaches to successive cyclicity, which can be distinguished according to their typological predictions of what type of successive cyclicity effects we expect to find. These predictions are summarized in Table 1.

Table 1. Expectations about reflexes of successive cyclicity.

	Effect on intermediate head	PF/LF presence of copy
Feature percolation	yes	no
Feature-driven movement	yes	yes
Featureless movement	no (except allomorphy)	yes

This paper tests these predictions. I survey the evidence for successive-cyclic movement and develop a taxonomy of attested successive cyclicity effects. On the basis of this, I argue that the attested reflexes of successive cyclicity suggest a featural component, as well as the presence of intermediate copies, lending support to a feature-driven intermediate movement approach (e.g. Chomsky 1995; McCloskey 2002; Abels 2003, 2012a).

At the same time, I will examine the question of how these reflexes are distributed across different possible phasal domains, focusing on CP, *v*P, DP, and PP. As we will see, this survey reveals a strong degree of parallellism between the CP and *v*P domain. Specifically, I will argue that each reflex attested at one edge is attested at the other, providing evidence that both phrases constitute locality domains (Chomsky 1986 et seq.). A more complex picture emerges for DP and PP, as we will see that some possible reflexes of successive-cyclic movement through these domains remain unattested.

2 Featural effects on intervening nodes

I will start this paper by examining the question of what types of successive cyclicity effects are visible on intermediate material. Both a feature percolation approach and feature-driven intermediate movement predict the existence of such effects. I identify at least four types of effects along these lines: extraction marking, parasitic agreement, lexical choice, and inversion. These facts provide evidence for a featural component to successive cyclicity.

2.1 Morphological form

The simplest way in which the presence of a feature can affect an intermediate head is through the morphological realization of an extraction feature, resulting in extraction marking. Such effects are commonly found at the CP edge, and at *v*P as well. In addition, a detailed look at extraction marking in Dinka suggests that such phenomena cannot uniformly reflect allomorphy, as a featureless approach would expect.

2.1.1 Extraction marking at the CP edge

I first discuss extraction marking at the CP edge, perhaps one of the most commonly found reflexes of successive cyclicity. A famous example of extraction marking comes from Irish complementizer alternations (e.g. McCloskey 1979, 2001, 2002). Irish has a declarative complementizer *go*, as well as a dedicated extraction complementizer *aL* that appears when Ā-movement targets the left periphery (4a–b).[5]

(4) *Two different complementizers in Irish:*

a. Creidim [$_{CP}$ **gu**-r inis sé bréag].
believe.1SG C.DCL-PAST tell he lie
'I believe that he told a lie.'

b. an fhilíocht [$_{CP}$ **a** chum sí ___]
the poetry C.EXT composed she
'the poetry that she composed'
(McCloskey 2002:185–186)

Importantly, all intervening complementizers on the path of long-distance movement must be *aL* (5), revealing the presence of intermediate successive-cyclic dependencies.

(5) *Extraction complementizer appears in intermediate clauses:*

an t-ainm [$_{CP}$ **a** hinnseadh dúinn [$_{CP}$ **a** bhí ___ ar an áit]]
the name C.EXT was-told to-us C.EXT was on the place
'the name that we were told was on the place'
(McCloskey 2002:185)

Dinka also has an extraction marking pattern (Van Urk 2015). Dinka has a V2 effect at the clause edge that is found both in matrix and embedded clauses. In addition to this, the verb/auxiliary in V2 position carries a prefix with a dedicated extraction form found with Ā-movement. In long-distance dependencies, this extraction prefix must appear both at final and intermediate V2 positions (6a–b).

(6) *Extraction prefix in Dinka:*

a. Yè kɔ̂ɔc-kó$_i$ Ø-yṳ̈ṳ̈kṳ̀ ké tàak [$_{CP}$ kɛ̈ Ø-cɪ̈́i Áyèn (ké)
be people-which EXT.3-HAB.1P 3PL think.NF C EXT.3-PRF.OV Ayen.GEN 3PL
càm kɛ̈nɛ̈ kêek$_i$]?
eat.NF with 3PL
'Which people do we think Ayen has eaten with?'

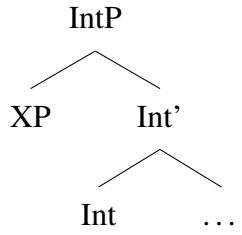
b. Ye kɔ̂ɔc-kó **ɛ́-kɛ̀**-yá ké tàak [$_{CP}$ **ɛ́-kɛ̀**-cɪ́i
be people.CS-which.PL EXT.PST-3P-HAB.2SG 3PL think.NF EXT.PST-3P-PRF.OV
Áyèn ké gàam gàlàm]]?
Ayen.GEN 3PL give.NF pen
'Which people did (s)he think that Ayen had given a pen to?'

[5]There is also a complementizer *aN* that signals resumption. The terms *aN* and *aL* refer to the mutation effect triggered on the following verb, where N = nasalization and L = lenition. See McCloskey (2002) for detailed discussion of the distribution of these complementizers.

In (6a), both the matrix and embedded auxiliary surface with a null prefix instead of the expected prefix in present tense declaratives, *à-*. In (6b), both auxiliaries appear with *ɛ̈́-* instead of the past tense variant *áa-*.

Extraction marking effects have often been interpreted as evidence for a featural component to successive cyclicity. However, as noted above, featureless approaches could account for extraction marking by positing an allomorphy effect, in which the form of a complementizer is sensitive to whether its specifier is occupied. Specifically, in a configuration like (7), we could imagine that Int has a special allomorph that only appears in the context of a filled specifier, with VI rules like (8).

(7) *Allomorphy configuration:*



(8) *VI rules for Int:*
$\text{Int}_\text{A} \rightarrow$ A
$\text{Int}_\text{B} \rightarrow$ B / XP ___

There are conceptual reasons to worry about this type of account, since some recent work on the locality of allomorphy explicitly rules out allomorphy in a configuration like (7) (e.g. Bobaljik 2012; Bobaljik and Harley 2017). Bobaljik and Harley observe that root suppletion triggered by number is sensitive only to the plurality of an unaccusative subject or transitive object. They account for this restriction by ruling out allomorphy in a specifier-head configuration.

But, if we set such concerns aside, the system described in (7) and (8) could create an apparent extraction marking effect without a featural trigger on Int. However, this idea cannot provide a general solution to extraction marking effects, because of the Dinka pattern in (6a–b). In Dinka, the extraction prefix cannot be the result of allomorphy triggered by a filled specifier, because this specifier is ordinarily occupied as well, as a result of Dinka's V2 system (see Van Urk and Richards 2015 and Van Urk 2015).[6] An alternative might be to adopt VI rules like (8) that care specifically about the featural content of the XP that precedes the V2 position, so that the allomorph of Int only appears when preceded by an XP with an Ā-feature. However, we can show that such an approach is not correct for Dinka. Long-distance topicalization is not accompanied by the extraction prefix at the landing site, so that the declarative prefix *à-* surfaces instead. However, in the intermediate landing site, the extraction prefix still appears (9).

(9) *Extraction prefix in intermediate position with topicalization:*
Cuîin **à**-yàa tàak [$_{\text{CP}}$ kɛ̀ **∅**-cɛ́ɛm Áyèn].
food DECL.3SG-HAB.1SG think.NF C EXT.3-eat.OV Ayen.GEN
'The food, I think Ayen is eating.'

[6]The Irish pattern is also difficult because of the need to distinguish *aL* from *aN*, which McCloskey (2002) does by featural means.

It cannot be the case then that the extraction prefix is an allomorph conditioned by the features of the moving XP, because the two prefixes should then be identical in form. In contrast, a featural approach can explain (9) by allowing for the probes driving intermediate and terminal movement to differ.[7]

Other languages with extraction marking patterns include at least Asante Twi (Korsah and Murphy 2016), Chamorro (Chung 1982), Kîîtharaka (Abels and Muriungi 2008), Seereer (Baier 2014), and Wolof (Torrence 2005).

2.1.2 Extraction marking at vP edge

Extraction marking is found at the *v*P edge as well. Bennett et al. (2012) describe a *v*P-level extraction morpheme in Defaka (Ijoid). In Defaka, the morpheme *-kè* appears on all verbs crossed by movement (11a–b).

(11) *Defaka -kè appears on all intermediate verbs:*

a. Bruce ndò Bòmá jírí-**kè** [$_{CP}$ ___ á ésé-mà]
Bruce FOC Boma know-EXT her see-NFUT
'It is Bruce that Boma knows saw her.'

b. áyá jíkà ndò Bòmá ì bíè-**kè** [$_{CP}$ ì ísò ___ sónó-mà-**kè**]
new house FOC Boma I ask-EXT I ISO buy-NFUT-EXT
'It is a new house that Boma asked me if I'm going to buy.'

Bennett et al. argue that this extraction morpheme is in the verb phrase and not in the left periphery, on the basis of the fact that extraction a local subject is not accompanied by extraction marking (12a). Subjects are generated at the *v*P edge and so do not need to undergo intermediate movement to escape this domain. The *-kè* morpheme is triggered by extraction of a local object or adjunct (12b–c).

(12) *Defaka -kè appears with non-subject extraction:*

a. ì kò Bòmá ésé-kà-rè
I FOC.SBJ Boma see-FUT-NEG
'It is me that will not see Boma.'

b. tárì ndo Àmànyà ómgbìnyà sónò àmà-**kè** ___ kí$^{!}$á $^{!}$té?
who FOC Amaya shirt buy give-EXT market P
'Who did Amaya buy a shirt for at the market?'

c. [$_{PP}$ ándù kìkià] ndò à èbèrè rì bòi-mà-**kè**
canoe under FOC the dog RE hide-NFUT-EXT
'It is under the canoe that the dog is hiding.'

[7]Note that we also cannot resort to the idea that the extraction prefix surfaces when nothing overtly occupies the clause-initial position. The clause-initial position can be occupied by other silent material without triggering the extraction prefix, in instances of *pro*-drop (10).

(10) *No extraction prefix with pro-drop in Dinka:*

pro **à**-cé̱ cu̱i̱n câam.
DECL.3SG-PRF food eat.NF
'S/he has eaten food.'

(Defaka; Bennett et al. 2012:294,296)

In addition, long-distance movement of a subject does trigger the extraction morpheme in the higher clause, since a subject must still cross the matrix *v*P edge (13). This tells us that there is no independent restriction on using *-kè* with subject extraction.

(13) *Defaka -kè appears on matrix vP with long-distance subject movement:*

Bruce ndò Bòmá jírí-**kè** [$_{CP}$ ___ á ésé-mà]
Bruce FOC Boma know-EXT her see-NFUT
'It is Bruce that Boma knows saw her.'
(Defaka; Bennett et al. 2012:294,296)

A similar pattern at the *v*P edge is voice marking in Malay/Indonesian languages (e.g. Saddy 1991, 1992; Cole and Hermon 1998; Sato 2012). In these languages, extraction across a verb triggers obligatory deletion of the transitivity prefix *meN-* (14a), which is otherwise an optional morpheme (14b).

(14) *MeN- cannot appear on intermediate verbs:*

a. siapa Bill **(*mem)**-beritahu ibunya [$_{CP}$ yang ___ **(men)**-yintai Fatimah]?
who Bill (*meN)-tell mother.his that (meN)-love Fatimah
'Who does Bill tell his mother that loves Fatimah?'

b. Ali **(mem)**-beri Fatimah hadiah untuk hari lahirnya
Ali **(meng)**-give Fatimah present for day birth
'Ali gave Fatimah a present for her birthday.'
(Malay; Cole and Hermon 1998:231–232)

This prefix is usually analyzed as a *v*P-level voice or transitivity morpheme (Cole et al. 2008; Sato 2012; *cf*. Rackowski and Richards 2005). As in Defaka, extraction of a local subject does not trigger *meN*-deletion (15a), in contrast to an embedded subject (14), providing additional evidence that this effect is at the *v*P edge. In contrast, local object movement also requires *meN*-deletion.

(15) *No MeN- deletion with movement of subjects:*

a. siapa **(mem)**-beli buku itu?
who (meN)-bought book that
'Who bought that book?'

b. apa Ali **(*mem)**-beri pada Fatimah?
what Ali (*meN)-gave to Fatimah
'What did Ali give to Fatimah?'
(Malay; Cole and Hermon 1998:231)

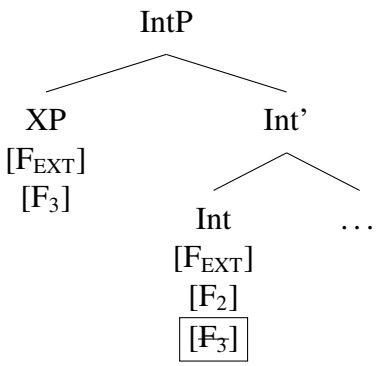
Similar *v*P-level effects may be found at least in Tagalog (Rackowski and Richards 2005) and Asante Twi (Korsah and Murphy 2016).

2.2 Satisfaction of other features: φ-agreement and V2

Another way in which successive-cyclic movement might affect intermediate heads is through the satisfaction of independent features on the intermediate head. suppose an intermediate head Int

carries other features in addition to the extraction feature, such as F_2 and F_3 in (16).

(16)



Since the moving XP ends up in a local relation with Int by virtue of the extraction feature, we might expect it to be capable of satisfying some of these unrelated features, if the XP happens to carry them as well, like F_3 in (16).

In fact, much work on probe-goal relations has argued that features can be satisfied parasitically in this fashion (e.g. Chomsky 2001; Bruening 2001; Kotek 2014; Deal 2014; Režać 2015; Van Urk 2015). Generalizing over this work, I will refer to this idea as Parasitic Agree (17).

(17) **Parasitic Agree:**
If a Probe on a certain head H has found a goal G, other probes on H can also enter into Agree/Attract relations with G.

If Agree relations can be parasitic on other Agree relations in this fashion, we expect feature-driven intermediate dependencies, whether the result of percolation or movement, to be able to satisfy unrelated features, like φ-features. As I will show in this section, such effects are found in both the CP and *v*P domain.

2.2.1 φ-agreement at the CP edge

In a number of languages, the path of long-distance movement is tracked by φ-agreement with the moving phrase. In Dinka, for example, intermediate movement to the CP edge results in φ-agreement. In (18a–b), relativization or topicalization of a plural DP is signalled by a plural agreement prefix at all intermediate clause boundaries (18a–b).[8]

(18) *Intermediate movement triggers φ-agreement:*

a. Yè **kɔ̂ɔc-kó** [$_{CP}$ *Op* ɛ̈-**kè**-yá ké tàak [$_{CP}$ è̈ ___
be people.CS1-which EXT.PST-PL-HAB.2SG 3PL think.NF C
ɛ̈-**kè**-cɪ̈i Áyèn ké gâam gàlàm]]?
EXT.PST-PL-PRF.OV Ayen.GEN 3PL give.NF pen
'Which people did (s)he think that Ayen had given a pen to?'

b. **Wɔ̂ɔk** yɪ̈i Bôl ké luêeel [$_{CP}$ è̈ ___ ɛ̈-**kè**-lɛ́ɛt Áyèn
we HAB.OV Bol.GEN 3PL say.NF C EXT.PST-PL-insult.OV Ayen.GEN

[8]See Van Urk (2015) for a detailed analysis of Dinka clause structure that places this agreement at C.

ké].
3PL
'Us, Bol says Ayen was insulting.'

As Van Urk (2015) argues, we can provide an account of this effect using the notion of parasitic agreement. In particular, we can understand the fact that φ-agreement in these intermediate positions seems to favor a moving phrase over a more local target if the satisfaction of an extraction feature may value φ-features on the intervening head as a "free rider".

Another pattern of φ-agreement at C is found in Wolof, as described by Torrence (2005, 2012). In particular, Torrence argues that Wolof has a complementizer that agrees in noun class with a moved *wh*-phrase. This agreeing complementizer may appear in intervening clauses (19a–b).[9]

(19) *Agreeing complementizers in Wolof:*

a. **K**-u Isaa foog [$_{CP}$ **k**-u a bëgg]?
AGR-C Isaa think AGR-C 2SG love
'Who does Isaa think you love?'

b. **F**-u Isaa wax ne [$_{CP}$ **f**-u-ma jàng-e taalif y-a]?
AGR-C Isaa say FRC AGR-C-1SG read-LOC poem DEF
'Where did Isaa say that I read the poems?'
(Torrence 2012:22)

2.2.2 φ-agreement at the vP edge

Similar interactions between successive-cyclic movement and agreement have been documented at the *v*P edge. Bruening (2001) shows that Ā-movement in Passamaquoddy can be accompanied by agreeing participial endings on verbs that lie on the path of the dependency, as in the examples of *wh*-movement and relativization in (20a–b).[10]

(20) *Passamaquoddy verbs may agree with Ā-moving phrases:*

a. **Wen-ik** kisitahatom-on-**ik** [$_{CP}$ keti-naci-wikuwamkom-oc-**ik**]?
who-3PL decide.IO-2CONJ-PART.3PL IC.FUT-go.do-visit.AO-2CONJ-PART.3PL
'Who all did you decide to go visit?'

b. Wot **nit** **pahtoliyas** [$_{CP}$ Mali elitahasi-c-**il** [$_{CP}$ eli wen
this that priest Mary IC.think-3CONJ-PART.OBV C someone
kisi-komutonom-ac-**il**]
PERF-rob.AO-3CONJ-PART.OBV
'This is the priest that Mary thinks someone robbed.'
(Passamaquoddy; Bruening 2006:34)

Just as suggested here, Bruening (p. 209) analyzes this as parasitic agreement as a result of movement to *v*P. A similar analysis might be applicable to interactions between long-distance movement and object agreement in Hungarian (see Den Dikken 2010 for extensive discussion).

[9]Torrence argues that such extractions involve silent *wh*-phrases, essentially null operators, obligatory in this construction as the result of a Doubly-Filled Comp Effect. See Torrence (2012) for detailed argumentation.

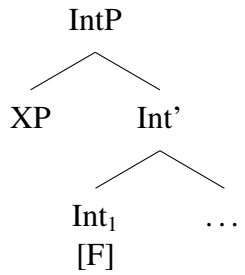
[10]The suffix *-il* realizes agreement with a 3rd person obviative.

As with extraction marking, the distribution of φ-agreement as a reflex of successive-cyclic movement is symmetrical: we can find examples of this effect both at the CP and *v*P edge.

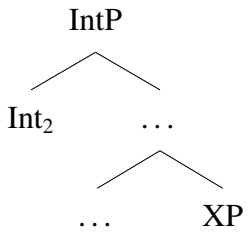
2.3 Lexical choice

Another way in which intermediate movement can affect the intermediate head is by having an effect on lexical choice. If intermediate movement is feature-driven, we may expect that flavors of the intermediate head can vary in whether they carry a featural trigger, as schematized in (21) and (22).

(21)



(22)



Such effects are distinct from extraction marking, because neither head necessarily realizes extraction morphology. In this section, I show that such effects are attested both at the CP and *v*P edge.

2.3.1 Lexical choice effects at the CP edge

It is well-known that the choice of complementizer may affect the availability of long-distance movement. In the simplest case, clauses headed by certain complementizers may block movement. For example, in Russian, movement is banned out of indicative clauses, but possible out of subjunctives (23a–b).[11]

(23) *Long-distance movement in Russian depends on complementizer:*

a. *Kakuju knigu ty dumaeš' [$_{CP}$ **čto** Petr pročital ___]?
which book you believe that.IND Petr read
'Which book do you believe that Petr read?'

b. Kakuju knigu ty dumaeš' [$_{CP}$ **čtoby** Petr pročital ___]?
which book you believe that.SUBJ Petr read
'Which book do you believe that Petr read?'
(Müller and Sternefeld 1993)

This is a lexical choice effect, and not extraction marking, because neither complementizer realizes extraction morphology and there are other syntactic and semantic differences between the heads involved.

Another effect that can be analyzed as lexical choice is inversion. In a number of languages, the subject and auxiliary must invert if intermediate movement targets the CP edge (e.g. Kayne and Pollock 1978; Torrego 1984; Henry 1995). I illustrate with Belfast English (Henry 1995).

[11] On this analysis, the islandhood of finite CPs in some languages reflects the lack of an extraction feature on C. Another possibility is that some additional factors cause CPs to be islands in these languages, as is likely the case for other islands.

(24) *Inversion in Belfast English:*

a. Who did John hope [$_{CP}$ **would** he see ___]?
b. What did Mary claim [$_{CP}$ **did** they steal ___]?
(Belfast English; Henry 1995:109)

A standard analysis of this pattern is to say the null C that hosts a featural trigger also happens to attract T.[12] This type of approach is essentially a lexical choice analysis, since inversion will only be obligatory if all other instances of C do not have a feature triggering movement and so would be blocked in the context of long-distance dependencies.

2.3.2 Lexical choice effects at the vP edge

There are again analogous effects in the *v*P domain. In Nupe, the choice of verb phrase correlates with extraction, as documented by Kandybowicz (2008). Specifically, extraction is blocked from verb phrases headed by perfect aspect (25a–b).

(25) *Movement out of perfect vPs impossible in Nupe:*

a. Ke Musa pa ___ o?
what Musa pound O
'What did Musa pound?'
b. Ke Musa **à** pa ___ o?
what Musa FUT pound O
'What will Musa pound?'
c. *Ke Musa **á** pa ___ o?
what Musa PRF pound O
'What has Musa pounded?'
(Nupe; Kandybowicz 2008:288)

Evidence that this is a *v*P-level restriction comes from the fact that local subjects may freely extract, as well as high adverbs (26a–b). In contrast, like objects, low adverbs may not be extracted out a perfect verb phrase.

(26) *Subjects, high adverbs, not low adverbs may move in perfect:*

a. **Bagi** na ___ á nakàn ba na
man REL PRF meat cut REL
'the man that had cut the meat'
b. **Panyi lèé** ___ Musa á nakàn ba o.
before past Musa PRF meat cut O
'A LONG TIME AGO, Musa had cut the meat.'
c. ***Karayín** Musa á nakàn ba ___ o.
carefully Musa PRF meat cut O
'Musa had cut the meat CAREFULLY.'
(Nupe; Kandybowicz 2008:291)

[12] It is worth noting that, in Romance languages, the auxiliary and verb invert together, so that inversion in these languages is not obviously the result of T-to-C movement. I set aside this issue here.

As predicted, such structural asymmetries disappear in long-distance extraction. If a higher *v*P is perfect, long-distance subject and object extraction are equally degraded (27a–b).

(27) *Long-distance movement across perfect vP banned:*

a. ***Nana** Musa á gan [$_{CP}$ gànán ___ pa eci o.
Nana Musa PRF say COMP pound yam O
'Musa has said that NANA pounded the yam.'

b. ***Eci** Musa á gan [$_{CP}$ gànán Nana pa ___ o.
yam Musa PRF say COMP Nana pound O
'Musa has said that Nana pounded THE YAM.'
(Nupe; Kandybowicz 2008:295)

We can also find inversion effects at the *v*P edge, as pointed out by Cognola (2013) in work on the Germanic dialect Mòcheno, spoken in northern Italy. Mòcheno allows both OV and VO orders in the verb phrase:

(28) *Mòcheno allows VO and OV order:*

a. Gester hone [$_{vP}$ a puach **kaft**].
yesterday have-1SG a book bought
'Yesterday, I bought a book.'

b. Gester hone [$_{vP}$ **kaft** a puach].
yesterday have-1SG bought a book
'Yesterday, I bought a book.'
(Mòcheno; Cognola 2008:81)

However, in the context of extraction, only VO syntax is possible (29a–b).[13]

(29) *Inversion in the vP with wh-movement in Mòcheno:*

a. En bem hòt-se [$_{vP}$ **kaft** de zaitung]
to whom has-she bought the newspaper
'Who has she bought a newspaper?'

b. *En bem hòt-se [$_{vP}$ de zaitung **kaft**]
to whom has-she the newspaper bought
'Who has she bought a newspaper?'
(Mòcheno; Cognola 2013:7)

This effect then is analogous to inversion in the CP domain and we can analyze it as a lexical choice effect. Suppose Mòcheno has two variants of *v*, one for OV and one for VO. If only the head that triggers VO is endowed with a featural trigger, we expect that OV verb phrases are islands, as shown in (29b).

2.4 A featural component in successive cyclicity

This section demonstrated that we can find at least three different types of reflexes of successive cyclicity that can be linked to the presence of features associated with extraction on intermediate

[13] Interestingly, Cognola notes that the same effect is observed with subject extraction, which is unexpected if this is a *v*P-level effect. But see Cognola (2008, 2013) for arguments that this effect is nonetheless in the verb phrase.

heads: extraction marking, parasitic agreement, and lexical choice effects. In addition, each effect is instantiated both at the CP and *v*P edge. These results provide evidence for a featural component in intermediate movement, as in a percolation or feature-driven approach, but contra featureless approaches (e.g. Heck and Müller 2000, 2003; Bošković 2007; Chomsky 2013, 2015). In addition, these featural effects are equally distributed across the CP/*v*P domain, providing evidence that these are both phasal domains (e.g. Chomsky 1986 et seq.).

3 On the PF presence of intermediate copies

I now turn to evidence for the presence of intermediate copies, as predicted both by feature-driven and featureless movement. Intermediate copies should be detectable both at PF and LF, and I will divide movement effects along these lines. I start by examining which PF effects are attested and identify at least four types: intermediate copy realization, multiple spell-out, stranding and V2 satisfaction. This taxonomy is actually what is predicted under a movement approach. In addition, these effects are symmetrically distributed across CP and *v*P edges.

3.1 Intermediate copy realization

The first and perhaps most obvious prediction of movement approaches is that we expect to find cases in which intermediate copies are realized. For example, if there are independent constraints blocking the realization of the highest copy, we might see a dislocated phrase realized in an intermediate position instead (30).

(30) *Intermediate copy realization:*
[~~Copy~~ … [$_{\text{IntP}}$ Copy … ~~Copy~~ …]]

The first type of construction that seems to instantiate this is partial *wh*-movement, in which a *wh*-phrase surfaces in an intermediate position, although it behaves as if it has undergo movement to the scopal position. As noted also by Fanselow (2006) and Abels (2012a:sec. 3.3–3.4), another configuration in which intermediate copy realization can be found is when intermediate movement interacts with pied-piping. Particularly, if a phasal domain like CP or *v*P can be pied-piped by a final movement step, we expect the moving phrase to be realized in its intermediate position, at the edge of the phase. This is schematized in (31).

(31) *Wh-trapping:*
[[$_{\text{IntP}}$ Copy … ~~Copy~~ …] … [$_{\text{IntP}}$ Copy … ~~Copy~~ …]]

I refer to such constructions as *wh-trapping*, and there are instances of this effect at the CP and *v*P edge.

3.1.1 Intermediate copy realization at the CP edge

It has frequently been observed that, in addition to full *wh*-movement and *wh*-in situ, some languages allow a third option, partial *wh*-movement, in which a moving phrase seems to surface in an intermediate position. The examples in (32a–c) illustrate for Malay (Cole and Hermon 2000), a language which allow full movement to Spec-CP, *wh*-in situ, but also partial *wh*-movement to an

intermediate clause edge.

(32) *Wh-in situ and full and partial wh-movement in Malay:*

a. **Siapa** Bill harap [$_{CP}$ ___ akan membeli baju untuknya]?
who Bill hopes will buy clothes for.him
'Who does Bill hope will buy clothes for him?'

b. Ali memberitahu kamu tadi [$_{CP}$ **apa** Fatimah baca ___]?
Ali told you just.now what Fatimah read
'What did Ali tell you just now that Fatimah was reading?'

c. Ali memberitahu kamu tadi [$_{CP}$ Fatimah baca **apa**]?
Ali told you just.now Fatimah read what
'What did Ali tell you just now that Fatimah was reading?'
(Cole and Hermon 1998:224–225)

Importantly, in Malay, partial *wh*-movement is sensitive both to islands above and below the intermediate position, just like full *wh*-movement, as demonstrated in (33a–b).

(33) *Partial wh-movement is sensitive to higher and lower islands:*

a. *Ali memberitahu kamu [$_{CP}$ **apa** Mary fikir [$_{CP}$ dia suka [$_{DP}$ perempuan yang beli
Ali told you what Mary think he likes woman that buy
___]]]?
'What did Ali tell you that Mary thinks that he likes a woman who bought?'

b. *Kamu sayang [$_{DP}$ perempuan yang Ali fikir [$_{CP}$ **apa** telah makan ___]]?
you love woman that Ali thinks what already eat
'Who do you love the woman who Ali thinks ate what?'
(Cole and Hermon 2000:91–92)

As Cole and Hermon note, this is evidence that a partially moved *wh*-phrase does undergo full movement covertly, so that constructions like (32b) are best realized as intermediate copy realization.[14] If this analysis is correct, partial *wh*-movement reveals intermediate movement in the embedded CP. See Fanselow (2006) for an overview of other languages that may allow similar partial *wh*-movement constructions.

Intermediate copy realization is also evident in languages that allow clausal pied-piping, which give rise to the *wh*-trapping configuration identified above. Languages that have been identified as clausal pied-piping languages include Imbabura Quechua and Basque (e.g. Hermon 1985; Ortiz de Urbina 1989; Arregi 2003). As evident in the examples in (34a–b), these languages reveal that the *wh*-phrase that triggers movement resides in a left-peripheral position inside that CP (34a–b).

(34) *Clausal pied-piping in Quechua and Basque:*

a. [$_{CP}$ **Ima-ta** wawa ___ miku-chun-taj] Maria muna-n?
what-ACC child.NOM eat-SUBJ-Q Maria want-PR.3
'What does Maria want that the child eat?'

[14] Establishing this is important, because there seem to be constructions that look like partial *wh*-movement in which there is no island-sensitivity above the partially moved *wh*-phrase (see, for example, Zentz 2016 on Shona). In such languages, partial *wh*-movement more likely should be analyzed as final movement combined with *wh*-in situ.

(Imbabura Quechua; Hermon 1985:151)

b. [$_{CP}$ **Se** idatzi rabela Jonek] pentzate su?
what written has Jon.ERG you-think
'What do you think Jon wrote?'
(Basque; Arregi 2003:118)

Such facts seem to demonstrate that the *wh*-phrase undergoes intermediate movement inside the CP. See also Heck (2008: sec. 2.3) for arguments that movement of infinitives in German relatives involves a similar configuration of clausal pied-piping.[15]

3.1.2 Intermediate copy realization at the vP edge

Let us now turn to the question of whether there are intermediate copy realization constructions at the *v*P edge. Manetta (2010) argues for Kashmiri and Hindi that these languages allow long-distance movement to stop at an intermediate *v*P. Such constructions might then represent partial *wh*-movement to the *v*P edge, although see Dayal (2014) for some critical discussion. For *wh*-trapping, we can find counterparts at the *v*P edge. This may be surprising, because a crosslinguistic generalization that seems to govern pied-piping is that *v*Ps cannot be pied-piped (Cable 2007, 2010; Heck 2008, 2009). However, *wh*-trapping effects do seem to emerge when *wh*-movement co-occurs with an independent instance of VP-fronting, as shown by Cozier (2006) and Buell (2012). In such environments, we find evidence for intermediate movement to the *v*P edge.

Cozier (2006) describes an interaction between intermediate movement and predicate clefting in Trinidadian English that operates along these lines. Trinidadian English does not allow pied-piping of verbs in isolation. However, Trinidadian English possesses an independent operation of long-distance predicate clefting, as in the examples in (35a–b).

(35) *Predicate clefting in Trinidadian English:*

a. Is **walk** [that Tim did *walk*].
'Tim really walked.'

b. Is **talk** [he tell me [that she *talk* about Ricky]].
(Trinidadian English; Cozier 2006:660,663)

Cozier argues that predicate clefting is phrasal movement, based on the observation that *v*P-internal adverbs to the left of the verb can be moved along (36a–b).[16]

(36) *Predicate cleft pied-pipes material to the left:*

a. Is **briefly touch** [he did *touch* upon that matter].
'He briefly touched upon that matter (as opposed to doing something else with that matter).'

b. Is **cleverly avoid** [he *avoid* the question].
'He cleverly AVOIDED the question (as opposed to cleverly doing something else with the question, like answering it).'

[15] An interesting observation is that clausal pied-piping is typically restricted to nominalized or infinitival clauses, which may suggest that neither full CPs or *v*Ps can be pied-piped in isolation. This does not diminish the point, however, that we can see the effects of intermediate movement when pied-piping of a clause is possible.

[16] Note that these adverbs must originate in the lower verb phrase, because a reading in which they modify the cleft clause is semantically implausible.

(Trinidadian English; Cozier 2006:666)

On this basis, Cozier proposes an analysis of predicate clefting as remnant *v*P-movement, with all other VP-internal material undergoing evacuating movements of the VP. As a result, only material at the *v*P edge, like a left-adjoined adverb, will surface in the fronted phrase.[17]

Importantly, *wh*-words that have undergone intermediate movement to the edge of the verb phrase can be pied-piped as well, as in (37a–c).

(37) *Predicate cleft may pied-pipe wh-words:*

a. Is **what fix** [he did *fix* ___ yesterday]?

b. *Is **who talk** [___ *talking* about she]?

(Trinidadian English; Cozier 2006:670,679)

Strikingly, this is possible even when the *wh*-phrase is undergoing long-distance movement from a lower clause and does not directly modify the clefted verb (38).

(38) *Predicate cleft can pied-pipe wh-word from lower clause:*
Is **who tell** [Tim *tell* you [that he give the car to ___]]?
(Trinidadian English; Cozier 2006:681)

This is the same effect as the clausal pied-piping example discussed above. The *wh*-phrase undergoes intermediate movement to a position at the *v*P edge and pied-pipes the *v*P from this position. In this way, predicate clefting in Trinidadian English reveals the presence of a copy in an intermediate *v*P position.

A similar interaction of *v*P-fronting and pied-piping is found in Ewe (Buell 2012). Buell observes that a focus-fronted *v*P may be in a pied-piping configuration, as long as the *wh*-phrase is generated inside the *v*P.

(39) *Objects but not subjects and high adjuncts can be pied-piped:*

a. [$_{vP}$ **Núkà** dù-ḿ] nè-lè?
what eat-PROG 2SG-be.at
'What are you eating?'

b. *[$_{vP}$ **Àmékà** dzó] gé lè?
who leave PROSP be.at
'Who is about to leave?'

c. *[$_{vP}$ **Núkàtà** dzó-ḿ] nè-lè?
why leave-PROG 2SG-be.at
'Why are you leaving?'
(Ewe; Buell 2012:4,7)

As in Trinidadian English, even *wh*-phrases that have undergone long-distance movement from within an embedded clause can pied-pipe the *v*P.[18] In (40), it is the matrix verb that undergoes *v*P-fronting, but the *wh*-phrase originates in a lower clause.

(40) *Movement of intermediate vP can pied-pipe wh-phrase:*

[17] An alternative might be to adopt a distributed deletion analysis, but nothing hinges on the choice for our purposes.

[18] Low adverbs do not seem to be included in the fronted *v*P in Ewe.

[$_{vP}$ **Núkà** dí-ḿ] nè-lè [$_{CP}$ bé má- dà ___]?
what want-PROG 2SG-be.at that 1SG.FUT-prepare
'What do you want me to make?'
(Ewe; Buell 2012:19)

This pattern follows if *v*P-fronting in Ewe includes the left edge of the *v*P, and so the position targeted by intermediate movement.

In this way, the Trinidadian English and Ewe patterns seem to provide particularly clear evidence for intermediate movement to the verb phrase edge.

3.2 Multiple copy spell-out

Another effect that reveals the presence of a copy is multiple copy spell-out, or constructions in which intermediate copies are overtly realized alongside the highest copy. One example of this is *wh*-copying. In a number of languages, *wh*-movement can be accompanied by *wh*-copying, so that a copy of the *wh*-phrase appears in all Spec-CP positions on the path of movement. Such constructions are found in German, Frisian, and Passamaquoddy, for example (41a–c).

(41) *Examples of wh-copying:*

a. **Wen** glaubst du [$_{CP}$ **wen** sie getroffen hat]?
who believe you who she met has
'Who do you believe she has met?'
(German; Felser 2004)

b. **Wêr** tinke jo [$_{CP}$ **wêr**'t Jan wennet]?
where think you where-C Jan lives
'Where do you think that Jan lives?'
(Frisian; Hiemstra 1986:99)

c. **Tayuwe** kt-itom-ups [$_{CP}$ **tayuwe** apc k-tol-i malsanikuwam-ok]?
when 2-say-DUB when again 2-there-go store-LOC
'When did you say you're going to go to the store?'
(Passamaquoddy; Bruening 2006:26)

See Felser (2004) and Bruening (2006) for arguments that such constructions arise from movement.

Wh-copying is usually limited to *wh*-movement and relative clauses (see, for example, Pankau 2013), but not always. Baier (2014) describes a pattern of multiple copy spell-out with all Ā-dependencies in Seereer. As evident in (42a–b), intermediate copies at the clause edge in Seereer are spelled out as pronouns.

(42) *Pronoun copying in Seereer:*

a. **Xar** foog-o [$_{CP}$ yee **ten** Yande a-lay-u [$_{CP}$ yee **ten** Jegaan a-ga'-u]]?
what think-2SG.EXT C 3SG Yande 3-say-EXT C 3SG Jegaan 3-see-EXT
'What do you think Yande said Jegaan saw?'

b. **Aniin** foog-o [$_{CP}$ yee **den** Yande a-lay-u [$_{CP}$ yee **den** Jegaan
who.PL think-2SG.EXT C 3PL Yande 3-say-EXT C 3PL Jegaan
a-ga'-u]]?
3-see-EXT
'Who all do you think Yande said Jegaan saw?'

(Seereer; Baier 2014)

A similar effect happens at the *v*P in Dinka. In Dinka, copies left at the *v*P edge by Ā-movement are spelled out as pronouns, in the same position as the V2 effect (43a–b).[19]

(43) *Movement in Dinka triggers pronoun copying at vP edge:*

a. Bòl à-cé̤ **rò̤o̤o̤r** [$_{CP}$ cè̤ [$_{vP}$ **kêek** lâat]] tî̤iŋ.
Bol 3S-PRF men PRF.3SG 3PL insult.NF see.NF
'Bol has seen the men he has insulted.'

b. Yè **kɔ̂ɔc-kó** [$_{CP}$ yí̤i Bôl [$_{vP}$ **ké** luêeel [$_{CP}$ è̤ cí̤i Áyèn
be people.CS1-which HAB.OV Bol.GEN 3PL say.NF C PRF.OV Ayen.GEN
[$_{vP}$ **ké** tî̤iŋ]]]?
3PL see.NF
'Which people does Bol say Ayen has seen?'

See Baier (2014) and Van Urk (2018) for extensive arguments that this reflects multiple copy spell-out.

Although perhaps less widely attested in the verb phrase, multiple copy spell-out is then found at both domain edges. Again, there is no reason then to suppose a qualitative difference between CP and *v*P in how they interact with successive-cyclic movement.[20]

3.3 Stranding

A third reflex of successive-cyclic movement that reveals the presence of a copy in an intermediate position is stranding (e.g. McCloskey 2000; Barbiers 2002; Henry 2012), found in Spec-CP and Spec-*v*P.

Perhaps the most well-known case of stranding is *all*-stranding in West Ulster English, as first described by McCloskey (2000). McCloskey observes that complex *wh*-phrases such as *what all* may strand *all* at Spec-CP in West Ulster English (44a–c).

(44) *All-stranding in West Ulster English:*

a. **What all** did he say [$_{CP}$ he wanted ___]?
b. **What** did he say [$_{CP}$ he wanted **all**]?
c. **What** did he say [$_{CP}$ **all** he wanted ___]? (West Ulster English; McCloskey 2000:61)

McCloskey argues that intermediate stranding in (44c) occurs in the intermediate Spec-CP, because the stranded *all* must follow material in the matrix verb phrase. This is demonstrated by the examples in (45a–c).[21]

[19] Note that copying is limited to plurals, as extensively discussed in Van Urk (2018).

[20] I do not know of languages in which there is a multiple spell-out effect at the CP and *v*P edge at the same time. A common approach to multiple spell-out is to assume that there are special constraints on the edges that require realization, which prevent copy deletion (see Landau 2006, Van Urk 2018). In such a theory, it is not in principle surprising that the CP and *v*P edge might behave differently in the same language. See also Van Urk (2018) for discussion of this question in Dinka.

[21] That *all* is not stranded in a position in the verb phrase is evident in the contrast between *all*-stranding in the base position, which may precede a PP object (ia), and intermediate stranding, which cannot (ib). This contrast is unexpected if *all*-stranding takes place in an intermediate verb phrase position, but expected if intermediate *all* forms a constituent with the embedded CP.

(45) *Stranded all must follow matrix vP-material:*

a. **What all** did he say to him that he wanted to buy ___]?
b. ?**What** did he say to him [$_{CP}$ **all** that he wanted to buy ___]?
c. *__What__ did he say **all** to him [$_{CP}$ that he wanted to buy ___]?
(West Ulster English; McCloskey 2000:63)

As McCloskey points out, these facts offer an argument for successive-cyclic movement through Spec-CP, under the assumption that *what all* moves as a unit to an intermediate position, followed by subextraction of *what*.

Similar stranding effects are found at the *v*P edge. Even in West Ulster varieties, Henry (2012) shows that there are grammars that allow stranding at the edge of *v*P as well. In South Derry English in fact, only *v*P-stranding is tolerated (46a–c).[22]

(46) *All-stranding only at vP in South Derry English:*

a. **What** did he [$_{vP}$ **all** do ___ on holiday]?
b. **What** did he [$_{vP}$ **all** say [$_{CP}$ that he did ___ on holiday]]?
c. *__What__ did he [$_{vP}$ say [$_{CP}$ **all** that he did ___ on holiday]]?
(Henry 2012:28)

Speakers of East Derry English allow stranding everywhere, both at the *v*P and CP edge (47a–c).

(47) *All-stranding at vP and CP in East Derry English:*

a. **What** did he [$_{vP}$ **all** do ___ in Derry]?
b. **What** did he say [$_{CP}$ **all** that he did ___ in Derry]?
c. **What** did he [$_{vP}$ **all** say [$_{CP}$ that he did ___ in Derry]]?
(Henry 2012:31)

There are also instances of *all*-stranding at the *v*P edge in other languages.[23] As pointed out by Barbiers (2002) and Koopman (2010), a similar pattern is found in Dutch, with stranding of the quantifier *allemaal* (48a). In Dutch, this stranding must target an intermediate *v*P, as evident by the relative positioning of a higher verb and the complementizer (48b–c).

(48) *Stranded allemaal in Dutch occurs at intermediate vP:*

a. Wat heeft hij gezegd [$_{CP}$ dat hij **allemaal** wil hebben]?
what has he said that he all wants have.NF
'What all has he said that he wants to have?'
b. Wat heeft hij [$_{vP}$ **allemaal** gezegd [$_{CP}$ dat hij ___ wil hebben]]?
what has he all said that he wants have.NF

(i) a. ?Who was talking **all** to the kids last night?
b. *What did he say **all** to his friends [$_{CP}$ that he wanted to buy]?
(West Ulster English; McCloskey 2000:63,74)

[22] Henry (2012) describes the different stranding varieties in geographical terms. Henry (2017) qualifies this and suggests that the different grammars described here may simply reflect variation within the same population.

[23] As with multiple spell-out, the question arises why all stranding languages do not behave like East Derry English, with stranding at both the CP and *v*P edge. An open question here is what mechanism could restrict stranding to specific edges.

'What all has he said that he wants to have?'

c. *Wat heeft hij gezegd [$_{CP}$ **allemaal** dat hij ___ wil hebben]?
what has he said all that he wants have.NF
'What all has he said that he wants to have?'
(Dutch; adapted from Koopman 2010:268)

In fact, Dutch allows stranding of other material in the same position, as Barbiers (2002) demonstrates. R-pronouns can strand a preposition at the *v*P edge as well, in any intermediate *v*P on the path of movement (49a–c).

(49) *Preposition stranding at intermediate vP in Dutch:*

a. **Waarmee** had jij dan gedacht [$_{CP}$ dat je de vis ___ zou moeten
where.with had you then thought that you the fish would have.to.NF
snijden]?
cut.NF
'With what had you then thought that you would have to cut the fish?'

b. **Waar** had jij dan gedacht [$_{CP}$ dat je de vis **mee** zou moeten snijden]?
where had you then thought that you the fish with would have.to.NF cut.NF
'With what had you then thought that you would have to cut the fish?'

c. **Waar** had jij dan [$_{vP}$ **mee** gedacht [$_{CP}$ dat je de vis ___ zou moeten
where had you then with thought that you the fish would have.to.NF
snijden]]?
cut.NF
'With what had you then thought that you would have to cut the fish?'
(Dutch; adapted from Barbiers 2002:49)

The same facts obtain in the *wat-voor* split. The remnant DP can be pied-piped (50a), stranded in the base position (50b), or stranded at an intermediate *v*P edge (50c).

(50) *Stranding in wat-voor split:*

a. **Wat voor bal** had jij dan gedacht [$_{CP}$ dat Ed ___ zou kopen]?
what for ball had you then thought that Ed would buy.NF
'What kind of ball had you then thought that Ed would buy?'

b. **Wat** had jij dan gedacht [$_{CP}$ dat Ed **voor bal** zou kopen]?
what had you then thought that Ed for ball would buy.NF
'What kind of ball had you then thought that Ed would buy?'

c. ?**Wat** had jij dan [$_{vP}$ **voor bal** gedacht [$_{CP}$ dat Ed ___ zou kopen]]?
what had you then for ball thought that Ed would buy.NF
'What kind of ball had you then thought that Ed would buy?'
(Dutch; adapted from Barbiers 2002:49)

A third pattern of stranding that shows symmetry between the CP and *v*P edge comes from Left Branch Extraction in Polish. Wiland (2010) points out that Left-Branch Extraction in Polish allows for the NP out of which extraction takes place to be stranded in intermediate positions, including the edge of *v*P and the edge of CP (51a–c).

(51) *Polish LBE may strand NP in intermediate positions:*

a. **Jaki** Pawel [$_{vP}$ **samochód** kupil swojej żonie ___]?
what Pawel car bought his wife
'What car did Pawel buy his wife?'

b. ?**Jaki** myślisz [$_{CP}$ **samochód** Pawel kupil swojej żonie ___]?
what thought.2SG car Pawel bought his wife
'What car did you think Pawel bought his wife?'

c. %**Jaki** Maria [$_{vP}$ **samochód** myślala [$_{CP}$ że Pawel kupil swojej żonie ___]]?
what Maria car thought that Pawel bought his wife
'What car did Mary think Pawel bought his wife?'
(Polish; Wiland 2010)

The distribution of stranding phenomena then provides additional support for the notion of successive-cyclic movement and shows that there is symmetry between CP and *v*P in the possibility of stranding under intermediate movement.

3.4 V2 satisfaction

The final effect that I attribute to the presence of intermediate copies is V2 satisfaction in intermediate positions. If V2 effects are interpreted as requirement that an XP overtly occupies the specifier of a functional head, then an intermediate movement account predicts that the presence of an intermediate copy, despite undergoing deletion, may be diagnosable through its effect on V2. In an approach to V2 in which V2 is only about featural requirements, these facts may instead constitute evidence for a featural component in intermediate movement. In any case, such effects offer evidence for successive cyclicity.

Thiersch (1978) observes that extraction from embedded V2 clauses in German must satisfy the V2 requirement, resulting in overt V1 order (52a–b).

(52) *Extraction satisfies V2 in German:*

a. **Wen** sagt Johan [$_{CP}$ ⟨___⟩ sehe er ___]?
who.ACC says Johan see.SBJ he
'Who does Johan say that he is seeing?'

b. *__Wen__ sagt Johan [$_{CP}$ ⟨er⟩ sehe ___]?
who.ACC says Johan he see.SBJ
'Who does Johan say that he is seeing?'
(German; Thiersch 1978:135)

We can show that this is linked to intermediate movement, because movement in the matrix clause still requires V2 in the complement. The pairs in (53a–b) and (53c–d) demonstrate. In (53a–b), movement of a PP from an embedded clause requires V1. The pattern of grammaticality reverses with movement of the same PP within the matrix clause: embedded V2 is now required and embedded V1 is impossible (53c–d).

(53) *V1 order due to extraction:*

a. In welche Schule sagte Leo [$_{CP}$ ___ sei er gegangen]?
to which school said Leo is.SBJ he went

'To which school did Leo say he went?'

b. *In welche Schule sagte Leo [$_{CP}$ **er** sei gegangen]?
to which school said Leo he is.SBJ went
'To which school did Leo say he went?'

c. *In welcher Sprache sagte Leo [$_{CP}$ ___ sei er gegangen]?
in which language said Leo is.SBJ he went
'In which language did say he went?'

d. In welcher Sprache sagte Leo [$_{CP}$ **er** sei gegangen]?
in which language said Leo he is.SBJ went
'In which language did say he went?'
(German; Susi Wurmbrand, p.c.)

These facts provides evidence for a step of intermediate movement, with the copy satisfying V2.

Van Urk and Richards (2015) describe a similar pattern in the Nilotic language Dinka. Dinka requires V2 in embedded clauses. Intermediate movement must satisfy the V2 property of any clause it passes through, resulting in overt V1 order (54a–d).[24]

(54) *Long-distance movement and V2:*

a. Yè **ŋà** yu̱u̱kù̱ luêeel [$_{CP}$ ___ cé̱ cuî̱in câam]?
be who HAB.1PL say.NF PRF food eat.NF
'Who do we say [$_{CP}$ ___ has eaten food]?'

b. *Yè **ŋà** yu̱u̱kù̱ luêeel [$_{CP}$ **cuî̱in** à-cí̱i câam]?
be who HAB.1PL say.NF food 3SG-PRF.OV eat.NF
'Who do we say [$_{CP}$ has eaten food]?'

c. Yè **ŋó̱** yu̱u̱kù̱ luêeel [$_{CP}$ ___ cí̱i Bôl câam]?
be what HAB.1PL say.NF PRF.OV Bol.GEN eat.NF
'What do we say [$_{CP}$ Bol has eaten ___]?'

d. *Yè **ŋó̱** yu̱u̱kù̱ luêeel [$_{CP}$ **Bòl** à-cé̱ câam]?
be what HAB.1PL say.NF Bol 3SG-PRF eat.NF
'What do we say [$_{CP}$ Bol has eaten ___]?'

Van Urk and Richards (2015; see also Van Urk 2015) show that an analogous V2 effect is found in the Dinka verb phrase. The Dinka verb phrase also has a V2 effect, so that the highest object must always appear initially, preceding the base position of the main verb, as with the ditransitive in (55a–d):

(55) *Dinka vP has V2 effect:*

a. Yî̱in cé̱ [$_{vP}$ **Àyén** gàam cáa].
you PRF.SV Ayen give.NF milk
'You have given Ayen milk.'

b. Yî̱in cé̱ [$_{vP}$ **cáa** gàam Àyén].
you PRF.SV milk give.NF Ayen

[24]In Dinka, we can also tell that an intermediate copy satisfies V2 in the embedded clause, because the moving phrase can trigger agreement on the highest verb/auxiliary in any clause it passes through, as discussed in section 2.2.1. This extraction marking effect is also evident in the alternation between *cé̱*, the unmarked form of the auxiliary, and *cí̱i*, which surfaces in the context of non-subject extraction.

‘You have given milk to Ayen.’

c. *Yî̱in cé̱ [$_{vP}$ ___ gàam cáa Àyén].
you PRF.SV give.NF milk Ayen
‘You have given Ayen milk.’

When an object is extracted from inside the verb phrase, however, the same effect as at the CP edge is observed. Intermediate movement satisfies *v*P V2, as demonstrated in (56a–d).

(56) *Object extraction satisfies V2:*

a. Yè **ŋó̱** [$_{CP}$ cí̱i môc [$_{vP}$ ___ yiě̱e̱n Bòl]]?
be what PRF.OV man.GEN give.NF Bol
‘What has the man given Bol?’

b. *Yè **ŋó̱** [$_{CP}$ cí̱i môc [$_{vP}$ **Bòl** yiě̱e̱n]]?
be what PRF.OV man.GEN Bol give.NF
‘What has the man given Ayen?’

c. Yè **ŋà** [$_{CP}$ cí̱i môc [$_{vP}$ ___ yiě̱e̱n kítàap]]?
be who PRF.OV man.GEN give.NF book
‘Who has the man given the book to?’

d. *Yè **ŋà** [$_{CP}$ cí̱i môc [$_{vP}$ **kítàap** yiě̱e̱n]]?
be who PRF.OV man.GEN book give.NF
‘Who has the man given the book to?’

V2 effects are then also equally distributed across the CP and *v*P edge, offering additional evidence that these domains are parallel.

4 On the LF presence of intermediate copies

A movement approach to successive cyclicity also predicts that intermediate copies should influence LF representations. In this section, I show that the presence of intermediate copies can be detected in the consequences for the binding of pronouns and anaphors (Fox 1999), the availability of intermediate scope (e.g. Rullmann 1993; Fox 1999), and licensing of parasitic gaps (Nissenbaum 2000). As above, I demonstrate that these effects are symmetrically distributed across CP and *v*P edges.

4.1 Binding of pronouns and anaphors

One LF effect that intermediate copies should have is that they should make available additional positions for binding relations. For example, long-distance movement allows an anaphor contained in the moving phrase to be bound by an antecedent on the path of movement (57a–b), even though this antecedent would not be able to bind the anaphor in its base position.

(57) *Anaphors can be bound in intermediate positions:*

a. Which picture of herself$_{i/j}$ did Sam$_i$ say [Kim$_j$ likes ___]?

b. Which picture of herself$_{i/j}$ did you tell Sam$_i$ [Kim$_j$ likes ___]?

An example like (57a) can be accommodated both by assuming an intermediate copy in Spec-CP or Spec-*v*P, but (57b) provides evidence specifically for a CP edge position, since the intermediate

position must at least be below the indirect object.

Fox (1999) tries to do construct examples that specifically require an intermediate *v*P position through the interaction of anaphor binding and Late Merge (Lebeaux 1998). Consider the contrast between (58a) and (58b).

(58) *Late Merge may apply in intermediate positions:*

a. *[$_{DP}$ Which of the papers that he$_i$ gave to Ms. Brown$_k$] did she$_k$ hope that every student$_i$ will revise ___?

b. [$_{DP}$ Which of the papers that he$_i$ gave to Ms. Brown$_k$] did every student$_i$ hope that she$_k$ will revise ___?
(Fox 1999:173)

The grammaticality of (58b) demonstrates that there is an intermediate position in long-distance movement at which Late Merge can apply. This intermediate position must lie between the quantifier *every student* and the pronoun *she*, and so interpreting the adjunct there satisfies both the conditions on variable binding and those on Principle C. Importantly, Late Merge at matrix Spec-CP would prevent variable binding and merging the adjunct in the base position should violate Principle C. Such cases then indicate that there are intermediate landing sites in long-distance movement.

Fox (1999) uses such effects to argue for an intermediate landing site at the *v*P edge. He points out to contrasts such as (59a–b).

(59) *Late Merge may apply at vP edge:*

a. [$_{DP}$ Which of the papers that he$_i$ asked Ms. Brown$_k$ for] did every student$_i$ [$_{vP}$ get her$_k$ to grade ___]?

b. *[$_{DP}$ Which of the papers that he$_i$ asked Ms. Brown$_k$ for] did she$_k$ [$_{vP}$ get every student$_i$ to grade ___]?
(Fox 1999:174)

In the grammatical (59a), the only intermediate position that can satisfy both variable binding and Principle C is in between the subject quantifier and the object, thus providing evidence for a landing site for long-distance movement at the *v*P edge.

We can manipulate these examples to argue for an intermediate Spec-CP position. Consider the pair in (60a–b), where the only difference is in the matrix indirect object and the embedded subject.

(60) *Late Merge may apply at CP edge:*

a. [$_{DP}$ Which of the papers that he$_i$ asked Ms. Brown$_k$ for] did you tell every student$_i$ [$_{CP}$ she$_k$ liked ___]?

b. *[$_{DP}$ Which of the papers that he$_i$ asked Ms. Brown$_k$ for] did you tell her$_k$ [$_{CP}$ every student$_i$ liked ___]?

The admissibility of (60a) suggests that there is an intermediate position between indirect objects and embedded subjects also, which I propose is Spec-CP.

The same picture as above then emerges from an examination of scope trapping effects: Spec-CP and Spec-*v*P are implicated to the same degree as intermediate landing sites.[25]

4.2 Intermediate scope

Another semantic effect that should be associated with the presence of a copy is the availability of additional scope positions. Intermediate positions should create the possibility of intermediate scope relations.

How many-phrases have been shown to give rise to scope ambiguities (Kroch 1989; Rullmann 1993; Cresti 1995). For example, the *how many*-phrase in (61) can be interpreted above and below *want*, as indicated by the paraphrases in (61a–b).

(61) *Scope ambiguities with how many-phrases:*
How many books does Chris want to buy ___?
a. What is the number *n* such that there are *n* books that Chris wants to buy?
b. What is the number *n* such that Chris wants to buy *n* books?
(Rullmann 1993:1)

Rullmann (1993) argues that *how many*-phrases may also take scope in an intermediate position, as demonstrated by the example in (62). In addition to wide and narrow scope, the intermediate reading paraphrased in (62c) is available as well (see also Fox 1999).

(62) *Intermediate reading of how many-phrase:*
How many books did Mary say [John needs ___]?
a. What is the number *n* such that there are *n* books which Mary says John needs?
b. What is the number *n* such that Mary says John needs *n* books?
c. What is the number *n* such that Mary says that there are *n* books which John needs?
(Rullmann 1993:11)

Following Rullmann, I propose that this intermediate reading is the result of interpreting the *how many*-phrase in the intermediate Spec-CP position.

We can construct similar examples that appear to demonstrate intermediate scope positions at a verb phrase edge. Consider an example like (63), with a modal above *require*. In addition to the wide and narrow scope readings, the intermediate reading in (63c) is available, in which the *how many*-phrase is interpreted in between the modal and *require*.

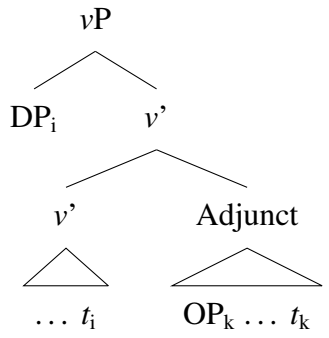
(63) *Intermediate reading of how many-phrase at vP edge:*
How many students could Kim be required to pass?
a. What is the number *n* such that there are *n* students that it is possible Kim is required to pass?
b. What is the number *n* such that it is possible that Kim is required to pass *n* students?
c. What is the number *n* such that it is possible that there are *n* students Kim is required to pass?

[25] One question is whether we can find configurations similar to the grammatical examples in ((59)a) and ((60)a) which are inadmissible because of the absence of an intermediate position in between the relevant DPs. This is what we expect if long-distance movement follows a punctuated path, as Abels (2012a) points out.

4.3 Parasitic gaps

Another LF effect is the distribution of parasitic gaps, a phenomenon that has been used to argue for intermediate copies at the *v*P edge, building on Nissenbaum (2000). Nissenbaum presents a theory of parasitic gap licensing that requires intermediate movement to the *v*P edge. Both intermediate successive-cyclic movement to *v*P and operator movement in a *v*P adjunct may create derived predicates, which can be conjoined:

(64) *Parasitic gap configuration in Nissenbaum (2000):*



On the assumption that both intermediate movement and null operator movement result in λ-abstraction and so form open predicates, the *v*P and adjunct in (64) can be combined to yield a conjoined predicate.[26] This conjoined predicate composes with the DP copy at the *v*P edge, leading to the appearance of a parasitic gap. If correct, parasitic gaps like (65) provide evidence for intermediate movement to the *v*P edge, assuming that the rationale clause is a *v*P adjunct.[27]

(65) *Parasitic gap at vP edge:*
What did he buy ___ [in order to read through ___]?

There are also CP adjuncts that license parasitic gaps. As Engdahl (1983) notes, *if*-clauses permit parasitic gaps for some speakers (66a). These are possible even with extraction of the subject, providing evidence that these parasitic gaps are licensed outside the *v*P.

(66) *Parasitic gaps in if-clauses:*

a. This is the professor that Kim says that you must not say hello to ___ if you run into ___.

b. This is the professor that Kim says that, if you run into ___, ___ won't say hello to you.
(modified from Engdahl 1983:11)

The semantic effects of copies can then be detected at the CP and *v*P edge. These facts provide evidence that successive cyclicity involves movement, contra a purely featural approach. In addition, I have demonstrated that all successive cyclicity effects that we might reasonably expect to

[26] It is important that the adjunct can be inserted in between the point of abstraction and the DP. In addition to this, more needs to be said about how such predicates can be conjoined. See Nissenbaum (2000) for details.

[27] Note that parasitic gaps do not distinguish between feature percolation theories and movement-based theories, since feature percolation provides a natural account of parasitic gaps as the unification of two different percolation paths (see Sag 1983, for instance).

surface, based on the idea of intermediate movement, are in fact attested. These facts then pose a real challenge to approaches to long-distance dependencies that do away with intermediate movement. In addition, a key conclusion that emerges from this discussion is that there are no empirical reasons to posit a qualitative asymmetry between CP and *v*P, since all the effects discussed can be detected in both domains (contra Rackowski and Richards 2005; Den Dikken 2009, 2010; Keine 2016).

5 Successive cyclicity in other domains

In this section, I examine how this taxonomy of successive cyclicity effects extends to other purported phasal domains. I will look in particular at PP and DP. Not all of the effects described above have clear counterparts in the PP/DP domain, painting a more nuanced picture than for the CP and *v*P edge. In particular, there are some apparently featural effects in DPs and PPs, extraction marking and lexical choice effects. In addition, there is some evidence for intermediate copy realization, in the interaction of PPs and DPs with pied-piping. However, many of the other effects described are missing or difficult to detect.

5.1 Extraction marking and lexical choice effects in DPs and PPs

There appear to be extraction marking effects in the PP domain. In Jamaican Creole (Durrleman 2008), for example, the preposition *fi/fa* is sensitive to extraction. When the preposition is followed by an in-situ complement, it is realized as *fi* (67a). But when the complement has been extracted, the preposition must be realized as *fa* (67b).

(67) *Extraction marking on preposition in Jamaican Creole:*

a. Im bring aki [$_{PP}$ **fi/*fa** piknidem]
3SG bring ackee for/for.EXT children
'(S)he brought the ackee for the children.'

b. A huu im bring dat [$_{PP}$ ***fi/fa** ___]?
A who 3SG bring that for/for.EXT
'Who did (s)he bring that for?'
(Jamaican Creole; Durrleman 2008)

A similar alternation is found with the preposition *nú*/*ná* in Fongbe (Da Cruz 1997).

(68) *Extraction marking on preposition in Fongbe:*

a. Kɔ̀kú sà mɔ̌tò ɔ́ [$_{PP}$ **nú/*ná** Àsíbá].
Koku sell car DET to/to.EXT Asiba
'Koku sold the car to Asiba.'

b. Àsíbá wɛ̀ Kɔ̀kú sà mɔ̌tò ɔ́ [$_{PP}$ ***nú/ná** ___].
Asiba FOC Koku sell car DET to/to.EXT
'Asiba, Koku sold the car to.'
(Fongbe; Da Cruz 1997)

A worry about these facts is that it is possible to analyze this alternations as allomorphy (sensitive to whether an overt DP follows), as discussed in section 2.1.1. In addition, we could treat this pattern as lexical choice effect, in which these prepositions are instantiations of non-phasal and phasal variants of the same head (see also Abels 2003).

I do not know of extraction marking effects in the DP domain, such as a determiner that only appears in the context of extraction. There are a number of lexical choice phenomena, however. Jeoung (to appear) describes a pattern along these lines in Indonesian-type languages. In Indonesian and Javanese, the noun is optionally marked with the determiner suffix *-nya*/*-ne* before possessors (69a–b).

(69) *Optional determiner suffix with possessors:*

a. uang**(-nya)** orang kaya
money-DEF person rich
'rich person's money' (Indonesian)

b. buku**(-ne)** Titin
book-DEF Titin
'Titin's book' (Javanese)
(Jeoung, to appear:7)

Jeoung observes that the determiner suffix is obligatory in contexts of extraction (70a–b).

(70) *Suffix determiner obligatory with extraction:*

a. Siapa yang adik baca buku-**nya**?
who REL younger.sibling read book-DET
'Who is it that little brother is reading (her/his) book?' (Indonesian)

b. wong sing buku-**ne** werno biru
person REL book-DET color blue
'the person whose book is blue' (Javanese)

c. Sapah se buku-**nah** e-bacah ale'?
who REL book-DET PV-read younger.sibling
'Whose book was read by little brother?' (Madurese)
(Jeoung, to appear:1)

Similarly, Uriagereka (1996) points out that Galician determiners have a clitic alternant that must be used in instances of extraction (71a–b).

(71) *Determiner clitic in Galician is used with extraction:*

a. (?)De quén liche-**los** [$_{DP}$ mellores poemas de amigo ___]?
of whom read.2SG-the best poems of friend
'Who did you read the best poems of friendship by?'

b. *De quén liches [$_{DP}$ **os** mellores poemas de amigo ___]?
of whom read.2SG the best poems of friend
'Who did you read the best poems of friendship by?'
(Uriagereka 1996:270–271)

In addition, there is a well-known correlation between the permissibility of Left-Branch Extraction and the presence of a D layer (Uriagereka 1988; Bošković 2005).[28]

[28]The Specificity Effect might also be seen as a lexical choice effect (72a–b) (Fiengo and Higginbotham 1981).

(72) *Specific DPs are more resistant to extraction:*

(73) *LBE permitted in languages without overt determiners:*

a. Krasnuju ja kupil [$_{NP}$ ___ mašinu].
red I bought car
'It is a red car that I bought.'

b. *Red, I bought [$_{DP}$ a ___ car].

These facts provide evidence that PP and DP are locality domains, but do not necessarily implicate intermediate movement.

5.2 Leftness effects

There is a class of effects that emerges with extraction out of PPs and DPs, but seems to be absent with *v*P and CP, leftness effects. Specifically, in some languages, only items that may appear leftmost in PP/DP can undergo movement.

Van Riemsdijk (1978) points out, for example, that only elements that appear to the left of prepositions can extract out of PPs. In Dutch, R-pronouns, but not other DPs, appear to the left of a preposition (74a–b).

(74) *R-pronouns appear on the left:*

a. Je kan [$_{PP}$ **daar**-op] rekenen.
you can there-on count
'You can count on it.'

b. Je kan [$_{PP}$ op **hem**] rekenen.
you can on him count
'You can count on him.'

In addition, only R-pronouns can undergo movement out of a PP:

(75) *Only R-pronouns can move out of PPs:*

a. ***Wie** kan je [$_{PP}$ op ___] rekenen.
who can you on count
'Who can you count on?'

b. **Waar** kan je [$_{PP}$ ___ op] rekenen.
where can you on count
'What can you count on?'

Bošković (2016) notes a similar effect in Left Branch Extraction in Serbo-Croatian. Although Left Branch Extraction of adjectives is generally permitted, it is blocked when a demonstrative is present, as in (76).

(76) *LBE of adjectives is blocked with demonstrative:*

a. Ponosnog sam vidio [$_{NP}$ ___ oca].
proud am seen father
'It is a proud father I saw.'

---

a. Who did you see [$_{DP}$ a picture of ___]?
b. ??Who did you see [$_{DP}$ that picture of ___]?

b. *Ponosnog sam vidio [$_{NP}$ tog ___ oca].
proud am seen this father
'It is this proud father that I saw.'
(Serbo-Croatian; Bošković 2016:3)

Bošković analyzes the ungrammaticality of (76) as a leftness effect. Demonstratives are different from other DP-internal elements, like possessors, in that they must precede adjectives:

(77) *Demonstratives precede adjectives:*

a. ova skupa slika
this expensive picture
'this expensive picture'

b. ?*skupa ova slika
expensive this picture
'this expensive picture'
(Serbo-Croatian; Bošković 2016)

We can then explain why (76) is bad. Adjectives can only undergo LBE when they are leftmost in the DP.

These facts provide evidence that PPs and DPs are phasal domains. A puzzle about leftness effects, however, is why elements that are not leftmost cannot just undergo intermediate movement, something that has often been attributed to anti-locality (e.g. Abels 2003). One alternative interpretation, given the overall paucity of successive cyclicity effects in these domains, is that it reflects an absence of intermediate movement altogether, so that extraction must proceed directly from the edge in these cases.

5.3 Internal movement and pied-piping

Let me turn now to effects that imply the presence of intermediate copies. It is difficult to construct examples that test for the LF presence of copies in the DP and PP domain for independent reasons, but we can examine the PF profile of DP and PP edges. There are no stranding or multiple spell-out effects in the DP or PP that I know of. However, when Ā-movement pied-pipes a DP or a PP, some languages show evidence of intermediate movement internal to the pied-piped phrase.

In Ch'ol, as demonstrated by Coon (2009), *wh*-possessors move internal to the DP. In ordinary DPs, possessors are strictly postnominal (78). A similar effect is found in a number of other Mayan languages.

(78) *Ch'ol has postnominal possessors:*

Tyi yajl-i [$_{DP}$ i-plato **aj-Maria**]
PRF fall-INTR 3S-plate CL-Maria
'Maria's plate fell.'
(Ch'ol; Coon 2009:166)

But when a possessor pied-pipes a DP, the *wh*-possessor must appear prenominally (79a–b).

(79) *Wh-possessor moves inside pied-piped DP:*

a. [$_{DP}$ **Maxki** i-plato] tyi yajl-i?
who 3S-plate PRF fall-INTR
'Whose plate fell?'

b. *[$_{DP}$ I-plato **maxki**] tyi yajl-i?
3S-plate who PRF fall-INTR
'Whose plate fell?'
(Ch'ol; Coon 2009:166)

These facts provide evidence for DP-internal intermediate movement.

We can find similar effects in the PP. In her work on Finnish, Huhmarniemi (2012) provides evidence for intermediate movement in a range of pied-piping configurations, including PPs. Finnish allows DPs to appear before and after prepositions (80a). However, a *wh*-phrase must appear leftmost when it pied-pipes a PP, as in (80b–c).

(80) *Wh-phrase moves inside pied-piped PP:*

a. Pekka käveli [$_{PP}$ kohti **puistoa**].
Pekka walked towards park.PAR
'Pekka walked towards the park.'

b. [$_{PP}$ **Mitä** kohti] Pekka käveli?
what towards Pekka walked
'What did Pekka walk towards?'

c. [$_{PP}$ **Mitä** yli] Pekka käveli?
what over Pekka walked
'What did Pekka walk over?'
(Huhmarniemi 2012:105,115)

These phenomena seem to offer evidence for intermediate movement within the DP and PP.

As with featural effects, a mixed picture emerges for movement out of PPs and DPs. A number of reflexes of successive cyclicity are absent. There are no stranding effects at the DP/PP edge or instances of intermediate copy spell-out. These facts seem to provide support for Bošković's (2014) observation that there is a qualitative asymmetry between CP/*v*P and DP/PP in the domain of successive cyclicity (see also Bošković's observations about contrasts between simple and deep extraction in PPs and DPs).

There are in principle at least two ways of trying to account for this asymmetry. One is to try to deny that there is intermediate movement in the DP/PP domain, such that these phrases are locality domains, but lack featural triggers. This type of approach explains the pervasiveness of leftness effects, since all extraction would have to proceed either directly from the phase edge or from within a non-phasal PP/DP. A challenge for this approach is how to account for cases in which it seems possible to extract an element embedded inside a PP in a DP and PP, but not from the edge of DP (81).

(81) *Extraction from PP inside DP:*
Who did you see a picture of?

In addition, this type of proposal would have to explain the appearance of internal movement in

pied-piping configurations.[29]

Another approach is to try to account for why some reflexes of successive cyclicity may not show up in the DP/PP domain. Parasitic agreement effects are likely to be rare for independent reasons, since many languages do not have agreement on prepositions. Multiple copy spell-out is not frequently attested at the *v*P edge either (I am only aware of the Dinka case) and *wh*-copying in particular may be limited to the CP edge. I leave the question for future research. What seems clear is that both DP and PP function as locality domains.

Conclusion

This paper has attempted to provide a taxonomy of reflexes of successive cyclicity. These results are summarized in Table 2.

Table 2. Reflexes of successive cyclicity at CP and *v*P.

		CP	***v*P**
	Effect on intermediate head		
1.	Extraction marking	Irish, Dinka, …	Defaka, Malay, …
2.	φ-agreement	Dinka, Kinande, Wolof, …	Kiribati, Passamaquoddy, …
3.	Lexical choice/inversion	Russian, Belfast English, Spanish, …	Nupe, Mòcheno
	PF presence of copy		
4.	Intermediate copy realization	Malay, Basque, Quechua	Trinidadian English, Ewe
5.	Multiple copy spell-out	German, Frisian, Seereer, …	Dinka
6.	Stranding	West Ulster English, Polish	West Ulster English, Dutch, Polish
7.	V2	German, Dinka	Dinka
	LF presence of copy		
8.	Binding	English, …	English, …
9.	Scope	English, …	English, …
10.	Parasitic gaps	English, …	English, …

As I have argued, the set of attested reflexes of successive cyclicity are exactly those that are predicted by a feature-driven movement approach (Chomsky 1995; McCloskey 2002; Abels 2012a). In contrast, theories that assume only feature percolation or movement without features have difficulty accounting for the full range of such phenomena. In addition to this, I have demonstrated that there is symmetry between the CP and *v*P in phasehood (contra, for instance, Rackowski and Richards 2005, Den Dikken 2009, 2010, and Keine 2016). A mixed picture emerges when this same taxonomy is investigated in the DP/PP domain. There appears to be a qualitative asymmetry

[29]One option is that there is an independent leftness requirement on pied-piping, which arises through a different process (e.g. Heck 2009; Richards 2017).

between CP/*v*P and PP/DP (see also Bošković 2014), in that many of the effects in Table 2 lack counterparts in the PP/DP domain.

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