Patterns of Movement Reflexes as the Result of the Order of Merge and Agree

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In this article, I analyze patterns of reflexes of Ā-movement found within and across languages: reflexes may occur in all or none of the clauses of the dependency, in the clause where the dependency terminates, or solely in clauses where it does not terminate. I argue that the variation can best be captured by the variable timing of Agree and two subtypes of internal Merge (final vs. intermediate movement steps) triggered by a single head: early movement feeds Agree and gives rise to a reflex; late movement has the opposite effect. Since the subtypes of movement can apply at different points relative to Agree, reflexes may occur only in some clauses of the dependency.

Keywords: movement reflexes, Agree, Merge, opacity, order of operations, optionality

1 Introduction

A lot has been learned in the last five decades about the nature of long Ā-movement dependencies. The findings indicate that such dependencies may be composed of smaller dependencies; that is, movement applies successive-cyclically rather than in one fell swoop. This finding in turn has advanced research on the size of the individual movement steps, the positions that constitute intermediate landing sites, the nature of the element in intermediate landing sites, the trigger for intermediate movement steps, and so on. Reflexes of movement have played a major role in answering some of these questions, in particular those about the positions of intermediate stopovers. What this line of research has not focused on, however, is the fact that crosslinguistically, long Ā-dependencies exhibit different patterns with respect to the distribution of movement reflexes across clauses. In this article, I identify four basic patterns found in different languages as well as mixtures that can occur within a single language. I propose that these patterns result from the varying order of the operations Merge and Agree when they are triggered by a single head: reflexes arise if Merge applies before Agree and thus feeds Agree; reflexes do not arise if Agree applies before Merge, so that Merge counterfeeds Agree. Together with the assumption that final and intermediate movement steps are triggered by distinct features, the logically possible orders

For valuable comments and discussion, I would like to thank Anke Assmann, Fabian Heck, Gereon Müller, Peter Muriungi, Andrew Nevins, Martin Salzmann, Harold Torrence, Coppe van Urk, Philipp Weisser, and Jason Zentz, as well as the audiences at GLOW 37 (Brussels 2014), the Workshop on Interaction of Syntactic Primitives (Potsdam 2013), and ConSOLE XXI (Potsdam 2013). This research was carried out in the DFG-funded projects ''Local Modelling of Non-local Dependencies in Syntax'' and the Research Training Group GRK 2011 ''Interaction of Grammatical Building Blocks'' at Universität Leipzig.

Linguistic Inquiry, Volume 48, Number 4, Fall 2017
585–626

doi: 10.1162/ling_a_00255

of operations predict the attested patterns. Thus, I argue for a more fine-grained typology of Merge, where subtypes of this operation are distinguished, as well as for extrinsic ordering of operation-inducing features on a head. This approach implies that the timing of intermediate movement steps (viz., edge feature discharge) is more flexible than previously assumed, and that Agree is a syntactic operation. Furthermore, I show that the few existing accounts of a subset of the attested patterns cannot straightforwardly be extended to capture all patterns. At least, such an extension would require undesirable assumptions and would lead to a nonuniform analysis of reflex patterns across and within languages, while the ordering approach offers a coherent analysis of all patterns.

The article is structured as follows. In section 2, I give an overview of the four basic patterns of movement reflexes as well as the cooccurrence and optionality of patterns within a single language. In section 3, I introduce an account of this variation that relies on the timing of Agree and (subtypes of) Merge. In section 4, I compare this ordering approach with existing accounts of the variation of two of the four basic patterns; I investigate whether and how these approaches can be extended to the other patterns and argue that they have several drawbacks, whereas the ordering approach allows for a uniform analysis. In section 5, I discuss implications of the ordering approach for the timing of edge feature discharge and the locus of Agree. I conclude in section 6.

2 Reflexes of Successive-Cyclic Movement

In this section, I introduce the empirical basis of the article: the four basic reflex patterns found across languages as well as mixtures of these patterns within languages.

2.1 Basic Patterns of Movement Reflexes

In many languages, Ā-movement (e.g., *wh*-movement, relativization, focus movement) leaves reflexes along the path of movement. The way these reflexes manifest themselves varies considerably: they can be semantic (reconstruction), syntactic (copying, stranding, inversion), morphological (morpheme changes), or phonological (tonal changes) in nature (see, e.g., Boeckx 2008b, Lahne 2008b, Abels 2012 for a data overview); they can result in addition, deletion, or replacement of an exponent (Zentz 2013). Furthermore, reflexes can occur either in XP position (i.e., in intermediate and/or final landing sites) or on a head that projects a landing site.

In this article, I will be concerned with reflexes that involve an Agree relation between a head and the moving XP, as these reflexes allow for a study of the interaction of Merge and Agree. Prototypically, these are reflexes on heads; that Agree is involved here is obvious from the fact that in many languages the form of the reflex on the head covaries with inherent properties of the moved XP. Reflexes in phrasal positions usually do not (have to) involve an Agree relation between the moving XP and a head; the reflex can be the result of copy spell-out or stranding of parts of the moved XP. However, some reflexes in phrasal position do seem to involve Agree, too. This is the case if the reflex occurs on a phrase YP in the specifier of the head F, and YP has not undergone Ā-movement itself; rather, YP's form is affected by Ā-movement of another phrase XP to the specifier of a different head H whose projection dominates FP (see, e.g., the discussion of Ewe below). I propose that there is an Agree relation between H and XP in this case and that there is another relation between H and F and/or YP that influences the realization of YP. An example of a reflex on a head can be found in Wolof (Niger-Congo) *u*-chains: in this construction, Ā-movement triggers a reflex on the complementizer *u.* As a result, C bears a prefix that indicates the noun class of the moved XP. (1) provides an example of local *wh*-movement (with a zero *wh*-operator Ø; see Torrence 2012 for discussion); the base position is indicated by an underline coindexed with the moved phrase, and the class prefix is in boldface.[1]

(1) *Complementizer agreement in Wolof* u-*chains*

a. $\emptyset_k$ **k**-u _____$_k$ togg ceeb ak jën?
Q CL-u cook rice and fish
'Who cooked rice and fish?'

b. $\emptyset_k$ **y**-u jigéén j-i togg _____$_k$?
Q CL-u woman CL-DEF.PROX cook
'What(pl) did the woman cook?'
(Torrence 2012:1151, 1171)

Morphophonological or syntactic changes in an Ā-dependency are said to be reflexes of movement (a) if the dependency exhibits the characteristic properties of movement (island sensitivity, weak crossover effects, reconstruction effects), and (b) if the reflex cannot occur if there is no Ā-movement in the first place (viz., in declaratives). Crosslinguistically, such reflexes are only triggered by movement that happens in the syntax—that is, movement that has an effect on PF and/or LF (realization of the moved element in a different position, scope changes, etc.; see, e.g., Clements 1984b, Haïk 1990, Cole and Hermon 2000, Muriungi 2005). Thus, the reflex does not occur if the operator stays in situ (*wh*-/foc-in-situ); and under partial movement it can only occur below the surface position of the moved XP, not between the scope position (potentially targeted by LF movement of XP) and XP's surface position. The languages that I will discuss in what follows have these properties. For reasons of space, I will not exemplify this; I refer the reader to the cited literature.[2] Under long Ā-movement, many languages exhibit reflexes on heads that are between the head projecting the final landing site of XP and XP's base position: in Wolof *u*-chains, *every* C-head along the path of *wh*-movement agrees in class with the moved XP.

[1] The following abbreviations and glosses are used in this article: 1/2/3 = 1st/2nd/3rd person, AGR = agreement marker, C = complementizer, CL = class marker, CNP = complex noun phrase, DEF = definite, DO = direct object, EXPL = expletive (default class marker), FOC = focus marker, FRC = force marker, FV = final vowel, L = linker, OBJ = objective, OBL = oblique, OP = operator, PERF = perfective, PL = plural, PRES = present, PROX = proximate, PST = past, Q = question word, SG = singular, SM = subject marker, WH = *wh*-agreement (agreement with an Ā-moved phrase).

[2] In general, island and crossover data are readily found in the literature, but reconstruction data are often not available. See, for example, Adger and Ramchand 2005 on the relevance of reconstruction effects in addition to other diagnostics for the distinction between base-generation and movement. What is important here is that for each of the four reflex patterns that will be introduced below there are languages for which reconstruction data are available (alongside other movement diagnostics); hence, it is clear that the reflexes are indeed the result of movement (see, e.g., Torrence 2012 on Wolof).

(2) *Complementizer agreement in Wolof* u-*chains*

a. [$_{\text{CP}}$ Ø$_{\text{k}}$ **f**-u a defe [$_{\text{CP}}$ **f**-u Maryam wax [$_{\text{CP}}$ **f**-u ñu teg tééré
Q CL-u 2SG think CL-u Maryam say CL-u 3PL put book
b-i ____$_{\text{k}}$]]]?
CL-DEF.PROX
'Where do you think Maryam said they put the book?'

b. [$_{\text{CP}}$ Ø$_{\text{k}}$ **k**-u Kumba wax [$_{\text{CP}}$ ne **k**-u Isaa defe [$_{\text{CP}}$ ne **k**-u Maryam
Q CL-u Kumba say FRC CL-u Isaa think FRC CL-u Maryam
dóór ____$_{\text{k}}$]]]?
hit
'Who did Kumba say that Isaa thought that Maryam hit?'
(Torrence 2012:1171)

Intermediate reflexes have been taken as evidence for the hypothesis that long Ā-movement proceeds successive-cyclically rather than in one fell swoop (see Chomsky 1973), because agreement requires a local relation between the target and the controller; in Minimalist terms, they need to be (at least) within the same phase. Which positions constitute intermediate landing sites is debated (see Abels 2012:chap. 2 for discussion); ultimately, this is an empirical question. For the sake of concreteness, I will assume that Ā-movement goes through every Spec,CP and Spec,vP (Chomsky 2000, 2001, Van Urk and Richards 2015), but there could be more stopovers. In what follows, I will refer to the clause in which the Ā-moved XP surfaces as the *final clause*, and to all lower clauses through which it moves as *nonfinal clauses.*

The crucial observation is that there are four different patterns of reflexes of long Ā-movement crosslinguistically, abbreviated as PI–PIV in what follows. The abstract patterns are given in (3). For the sake of illustration, I exemplify them with long *wh*-movement of an XP (base position underscored) that leaves a reflex R on the head H (boldfaced); H is the head on which a reflex is found in a given language (e.g., C or v). Clause boundaries are indicated by S. Crucially, the reflexes could also occur under other types of Ā-movement; the manifestation of the reflex is irrelevant (tone, affix, inversion, etc.). What is important here is the distribution of the reflex across clauses.

(3) *Patterns of reflexes of long Ā-movement*

a. PI: Reflex in the final and nonfinal clauses
[$_{\text{S1}}$ . . . [$_{\text{HP}}$ XP$_{\text{wh}}$ [$_{\text{H'}}$ **H-R** . . . [$_{\text{S2}}$ . . . **H-R** . . . [$_{\text{S3}}$ . . . **H-R** . . . ____$_{\text{XP}}$]]]]]

b. PII: Reflex solely in the final clause
[$_{\text{S1}}$ . . . [$_{\text{HP}}$ XP$_{\text{wh}}$ [$_{\text{H'}}$ **H-R** . . . [$_{\text{S2}}$ . . . H . . . [$_{\text{S3}}$ . . . H . . . ____$_{\text{XP}}$]]]]]

c. PIII: Reflex solely in nonfinal clauses
[$_{\text{S1}}$ . . . [$_{\text{HP}}$ XP$_{\text{wh}}$ [$_{\text{H'}}$ H . . . [$_{\text{S2}}$ . . . **H-R** . . . [$_{\text{S3}}$ . . . **H-R** . . . ____$_{\text{XP}}$]]]]]

d. PIV: No reflex in any clause
[$_{\text{S1}}$ . . . [$_{\text{HP}}$ XP$_{\text{wh}}$ [$_{\text{H'}}$ H . . . [$_{\text{S2}}$ . . . H . . . [$_{\text{S3}}$ . . . H . . . ____$_{\text{XP}}$]]]]]

The most well-known pattern and the one that motivated successive-cyclic movement is PI as we find it in Wolof *u*-chains (see (2)): the reflex of movement that appears on a head of a certain category (C in Wolof) occurs in every clause along the path of movement. Other languages with PI include Chamorro (case agreement on the verb; Chung 1998), Irish (complementizer selection in *aL*-chains; McCloskey 1979, 2002), Indonesian/Malay (voice marker deletion; Saddy 1991, Cole and Hermon 1998, 2000), Kikuyu (downstep deletion; Clements et al. 1983, Clements 1984a), Spanish and Belfast English (subject-auxiliary inversion; Torrego 1984, Henry 1995). In other languages, the reflex manifests itself solely on the head that projects the final landing site of the Ā-moved phrase, that is, in the final clause (PII). The opposite is also attested (PIII): the reflex occurs on heads that project a nonfinal landing site of XP (i.e., in nonfinal clauses), but not on the head that projects the final landing site. Finally, there are languages in which movement does not leave a reflex in any clause (PIV).[3]

An example of a PII reflex is *no*-marking in Duala (Niger-Congo; Epée 1976a,b, Biloa 1993): if an object or an adjunct is Ā-moved, it obligatorily triggers the insertion of the marker *no* after the finite verb in T.[4] (4a) provides the baseline sentence. (4b) shows that extraction of the direct object triggers *no*-insertion; without *no*, ungrammaticality results. Crucially, under long Ā-movement, *no* surfaces only in the clause that hosts the moved XP, not in nonfinal clauses; see (4c).

(4) *Focus movement in Duala*

a. Kuo a bodi nu moto kalati kiele.
Kuo 3SG give that man book yesterday
'Kuo gave a book to that man yesterday.' *declarative*

b. Kalati$_k$ nde Kuo a bodi **no** nu moto ____$_k$ kiele.
book FOC Kuo 3SG give NO that man yesterday
'It's a book Kuo gave to that man yesterday.' *DO extraction*

c. [$_{CP}$ Ni kalati$_k$ nde na ta **no** na kwalane Kuo [$_{CP}$ na a-angamente
that book FOC I PST NO I tell Kuo that 3SG-must
wana ____$_k$]].
bring
'That's the book I told Kuo that he should bring.' *long DO extraction*
(Epée 1976b:194, 196)

Other PII reflexes are found in Chamorro (complementizer agreement; Chung 1998), Ewe (subject pronoun choice; see below), Indonesian (focus marking; Saddy 1991), Bùlì (complementizer

[3] Another pattern is found in French participle agreement: the reflex occurs only in the clause in which the moved XP originates, but not in higher clauses crossed by XP-movement (see, e.g., Kayne 1989, Branigan 1992, Chomsky 1995, Grohmann 2003). This pattern does not seem common crosslinguistically. I assume that unlike PI–PIV it is not the result of the order of Merge and Agree (see section 3.3). Rather, it seems to be related to resumption: as Boeckx (2003:59ff.) points out, resumption and participle agreement have the same semantic effects and improve island violations; resumptives are also found only in the clause where the Ā-dependency starts out, not in higher clauses (Salzmann 2011:198). If resumption involves movement (Pesetsky 1998, Aoun, Choueiri, and Hornstein 2001, Boeckx 2003), the similarity is even more pervasive. Thus, I suggest that what we find in French is the head-marking equivalent of resumption: using the stranding analysis of resumption (Aoun, Choueiri, and Hornstein 2001, Boeckx 2003, Klein 2016), this can be implemented by incorporation of the stranded material (usually realized as the resumptive) into v: see Georgi 2014:sec. 4.3 for details and Rocquet 2013:209–210 for a similar account of French participle agreement.

[4] Even though the reflex surfaces in the TP, it is triggered by Ā-movement to Spec,CP; regular A-movement of the subject to Spec,TP does not cause *no*-insertion. I follow Biloa (1993) in assuming that *no* is a clitic that attaches to the right of the element in T. See footnote 20 for a technical implementation of the interaction of movement to Spec,CP and the realization of a reflex of this movement in T in Duala.

agreement; Hiraiwa 2005), Hausa (relative tense marking; Tuller 1985, 1986), Moore (deletion of a verbal suffix; Haïk, Koopman, and Sportiche 1985, Haïk 1990), and Haitian Creole (complementizer selection; Takahashi and Gracanin Yuksek 2008).

An example of a PIII reflex is preverbal focus marking in Kiitharaka (Niger-Congo; Muriungi 2005, Abels and Muriungi 2008). The basic word order in declaratives is SVO. If an Ā-dependency is formed by overt movement, the moved XP appears in clause-initial position; see the *wh*-movement example (5b), based on (5a).[5]

(5) *Kiitharaka* wh-*movement*

a. Maria a-gur-ir-e i-buku.
   Maria SM-buy-PERF-FV 5-book
   'Maria bought a book.'
   (Abels and Muriungi 2008:692)

b. I-mbi$_k$ Maria a-k-ir-e ____$_k$?
   FOC-what Maria SM-build-PERF-FV
   'What did Maria build?'
   (Muriungi 2005:45)

In long Ā-dependencies, the prefix *n*- (or its allomorph *i*- before consonant-initial stems) attaches to the verb in nonfinal clauses; see (6). Muriungi (2003, 2005) and Abels and Muriungi (2008) identify the prefix as a focus marker.

(6) *Cross-clausal* wh-*movement*

a. [$_{CP}$ I-mbi$_k$ g-ug-ir-e [$_{CP}$ ati John **n**-a-ring-ir-e ____$_k$]]?
   FOC-what 2SG-say-PERF-FV that John FOC-SM-beat-PERF-FV
   'What did you say that John beat?'

b. [$_{CP}$ N-uu$_k$ u-ku-thugania [$_{CP}$ ati John **n**-a-ug-ir-e [$_{CP}$ Lucy
   FOC-who 2SG-PRES-think that John FOC-SM-say-PERF-FV Lucy
   n-a-ring-ir-e ____$_k$]]?
   FOC-SM-beat-PERF-FV
   'Who do you think that John said Lucy beat?'
   (Muriungi 2005:47–48, 67–68)

Crucially, the preverbal focus marker cannot occur in the clause in which the *wh*-phrase surfaces (see Muriungi 2005:67); it is thus absent in examples with clause-bound *wh*-movement such as (5b). Hence, preverbal focus marking exhibits PIII.[6] Other languages with PIII include Dinka (*ke*-marking at the edge of vP; Van Urk and Richards 2015, Van Urk 2016), Wolof (complementizer

[5] Verbs in Kiitharaka always end in a final vowel. Its surface form depends on various factors, but this is of no importance for the discussion of movement reflexes. Following Muriungi (2005), I do not indicate tones in the examples, as they do not seem to interfere with focus marking.

[6] Since a focus marker also occurs on the moved *wh*-phrase and thus in the final clause, Abels and Muriungi (2008) assume that focus marking exhibits what I call PI. I assume that the prenominal focus marker is not the same as the preverbal one: apart from their different positions, Abels and Muriungi (2008) note that the two have somewhat different semantics and that the prenominal marker triggers a phonological change (lengthening) that the preverbal marker does not.

agreement in *an*-chains; see below, Torrence 2012), and German (obligatory extraposition; Müller 1999).

Finally, in many languages movement does not leave a reflex in any clause affected by Ā-movement (PIV). One may wonder why such languages are included in the present discussion, since the absence of a reflex could simply be due to the absence of agreement between a head H and the moving XP. Alternatively, agreement may take place but the reflex is morphologically zero (see section 4.4 for discussion of an approach to reflex patterns based on zero exponence). Fortunately, there are a few PIV languages that provide evidence that agreement is indeed established (and it is not zero). The evidence comes from default exponents, as found for example in Wolof *an*-chains. In this construction (which freely alternates with the *u*-construction in questions; see Torrence 2012), the complementizer C also agrees in class with the operator. But this time the operator is overt (viz., *an*), and the C-head is realized as *a* or *u*. Upon successful class agreement with the operator, C and the *wh*-phrase bear the same prefix (set in boldface on the C-head in (7)). Class agreement in *an*-chains exhibits PIII or PIV. It is impossible in the final clause and hence does not surface under local Ā-movement; see (7a), where the operator *an* and C do not bear the same prefix. However, it is optionally possible in nonfinal clauses, giving rise to PIII or PIV; see (7b) vs. (7c). (Indeed, the presence or absence of C-agreement can vary between nonfinal clauses; see section 3.5 for a detailed discussion of such alternations.)[7]

(7) *A reflex of Ā-movement in Wolof* an-*chains*

a. Y-an$_k$ l-a jigéén j-i togg ____$_k$?
CL-an EXPL-a woman CL-DEF.PROX cook
'What(pl) did the woman cook?' *local movement*

b. [$_{CP}$ K-an$_k$ l-a-ñu wax [$_{CP}$ **k**-u jigéén j-i foog [$_{CP}$ **k**-u ma
CL-an EXPL-a-3PL say CL-u woman CL-DEF.PROX think CL-u 1SG
dóór ____$_k$]]]?
hit
'Who did they say that the woman thinks that I hit?' *PIII*

c. [$_{CP}$ K-an$_k$ l-a-ñu wax [$_{CP}$ **l**-a jigéén j-i foog [$_{CP}$ l-a-a
CL-an EXPL-a-3PL say EXPL-a woman CL-DEF.PROX think EXPL-a-1SG
dóór ____$_k$]]]?
hit
'Who did they say that the woman thinks that I hit?' *PIV*
(Torrence 2012:1152, 1173)

Crucially, the class prefix is not simply absent in the final clause and/or the nonfinal clauses in (7b) (PIII) and (7c) (PIV). Rather, the default class marker *l-* (gloss EXPL) surfaces, regardless

[7] In *an*-chains, the alternation between the complementizers *u* and *a* is regulated by the same factors as real vs. default class agreement: if there is class agreement with the moving XP, C surfaces as *u*, just as in *u*-chains; if class agreement fails and the default marker *l-* occurs, C surfaces as *a*. Following Torrence (2012:1155–1156), I take the difference in the form of the C-head to indicate definiteness agreement with the moved XP: *u* is the indefinite form that encodes Agree with the indefinite *wh*-operator. If Agree fails, the default form of the complementizer, *a*, is chosen (see Martinović 2017 on the default status of *a*).

of the class of the moved element (Torrence 2012, 2013). I take the default marker to indicate the presence of a class probe on the C-head that initiates agreement with the moving XP, but cannot be valued by it. Instead, the probe receives a default value that is realized as *l-* in Wolof. There is no reason why a prefix should occur if the C-head did not attempt to agree. A purely morphological analysis, according to which the default marker is present because of a morphological requirement that demands that the prefix slot of C be filled, fails: there are contexts in which the C-head surfaces without any class prefix, for example, when the subject is locally Ā-moved (see Torrence 2012:1152, Martinović 2017).[8] Hence, crosslinguistically we need to distinguish among four reflex patterns that arise because of (attempted) agreement with a moved XP.

2.2 Mixed Patterns and Optionality

As we have seen, the four basic reflex patterns occur across languages. It is also possible that several of the patterns are found within a language: the patterns either cooccur, a setting I will call *mixed patterns*, or they alternate, an instance of *optionality.* As for mixed patterns, a single instance of Ā-movement triggers more than one reflex and the reflexes exhibit distinct patterns. Of particular interest will be languages in which long Ā-movement leaves both PI and PII reflexes. In Chamorro (Chung 1998), for example, *wh*-movement triggers a PI reflex on the verb (= case agreement with the moved XP; see Chung 1994, 1998) as well as a PII reflex on the complementizer (agreement with the moved XP in category); see the abstract pattern in (8).[9] In the concrete example in (9), movement-induced forms of the C-head are boldfaced; the reflex on the verb is indicated by the gloss 'WH' (it is not always a discrete segment).

(8) *Mixed patterns in Chamorro: PII on C and PI on the verb*
[$_{CP1}$ wh-XP$_k$ [$_{C'}$ **C-R** . . . **v-R** . . . [$_{CP2}$ C . . . **v-R** [$_{CP3}$ C . . . **v-R** . . . ___$_k$]]]]

(9) *PI and PII in Chamorro*

[Manu	na	lepblu]$_k$	Ø	malagu'ñiha	[$_{CP}$ na	u-taitai	___$_k$]?
which	L	book	C	WH.OBL.want-AGR	C	WH.OBJ.AGR-read	

Lit.: 'Which book do they$_i$ want that they$_i$ should read?'
(Chung 1998:230)

In (9), C in the final clause surfaces as zero since it agrees with the *wh*-phrase in category (a noun that does not denote location/time). In the embedded clause, the form *na* occurs. It is not determined by the category of the moved XP (it should then be identical to the form in the final clause). Rather, it is determined by the finiteness and the embedding status of the clause—the same principles that regulate the choice of C in clauses without any Ā-dependency; hence, *na* does not contain a reflex of movement (see Chung 1998:223ff. for an overview of C-forms). The

[8] In Wolof, only nonsubject extraction can lead to class agreement. Splits based on the argument/adjunct or subject/nonsubject status of the moved XP are frequent in languages with movement reflexes. See Georgi 2014 for a proposal about how to derive such splits in the account argued for here.

[9] Chung (1998) assumes that the verb and hence the PI reflex is in T and not in v/V, but the location does not matter for the present discussion; what is important is that the verbal reflex exhibits PI.

wh-form of the verb indicates the grammatical function of the extracted XP (or of the clause from which it is extracted).[10]

I now turn to optionality. As shown for Wolof *an*-chains in (7), reflexes can be optional in certain clauses affected by Ā-movement (see Boeckx 2008b:35n2). Thus, the relevant languages also exhibit more than one pattern. However, the patterns do not cooccur; rather, one or the other is triggered. In Wolof *an*-chains, movement results in PIII or PIV. In Ewe (Niger-Congo), it results in PI or PII: the choice of the 3rd person subject pronoun in Spec,TP is influenced by movement of a vP-internal element to Spec,CP.[11] The default form of the pronoun is *é*; under Ā-movement across Spec,TP, it changes to *wò*; see (10a) vs. (10b). Collins (1993:178–179, 187ff.) notes that the special Ā-form is obligatory in the final clause, (10b), but optional in nonfinal clauses, (10c). If it occurs in nonfinal clauses, PI results; if it does not, we find PII.

(10) *Subject pronoun choice in Ewe*

a. [É/*Wò] fo Kɔsi.
he hit Kɔsi
'He hit Kɔsi.' *declarative*

b. [$_{CP}$ Kofi biɛ [$_{CP}$ be lamata$_k$ [*é/**wò**] fo Kɔsi ____$_k$]].
Kofi asked C why he hit Kɔsi
'Kofi asked why he hit Kɔsi.' *embedded question*

c. [$_{CP}$ Me$_k$ e gblɔ [$_{CP}$ be [**é**/**wò**] fo ____$_k$]]?
who you say C he hit
'Who did you say that he hit?' *long* wh-*movement*
(Collins 1993:157, 177, 179)

The same PI/PII optionality is found in Wolof *u*-chains: class agreement on the C-head is obligatory in the final clause, but optional in nonfinal clauses. In nonfinal clauses, we find either a class marker (PI, (11a)) or the default marker *l*- (PII, (11b)).

(11) *PI and PII in Wolof* u-*chains*

a. [$_{CP}$ Ø$_k$ **k**-u Kumba wax [$_{CP}$ ne **k**-u Isaa defe [$_{CP}$ ne **k**-u Maryam
Q CL-u Kumba say FRC CL-u Isaa think FRC CL-u Maryam
dóór ____$_k$]]]?
hit *PI*

[10] The PI reflex in Chamorro is different from the other PI reflexes listed in section 2.1. In the latter, the reflex in every clause indicates the properties of the moved XP. In Chamorro, however, the reflex on the verb registers the (case) features of the moving XP only in the clause in which the XP originates; in all higher clauses of the dependency, the verb tracks the features of the CP from which the XP is extracted. Hence, in example (9) the lower verb exhibits objective agreement because its object is extracted; the higher verb exhibits oblique agreement because the complement of the matrix verb bears oblique case. This pattern occurs in other Austronesian languages as well (e.g., in Tagalog; Rackowski 2005, Rackowski and Richards 2005). Still, it is a PI reflex and this is what is crucial for the discussion here.

[11] Ewe is included here even though its movement reflex occurs not on a head but in Spec,TP, because Agree seems to be involved in the reflex nevertheless. In particular, Ewe exhibits an instance of the abstract pattern introduced in section 2.1: the reflex in Spec,TP is not triggered by movement of a YP to Spec,TP (see Collins 1993:41–42 on EPP movement in Ewe); rather, it is triggered by Ā-movement of another phrase XP to a higher projection (viz., Spec,CP). I assume that an Agree relation holds between C and the XP in Spec,CP, plus a relation that transmits the information about this Agree relation from C to (Spec,)T.

b. [$_{CP}$ Ø$_k$ **k**-u Kumba wax [$_{CP}$ ne **l**-a Isaa defe [$_{CP}$ ne **l**-a Maryam
Q CL-u Kumba say FRC EXPL-a Isaa think FRC EXPL-a Maryam
dóór ____$_k$]]]?
hit
'Who did Kumba say that Isaa thought that Maryam hit?' *PII*
(Torrence 2012:1173)

Given the distributional variation of movement reflexes across and within languages, the central question is how this variation can be accounted for. So far, a uniform analysis of the four basic patterns is missing. Indeed, there is little comparative work that tries to provide an analysis for at least some of the patterns. The few existing approaches are restricted to PI vs. PII (see section 4 for discussion)—though this is due to the fact that examples of PIII have only been described within the last 15 years. But even PII, known at least since Epée 1976b, is often neglected (see, e.g., Boeckx 2008b:36n7) or disregarded as a movement reflex (Lahne 2008b). The goal of this article is to provide a uniform analysis of all four patterns, including mixed patterns and optionality.

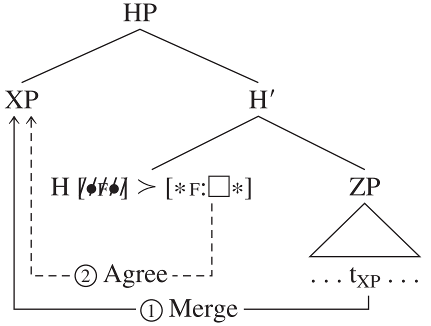
3 An Ordering Approach

The central question is why in some languages movement does not leave a reflex in all clauses crossed by movement. In this section, I present a syntactic account that is based on the order of Merge and Agree initiated by a single head. I show that the timing of these operations plus the assumption that final and nonfinal movement steps are triggered by distinct features allows for a uniform analysis of all patterns; variation is the result of reordering of operation-inducing features. Arguments in favor of this approach will be given in section 4, where it is compared with existing approaches to PI vs. PII.

3.1 Reflexes of Movement as Feeding Relations

I adopt a derivational model of syntax in which syntactic structure unfolds step by step from bottom to top by applications of Merge and Agree. Merge is a structure-building operation triggered by [•F•]-features; Agree relates a probe feature [∗F:□∗] that seeks a value and a goal by copying the goal's value onto the probe (Chomsky 2000, 2001). (The notation is adopted from Adger 2003, Sternefeld 2006, Heck and Müller 2007.) Movement, an instance of internal Merge, is subject to the Phase Impenetrability Condition (Chomsky 2000:108). As a consequence, long movement applies successive-cyclically through the edges of phases, which I take to be vP and CP (see Chomsky 1986, 2000, 2001, Van Urk 2015). I follow the traditional view that reflexes of movement are the result of Spec-head-Agree between the head H and an XP moved to Spec,HP (see, e.g., Torrego 1984, Chung and McCloskey 1987, Kayne 1989, McCloskey 1990, Rizzi 1990, Kinyalolo 1991, Collins 1993, Henry 1995, Schneider-Zioga 1995, Watanabe 1996, Chung 1998, Torrence 2012). The features acquired by H under Agree are realized postsyntactically. Technically, this is achieved by (a) upward probing of the probe on H (the goal must c-command the probe; see Baker 2008, Wurmbrand 2012, Zeijlstra 2012), and (b) ordering of the two operation-inducing features of H such that [•F•] (which triggers movement of XP) applies before [∗F:□∗] (which triggers Agree with XP).

(12) *Merge ≻ Agree (feeding)*



In (12), H first triggers movement of XP to Spec,HP, discharging [•F•], indicated by a strikethrough. Afterward, the probe on H seeks for a goal with a matching feature that c-commands it; assuming that XP bears such a feature, the probe is valued by XP. This is possible because XP, having moved to Spec,HP, is in H's search domain. Hence, early movement to Spec,HP feeds (upward) Agree. In Wolof, for example, where C enters into class agreement with an Ā-moved XP, the C-head bears a class probe [∗CLASS:□∗] that targets the operator in Spec,CP. Upon successful valuation of the probe, the class value is realized by a prefix.

Adopting upward Agree implements the fact that crosslinguistically, reflexes of movement are not found with *wh-*/foc-in-situ: an in-situ operator is never in the search domain of an upward-looking probe on a structurally higher head (see Baker 2008 for this type of argument in favor of upward Agree). Under downward Agree, where the probe must c-command the goal, an in-situ operator *is* in the domain of the probe; hence, further restrictions would be required to block downward Agree with an in-situ operator.[12] But apart from this, the core of the present analysis could also be upheld under downward Agree; see footnote 19 for details.[13]

[12] One way to derive the absence of reflexes of movement with *wh-*/foc-in-situ under downward Agree is to assume that the probe is accompanied by an EPP feature that triggers movement of the goal (Carstens 2005, Reintges, LeSourd, and Chung 2006). See Baker 2008:173 for examples where this solution collapses since the goal has never been in the c-command domain of the probe at any stage of the derivation; but see Preminger and Polinsky 2015 for a critical review of Baker's arguments. Rezac (2004:113–114) offers a discussion of conceptual problems with the downward Agree + EPP approach. An anonymous reviewer proposes that the absence of agreement with in-situ XPs under downward Agree is simply due to well-known locality conditions, so no stipulations have to be added to derive this restriction: the XP is in a domain that is not accessible to the Agree-triggering head H because of a locality barrier (e.g., a phase boundary) between H and XP. If such a barrier can be identified in all the relevant examples, the absence of a reflex with *wh-*/foc-in-situ can be reconciled with downward Agree. This is possible for example in cases where C is the probing head and the to-be-moved XP is the direct object of the verb, as there is a phase boundary between them, but it is less obvious for examples where the reflex is on v (e.g., *men*-deletion in Malay and Indonesian, Cole and Hermon 1998; H-tone raising on verbs in Akan, Korsah and Murphy 2015; *ke*-marking in Dinka, Van Urk 2015), since v and the direct object are part of the same phase.

[13] Chomsky (2001 et seq.) holds that Agree solely applies downward, whereas Wurmbrand (2012) and Zeijlstra (2012) argue that it applies only upward. The latter view has been challenged by Van Koppen (2011), Van Koppen, Diercks, and Putnam (2011), and Preminger (2013), who argue that downward Agree with the probe c-commanding the goal is necessary after all. Others allow for both options, with a preference for either downward Agree (Béjar and Rezac 2009) or upward Agree (Assmann et al. 2015).

What is crucial for this analysis is the order of Merge and Agree. If the order is reversed, with (upward) Agree applying before Merge, counterfeeding results: the probe on H cannot be valued because at the point where it probes, there is no goal in its search domain (Spec,HP); XP moves there only afterward. If there is no value on H, there can be no morphological realization of it and hence, there is no reflex of movement. It is the variable order of Merge and Agree that I will use to derive the presence or absence of a reflex. Merge and Agree always apply, but sometimes Merge simply comes too late to feed Agree, resulting in the absence of a reflex of movement. Ordering Merge and Agree triggers located on a single head has frequently been used in recent years to capture bleeding and feeding effects with downward Agree in individual languages; see Bruening 2005, Van Koppen 2005, Halpert 2012, Richards 2013, and Kalin and Van Urk 2015 on bleeding (early movement of XP bleeds subsequent downward Agree with XP), and Anand and Nevins 2005, Sigurðsson and Holmberg 2008, and Asarina 2011 on feeding (early movement of an intervening XP enables subsequent downward Agree with a lower YP).[14] The variable order of Merge and Agree triggered by a single head has been argued to capture crosslinguistic variation in Heck and Müller 2007, Lahne 2008a, Müller 2009, and Heck and Himmelreich 2017. Note, for example, that the reverse, counterbleeding order of downward Agree and Merge (Agree before Merge) is used in the standard analysis of subject-verb agreement in English (T agrees with an argument inside vP that subsequently undergoes EPP movement to Spec,TP).

3.2 Further Assumptions

Reflexes of movement arise if movement applies before upward Agree; given this order, the probing head is valued by the moved XP (feeding; see (12)), and the realization of the value is the reflex. Under the reverse order, there is no valuation of H's probe because movement applies too late (counterfeeding); hence, there is no reflex of movement. The different orders of Merge and (upward) Agree plus the assumption that long Ā-movement applies successive-cyclically derive patterns PI (Merge ≻ Agree) and PIV (Agree ≻ Merge): the operator makes stopovers in every clause of the dependency, and hence, assuming (at least for the time being) that the order of Merge and Agree does not vary from clause to clause, Agree with the operator is successful in each clause (PI) or fails in each clause (PIV). However, in PII and PIII languages movement does not behave in a uniform way: we find a reflex in some clauses of the dependency, but not all. In the present system, this would imply the symmetrical order Merge ≻ Agree ≻ Merge within a single language, which is paradoxical. One way to resolve this is to distinguish between

[14] To obtain a bleeding effect under downward Agree by early movement of the goal XP out of the probe's accessible domain, the copy/trace of the moved XP must not be visible for the probe, as noted for example in Chomsky 2000:131, Rezac 2004:51ff., Anand and Nevins 2005:16, and Van Koppen 2005, 2007. Several explanations have been proposed for this. For example, Van Koppen (2007) argues that the internal structure of lower copies is not accessible to Agree because lower copies are reduced in such a way that the features on the highest projection are accessible, but those on nodes dominated by this projection are not. Rezac (2004:52ff.) assumes that a functional (DP-)shell is inserted on top of lower copies and shields the features of the copy from being visible to an outside probe.

different types of Merge that can apply at different points relative to Agree. As PII and PIII indicate, the crucial difference is between final and nonfinal (intermediate) movement steps. Therefore, I assume that these steps are triggered by distinct features: the final movement step is triggered by the familiar (potentially movement-type-specific) features such as [•WH•] for *wh*-movement; however, nonfinal movement steps are triggered by edge features [•EF•] (Chomsky 2000 et seq.; contra McCloskey 2002, Abels 2012, Van Urk 2015).[15] If *subtypes* of Merge are ordered with respect to Agree, as for example in (13), some movement steps can apply before Agree, while others apply after Agree. As a consequence, some feed Agree, while others counterfeed it. Given the distinction between final and nonfinal movement steps, this will derive PII and PIII; see section 3.3 for details.[16]

(13) [•WH•] ≻ Agree ≻ [•EF•] *Merge (final) ≻ Agree ≻ Merge (nonfinal)*

To avoid overgeneration, I assume that edge features cannot be added freely to heads; rather, they are added to a phase head in the numeration if required for convergence, that is, if the movement they trigger is the only way to keep the element that is to satisfy a final movement trigger accessible.[17]

To enforce an order among the operation-inducing features on a head in the first place, I adopt the view that only one operation can apply at every step of the derivation. I propose that the order of these features is determined by language-specific ordering statements of the form in (14).

(14) *Abstract ordering statement*
[•F•] ≻ [∗F:□∗] ≻ [•EF•]

These statements require that if a head bears different types of features, the one that is leftmost in the ordering statement is discharged before one that is further to the right. In (14), for example, final movement steps are triggered before Agree. Often a head will have only a subset of these features; what matters is their relative order. Ordering applies to the selected phase head in the numeration (after edge features have been added). The operation-inducing features on a head are ordered on a stack such that the leftmost feature in the ordering statement ends up as the topmost feature of the stack and the rightmost feature becomes the bottommost feature. If the head H in

[15] See Abels 2012:53ff. for arguments in favor of movement-type-specific features. Following Abels's argumentation, we will ultimately also need movement-type-specific [•EF•]s. But since this plays no role for present purposes, a generic [•EF•] is used throughout this article.

[16] The same reasoning has been used to argue for a split of Agree into subtypes: Agree can be interleaved with another operation O (e.g., impoverishment, lowering), with some Agree operations applying before and others applying after O, resulting in opacity effects (see, e.g., Keine 2010 on case- vs. ϕ-Agree and Arregi and Nevins 2012 on Agree-Link vs. Agree-Copy). Here I extend this logic to Merge.

[17] How exactly it can be determined whether an [•EF•] is required is orthogonal to the present discussion. See Heck and Müller 2000, Fox and Pesetsky 2005, and Georgi 2014:114 for proposals that circumvent the lookahead problem of Attract theories.

a language with the statement in (14) bore a final movement trigger and a probe feature, the stack would thus look as in (15).

(15) *Feature stack on a head*

$$\text{H}\begin{bmatrix}[\bullet\text{F}\bullet]\\ [*\text{F}:\square*]\end{bmatrix}$$

Crucially, only the topmost feature of the stack can trigger operations. It needs to be discharged (by triggering Merge or by being valued) before the next lower feature can become accessible. This essentially has the effect of the Strict Ordering Hypothesis (Chomsky 1965, Kenstowicz and Kisseberth 1979): every operation can apply at exactly one point of the derivation, neither before nor after, even if its context is met at an earlier or a later stage; operations cannot be postponed. Consequently, upward Agree reduces to Spec-head-Agree; it cannot apply at a distance (with the goal introduced in a higher phrase than the probe-bearing head). Crucially, a probe that does not find a goal when it is on top of the stack does not cause the derivation to crash (see Rezac 2004, Anand and Nevins 2005, Preminger 2011). Nevertheless, it needs to be discharged to make way for the next feature on the stack. To achieve this, I assume that the probe is either deleted or assigned a default value (language-specific choice). In the former case, there will be no reflex on H since it does not bear a valued probe; in the latter case, there will be a default exponent (realizing the default value).

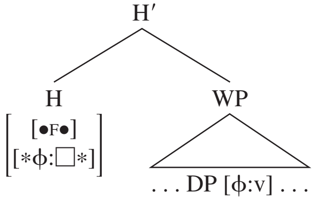
3.3 Derivations of PI–PIV

The derivations in (16) and (17) illustrate how this system leads to feeding and counterfeeding interactions for ϕ-Agree between a head H and a DP moving to Spec,HP. In (16), movement applies before Agree, resulting in feeding: the DP first moves from the c-command domain of H to Spec,HP, discharging [•F•]. In a subsequent step, the probe on H probes upward and finds a goal (viz., the DP in Spec,HP), resulting in valuation of [∗ϕ:□∗] to [ϕ:v]. The value *v* will feed a postsyntactic realization rule, leading to the presence of a reflex (not illustrated here).[18] In (17), H triggers Agree before internal Merge, leading to counterfeeding: at the time where the probe on H seeks for a goal, there is no XP in its probing domain that could serve as one. Thus, the probe [∗ϕ:□∗] is deleted by default (or assigned a default value). Afterward, [•F•] is on top of H's feature stack and triggers movement of DP to Spec,HP; ~~[•F•]~~ is discharged. Since there is no value on H that could be realized, there is no reflex.

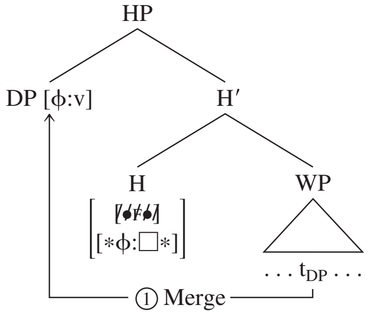
[18] For a language like Chamorro where the PI reflex on v tracks features of the CP from which XP-extraction takes place, the present system requires movement of the whole CP to Spec,vP. There is independent evidence that in some languages long-distance movement of an XP involves movement of the whole CP from which XP is to be extracted; afterward, the CP becomes transparent for subextraction of XP (see Van Urk and Richards 2015 on Dinka). The question is why the moved CP does not surface in its derived position. Two solutions have been proposed in the literature to resurrect the surface word order: (a) the moved CP is extraposed before Spell-Out (Van Urk and Richards 2015); (b) CP-movement is followed by remnant TP-movement (Noonan 2002). I will not choose between these options, but note that CP-extraposition is independently attested in Chamorro (see Chung 1991:88–89).

(16) *Feeding: Merge ≻ Agree*

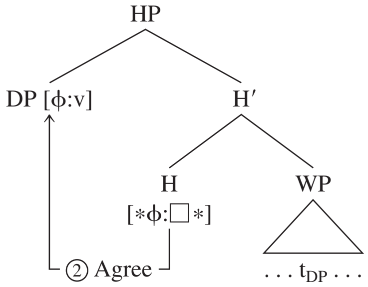
a. Initial structure



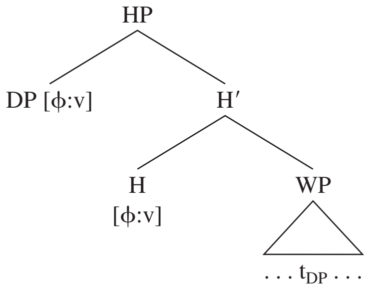
b. ① Internal Merge of DP



c. ② Agree H – DP

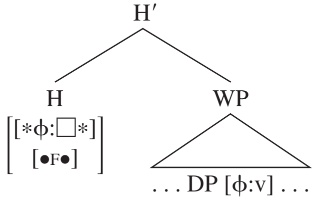


d. Result: Probe valued

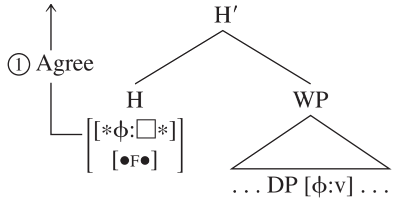


(17) *Counterfeeding: Agree ≻ Merge*

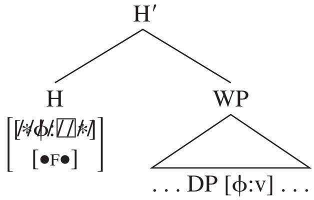
a. Initial structure



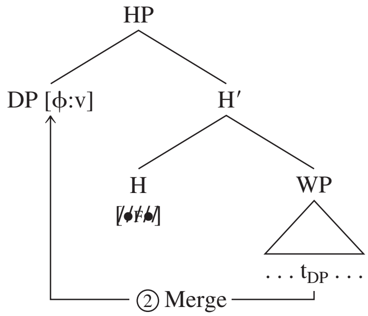
b. ① Agree fails, no goal found



c. Repair: Probe deleted



d. ② Internal Merge of DP



For the three types of features (probe [∗F:□∗]; movement triggers [•F•], [•EF•]), there are six logically possible orders. They result in the four attested reflex patterns shown in (18) (features separated by a comma can apply in any order; the resulting pattern is the same). Thus, variation results from the reordering of operation-inducing features on a head.

(18) *Orderings of the two types of internal Merge triggers and a probe feature*

Order of features	Interactions		Pattern
	Final step	Nonfinal steps	
a. [•F•], [•EF•] ≻ [∗F:□∗]	feed(s) Agree		PI
b. [•F•] ≻ [∗F:□∗] ≻ [•EF•]	feeds Agree	counterfeed Agree	PII
c. [•EF•] ≻ [∗F:□∗] ≻ [•F•]	counterfeeds Agree	feed Agree	PIII
d. [∗F:□∗] ≻ [•F•], [•EF•]	counterfeed(s) Agree		PIV

If final and nonfinal movement steps apply before Agree, they both feed Agree. Hence, there is a reflex in every clause of the dependency, PI. If both movement steps apply after Agree, they both counterfeed Agree, which gives rise to PIV. If one type of movement applies before and the other after Agree, splits result as in PII and PIII languages, where only one type of movement feeds Agree.[19] To give a few examples: Wolof *u*-chains exhibit class agreement between the C-head and the moving XP in every clause (PI). Thus, Wolof has the ordering statement in (19a), which determines the order of features on the stack of a C-head triggering a nonfinal or a final *wh*-movement step; see (19b) vs. (19c). Since Merge always applies before Agree, every movement step to Spec,CP feeds class valuation. In Duala, *no*-marking is triggered by *wh*-movement to Spec,CP only in the final clause (PII). This requires the ordering statement in (20a), resulting in the feature stacks in (20b) and (20c) for final and nonfinal C-heads, respectively. Only final movement steps apply early enough to feed Agree. Since the reflex is invariant in Duala, it is unclear which feature is involved in Agree; for concreteness, I assume that it is an operator feature [OP] that can have two values [±OP]; [+OP] is realized as *no*.[20] In Kiitharaka, the preverbal focus marker *n-* occurs only in nonfinal clauses (PIII). Since there is no evidence for verb movement to T or C (see Abels and Muriungi 2008:717), I take the focus marker to be a reflex on v, resulting

[19] As mentioned in section 3.1 and footnote 12, the patterns could also be derived under downward Agree (probe c-commands goal). We simply have to reverse the order of operations. If movement applies before downward Agree, it bleeds Agree because the goal is no longer in the search domain of the probe; if movement applies after downward Agree, it counterbleeds Agree. PI: [∗F:□∗] ≻ [•F•], [•EF•]; PII: [•EF•] ≻ [∗F:□∗] ≻ [•F•]; PIII: [•F•] ≻ [∗F:□∗] ≻ [•EF•]; PIV: [•F•], [•EF•] ≻ [∗F:□∗].

[20] *No*-marking in Duala (as well as pronoun choice in Ewe) is triggered by Ā-movement to Spec,CP, but not by movement to Spec,TP. Nevertheless, the reflex surfaces in the T-domain. There is no evidence for T-to-C movement in questions in Duala (Epée 1976b). To account for the surface position of *no*, I assume that there is a postsyntactic Lowering operation (Embick and Noyer 2001:561) that adjoins [+OP] to the head of C's complement—namely, to T, where *no* is inserted afterward. The same result can be obtained by postsyntactic Feature Inheritance from C to T (see Chomsky 2004, Richards 2007 for this concept and Ouali 2008 on variation in the timing of its application).

from Agree with a phrase moved through Spec,vP.[21] PIII results from the ordering statement in (21a) and the corresponding feature stacks of (non)final v-heads in (21b) and (21c). Only nonfinal movement steps apply early enough to feed Agree. Since the reflex in Kiitharaka is invariant, as in Duala, I postulate Agree in an abstract operator feature [OP]. The value [+OP] is realized by the exponent *n* (or its allomorph *i*).[22]

(19) *Ordering in Wolof*
  a. Ordering statement
     [•WH•], [•EF•] ≻ [∗CLASS:□∗]
  b. Features on C (nonfinal step)
     $\text{H}\begin{bmatrix}[\bullet\text{EF}\bullet]\\ [*\text{CLASS}:\square *]\end{bmatrix}$
  c. Features on C (final step)
     $\text{H}\begin{bmatrix}[\bullet\text{WH}\bullet]\\ [*\text{CLASS}:\square *]\end{bmatrix}$

(20) *Ordering in Duala*
  a. Ordering statement
     [•WH•] ≻ [∗OP:□∗] ≻ [•EF•]
  b. Features on C (nonfinal step)
     $\text{H}\begin{bmatrix}[*\text{OP}:\square *]\\ [\bullet\text{EF}\bullet]\end{bmatrix}$
  c. Features on C (final step)
     $\text{H}\begin{bmatrix}[\bullet\text{WH}\bullet]\\ [*\text{OP}:\square *]\end{bmatrix}$

(21) *Ordering in Kiitharaka*
  a. Ordering statement
     [•EF•] ≻ [∗OP:□∗] ≻ [•WH•]
  b. Features on v (nonfinal step)
     $\text{H}\begin{bmatrix}[\bullet\text{EF}\bullet]\\ [*\text{OP}:\square *]\end{bmatrix}$
  c. Features on v (final step)
     $\text{H}\begin{bmatrix}[*\text{OP}:\square *]\\ [\bullet\text{WH}\bullet]\end{bmatrix}$

[21] Alternatively, if one wants to associate the preverbal focus marker with a focus position in the left periphery (e.g., a Foc-head), as Abels and Muriungi (2008) do, the probe responsible for the reflex could also be located on this Foc-head. What is required then is that FocP is a phase such that the *wh*-phrase must move through its specifier to trigger Agree with the probe on Foc. The exponent realizing the value on Foc must then be connected with the verb stem in the morphology. All of this is compatible with the present system; what is crucial is just the order of operations on the particular head that bears the probe.

[22] See Georgi 2014 for (a) detailed morphological analyses of morphophonological reflexes and a derivation of syntactic reflexes within the ordering approach, (b) an account of argument/adjunct and subject/nonsubject asymmetries in reflexes, and (c) a study of the interaction of movement and downward Agree that also provides evidence for the split of internal Merge into final and nonfinal steps.

3.4 Mixed Patterns

The ordering approach can also capture mixed patterns, where a single instance of Ā-movement triggers different reflex patterns (as in Chamorro, where PI and PII cooccur; see (9)). They arise if the Agree operations that result in the two reflexes apply at different points relative to the subtypes of movement; see (22).

(22) [•F•] ≻ [∗F:□∗] ≻ [•EF•] ≻ [∗L:□∗]

In (22), Agree in feature [L] results in a PI reflex because it applies after both final and nonfinal movement steps and is thus fed by both. Agree in feature [F], however, leads to a PII reflex because it is fed only by a final movement step. This interleaving of Agree with Merge is possible if different Agree relations are involved, that is, if the reflexes encode different features. This is the case in Chamorro: the PII reflex on C tracks (e.g.) the category of the moved XP, whereas the PI reflex on the verb tracks case (of XP or CP; see footnote 10). Hence, we need Agree in category (triggered by a probe [∗CAT:□∗]) and case (triggered by a probe [∗CASE:□∗]). The order of operations in Chamorro is shown in (23). (Recall that not every head bears all the features mentioned in an ordering statement. In Chamorro, the reflexes occur on different heads (C vs. v), so that each of them bears only one type of probe: v bears the L-probe (case) and C the F-probe (category); besides, Ā-movement to Spec,vP is never final.)

(23) [•WH•] ≻ [∗CAT:□∗] ≻ [•EF•] ≻ [∗CASE:□∗]

The cooccurrence of PI and PIII is also possible. It results from the order in (24). [F]-Agree leads to PIII because it is solely fed by nonfinal movement steps, whereas [L]-Agree leads to PI because it applies so late that it is fed by both types of movement steps.

(24) [•EF•] ≻ [∗F:□∗] ≻ [•F•] ≻ [∗L:□∗]

Such a mixed pattern is attested for example in Kiitharaka (see Muriungi 2005), where preverbal focus marking, following PIII (see section 2.1), cooccurs with present tense marker selection that exhibits PI. Both are triggered by a single instance of Ā-movement. What is excluded in this system is the cooccurrence of a PII reflex and a PIII reflex triggered by a single instance of Ā-movement: in both cases, Agree would have to apply between the final and nonfinal movement steps, but this requires the opposite order of the two Merge triggers ([•F•] ≻ [∗F:□∗] ≻ [•EF•] vs. [•EF•] ≻ [∗L:□∗] ≻ [•F•]), which cannot hold at the same time.[23] I am not aware of an example of this type.[24]

[23] There are 24 possible orderings of two Merge triggers and two probe features. However, in many cases the two Agree operations apply at the same point relative to Merge and hence result in the same pattern. Furthermore, there are orders in which one Agree operation applies before all Merge operations, causing PIV; since PIV is very often not visible unless a default marker is present, we cannot see that two patterns are mixed. But in principle, a mixed pattern including PIV is possible under this approach.

[24] Note that Wolof has both PII (in *u*-chains, alternating with PI) and PIII (in *an*-chains, alternating with PIV; see section 3.5). Crucially, however, they do not cooccur; they alternate, but only one of them can surface at once. Which pattern is chosen depends on the construction: one occurs in *an*-chains, the other in *u*-chains. These constructions have

3.5 Optionality

Recall that in the present system Merge and Agree *always* apply, even if we do not see a reflex on the surface; the absence of a reflex is simply due to the counterfeeding order Agree ≻ Merge. To capture the optionality of reflexes, we can thus say that the order of certain operations is variable. This can be achieved if the order of operation-inducing features in the ordering statements is only partial, with some features not ordered relative to the others. Nevertheless, if a head H bears an operation-inducing feature whose order is not determined by the ordering statement, it must be put somewhere on the stack on H, because only one operation can apply at any stage of the derivation. Since the ordering statement does not impose any restrictions, this feature can be put anywhere on the stack. If the unordered feature is a structure-building feature, it can be put above or below a probe feature on H's feature stack; consequently, it can apply before or after Agree and thus feed or counterfeed Agree. Optionality between PI and PII (as in Wolof *u*-chains and Ewe; see section 2.2) follows from the underspecified ordering statement in (25), where the nonfinal movement trigger is not ordered relative to the other features (unordered = to the right of the vertical line).

(25) *Optionality between PI and PII*
[•F•] ≻ [∗F:□∗] | [•EF•]

The fixed order of [•F•] and [∗F:□∗] leads to feeding of Agree by a final movement step; that is, the reflex is obligatory in the final clause. But [•EF•] can be ordered freely on the stack: if it is put below the probe feature, it applies after Agree, and thus nonfinal movement steps counterfeed Agree, resulting in PII; if it is put above the probe feature, nonfinal movement steps feed Agree, just like the final step, resulting in PI. Likewise, optionality between PIII and PIV (as in Wolof *an*-chains) arises under the ordering in (26): final movement steps always counterfeed Agree, accounting for the obligatory absence of a reflex in the final clause; nonfinal movement steps can apply before or after Agree, thus feeding (PIII) or counterfeeding (PIV) Agree in nonfinal clauses.

(26) *Optionality between PIII and PIV*
[∗F:□∗] ≻ [•F•] | [•EF•]

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different properties: for example, the operator is overt in the former but covert in the latter. Nevertheless, there is no single ordering statement that captures PI/PII as well as PIII/PIV within the same language. To account for this, I propose that the general ordering statement in a language can be overwritten by a lexically specified ordering. As for Wolof, let us assume that the general ordering statement is the one in (19a) that leads to PI. By default, this statement applies to all C-heads, hence also to those in *u*-chains. The C-head used in *an*-chains, however, has a lexically specified ordering statement that results in PIII. As usual, lexically specified information overwrites general rules, an Elsewhere Condition effect. Independent evidence for lexically specified orderings comes from Kinande and Lubukusu (Bantu): bleeding of subject-verb agreement under Ā-movement only happens when a particular complementizer is used; with others, the effect is absent (Schneider-Zioga 2000, Diercks 2010:188ff.). I thank Jason Zentz for drawing my attention to the Bantu facts.

Note that nothing in this approach to optionality enforces that [•EF•], present on the head H in each nonfinal clause, is ordered alike relative to Agree in every nonfinal clause. The location of [•EF•] on H's feature stack can in principle be chosen anew in each of them. Thus, we predict that in case there is more than one nonfinal clause in an Ā-dependency, these clauses can differ in the presence of a reflex, depending on whether [•EF•] was put above or below [∗F:□∗]. I will refer to this as *free alternations.* Indeed, we do find free alternations in languages with optional reflexes. The partial ordering statement in (25), active in Wolof *u*-chains and in Ewe, leads to an obligatory reflex in the final clause (see the ungrammatical (27c) from Wolof with the default marker *l-* in the final clause instead of the ''real'' reflex); but in nonfinal clauses any combination of the presence or absence of the reflex is grammatical, possibly varying from clause to clause. Thus, (27a) and (27b) are possible in addition to the patterns in (11) (the *k*-prefix indicates successful valuation and the *l*-prefix failed valuation).[25]

(27) *More reflex patterns in Wolof* u-*chains*

a. [$_{CP}$ Ø$_k$ **k**-u Kumba wax [$_{CP}$ ne **l**-a Isaa defe [$_{CP}$ ne **k**-u Maryam
   Q CL-u Kumba say FRC EXPL-a Isaa think FRC CL-u Maryam
   dóór ____$_k$]]]?
   hit

b. [$_{CP}$ Ø$_k$ **k**-u Kumba wax [$_{CP}$ ne **k**-u Isaa defe [$_{CP}$ ne **l**-a Maryam
   Q CL-u Kumba say FRC CL-u Isaa think FRC EXPL-a Maryam
   dóór ____$_k$]]]?
   hit

c. *[$_{CP}$ Ø$_k$ **l**-a Kumba wax [$_{CP}$ ne **k**-u Isaa defe [$_{CP}$ ne **l**-a Maryam
   Q EXPL-a Kumba say FRC CL-u Isaa think FRC EXPL-a Maryam
   dóór ____$_k$]]]?
   hit
   'Who did Kumba say that Isaa thought that Maryam hit?'
   (Torrence 2012:1173)

The same holds for Ewe: the special movement-induced form of the subject pronoun must occur in the final clause (compare (28a–d) and (28e)), but in nonfinal clauses any combination of the default and the special pronoun is grammatical (see (28a–d)).

(28) *Long-distance movement in Ewe*[26]

a. [$_{CP}$ Meka-e$_k$ **wò** gblɔ [$_{CP}$ be **é**-bu [$_{CP}$ be **é**-fò ____$_k$]]]?
   who-FOC he say that he-think that he-hit

[25] Martinović (2017:221–222) states that in the variety of Wolof she investigates only PII is grammatical; that is, the agreeing complementizer *u* is impossible in nonfinal clauses. This implies that the ordering statement is not underspecified in this variety; [•EF•] is strictly ordered to the right of the probe.

[26] Collins (1993) does not provide examples with long Ā-movement across more than one nonfinal clause. The data in the text were tested with two native speakers of Ewe, Princess Korsah and Elvis Yevudey. I thank the speakers for providing judgments and Sampson Korsah for establishing the contact.

b. [$_{CP}$ Meka-e$_k$ **wò** gblɔ [$_{CP}$ be **wò**-bu [$_{CP}$ be **wò**-fò ___$_k$]]]?
c. [$_{CP}$ Meka-e$_k$ **wò** gblɔ [$_{CP}$ be **é**-bu [$_{CP}$ be **wò**-fò ___$_k$]]]?
d. [$_{CP}$ Meka-e$_k$ **wò** gblɔ [$_{CP}$ be **wò**-bu [$_{CP}$ be **é**-fò ___$_k$]]]?
e. *[$_{CP}$ Meka-e$_k$ **é** gblɔ [$_{CP}$ be **é/wò**-bu [$_{CP}$ be **é/wò**-fò ___$_k$]]]?
'Who did he$_i$ say that he$_j$ thinks that he$_m$ hit?'

Given the optionality between PIII and PIV in Wolof *an*-chains, due to the order in (26), we also expect free alternations. Indeed, the reflex must not be present in the final clause (there must be a default marker). In nonfinal clauses, however, every combination is possible: a reflex in all nonfinal clauses (PIII), in none of them (PIV), or in some but not in all (see the data in Torrence 2012:1173–1174). Thus, several languages known to have optional reflexes indeed exhibit free alternations; but more empirical work is needed to see whether free alternations exist in other languages with optional reflexes.

Let me summarize the approach. Reflexes of movement on a head H result from an interaction of Merge and upward Agree triggered by H: early movement of XP to Spec,HP feeds Agree, leading to a reflex; the absence of a reflex is due to the reverse order, Agree before Merge, resulting in counterfeeding of Agree. Thus, Agree and Merge always apply; whether we see a reflex or not depends on their timing. Languages in which only final or only nonfinal clauses exhibit reflexes are captured by postulating distinct triggers for final and nonfinal movement steps. Variation results from reordering of the three feature types [•F•], [•EF•], [∗F:□∗]. Mixed patterns are captured by interleaving different types of Agree and Merge. Optionality is the result of a partially undetermined order of operations, which correctly predicts free alternations.[27]

4 Alternative Approaches

In this section, I will compare the ordering analysis of patterns of movement reflexes with alternative approaches from the literature. All of the alternatives are restricted to the difference between PI and PII. I will thus investigate whether and how the basic ideas of these approaches can be extended to capture PIII, PIV, mixed patterns, and optionality of reflexes. Finally, I will evaluate the approaches with respect to their empirical coverage and the assumptions they require.

[27] An anonymous reviewer raises a question about learnability: if the order of operations is language-specific and can only be detected in movement reflexes, it seems that extended exposure to complex cases of long Ā-movement must be available to the child. However, the data required to learn the pattern of a language are not particularly complex. To determine the basic pattern (PI–PIV), one level of CP-embedding is sufficient. In addition, it is possible that not all the subtypes of Merge (and Agree) triggers are present in the child's grammar from the beginning. Rather, the child may start with the basic operations Merge and Agree. Their order can be determined even in a simple clause without embedding, for example, in a simple *wh*-question: if there is a reflex, the order is Merge ≻ Agree; if there is no reflex, the order is Agree ≻ Merge. This is already sufficient for PI and PIV languages. An operation is split up into subtypes only if at some point there is conflicting evidence for the order of the two operations—as in PII and PIII languages, where Merge would have to apply before and after Agree. Since this is impossible, Merge is divided into two subtypes. The only phenomenon that requires rather complex examples is free alternations in languages with optionality of reflexes; two levels of embedding are necessary to detect these. I thus expect free alternations to take more time to be acquired than PI–PIV.

4.1 Absence of Features

One obvious way to account for the absence of reflexes is to assume that one of the two components involved in the emergence of a reflex (movement or Agree) does not apply; that is, the triggering feature is simply absent on the head H.

4.1.1 Absence of Movement First I will consider approaches that deny the application of movement. As for PII reflexes, one could assume that there are no reflexes in nonfinal clauses because there is no movement through these clauses. Two versions of this approach have been proposed in the literature: (a) base-generation and (b) movement in one fell swoop. According to (a), the Ā-dependency does not involve movement; rather, it involves base-generation of the operator in its surface position. Although there is evidence that this analysis is on the right track for some PII reflexes, such as complementizer selection in Irish *aN*-chains (see McCloskey 1979, 1990, 2001, 2002 for arguments in favor of base-generation), it cannot be extended to all PII reflexes: in the PII languages listed in section 2.1, the reflex-inducing dependencies exhibit the hallmarks of movement. In Duala, for example, relativization triggers *no*-marking in the final clause (see (29a)); this Ā-dependency is island-sensitive (see (29b–c)). Thus, for the languages in which PII arises under movement, we need to explain the absence of reflexes in nonfinal clauses.[28]

(29) *Island sensitivity in Duala*

a. moto_i [$_{CP}$ $\text{nyena}_{i,k}$ na mongole **no** [$_{CP}$ na o kwadi [$_{CP}$ na o
man who I think NO that you say that you
wen $\_\_\_\__k$]]]
see
'the man who I think that you said that you saw'

b. *moto_i [$_{CP}$ [nyena_i]$_k$ na neimbi **no** [$_{NP}$ mbo_j [$_{CP}$ [nyenat_j]$_n$ $\_\_\_\__n$ e
man who I recognize NO dog which SM
kuko $\_\_\_\__k$]]]
bit
'the man who I recognized the dog which bit (him)' *CNP island*

c. *moto_i [$_{CP}$ [nyena_i]$_k$ na nyaka **no** [$_{CP}$ [nja mmuto]$_n$ $\_\_\_\__n$
man who I am.astonished NO who woman
bai $\_\_\_\__k$]]
married
'the man who I wonder which woman married (him)' wh-*island*
(Biloa 1993:70–71)

Option (b) is that movement takes place in PII languages like Duala but applies without intermediate stopovers in nonfinal clauses (see, e.g., Epée 1976b on Duala *no*-marking, and

[28] It has also been argued that PI is not always the result of successive-cyclic movement; rather, the dependency seems to involve a sequence of clause-bound movements in some languages (see section 4.3).

Takahashi and Gracanin Yuksek 2008:240 for a similar analysis of C-selection in Haitian Creole). In the present system, this would mean that the head H in nonfinal clauses does not bear the feature [•EF•]. But crucially, one cannot conclude from the presence of PII that movement applies in one fell swoop: subject-auxiliary inversion in standard English also exhibits PII, but reconstruction effects provide evidence for intermediate movement steps (see Barss 1986, Fox 1999). Nevertheless, let us see whether the logic of this approach—if there is no reflex of movement, there is no movement—can be applied to derive the remaining patterns. Optionality—say, between PI and PII—can be derived if [•EF•] is optional. If the decision about its presence/absence on H's feature stack can be made anew in every nonfinal clause, free alternations can be derived, too. Mixed patterns as in Chamorro, with PI on v and PII on C, seem to be problematic, as movement would have to apply in one fell swoop to derive PII, but at the same time would have to apply successive-cyclically to derive PI—a contradiction. However, there is a way to derive this if we capitalize on the different location of the two types of reflexes (v vs. C). The Chamorro pattern follows if there is movement through the edges of every vP but not through the edges of CP; movement to Spec,CP only applies in the final clause. Thus, long Ā-movement may be partially successive-cyclic, targeting only some projections (here, Spec,vP). Such a path of long Ā-movement is argued for on independent grounds by Rackowski and Richards (2005) and Den Dikken (2009a, 2012) (although the conclusions of the first paper have been revised in Van Urk and Richards 2015). If we allow for such paths, this approach can also derive mixed patterns. However, a problem arises for PIII: if the absence of a reflex indicates the absence of movement, we need to say that movement in PIII languages applies successive-cyclically (to produce reflexes in nonfinal clauses) but does not reach Spec,HP in the final clause; that is, [•F•] is absent in the final clause in PIII languages. But the operator *does* show up in the final clause (see, e.g., the Wolof data in (7)). We cannot simply say that the operator is base-generated there because the standard tests show that there is a movement dependency (at least in the PIII languages listed in section 2.1). Still, the operator does not trigger a reflex on H in the final clause; this is unexpected under the *no-reflex – no-movement* approach. A technical way out would be one inspired by Den Dikken's (2009b) *full concordial scope marking*: a silent operator (OP in (30)) moves successive-cyclically from its base position through nonfinal clauses and terminates in the topmost nonfinal clause; in addition, an overt scope marker (SCO in (30)) is base-generated in the final clause and binds the silent operator lower in the structure (SCO looks like the usual *wh*-operator owing to concord with the latter). Movement of the operator through the nonfinal clauses accounts for the movement characteristics of the dependency and the reflexes in these clauses; the absence of movement into the final clause accounts for the absence of a reflex there (assuming that the reflex tracks not just the presence of an XP in Spec,HP but in fact movement of an XP to Spec,HP, a distinction that is required anyway as it is morphologically manifested in, for example, Irish *aN*- vs. *aL*-chains).[29]

[29] See Abels 2012:51ff. for a critical discussion of Den Dikken's (2009b) proposal. Abels argues that full-concordial scope making is just movement because it patterns with movement rather than with scope marking or concord with respect to linearization, pied-piping, and locality.

(30) [$_{CP}$ SCO [$_{C'}$ C . . . [$_{CP}$ OP$_k$ [$_{C'}$ C . . . [$_{CP}$ ___$_k$ [$_{C'}$ C . . . ___$_k$]]]]]]

binding movement

However, there are data from PIII languages that show that the operator actually *moves* into the final clause. If there is an island between the final and the topmost nonfinal clauses, the examples are ungrammatical; see the *wh*-island in (31) from Kiitharaka, where preverbal focus marking (boldfaced) exhibits PIII.

(31) ??[$_{CP1}$ N-ata$_k$ u-ku-ama [$_{CP2}$ kethira **n**-a-kar-ir-e ___$_k$]]?
FOC-what 2SG-PRES-wonder whether FOC-SM-behave-PERF-FV
'How do you wonder whether she/he behaved?'
(Muriungi 2005:63)

The ungrammaticality follows if there is movement from the topmost nonfinal clause into the final clause unlike in the scope-making approach sketched above. Thus, saying that the absence of a movement reflex on H is due to the absence of movement to Spec,HP fails to account for PIII. A similar problem arises for PIV: while [•EF•] could be absent, [•F•] must be present because the operator surfaces in the final clause (and there is evidence for a movement dependency); still, there is no reflex in this clause.

To summarize, the absence of a reflex of movement on a head H in a clause does not automatically indicate the absence of movement through Spec,HP.[30] PIII cannot be derived in this way, nor can all PII reflexes. This approach is also questionable from a conceptual point of view, as it presupposes that languages can differ drastically in the locality of Ā-movement: in PII languages, Ā-movement is in principle unbounded, whereas it applies successive-cyclically in PI languages. Given that research in the last decades has shown that in many typologically diverse languages Ā-movement is subject to the same locality restrictions (islands), I take this to be undesirable.[31]

[30] Interestingly, the same conclusion has been drawn for semantic reflexes of successive-cyclic movement: the absence of reconstruction to intermediate positions does not necessarily imply that there has been no movement through these positions (see, e.g., Anand and Nevins 2005, Bobaljik and Wurmbrand 2005, Boeckx 2008b; and see Abels 2003, 2012 for a different view).

[31] Having said this, I do not intend to suggest that languages cannot differ in the way they form Ā-*dependencies.* We know that some Ā-dependencies are formed by movement while others are the result of base-generation of the operator. Some languages have just one of these options; others have both. In the latter type, there may be constraints on when which Ā-dependency can be used; in others, the choice is optional (see Salzmann to appear a:chap. 2 for an overview). In a language like Irish, the two strategies can even be mixed within a sentence (see, e.g., McCloskey 2002). This article is solely concerned with Ā-dependencies formed by *movement*, as diagnosed by island sensitivity, reconstruction effects, and so on. The null hypothesis adopted here is that movement dependencies are formed in a uniform way across languages, unless there is clear evidence to the contrary. In any case, the reflex patterns should not be taken as direct evidence for the way in which Ā-movement applies: (standard) English subject-auxiliary inversion exhibits PII, which one might take to indicate movement in one fell swoop; however, reconstruction effects show that there are intermediate stopovers nevertheless.

4.1.2 Absence of Agreement To avoid the problems with PIII and PIV in the *no-reflex – no-movement* approach, let us assume that is it not movement but rather Agree that is absent in clauses without reflexes; that is, some heads H do not bear a probe feature and thus cannot enter an Agree relation with the phrase moved to their specifier. We could say that in PI languages, H bears a probe in every clause; in PII languages, only H in the final clause bears a probe (which can be implemented by a cooccurrence restriction that allows the presence of a probe only in the context of [•F•] on the same head); in PIII languages, only H in nonfinal clauses bears a probe (its presence is tied to the presence of [•EF•]); and in PIV languages without any reflex, no head H ever bears a probe. In languages with optionality—say, between PI and PII—probes can be said to be optionally present on heads H that bear [•EF•] but obligatorily present on heads H that bear [•F•]. Mixed patterns as in Chamorro can be integrated if we allow category-sensitive rules such that probes must be present on every v-head as well as on C in the context of [•F•], but are prohibited on C-heads bearing [•EF•]. Note that this account also presupposes a difference in the features of heads that project the final landing site and those that project a nonfinal one. However, a problem arises with default exponence. As argued in section 2.1, I take the occurrence of default exponents in some PII/PIII/PIV languages that occupy the slot in which the reflex usually occurs as evidence for the presence of a probe. There is no reason why the default exponent should occur otherwise. If regular valuation of the probe fails, it receives a default value.

4.2 Enriched Representations

Another class of accounts of the PI/PII variation is formulated within the Government-Binding/ early Minimalist framework: Haïk 1990, Collins 1993, Chung 1998. These approaches refer to surface structure; opacity is derived by reference to enriched representations in which abstract elements (traces) occupy nonfinal landing sites. Two types of this approach can be distinguished: (a) there are different types of traces (see section 4.2.1); (b) rules apply to traces and influence their ability to license reflexes (see section 4.2.2).

4.2.1 Different Types of Traces Haïk (1990) analyzes morphological reflexes of movement in terms of Ā-binding (cf. Aoun 1985, 1986, Finer 1985): the special morpheme found under Ā-movement (the reflex) is an anaphor that requires a local binder in an Ā-position, namely, in Spec,CP of the minimal clause at S-Structure. The anaphor alternates with a zero allomorph that is a pronoun and must thus not be locally bound from an Ā-position. If there is movement to the local Spec,CP, there is a local binder and hence grammaticality results only if the anaphoric allomorph was chosen; if there is no movement to the local Spec,CP, only the pronominal allomorph is licensed. Thus, the ‘‘reflex’’ is actually not the result of movement; rather, the allomorph can be chosen freely and the independent (non)application of movement filters out certain combinations.[32] At S-Structure, the operator is only present in Spec,CP of the final clause, so we expect

[32] The Ā-binding approach to reflexes is also used in Haïk, Koopman, and Sportiche 1985, Biloa 1993, and Ouhalla 1993.

PII. To capture PI, Haïk proposes that traces left by Ā-movement in nonfinal clauses can act as binders in PI languages and thus license reflexes in nonfinal clauses. In PII languages, traces do not have this capacity. Hence, two types of traces are postulated, binders and nonbinders; languages can choose between them.

Let us see how this idea can be extended to the other patterns. Optionality arises if we allow languages to have both types of traces and to choose freely between them, even within a single sentence, giving rise to free alternations. Mixed patterns as in Chamorro are problematic, as traces must be binders (to derive PI) and at the same time must not be binders (to derive PII). This paradox can be solved if we adopt filters that make reference to the position of the trace: one that demands the presence of a binding trace in Spec,vP (leading to PI on v), and one that requires the presence of a nonbinding trace in Spec,CP (leading to PII on C). To derive PIII (reflexes in nonfinal clauses), traces must be binders. However, the operator in the final clause must not count as a binder. This last assumption is questionable: while it is a standard assumption in Government-Binding that traces are in some sense deficient and are thus subject to special licensing conditions (e.g., the Empty Category Principle), the antecedent of a trace has usually been considered to be nondeficient and thus a potential binder. The same problem obtains for PIV languages without any reflex: how can the reflex be absent in the final clause given the presence of the operator in Spec,CP? A solution for PIII and PIV would be to say that the operator is always a binder, but the anaphor it binds in the final clause happens to be phonologically zero. While this solution is technically feasible, it is a pure coincidence that the anaphor is zero; why do we never find an overt morpheme in the final clause that is different from the morpheme in nonfinal clauses? Furthermore, for PIII languages this approach requires that there be two allomorphs of the anaphor, an overt and a nonovert one. How can we ensure that the former occurs only in nonfinal clauses and the latter only in final clauses, if they realize the same features? To derive this, additional restrictions are required. And finally, this purely morphological solution would lead to a nonuniform analysis of the absence of a reflex of movement: in some cases the absence is due to the inability of a trace to be a binder, and in others it arises because the anaphor happens to be zero. This clearly complicates Haïk's (1990) initial system.

Chung (1998:230, 257) proposes a similar analysis for the PI/PII variation based on agreement instead of binding: reflexes of movement are the result of an agreement relation between a head and the operator in its specifier at S-Structure. Since at S-Structure the operator is present only in the final clause, we expect PII. To account for PI, Chung assumes that traces in PI languages are also agreement controllers (in recent terminology, they can be goals for Agree); in PII languages, however, traces do not have this capacity. Hence, Chung also postulates two types of traces: agreement controllers and noncontrollers. Can this idea be extended to the other patterns? Optionality (e.g., between PI and PII) arises if a language has both types of traces and can choose between them; if different types can cooccur in a single sentence, free alternations arise. As with the Ā-binding approach, mixed patterns as in Chamorro can be derived if we make reference to the position of the trace: traces in Spec,vP must be agreement controllers (PI), while traces in Spec,CP must be noncontrollers (PII). Nevertheless, the assumption that the same element (trace) left by the same instance of Ā-movement behaves so differently with regard to the same process (agreement) within a single language strikes me as questionable. PIII can be derived if traces in PIII languages are agreement controllers but the operator itself is not an agreement controller. While this can easily be stated, it is not obvious to me why the operator must not be a goal for agreement given that the relevant features are inherent to it. One could return to the morphological account and say that in PIII languages the operator is always an agreement controller but the reflex happens to be zero; the drawbacks of such a solution have been discussed above. Even if one adopts the zero morphology solution for the final clause in PIII languages, this means that the absence of the reflex has two different sources in PIV languages: zero exponence in the final clause vs. trace type (noncontroller) in nonfinal clauses.

To summarize, while enriched-representation approaches can capture PI, PII, optionality, and mixed patterns (with additional restrictions on the distribution of trace types), they cannot straightforwardly be extended to PIII and PIV. Potential solutions require accidental zero morphology and lead to a nonuniform account of the absence of movement reflexes across as well as within languages (PIV). Furthermore, the accounts postulate different types of traces; this is problematic under more recent developments in Minimalism that try to avoid a proliferation of empty elements. Finally, under output-oriented approaches, reflex licensing (agreement) applies countercyclically.

4.2.2 Operations Applying to Traces Haïk (1990) envisages another strategy to account for the variation between PI and PII in the Ā-binding system. Under this analysis, traces share the properties of their antecedent; that is, they are always binders and can thus license reflexes in nonfinal clauses, leading to PI. In PII languages, traces are deleted before binding applies; hence, binding is bled in nonfinal clauses. Languages differ in whether trace deletion applies or not. Let us see how the remaining patterns can be derived under this approach. Optionality, including free alternations, follows if the deletion rule is optional in a language. Mixed patterns as in Chamorro can be captured if the application of trace deletion is sensitive to categories: deletion applies to traces in Spec,CP, but not to traces in Spec,vP. PIII is more challenging: it requires the nonapplication of the deletion rule to traces to get a reflex in nonfinal clauses, but also the deletion of the operator to explain the absence of the anaphor in the final clause. However, in PIII languages the operator does surface in the final clause, so it cannot be deleted. The same issue arises in the final clause of PIV. As before, a way out would be to have the operator bind an anaphor in the final clause that happens to be zero; see the discussion above.

Collins (1993:187ff.) sketches the reverse of the deletion approach: in contrast to Haïk (1990), he assumes that traces initially do not share the property of their antecedent that enables them to license a reflex of movement; only the antecedent can do so. Hence, the default pattern is PII. To derive PI, Collins proposes that PI languages have a rule that copies the relevant property of the antecedent (the feature [+OP]) onto the traces before the licensing of the reflex applies. Thus, languages differ in whether they apply the copying rule or not. Like the deletion account, this approach can easily capture optionality of reflexes and free alternations by saying that the copying rule is optional. Mixed patterns are derived if copying only targets traces in certain positions (Spec,vP in Chamorro) but not in others (Spec,CP). However, PIII is problematic: in PIII languages, the copying rule must apply obligatorily; but more needs to be said to account for the absence of a reflex in the final clause, as the operator, the source of copying, inherently bears the relevant feature. If we do not want to say that the reflex is accidentally zero, we need to assume that PIII languages have an additional rule that deletes the relevant feature in the operator (applied *after* copying but *before* reflex licensing); the same applies to the final clause in PIV languages. Such a system requires additional rules and thus complicates the simple system Collins proposes. Furthermore, there is no longer a uniform account of the absence of a reflex: in some languages it is due to the nonapplication of copying, and in others it is due to accidental zero exponence or to deletion. Thus, approaches that postulate different types of traces have difficulties with accounting for PIII, and potential solutions lead to a nonuniform analysis of reflex patterns.

4.3 Iterative Prolepsis

A more recent approach to PI vs. PII is presented by Bošković (2007a). He argues that feature checking with a moved XP is only possible in XP's final landing site; feature checking (Agree) with an XP in nonfinal landing sites is impossible. The expected pattern is thus PII. To capture PI, Bošković (2007a:209–210) (see also Boeckx 2008a) proposes that this pattern is the result not of successive-cyclic movement but of iterative prolepsis. That is, it involves a sequence of clause-bound terminal movement steps (see (32)): in every clause, an operator is merged and moves to the minimal Spec,CP. In nonfinal clauses, the operator is zero; only the one in the final clause is overt and binds the empty operators. Since movement to Spec,CP is a final movement step in each clause, there can be feature checking with the operators, giving rise to PI on the surface.

(32) $[_{CP}\ OP_i \ldots t_i\ [_{CP}\ OP_i \ldots t_i\ [_{CP}\ OP_i \ldots t_i]]]$

Indeed, there is evidence from Kinande that seemingly long movement can be the result of multiple local movements: long dependencies in Kinande, unlike local ones, exhibit (e.g.) no reconstruction effects (Schneider-Zioga 2009). However, we do find a PI reflex on the complementizer in Kinande. Hence, a reanalysis in terms of iterative prolepsis is a viable alternative. However, Bošković, following Boeckx (2003), makes the stronger claim that there is probably *no* language with true intermediate reflexes; that is, he claims that in all PI languages either the dependency involves iterative prolepsis as in Kinande, or the reflex tracks features of the clause from which extraction takes place (as, e.g., in Chamorro; see footnote 10), which involves a different derivation (exactly which one remains open, though). This view is problematic, as it is clearly not the case that all PI languages pattern either like Chamorro or like Kinande. The PI reflex in Wolof *u*-chains, for example, only tracks features of the moving XP, and the dependency exhibits all the hallmarks of movement, including reconstruction effects. The same holds for many other PI languages; for example, in Irish it holds for complementizer selection in *aL*-chains (McCloskey 2001).

Apart from this, problems arise for this account if we try to capture the other patterns. First, the derivation of PIII would require iterative prolepsis to gain reflexes in nonfinal clauses, but it is obscure why no reflex occurs in the final clause, where feature checking with the overt operator is obligatory in Bošković 2007a,b. It seems that a difference between features checked in final and nonfinal clauses has to be introduced as well. A way out is to say that there is feature checking in the final clause, but the reflex is zero; see section 4.4 for discussion. The same problem obtains for the final clause in PIV languages. Optionality—say, between PI and PII—can be derived if a language can choose between successive-cyclic movement and prolepsis to form an Ā-dependency. Free alternations require a mixture of both strategies—that is, successive-cyclic movement from one nonfinal clause to the other, followed by prolepsis, namely, introduction of a new operator in the structurally higher clause that binds the moved zero operator in the lower clause. A mixed movement/prolepsis dependency is also needed to capture mixed patterns. However, this approach is not worked out in detail; therefore, many questions arise. First, why is the operator in nonscope positions never overt? It is in its final landing site, and usually, operators in a terminal position can be overt, so we expect that at least some PI/PIII languages have overt operators in nonfinal clauses.[33] Second, if the operators are DPs, how are they licensed in the syntax; that is, how do they get case? In many languages with prolepsis, a preposition is required to license the proleptic element. Furthermore, it remains unclear whether the postulated construction corresponds to an actually attested phenomenon in the languages of the world. According to a recent survey (Salzmann to appear b), (overt) prolepsis has the following properties: it is unbounded, it occurs with resumptives, it requires a wide scope interpretation of the antecedent of the resumptive, it also occurs in constructions without a long Ā-dependency, and the languages also have this construction with the proleptic element in situ. One would have to show that these properties are found in all languages with PI and PIII. For the languages listed in section 2.1, it is far from clear whether they have (overt) prolepsis in the first place, for example.

4.4 PF Realization

An alternative to a syntactic approach to reflexes of movement is a pure PF approach, hinted at in the discussion of the other approaches. According to this view, there is agreement between the head H and the moving XP in every clause, but languages differ in whether the syntactic agreement is morphologically realized or not. An approach along these lines is proposed by Reintges, LeSourd, and Chung (2006) for PI vs. PII. They assume that H bears a probe feature

[33] A reviewer remarks that overt operators in nonfinal clauses are well-attested in partial *wh*-movement. However, partial movement would not lead to the pattern that the prolepsis approach predicts. A PI reflex on, say, the C-head, with an overt operator pronounced in for example the second of three CPs would result in the following configuration under the prolepsis approach (with the pronounced operator in boldface):

(i) $[_{CP}\ OP_n\ [_{C'}\ \mathbf{C\text{-}R}\ [_{TP} \ldots t_n \ldots [_{CP}\ \mathbf{OP}_j\ [_{C'}\ \mathbf{C\text{-}R}\ [_{TP} \ldots t_j \ldots [_{CP}\ OP_i\ [_{C'}\ \mathbf{C\text{-}R}\ [_{TP} \ldots t_i \ldots]]]]]]]]]$

Under partial movement, the pattern would be different. Recall that reflexes are only triggered by movement *in the syntax*. Thus, under partial movement a reflex can occur only in the clauses that are visibly crossed by the operator, but not in clauses between its scope position and the overt instance of OP. Thus, PI on the C-head under partial movement to Spec,CP of the second of three CPs would be identical to (i) except for the topmost CP, in which there would be no reflex owing to the absence of overt movement to this clause. Hence, the overt realization of OP in a nonfinal clause under prolepsis is not the same as partial movement, as the distribution of reflexes shows. I know of no instance of the pattern in (i).

[uX] that agrees with an operator bearing the feature [wh]; [uX] is checked after Agree, represented as [~~u~~X]. Subsequently, the operator moves to Spec,HP.[34] If H projects the final landing site of movement, it bears an additional feature [uQ] that enters into a checking relation with the corresponding [Q]-feature of the operator. Hence, in a dependency with two embedded clauses, the feature content of the relevant heads is as in (33) (the *wh*-phrase is represented in its initial position in the most deeply embedded clause; its final landing site is indicated by *OP*).

(33) $[_{CP}\ \mathrm{OP} \ldots \mathrm{H}_{[uQ,uX]} \ldots [_{CP} \ldots \mathrm{H}_{[uX]} \ldots [_{CP} \ldots \mathrm{H}_{[uX]} \ldots \mathrm{XP}_{[Q,wh]}]]]$

PI arises if the checked [~~u~~X]-feature, present in every clause, is morphologically realized, and if [~~u~~Q] is silent. PII arises if solely the checked [~~u~~Q]-feature is realized overtly. Thus, since Hs in final and nonfinal clauses have different feature specifications, exponents can be sensitive to this difference. Let us see how this approach can be extended to the other patterns. PIV arises if [~~u~~X] and [~~u~~Q] remain silent—either because there is no exponent for these features or because they are realized by a zero exponent; alternatively, there could be a default exponent for [~~u~~X] plus a silent [~~u~~Q]. As for PIII, however, a realization approach encounters a problem: as with PIV, [~~u~~Q] must be silent. To get a reflex in nonfinal clauses, [~~u~~X] must be overtly realized, but since [~~u~~X] is present in *every* clause, having an exponent for [~~u~~X] results in PI. There are several technical ways to suppress the realization of [~~u~~X] in the final clause. To illustrate these, I will presuppose the architecture and mechanisms of Distributed Morphology (see, e.g., Bonet 1991, Halle and Marantz 1993, 1994, Harley and Noyer 1999). First, [~~u~~X] could be deleted in the context of [~~u~~Q] on the same head (i.e., in the final clause), by an impoverishment rule as in (34a).

(34) *Deriving PIII in a PF realization approach*
  a. Impoverishment rule
     [~~u~~X] → Ø / ____ [~~u~~Q]
  b. i. /a/ ↔ [~~u~~X]
     ii. /Ø/ ↔ [~~u~~X] / ____ /a/ [~~u~~Q]

As a result, [~~u~~X] is only present in nonfinal clauses at the point of Vocabulary Insertion, leading to PIII if the exponent for the remaining [~~u~~X]-features is overt. Alternatively, there could be two exponents for [~~u~~X], a default realization of this feature by exponent /a/ and a zero allomorph that is inserted in the context of [~~u~~Q], as in (34b) (the exponents /a/, /b/, and so on, are abstract placeholders for the actual exponents of a given language). If context specifications count for the determination of specificity, the more specific zero allomorph is inserted on H in the final clause and the overt allomorph realizes [~~u~~X] in nonfinal clauses. As before, [~~u~~Q] must remain silent. Hence, the basic patterns PI–PIV can be derived under the morphological approach with several additional rules and exponents. The same is true for mixed patterns as in Chamorro: PI on v

[34] Reintges, LeSourd, and Chung (2006) assume downward Agree (i.e., the probe must c-command the goal); subsequently, the goal undergoes EPP-driven movement to Spec,HP. The different direction of Agree in their approach and the ordering approach is of no importance. All that matters for the PF approach is how the features acquired by H are morphologically realized, not how they ended up on H in the syntax.

arises if there is an exponent for [ʉX] inserted in the context of the category feature [cat:v] (see (35a)); PII on C arises if there is an overt exponent for [ʉQ] in the context of [cat:C], while [ʉX] remains silent in the context of C (e.g., because this exponent is zero) (see (35b–c)).

(35) a. /a/ ↔ [ʉX] / ____ [cat:v]
b. /b/ ↔ [ʉQ] / ____ [cat:C]
c. (/∅/ ↔ [ʉX] / ____ [cat:C])

Let us now consider optionality, say, between PI and PII. As described above, PI results if [ʉQ] is silent (e.g., realized by a zero exponent) and [ʉX] is realized overtly; see (36).

(36) a. /$\emptyset_1$/ ↔ [ʉQ]
b. /a/ ↔ [ʉX]

There are several ways to produce a PII pattern that alternates with a PI pattern resulting from the Vocabulary items (VIs) in (36). The strategy envisaged above was to say that PII results if [ʉX] is silent and [ʉQ] is overtly realized, as the VIs in (37) ensure.

(37) a. /b/ ↔ [ʉQ]
b. /$\emptyset_2$/ ↔ [ʉX]

Hence, to produce optionality, both the exponent for [ʉX] and the exponent for [ʉQ] must have two allomorphs each, one being zero and one being overt; compare (36) and (37). Note that the absence of an overt exponent cannot be due to the absence of any matching VI in languages with optionality of patterns, because for both [ʉX] and [ʉQ] there is a matching overt VI (/a/ and /b/) that can be inserted. Thus, there needs to be an equally specific zero equivalent of /a/ and /b/; as a consequence, specificity cannot decide which one to insert, the zero or the overt VI, resulting in optionality.[35]

This account of the PI/PII alternation has several shortcomings. First, it presupposes that one of the two allomorphs of [ʉX] and [ʉQ] is zero. But nothing prevents two overt allomorphs. If, for example, the exponent for [ʉX] in (37) were overt, we would not get a pure PII pattern; rather, we would get a PI pattern with a different overt reflex in final and nonfinal clauses. However, crosslinguistically, the reflex in the final clause and the reflex in nonfinal clauses are always identical under PI (see McCloskey 2002:188). In the PF approach, the fact that one of the allmorphs is zero is a coincidence of marker specification; the VI could in principle also be overt. Another problem with this account of the PI/PII optionality is that /b/ must be phonologically identical to /a/: in the languages with this alternation, the form of the reflex we find under PII (in the final clause) is identical to the reflex we find in nonfinal (and final) clauses under PI. But this homophony must be stipulated under the PF realization approach; nothing enforces it. And finally, we only get the desired PI/PII alternation if either the two VIs in (36) or those in

[35] See Hein 2008 for a PF account of optionality that uses equally specific VIs. As Hein (2008:61) shows, this is possible if the Subset Principle is slightly reformulated in such a way that it allows for insertion of *one of the most specific* and not just *the most specific* VI.

(37) are chosen; they need to group together. But since the exponents are all equally specific, it is in principle possible that (36a) and (37b), the two zero exponents, are chosen to realize [ʉX] and [ʉQ], respectively, resulting in zero marking throughout (= PIV), or that (36b) and (37a), the two overt markers, are chosen, resulting in PI plus an additional overt exponent on the final H. But we do not find these alternations in addition to the PI/PII alternation in languages; thus, further restrictions must be added to exclude these combinations.

There is an alternative way to derive the PI/PII alternation that does not encounter these problems: PI is derived by the VIs in (36) as before, while PII results from the overt realization of [ʉX] in the context of [ʉQ] plus the zero realization of the remaining [ʉX] (in nonfinal clauses) and [ʉQ]. Hence, in addition to (36) we have the following VIs:

(38) a. /c/ ↔ [ʉX] / ___ [ʉQ]
b. /$\emptyset_3$/ ↔ [ʉX]

(36b) and (38b) are equally specific allomorphs for the realization of [ʉX], which results in optionality of a reflex in nonfinal clauses. (36a) guarantees the silence of [ʉQ]; (38a) guarantees the overt realization of [ʉX] in the final clause. Depending on whether (36b) or (38b) is chosen for the realization of [ʉX] in nonfinal clauses, we get either PI or PII. However, apart from the necessity of *zero* (as opposed to two overt) allomorphs, this approach to the PI/PII alternation also requires that the exponent /c/ be phonologically identical to /a/ in (36b) to produce PI, as the reflexes in the final and the nonfinal clause are identical; but this is a pure coincidence under the PF approach.

A third way to derive the PI/PII alternation is the optional impoverishment of [ʉX] and the overt realization of [ʉQ]; that is, there is an overt allomorph of the zero VI in (36a).

(39) a. Impoverishment rule (optional)
[ʉX] → ∅
b. /b/ ↔ [ʉQ]

If impoverishment does not apply and the zero allomorph for [ʉQ] is chosen, we get PI ([ʉX] is realized in all clauses); if impoverishment applies and the overt allomorph for [ʉQ] is chosen, we get PII. But again, this presupposes that the overt [ʉQ] allomorph and the exponent for [ʉX] in (36b) are homophonous—a pure accident. Furthermore, nothing prevents the application of impoverishment plus the choice of the zero allomorph in (39b), resulting in the absence of any reflex; but this is not an option in the relevant languages. Likewise, nothing prevents the nonapplication of impoverishment and the choice of the overt allomorph for [ʉQ], resulting in PI plus an additional identical reflex on H in the final clause. I am not aware of such patterns in languages with the PI/PII alternation. Thus, while PI–PIV and mixed patterns can be derived, optionality is a challenge for Reintges, LeSourd, and Chung's (2006) PF approach. Technically, it can be accounted for, but the analysis must rely on accidental homophony of exponents and the application of impoverishment to derive gaps (rather than systematic homophony).

An anonymous reviewer suggests a different version of the PF account: the head H in the final clause does not bear the same feature as H in nonfinal clauses; rather, it bears solely a different feature that is related to the scopal (i.e., semantically underpinned) relation between the operator and H in the final clause. Translating the proposal into Reintges, LeSourd, and Chung's (2006) notation for ease of comparison, this means that H in nonfinal clauses still bears [ʉX], while H in the final clause only bears [ʉQ]; see (40).[36]

(40) $[_{CP}$ OP . . . $H_{[uQ]}$ . . . $[_{CP}$ . . . $H_{[uX]}$ . . . $[_{CP}$ . . . $H_{[uX]}$ . . . $XP_{[Q,wh]}]]]$

The four basic patterns of reflexes follow if either [ʉX] or [ʉQ], both, or neither of them are morphologically realized (as before, absence of a reflex can be due to the insertion of a zero VI or to the absence of a matching VI; therefore, zero exponents are in parentheses).

(41) *PI*
a. /a/ ↔ [ʉX]
b. /b/ ↔ [ʉQ]

(42) *PII*
a. (/Ø/ ↔ [ʉX])
b. /b/ ↔ [ʉQ]

(43) *PIII*
a. /a/ ↔ [ʉX]
b. (/Ø/ ↔ [ʉQ])

(44) *PIV*
a. (/Ø/ ↔ [ʉX])
b. (/Ø/ ↔ [ʉQ])

This alternative PF approach does not have a problem with PIII because the head H does not bear the same feature in the final clause as in nonfinal clauses. However, to get a simple PI reflex, the exponents /a/ and /b/ in (41) need to be homophonous, as the reflexes in these clauses are identical. But this homophony must be stipulated and does not follow from anything. Mixed patterns as in Chamorro can be derived in exactly the same way as in the first PF approach with the VIs/rules in (35). Optionality—say, between PI and PII—is derived as follows: PI results from the VIs in (41); in addition, there is either a zero allomorph of VI /b/ (see (45a)) or an optional impoverishment rule that deletes [ʉX] (see (45b)). While this PF approach is simpler than the first version, the identity of reflexes in final and nonfinal clauses under PI remains an accident.

(45) a. /Ø/ ↔ [ʉX]
b. Impoverishment rule (optional)
[ʉX] → [ʉX]

[36] It is not sufficient to say, as a reviewer proposes, that the ''special'' feature on H in the final clause is related to the scopal properties of H: under partial movement, the clause in which the partially moved XP surfaces counts as the final clause for the reflex pattern (recall: only movement in narrow syntax triggers reflexes), even though there is no scopal relation between the XP and H in this clause. But this does not undermine the reviewer's proposal. All that matters is that the head H in the final clause bears a feature that is different from those of H in nonfinal clauses.

4.5 Summary and Comparison

The previous accounts of the PI/PII alternation can by and large also capture mixed patterns and optionality, but PIII (and PIV) is highly problematic for all of them. While technical solutions can be developed, they require undesirable assumptions and complicate the basic systems. The question is what price one is prepared to pay for an alternative without reordering. Under the *no-reflex – no-movement* account as well as under iterative prolepsis, languages differ drastically in how long Ā-movement applies (i.e., whether it is unbounded, successive-cyclic, or clause-bound). The PF approach works only if we accept accidental homophony, accidental zero exponence, and impoverishment rules to derive gaps; but even if we do so, the system needed to capture optionality wrongly predicts further alternating patterns in languages with PI/PII and PIII/PIV optionality. Enriched-representation approaches require the proliferation of empty elements and countercyclic operations, both of which are problematic under a Minimalist perspective. Finally, in many of the alternatives the assumptions required to derive all patterns lead to a nonuniform account of the absence of reflexes across and within languages.

The ordering approach provides a uniform account of all reflex patterns: the absence of a reflex is *always* due to failed valuation resulting from the order Agree > Merge. Furthermore, long Ā-movement can apply in a uniform fashion across languages (successive-cyclically); differences in the formation of long Ā-dependencies are possible, but not required to derive the different reflex patterns. The patterns do not result from the idiosyncratic specification of VIs. The account is compatible with the copy theory, the multidominance theory, and the view that nothing is left behind by movement. Moreover, the approach aligns with the Borer Conjecture (Borer 1984) according to which all variation is restricted to the features of lexical items. The ordering approach requires (a) a featural distinction between final and nonfinal movement steps, and (b) ordering of operations. The former is also necessary in the alternative accounts, encoded either on the heads that trigger movement (e.g., [uQ] vs. [uX]) or in the elements that occupy a landing site (trace vs. operator). As for (b), feeding and bleeding interactions discussed since transformational grammar (see, e.g., Kenstowicz and Kisseberth 1979) provide independent evidence for the necessity of ordering operations. I conclude that the ordering approach is the most straightforward and consistent account of reflex patterns.

5 Implications of the Ordering Approach

In this section, I will discuss the consequences that the ordering approach has for the intrinsic/extrinsic debate, the timing of edge feature insertion and discharge, and the timing of Agree.

5.1 Extrinsic vs. Intrinsic Ordering

If operations apply sequentially, the question arises whether their order is determined language-specifically (extrinsic ordering) or whether it follows from independent principles of the grammar (intrinsic ordering). There are two major views in the literature: Chomsky (1965) states that extrinsic ordering is required in addition to intrinsic ordering; Pullum (1979) claims that every order is determined by universal principles. Such principles include specificity (Anderson 1969, 1992, Kiparsky 1973, Koutsoudas, Sanders, and Noll 1974, Lahne 2012), complexity (e.g., *Merge before Move* in Chomsky 1995), obligatoriness (Ringen 1972, Perlmutter and Soames 1979), (versions of) the Williams Cycle (Williams 1974, 2003, Grohmann 2003, Abels 2008), and the Strict Cycle (Chomsky, Halle, and Lukoff 1956, Chomsky 1973, Pullum 1979). The variation in the order of operations required to derive all reflex patterns provides an argument for extrinsic ordering. The reason is that if there are two operations A and B, the principles predict either the order A > B or the order B > A. However, some of the orders in (18) are the opposite of one another. For example, [•F•] needs to apply before [∗F:□∗] to derive PI and PII, but after [∗F:□∗] to derive PIII and PIV. Crucially, no principle can predict A > B and B > A at the same time. Hence, the order of operation-inducing features on a head must be extrinsic. Indeed, the possibility of extrinsic ordering is expected for operations that are triggered by the same head because the Strict Cycle and the Williams Cycle—the two still widely adopted order-determining principles in syntax—do not predict an order among them, as they apply *within the same domain* (see Rezac 2004:7).

5.2 The Timing of Edge Feature Insertion and Discharge

In the system proposed here, all operations are feature-driven. Crucially, nonfinal movement steps are triggered by features distinct from those that trigger final movement steps: following Chomsky (2000, 2001), I call them edge features [•EF•]. To avoid overgeneration, I assume that [•EF•]s are not freely available but are inserted on a head if required (see footnote 17). The question is when insertion happens. There are two proposals in the literature about the timing of [•EF•]-insertion that also restrict the timing of [•EF•]-discharge: according to Chomsky (2000, 2001), [•EF•]s can be inserted on the head of a phase if the phase has discharged all of its operation-inducing features; consequently, nonfinal movement steps are the last operation triggered by a phase head. Müller (2010, 2011) proposes that Condition on Extraction Domain effects can be derived if an [•EF•] can be inserted on a phase head as long as it still bears at least one operation-inducing feature. Since features are ordered on a stack of which only the topmost item is accessible, and since [•EF•] is put on top of the stack, it must be discharged immediately after its insertion; hence, nonfinal movement steps cannot be the last operation triggered by a phase head.

If the ordering approach to movement reflexes is adopted, both proposals are too restrictive, as they exclude some of the required orders. Chomsky's proposal precludes PI and PIII because these patterns require that nonfinal [•EF•]-driven movement steps apply before Agree; thus, they are not the last operation the phase head triggers. Müller's proposal is at odds with PII and PIV because nonfinal movement steps are (or can be in the case of PIV) the last operation in the phase. The crosslinguistic variation in reflex patterns thus requires that the timing of edge feature discharge be more flexible, such that nonfinal movement steps can apply at various points of the derivation. I assumed that [•EF•]-insertion happens early, in the numeration; as a consequence, [•EF•] can be ordered with respect to every other feature on the same head (none of them has been discharged yet), governed by language-specific ordering statements.

5.3 Agree as a Syntactic Operation

The ordering approach to reflex patterns provides an argument in favor of the hypothesis that Agree is a syntactic operation (see, e.g., Preminger 2014) and against claims that Agree applies postsyntactically (see, e.g., Bobaljik 2008 on ϕ-Agree). Given the Y/T-model of grammar, syntactic operations can feed or bleed postsyntactic operations, but postsyntactic operations cannot feed or bleed syntactic ones. However, the account of PII–PIV requires that Agree apply before final and/or nonfinal movement steps (resulting in feeding), which is excluded if Agree happens postsyntactically. Postsyntactic Agree could precede movement only if movement were a postsyntactic operation, too. However, this is not an option: the movement operations under discussion feed PF and LF processes (linearization, interpretation); moreover, recall that reflexes of Ā-movement are only triggered by movement in the syntax. Hence, reflex-triggering movements must apply in narrow syntax, and if Agree applies before them, Agree must be syntactic, too.

6 Conclusions

Crosslinguistically, there are four patterns of movement reflexes with respect to the distribution of the reflex across the clauses spanned by Ā-movement: the reflex occurs in all clauses of the dependency, in none of them, only in the clause where the dependency terminates, or only in clauses where it does not terminate. In some languages, several patterns cooccur (mixed patterns) or alternate (optionality). In this article, I have proposed an analysis according to which these patterns result from the timing of (internal) Merge and (upward) Agree triggered by a single head. A reflex arises if Merge applies before Agree (feeding); the absence of a reflex is due to the reverse order Agree before Merge (counterfeeding). If final and nonfinal movement steps are triggered by distinct features, the attested variation is predicted by the reordering of three types of operation-inducing features (probe features, structure-building features triggering either final or nonfinal movement) on a head. Consequently, the order of these features must be language-specific (extrinsic). I have argued that existing accounts of a subset of the four patterns cannot straightforwardly be extended to the remaining patterns. Technical solutions are possible, but require a number of undesirable assumptions and lead to a nonuniform account of the absence of reflexes, while the ordering approach offers a coherent analysis. Finally, the ordering approach implies that the timing of edge feature discharge must be more flexible than assumed in the literature, and that Agree is a syntactic operation.

References

Abels, Klaus. 2003. Successive cyclicity, anti-locality, and adposition stranding. Doctoral dissertation, University of Connecticut, Storrs.

Abels, Klaus. 2008. Towards a restrictive theory of (remnant) movement. *Linguistic Variation Yearbook* 7: 53–120.

Abels, Klaus. 2012. *Phases: An essay on cyclicity in syntax.* Berlin: de Gruyter.

Abels, Klaus, and Peter Muriungi. 2008. The focus marker in Kîîtharaka: Syntax and semantics. *Lingua* 118:687–731.

Adger, David. 2003. *Core syntax.* Oxford: Oxford University Press.

Adger, David, and Gillian Ramchand. 2005. Merge and Move: *Wh*-dependencies revisited. *Linguistic Inquiry* 36:161–193.

Anand, Pranav, and Andrew Nevins. 2005. The locus of ergative case assignment: Evidence from scope. In *Ergativity: Emerging issues*, ed. by Alana Johns, Diane Massam, and Juvenal Ndayiragije, 3–27. Dordrecht: Kluwer.

Anderson, Stephen R. 1969. West Scandinavian vowel systems and the ordering of phonological rules. Doctoral dissertation, MIT, Cambridge, MA.

Anderson, Stephen R. 1992. *A-morphous morphology.* Cambridge: Cambridge University Press.

Aoun, Joseph. 1985. *A grammar of anaphora.* Cambridge, MA: MIT Press.

Aoun, Joseph. 1986. *Generalized binding.* Dordrecht: Foris.

Aoun, Joseph, Lina Choueiri, and Norbert Hornstein. 2001. Resumption, movement, and derivational economy. *Linguistic Inquiry* 32:371–403.

Arregi, Karlos, and Andrew Nevins. 2012. *Morphotactics: Basque auxiliaries and the structure of Spellout.* Dordrecht: Springer.

Asarina, Alya. 2011. Case in Uyghur and beyond. Doctoral dissertation, MIT, Cambridge, MA.

Assmann, Anke, Doreen Georgi, Fabian Heck, Gereon Müller, and Philipp Weisser. 2015. Ergatives move too early: On an instance of opacity in syntax. *Syntax* 18:343–387.

Baker, Mark C. 2008. *The syntax of agreement and concord.* Cambridge: Cambridge University Press.

Barss, Andrew. 1986. Chains and anaphoric dependence: On reconstruction and its implications. Doctoral dissertation, MIT, Cambridge, MA.

Béjar, Susana, and Milan Rezac. 2009. Cyclic Agree. *Linguistic Inquiry* 40:35–73.

Biloa, Edmond. 1993. Clitic climbing in Bantu. In *Topics in African linguistics: Papers from the XXI Annual Conference on African Linguistics*, ed. by Salikoko S. Mufwene and Lioba Moshi, 67–77. Amsterdam: John Benjamins.

Bobaljik, Jonathan David. 2008. Where's phi? Agreement as a post-syntactic operation. In *Phi theory: Phi-features across modules and interfaces*, ed. by Daniel Harbour, David Adger, and Susana Béjar, 295–328. Oxford: Oxford University Press.

Bobaljik, Jonathan David, and Susanne Wurmbrand. 2005. The domain of agreement. *Natural Language and Linguistic Theory* 23:809–865.

Boeckx, Cedric. 2003. *Islands and chains: Resumption as stranding.* Amsterdam: John Benjamins.

Boeckx, Cedric. 2008a. *Bare syntax.* Oxford: Oxford University Press.

Boeckx, Cedric. 2008b. *Understanding Minimalist syntax: Lessons from locality in long-distance dependencies.* Oxford: Blackwell.

Bonet, Eulàlia. 1991. Morphology after syntax. Doctoral dissertation, MIT, Cambridge, MA.

Borer, Hagit. 1984. *Parametric syntax.* Dordrecht: Foris.

Bošković, Željko. 2007a. On successive cyclic movement and the freezing effect of feature checking. In *Sounds of silence: Empty elements in syntax and phonology*, ed. by Jutta Hartmann, Veronika Hegedűs, and Henk van Riemsdijk, 195–233. Amsterdam: Elsevier.

Bošković, Željko. 2007b. On the locality and motivation of Move and Agree: An even more minimal theory. *Linguistic Inquiry* 38:589–644.

Branigan, Phil. 1992. Subjects and complementizers. Doctoral dissertation, MIT, Cambridge, MA.

Bruening, Benjamin. 2005. The Algonquian inverse is syntactic: Binding in Passamaquoddy. Ms., University of Delaware, Newark.

Carstens, Vicki. 2005. Agree and EPP in Bantu. *Natural Language and Linguistic Theory* 23:219–279.

Chomsky, Noam. 1965. *Aspects of the theory of syntax.* Cambridge, MA: MIT Press.

Chomsky, Noam. 1973. Conditions on transformations. In *A festschrift for Morris Halle*, ed. by Stephen R. Anderson and Paul Kiparsky, 232–286. New York: Holt, Rinehart and Winston.

Chomsky, Noam. 1986. *Barriers.* Cambridge, MA: MIT Press.

Chomsky, Noam. 1995. *The Minimalist Program.* Cambridge, MA: MIT Press.
Chomsky, Noam. 2000. Minimalist inquiries: The framework. In *Step by step*, ed. by Roger Martin, David Michaels, and Juan Uriagereka, 89–155. Cambridge, MA: MIT Press.
Chomsky, Noam. 2001. Derivation by phase. In *Ken Hale: A life in language*, ed. by Michael Kenstowicz, 1–52. Cambridge, MA: MIT Press.
Chomsky, Noam. 2004. Beyond explanatory adequacy. In *Structures and beyond: The cartography of syntactic structures, vol 3*, ed. by Adriana Belletti, 104–131. Oxford: Oxford University Press.
Chomsky, Noam, Morris Halle, and Fred Lukoff. 1956. On accent and juncture in English. In *For Roman Jakobson: Essays on the occasion of his sixtieth birthday*, ed. by Hugh McLean, Horace G. Lunt, Cornelis H. van Schooneveld, and Morris Halle, 65–80. The Hague: Mouton.
Chung, Sandra. 1991. Sentential subjects and proper government in Chamorro. In *Interdisciplinary approaches to language: Essays in honor of S.-Y. Kuroda*, ed. by Carol Georgopoulos and Roberta Ishihara, 75–99. Dordrecht: Kluwer.
Chung, Sandra. 1994. *Wh*-agreement and ‘‘referentiality’’ in Chamorro. *Linguistic Inquiry* 25:1–44.
Chung, Sandra. 1998. *The design of agreement: Evidence from Chamorro.* Chicago: University of Chicago Press.
Chung, Sandra, and James McCloskey. 1987. Government, barriers, and small clauses in Modern Irish. *Linguistic Inquiry* 18:173–237.
Clements, George. 1984a. Binding domains in Kikuyu. *Studies in the Linguistic Sciences* 14:37–56.
Clements, George. 1984b. Principles of tone assignment in Kikuyu. In *Autosegmental studies in Bantu tone*, ed. by George Clements and John Goldsmith, 281–339. Dordrecht: Foris.
Clements, George, James McCloskey, Joan Maling, and Annie Zaenen. 1983. String-vacuous rule application. *Linguistic Inquiry* 14:1–17.
Cole, Peter, and Gabriella Hermon. 1998. The typology of *wh*-movement and *wh*-questions in Malay. *Syntax* 1:221–258.
Cole, Peter, and Gabriella Hermon. 2000. Partial *wh*-movement: Evidence from Malay. In Wh-*scope marking*, ed. by Uli Lutz, Gereon Müller, and Arnim von Stechow, 101–130. Amsterdam: John Benjamins.
Collins, Chris. 1993. Topics in Ewe syntax. Doctoral dissertation, MIT, Cambridge, MA.
Diercks, Michael. 2010. Agreement with subjects in Lubukusu. Doctoral dissertation, Georgetown University, Washington, DC.
Dikken, Marcel den. 2009a. Arguments for successive-cyclic movement through SpecCP: A critical review. *Linguistic Variation Yearbook* 9:89–126.
Dikken, Marcel den. 2009b. On the nature and distribution of successive cyclicity: Adjunction, resumption, and scope marking as the roads to success in long-distance relation building. Ms., City University of New York.
Dikken, Marcel den. 2012. On the strategies for forming long Ā-dependencies: Evidence from Hungarian. Ms., City University of New York.
Embick, David, and Rolf Noyer. 2001. Movement operations after syntax. *Linguistic Inquiry* 32:555–595.
Epée, Roger. 1976a. Generative syntactic studies in Duala. Doctoral dissertation, Cornell University, Ithaca, NY.
Epée, Roger. 1976b. On some rules that are not successive cyclic in Duala. *Linguistic Inquiry* 7:193–198.
Finer, Daniel. 1985. The syntax of switch-reference. *Linguistic Inquiry* 16:35–55.
Fox, Danny. 1999. Reconstruction, binding theory, and the interpretation of chains. *Linguistic Inquiry* 30: 157–196.
Fox, Danny, and David Pesetsky. 2005. Cyclic linearization of syntactic structure. *Theoretical Linguistics* 31:1–45.
Georgi, Doreen. 2014. Opaque interactions of Merge and Agree: On the nature and order of elementary operations. Doctoral dissertation, Leipzig University.

Grohmann, Kleanthes. 2003. *Prolific domains: On the anti-locality of movement dependencies.* Amsterdam: John Benjamins.

Haïk, Isabelle. 1990. Anaphoric, pronominal and referential INFL. *Natural Language and Linguistic Theory* 8:347–374.

Haïk, Isabelle, Hilda Koopman, and Dominique Sportiche. 1985. INFL en mooré et le liage dans le système A. In *Rapport de recherches du groupe de linguistique africaniste, année 1985–1986.* Montréal: Université du Québec à Montréal.

Halle, Morris, and Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In *The view from Building 20*, ed by Kenneth Hale and Samuel Jay Keyser, 111–176. Cambridge, MA: MIT Press.

Halle, Morris, and Alec Marantz. 1994. Some key features of Distributed Morphology. In *Papers on phonology and morphology*, ed. by Andrew Carnie, Heidi Harley, and Tony Bures, 275–288. MIT Working Papers in Linguistics 21. Cambridge, MA: MIT, MIT Working Papers in Linguistics.

Halpert, Claire. 2012. Argument licensing and agreement in Zulu. Doctoral dissertation, MIT, Cambridge, MA.

Harley, Heidi, and Rolf Noyer. 1999. Distributed Morphology: State-of-the-article. *Glot International* 4:3–9.

Heck, Fabian, and Anke Himmelreich. 2017. Opaque intervention. *Linguistic Inquiry* 48:47–97.

Heck, Fabian, and Gereon Müller. 2000. Successive cyclicity, long-distance superiority, and local optimization. In *Proceedings of WCCFL 19*, ed. by Roger Billerey and Brook Danielle Lillehaugen, 218–231. Somerville, MA: Cascadilla Press.

Heck, Fabian, and Gereon Müller. 2007. Extremely local optimization. In *Proceedings of WECOL 26*, ed. by Erin Bainbridge and Brian Agbayani, 170–183. Fresno: California State University, Department of Linguistics.

Hein, Johannes. 2008. Verbflexion im Warembori: Eine Analyse im Rahmen der Distribuierten Morphologie. In *Varieties of competition*, ed. by Fabian Heck, Gereon Müller, and Jochen Trommer, 49–63. Leipzig: Institut für Linguistik.

Henry, Alison. 1995. *Belfast English and Standard English: Dialect variation and parameter setting.* Oxford: Oxford University Press.

Hiraiwa, Ken. 2005. The morphosyntax of the EPP and C in Buli. In *NELS 35*, ed. by Leah Bateman and Cherlon Ussery, 267–278. Amherst: University of Massachusetts, Graduate Linguistic Student Association.

Kalin, Laura, and Coppe van Urk. 2015. Aspect splits without ergativity: Agreement asymmetries in Neo-Aramaic. *Natural Language and Linguistic Theory* 33:659–702.

Kayne, Richard S. 1989. Facets of Romance past participle agreement. In *Dialect variation and the theory of grammar*, ed. by Paola Benincà, 85–103. Dordrecht: Foris.

Keine, Stefan. 2010. *Case and agreement from fringe to core: A Minimalist approach.* Berlin: de Gruyter.

Kenstowicz, Michael, and Charles Kisseberth. 1979. *Generative phonology.* New York: Academic Press.

Kinyalolo, Kasangani K. W. 1991. Syntactic dependencies and the Spec-head agreement hypothesis in Kilega. Doctoral dissertation, UCLA, Los Angeles, CA.

Kiparsky, Paul. 1973. ''Elsewhere'' in phonology. In *A festschrift for Morris Halle*, ed. by Stephen R. Anderson and Paul Kiparsky, 93–106. New York: Holt, Rinehart and Winston.

Klein, Timo. 2016. Syntactic interaction in resumption. In *Proceedings of ConSOLE XXIII*, ed. by Kate Bellamy, Elena Karvovskaya, Martin Kohlberger, and George Saad, 248–272. Leiden: Leiden University Centre for Linguistics.

Koppen, Marjo van. 2005. One probe – Two goals: Aspects of agreement in Dutch dialects. Doctoral dissertation, Leiden University.

Koppen, Marjo van. 2007. Agreement with (the internal structure of) copies of movement. In *The copy theory of movement*, ed. by Norbert Corver and Jairo Nunes, 327–350. Amsterdam: John Benjamins.

Koppen, Marjo van. 2011. The directionality of Agree. Handout of a talk at Brussels Conference on Generative Linguistics (BCGL) 6, ''Agreement.'' Brussels, December 2011.

Koppen, Marjo van, Michael Diercks, and Mike Putnam. 2011. The directionality of Agree: Can a universal feature value operation be established? Handout of a talk at ''Quo Vadis? Newborn, Reborn, or Stillborn?'' Potsdam, 2011.

Korsah, Sampson, and Andrew Murphy. 2015. Tonal reflexes of successive-cyclic movement in Asante Twi. Ms., Leipzig University.

Koutsoudas, Andreas, Gerald Sanders, and Craig Noll. 1974. The application of phonological rules. *Language* 50:1–28.

Lahne, Antje. 2008a. Excluding SVO in ergative languages: A new view on Mahajan's Generalisation. In *Varieties of competition*, ed. by Fabian Heck, Gereon Müller, and Jochen Trommer, 65–80. Leipzig: Institut für Linguistik.

Lahne, Antje. 2008b. Where there is fire there is smoke: Local modelling of successive-cyclic movement. Doctoral dissertation, Leipzig University.

Lahne, Antje. 2012. Specificity-driven syntactic derivation. In *Ways of structure building*, ed. by Myriam Uribe-Etxebarria and Vidal Valmala, 271–296. Oxford: Oxford University Press.

Martinović, Martina. 2017. Wolof *wh*-movement at the syntax-morphology interface. *Natural Language and Linguistic Theory* 35:205–256.

McCloskey, James. 1979. *Transformational syntax and model theoretic semantics: A case study in Modern Irish.* Dordrecht: Reidel.

McCloskey, James. 1990. Resumptive pronouns, Ā-binding and levels of representation in Irish. In *Syntax of the modern Celtic languages*, ed. by Randall Hendrick, 199–248. San Diego, CA: Academic Press.

McCloskey, James. 2001. The morphosyntax of *wh*-extraction in Irish. *Journal of Linguistics* 37:67–100.

McCloskey, James. 2002. Resumption, successive cyclicity, and the locality of operations. In *Derivation and explanation in the Minimalist Program*, ed. by Samuel David Epstein and T. Daniel Seely, 184–226. Oxford: Blackwell.

Müller, Gereon. 1999. Imperfect checking. *The Linguistic Review* 16:359–404.

Müller, Gereon. 2009. Ergativity, accusativity, and the order of Merge and Agree. In *Explorations of phase theory: Features and arguments*, ed. by Kleanthes Grohmann, 269–308. Berlin: de Gruyter.

Müller, Gereon. 2010. On deriving CED effects from the PIC. *Linguistic Inquiry* 41:35–82.

Müller, Gereon. 2011. *Constraints on displacement: A phase-based approach.* Amsterdam: John Benjamins.

Muriungi, Peter. 2003. *Wh*-questions in Kiitharaka. Master's thesis, University of Witwatersrand, Johannesburg.

Muriungi, Peter. 2005. *Wh*-questions in Kiitharaka. *Studies in African Linguistics* 34:43–104.

Noonan, Máire. 2002. CP-pied-piping and remnant IP movement in long distance *wh*-movement. In *Dimensions of movement: From features to remnants*, ed. by Artemis Alexiadou, Elena Anagnostopoulou, Sjef Barbiers, and Hans-Martin Gärtner, 269–295. Amsterdam: John Benjamins.

Ouali, Hamid. 2008. On C-to-T-feature transfer: The nature of agreement and anti-agreement in Berber. In *Agreement restrictions*, ed. by Roberta D'Alessandro, Susann Fischer, and Gunnar Hrafn Hrafnbjargarson, 159–180. Berlin: de Gruyter.

Ouhalla, Jamal. 1993. Subject-extraction, negation and the antiagreement effect. *Natural Language and Linguistic Theory* 11:477–518.

Perlmutter, David, and Scott Soames. 1979. *Syntactic argumentation and the structure of English.* Berkeley: University of California Press.

Pesetsky, David. 1998. Some optimality principles of sentence pronunciation. In *Is the best good enough?*, ed. by Pilar Barbosa, Danny Fox, Paul Hagstrom, Martha McGinnis, and David Pesetsky, 337–383. Cambridge, MA: MIT Press.

Preminger, Omer. 2011. Agreement as a fallible operation. Doctoral dissertation, MIT, Cambridge, MA.

Preminger, Omer. 2013. That's not how you agree: A reply to Zeijlstra. *The Linguistic Review* 30:491–500.

Preminger, Omer. 2014. *Agreement and its failures.* Cambridge, MA: MIT Press.

Preminger, Omer, and Maria Polinsky. 2015. Agreement and semantic concord: A spurious unification. Ms., University of Maryland, College Park.

Pullum, Geoffrey K. 1979. *Rule interaction and the organization of a grammar.* New York: Garland.

Rackowski, Andrea. 2005. The structure of Tagalog: Specificity, voice, and the distribution of arguments. Doctoral dissertation, MIT, Cambridge, MA.

Rackowski, Andrea, and Norvin Richards. 2005. Phase edge and extraction: A Tagalog case study. *Linguistic Inquiry* 36:565–599.

Reintges, Chris H., Philip LeSourd, and Sandra Chung. 2006. Movement, *wh*-agreement, and apparent *wh*-in-situ. In Wh-*movement: Moving on*, ed. by Lisa Lai-Shen Cheng and Norbert Corver, 165–194. Cambridge, MA: MIT Press.

Rezac, Milan. 2004. Elements of cyclic Agree: Agree and Merge. Doctoral dissertation, University of Toronto.

Richards, Marc D. 2007. On feature inheritance: An argument from the Phase Impenetrability Condition. *Linguistic Inquiry* 38:563–572.

Richards, Norvin. 2013. Lardil ''case stacking'' and the timing of case assignment. *Syntax* 16:42–76.

Ringen, Catherine. 1972. On arguments for rule ordering. *Foundations of Language* 8:266–273.

Rizzi, Luigi. 1990. *Relativized Minimality.* Cambridge, MA: MIT Press.

Rocquet, Amélie. 2013. Splitting objects: A nanosyntactic account of direct object marking. Doctoral dissertation, Universiteit Gent.

Saddy, Douglas. 1991. *Wh*-scope mechanisms in Bahasa Indonesia. In *More papers on* wh-*movement*, ed. by Lisa Lai-Shen Cheng and Hamida Demirdache, 183–218. MIT Working Papers in Linguistics 15. Cambridge, MA: MIT, MIT Working Papers in Linguistics.

Salzmann, Martin. 2011. Silent resumptives in Zurich German possessor relativization. In *Null pronouns*, ed. by Peter Gallmann and Melanie Wratil, 141–221. Berlin: de Gruyter.

Salzmann, Martin. To appear a. *Reconstruction and resumption in indirect A′-dependencies: On the syntax of prolepsis and relativization in (Swiss) German and beyond.* Berlin: de Gruyter.

Salzmann, Martin. To appear b. Prolepsis. In *The Blackwell companion to syntax*, ed. by Martin Everaert and Henk van Riemsdijk. 2nd ed. Oxford: Wiley-Blackwell.

Schneider-Zioga, Patricia. 1995. Specifier/head agreement in Kinande. *Cahiers Linguistiques d'Ottawa* 23: 67–96.

Schneider-Zioga, Patricia. 2000. Anti-agreement and the fine structure of the left edge. In *University of California Irvine Working Papers in Linguistics 6*, ed. by Ruixi Ai, Francesca Del Gobbo, et al.

Schneider-Zioga, Patricia. 2009. *Wh*-agreement and bounded unbounded movement. In *Merging features: Computation, interpretation, and acquisition*, ed. by José M. Brucart, Anna Gavarró, and Jaume Solà, 46–59. Oxford: Oxford University Press.

Sigurðsson, Halldór Ármann, and Anders Holmberg. 2008. Icelandic dative intervention: Person and number are separate probes. In *Agreement restrictions*, ed. by Roberta D'Alessandro, Susann Fischer, and Gunnar Hrafn Hrafnbjargarson, 251–280. Berlin: de Gruyter.

Sternefeld, Wolfgang. 2006. *Syntax: Eine morphologisch motivierte generative Beschreibung des Deutschen.* Tübingen: Stauffenburg.

Takahashi, Shoichi, and Martina Gracanin Yuksek. 2008. Morphosyntax of movement dependencies in Haitian Creole. *Syntax* 11:223–250.

Torrego, Esther. 1984. On inversion in Spanish and some of its effects. *Linguistic Inquiry* 15:103–129.

Torrence, Harold. 2012. The morpho-syntax of silent *wh*-expressions in Wolof. *Natural Language and Linguistic Theory* 30:1147–1184.

Torrence, Harold. 2013. The morphosyntax of Wolof clefts: Structure and movement. In *Cleft structures*, ed. by Katharina Hartmann and Tonjes Veenstra, 187–223. Amsterdam: John Benjamins.

Tuller, Laurice Anne. 1985. Tense features and operators in Hausa. In *Rapport de recherches du groupe de linguistique africaniste, année 1985–1986*, 493–516. Montréal: Université du Québec à Montréal.

Tuller, Laurice Anne. 1986. Bijective relations in Universal Grammar and the syntax of Hausa. Doctoral dissertation, UCLA, Los Angeles, CA.

van Urk, Coppe. 2015. A uniform syntax for phrasal movement: A case study of Dinka Bor. Doctoral dissertation, MIT, Cambridge, MA.

van Urk, Coppe. 2016. Pronoun copying in Dinka and the copy theory of movement. Ms., Queen Mary University of London.

van Urk, Coppe, and Norvin Richards. 2015. Two components of long-distance extraction: Successive cyclicity in Dinka. *Linguistic Inquiry* 46:113–155.

Watanabe, Akira. 1996. *Case absorption and* wh-*agreement.* Dordrecht: Kluwer.

Williams, Edwin S. 1974. Rule ordering in syntax. Doctoral dissertation, MIT, Cambridge, MA.

Williams, Edwin S. 2003. *Representation Theory.* Cambridge, MA: MIT Press.

Wurmbrand, Susanne. 2012. Agree(ment): Looking up or looking down? Lecture given in Agreement Seminar, MIT, Cambridge, MA.

Zeijlstra, Hedde. 2012. There is only one way to agree. *The Linguistic Review* 29:491–539.

Zentz, Jason. 2013. Bantu *wh*-agreement and the case against probe impoverishment. Handout of a talk at the Georgetown University Round Table on Languages and Linguistics, March 2013.

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