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German *wh*-copying: A top-down analysis*

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Abstract:

German *wh*-copying is often taken to represent clear evidence for successive cyclicity and for the Copy Theory of Movement. The generative literature has focused on a particular type of *wh*-copying displaying morphophonological identity among the overtly realized members of the A'-chain. The present article discusses the case of two additional types of *wh*-copying found in German, i.e. 'imperfect' and 'complex' *wh*-copying. It will be argued that standard bottom-up analyses run into a few complications when extended to account for the latter types of *wh*-copying. A novel analysis embedded in a Top-Down derivational model of grammar is then proposed, which is argued to be conceptually as well as empirically superior over more traditional alternatives. The analysis of complex *wh*-copying in German is further extended to the case of Afrikaans and dialectal Dutch.

Keywords: *copy theory of movement, German morphosyntax, successive-cyclic movement, top-down derivation, wh-copying*

1. Introduction

It is standardly assumed that long-distance *wh*-movement — i.e., displacement of some *wh*-XP from an embedded to a matrix clause — can be modeled as proceeding in a successive-cyclic fashion (Chomsky 1977, 2001). Moreover, according to the Copy Theory of Movement (Chomsky 1993), the members of some non-trivial A'-chain represent tokens of one and the same element. This characterization of movement finds wide empirical support (see e.g. Chung 1998 and Lahne 2008 for detailed overviews of the effects of successive-cyclicity in natural languages; cf. Den Dikken 2009 for an opposing view).

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The German *wh*-copying construction is often considered one such type of evidence, as it displays the overt realization of multiple tokens of the A'-chain. More specifically, such a construction involves a type of long-distance interrogative¹ where the overtly realized copies include a criterial (Rizzi 2006) or *extracted* copy located at a scope-discourse position, and one or more intermediate or *resuming* copies found at the edges of the embedded clauses (terminology in italics borrowed from Pankau 2013). This is illustrated in (1), where the spelled-out *wh*-copies display phonological identity (the extracted and resuming elements will be boldfaced and italicized, respectively, throughout the discussion). The purpose of the present article is to investigate the formalization of such A'-chains and the members that constitute them. Moreover, I attempt to challenge the idea whereby A'-tokens are featurally non-distinct for the purposes of the narrow syntactic computation. Given the scope of the paper, I therefore leave out discussion of the issue why the in situ copy should not be spelled-out (cf. the collection of papers in Corver and Nunes 2007), as well as a comparison of *wh*-copying with seemingly similar types of interrogatives, such as the so-called 'scope-marker construction' (Lutz et al. 2000) or pseudo *wh*-copying (Pankau 2018).

- (1) **Wen** glaubst du *wen* sie liebt?
 who believe you who she loves
 'Who do you think she loves?'

(Pankau 2013: 1)

The example in (1) represents a prototypical case of what may be called *identical wh*-copying. According to standard analyses, the derivation of (1) may be (roughly) described as a copying operation involving the entire featural content of the *wh*-phrase; such copies are then internally merged in a step-wise fashion from their original VP-internal position to the specifier of each intervening clause, until a copy ultimately reaches its criterial position in the matrix clause, as illustrated in (2) (cf. e.g. Fanselow and Mahajan 2000). Whichever parameter is involved in licensing the spell-out of the intermediate copies (see e.g. Felser 2004, Nunes 2004, Schippers 2012, Baier 2018, for some proposals), *wh*-copying appears to be a morphophonological manifestation of one of the most fundamental properties of natural language syntax.

- (2) [SpecCP_{n+x} wH_k [... [SpecCP_n wH_k [... [VP <wH_k>]]]]]

However, recent studies have highlighted a number of properties that appear hard to reconcile with certain widely held assumptions about the Copy Theory, in particular that copies of an A'-chain are featurally undistinguishable at Narrow Syntax. Two types of copying appear to bring about complications for standard analyses: (i) *imperfect wh*-copying involving d-pronouns² at intermediate positions (cf. *den* in (3)); and (ii) *complex wh*-copying involving D-linked *wh*-phrases

¹ The idea that *wh*-copying is parasitic on long-distance *wh*-extraction seems to be well-established (see e.g. Felser 2004: 548ff., Pankau 2013: 5ff. for discussion). I assume such an idea here to be essentially correct. However, it should be pointed out that *wh*-copying has been argued to show a somewhat different behavior than regular long-distance *wh*-movement under certain conditions (see Murphy 2016; cf. however Pankau 2018 for a different analysis that may possibly be applied to some of Murphy's data).

² The term essentially refers to demonstratives like *der* 'that one.NOM', *den* 'that one.ACC', *das* 'that', etc., so called because they start with the letter 'd' (Pankau 2013: 50 fn.6). Cf. McDaniel (1986: 183-4), who first observed the use of such pronouns in German *wh*-copying.

at criterial positions and simplex *wh*-/d-pronouns at intermediate positions (cf. *wen/dem* in (4)).

- (3) **Wen** glaubst du *den* ich gesehen habe?
 whom believe you this I seen have
 ‘Who do you think that I have seen?’

(Pankau 2009: 206)

- (4) Welchem **Mann** glaubst du *wem/dem* sie das Buch gegeben hat?
 which man believe you who she the book given has
 ‘Which man do you think she has given the book to?’

(Adapted from Anyadi and Tamrazian 1993: 4)

The issue arising in connection with this sort of data is then how to account for the apparent morphophonological asymmetry obtaining between the criterial and the intermediate copy if according to standard implementations of the Copy Theory they are assumed to be featurally identical. In fact, here it will be argued that it is not at all clear how such an account may be achieved by standard bottom-up analyses, which moreover face some theoretical complications with the derivation of successive-cyclicity, such as violations on the ban on phasal “look-ahead” or their inadequacy with capturing freezing effects (Chesi 2012). Possible stipulations within standard frameworks (such as e.g. the assumption that the features retained on a copy are the result of feature-valuation; cf. Pankau 2009) do not seem to be readily implementable from a cross-linguistic perspective (cf. complex *wh*-copying in dialectal Dutch in (5) and Afrikaans (6), where intermediate copies, unlike those in German, carry a morpheme that expresses D-linking in the sense of Pesetsky 1987):

- (5) **Welke boeken** denk je *welke* zij gekocht heeft?
 which books think you which she bought has
 ‘Which books do you think she bought?’

(Dutch; Koster 2009: 23)

- (6) **Watter meisie** sê hy *watter meisie* kom vanaand kuier?
 which girl say he which girl come tonight visit
 ‘Which girl did he say is coming to visit tonight?’

(Afrikaans; Lohndal 2010: ex. 16, reporting Theresa Biberauer’s judgments)

The solution proposed here is that the intra- and cross-linguistic variation may be captured within a derivational model of grammar in which the directionality of operations flows Top Down (i.e. from the root of the tree (CP/ForceP) down to its predicative core (VP); Chesi 2004 *et seq.*). More specifically, I aim to show how the relevant featural asymmetry may be derived as a consequence of the adopted approach.

The present article is structured as follows. Section 2 provides an empirical overview of German *wh*-copying in order to highlight certain aspects of the construction that must be captured by formal analyses. Section 3 discusses the analysis of the data within some bottom-up approaches and concludes that previous analyses can capture the construction from neither an empirical

nor a theoretical standpoint. Section 4 argues in favor of an alternative analysis, based on a Top-Down model of grammar, which seeks to derive the morphophonological shape of the copies as a direct consequence of the syntactic computation. In particular, the assumption that A^2 -tokens are featurally non-distinct at Narrow Syntax is argued to be empirically unwarranted. Moreover, two parameters are proposed, which are argued to account for the cross-linguistic variation with complex *wh-copying*. Finally, Section 5 wraps up the discussion and draws some conclusions.

2. *An empirical characterization of German wh-copying*

2.1 *Imperfect and complex wh-copying*

Consider again the case of imperfect copying in (3), repeated below:

- (3) **Wen** glaubst du *den* ich gesehen habe?
 whom believe you this I seen have
 ‘Who do you think that I have seen?’

(Pankau 2009: 206)

Examples like (3), with a d-pronoun in the embedded clause, appear to be the only option allowed by some speakers of the *d-variety*³ (cf. Pankau 2009). Such a variety is to be distinguished from the *wh-variety*, which cannot employ d-pronouns as legitimate resuming elements. Some speakers of the d-variety also have the option of employing *wh*-pronouns alongside d-pronouns at intermediate positions; in fact, both types of pronoun can freely alternate for such speakers — that is, without triggering semantic or pragmatic effects (cf. (7)).

- (7) a. **Wen** glaubst du *wen* Peter denkt *den* sie geküsst hat?
 b. **Wen** glaubst du *den* Peter denkt *wen* sie geküsst hat?
 who believe you who Peter thinks who she kissed has
 ‘Who do you think Peter believes she has kissed?’

(Pankau 2013: 50)

Imperfect *wh-copying* thus displays a featural mismatch between the criterial and the intermediate copies. A similar asymmetry can be observed in complex *wh-copying* (cf. (4)):

- (4) **Welchem Mann** glaubst du *wem/dem* sie das Buch gegeben hat?
 which man believe you who she the book given has
 ‘Which man do you think she has given the book to?’

(Adapted from Anyadi and Tamrazian 1993: 4)

³The term “d-variety” will be used to refer to those varieties of German which allow d-pronouns to occur as intermediate elements in *wh-copying*, regardless of whether such varieties can also employ *wh*-pronouns or not.

Though the first mention of complex *wh*-copying traces back to Anyadi and Tamrazian (1993), it is only recently, with Pankau's (2013) doctoral dissertation, that an articulate discussion has been offered. In fact, data of the kind in (4) have largely been ignored by the literature on *wh*-copying (presumably, because they do not display actual copies of the extracted phrase). Fanselow and Ćavar (2001), for instance, dismiss the possibility that (4) constitutes a case of *wh*-copying, suggesting instead that the intermediate copy be treated as an agreeing form of the complementizer. However, as Pankau (2013: 49) notes, they do not provide arguments in support of their claim, whereas examples such as (8a) clearly show that complex *wh*-phrases can be copied multiple times, in an unbounded fashion, precisely as one would expect with the extraction of a *wh*-pronoun (cf. (8b)). According to Pankau (2013: 49), then, "there seems little justification for the claim that *wh*-copying with complex *wh*-phrases is different from *wh*-copying with *wh*-pronouns".

- (8) a. **Welchen Mann** glaubst du *wen* Peter denkt *wen* sie geküsst hat?
 which man believe you who Peter thinks who she kissed has
 'Which man do you think Peter believes she has kissed?'
 b. **Wen** glaubst du *wen* er meint *wen* sie liebt?
 who believe you who he means who she loves
 'Who do you think he believes she loves?'

(Pankau 2013: 1)

In fact, Pankau (2013) corroborates the legitimacy of complex *wh*-copying by presenting novel data from the variety that judges as grammatical questions such as (4). He dubs such a variety "liberal" (henceforth Liberal German, LG), which contrasts with the more "restrictive" variety of German (Restrictive German, RG), where complex *wh*-copying is banned altogether. The following sentences are thus prohibited in RG, but grammatical in LG:

- (9) a. **Was für einen Mann** glaubst du *wen* sie eingeladen hat?
 what for a man believe you who she invited has
 'What a man do you think she has invited?'
 b. **Wessen Freund** glaubst du *wen* sie eingeladen hat?
 whose friend believe you who she invited has
 'Whose friend do you think she has invited?'
 c. **Wem seinen Freund** glaubst du *wen* sie eingeladen hat?
 who his friend believe you who she invited has
 'Whose friend do you think she has invited?'
 d. **Wen von den Männern** glaubst du *wen* sie eingeladen hat?
 who of the men believe you who she invited has
 'Which of the men do you think she has invited?'

(*Ibidem*, 48-49)

It is important to note that the intermediate copies always agree in ϕ -features with the lexical restriction. In fact, *wh*-copying cannot take place in German when ϕ -agreement between the extracted and the resuming element does not obtain. In Tables 1-2 I present the paradigm for *wh*- and d-pronouns showing that the former lack inflection for feminine gender and plural number.

	SG			PL
	MASC	FEM	NEUT	
NOM	<i>wer</i>	-	<i>was</i>	-
ACC	<i>wen</i>	-	<i>was</i>	-
DAT	<i>wem</i>	-	<i>was</i>	-

Table 1. Paradigm for *wh*-pronouns (Pankau 2013: 60)

	SG			PL
	MASC	FEM	NEUT	
NOM	<i>der</i>	<i>die</i>	<i>das</i>	<i>die</i>
ACC	<i>den</i>	<i>die</i>	<i>das</i>	<i>die</i>
DAT	<i>dem</i>	der	dem	denen

Table 2. Paradigm for d-pronouns (Pankau 2013: 60)

As shown in Pankau (2013: 59ff.), feminine and plural complex *wh*-phrases cannot be resumed by *wh*-pronouns (cf. (10-b)) due to latter's defective inflectional paradigm (cf. Table 1). Nonetheless, copying of extracted complex feminine *wh*-phrases may still apply if d-pronouns may be used instead as resuming elements (cf. (10c)), as these do have the option of inflecting for the relevant ϕ -features (cf. Table 2).

- (10) a. * **Welche Frau** glaubst du *wen* er eingeladen hat?
 which woman.FEM.SG believe you who.MASC.SG he invited has
- b. * **Welche Frau** glaubst du *was* er eingeladen hat?
 which woman.FEM.SG believe you what.NEUT.SG he invited has
- c. **Welche Frau** glaubst du *die* er eingeladen hat?
 which woman.FEM.SG believe you who.FEM.SG he invited has
 'Which woman do you think he has invited?'

(*Ibidem*, 62-63)

However, despite the fact that determiners that can adequately express the ϕ -features of the criterial copy are available in the lexicon, the grammar seems unable to license intermediate copies on the basis of ϕ -features alone (cf. (11)), suggesting that some other constraint must be at play in regulating their realization.

- (11) a. * **Welche Frau** glaubst du *sie* er eingeladen hat?
 which woman.FEM.SG believe you she he invited has
- b. * **Welche Frau** glaubst du *welche* er eingeladen hat?
 which woman.FEM.SG believe you which.FEM.SG he invited has

2.2 *A characterization of the intermediate copy*

A few questions arise from an empirical standpoint when considering the sort of data presented so far. Of particular importance for a characterization of the construction under investigation is whether a principled reason can be given as to why the set of resuming elements contains only *wh*-pronouns for some speakers, while the set is extended to include *d*-pronouns for others. Furthermore, why is it the case that LG resumes the extracted complex *wh*-phrases by means of pronominal elements, instead of *which*-like elements or full-fledged copies? Recall that the two options are allowed by Dutch and Afrikaans, respectively (cf. section 4.3). In other words, we are interested in understanding the status and nature of the intermediate copy in German as a means of tackling also the issue of variation.

One condition noted above with respect to the morphological realization of copies in a German *wh*-copying construction is that their ϕ -features must remain unchanged throughout the A'-chain. However, this restriction alone is clearly insufficient to capture the full range of data, as shown by the fact that not all imaginable forms are admissible (cf. (11) above and (12-14)). The ungrammaticality of (12a) is due to the fact that the sentence contains two full copies of the same complex *wh*-phrase, an option that neither the restrictive nor the liberal varieties of German permit. Example (12b), on the other hand, shows that spelling out one of the copies as a *wh*-pronoun is not a sufficient condition for the grammaticality of the sentence. The position where such copies appear is crucial, the complex copy being licensed only at scope position.

- (12) a. * **Welchem Mann** glaubst du *welchem Mann* sie eingeladen hat?
 which man believe you which man she invited has
 'Which man do you think she has invited?'
- b. * **Wem** glaubst du *welchem Mann* sie eingeladen hat?
 who believe you which man she invited has
 'Which man do you think she has invited?'

(*Ibidem*, 77-78)

Lastly, examples (13) and (14), involving extracted PPs, show that the grammaticality of the sentences is not yielded by the selectional constraints imposed on the moved constituents by the gap site, i.e. by what Jacobson (1984) calls connectivity effects. For if connectivity effects were involved, we would expect the copied constituents in sentences (13-14) to be licensed by the predicates *sprechen* and *schreiben*, since both options would be compatible with them (cf. (15) and (16)).

- (13) * **Wen** denkst du *an wen* sie einen Brief schreibt?
 who.DAT think you on who.ACC she a letter writes
 ‘Who do you think she writes a letter to?’

(*Ibidem*, 67)

- (14) a. * **Von wen** glaubst du *über wen* er spricht
 of whom believe you about whom he talks
 b. * **Über wen** glaubst du *von wem* er spricht
 about whom believe you of whom he talks
 ‘Who do you think he talks about?’

(*Ibidem*, 68)

- (15) Ich spreche von Maria/ über Maria.
 I speak of Maria about Maria
 ‘I talk about Maria.’

- (16) Sie schreibt ihm/ an ihn einen Brief.
 she writes him.DAT on him.ACC a letter
 ‘She writes a letter to him.’

(*Ibidem*, 67)

Various characterizations of the intermediate element have been proposed in the literature (see Pankau 2013: 42ff. for an exhaustive overview). According to some, the intermediate element would be nothing more than a copy of the extracted element, minus the latter’s *wh*-feature (Pankau 2009). According to others, the intermediate copy belongs morphologically to the class of indefinites (Felser 2004). For others still, it is a relative pronoun (Barbiers et al. 2009). Though theoretically plausible, all these solutions seem to be empirically untenable, at least for the German data. For instance, consider Pankau’s (2009) approach, which is partially based on the following contrast:

- (17) a. * Ich glaube_[-wh] [wen sie liebt].
 I believe whom she loves
 ‘I believe whom she loves.’
 b. Wen glaubst_[-wh] du [wen sie liebt]?
 whom believe you whom she loves?
 ‘Who do you think that she loves?’

(Pankau 2009: 200-201)

Since bridge verbs such as *glauben* cannot select as complements *wh*-marked clauses (cf. (17a)), Pankau (2009) suggests that the *wh*-feature must be absent from the intermediate element in the *wh*-copying construction (cf. (17b)). Alternatively, one could propose that the selectional requirements of the verb can somehow be overridden, but as Pankau (2009: 201) notes, it would seem rather unlikely that this could be the case. Pankau's (2009) approach can correctly include in the set of resuming elements both *wh*- and d-pronouns, since d-pronouns do not bear a *wh*-feature,⁴ and *wh*-pronouns do not bear it obligatorily (cf. (18a-b), where the *wh*-pronouns is used as an indefinite and a free relative pronoun, respectively):

- (18) a. Ich sehe wen
I see who
'I see someone.'
(Pankau 2013: 89)
- b. Ich glaube wem du vertraust
I believe whom you trust
'I believe who you trust.'

(Pankau 2009: 207)

While Pankau's (2009) approach may correctly capture the observations that the intermediate element is not interpreted as an interrogative operator and that it may at times show up as a d-pronoun, it is not sufficient, as later acknowledged by Pankau (2013: 89). Indeed, consider the following sentences, which turn out to be ungrammatical in spite of the fact that the *wh*-feature has been stripped from the resuming phrases:

- (19) a. * **Welchen** Mann glaubst du *den* Mann sie eingeladen hat?
which man believe you the man she invited has
- b. * **Welchen** Mann glaubst du *diesen* Mann sie eingeladen hat?
which man believe you this man she invited has
'Which man do you think she has invited?'
- c. * **Was** für einen Mann glaubst du *einen* Mann sie eingeladen hat?
what for a man believe you a man she invited has
'What man do you think she has invited?'

(Pankau 2013: 105)

Felser's (2004) approach is similar to Pankau's (2009) in that it attributes the featural difference amongst copies to the different structural positions that they occupy.⁵ Thus, building on Cheng's (2000) treatment of German *wh*-items (according to which such items are the

⁴I take the *wh*-feature to represent the property of some item to be used as an interrogative operator. It is thus unrelated with and ought to be kept distinct from the actual morphophonological aspect of said item.

⁵Felser (2004) and Pankau (2009) can be grouped together into a class of approaches called the *partial copy* analysis, which is to be contrasted with the *full copy* analysis, where copies are instead assumed to be identical under every aspect (cf. Pankau 2013: 91 and 93-4).

combination of a morphological ‘core’ with a *wh*-feature, cf. section 4.2), Felser (2004) analyzes *wh*-copying as the result of a “selective” spell-out: criterial positions spell out the *wh*-feature or the quantificational part, whereas intermediate positions spell out the core part, which she takes to correspond to an indefinite. Her proposal is partially based on the observation that some resuming elements can indeed be used as indefinite pronouns, as was noted for (18a) above. However, this approach is problematic in that it incorrectly excludes d-pronouns from the set of resuming elements, as these cannot be used as indefinite pronouns (cf. Pankau 2013: 89-90):

- (20) * Ich sehe den
 I see who
 ‘I see someone.’

(*Ibidem*, 89)

Though one could envisage that Felser’s (2004) characterization is perhaps correct only for the *wh*-variety, it still faces other problems, such as the fact that not all *wh*-items can be used as indefinites. For instance, while adverbs like *wann* ‘when’ and *wo* ‘where’ cannot realize indefinites (cf. (21)), their use as intermediate elements in *wh*-copying is deemed acceptable (cf. (22)). Therefore, the characterization of the resuming element as an indefinite pronoun cannot be maintained, either for the d- or the *wh*-variety of German.

- (21) a. * Ich ruf dich wann an.
 I call you when on
 ‘I call you at some point.’
 b. * Ich hab ihn wo abgesetzt.
 I have him where dropped-off
 ‘I dropped him off somewhere.’
- (22) a. **Wann** glaubst du wann wir uns treffen sollten?
 when believe you when we us meet should
 ‘When do you think we should meet?’
 b. **Wo** glaubst du wo wir uns treffen sollten?
 where believe you where we us meet should
 ‘Where do you think we should meet?’

(*Ibidem*, 90)

A more recent alternative, developed in Pankau (2013), takes the resuming element to be a free relative proform. The term proform is used to indicate that: (i) the resuming element is not just a pronoun, since it can be a PP or an AdvP in the case of PP- or AdvP copying; and that (ii) the resuming element cannot host lexical nouns (Pankau 2013: 56).

Pankau (2013: 52-3, 72-5) provides a diachronic as well as three synchronic arguments in support of his proposal. Let us briefly consider them, starting with the latter. First, recall that while the *wh*-variety allows only *wh*-pronouns to occur at intermediate positions in *wh*-copying, the d-variety

licenses the use of d-pronouns. The contrast between the two varieties is related by Pankau (2013) to a difference in the size of the set of free relative proforms: while the set of free relative proforms is a proper subset of the set of *wh*-pronouns in the *wh*-variety, the set of free relative proforms also contains d-pronouns in the d-variety. In other words, the *wh*-variety does not allow d-pronouns in *wh*-copying because they cannot be used to introduce free relative clauses in that variety (the following a-sentences are indeed ungrammatical for speakers of the *wh*-variety), whereas this use is fully grammatical in the d-variety (both a- and b-sentences are permitted), hence their availability in *wh*-copying:

- (23) a. Ich lade ein den alle mögen.
 b. Ich lade ein wen alle mögen.
 I invite in who everyone likes
 'I invite who everyone likes.'
- (24) a. Ich esse das du gekochst hast.
 b. Ich esse was du gekochst hast.
 I eat what you cooked have
 'I eat what you cooked.'

(*Ibidem*, 52)

The second argument Pankau (2013) provides is based on the observation that whenever an item is not allowed as a resuming element, that item is not allowed to introduce free relative clauses either:

- (25) * **Welchen Mann** glaubst du *ihn* sie eingeladen hat?
 which man believe you him she invited has
 'Which man do you believe she has invited?'
- (26) * Ich lade ein ihn alle mögen.
 I invite in him everyone like
 'I invite who everyone likes.'

(*Ibidem*)

The third synchronic argument is related to the fact that the alternation between *wh*- and d-pronouns is restricted to free relative clauses only. The alternation may not occur in headed relative clauses, as illustrated by the following example:

- (27) a. * Der Mann wen sie liebt ist ein Idiot.
 b. Der Mann den sie liebt ist ein Idiot.
 the man who she loves is an idiot
 'The man whom she loves is an idiot.'

(*Ibidem*, 91)

Pankau (2013: 72-5) provides additional support in favor of the characterization of the resuming element as a free relative proform by presenting the following diachronic argument.

He observes that *wh*-copying has been a productive strategy of question formation through most stages of the history of German. Consider example (28) from Middle High German (ca. 1050-1350), example (29) from Early New High German (ca. 1350-1650), and example (30) from an older stage of New High German (XVIII century; see Pankau 2013: 72 and references therein).

- (28) **Wër** wænestû *dër* ëz sage dëm Bernære?
 who think.you who it say the Barnese
 ‘Who do you think will say it to the one from Bern?’
- (29) **Wer** meinestu wol, *der* ein Mitleiden mit deiner
 who believe.you well who a pity with your
 armen Seel und ihrer Verdammnus haben werde?
 poor soul and her perdition have will
 ‘Who do you think will have a pity on your soul and its perdition?’
- (30) **Was** wollen sie *das* noch geschehen soll?
 what want you that still happen should
 What do you want to happen?

Examples (28-30) feature d-pronouns as resuming elements.⁶ If such examples are representative of older stages of German, as Pankau (2013: 73) takes them to be, the question now arises as to what allowed d-pronouns to be preferred over *wh*-pronouns, given that the situation is completely reversed in modern German. The reason seems clear: d-pronouns were standardly used to introduce free relative clauses in older stages of German, as illustrated by the following examples from Old High German (31) and Middle High German (32) (Pankau 2013:73):

- (31) Ther brut habêt, ther scal brütigomo sîn.
 who wife has who shall husband be
 ‘He who has a wife shall be a husband.’
- (32) Ich bin der hât gewarnet die edelen fürsten rîch.
 I am who has warned the noble prince rich
 ‘I am the one who has warned the noble rich prince.’

The characterization of the resuming element as a free relative proform thus seems to find adequate empirical support, from both a synchronic and a diachronic point of view.

⁶This is also true of example (30). As Axel-Tober (2012: 81, cited in Pankau 2013: 73 fn. 20) points out, German orthography was already distinguishing between *das* (d-pronoun) and *dass* (complementizer) at the time of the sentence's writing.

2.2.1 Problematic data and some proposed solutions

Some apparently problematic data for the characterization of the resuming element as a free relative proform involve two types of constructions featuring complex wh-phrases as resuming elements (see Pankau 2013: 77-81), illustrated by the following examples:

(33) **Wen** denkst du *wen von den Studenten* man einladen sollte?
 who think you who of the students one invite should
 ‘Which of the students do you think that one should invite?’

(34) **Wieviel** sagst du *wieviel Schweine* ihr *habt*?
 how.many say you how.many pigs you have
 ‘How many pigs do you say that you have?’

(Fanselow and Ćavar 2001: exx. 37-38)

Both examples suggest that the resuming element can be complex with certain types of phrases, namely with phrases of the type *wen von den* + NP and *wieviel* + NP. If this were the correct analysis, then examples such as (33) and (34) would represent clear evidence against the characterization of the resuming element as a free relative proform (recall that proforms, by definition, cannot host lexical nouns). However, it can be argued that this is not the case. The analysis proposed by Pankau (2013) to account for these examples is consistent with his characterization of the resuming element as a free relative proform. In fact, according to Pankau (2013), it is only the proforms (*wen* and *wieviel*) that occupy the intermediate position, and not the entire complex phrases (*wen von den Männern* and *wieviel Schweine*), out of which the proforms have undergone sub-extraction. The following illustration provides a sketch of his analysis for example (33).

(35) Wen_i denkst du wen_i [t_i von den Studenten] $_k$ man t_k einladen sollte?
 who think you who of the students one invite should
 Which of the students do you think that one should invite?

Pankau (2013: 79) further shows that sub-extraction of *wen* is not an ad hoc solution, as it is a generally available process in German (cf. (36)).

(36) a. [Wen von den Männern] $_i$ hat Maria t_i eingeladen?
 who of the men has Maria invited?
 b. [Wen] $_k$ hat Maria [t_k von den Männern] eingeladen?
 who has Maria of the men invited
 c. [Wen] $_k$ hat [t_k von den Männern] Maria eingeladen?
 who has of the men Maria invited?
 ‘Which of the men has Maria invited?’

(Pankau 2013: 79)

If the proform and the rest of the complex phrase are analyzed as being split from each other, we can predict that overt material should be able to intervene between them, since they would be part of two different constituents. This prediction is borne out, as illustrated by the following example from a dialect where the *wh*-pronoun and the complementizer can co-occur (i.e. where the Doubly Filled Comp Filter does not hold).

- (37) Wen glaubst du wen dass von den Professoren die Studentin verführt hat?
 Who believe you who that of the professors the student seduced has
 ‘Which of the professors do you think the student has seduced?’

(*Ibidem*, fn. 25)

The sub-extraction analysis seemingly faces one problem when applied to the example in (34), namely that Standard German does not allow such a process to occur with *wieviel* (cf. (38b)).

- (38) a. [Wieviel Schweine]_i habt ihr t_i?
 how.many pigs have you
 b. * [Wieviel]_k habt ihr [t_k Schweine]?
 how.many have you pigs?
 ‘How many pigs do you say that you have?’

(*Ibidem*, 81)

However, as Pankau (2013: 81) remarks, this is not a real problem since sentences such as (38b), involving sub-extraction of *wieviel*, are in fact grammatical for the speakers who accept (34) above.

We can then conclude that these data do not pose a threat for the characterization of the resuming element as a free relative proform, at least as far as German is concerned.^{7, 8}

2.3 Summary

German *wh*-copying is subject to parametric intra-linguistic variation with respect to the shape and ‘size’ of the copies generated by successive-cyclic movement, in particular, (i) the contrast between LG and RG pertaining to the availability or otherwise of D-linked *wh*-expressions as extracted elements; and (ii) the possibility of employing d-pronouns for some speakers as opposed to others. The morphosyntactic behavior of resuming elements moreover supports

⁷ As van Urk (2015: 210-1) notes, Dutch prohibits scrambling of material over subjects of the relevant type, which would render problematic an extension of Pankau’s sub-extraction analysis to the Dutch data. However, just as there are speakers of German who allow sub-extraction processes that are not permitted in the standard language (i.e. sub-extraction of *wieviel*), it might be the case that the same could be true for some Dutch speakers. Future work would need to document the intra-linguistic variation of Dutch *wh*-copying with complex *wh*-phrases in order to establish whether Pankau’s analysis can be extended to this language.

⁸ Note that Pankau (2013) does not claim that the characterization of the resuming element as a free relative proform is correct for every language with *wh*-copying, but only that such a characterization is correct for German. Afrikaans, for instance, seems to differ remarkably in this aspect (cf. example (6) in section 1). Moreover, it is important to note that the fact that free relative proforms appear as resuming elements does not imply that embedded clauses in *wh*-copying are free relatives, which in fact can be shown not to be the case (Pankau 2013: 75-7).

the generalization developed in Pankau (2013), according to which intermediate copies may be ascribed to the class of free relative proforms.

3. *Some theoretical issues raised by German wh-copying*

3.1 *Introduction*

Consider the following schema:

(39) [SpecCP_{n+x} *wh_k* [... [SpecCP_n FR-PROFORM_k [... [VP <*wh_k*>]]]]]

What the schema in (39) says is that the German *wh*-copying construction features multiple tokens of some interrogative phrase (*wh_k*) which surface as relative proforms at intermediate positions. According to standard bottom-up accounts of long-distance *wh*-movement, the *wh*-phrase originating in the VP is displaced onto each intervening specifier until it reaches its criterial position.⁹ More precisely, it is usually assumed since Chomsky (1993) that movement amounts to a copying operation targeting the entire featural content of some syntactic object.¹⁰ Given such an analysis, the tokens of the A'-chain are expected to preserve their ϕ -features (or prepositions in the case of PPs) throughout the derivation. This may correctly capture the observation that copies are in ϕ -agreement in German *wh*-copying,¹¹ but it raises further questions. First, there is the more general issue of how the process of successive-cyclicity may be formalized. That is, how can the fact that *wh*-phrases transit through intermediate, unselecting positions be modeled? Second, how can the fact be captured that intermediate copies overtly surface as free relative proforms in German *wh*-copying? In particular, how is such an observation compatible with the assumption that the members of the A'-chain are featurally non-distinct?

3.2 *Bottom-up successive-cyclic movement*

Concerning the issue of successive-cyclicity, two major classes of approaches may be identified within the standard bottom-up framework (cf. Chesi 2007): the Formal Feature Approaches (FFA) (e.g. Chomsky 2000, McCloskey 2002, Rizzi 2006), and the Edge Feature Approaches (EFA) (e.g. Chomsky 2008; cf. Preminger 2011).

Associated with the FFA is the classical minimalist idea that movement is a last resort operation, 'triggered' by the need to satisfy some interface requirement (Chomsky 1995). A standard implementation of this idea identifies movement with a feature-checking operation following

⁹ Since nothing crucial hinges upon it for our purposes, I will leave aside discussion of movement targeting the edge of vP.

¹⁰ Barbiers et al. (2010) propose a bottom-up derivational system wherein displacement is allowed to be partial as well as total. In particular, they suggest that partial movement be conceptualized as a copying operation affecting only a proper subset of the features of a given element. Note however that besides raising the question of why syntax should allow copying to be both total and partial — or indeed how syntax should decide whether to execute one or the other type of copying — such an approach seems to be incompatible with the German data, as it predicts a richer featural specification for the intermediate copies with respect to the criterial one (i.e. the exact opposite of what the present article will propose). Indeed, as discussed in Pankau (2013: 102-4), for instance, it would be difficult to see how complex *wh*-copying may be captured under Barbiers et al.'s (2010) bottom-up partial copying approach.

¹¹ We are abstracting away here from the case of adverbial *wh*-copying, which naturally lacks ϕ -agreement.

the establishment of an Agree relation between a probe and a goal. The main advantage of such approaches is that they can adequately capture important empirical observations, such as freezing effects (see e.g.: Rizzi and Shlonsky 2007, Bošković 2008). This is because a goal is allowed to move as long as its features are still active, i.e., until they have not been checked, or deleted, by a matching probe. Upon deletion of its features, the goal is rendered inactive: it is thus ‘frozen’ in place. Conceptualizing displacement as a feature-checking operation however leads to a few problems. For instance, given the unbounded nature of long-distance dependencies, an indefinite number of formal features would need to be postulated on the goal in order for it to transit through intermediate positions, as each step of the movement path would delete a different formal feature from the moving element. The illustration in (40) represents a derivation predicted by the idea of feature-triggered movement (from Chesi 2007: 58); (40a) shows the pre-movement configuration; (40b) shows the post-movement configuration, where the deleted features on both the probe and the goal are stricken through after each movement step. As pointed out in Chesi (2007: 59), such a mechanism would violate the finitary nature of the lexicon. Moreover, it would violate the ban against look-ahead, since the computation would need to ‘know’ how many intermediate steps there will be in the course of the derivation in order to insert the appropriate number of formal features on the goal. Clearly, however, such knowledge could not obtain if we follow Chomsky (2001) in assuming that derivations proceed in locally determined chunks of computation, which should therefore be blind to subsequent operations.

- (40) a. [_{+WH} C] do you think [_{+FF} C] Mary said ... [_{+FF} C] everybody admired
 [_{-FF -FF ... -FF -WH} who] who?
 b. [_{+WH} [_{-WH} who] C] do you think [_{+FF} <_{-FF -WH} who> C] Mary said ...
 [_{+FF} <_{+FF -FF ... -FF -WH} who> C] everybody admired <_{-FF -FF ... -FF -WH} who>?

The EFA, on the other hand, might provide a solution to these issues, as they dispense with the mechanism of feature-checking. Chomsky (2008) proposes to endow phase heads with Edge Features responsible for triggering movement. The mechanism of paired deletion can therefore be removed from the theory and the problems faced by the FFA overcome. The advantages brought about by dispensing with feature-triggered movement are maintained in more recent formulations of such approaches (Chomsky et al. 2019), wherein movement, an instance of Merge, is taken to operate freely. In other words, according to Chomsky et al. (2019), movement (or Merge in general, for that matter) is not triggered by any type of feature and can apply unboundedly, i.e. without constraints (but within the confines of phases). Freeing Merge from triggering requirements may thus yield successive-cyclicity without violations on either the ban against look-ahead or the finitary nature of the lexicon. It moreover leads to a simpler system where the fundamental properties of syntax (e.g. hierarchical constituency, recursion, etc.) can be derived straightforwardly (cf. Fukui and Narita 2014). Nonetheless, a few issues remain with this class of approaches. First, as discussed in Chesi (2012: 147), a free-Merge system may not be desirable from a computational standpoint: if Merge is allowed to ‘over-generate’ with respect to what is empirically attested, the complexity of the derivation could grow boundlessly as a result of constructing indefinitely many objects which would get filtered out only at the interfaces. Second, by eliminating the mechanism of feature deletion on the goal, it becomes unclear how an element’s movement through the structure may be formally ceased. In other words, as there is nothing in these systems that would prevent an element from moving into positions other than those in which their satisfy their scope-discourse semantics, such approaches would have a hard time with capturing freezing effects (Chesi 2007; cf. however Epstein et al. 2016, Gallego 2018).

3.3 Accounting for the morphophonological shape of copies

Leaving aside the complications raised by successive-cyclicity, let us now turn to the second issue raised by (39), namely how to account for the fact that intermediate copies surface as free relative proforms in German *wh*-copying. Consider again the case of identical *wh*-copying in (1), repeated below for convenience:

- (1) **Wen** glaubst du *wen* sie liebt?
 who believe you who she loves
 ‘Who do you think she loves?’

(Pankau 2013: 1)

Despite the fact that the criterial and the intermediate copies display phonological identity, there is a featural asymmetry between the two: only the upstairs copy is a *wh*-operator. Indeed, recall that bridge verbs such as *glauben* cannot select as complements interrogative clauses (cf. (17) and (18b) above). This suggests the criterial *wh*-feature must be absent from the intermediate copy, despite the copy’s overt morphophonological shape. The lack of a *wh*-feature on the intermediate copy is perhaps more clearly visible in the case of imperfect *wh*-copying, where *d*-pronouns are used as resuming elements (cf. (3)). However, the fact that *wh*- and *d*-pronouns may freely alternate at intermediate positions for some speakers strongly indicates that we are in fact dealing with one and the same morphosyntactic element (cf. (7)).

- (3) **Wen** glaubst du *den* ich gesehen habe?
 whom believe you this I seen have
 ‘Who do you think that I have seen?’

(Pankau 2009: 206)

- (7) a. **Wen** glaubst du *wen* Peter denkt *den* sie geküsst hat?
 b. **Wen** glaubst du *den* Peter denkt *wen* sie geküsst hat?
 who believe you who Peter thinks who she kissed has
 ‘Who do you think Peter believes she has kissed?’

(Pankau 2013: 50)

Given these considerations, I will assume that what differentiates the extracted from the resuming element is the criterial feature, which is present on the former but not on the latter. This is, in its essence, the insight shared by Felser (2004) and Pankau (2009), who attribute the featural asymmetry between copies to the different structural positions that they occupy. Roughly, what these authors suggest is that the absence of the *wh*-feature on the intermediate copy would be due to a lack of agree between the *wh*-feature on the moving element and the embedded (non-interrogative) *C*. Conversely, the criterial *wh*-feature can be spelled-out at matrix *C* since such a position would be endowed with the relevant feature with which the moving element can agree (cf. Pankau 2013: 104-5). Put another way, whereas the highest copy can get its *wh*-feature valued by the criterial head, intermediate copies cannot do so, as embedded positions cannot provide the relevant value. Thus, the crucial idea, sketched in

(41) (adapted from Pankau 2013: 104), is that the retained features on a copy are the result of feature-valuation:

(41) [CP1 **wen** [*wh*: +] glaubst du [CP2 *wen* [*wh*: -] Maria *t* liebt]]

This mechanism may correctly capture the featural asymmetry between the criterial and the intermediate copy in the case of identical and imperfect *wh*-copying. Furthermore, the free alternation between the use of *wh*- and *d*-pronouns at intermediate positions may be accounted for by assuming a post-syntactic, “Late Insertion” mechanism reminiscent of Distributed Morphology (Halle and Marantz 1993; cf. Pankau 2009). The assumption that copies are featurally identical at Narrow Syntax could then be maintained under such approaches.

However, the idea that the features to be retained on a copy are the result of feature-valuation runs into serious issues when considering complex *wh*-copying (cf. (4)). Here I will limit myself to pointing out certain problematic aspects with such a mechanism, referring the reader to Pankau (2013: 105-11) for a more thorough discussion.

(4) **Welchem Mann** glaubst du *wem/dem* sie das Buch gegeben hat?
 which man believe you who she the book given has
 ‘Which man do you think she has given the book to?’

(Adapted from Anyadi and Tamrazian 1993: 4)

As was observed in the previous section, intermediate copies in complex *wh*-copying do not lack just the *wh*-feature of the criterial copy: what is also absent on such copies is the D-linked feature (expressed by the morpheme *-lch-*) that is present on the extracted element, as well as the lexical restriction (the noun *Mann*, in example (4)). Leaving momentarily aside the question why the lexical restriction should not be spelled out on intermediate copies, it could be proposed that the absence of D-linking on resuming elements may be motivated on grounds of feature-valuation, i.e., just as was proposed for their lack of a *wh*-feature. As such, the D-linked feature could get its value in the left periphery of the matrix clause (presumably, where such a feature can get valued), whereas all other copies cannot do so, hence their lack of D-linking. However, as pointed out by Pankau (2013: 107), valuation of the D-linked feature should not be “at stake [...] because *d*-linking and the φ -features are all inherent features of the complex *wh*-phrases, and therefore need no valuation. Therefore, one is left wondering why the resuming element doesn’t show the reverse pattern of retention: φ -features are not spelled out, whereas *d*-linking is spelled out”.

Let us nonetheless assume, for the sake of argument, that feature-valuation is necessary whenever some scope-discourse property of an item must be licensed.¹² Thus, the highest copy could achieve its D-linked status through feature-valuation with a relevant head in the left periphery, as sketched in (42) (again, I am abstracting away from the issue of the absence of the lexical restriction on the intermediate copy):

(42) [CP1 **welchen Mann** [*D-linked*: +], [*wh*: +] glaubst du [CP2 *welchen Mann* [*D-link*: -], [*wh*: -] Maria *t* liebt]]

¹² In fact, in light of its peculiar semantic and morphosyntactic properties, D-linking will be assumed to represent a criterial feature in the analysis to be developed (cf. 4.3).

Given the absence of valuation of the D-linked feature on the intermediate copy at Narrow Syntax, such a feature presumably could not receive an interpretation at the interfaces. Removing the criterial features from the intermediate tokens at the point of Spell-Out through a process of feature-valuation could therefore suggest a way to capturing the proform status of the resuming elements.

However, as mentioned in section 1 such an approach is problematic in that it could not be readily extended to account for the fact that the D-linked feature can in fact be present on intermediate copies in complex *wh*-copying in other languages, such as Dutch (5) and Afrikaans (6):

- (5) **Welke boeken** denk je *welke* zij gekocht heeft?
 which books think you which she bought has
 ‘Which books do you think she bought?’

(Dutch; Koster 2009: 23)

- (6) **Watter meisie** sê hy *watter meisie* kom vanaand kuier?
 which girl say he which girl come tonight visit
 ‘Which girl did he say is coming to visit tonight?’

(Afrikaans; Lohndal 2010: ex. 16, reporting Theresa Biberauer’s judgments)

Therefore, if the idea illustrated above were adopted, one would need assume that in such languages as Dutch and Afrikaans the D-linked feature of the moving *wh*-phrase can get valued at each C, be it root or embedded, given its overt presence on each copy. This seems to be untenable. First, such an assumption would require stipulating that whereas some languages may value certain features at specific positions, other languages may do so in a more unconstrained way. Specifically, this would raise the question of how the parametric difference between the varieties of German on the one hand and Afrikaans and Dutch on the other could be formally encoded in the grammar. More problematic still is that such a mechanism would conflict with the standard implementation of feature-valuation, whereby features are removed from the syntactic computation upon their valuation (see e.g. Pesetsky and Torrego 2007). The presence of D-linking on the extracted copy would be then left unexplained.

4. *A new Top-Down Analysis*

4.1 *Top-Down movement*

Given the complications faced by standard bottom-up analyses in formalizing certain aspects of the German *wh*-copying construction (i.e. (i) the successive-cyclic displacement of the tokens of the A'-chain, and (ii) their morphophonological realization), I propose an alternative solution, embedded in a Top-Down derivational model of grammar (Chesi 2004 *et seq.*). In what follows, I will sketch the main assumptions of the particular Top-Down framework I adopt, referring the reader to Chesi (2007, 2012, 2015) and Bianchi and Chesi (2006) for a more articulate exposition of its theoretical underpinnings (cf. also Den Dikken 2018 for a partially overlapping approach).

Computing from the top down essentially means that the derivation starts from the root of the tree (CP, or ForceP as in Rizzi 1997) and proceeds down its predicative core (the VP). In such a system criterial/functional features are therefore computed before the thematic ones.

In the case of a *wh*-question such as *who does John love?*, the criterial *wh*-feature present on the *wh*-probe (C, or Foc) will trigger the insertion of a compatible feature-bundle (43):

(43) *who* = [+wh +D + ϕ N]¹³

The criterial *wh*-feature of *who* is thus licensed (*lexicalized*) at C upon the insertion/merger of the feature-bundle. However, the feature-bundle corresponding to *who* also contains *unexpected* features (Chesi 2015: 75), namely those features that cannot be licensed/selected at a particular position. The unexpected features of the *wh*-item (the remaining argumental features, in this case) are therefore stored into a repository termed *memory buffer*, as illustrated in (44):

(44) [+D + ϕ N] (feature-bundle stored in the memory buffer after lexicalization of the *wh*-feature)

Simplifying, the unexpected features remain on hold in the memory buffer according to the following regulation (cf. Chesi 2015:80):

(45) Constraint on memory buffer inheritance:¹⁴

The contents of the memory buffer must be discharged either through appropriate selection within the current phase or onto the edge of the subsequent phase.

¹³This particular formalism is based on Stabler (1997). In the case of (43), the '+' symbol indicates licensing of scope-discourse/morphosyntactic properties, whereas 'N' indicates the morphosyntactic category to which the item belongs. Semantic features will be omitted from the representation since not relevant for our purposes. We moreover assume that phonological features are never present at Narrow Syntax, the phonological interpretation of an item being assigned at spell-out on the basis of its abstract morphosyntactic features (cf. Halle and Marantz 1993 and the discussion in section 4.2).

¹⁴See Bianchi and Chesi (2006) and Chesi (2012: 166-70) for a discussion of the computational advantages caused by this assumption. Note however that the classical notion of 'edge' (corresponding to the specifier of some phase head) is hard to capture precisely within this particular Top-Down framework. Indeed, it is not clear how intermediate edges could be projected in Chesi's (2015) framework, as he defines phases as the set of licensers and selectors that are projected by the phase head. Within Chesi's (2015) framework it would thus be hard to justify the presence of intermediate edges, which are not intrinsically part of the phase, as they can neither select nor license the expectations of the phase head. Perhaps more problematic still is the fact that, despite their inability to select/license features of any kind, such intermediate edges are apparently somehow capable of retrieving the contents of the memory buffer (as correctly pointed out by Den Dikken 2018: 92). However, these two problematic aspects may find a unified solution if we abandon the idea of intermediate edges as being projected by some phase-internal head. Instead, the presence of an edge might be justified on a third factor principle (Chomsky 2005), that is, as some extra-syntactic factor. Such edges could then be characterized as positions demanded by other cognitive systems with which language interfaces, and in particular working memory. More specifically, an edge so characterized would be triggered by the need to re-activate the items stored in the memory buffer (*memory refresh*; cf. Felser 2001, Chesi 2012: 164) so that they may be processed in the upcoming phase. The memory refresh is justified as an operation when considering the effects of memory decay in the processing of long-distance dependencies (cf. Lewis and Vasishth 2005). Some evidence pointing towards the characterization of an edge as a being linked to the memory refresh operation may be found in Gibson and Warren 2004: 60-1), who show how sentences containing more intermediate edges are processed faster than sentences of similar length that contain fewer. If this idea were on the right track, the presence of an edge and its ability to retrieve unexpected features would find an immediate account: edges are points at which Narrow Syntax interfaces with working memory in order to refresh the unlicensed contents of the previous phase and thus increase the probe's chances of establishing a successful dependency with its goal by mitigating the effects of memory decay. The presence of a (oft-unpronounced) copy in such positions would then be a byproduct of the refresh operation. Note moreover that the insight of standard Phase Theory that phases are the product of memory limitations would be captured in a more transparent way by such a characterization of 'edge'.

Such a mechanism has the advantage of preserving the complexity-reducing insights of Phase Theory (Chomsky 2001, Gallego 2010), as it restricts the set of items that must be kept active in memory at each derivational stage (cf. Chesi 2015: 79). At the same time, since movement is no longer driven by *ad hoc* features on probes, but from the unexpected/unselected features of the item lexicalizing the criterial position, the theoretical complications faced by the standard bottom-up approaches outlined in the previous section may fall out naturally. In particular, while movement can be constrained (*pace* Chomsky et al. 2019),¹⁵ the Top-Down system violates neither the ban against look-ahead nor the finitary of the lexicon (as opposed to the FFA). Moreover, the assumption that members of the A'-chains are tokens of the same element is maintained, as in the Copy Theory. The Top-Down approach to movement however generates a featural asymmetry between the criterial token on the one hand and the intermediate/thematic one on the other by its very nature. In other words, copies in the A'-chain are featurally distinct at Narrow Syntax, the lower copies being only partially related to the higher copies. Consequently, distinct re-merge positions are in fact predicted to behave differently as a result of the syntactic computation. This leads to a more efficient syntactic system that can do away with featural redundancies,¹⁶ is more in line with processing concerns,¹⁷ and, as I attempt to show in the remainder of this section, may be empirically more adequate.¹⁸

4.2 *Deriving identical/imperfect wh-copying*

This section outlines the implementation of the Top-Down approach for the derivation of *wh*-copying involving bare *wh*-elements. For illustrative purposes I will only discuss the case of bare DPs, although it should be clear that the same mechanism could be readily transposed to the derivation of bare AdvP- and PP-copying with no extra assumptions or modifications. Consider the sentence in (46):

- (46) **Wen** glaubst du *wen/den* sie liebt?
 who believe you who she loves
 'Who do you think she loves?'

What needs to be accounted for in (46) is the fact that (i) the resuming element is found at the edge of the embedded CP-phase (i.e. successive-cyclic movement); and that (ii) the resuming element is featurally distinct from the extracted element and behaves as a free relative pronoun (cf. 3.3).

¹⁵ Of course, for Chomsky et al. (2019) movement is constrained by the PIC. But the PIC only serves to constraint movement out of phases. Within the confines of phases movement remains unconstrained, as does any other instance of Merge.

¹⁶ From a processing perspective, assuming featural non-distinctness among the tokens of the A'-chain may lead to less economical computations as irrelevant features must be kept active in working memory throughout the derivation.

¹⁷ Although it is not necessary to conclude that "the grammar is the parser" (Phillips 1996), assuming a model of grammar with one derivational mechanism active in both parsing and production should be favorable (cf. Jackendoff 2002), as it would be more in line with the tenets of the Minimalist Program.

¹⁸ A particularly problematic aspect of the analysis to be developed is the fact that German shows case morphology on copies whose predicates have not yet been introduced in the derivation. This is in fact a problem that afflicts the Top-Down model in general and is still pending treatment (I thank an anonymous reviewer for raising this point).

Both of these facts follow straightforwardly from a Top-Down approach. In particular, successive-cyclic movement is derived from the mechanism outlined in the previous section (cf. Chesi 2015). As for (ii), the featural asymmetry between the extracted and the resuming element is generated as a result of the syntactic computation. More specifically, from the current perspective the criterial features are removed from the item upon their lexicalization in the left periphery. This means that the intermediate copy will correspond to a proper subset of the set of features of the criterial copy. That resuming elements really lack the criterial feature of the extracted element is suggested by the following observations (as discussed in section 3.3.). First, we note that bridge verbs may not select interrogative clauses as complements. Second, d-pronouns may appear as resuming elements, which clearly lack a *wh*-feature. Third, the free alternation between d-pronouns and *wh*-pronouns at intermediate positions indicates that both types of resuming element correspond to the same set of morphosyntactic features. Fourth, the correlation between the availability of a type of pronoun as a resuming element and its availability as a free relative pronoun further indicates that their features must be identical. These facts then indicate that the criterial *wh*-feature must be absent from the intermediate copy, as is in fact expected under our approach.

Moreover, the fact that intermediate copies correspond to free relative pronouns in German is not unexpected if, with Cheng (2000) and Felser (2004), we assume that *wh*-operators are constructed by combining a morphological ‘core’ with an inherently silent *wh*-feature, as illustrated in (47) for the *wh*-operator *wer* ‘who.NOM’ (from Cheng 2000: 86).¹⁹ From the perspective of the present analysis, (47) may be featurally decomposed as in (48). In particular, the core is taken to correspond to the argumental features, namely [+D + ϕ N], a nominal extended projection in the sense of Grimshaw (1991), whereas the full-fledged *wh*-operator corresponds to the nominal extended projection with an interrogative specification: [+wh +D + ϕ N].

(47) *wer*: [\emptyset -*wer*]
 wh-core

(48) *wer*: [[*wh*: +wh (\emptyset)] [core: +D (*w*-) + ϕ (*-er*) N (\emptyset)]]

Given that the *wh*-feature gets removed in the matrix clause, we expect intermediate copies to spell out the morphological core part of *wh*-operators (cf. Felser 2004). In light of the generalizations proposed in Pankau (2013), however, I am led to assume (*contra* e.g. Felser 2004) that in German such cores correspond to the morphosyntactic features of free relative pronouns. As a consequence, argumental *wh*-operators in German may be constructed by at-

¹⁹Some evidence in support of the morphological process whereby quantificational elements can attach to cores comes from indefinites, which may be formed by attaching an existential quantifier to the morphological basis. Cf. the following table from Cheng (2000: 86):

(i)	<i>wh</i> -phrases:		indefinites:	
	<i>wer</i>	‘who’	<i>irgendwer</i>	‘someone’
	<i>was</i>	‘what’	<i>irgendwas</i>	‘something’
	<i>wann</i>	‘when’	<i>irgendwann</i>	‘sometime’
	<i>wo</i>	‘where’	<i>irgendwo</i>	‘somewhere’
	<i>welche</i>	‘which’	<i>irgendwelche</i>	‘some kind of’

taching a *wh*-feature to the features of free relative pronouns.²⁰ If this is on the right track, the analysis may straightforwardly derive the following observations. First, it accounts for the fact that intermediate copies may be spelled-out as either d- or *wh*-pronouns, depending on whether these are independently available as free relative pronouns. Second, given that feature-bundles remain unaltered through intermediate A'-positions (as such positions may license no features), the analysis accounts for the fact that intermediate copies can show up at intermediate positions only as free relative pronouns (and not, e.g. as personal pronouns).²¹ It is important to remark in this regard that I do not assume items to enter the derivation endowed with phonological features. Rather, their phonological interpretation would be assigned via a Late Insertion mechanism at the interface with phonology on the basis of their morphosyntactic features (Halle and Marantz 1993; cf. Pankau 2009 for a similar approach). As mentioned, this would allow us to readily account for the free alternation between *wh*- and d-pronouns found in (some of) the d-varieties of German: the feature-bundle [+D + ϕ N] can be spelled-out as either *wen* or *den* for such varieties.

Therefore, in order to derive (46), I assume that the *wh*-probe triggers the insertion of the *wh*-operator ([+wh +D + ϕ N]). Upon its lexicalization, the operator's criterial feature is removed from the computation and its remaining unexpected features ([+D + ϕ N]) stored into the memory buffer, where they are put on hold until the subsequent phase is initiated. By regulation (45), the lower CP-edge can then retrieve the stored feature-bundle from the memory buffer, where they can be spelled-out as either *wen* or *den*, depending on the particular morphemes the variety uses to introduce free relatives.²² The relevant derivation may be sketched as in (49):

- (49) [+wh +D + ϕ N (*wen*)] ... glaubst du ... *lexicalization of wh-probe*
 [+wh +D + ϕ N (*wen*)] ... glaubst ... [+D + ϕ N (*wen*)/(*den*)] *lexicalization of next edge*

4.3 Deriving complex *wh*-copying

The derivation of complex *wh*-copying may require some additional assumptions, especially in view of its cross-linguistic variation. The issue engendered by complex *wh*-copying stems from the fact that it is subject to the following variation:²³

²⁰If correct, the Top-Down framework could offer a new perspective on the issue of the featural decomposition of determiners (cf. Leu 2015).

²¹An anonymous reviewer points out that the same effect can be obtained via a bottom-up derivation assuming that the variable moves edge-by-edge and is interpreted as a *wh*-operator when it is merged with an interrogative C. This is true, and I concede that the Top-Down analysis might not offer a substantial empirical advantage in the case of bare *wh*-copying. However, the suggested bottom-up alternative seems to me to be comparable to previous analyses such as Pankau's (2009) or Felser's (2004) in that the operator comes to be spelled out as such thanks to some property of interrogative C. The problems discussed for those analyses in section 3.3 are therefore applicable to the reviewer's alternative: how can we account for the fact that German shows no D-linking morpheme on intermediate copies in complex *wh*-copying, whereas (the relevant dialects of) Dutch and Afrikaans do?

²²This follows from the assumption that cores correspond to free relative proforms in German: the feature-bundle [+D + ϕ N] could not be interpreted phonologically as a d-pronoun by the *wh*-variety, because such morphemes cannot be used to introduce free relatives in that variety.

²³Here we will only discuss the case of the Germanic branch, though it should be noted that the phenomenon has also been reported in Seereer (Baier 2018), a Senegambian language. Interestingly, Vallader, a Rhaeto-Romance variety, shows a similar pattern to Liberal German complex *wh*-copying (cf. (i-ii)), which has traditionally been analyzed as a *quel/qui* alternation (Taraldsen 2002: 30-1; cf. Poletto and Sanfelici 2018: 273ff.). This raises the question whether the *quel/qui* alternation may be reanalyzed as a form of residual *wh*-copying.

Restrictive German:

- (50) * **Wessen Buch** glaubst du *was/ wessen Buch* Hans liest?
 whose book believe you what whose book Hans reads
 ‘Whose book do you think Hans reads?’

(Adapted from McDaniel 1986: 183)

Liberal German:

- (4) **Welchem Mann** glaubst du *wem/dem* sie das Buch gegeben hat?
 which man believe you who she the book given has
 ‘Which man do you think she has given the book to?’

(Adapted from Anyadi and Tamrazian 1993: 4)

Dialectal Dutch:

- (5) **Welke boeken** denk je *welke* zij gekocht heeft?
 which books think you which she bought has
 ‘Which books do you think she bought?’

(Koster 2009: 23)

Afrikaans:

- (51) a. **Watter meisie** sê hy *watter meisie* kom vanaand kuier?
 which girl say he which girl come tonight visit
 ‘Which girl did he say is coming to visit tonight?’

- b. **Watter mooi meisie** sê hy
 which beautiful girl say he
watter mooi meisie kom vanand kuier
 which beautiful girl come tonight visit
 ‘Which beautiful girl did he say is coming to visit tonight?’

(Lohndal 2010: ex. 16, reporting Theresa Biberauer’s judgments)

The cross-linguistic variation may be represented by means of Table 3. Therefore, what needs to be accounted for is the fact that the intermediate copy either must not be spelled-out

- (i) **Qual cudesch** crajast *cha* las mattas cumpraran?
 which book think.you what the girls will.buy
- (ii) **Qualas mattas** crajast *chi* cumpraran quel cudesch?
 which girls think.you who will.buy that book

at all or may be spelled out to varying degrees. I contend that the Top-Down derivation may account for the observed intra- and cross-linguistic variation when coupled with two parameters: (i) a morphophonological parameter regulating the spell-out of intermediate feature-bundles; and (ii) a morphosyntactic parameter concerning the cross-linguistic distribution of the criterial +D-linked position.

	Intermediate Copy	Ex.	Eng.
RG	silent	∅	∅
LG	proform	<i>wen</i>	'who'
Dialectal Dutch	adjectival	<i>welke</i>	'which'
Afrikaans	full copy	<i>watter</i> + N	'which + N'

Table 3. Crosslinguistic variation with complex *wh*-phrases

As concerns the morphophonological parameter, it can be noted from Table 3 that intermediate copies vary in morphological complexity: the resuming element either incorporates the +D-linked feature (Dutch, Afrikaans) or not (LG), or realizes the lexical restriction along with its determiner (Afrikaans). Such variation can however be argued not to be arbitrary. In fact, it can be accounted for by a morphophonological constraint whereby the spell-out of the features of intermediate copies amounts to the set of functional features projected by the lexical head (an extended projection; Grimshaw 1991).²⁴ Indeed, notice that a generalization presents itself: apart from RG (where the resuming element must be silenced altogether), the intermediate copy is realized via morphemes encapsulating the functional features of the extracted phrase: +D and + ϕ . Specifically, in German, the resuming element *wem* is a determiner morphologically inflected for the case and gender of the noun *Mann*. Similarly, in Dutch, the determiner *welke* is the form of *welk* inflected for the lexical restriction *boeken*'s number. In Afrikaans, since the *which*-like determiner *watter* does not inflect for ϕ -features (Donaldson 1993), it may be necessary to spell out the lexical restriction as well in order to assign a proper value to such features. It might then be suggested that what gets spelled out as a resuming element corresponds to the morphosyntactic features of the extracted phrase (as is also the case in bare *wh*-copying). In particular, the spelled-out morpheme is of the same functional category as the extracted phrase (+D, in this particular cases), and realizes the ϕ -features of its lexical restriction either via an inflectional morpheme on the determiner (LG and Dutch), or, when these are not present in a particular lexicon, via the lexical restriction itself.²⁵ These considerations then suggest the morphophonological principle in (52):

²⁴ Interestingly, if this idea is correct, the spelled-out portion could be identified with the domain of a Top-Down phase, with the boundary coinciding with its edge. See Chesi (2007, 2015) for a description of such phases; cf. Chesi and Brattico (2018).

²⁵ Recall that in either case the ϕ -features are assumed to be projected by the lexical head as part of its extended projection.

(52) Morphophonological principle on intermediate copy spell-out:

A PF-convergent intermediate copy corresponds to the set of functional features of the feature-bundle in memory.

Assuming that intermediate tokens indeed amount to bundles of features, the generalization may be stated as the following morphophonological parameter:

(53) Morphophonological parameter on intermediate copy spell-out:

Languages may either silence a feature-bundle at intermediate position or spell-out a PF-convergent object (i.e. its set of functional features).

Such a parameter captures the observation that the intermediate copies may minimally spell out +D and + φ (and everything in between in some cases; cf. (51b), where even the adjective *mooi* is resumed). The elision of the lexical restriction observed in LG and Dutch would thus receive an immediate account: as the set of functional features terminates with the spell-out of the + φ -features, the lexical restriction can be left out. From a Top-Down perspective, the elision of the lexical restriction may be derived via a mechanism of truncation, which begins with the realization of the left-most feature of the set functional features (+D, in the above examples) and terminates with the realization of its last feature (+ φ). Put another way, the phonological interface will be ‘satisfied’ as long as it gets to spell out the functional features of the extracted phrase: everything that follows such features will be removed from the phonological output.²⁶ Thus, upon receiving the ‘complex’ feature-bundle, the phonological component can decide whether to discard it (as in RG), or whether it should spell out the relevant features.

If (53) is accepted, then it follows that the set of functional features of intermediate feature-bundles must contain the +D-linked feature in the dialect of Dutch and Afrikaans, as may be gathered from the presence of specific morphemes overtly found on the resuming elements (*-lk-* and *-ter-*, respectively). These two languages then differ with respect to German, which cannot realize a +D-linked feature on intermediate copies:

- (54) * **Welche Frau** glaubst du *welche* er eingeladen hat?
 Which woman.FEM.SG believe you which.FEM.SG he invited has
 ‘Which woman do you think she has invited?’

(Pankau 2013: 63)

Recalling that extracted feminine phrases cannot be resumed by *wh*-pronouns (as the *wh*-paradigm lacks the appropriate φ -inflection; cf. 2.1), we may note that the adjectival *welche*, even if inflected for the relevant φ -features, cannot resume the extracted phrase in (54). Recall further that there is no general ban against resuming complex feminine extracted phrases, as these are allowed in the d-variety:

²⁶ Why such a generalization should hold, however — that is, why the set of functional features should deliver a PF-convergent object — remains to be determined more precisely.

- (55) **Welche Frau** glaubst du *die* er eingeladen hat?
 Which woman.FEM.SG believe you which.FEM.SG he invited has
 ‘Which woman do you think she has invited?’

(*Ibidem*)

These facts strongly indicate that the +D-linked feature cannot be realized on intermediate copies in German complex *wh*-copying. The question then arises as to why that is the case. Let us therefore introduce the second parameter I assume in my analysis, which concerns precisely the morphosyntactic status of D-linked *wh*-phrases.

Pragmatically, phrases like *which man*, as used in e.g. *which man did she kiss?*, can be characterized as D(iscourse)-linked (Pesetsky 1987), that is, phrases which interrogate about an item belonging to a specific set that is presupposed by both interlocutors (i.e. ‘she kissed *x* and *x* is part of the set of men’ is presupposed). Given the discourse-related character of D-linking, I follow Rizzi (2011) a.o. in assuming that D-linking is expressed as a criterial feature licensed in the left periphery.²⁷ In addition to theory-internal arguments, there is in fact empirical evidence supporting this assumption. For instance, as shown by Munaro (1999), some dialects of northern Italy place their D-linked *wh*-phrases at a higher position with respect to bare *wh*-operators. Similarly, in Romanian, which allows multiple *wh*-phrases to occur in the left periphery in interrogatives, complex non-subject *wh*-phrases must be placed higher than bare subject *wh*-operators (*Cu care candidat cine a votat?* ‘For which candidate who voted?’), an option not available to bare non-subject *wh*-phrases (*Cine cu cine a votat?* ‘Who for whom voted?’) (see Villata et al. 2016: 79-80 and references cited therein). These studies suggest the hypothesis that D-linked *wh*-phrases land onto specific (“criterial”) positions located within an articulated left periphery dedicated to hosting a wide but universally-arranged array of scope-discourse functional heads (Rizzi 1997 *et seq.*). I assume such a hypothesis here.

Villata et al. (2016) further suggest that D-linked phrases might have the option of landing onto two different positions in the left periphery: one exclusive to D-linked phrases, simply referred to here as +D-linked, and a distinct one normally available to bare *wh*-operators, +wh (see also Friedmann et al. 2009 and Rizzi 2011). Building on these studies, it could then be hypothesized that the varieties discussed here differ with respect to the criterial feature that they license in the left periphery. Specifically, the German varieties would generate their D-linked phrases at +D-linked, while Afrikaans and the dialect of Dutch would lexicalize +wh instead. I then propose the following morphosyntactic parameter:

- (56) Morphosyntactic parameter on the distribution of D-linked positions:
 Languages may either lexicalize D-linked *wh*-phrases at +D-linked or +wh.

We are now in a position to account for the cross-linguistic variation.

As far as the German varieties are concerned, given parameters (53) and (56) and the Top-Down mechanism, the derivation of a complex *wh*-copying sentence such as (4) may be outlined as follows. First, the +D-linked position triggers the insertion of the compatible feature-bundle in (57):

²⁷ See Cruschina (2011) on the focal nature of D-linked phrases; Grewendorf (2012) for evidence of their topicality in Bavarian.

(57) [+wh (\emptyset) +D (*w-*) +D-link (*-lch-*) + ϕ (*-en*) N (*Mann*)]

Second, the criterial features are removed from the item upon its lexicalization in the left periphery.²⁸ The unexpected features stored in the memory buffer will therefore correspond to (58):

(58) [+D (*w-*) + ϕ (*-en*) N (*Mann*)]

Whereas RG would silence this complex feature-bundle at the interface with phonology,²⁹ LG would spell it out according to principle (52), obtaining the free relative proform *wen* (or *den*, for the d-varieties) as a resuming element. Since the elision of the lexical restriction is licensed by + ϕ and the +D-feature of the extracted copy is preserved into the memory buffer, the analysis predicts the ungrammaticality of the following examples.

(59) a. * **Welchen Mann** glaubst du *den Mann* sie eingeladen hat?
 which man believe you the man she invited has

(*Ibidem*, 105)

b. * **Welchen Mann** glaubst du *ihn* sie eingeladen hat?
 which man believe you he she invited has

c. * **Welchen Mann** glaubst du *diesen sie eingelanden* hat?
 which man believe you this she invited has

‘Which man do you think she has invited?’

(*Ibidem*, 50-51)

On the other hand, the intermediate copies of Afrikaans and of the Dutch dialect would have a different featural specification because of the different functional features that they would lexicalize. More specifically, the +D-linked feature would be preserved at intermediate position in these languages, because such a feature would not be licensed in the left periphery, as expected under parameter (56).³⁰ The intermediate feature-bundles would then correspond to something like (60) for Dutch, and (61) for Afrikaans. Therefore, by parameter (53), examples (5) and (6/51a) can be correctly ruled in.

(60) [+D (*w-*) +D-link (*-lk-*) + ϕ (*-e*) N (*boeken*)]

(61) [+D (*wat-*) +D-link (*-ter-*) + ϕ (*- \emptyset*) N (*meisie*)]³¹

²⁸ It is irrelevant for our purposes whether +D-linked is a simple position encoding solely for +D-linked, or whether it can also lexicalize the +wh feature.

²⁹ Although I do not currently have a full-fledged analysis as to why RG should silence complex feature-bundles, it would not be unreasonable to assume that such a restriction may be caused by the semantic conflict that would ensue by spelling out a phrase containing both a pronoun and a noun.

³⁰ I leave out the issue of how the presupposition of the speaker can be expressed in these languages (though a possible means might be prosody).

³¹ It is irrelevant for our purposes whether *watter* should be analyzed as *wat + ter*, as in the representation in (60), or as *w + atter*. What is important is that the element carries no overt ϕ -features.

Note moreover that the assumption that the Dutch dialect and Afrikaans may preserve the +D-linked feature at intermediate positions seems to be a necessary one. In fact, while one could assume that the intermediate feature-bundle corresponds to the one assumed for German in (57), this approach would turn out to be problematic for at least two reasons. First, it would need to be explained how the +D-linked feature can be spelled-out at intermediate positions for such languages if this feature had already been licensed at a criterial position. It could be suggested here that the +D-linked feature may be added through a process of morphological reanalysis which allows these languages to spell out the relevant φ -features, as they would otherwise remain unexpressed by pronominal *wh*-elements.³² But making this assumption would lead us to the second problem with this approach, namely that it would remain unexplained why such a process of morphological reanalysis is not available for German, as shown by the impossibility of resuming complex *wh*-phrases expressing φ -features unavailable for *wh*-pronouns (cf. (54) above). Conversely, example (54) suggests that the analysis whereby the +D-linked feature is removed in the left periphery is on the right track for German. Note indeed that the fact that in LG *welche* may not be used as an intermediate copy — in spite of the fact that such an element would constitute a legitimate morphophonological object as per principle (52) — would otherwise remain unexplained on principled grounds.

5. *Summary and Conclusions*

From a theoretical perspective, *wh*-copying appears to involve the cooperation of multiple modules of the grammar: while the morphosyntactic component would be involved in the mechanism of successive-cyclicity and the generation of the featural asymmetry that ensues among copies at distinct re-merge positions, the morphophonological interface would regulate the intra- and cross-linguistic realization of such features.

The present article proposed an analysis of German *wh*-copying under a derivational framework that takes the order of computations to proceed from the top (CP) down (VP). The analysis is argued to be superior over more traditional bottom-up alternatives, for the following reasons. For starters, the assumption that derivations may proceed from the top down is empirically well-justified when considering sentence parsing and production, both of which necessarily require the flow of the computation to proceed in a left-to-right, top-down order; syntactic derivations could then be brought “into closer harmony with processing concerns” (Chesi 2015:79).

The Top-Down directionality may also prove to be theoretically and empirically superior for the derivation of long-distance *wh*-extraction, and, consequently, *wh*-copying. First, movement is constrained in an effort to reduce the computational complexity of the derivation, whilst achieving successive-cyclicity with the aid of no teleological device (such as movement-triggering probes; cf. 3.2). Second, the morphophonological shape of the copy may be derived as a consequence of the Top-Down syntactic computation. In particular, the present analysis assumed that the proform status of the intermediate copy in German is achieved as a result of the lexicalization of the criterial features in the left periphery of the matrix clause. Such an assumption is justified in my view if, with Cheng (2000), we take bare *wh*-operators to be a combination of a core with quantificational features. Under our approach, such quantificational features are criterial and are thus removed from the item upon its lexicalization in the left periphery. The intermediate copy will then corre-

³² Afrikaans *wh*-pronouns do not inflect for φ -features; Dutch, like German, does not inflect its pronouns for number in the *wh*-paradigm: the plural phrase *welke boeken* could thus not be resumed by a pronominal *wh*-element.

spond to a featurally-impoverished version — the morphosyntactic core — of the criterial copy. Furthermore, I take the free alternation between *wh*- and *d*-pronouns at intermediate position to be suggestive of the fact that the morphosyntactic features of these types of resuming element are identical (as predicted by our analysis for intermediate A' -tokens in general). The fact that the availability of some pronoun as a resuming element is contingent upon the pronoun's availability as a free relative pronoun moreover indicates that the features of the cores must be identical to those of free relative pronouns. If this idea is on the right track, the empirical generalizations put forth in Pankau (2013) may be captured within a generative model, whilst also offering a new perspective on the issue of the featural decomposition of determiners (cf. Leu 2015).

The Top-Down analysis may also unify aspects of the morphosyntactic and morphophonological sides of *wh*-copying that might otherwise remain unrelated from a bottom-up perspective. Consider for instance the case of complex *wh*-copying, and in particular the phenomenon of the elision of the lexical restriction found in LG and the dialect of Dutch. While the Top-Down derivation can identify a precise spell-out domain to derive the morphemes used at intermediate position (i.e. the set of functional features of the item in the memory buffer), the bottom-up models would need to stipulate some extra mechanism in order to filter out the unattested features. Indeed, note that spelling out the set of functional would not work from a bottom-up perspective (cf. Pankau 2013: 105-11), as that would incorrectly rule in examples like (54), where the D-linked feature is present on the intermediate copy.

On the other hand, the analysis described here can account for the facts of German by assuming that: (i) such features as +*wh* and +D-linked are criterial and are thus removed from the item upon their lexicalization; and that (ii) the spell-out of intermediate copies is regulated by a parameter set to either silence the entire feature-bundle or to overtly realize the set of functional features. Finally, another advantage of the present analysis is that it can be extended to account for the observed cross-linguistic variation with complex *wh*-copying. Such an extension might have to rely on the assumption that D-linked phrases can be generated at a position normally reserved for bare *wh*-operators. In light of the considerations outlined in the previous section, however, such an assumption would not seem unreasonable; nonetheless, its consequences are not entirely clear yet, and I leave their investigation to future research.

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