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This is a contribution from *Adjectives in Germanic and Romance*.
Edited by Petra Sleeman, Freek Van de Velde and Harry Perridon.
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PART II

Variation

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On the properties of attributive phrases in Germanic (and beyond)

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The syntactic structure of attributive constructions and their (corresponding) semantic integration into nominal projections is the subject of a long-standing debate. In this article, we focus on complex attributes in German, Dutch and Standard Arabic. We argue that adjectival, participial and relative clauses attributes are all essentially predicative structures embedded under a special kind of phase head. Morphophonologically, this head is realized as the (alleged) case, number and gender endings on the adjective/participle and on the relative clause marker. Crucially, we argue that these endings are not agreement suffixes, contrary to common assumptions: rather, they are probing heads whose features identify an argument in the attributive structure. The properties attributed to the head noun are derived from the properties predicated of this argument. This analysis also defines a number of properties along which attributive phase heads can vary, yielding a number of typologically attested types of attributive structures.

1. Introduction

In this article, we propose a common representation for both finite (φ-complete) and infinitival (φ-incomplete) attributive structures in German: a phase-level functional head, called CGN-C (for *case-number-gender*), implements complex attribution in ways we will make precise below. In other languages, a variety of related attributive C heads implement attribution in similar ways, according to their respective feature sets. In this way, a cross-linguistic research program is outlined: given that typological variation should be confined to functional heads (or even just to phase-level functional heads), under current assumptions, what kinds of attributive functional heads do we expect to find? The definition of attributive heads provides a natural locus for the range of attributive constructions of the world's languages and serves as a valuable *tertium comparationis* for comparative research.

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The article is structured as follows: in Section 2, a detailed analysis of the morphosyntactic properties found in attributive structures in German is given. This section concludes with the proposal that attributive structures in German – whether adjectival, participial, or clausal – are structures projected from a common functional head, called CGN-C. In Section 3, we demonstrate that attributive heads similar to CGN-C seem to exist in many more languages. However, their respective feature make-ups demonstrably differ from German CGN-C. We discuss possible variations expected to occur and provide examples showing that the expected variants do indeed exist.

2. German

There is a rather wide array of constructions that are considered *attributive* ('Attribute') in German. In this paper, we concentrate on those structures that may be termed 'complex attributes' in that they show projections of complex argument structure and complex inflectional properties. Attributive adjectives and their projections, participial attributes and relative clauses all fall under this heading, while other constructions, such as attributive genitives or PPs, are ignored here for reasons of space (but see Struckmeier 2007 for comments).

2.1 General properties of complex attributes in German

In German, adjectives and participles precede the noun they modify. They obligatorily show suffixes that have traditionally been described as case, gender, and number (henceforth called CGN) agreement with the head noun:[1]

(1) *gut-er* *Wein* *gut-en* *Wein-es*
good-NOM wine good-GEN wine-GEN
gut-em *Wein* *gut-en* *Wein*
good-DAT wine good-ACC wine
"good wine" (*all CGN suffixes are also masculine singular*)

1. Note that there are three paradigms for CGN, depending on the realization of D. In this article, we will only use the so-called 'strong', pronoun-like inflection. The difference, however, is not relevant to the properties we discuss for CGN. Furthermore, although there is some overlap between CGN and inflection on so-called weak nouns, we consider this to be accidental, in much the same way that there is accidental overlap with certain verbal endings (e.g. *-en* on infinitives).

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Relative clauses in German follow the noun they modify. The relative pronoun shows an obligatory suffix paradigm nearly identical to the inventory of CGN-forms of adjectives and participles. Note right away, however, that the case of the relative pronoun is determined independently of N. That is to say, the relative pronoun appears to agree with the modified noun in gender and number, but not in case. The CGN suffixes in the following example are all masculine singular, but vary in case:

(2) *der Wein*
the-NOM wine
"the wine"

a. *d-er gut schmeckt*
REL-NOM good tastes
"… that tastes good"

b. *dess-en man nie überdrüssig wird*
REL-GEN one never tired becomes
"… that you never grow tired of"

c. *d-em man reichlich zuspricht*
REL-DAT one lavishly consumes
"… that you drink a lot"

d. *d-en man mag*
REL-ACC one likes
"… that you like"

2.2 Differences between attributive structures

Adjectival projections, participial structures, and relative clauses all have a common function: they attribute properties to the referent(s) of the DP that contains them. However, attributes can be differentiated on the basis of morphosyntactic properties that they do *not* share: relative clauses are the only attributes with a φ-complete T, comprising tense and agreement features. Participles show an aspect marking but no tense, and also have CGN. Adjectives form the least complex attributes morphologically, inflecting only for CGN:

(3)

CGN	Tense/Aspect	φ-complete	
yes	yes	yes	= relative clauses
yes	yes	*no*	= participles
yes	*no*	*no*	= adjectives

Insofar as all three types of construction are used to modify noun phrases, the only morphological marking that seems to be relevant for this function is CGN, according to (3). If we assume, then, that CGN is a marking that heads complex attributes, we predict that each attribute will have to include exactly one instance

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of CGN. This is borne out by the facts, in that more than one instance of CGN (as in (4)) and no instance of CGN (as in (5)) are equally ungrammatical:

(4) *der öfter(*-e) umrührend-e Koch*
the often stirring-CGN chef
"the chef who is stirring continuously"

(5) *der geschrieben-*(e) Brief*
the written-CGN letter
"the written letter"

Participles in German inflect for aspect, in that the present participle denotes an ongoing process, while the past participle in its attributive use designates a completed action:

(6) a. *der in die Station einfahrende Zug*
the into the station in.driving train
"the train that is pulling into the station"

b. *der in die Station eingefahrene Zug*
the into the station in.driven train
"the train that has pulled into the station"

Given that present and past participles are differentiated by the suffixes *-end* (present participle) and *-t* or *-en* (past participle), these endings will have to be analyzed as aspectual markings: progressive aspect for the present participle, perfective for the attributive past participle.[2]

With all the relevant building blocks in place, the next section derives a detailed morphosyntactic analysis of the various complex attributive structures. As we will see, the functions assigned to the participial suffixes and CGN allow for a unified analysis of all attributive structures in German.

2.3 Attributes in German: The morphosyntactic derivation

The presentation in this section starts out with present participles, since they are the most problematic cases in many ways: while they seem to inflect like adjectives, they clearly behave like verbs in terms of their argument structure and case assignment properties. After the analysis has been shown to work for this particularly

2. The same aspectual differences hold for adverbial participles, which use the same suffixes. Also, a modal subtype of the present participle (*das zu lesende Buch* "the book that is to be read") shows a progressive reading and the *-end* suffix. For reasons of space, the reader is referred to Struckmeier (2007) for details on this third attributive participle construction.

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troublesome construction in Sections 2.3.1–3, Section 2.3.4 will apply the analysis to the other two (adjectival and relative clause) attributes.

2.3.1 *The structure of participial attributes*

Present participles project transitive argument structures and assign accusative case to their direct objects. In other words, they behave like *v**P level projections (cf. Chomsky 2000):

(7) *der* *den* *Hund* *jagende* *Junge*
the.NOM the.ACC dog chasing boy.NOM
"the boy who is chasing the dog"

Note that Burzio's generalization states that "all and only the verbs that can assign theta-role [sic] to the subject can assign (accusative) case to an object" (Burzio 1986: 187). For the time being, we will label the subject argument simply as *subject*. The precise nature of this element will become clear shortly. The *v**P structure projected by a transitive verb, for now, looks like this:

(8) $[_{v^*P}$ *subject v* $[_{VP}$ $[_{DP}$ den Hund] jag_{V}-]]

The aspect marker of the present participle is accommodated in the next functional layer:[3]

(9) $[_{T'}$ $[_{v^*P}$ *subject v* $[_{VP}$ $[_{DP}$ den Hund] jag_{V}-]]-end-]

As for the specifier position of T, Fanselow (1986) already showed that participles and adjectives can have anaphoric object arguments attributively without any overt binder:

(10) *die* [__ *sich* *treue*] *Frau*
the to.herself loyal woman
"the woman who is loyal to herself"

The anaphor cannot be bound by the modified noun, as this would yield an *i-within-i* configuration:

(11) *die* $[_{i}$ … *sich*$_{i}$ *treue Frau*$_{i}$]

(12) *[γ … δ…], where γ and δ bear the same index.

(Chomsky 1986, 212)

3. Nothing hinges on the categorization of the aspect marking as T here: while this categorization seems natural enough for German with its heavily intertwined tense and aspect system, the reader may feel free to substitute a category of his or her own choice.

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Note that the *i-within-i* filter is doubtlessly operational in German, as e.g. the following example (by Fanselow 1986: 344) shows:

(13) **der Besitzer*$_{i}$ *seines*$_{i}$ *Bootes*
the owner his.GEN boat.GEN
"the owner of a boat/his own boat" (unavailable reading)

Note also that, if participles are verbal elements with an obligatory theta projection, the modified noun cannot have moved out of the attributive structure (to, e.g. become the modified noun itself): the arguments of the embedded predicate have been theta-marked in a regular manner and, without stipulation to the contrary, cannot receive an additional theta role from a predicate in the clause that embeds the DP as a whole. Thus, we follow Fanselow (amongst many others) in assuming that there is a covert binder in the attributive construction. For the German constructions, we assume that this element is the covert operator *op*.

Any other analysis is simply not possible: first, PRO is excluded for semantic reasons as the subject of the participle in modern German has to be coreferential with the modified noun – but nothing would force PRO to be interpreted in that way, since in the absence of a controller PRO allows arbitrary reference. Note furthermore that even a stipulation simply requiring PRO to be interpreted as coreferential in configurations such as these (cf. Williams 1980) will not help: in Middle High German, arbitrary reference of the subject of an attribute was possible (Thim-Mabrey 1990):

(14) *ein lebendez obez*
a living fruit
"a fruit that makes X live" not: "a fruit that lives"
(cf. Thim-Mabrey 1990, p. 374)

Hence, unless the stipulation about the interpretation of PRO were backed up by yet another stipulation to the effect that the attributive structures in Middle High German were wildly different from their modern counterparts, the argument for PRO breaks down. Similarly, *pro* can be excluded as German is simply not a *pro*-drop language. That is, not even φ-complete verbs license *pro* in this language. Any claim that φ-defective participles (and even adjectives) license *pro* would thus be nothing but an unwarranted stipulation.

The remaining choice for the subject then is an empty operator *op*, a solution firmly established in the literature, especially for relative constructions (cf. e.g. Chomsky 1986; Chomsky & Lasnik 1993; Platzack 2000). As will be seen below, this choice also allows prenominal and postnominal attributes to receive an interesting unified analysis. It follows that the attributive construction has to comprise a top-most functional layer that supplies the final (operator) position for *op*:

(15) [*op* … [$_{TP}$ ~~*op*~~ [$_{T'}$ [$_{v*P}$ ~~*op*~~ v [$_{VP}$ [$_{DP}$ den Hund] jag$_{V}$-]]-end-]]…]

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At least three questions arise: (a) What is the head of the highest projection? (b) How is case licensed on *op*, if participles are φ-defective? (c) What differences and similarities does the analysis predict for pre- and postnominal attributive structures in German? These questions are addressed in turn in the next subsections.[4]

2.3.2 *The head of the C projection*

The head of a projection, according to standard assumptions, is the element that determines the principal properties of the projection as a whole. Also, the head of a structure is the element that can never be omitted. This section shows that CGN is exactly this kind of element: every complex attribute has to comprise exactly one instance of CGN. All and only the elements in the DP that receive a CGN suffix are attributes in their own right, while e.g. adverbs, arguments of adjectives and participles, etc. can never receive this ending.

This reinterpretation of the nature of CGN also explains many hitherto mysterious properties of these alleged case, gender, and number suffixes: semantically, it never made much sense to mark adjuncts with case to begin with, if case is taken to be the result of mapping argument (!) roles onto a morphosyntactic realization. One might assume that CGN is merely some 'copied' marking that simply signals which noun the attribute belongs to. However, not only would this analysis not be very illuminating, a real problem is the fact that phonologically, the German CGN suffixes look nothing like the nominal suffixes. This clearly distinguishes German from, say, Latin or Italian, where an attributive suffix can indeed be extremely similar to the corresponding suffix from the nominal paradigm.

Furthermore, separating CGN morphology from the nominal paradigm has another welcome effect: nominal endings in German are becoming more and more obsolete diachronically (the so-called *case loss*, see Gallmann 1996: 287ff). Attributive CGN, on the other hand, is not disappearing. Rather, the paradigm continues to differentiate the relevant distinctions obligatorily – and in a phonologically rather ostentatious manner, too. In other words, what we have been calling (and in spite of these remarks, will continue to call) attributive CGN does not constitute regular case, gender, and number features. Rather, it forms a different morphosyntactic system with its own synchronic and diachronic properties: CGN constitutes the attributive head that implements complex attribution in German.

4. Note that we do not wish to make the claim that *all* attribute constructions in *all* languages have an *op* subject, nor that constructions that are (superficially) similar, such as secondary predicates, do. We do not believe that other kinds of elements are excluded as subjects. We simply claim that in German attributive constructions, there must be a subject and it must be *op*.

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The element heads a CP-level structure that embeds various types of predicate projections. In the remainder of this paper, we will use the term CGN-C to refer to the features that constitute the attributive ending in German.

If we assume that CGN-C is a C head, it should come equipped with an EPP feature, in order to implement the raising of the empty operator *op* into the Spec,CP position (Chomsky 2000: 13). How might this be implemented? As part of the operation *Internal Merge*, an attracting element needs to identify the goal it attracts (Chomsky 2000: 37ff). It seems to us that CGN-C is uniquely qualified to fulfill this function: we propose that CGN-C does not specify its *own* case, gender, or number. Rather, it identifies an element from the embedded structure, by picking out *this element's* case, gender, and number features. CGN-C, in other words, does not constitute case, gender, or number – rather, it is a feature complex that *identifies* a case, gender, and number feature set.

Compare this to a T head: T identifies the nominative subject by the *subject's* person and number features and assigns nominative case in the process. Yet, it would be clearly nonsensical to claim that T itself is marked for case! Similarly, we argue that CGN-C identifies an argument by the argument's case, gender, and number features without being specified for case, gender, and number itself. CGN-C thus has to attach to predicate projections and attract an operator argument from them. The semantic function of CGN-C is to implement attribution: it states that the properties which are predicated of the raised operator in the embedded structure hold for the referent of the modified DP as well. But can this operator be licensed if CGN-C does not constitute case marking?

2.3.3 *Case-licensing of* op

At first glance there seems to be no way that *op* could have its case-feature licensed within the φ-defective surroundings encountered in adjectival and participial attributes. Note, however, that *op* obligatorily moves to the specifier of CGN-C. If indeed CGN-C is a C head, this means that *op* winds up in the edge of a C phase. Furthermore, *op* can only appear in φ-defective constructions. If we take these properties seriously, a rather innocuous way of implementing case licensing for *op* turns out to be available: if *op* had all the features associated with overt relative operators, there would quite simply be no way to explain why it can never serve in lieu of its overt equivalents (unlike, say, its English counterpart, which can do so in at least some contexts). It thus seems reasonable to assume that *op* is a defective element. In this way, we can easily explain that *op* can only serve as a subject in φ-defective projections: given that *op* lacks features involved in the Agree process with a φ-complete probe, the uninterpretable features of this probe could never be licensed symmetrically, and the derivation is correctly predicted to crash. Recall that participles and adjectives in German do not inflect for [person]. Hence, in

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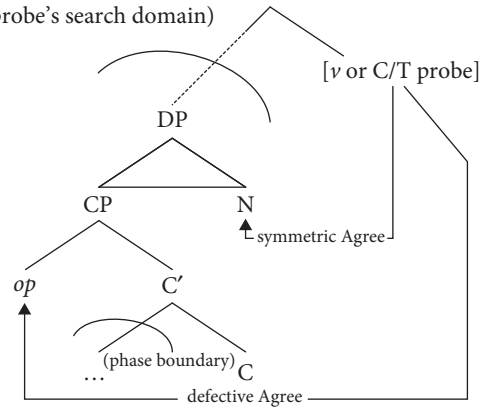
order to serve as a subject for predicates of this kind, *op* need not have a [person] feature itself.

If this is correct, it stands to reason that *op*, now a defective category, also yields a defective instance of Agree in cases where its own case licensing in attributive constructions is at stake. Thus, if a case licenser licenses the modified noun's case, it could also license *op*'s case: if *op* is defective, defective Agree between *op* and the case licenser will not affect the case licenser's probing features, under standard assumptions. Thus, if *op* is in an extremely local configuration with a non-defective goal, it could get its case licensed – and the case licenser could, in due turn, check off its features against the feature-complete goal.

Recall now that φ-defective attributive constructions in German have to be in exactly this kind of configuration: they only appear inside the DP, next to the modified noun – i.e. right next to the feature-complete goal. In this way, everything falls into place: the specifier position of CGN-C marks the edge of the CGN-phase. In this position, *op* can license its case defectively against the same probe that licenses the case of the head N, i.e. the noun modified by the CGN-C with *op* in its specifier:[5]

(16)



That is, the apparent 'agreement' between CGN-C and the modified noun is explicitly *not* the result of an Agree operation between the noun and CGN-C. Rather, CGN-C identifies the *op* in the attribute phrase. This operator, however, receives its case from the same probe that licenses N's case. CGN-C thus can only identify

5. Note that we remain agnostic about the position of the attribute phrase inside the noun phrase it modifies. As far as we can tell, our analysis is in principle compatible with any analysis of noun phrases proposed in the literature. Note also that because the Agree operation between the probe and *op* is defective, there can be more than one such operation. Multiple attributes are therefore handled in the same way as a single attribute.

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operators that have the same case as the modified noun – as no other case is available locally. The same of course does not hold for (φ-complete) relative clauses. The defective nature of *op* will thus do double duty as an explanation for the agreement facts in German, as subsection 2.3.4. will show.

For now, we have to double check that *op* indeed behaves like a defective element. As it turns out, German provides a convincing test environment for just this demonstration: some verbs in German specify the case of their arguments lexically – i.e. these verbs assign quirky object cases even when they are passivized:

(17) a. *Ich helfe dem Mann*
I help the.DAT man
"I am helping the man"

b. *Dem/*der Mann wird geholfen.*
the.DAT/*the.NOM man is helped
"The man is being helped"

Consequently, these verbs should not appear as attributive participles, where they would have to license their case-assigning features against *op*. Strikingly, this restriction is borne out:

(18) a. **der geholfene Mann*
the helped man
"the man that received help" (intended)

b. **der (vor mir) grauende Mann*
the (of me) scaring man
"the man who is scared (of me)" (intended)

Note that present participle formation in German is usually considered to be essentially unrestricted. This gap for present participle formation generally goes unnoticed (but see Haider 1993: 118 for an analysis of similar facts). We would like to submit that the assumption of a feature-defective *op* seems just the right assumption to explain this gap.

As an additional piece of evidence for the relevance of case for the formation of attributive structure, consider the range of arguments that can be used in participial attributes to begin with: without exception, the highest argument of a participle has to raise to Spec,CGN-CP regardless, e.g. of the nature of the predicate or the argument's theta role.

Under the assumption that Spec,CGN-CP is needed to indirectly case-license *op*, it actually follows that only the highest argument (but no other argument or adjunct) can be relativized. If another element were raised to Spec,CGN-CP, blocking the raising of *op* to this position, *op* could not license its case defectively with the probe from the matrix clause: being embedded in TP (Spec,TP at the highest),

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the argument would be invisible to the probe, for reasons of *phase impenetrability* (see Chomsky 2001: 13): only the edge of the CGN-CP phase (i.e. its specifier and head) is visible for later steps in the derivation, but nothing below this edge. As the following subsection will establish, the case-licensing mechanism explains all the major differences between pre- and postnominal attributes in German.

2.3.4 *A unified analysis*

Adjectival attributes are easy to implement in a parallel fashion: first of all, note that Fanselow (1986) clearly shows that attributive adjectives are 'sentential' in that they constitute binding domains. Attributive adjectives also use the same CGN-C endings as participial attributes. Hence, if the above is correct, adjectives can extract one of their arguments (invariably the external one, which needs to be case-licensed) from the AP projection and implement coreference for this argument in the same way that CGN-C does in participial structures.

APs in German can also comprise various additional arguments, where these receive lexical case or are spelled out as PPs:

(19) a. *seine* [$_{AP}$ *ihm*$_{DAT}$ *treue*] *Frau*
his to.him loyal wife
"his wife, who is loyal to him"

b. *der* [[$_{PP}$ *auf seinen Vater*] *stolze*] *Sohn*
the of his father proud son
"the son who is proud of his father"

On the other hand, German adjectives do not project obligatory DP objects and are not marked for aspect or tense. Thus, *v**or T projections may not seem necessary at first glance. Note, however, that adjectives allow for various orders of their arguments *vis-à-vis* adverbs. These movements resemble scrambling movements (Struckmeier 2010). Without going into details, it seems reasonable to assume that adjectives project an AP (to host their arguments) and optionally project higher functional layers responsible for these information structure-driven scrambling movements. Adjectival attributes finally embed under the same CGN-C layer that participial attributes use.[6] For the attributes in (19), the structure (which is the simple case without scrambling) looks like (20).

(20) a. [$_{DP}$ seine … [$_{CGN\text{-}CP}$ *op* [$_{AP}$ *op* ihm treu]-e] Frau]
b. [$_{DP}$ der … [$_{CGN\text{-}CP}$ *op* [$_{AP}$ *op* [$_{PP}$ auf seinen Vater] stolz]-e] Sohn]

6. Note that postnominal adjectives without CGN constitute no counter-evidence against (20), as these (marginal) constructions are invariably simplex, i.e. show no complex argument projection and do not act as binding domains.

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One advantage of the analysis of adjectives and participles just outlined is that it links up easily to an analysis of relative clauses with very few adaptations. First of all, there are two relative pronouns in German: *der* and *welcher*. Both implement complex attribution in our understanding of the term, and both show a set of CGN endings. Therefore, if we simply assume that the first parts of these relative pronouns, the parts that do not resemble the CGN-endings, i.e. *d-* and *welch-*, respectively, figure as the operator parts of the relative pronoun, while their suffixes are the actual CGN-C elements, both the similarities and the differences between relative clauses and prenominal attributes become clearly visible: both share the exact same structural layers (*v*P, TP and CGN-CP). On the other hand, the linearization of the CGN-C head and the subject agreement features differ:

(21) **clause (head-initial CGN-C and φ-complete):**
ein Mann, [$_{CP}$ *d- er* [$_{TP}$ ~~*d*~~ *geht*]]
a man *op* CGN walks
"a man that is walking"

(22) **participle structure (head-final CGN-C, φ-defective):**
ein [$_{CP}$ *op* [$_{TP}$ ~~*op*~~ *geh-end*] *-er*] *Mann*
a *op* walk-ing-CGN man
"a walking man"

The derivations work in exactly the same way: CGN-C identifies an argument from the embedded clause (either *op*, *d-* or *welch-*) and raises it into the Spec,CP position where it is interpreted to supply the attributed properties for the modified noun. This allows us to specify exactly what it means formally to be a complex attribute functionally: a complex attribute is a predicate projection embedded within a CGN-CP.

As for differences between different types of complex attributes, note that the operators *d-* and *welch-* obviously differ from *op*. This is in line with the fact that *d-* and *welch-* (i.e. the phonologically overt elements) are case-licensed within the relative clause itself: by finite T when the subject is relativized, by *v**when an object is relativized. This explains why *d-* and *welch-* cannot be used in prenominal attributes: obviously, they can function as goals of probes in symmetric, non-defective Agree processes. Hence, *d-* and *welch-* must be φ-complete elements – unlike *op*, which is φ-defective, as argued above.

Thus, if *d-* and *welch-* were used in prenominal attributes, their case feature could not be licensed inside the defective TP of participial attributes, let alone in the projection of adjectives. This means that their case feature would have to be licensed by the probe that also licenses the case of the modified N. This,

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however, is impossible, too: *d-* and *welch-* are not defective elements. This is why they cannot 'share' a case-licensing with N like defective *op* can: if the case of *d-/welch-* gets licensed, the case-licensing probe cannot also license N's case. If the probe licenses N's case, *d-/welch-* cannot be taken care of. Thus, there is no way that these φ-complete operators could ever be used in non-finite prenominal attributes.

Recall that in non-finite attributes, only the highest argument, not being case-licensed, can be relativized. In relative clauses, on the other hand, no argument is left without a proper case licensing. We would expect, then, that relative clauses, but not prenominal attributes, can relativize any argument or adjunct, as long as movement to Spec,CP is not barred for independent reasons. This prediction is borne out, as seen in the following table:

Φ-defective attributes	**Relativized element**	**φ-complete relative clauses**
der op *dicke Mann* the fat man "the fat man"	(highest) argument of A	*der Mann, der dick ist* the man that fat is "the man who is fat"
der op *laufende Mann* the running man "the running man"	(highest) argument of active V	*der Mann, der läuft* the man that runs "the man that is running"
der op *geschlagene Junge* the beaten boy "the boy that was beaten"	(highest) argument of passive V	*der Junge, der geschlagen wurde* the boy that beaten was "the boy that was beaten"
**der* op *ich gehende Garten* the I walking garden "the garden I walk into" (intended)	locative adjunct	*der Garten, in den ich gehe* the garden into which I walk "the garden I walk into"
**der* op *ich sehende Mann* the I seeing man "the man I see" (intended)	internal argument of active V	*der Mann, den ich sehe* the man that I see "the man I see"

It seems, then, as if the assumption of a CGN-CP (and the auxiliary assumption of a φ-defective operator, *op*) correctly predicts all the major syntactic, morphological and semantic properties of complex attribution in German. Complex attribution is, of course, a phenomenon found in many other languages as well. In the following section, we want to argue that a CGN-like head makes for an interesting proposition for cross-linguistic research, too.

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3. Cross-linguistic variations on a theme: Attributive functional heads in other languages

We have established an analysis of German CGN-C that postulates the following features for it:

(23) Pre-nominal, φ-defective CGN-C (for adjectival and participial constructions):
- EPP feature
- verbal agreement features on sister T
- identification features for *op*, namely case, gender, and number

(24) Post-nominal, φ-complete CGN-C (in relative clauses):
- EPP feature
- full verbal agreement features on sister T
- identification features for *d-/welch-*, namely case, gender, and number

With regard to subject agreement features, German already demonstrates that a range of possible scenarios (both subject agreement and no subject agreement) is possible in attributive structures. As for the other two feature sets:

- Can attributive CGN-C variants get by without EPP features? Section 3.1 demonstrates that this case is given by cases of *in-situ* relativization. Proposals by Höhn (2011) and von Prince (2008) seem to us to warrant the idea that even φ-defective structures (showing no subject agreement) can potentially be used without an EPP feature on the attributive head – iff the case licensing of all arguments contained inside the attributive construction can be handled without a φ-complete T and without defective case licensing.
- Can an attributive construction vary with regard to the identification features? Section 3.2.1 demonstrates that attributive C heads can indeed use different identification feature sets. Section 3.2.2 furthermore demonstrates that attribution in Standard Arabic uses identification features so unspecific that ambiguous attributive structures result. Section 3.2.3 goes on to show that even the complete absence of identification features might be attested in languages like Mandarin Chinese.

Variation of these feature sets of attributive heads is not at all harmful to our theory. We explicitly acknowledge that feature variation for attributive heads exists and the feature set of German CGN-C is by no means the only approach to the syntacto-semantic implementation of attribution. Many other possibilities are straightforwardly attested in the world's languages. It is up to future research to identify how these attributive heads function precisely: the following sections only

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provide a starting point to this worthwhile enterprise, not a list covering all conceivable possibilities.

3.1 EPP-less attribution is *in-situ* attribution

First of all, what if the EPP feature is absent from alternative CGN-Cs? This is no problem at all for φ-complete relative clauses, as it simply leads to (typologically well-attested) cases of *in-situ* relativization, as e.g. in Hindi (see Mahajan 2000: 203) and other languages (see, e.g. Lehmann 1984).

For the φ-defective cases, however, a problem presents itself: if the relativized argument in these structures does not raise to the edge of the attributive phase, the defective case licensing mechanism outlined above will cease to operate. We would thus be forced to assume that the relativized argument receives no case at all and accordingly, the derivation would crash. However, there are two potential ways out of this problem: firstly, the attributive head itself could introduce case-licensing features, such that the nature of the embedded predicate projection becomes irrelevant for case licensing. Alternatively, the attributive head could take a sister that simply does not contain an argument in need of case-licensing. Both of these scenarios have been argued for and are taken up in turn in the following.

Von Prince (2008: 61) assumes that attributive heads themselves could act as case-licensers. In this case, the attributive head itself would license the case of an argument contained in the attributive structure without any need for that argument to raise to the specifier of the attributive element, given the definition of Agree. A derivation containing an attributive head of this kind would thus converge even if the attributive head had no EPP feature. After all, as von Prince points out, the same logic holds for complementizers: English *for*, e.g. embeds a φ-defective clause, whose subject should receive no case. However, if *for* assigns case itself, it is no surprise that *for*-clauses can, as a matter of fact, contain case-marked subjects overtly (e.g. *I want* [*for* [*her to go*]]).

Höhn (2011) proposes another solution for attribution without relativization movements. In Basque, the attributive marker *ko-* turns various types of phrases into attributive structures:

(25) [[*mahai azpi-*∅]-*ko*] *katu-a*
[[table under$_{\text{locative, sg.}}$]-*ko*] cat-the
"the cat under the table"

(26) [[*ama-ren-tza*]-*ko*] *opari-a*
[[mother$_{\text{genitive, benefactive}}$]-*ko*] present-the
"the present for the mother" (both analyses by Höhn 2011: 8)

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Höhn (2011:29) explicitly likens *ko-* to German CGN along the lines of Struckmeier (2007). However, in his analysis, the NP and PP predicates project no external argument in need of case-licensing. Accordingly, no such argument raises to the specifier of *ko-* which thus is a head without an EPP feature. Höhn assumes that *ko-* is of the semantic type ⟨et, ⟨et,et⟩⟩. Thus, it links up ⟨e,t⟩ projections such as PPs and the type ⟨e,t⟩ (modified) noun phrase and derives the attributive reading between these two phrases without syntactic movement to the specifier of *ko-* (cf. 2011:32). According to Höhn's analysis, then, the Basque *ko-*structure is an attributive structure whose head contains no verbal φ-features, uses no EPP-feature, and yet still implements the attributive use of predicate projections of various types.

3.2 Variation of the identification features

Case, gender, and number features are used to identify the relativized argument in German attributive structure. The properties that are predicated of these arguments in the attributive structure are the ones that constitute the semantic features attributed to the modified head noun. What other identification feature sets could be used to implement this type of structure?

- Firstly, different languages could differentiate fewer identification features than German. However, in this scenario, the attributive properties are derived in the same way as above: the identified argument's properties are attributed of the modified noun. As Section 3.2.1 shows, attributive heads with different identification feature sets are easily found, even in languages closely related to German.
- Section 3.2.2 shows that these subsets need not be functionally equivalent to their German counterparts: as fewer identification features are used, this may lead to the ambiguous interpretations attested for Standard Arabic attributive constructions.
- We also should not rule out the possibility that languages might opt to use an attributive head that uses no identification features at all. Section 3.2.3 demonstrates that attributive heads of this type may be attested in Chinese.

3.2.1 *Differing identification feature sets in other languages*

Already in many European languages, attributive structures are implemented in essentially comparable ways structurally – but with other identification features in C. Dutch pre-nominal attributive structures, for example, show sentential properties very similar to their German counterparts. Passive participles can be used with PP subject arguments (27a) and active participles allow for their objects to appear inside the attributive structure, too (27b):

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(27) a. *de door mij gebruikte ingrediënten*
the by me used ingredients
"the ingredients I have used"

b. *een mij veel overlast bezorgende machine*
a me much trouble getting machine
"a machine that causes me a lot of trouble"
(example from Bennis 2004: 100)

We would thus propose that the Dutch structures can be analyzed in a similar way – however, with a twist: the Dutch attributive head only differentiates neuter, singular, definite contexts from all other contexts. Consequently, it makes little sense to adopt the CGN feature specification from German too literally. Rather, a reduced set of identification features (possibly gender and number, but not case) would suffice for Dutch. Compared to Dutch, French uses the opposite feature set: the *que/qui* distinction in French relative clauses differentiates only relativized subject arguments from relativized non-subjects. Thus, *que/qui* identify relativized arguments solely by case (and not by gender or number).

Attributive C heads serve as a locus of these varying feature sets. In this way, these heads constitute a valuable *tertium comparationis* that systematizes differences and similarities between attributive structures both within and across languages: all of these heads derive attributive structures from embedded predication structures. They differ, however, with regard to the identification features for the relativized argument.

3.2.2 *Potentially ambiguous identification features: The case of Standard Arabic*
In Standard Arabic, an attributive marker *allaḍī* agrees with the modified noun (and not the relativized argument) in case and number. This means that the attributive marker does not always suffice to identify the relativized argument in the same way that German CGN-C would. Sometimes, only features of the arguments themselves (rather than identification features of the attributive head) make clear what the intended reading of a relative clause is:

(28) *al-rajul-u -llaḍī raʔaytu-hu ʔamsi*
the-man-NOM REL.M.SG saw.1SG-him yesterday
"the man that I saw yesterday"

The relative marker in this example is marked for masculine and singular, as indicated. Inside the relative clause, both the subject *I* and the object *him* are masculine singular arguments. Thus, the relativizing head identifies neither as the relativized argument. It is only the feature make-up of the arguments themselves that disambiguates this structure: the modified noun is a 3rd person element, and the relative clause subject *I* obviously is not. Thus, only the 3rd person object *him*

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can be construed as the relativized argument. Note that the attributive head itself does not bring about the disambiguation – in case, e.g. the relative marker and the relativized argument do not agree.

With identification features so unspecific, ambiguous attributive structures can easily occur:

(29) *al-rajul-u -llaḏī raʔā-hu ʔamsi*
the-man-NOM REL.M.SG saw.3SG.M-him yesterday
"the man that he saw yesterday" or:
"the man that saw him yesterday"

In this example, both the *pro* subject and the object of the relative clause are 3rd person and could thus be the relativized argument. Consequently, the two readings indicated are both available, since the structure is not disambiguated by any morphological or syntactic means.

3.2.3 *No identification at all: Chinese* de

Given the variability we have already observed, the question arises whether an attributive C head could get by without any identification features at all. The predictions for the attributive structure headed by such an element would, arguably, be the following:

- The attributive structure contains some sort of predicative projection. However, since the attributive marker does not identify an argument inside this predicative projection, the corresponding restrictions that, e.g. German prenominal attributes show, are not expected. Thus, the set of predicate projections an attributive head without identification features embeds could (at least potentially) be rather unselective.
- Semantically, no argument or adjunct contained in that predicative projection would necessarily have to be interpreted as the relativized argument (since there are no identification features that would pick out the element): all that the attributive head states is that the attributive structure as a whole is an attribute to the modified noun – but no individual element is specifically designated as the relativized argument.

We would like to propose that the marker *de* in Mandarin Chinese is just such an element. With regard to the first prediction, *de* turns surprisingly many types of phrases into attributive constructions (Examples (a–c) by Paul, forthc.; Example (d) by Paul 2005: 774):

(30) a. NP: *Měilì de diànnǎo*
Mary DE computer
"Mary's computer"

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b. PP: *guānyú tiānwénxué de zhīshì*
about astronomy DE knowledge
"knowledge about astronomy"

c. TP: *nǐ jìlái de xìn*
2SG send DE letter
"the letter you sent"

d. AP: *yi-ge feichang cingming de haizi*
1-Cl extremely intelligent DE child
"an extremely intelligent child"

With regard to the semantic predictions, *de* essentially conforms to our expectations as well: in many cases, an argument or adjunct contained in these projections can be construed as the relativized argument – but this need not be the case, as the following example demonstrates:

(31) *Liú Xiáobō dé Nuòbèiěr jiǎng de xiāoxi*
Liu Xiaobo obtain Nobel prize DE news
"the news that Liu Xiaobo obtained the Nobel prize"

If these examples seem too far-fetched, consider attributive constructions in English: here, too, elements other than C heads appear to be able to embed sentences into DPs as restrictive attributes:

(32) Speaker A: Did you hear the screams?
Speaker B: What screams?
Speaker A: The screams (of the crowd) [as [$_{TP}$ he fell off his bike]]

In the last sentence in this sequence, *as* embeds a full-blown TP structure and turns it into a restrictive attribute. However, there is no relativized argument of any sort: as the possibility of adding *of the crowd* demonstrates, *the screams*, for example, need not be the bike rider's screams. Thus, no element inside this attributive construction (especially not *he*, either) bears any privileged relation to *the screams*. Rather, the whole *as*-construction provides attributive properties that help to identify *the screams*. Suppose now that *as* might semantically bleach and lose the temporal interpretation it has today. In this case, this new *as* element would arguably be analyzed as a functional category – and this functional category would embed a finite clause without having identification features. We consider it plausible that attributive heads of this type can exist in Germanic languages, too.[7]

7. Note that that in the English translation of (30) does not qualify: given that only very few nouns accept *that*-clauses inside their extended DP projection, *that*-CPs should be considered (selected) complements.

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This concludes our small survey of attributive heads. To sum up, attributive functional heads show differing feature sets. The typologically widespread (and often diachronically robust) appearance of such markers (see also Struckmeier 2007 and von Prince 2008 for more examples) warrants further research, in our opinion: the variable properties of the resulting attributive structures point to the fact that these elements are no simple 'phonological copies' of the modified nouns' paradigms. Rather, they form an integral syntacto-semantic part of the structure of DPs in many of the world's languages. As such, attributive functional heads deserve more attention than they have received to date.

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