

# Attribution: Towards a typology of modifiers in the nominal domain

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- **Abstract:** Attributive adjectives, participles and relative clauses appear superficially to be quite different structures. This paper presents a close examination of the relevant structures in two unrelated languages, German and Standard Arabic, and shows that for both languages the same conclusion can be drawn: all three types of attributive constructions share essentially the same structure. The differences between them are directly related to the differences in the feature content of the functional heads involved. We argue that attributive structures are in fact full predicational structures, phrases embedded under a CP. The C head of this CP is of a special nature: it cancels the independent reference capability of the phrase, and instead restricts the reference of the head noun. Additionally, one argument in the attributive phrase must be identified as coreferential with the head noun. German does this in syntax, by realizing the coreferential argument as an operator and subsequently raising this operator to Spec,CP. In Arabic, no syntactic identification takes place. The coreferential argument is realized as a resumptive pronoun, and its identification takes place in semantics or pragmatics. We end the paper with an overview of the different types of attributive structures that our analysis predicts, and how they are instantiated in the languages that we discuss. We hope that this overview will provide a starting point for a feature-driven analysis of attributive structures cross-linguistically.
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# 1 Introduction

In recent research, most (if not all) syntactic operations are triggered by features of phase heads (Chomsky 2005, 2006, forthcoming, Richards 2007). C heads, for example, implement not only a sentence's referential properties (as a matrix or embedded clause) but also serve as the potential locus of *wh*-features, and also include T's  $\varphi$ -features. In this way, both A- and A'-movement operations and case licensing operations are triggered by features of C heads. Main and subclause C heads, for this reason, have received ample discussion in the literature.

However, in our opinion, attributive sentence types have not received an equally uniform and elegant description. One of the reasons for this may be the fact that there is little consensus on what actually is the head of, e.g., a relative clause (the relativized XP itself residing in Spec,CP). In this article, we propose a common representation for both finite ( $\varphi$ -complete) and infinitival ( $\varphi$ -incomplete) attributive structures. We show that there are designated C heads that implement attribution in various ways according to their feature sets: case licensing and movement properties are implemented in ways that parallel operations found in matrix and subordinate clause contexts. We propose that three binary features are necessary to account for the eight types of attributive structures found in the languages described in this paper: German, Standard Arabic and English.

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 CPs. In section 3, we then show that the same conclusion, on partially different grounds, must be drawn for Arabic:<sup>1</sup> in both German and Arabic, attributive structures always constitute phasal units which show complex, sentential properties even when they do not constitute  $\varphi$ -finite clauses (i.e., relative clauses). In section 4, this picture is contrasted with English attributive structures: in this language, only post-nominal relative clauses seem to constitute similarly complex structures, while prenominal attributes are structurally simpler.

Section 5 of the paper summarizes the findings: there is solid evidence for a specialized C head whose task it is to implement attribution in German and Arabic (and English post-nominal) attributes: sentential structures are embedded under this head in order to *attribut-ize* them in much the same way that an embedding C head is usually considered to *complement-ize* the clause it embeds: the clause's referential potential is re-mapped in order to restrict the referential projection of the matrix construction rather than having the embedded clause itself refer autonomously. The general picture that emerges allows us to unify both reference to sets of indices (matrix and subordinate CP) and reference to sets of individuals (DPs and attributive structures) in a simple cross-classification.

We go on to show that differences between the feature sets of various C heads account for virtually all the properties that were outlined in the sections 2–4 of the paper. Thus, a typology of attributive structures emerges, with the differences between the different subtypes of attributes following from the respective phase head's feature set.

In this way, both commonalities and differences between attributive structures can be represented in an interesting (and straightforward) way: the feature set of the proposed phasal C head structures the attributive construction in much the same way that C heads in matrix and subordinating contexts do. This proposed common head and its features, we hope, will serve as a basis for further discussions of these and similar constructions.

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<sup>1</sup>These sections are based on earlier work (cf. the more elaborate descriptions in Kremers 2003, Struckmeier 2007)

## 2 German

There is a rather wide array of constructions that are referred to as *attributes* 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 to constitute case, gender and number agreement (henceforth, CGN) with the head noun. E.g. for masculine, singular nouns such as *Wein* ‘wine’, the case paradigm (comprising nominative, genitive, dative and accusative) looks like this:<sup>2</sup>

- (1)    gut-er    Wein    gut-en    Weines    gut-em    Wein    gut-en    Wein  
         good-NOM wine    good-GEN wine    good-DAT wine    good-ACC wine

Relative clauses, on the other hand, follow the noun they modify. The relative pronoun (REL) shows an obligatory suffix paradigm near-identical to the inventory of CGN-forms of adjectives and participles. However, the relative pronoun’s case is determined inside the relative clause. That is to say, the relative pronoun appears to agree with the modified noun in gender and number, but not in case. Hence, in (2) the modified noun is nominative, but the relative pronoun changes its case according to the different case assigners in the relative clauses:

- (2)    a.    der    Wein...    d-er    gut    schmeckt  
         the-NOM wine    REL-NOM good tastes  
         ‘the wine’    ‘... that tastes good’
- b.                            d-ess-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 in large quantities’
- d.                            d-en    man mag  
   REL-ACC one likes  
   ‘... that you like’

The next section summarizes the relevant morphological properties of attributes in German in greater detail.

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<sup>2</sup>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.

## 2.2 Morphological properties of attributive structures

Adjectival projections, participial structures and relative clauses all have a common function: they attribute properties to the referents 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  $\varphi$ -complete T, comprising tense and agreement features. Participles show only an aspect marking and no tense, but show CGN. Adjectives form the least complex attributes morphologically, inflecting only for CGN:

(3)		CGN	Tense/Aspect	$\varphi$ -complete
	relative clauses	yes	yes	yes
	participles	yes	yes	no
	adjectives	yes	no	no

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 marks complex attributes, we predict that each attribute will have to include exactly one instance of CGN. This is born out by the facts, in that more than one instance of CGN (cf. (4)) and no instance of CGN (cf. (5)) are equally ungrammatical:<sup>3</sup>

(4) der geschrieben(\*-e) werdende Brief  
 the written being letter  
 ‘the letter that is being written’

(5) \*der geschrieben Brief  
 the written letter  
 ‘the written letter’ (intended)

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:<sup>4</sup> progressive aspect for the present participle, perfective for the attributive past participle.<sup>5</sup>

One complication that has often arisen with respect to the syntactic category of the attributive past participle is the fact that some past participles clearly behave like adjectives, in that they form comparatives and superlatives, lose their verbal argument structure, and so on. However, we do not

<sup>3</sup>The example in (4) is only marginally acceptable for some speakers. However, the deviance increases dramatically when more than one CGN-ending is used.

<sup>4</sup>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.

<sup>5</sup>Note that the predicative use of past participles is slightly more complex. Again, see Struckmeier (2007) for details not relevant here.

think that this state of affairs is particularly troublesome: note that most descriptions of predicative past participles assume (albeit often tacitly) that the *-en/-t* suffixes can also derive adjectives. Hence, all that needs to be assumed is that there are two homophonous suffixes: one that derives adjectives, and one that inflects the verb for aspect. Note also that no comparable problem arises with respect to the present participle morphology: present participles almost never form comparatives or superlatives, and almost always make use of their full argument structure attributively.<sup>6</sup>

Furthermore, participial morphology also has another function: while the present participle suffix causes no changes in the argument structure of the underlying verb and can be used for transitive *v*\*-type predicates, past participles can only occur as passive/unaccusative *v*-type predicates. Verbs in relative clauses are unproblematic: they are  $\varphi$ -complete and inflect just like verbs in main clauses, with no changes in their argument structure.

Thus, with all the relevant morphemes in place, the next section derives a detailed morphosyntactic analysis. The most important point of this section is that CGN appears to be a decisive factor in the construction of attributes in German, while aspect, tense and person suffixes differ among the different subtypes of attributive constructions.

### 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 troublesome construction, it will be carried over to other attribute types.

#### 2.3.1 The structure of participial attributes

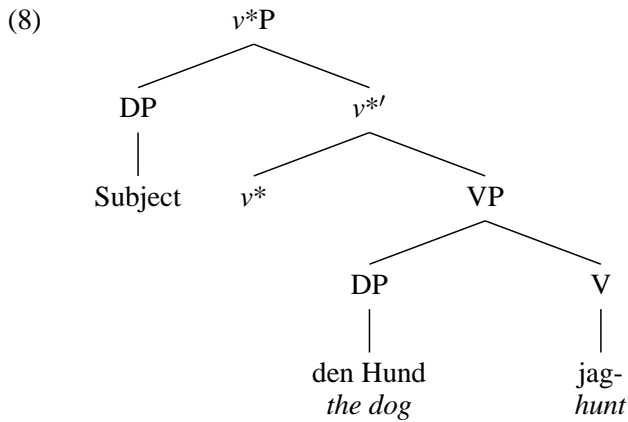
Given their unrestricted argument structure, present participles obviously have to be analyzed as verbal in nature. Because they can assign accusative case to their direct objects, we assume that present participles project *v*\*Ps (cf. Chomsky 2000):

- (7)    der        den        Hund jagende Junge  
           the-NOM the-ACC dog   chasing boy.NOM  
           ‘the boy who is chasing the dog’

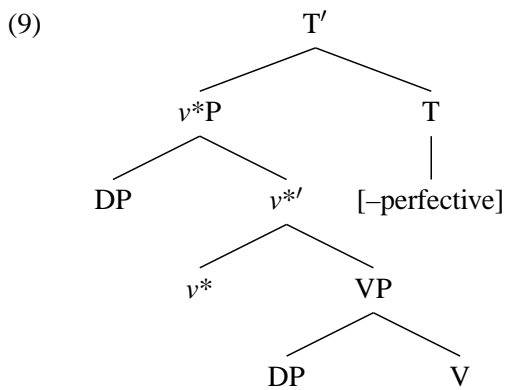
Note that Burzio’s generalization states that “all and only the verbs that can assign theta-role [sic] to the subject can assign (accusative) case to an object” (Burzio 1986, 187). If present participles are indeed verbal elements, Burzio’s generalization should hold for them as well. We can thus assume the following argument projection for present participles:

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<sup>6</sup>Exceptions are scarce, and can be handled as lexicalized cases.



The aspectual suffix of the present participle can then be accommodated for in the next functional layer:



The perfective suffix of past participles, on the other hand, never selects for  $v^*$ , as no transitive structure is ever projected. This can be captured by assuming that the perfective suffix in T selects for intransitive  $vP$ .<sup>7</sup>

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

- (10) die [ \_\_ sich treue ] Frau  
 the to-herself loyal woman  
 'the woman who is loyal to herself'

Note that the anaphor cannot be bound by the modified noun: as Fanselow demonstrates, this coindexation of anaphor and head noun would yield an *i-within-i* configuration:

- (11) Die [<sub>i</sub> ... sich<sub>i</sub> treue Frau<sub>i</sub> ]  
 the to-herself loyal woman

- (12) \* $[\gamma \dots \delta \dots]$ , where  $\gamma$  and  $\delta$  bear the same index. (Chomsky 1986, 212)

This filter is doubtlessly operational in German, as e.g. the following example from Fanselow shows:

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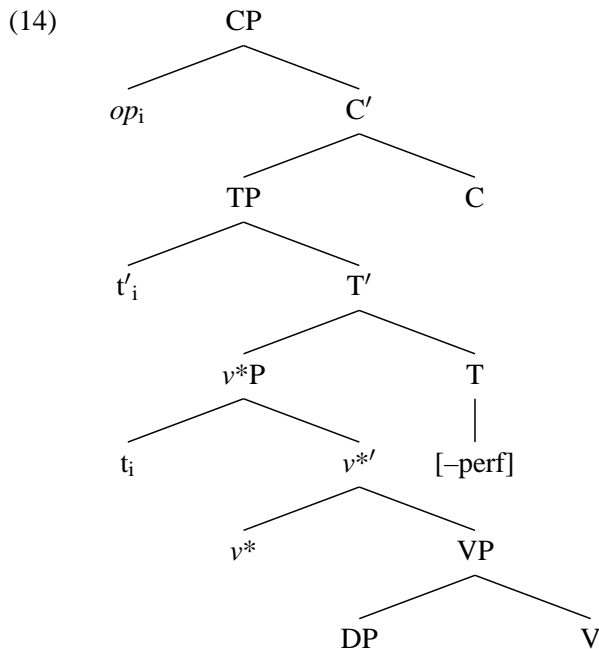
<sup>7</sup>Note that nothing hinges on the categorization of the aspect marking as a T element here: while this categorization seems natural enough for German with its heavily intertwined tense and aspect system, the reader may feel free to substitute a category of his or her own choice.

- (13) \*der Besitzer<sub>i</sub> seines<sub>i</sub> Bootes  
 the owner of-his boat  
 ‘the owner of a boat/his own boat’ (unavailable reading)  
 (Fanselow 1986, 344)

Note also that, given the fact that we regard participles as quintessentially verbal elements, the modified noun cannot have moved out of the attributive structure: the arguments of the embedded predicate have been theta-marked in a regular manner and, without stipulation to the contrary, cannot receive another theta role in the context of the embedding clause. Thus, Fanselow assumes that there is a covert binder in the attributive construction. For the German constructions, we assume that this element is the covert operator *op*, for the simple reason that no other element seems available.

First, PRO seems to be out for semantic reasons as the subject of the participle in modern German has to be coreferential with the modified noun, and there is nothing that forces PRO to be interpreted in that way. Note furthermore that even a stipulation simply requiring PRO to be interpreted as coreferential in configurations such as these (cf. Williams 1980) cannot help us here: in Middle High German, arbitrary reference of the subject of an attribute was possible (Thim-Mabrey 1990). Hence, unless the stipulation about the interpretation of PRO would be backed up by yet another stipulation to the effect that the attributive structure in Middle High German was wildly different from its modern counterpart, the argument breaks down.

Second, *pro* can be excluded for the simple fact that German is not a *pro*-drop language. That is, not even  $\varphi$ -complete verbs license *pro*, so that any claim that  $\varphi$ -defective participles or even adjectives do, would be nothing but an unwarranted stipulation. The only remaining choice for the subject then is an empty operator, 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. Assuming that the subject of the verbal projection is indeed an operator, it follows that the attributive construction comprises yet another functional layer that supplies the final operator position of *op*:



How can this analysis be justified? At least three questions immediately arise: **a)** What is the head of the C projection? **b)** How is case licensed on *op*, if participles are  $\varphi$ -defective? **c)** How does this analysis relate adjectival, participial and relative clause structures?

### 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. For attributive structures, section 2.2 establishes CGN to be exactly this kind of element: recall that every complex attribute has to comprise exactly one instance of CGN. Note furthermore that 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. never receive this ending.

Note also that this reinterpretation of the data seems to elegantly explain hitherto mysterious properties of the alleged case, gender and number suffixes: semantically, it does not seem to make 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, CGN suffixes look nothing like nominal suffixes. This clearly distinguishes German from the case of, say, Latin, where the attributive marking is indeed similar to the nominal paradigm. Morphologically, these suffixes have always been troublesome in that they do not seem to select for stems with specific categories to begin with: colloquially, all kinds of elements serve as hosts to CGN:

- (15) a. ein klasse<sub>N</sub>-s Auto  
       a class-CGN car  
       ‘a snazzy car’  
       b. unter öfter<sub>Adv</sub>-em Umrühren  
       under often-CGN stirring  
       ‘while stirring continuously’  
       c. der ab<sub>p</sub>-e Arm  
       the off-CGN arm  
       ‘the arm that has come off’

Syntactically, German attributes (again, unlike their Latin counterparts) cannot be placed freely vis-à-vis the noun they modify. Rather, they must occur inside the DP. That is, even if the functional notion of who-modifies-who had any significance, it would be entirely unnecessary in German.

Furthermore, separating CGN morphology from nominal case has another welcome effect: the nominal endings are becoming more and more obsolete diachronically (the so-called ‘Kasusschwund’, i.e. case loss, described in Gallmann 1996, 287ff). Attributive CGN, on the other hand, is not disappearing. Rather, the paradigm continues to systematically differentiate the relevant distinctions, in a phonologically rather fully-fledged manner.

In other words, what we have been calling (and in spite of these remarks, will continue to call) attributive CGN does not constitute the “normal” case, gender and number features. Rather, it forms a different morphosyntactic system with its own synchronic and diachronic properties. In the remainder of this paper, we will use the term CGN (or CGN-C) to refer to the features that constitute the attributive ending, which are realized on the C head of the attributive phrase, and which differ from case, gender and number on DPs.

Now, assuming 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 Move (i.e. Internal Merge), an attracting element needs to identify the goal it attracts (Chomsky 2000, 37ff). Given that CGN-C obviously points towards a case, gender and number specification, it seems that CGN-C is uniquely qualified to fulfill this function. Hence, CGN-C does not specify its own case, gender or number. Rather, it identifies an element from the embedded structure, and it is this element's case, gender and number features that match its own feature specification. CGN-C, in other words, is a feature complex that is complementary to case, gender and number.

To see what we mean by this, consider the case of the head T. T identifies the nominative subject of the clause by its person and number features and assigns nominative case in the process.<sup>8</sup> Yet, it is clearly nonsensical to claim that T is itself 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 itself. Phonologically, CGN-C resembles clitic pronouns in German. With regard to these clitics, Wiese (1996, 251) states that "it is hard to see how a unified syntactic description of the clitic contexts can be construed". We assume that CGN-C is a variation on this theme: CGN-C in German attaches to predications (actually, all kinds of predications, as we will see below), and attracts an operator argument from them. The resulting structure is to be interpreted coreferentially in the sense that the features of CGN-C state that whatever properties are predicated of the raised operator in the embedded structure have to be assumed to hold of the referent of the modified DP as well.

If, however, the case of the raised operator enters into the identification by the CGN-C, how does this case get licensed in  $\varphi$ -defective predications to begin with?

### 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  $\varphi$ -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. Recall further that  $\varphi$ -defective attributes can never leave the DP they modify. Furthermore, *op* can only appear in  $\varphi$ -defective constructions.<sup>9</sup> If we take these properties seriously, a rather innocuous way of implementing case licensing for *op* turns out to be available.

First of all, note that 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. It seems reasonable then to assume that *op* is in some way defective. In this way, we can easily explain that *op* can only serve as a subject for  $\varphi$ -defective predicates: given that *op* lacks features involved in the Agree process with a  $\varphi$ -complete T, the uninterpretable features of T cannot be licensed, and the derivation is correctly predicted to crash.

Participles and adjectives do not inflect for [person].<sup>10</sup> Hence, in order to serve as a subject for predicates of this kind, *op* need not have a full set of  $\varphi$ -features. That is, *op* need not have a [person] feature itself. If this is true, 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, the features of a case-licensing probe (i.e.  $v$  or C/T) are not deleted when the probe licenses *op*'s case.

This of course entails that in order for the derivation to converge, *op* needs to appear in an extremely local configuration with a  $\varphi$ -complete goal for the probe to match its features against in due

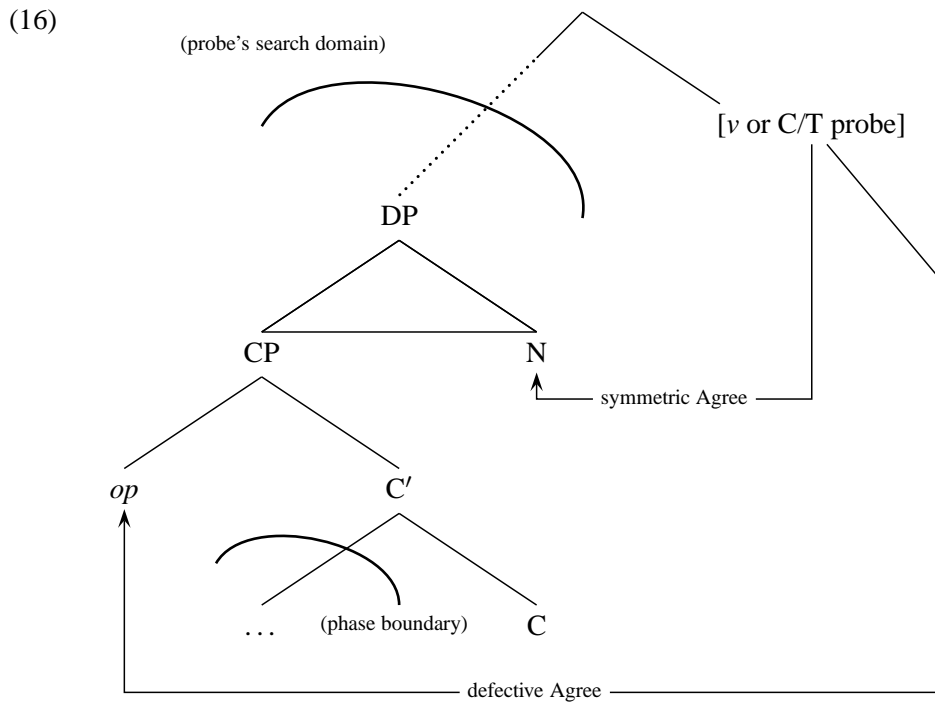
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<sup>8</sup>Note that quirky subjects normally do not trigger agreement on T in German, which shows that agreement and case assignment are indeed linked.

<sup>9</sup>That is, unlike their English counterparts, relative operators have to be overt in finite relative clauses in German.

<sup>10</sup>In section 3.2 we will see that the  $\varphi$ -defectiveness of German participles and adjectives actually goes beyond [person].

time. Recall now that *op* in German has to be in exactly this kind of configuration: inside the DP, next to the modified noun — and nowhere else. With the simple assumption that *op* is defective, 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:



That is, the ‘agreement’ between CGN-C and the head noun is explicitly *not* the result of an Agree operation between them. Rather, CGN-C identifies the *op* in the attribute phrase. This operator, however, does not receive case in the attribute phrase, because prenominal attributes (i.e., adjectives and participles) cannot license *op*’s case themselves. Instead, *op* receives case by virtue of being in a local configuration with a DP that receives case. Because of the identification relation between *op* and CGN-C, the morphological realization of CGN-C can (and does) reflect the case feature assigned to *op*.

Note that this mechanism not only establishes the features of CGN-C, it also establishes coreferentiality between the argument realized by *op* and the head noun. As we will see below, relative clauses employ the same raising mechanism to implement coreferentiality. However, since relative clauses comprise a  $\varphi$ -complete T, all cases, including the operator’s, can be licensed internally, so that no case “agreement” between operator and N is necessary.

In this way, the differences with regard to agreement are tied to independently established principles of case licensing. CP in German never projects more than one specifier (resulting in German’s V2 word order, e.g.). This means that only those predicates can be used attributively that project exactly one argument whose case they cannot license. This gives us an easy characterization of the admissible predicates:

- (17) adjectives (one external argument, all others licensed lexically)  
 present participles (one external argument, objects licensed by v\*)  
 past participles (one internal argument, all others licensed lexically or as PPs)

Note that this argument even holds the other way round: verbs that assign lexical cases do not allow the respective arguments to be realized as *op*. That is, verbs with lexical object cases cannot be used as past participles, since the internal object argument would have to be *op*. For example, the verb *helfen* ‘to help’ assigns dative to its object. As (18) shows, this object cannot be realized as defective *op*, because the lexical case must be assigned:

- (18) ich habe dem Mann geholfen \*der geholfene Mann  
 I have the-DAT man helped the helped man  
 ‘I have helped the man’ ‘the man that received help’ (intended)

Likewise, present participles cannot be formed from verbs with lexically assigned subject cases, because the external argument would again have to be *op*:

- (19) dem Mann graut vor mir \*der grauende Mann  
 the-DAT man scares from me the scaring man  
 ‘the man is scared of me’ ‘the scared man’ (intended)

To the best of our knowledge, these gaps for participle formation have never been discussed in a systematic fashion, let alone explained. With the assumption that *op* cannot serve as the goal of a symmetrical Agree process, however, an explanation seems feasible: if a lexical case needs to be assigned to a non-defective goal, *op* would be out, since it is defective.

As an additional piece of evidence, consider the range of phrases that can be relativized in adjectival and participial attributes:<sup>11</sup> without exception, the highest argument has to raise to Spec,CP. Under the assumption that this position is needed to indirectly case-license the operator, it actually follows that only the highest argument, but no other argument or adjunct, can be relativized. If another element would raise to Spec,CP, blocking the raising of *op* to this position, the highest argument could not license its case defectively with the probe from the matrix clause: being embedded in TP (Spec,TP at the highest), the argument would be invisible to the probe, for reasons of phase impenetrability (cf. Chomsky 2001, 13): only the edge of the CGN-CP phase (i.e. its specifier and head) are visible for later steps in the derivation, but nothing below the edge.

Returning to the nature of CGN-C, it becomes apparent now that, with the assumption that CGN-C does indeed head various complex attributive structures, a unified analysis for all subtypes of attributes is within reach. However, one might ask, how does CGN-C actually carry over to the other subtypes? The next section discusses the way in which CGN-C relates participial attributes to the other relevant structures.

### 2.3.4 A unified analysis

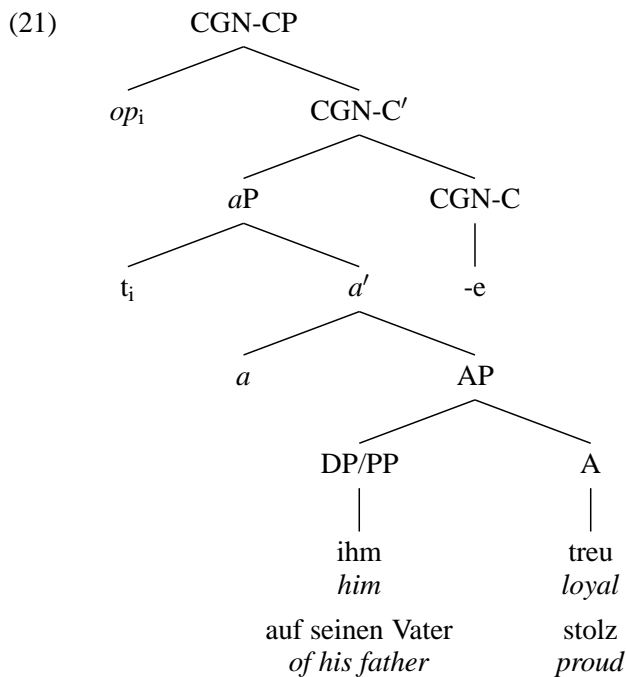
Adjectival attributes are easy to implement in a parallel fashion: first of all, note that Fanselow (1986) clearly shows that attributive adjectives are ‘sentential’ in that they constitute binding domains. Attributive adjectives also use the same CGN-C endings as participial attributes. Hence, if the above is correct, adjectives can extract one of their arguments (invariably the external one, which needs to be

<sup>11</sup>For a comparison with the much more variable options in relative clauses, see (25), and the analysis that concludes with that example.

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 other arguments, which all receive lexical case or are spelled out as PPs:

- (20) a. seine [ ihm<sub>DAT</sub> treue ] Frau  
 his to-him loyal wife  
 ‘his wife, who is loyal to him’  
 b. der [[<sub>PP</sub> auf seinen Vater ] stolze ] Sohn  
 the of his father proud son  
 ‘the son who is proud of his father’

Unlike present participles, adjectives can never assign accusative case.<sup>12</sup> Hence, it is not likely that they comprise a *v*\*P. Furthermore, adjectives have no referential argument that could project a TP (cf. e.g. Wunderlich 1996). This also matches the fact that adjectives have no equivalent for the *-end* and *-t/-en* suffixes analyzed as T heads above. Note however, that adjectives allow for various orders of their arguments vis-à-vis adverbs. These movements resemble scrambling movements at the sentence level (cf. e.g. Struckmeier in preparation). Without going into the matter further, it seems reasonable to assume that adjectives project a full predicational AP, optionally project functional layers responsible for information structure-driven scrambling movements and cap off with the same CGN-C layer that participial attributes use. For the attributes in (20), the structure (which is the simple case without scrambling) looks like (21).<sup>13</sup> We assume a head *a* equivalent to *v* in the clause, providing a position for the adjective’s subject:



<sup>12</sup>Note that the so-called measure adjectives *einen Meter weit*, *einen Meter groß* ‘one meter wide, one meter tall’ etc. do not constitute valid counter-examples to this general rule; see Struckmeier (2007) for details.

<sup>13</sup>Note that non-standard adjectives such as *mutmaßlich* ‘alleged’, *falsch* ‘fake’ etc. can be accommodated as modal elements that shift the reference of the modified noun to other possible worlds. Also, postnominal adjectives without CGN constitute no counter-evidence against (21), as these (marginal) constructions are invariably simplex, i.e. show no complex argument projection and do not act as binding domains.

From a minimalist perspective, a desirable generalization presents itself: in order to abstract a specific argument from a complex predicational structure, a CGN-C is needed. If there is no such element in a structure, no comparable attributive construction can be constructed: in English, there is no equivalent for the prenominal CGN-C projection. Thus, only simplex attributes can be formed, projecting unaccusative predicates with only one argument available for coreference to begin with (see section 4). The only other option would be to leave the question of coreference undetermined: in this scenario, a complex predicate can be turned into an attribute, but the structure remains ambiguous with regard to which argument is to be interpreted coreferentially with the head noun. It will be shown in section 3 that exactly this kind of structure is found in attributes in Arabic.

One big advantage of the analysis of adjectives and participles outlined above is that it links up easily to the structural representations used for relative clauses. However, as the CGN-endings are found on the relative pronouns in these constructions, some changes seem necessary to account for this ordering: since relative pronouns undoubtedly figure as arguments in the embedded clause, they have to occupy the specifier position of the CP (cf. e.g. Fanselow & Felix 1993, 144). While this is of course completely parallel to the placement of *op* in the prenominal attributes, it bars the possibility to regard the relative pronoun as a whole as an instance of another CGN-C head. Luckily, this does not seem to be necessary, or even desirable.

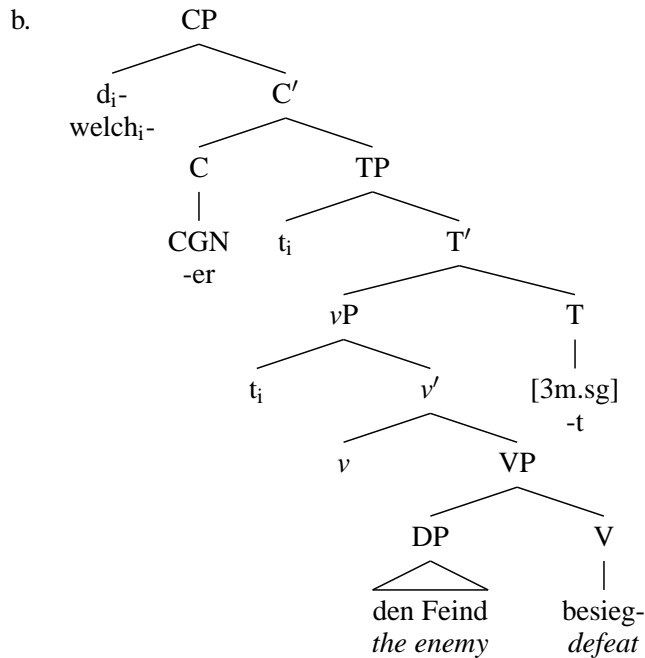
Note that there are actually two relative pronouns in German: *der* und *welcher*. Both implement complex attribution in our understanding of the term, and both use the same set of CGN-like endings. Therefore, if we simply assume that the first parts of these relative pronouns, the parts that are *not* part of 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:

- (22) ein Mann, [<sub>CP</sub> d- er [<sub>TP</sub> t geht ]]  
 a man *op<sub>cpl</sub>* CGN walks  
 ‘a man that is walking’
- (23) ein [<sub>CP</sub> *op* [<sub>TP</sub> t geh-end ] -er] Mann  
 a *op<sub>defc</sub>* walk-ing CGN man  
 ‘a walking man’

The similarities are easy to see: both structures layer the exact same sequence of functional projections, capped off by the same CGN-C head. The implementation works in exactly the same way: CGN-C identifies an argument from the embedded clause (*op*, *d-* or *welch-*) and raises it into the Spec,CP position where it is interpreted coreferentially with the head noun. This allows us to specify exactly what it means formally to be an attribute functionally: a predicate embedded within a projection of CGN-C is an attribute.

The relative clause structure is the following:

- (24) a. der Mann, der/welcher den Feind besiegt  
 the man REL the-ACC enemy defeats  
 ‘the man that defeats the enemy’



Furthermore, the analysis also clearly shows the differences between the various subtypes of complex attributes: first of all, 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 embedded 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  $\varphi$ -complete elements, unlike *op*, which is defective.

If *d-* and *welch-* would be 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, however, is clearly impossible: *d-* and *welch-* are not defective elements. This is why they cannot ‘share’ case-licensing with N like defective *op* can: if the case of *d-/welch-* gets licensed, the 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 feature-complete operators could ever be used in non-finite attributes prenominally.

Recall that in non-finite attributes, only the highest argument, not being case-licensed, can be relativized. Relative clauses, on the other hand, contain a  $\varphi$ -complete T. Hence, 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 the movement to Spec,CP is not barred for independent reasons. This prediction is (obviously) borne out:

(25)	$\varphi$ -defective attributes	$\varphi$ -complete relative clauses	raised element
	der <i>op</i> dicke Mann <i>the fat man</i>	der Mann, der dick ist <i>the man that fat is</i> 'the man that is fat'	highest argument of A
	der <i>op</i> laufende Mann <i>the running man</i>	der Mann, der läuft <i>the man that runs</i> 'the man that is running'	highest argument of (active) V
	der <i>op</i> geschlagene Junge <i>the beaten boy</i>	der Junge, der geschlagen wurde <i>the boy that beaten was</i> 'the boy that was beaten'	highest argument of (passive) V
	*der <i>op</i> ich gehende Garten <i>the I walking garden</i> 'the garden I walk into' (intended)	der Garten, in den ich gehe <i>the garden into which I walk</i> 'the garden I walk into'	adjunct PP
	*der <i>op</i> ich sehende Mann <i>the I seeing man</i> 'the man I see' (intended)	der Mann, den ich sehe <i>the man that I see</i> 'the man that I see'	internal argument (direct object)

Thus, the analysis presented here explains the similarities and the differences between the various subtypes of attributes. Adjectives and participles identify the coreferential argument with an operator that cannot be case-marked inside the attribute phrase because no case is available. The operator is a defective one, and raises to Spec,CP, where it receives case in the same Agree process that assigns case to the head noun. This entails that only the highest argument can be coreferential with the head noun, because no other argument could be raised to Spec,CP.

Relative clauses use the same strategy: they mark the coreferential argument with an operator as well. The differences that relative clauses show are caused by the fact that the operator can (and in fact *must*) receive case in the attribute phrase. The operator still raises to Spec,CP (due to an EPP feature on C), but does not receive case there. As a result, the feature value on CGN-C is not the same as the case on the head noun.<sup>14</sup>

### 3 Arabic

Having discussed German, it is now time to turn to Arabic. The analysis here is essentially the one developed in Kremers (2003), taking into account what we have presented above for German.

<sup>14</sup>We have said nothing about the order of the various elements in the attribute phrase and of the attribute and the head noun. We consider linear order a matter of PF, so that it is orthogonal to the syntactic issues discussed here. For details on the way in which the relevant orders can be derived for German, see Struckmeier (2007).

### 3.1 Participles

In section 2 we started out by showing that German participles must be considered complete predicational structures, due to the fact that they have aspect marking, requiring a T head, and that, given that they can assign accusative case, a subject theta role must also be present, that must be assigned (due to Burzio's Generalization).

A similar (though not identical) point can be made for Standard Arabic. First, participles in Arabic are marked for voice. For ground stem verbs,<sup>15</sup> the active participle is formed with the vowel pattern *CāCiC*, while the passive participle is formed with the pattern *maCCūC*:

- (26) *kataba* 'to write':
- a. *kātib* 'writing, having written'
  - b. *maktūb* 'being written, having been written'

Participles of other (so-called *derived*) stems are characterized by the prefix *mu-* and a vowel pattern that consists of all *a*'s in the passive, while in the active participle the final vowel is *i*:

- (27) *istaʕmala* 'to use':
- a. *muʕtaʕmil* 'using, having used'
  - b. *muʕtaʕmal* 'being used, having been used'

The active/passive distinction is obviously a sign that participles are verbal in nature and contain either a *v*\* or a *v* projection. This is confirmed by the fact that active participles, with *v*\*, can assign accusative case:

- (28) a. hal ʔantum sāmiʕūna      ʕarāḥ-a-nā?  
Q you.pl hearing-pl.NOM cry-ACC-our?  
'do you hear our cry?'  
(Cantarino 1975, vol. II, p. 412)
- b. al-nās-u      -l-sāmiʕūna      ʕarāḥ-a-nā  
the-people-NOM the-hearing-pl.NOM cry-ACC-our  
'the people that hear our cry'

---

<sup>15</sup>A root in Arabic can form a total of about 15 verb stems through affixation and certain prosodic processes (cf. McCarthy & Prince 1990). The first or ground stem is the morphologically most simplex form.

Furthermore, we can confirm that participles form binding domains for anaphors:

- (29) ʔinna-hu ʔiǧmālan šaḥṣ-un [ wāṭiq-un min nafs-i-hi ]  
 TOP-him<sup>16</sup> on the whole person-NOM [ trusting-NOM from self-GEN-his ]  
 ‘on the whole, he is a self-confident person’ (lit. ‘trusting in himself’)  
 (Kremers 1997)

The relevant participle in (29) is *wāṭiq* ‘trusting’, which modifies the noun *šaḥṣ* ‘person’. The verb *wāṭiq* ‘to trust, have faith in’ takes a prepositional object with *min* ‘from’. To avoid an *i-within-i* filter violation, we must assume, like we did for German, that the head noun is not the binder of the reflexive, and that instead the participial phrase contains a subject.

In contrast to German, however, the subject of an attributive participle in Arabic is not an operator, but *pro*. Unlike German, Arabic is a *pro*-drop language, so that our principle argument against *pro* in German does not apply to Arabic. However, apart from the fact that *pro* exists in Arabic, there is evidence to support the claim that the subject of a participle is indeed a pronoun rather than an operator. Before we can turn to this evidence, however, we must first discuss the morphology of participles and adjectives in Arabic.

### 3.2 Morphological properties of participles and adjectives

To start out, Arabic nouns are marked for gender (masculine or feminine) and number, and attributive adjectives agree with them in these features:

- (30) a. raǧul-un ʔawīl-un  
 man-NOM tall-NOM  
 ‘a tall man’  
 b. riǧāl-un ʔiwāl-un  
 men-NOM tall.pl-NOM  
 ‘tall men’

Many Arabic nouns form so-called *broken* plurals, meaning that they form the plural by changing the vowel pattern. Adjectives often do the same, as shown in (30b).

Feminine gender on nouns is (usually) marked with the ending *-at*.<sup>17</sup> This ending is also used to mark feminine gender on adjectives. Although feminine nouns may form broken plurals, the ending *-at* has a regular plural form *-āt*,<sup>18</sup> which is applied to all feminine adjectives:

- (31) a. imraʔ-at-un ʔawīl-at-un  
 woman-f-NOM tall-f-NOM  
 ‘a tall woman’  
 b. nisāʔ-un<sup>19</sup> ʔawīl-āt-un  
 women-NOM tall-f.pl-NOM  
 ‘tall women’

Arabic nouns are also marked for case, and adjectives agree in this feature as well:

<sup>16</sup>The suffix *-hu* is the accusative form of the personal pronoun. Accusative appears due to the topic marker *ʔinna*.

<sup>17</sup>The *-t* of this ending is dropped when the word is pronounced in isolation. The same, by the way, is true for case endings. For this reason, they are only written in the examples, not when a word is quoted in the text.

<sup>18</sup>The *-t* of this plural form is never dropped.

<sup>19</sup>The form *nisāʔ* ‘women’ is a suppletive plural form of the singular *imraʔa* ‘woman’.

- (32) a. rağul-un ṭawīl-un  
man-NOM tall-NOM  
'a tall man'
- b. li rağul-in ṭawīl-in  
to man-GEN tall-GEN  
'to a tall man'
- c. ṭinna rağul-an ṭawīl-an  
TOP man-ACC tall-ACC  
'(as for) a tall man'

(32a) shows the nominative form. In (32b), the noun phrase is the complement of a preposition, which governs genitive on the noun. In (32c), the noun phrase is the complement of the topicalization particle *ṭinna*, which governs the accusative.

Lastly, and most interestingly, adjectives also agree with their head nouns in definiteness. Definiteness on the noun is marked with a prefix *al-*, essentially the definite article, or with a suffix *-n* (which follows the case ending), marking indefiniteness. Attributive adjectives show the same morphology.<sup>20</sup>

- (33) a. rağul-u-n ṭawīl-u-n  
man-NOM-IND tall-NOM-IND  
'a tall man'
- b. al-rağul-u -l-ṭawīl-u  
the-man-NOM the-tall-NOM  
'the tall man'

Attributive participles show the same morphology that adjectives do. Like adjectives, they agree with the head noun in gender and number, and in definiteness and case.<sup>21</sup>

It is important to note that the agreement between adjective and noun in Arabic is not quite the same as CGN-agreement that German adjectives and participles show. In section 2.2, we noted that participles (and adjectives) in German are  $\varphi$ -defective. How defective they actually are becomes clear when we compare them to Arabic adjectives: it turns out that German participles and adjectives have *no* features for case, gender and number. Only CGN-C has them.

This fact becomes apparent when we consider adjectives used as sentential predicates. In German, such adjectives are invariant, they do not take case, gender or number endings. In Arabic, on the other hand, a predicative adjective (and participle) still agrees with the subject in gender and number:

- (34) a. der Mann ist groß-(\*er)  
the-NOM man is tall-(\*CGN)  
'the man is tall'
- b. al-rağul-u ṭawīl-u-n  
the-man-NOM tall.m-NOM-IND  
'the man is tall'

Note that agreement between subject and adjective in predicative contexts such as (34b) only exists in the features gender and number. An adjectival or participial sentential predicate is always

<sup>20</sup>IND stands for 'indefinite'.

<sup>21</sup>Furthermore, like German participles, participles in Arabic are often ambiguous between a verbal and a non-verbal use. The latter comprises both adjectival and nominalized participles. The *nomen agentis*, for example, is formed with the active participle. As mentioned before, these forms do not concern us here.

indefinite, regardless of the definiteness of the subject,<sup>22</sup> and its case depends on the syntactic structure of the phrase, not on the case of the subject:

- (35) a. *ʔinna Qayṣar-a ḥanīf-u-n*  
 TOP Caesar-ACC cruel-NOM-IND  
 ‘Caesar is cruel’  
 b. *kāna Qayṣar-u ḥanīf-a-n*  
 was Caesar-NOM cruel-ACC-IND  
 ‘Caesar was cruel’

In (35a), the subject of the clause takes accusative case because it is governed by the topic marker *ʔinna*. The adjective, however, takes nominative, because of its function as sentential predicate. In (35b), things are reversed: the adjectival predicate *ḥanīf* ‘cruel’ takes accusative case, as it is now the complement of the verb *kāna* ‘to be’.<sup>23</sup> Again, this differs from the case of the subject, which is nominative here.

These facts strongly suggest that at least in the case of predicative use of adjectives and participles, the features of the adjective/participle are assigned through two different mechanisms. In what way exactly they differ becomes clear if we take a closer look at attributive structures.

### 3.3 Subjects in attributes

Attributive adjectives and participles in Arabic can take overt subjects. When they do, a resumptive pronoun in the attributive phrase refers back to the head noun. (36) presents a typical example:

- (36) *li -l-ḡazāʔir-i -l-mutaqaddim-i dīkr-u-hā*  
 to the-islands.f-GEN the-preceding.m.sg-GEN mentioning.m-NOM-*their*  
 ‘to the aforementioned islands’

The head noun of the phrase in (36) is the noun *al-ḡazāʔir* ‘the islands’. It takes genitive case because of the preposition *li*. This noun is modified by a participle, *mutaqaddim* ‘preceding’. However, although it is modified by the participle *mutaqaddim*, the head noun *ḡazāʔir* ‘islands’ is *not* the subject of the participle. The subject of the participle is *dīkr-u-hā* ‘the mentioning of them’. This is a gerund-like deverbal noun, which has attached to it a pronominal suffix *-hā* expressing the object of the underlying verb. This suffix is essentially a resumptive pronoun referring back to ‘islands’.<sup>24</sup> Note that the noun *dīkr-u-hā* has nominative case, since it is the subject of the participle.

The combination *mutaqaddim dīkr-u-hā* means ‘their mentioning preceding’. When it is used attributively with the noun *ḡazāʔir*, the whole has the meaning ‘the islands whose mentioning preceded’, which may be rendered in English as indicated.

The agreement facts in (36) are particularly interesting. The head noun *al-ḡazāʔir* is feminine plural, definite and has genitive case. The subject of the participle, *dīkr-u-hā*, is masculine singular, definite and has nominative case. Somewhat surprisingly, the participle *mutaqaddim* shows a mixed set of features. It is masculine singular, definite and has genitive case. That is, in gender and number it agrees with its subject *dīkr-u-hā*, whereas its case and definiteness features are coming from the noun it modifies, here *ḡazāʔir*. These facts confirm that not only do we have two mechanisms assigning features to adjectives and participles when they are used as sentential predicates, we also have two

<sup>22</sup>It can be definite, but then the adjective takes the meaning of a nominalized adjective, i.e. ‘the tall one’, etc.

<sup>23</sup>Copulas in Standard Arabic assign accusative case to the predicate.

<sup>24</sup>Here and below, we indicate the resumptive pronouns in the Arabic examples and their glosses with italic face.

mechanisms when they are used as attributes.

The following examples show the versatility of this construction. As before, the resumptive pronouns are italicized:

- (37) a. raʔaytu -mraʔ-at-a-n      ǧamīl-a-n      waǧh-u-hā  
 I.saw woman-f-ACC-IND beautiful.m-ACC-IND face.m-NOM-*her*  
 lit. ‘I saw a woman beautiful her face’  
 ‘I saw a woman with a beautiful face’
- b. ǧāʔat min balad-i-n      maʕrūf-at-i-n      šidd-at-u      ḥarārat-i-*hi*  
 it.came from country.m-GEN-IND known-f-GEN-IND strength-f-NOM heat-GEN-*its*  
 lit. ‘it came from a country known the strength of its heat’  
 ‘it (the heat) came from a country known for (the strength of) its heat’  
 (El-Ayoubi, Fischer & Langer 2001, p. 187)
- c. (...) min al-ḥurūb-i      -l-šaʕb-i      -l-taḥakkum-u      bi  
 (...) of the-wars.f-GEN the-difficult.m-GEN the-containing-NOM with  
 natāʔiǧ-i-*hā*  
 results-GEN-*their*  
 lit. ‘(...) of wars their effects difficult to contain’  
 ‘(this tension could lead to a new chain) of wars whose effects will be difficult to contain’  
 (El-Ayoubi et al. 2001, p. 187)

First of all, the examples show that the construction is not limited to participles, but also occurs with adjectives: *ǧamīl* ‘beautiful’ in (37a) and *šaʕb* ‘difficult’ in (37c).<sup>25</sup> They also provide extra illustration of the two agreement processes. In (37a), the modified noun, *imraʔa* ‘woman’, is feminine, indefinite, and takes accusative case. The modifying adjective, *ǧamīl* ‘beautiful’, is masculine, agreeing with *waǧh* ‘face’, but the adjective is at the same time indefinite, agreeing with *imraʔa* rather than with *waǧh-u-hā*, which is definite.<sup>26</sup> Note that the adjective also has accusative case, like the head noun.

Both (37b) and (37c) show a difference in gender between the head noun and the modifying adjective. In (37b), the head noun is *balad* ‘country’, which is masculine, whereas the participle modifying it, *maʕrūf* ‘known’, has a feminine form. The subject of this participle is feminine also: *šiddatu ḥarār-at-i-hi* ‘the strength of its heat’, confirming that the attributive participle agrees in gender with its attribute-internal subject, not with the head noun. (37c) is similar: the head noun *ḥurūb* ‘wars’ is feminine, while the attributive adjective *šaʕb* ‘difficult’, is masculine, in agreement with the adjective’s subject *taḥakkum* ‘containment’, which is a masculine noun.

Note also that the resumptive pronoun does not have to occur on the subject of the adjective or participle. This is shown by the last example, (37c), in which the subject is a complex event nominal, *al-taḥakkum* ‘the containing’, and the resumptive pronoun occurs on its object *natāʔiǧ-i-hā* ‘their results’. Similarly, in the case of participles, the resumptive pronoun may also be the object of the verb:

- (38) al-šāriʕ-u      -l-muǧattī-*hi*      rumād-u      -l-burkān-i  
 the-street-NOM the-covering-*it* ash-NOM the-volcano-GEN  
 ‘the street covered by the volcano’s ashes’

<sup>25</sup>*Maʕrūf* ‘known’ in (37b) is a passive participle.

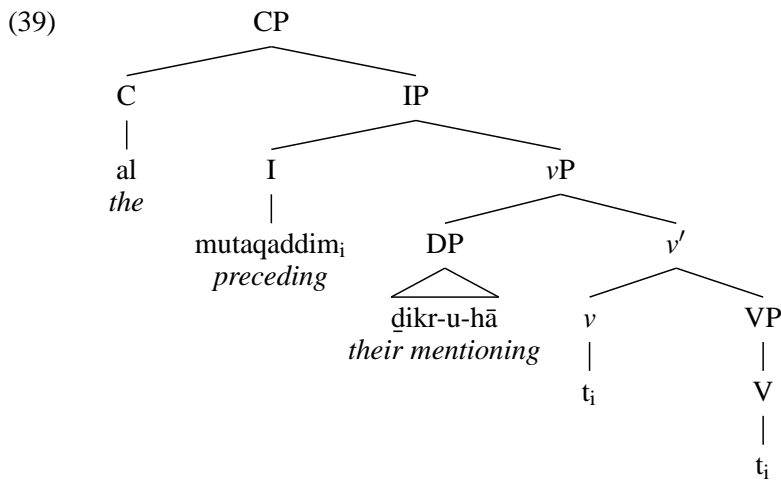
<sup>26</sup>A noun that has a genitive modifier is grammatically definite in Arabic, even if this definiteness is not (and cannot) be marked morphologically with the definite article. This is the well-known Semitic *construct state*.

The participle *muḡattīn*<sup>27</sup> is the active participle of the verb *ḡattā* ‘to cover’. Its subject is *rumād* ‘ash’, its object the resumptive pronoun *-hi*, which refers back to the head noun *šāriḥ* ‘street’.

### 3.4 Structural analysis

The data presented in the previous section tell us several things. First, they tell us that both participial and adjectival phrases can contain a resumptive pronoun. Second, they tell us that nominative case is available inside the attribute phrase, witness the nominative case on the overt subjects. Both facts support our earlier assumption that in cases where the subject of the attributive phrase is (coreferential with) the head noun, this subject is realized as *pro*. Adopting *pro* in such contexts means that we can ascribe the same structure to all attributive structures, be they with or without overt subject: they contain a resumptive pronoun that is coreferential with the head noun.

The structure that we ascribe to participles is now straightforward. First, as in German, a *v*-projection must be present. Furthermore, we need a projection that establishes agreement between the subject and the participle. We take this process to be analogous to subject-verb agreement, in that it is responsible for assigning the  $\varphi$ -features to the predicate and case to the subject. We label this head I, since T would be a misnomer, given the lack of tense.<sup>28</sup> In order to derive the proper word order, we simply assume that the participle moves to T, while the subject, although probed by T, is not raised. Nothing in the present discussion depends on this, however.<sup>29</sup>



Note that this structure differs from German in one respect. In German the T/I head does *not* establish subject-predicate agreement. Subject-Verb agreement in German is tied to the presence of tense. In Arabic, the two are separate, so that a T/I head without tense can still show agreement.<sup>30</sup>

Participles that have no overt subject have the same structure, with *pro* occupying subject position:

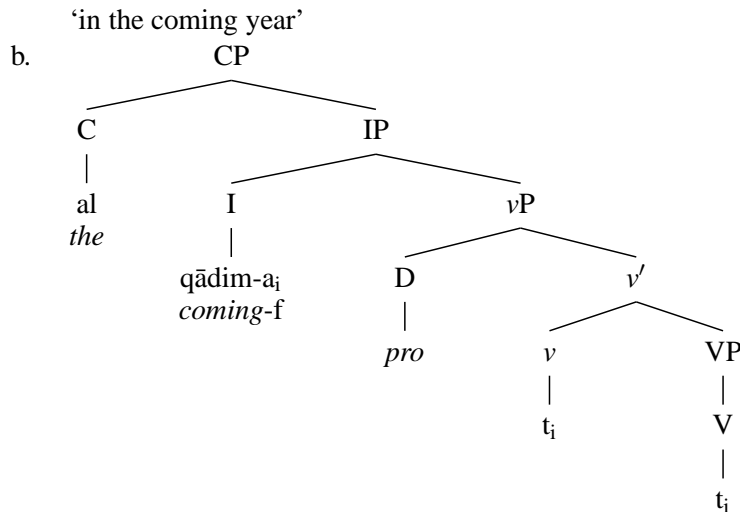
- (40) a. fī -l-san-at-i      -l-qādim-at-i  
in the-year-f-GEN the-coming-f-NOM

<sup>27</sup>The citation form of *muḡattī*.

<sup>28</sup>However, as noted in footnote 7, nothing really hinges on this categorization.

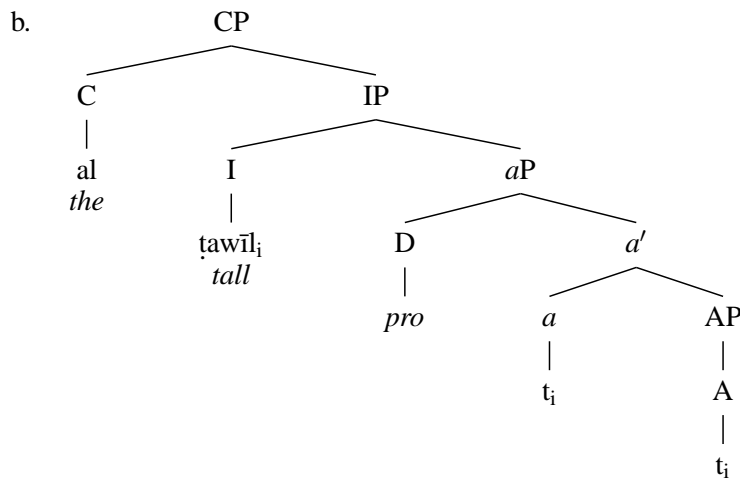
<sup>29</sup>Alternatively, it could be argued that the participle moves to C, and the subject to Spec,IP, which would be in line with the assumption that EPP on T is universal.

<sup>30</sup>The only non-finite verb forms that exist in Arabic are participles, which do indeed show agreement, as we have seen. There are no verbal infinitives to test this hypothesis with. What is sometimes called the “infinitive” of the Arabic verb is a gerund-like deverbal noun.



Adjectives, as shown by the data in the previous section, also allow a resumptive pronoun. As in the case of participles, we assume that in fact they always contain one. Again, we adopt an *a* head equivalent to *v*, providing a position for the subject. Furthermore, the I head that we assumed for participles is also present here. In this respect, Arabic adjectives differ from German ones, which lack an inflectional head (see the tree structure in (21)). The reason for this is the fact that Arabic adjectives have features for gender and number, as discussed above in example (34),

- (41) a. al-rağul-u    -l-ṭawīl-u  
 the-man-NOM the-tall-NOM  
 'the tall man'



The I head in these structures is actually of great relevance. It establishes agreement between the predicate and its subject, and assigns nominative case to the latter. This means that the attribute's subject is *not*  $\varphi$ -defective. That is, in this respect Arabic adjectival and participial attributes are like German relative clauses.

### 3.5 CGN-C in Arabic

Nothing has been said yet about the C head in the Arabic attributive structures. As shown in section 3.2, attributive adjectives and participles agree in definiteness with the head noun. In our tree structures above, we have placed the determiner *al-* that marks this agreement in the head position of C. It will be obvious to the reader that we intend to argue that this C head is actually a CGN-C head.

Evidence for this position comes from Arabic relative clauses, which so far we have not discussed. Essentially, a relative clause in Arabic consists of a CP headed by the relative clause marker *alladī*. The relative clause follows the head noun (after any adjectives, participles or PP modifiers), and shows no special word order or any other special properties, apart from the fact that it contains a resumptive pronoun referring back to the head noun. In the following examples, the resumptive pronoun is italicized:<sup>31</sup>

- (42) al-rağul-u    -llađī    ra?aytu-*hu*    ?amsi  
 the-man-NOM REL.m.sg saw.1sg-*him* yesterday  
 ‘the man that I saw yesterday’

The relative marker agrees with the head noun in number and gender. If the head noun is feminine, the relative marker becomes *allatī*:

- (43) al-mar?-at-u    -llatī    ra?aytu-*hā*    ?amsi  
 the-woman-f-NOM REL.f.sg saw.1sg-*her* yesterday  
 ‘the woman that I saw yesterday’

Similarly, with plural head nouns, the relative marker takes the form *alladīna* for masculine and *allatī* for feminine nouns:

- (44) a. al-riğāl-u    -llađīna    ra?aytu-*hum*    ?amsi  
 the-men-NOM REL.m.pl saw.1sg-*them.m* yesterday  
 ‘the men that I saw yesterday’  
 b. al-nisā?-u    -llatī    ra?aytu-*hunna*    ?amsi  
 the-women-NOM REL.f.pl saw.1sg-*them.f* yesterday  
 ‘the women that I saw yesterday’

Apart from singular and plural, Arabic also has a dual number. Dual on nouns and adjectives is marked with the ending *-āni* for nominative and *-ayni* for both genitive and accusative. The relative marker *alladī* has a dual form as well. This is in fact the only form that shows case, all the other forms being invariable for case. Interestingly, the case marking on the relative marker agrees with the case of the head noun, *not* with the case of the resumptive pronoun in the relative clause:

- (45) a. al-rağul-āni    -llađāni    ra?aytu-*humā*    ?amsi  
 the-man-du.NOM REL.du.m.NOM saw.1sg-*them(du.m)* yesterday  
 ‘the two men that I saw yesterday’  
 b. li -l-mar?-at-ayni    -llatayni    waşal-at-ā    ?amsi  
 to the-woman-f-du.GEN REL.du.f.GEN arrived-f-du yesterday  
 ‘to the two women that arrived yesterday’

The head noun in (45a), *rağulāni* ‘the two men’ has nominative case. The resumptive pronoun in

<sup>31</sup>Note that this resumptive pronoun is morphologically a normal pronoun. In other words, a relative clause is not distinguished from main or embedded clauses except by the form of its C head.

the relative clause is the object of the verb, and therefore has accusative case. The case of the relative marker is nominative, in agreement with the head noun. In (45b), things are reversed: the head noun *al-marʔ-at-ayni* ‘the two women’ has genitive case, while the resumptive pronoun (which is *pro* here, subject of the verb) is nominative. The relative marker shows genitive case, in agreement with the head noun.

Apart from agreement in gender, number, and case, the relative marker also shows agreement in definiteness. When a relative clause modifies an indefinite noun, the relative marker is obligatorily dropped:<sup>32</sup>

- (46) a. suʔāl-u-n            (\*allādī) lā yusʔalu  
question-NOM-IND (\*REL) not ask.3sg.m.PASS  
‘a question that is not asked’
- b. radd-u-n            (\*allādī) lan ʔafhama-*hu*        ʔabadan  
answer-NOM-IND (\*REL) not understand.1sg-*it* ever  
‘a reaction I will never understand’

That is, we have a full set of case, definiteness, gender and number features on the relative marker. These features are not, however, lexical features of the relative marker. Rather, they function to signal the fact that the clause is an attribute, instead of having independent reference. In other words, they do exactly what CGN-C does in German. The only difference appears to be that in Arabic, this C head has a definiteness feature alongside its case, gender and number features, and would therefore more appropriately be called CDGN-C.<sup>33</sup>

Note, by the way, that both German *op* and the pronoun in Arabic have number and gender (and definiteness) features because they are referential. Their case feature is assigned, in the manner discussed. We make a similar assumption for the features on C(D)GN-C: they are given, because they are needed to restrict the reference of the noun phrase they are attached to.<sup>34</sup>

Recall that in German, the CGN-C head is endowed with an EPP feature, so that CGN-C must attract an element from the attributive clause. The feature values of CGN-C determine the element that it can attract, in the sense that it must be an element with exactly those feature values. It is the operator, which is coreferential with the head noun, that matches this requirement. As a result, *op* ends up in a position in which its case feature can be valued.

In contrast, the Arabic CDGN-C head, although endowed with a set of case, definiteness, gender and number features, does not have an EPP feature and therefore does not attract any element from the attributive clause. The coreferential element in the clause, we have argued, is not a  $\varphi$ -defective operator, but a pronoun, either overt or *pro*, which is  $\varphi$ -complete. Given the availability of nominative case in the attributive clause, the pronoun does not need to move to Spec,CP to be assigned case from

<sup>32</sup>In fact, as Wright (1981, i-270) points out, the relative marker *allādī* is historically composed of the definite article *al-* plus an emphatic marker *la* and an emphatic pronoun *dā/dū*. Given the presence of the definite article, it is no surprise that it actually functions as a marker of definiteness.

<sup>33</sup>One may argue that the German CGN-C head has a definiteness feature as well, given that the morphological form of the CGN-C head is dependent on the definiteness of the head noun. (Cf. footnote 2. However, German adjectives show three inflectional paradigms: one with nouns that have a definite determiner, one with nouns with an indefinite determiner, and a third one with nouns that have no (overt) determiner at all. It is not entirely clear how this fact is to be analyzed, so we leave the matter open here.

<sup>34</sup>In fact, the main point here is that G(D)GN-C has the features that it has because it is in a local configuration with the head noun. It does not seem inconceivable to develop an account of C(D)GN-C in terms of uninterpretable features with some formalized notion of feature inheritance inside the local (DP) domain. We will not attempt to do so here, as it would divert attention from the main point we wish to make about attribution.

outside. The CDGN-features on the Arabic CDGN-C head therefore only establish the structure as an attribute, they do not identify the coreferential argument inside the clause.

What this means is that there is no syntactic mechanism in Arabic that identifies the coreferential argument. Indeed, if more than one pronoun occurs in the attributive phrase that is feature-compatible with the head noun, there is no way of telling which argument is coreferential. The relative clause in (47), for example, has a 3sg masculine object pronoun *-hu*, and a subject *pro* with the same features. As a result, the phrase has two possible readings:

- (47) al-rağul-u    -llađī    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 section 2.3.3, we established that because German participial attributes realize the coreferential argument with a defective *op*, they can only relativize their highest argument, and furthermore, they cannot relativize arguments with lexical cases. Given that Arabic does not identify the coreferential argument with a defective *op*, and that nominative case is available for the highest argument, we would expect that neither of these restrictions apply in Arabic. First of all, as seen in section 3.3, Arabic can relativize other arguments besides the highest one in adjectival and participial attributes. In fact, there is not even a restriction that the relativized element is an argument of the attributive predicate. It may also be embedded inside one, as shown in example (37c).

As for the second restriction, Arabic does not have lexical case, but we can test the prediction with prepositional arguments, which are essentially similar. The verb *ḥakama* ‘to judge, to sentence’, for example, is construed with two prepositional objects in Arabic: *ʕalā* ‘on’ for the person being judged, and *bi* ‘with’ for the sentence being passed:

- (48) a. yaḥkumu    -l-ḥākim-u    ʕalā -l-muttahim-īna    bi    -l-iʕdām-i  
 sentence.3sg.m the-judge-NOM on the-accused-pl.GEN with the-execution-GEN  
 ‘the judge sentenced the defendants to death’  
 b. al-muttahim-ūna    -l-maḥkūm-u    ʕalay-*him* bi    -l-iʕdām-i  
 the-accused-PL.NOM the-sentenced.sg-NOM on-*them* with the-execution-GEN  
 ‘the defendants that are sentenced to death’

In (48b), *maḥkūm*, the passive participle of *ḥakama*, modifies the noun *al-muttahimūna* ‘the accused’. This head noun is taken up by the resumptive pronoun *-him* on the preposition *ʕalā*.<sup>35</sup> Note that the participial construction is an impersonal passive: the participle has default 3rd person masculine singular features. In other words, it is possible in Arabic for a participle to relativize a prepositional argument, so that the second restriction that holds for German participles indeed does not hold in Arabic either.

## 4 English

Having presented a detailed analysis of German and Arabic attributive structures, we now take a quick look at English. We assume that the reader is familiar with English attributes, so we will limit ourselves here to a rather short comparison. In English, many of the complex ‘sentential’ features found in German and Standard Arabic attributes can only be replicated in post-nominal,  $\varphi$ -complete

<sup>35</sup> *ʕalā* changes to *ʕalay-* when combined with a suffix pronoun.

relative clauses. In these constructions, the relativized element can be both an argument or an adjunct:

- (49)      the cake which I eat      *relativized object*  
             the man who sees me      *relativized subject*  
             the house in which I live      *relativized adjunct PP*  
             ...

In (49), the *wh*-element is the relativizing operator, similar to German *welch-* (and unlike Arabic *alladī*, which has different properties, as we have seen above). Given this array of options, we have to conclude that the English attributive head features the same kind of feature make-up as its German equivalent: the attributive head serves to implement the identification of the relativized element, and the range of admissible relativized phrases seems to be the same as in German. However, English has no attributive agreement morphology. Thus, we assume that the relevant attributive head is simply phonologically null.

English *that*-relatives, we assume, are similar, the one difference being that it is the C-head that is overtly realized, not the operator. That is, *that*-relatives contain an overt CGN-C head, albeit with a single, invariable morphological realization. A third option, at least when the object is relativized, is to realize both operator and C-head covertly:

- (50)      the cake  $\emptyset_{op}$   $\emptyset_C$  I eat

Hence, it has standardly been assumed that English features a phonologically null operator which, however, behaves just like its overt equivalents (cf. amongst others, Aoun & Clark (1985), Chomsky 1982, Contreras 1993). Note that in some varieties of English, this operator can be used as a subject as well:

- (51)      there's a man wants to see you  
             (Fabb 1994, 3521)

We regard the presence of this empty operator to be a purely lexical phenomenon which separates English from, say, German. As far as  $\varphi$ -complete relative clauses go, we think that syntactic differences should turn out to be rather limited, and often do not compare straightforwardly. For example, an empty operator does not pied-pipe a preposition, like overt relative pronouns do. So *which* in English and *d-* in German can pied-pipe a pronoun, as in (52), but (53b), with a covert operator, is ungrammatical:

- (52)      a.    the garden in which I live  
             b.    der Garten, in dem ich lebe  
                   the garden, in that I live
- (53)      a.    the garden I live in  
             b.    \*the garden in  $\emptyset$  I live

However, German simply has no covert operator for  $\varphi$ -complete attributes to compare these structures to. The phenomenon seems to us to boil down to lexical differences without fundamental consequences.

Major differences between English and both German and Arabic, however, can be found when it comes to  $\varphi$ -defective attributive structures. Here, English does not show the 'complex' type of attributes that German and Arabic have:

- (54) a. der den Kuchen essende Mann  
 the.NOM the.ACC cake eating man  
 ‘the man that’s eating the cake’  
 b. \*the the cake eating man
- (55) a. der vom Wind überraschte Seemann  
 the by.the wind surprised sailor  
 ‘the sailor that was surprised by the wind’  
 b. \*the by the wind surprised sailor

At least as far as prenominal attributes go, English seems to be restricted to implement attribution with only one lexical projection (i.e. of an adjective or participle head). The use of syntactic arguments or adjuncts in these projections is furthermore highly deviant. It seems, then, that English completely lacks the functional layers found in German and Arabic prenominal attributes, and therefore cannot license argument cases nor provide the attachment sites for adjunct PPs.

Importantly, now, the  $\nu$  and T found in attributive constructions in German and Arabic are not fundamentally different from their equivalent elements in non-attributive clauses. Thus, it should not be necessary for English to implement  $\varphi$ -defective attribution with any ‘specialized’  $\nu$  or T heads, either. The simplest assumption, then, would be to conclude that English simply does not feature an attributive  $\varphi$ -defective C head for use in the prenominal position: thus, English lacks the possibility to re-map  $\varphi$ -defective  $\nu$ /T projections in order to use them in attributive constructions.

In the postnominal position,  $\varphi$ -complete relative clauses show a comparable behavior to, e.g., their German equivalents.<sup>36</sup> To sum up, English seems to lack a  $\varphi$ -defective attributive C head, but not its  $\varphi$ -complete sibling.

## 5 Establishing Attribution

In the previous sections, we have shown that in both German and Arabic, attributive structures are essentially full predicational structures embedded under a C head that turns the structure into an attribute. What, however, is it exactly that this C head does?

An attributive structure consists of a phrase that expresses a complete predication. The attributive structure may have an adjectival base, with the functional projection  $a$ , and possibly an inflectional head. This yields an adjectival attribute. Alternatively, the attribute phrase may have a verbal base. In this case, it may have a non-finite T/I head, yielding a participial structure, or it may have a finite T head, giving rise to a relative clause.

With the proper functional projections, such a structure could in principle establish reference to a set of indices on its own. Instead, what happens in an attributive structure is that the phrase becomes the complement of a C head whose task it is to disable the independent reference of the phrase, and instead signal that the phrase modifies the reference of the nominal structure to which it is adjoined. The C head has this ability by virtue of the case, gender and number (and in Arabic, definiteness) features that it has.<sup>37</sup>

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<sup>36</sup>There is another type of attributive construction in English that we do not discuss here: postnominally, complex  $\varphi$ -defective attributes seem to exist (*the man eating the cake*). However, we are not sure whether these constructions actually parallel the German constructions enough to be considered instantiations of the same referential head. We will have to leave this question open for further research.

<sup>37</sup>We assume that the modified noun may be phonologically null in the languages under discussion, allowing for nominalized adjectives and headless relative clauses.

Note that we refer to the relevant head as a C head, not as a D head, in spite of the fact that it is characterized by a set of C(D)GN-features: we consider both C and D instantiations of the same head. As discussed by Struckmeier (2007), the C head under consideration fills a gap in the typology of C/D heads. Let us say that the (traditional) C head expresses reference to indices and the D head reference to individuals. Now, there are in fact two types of C heads: the type found in main clauses, which establishes independent index reference, and the type found in subclauses, which does not refer itself, but instead restricts the reference of its matrix clause.

The D head of a noun phrase is equivalent to the first type of C head: it establishes an independent reference to individuals. The question one may ask is: is there a D head equivalent to the second kind of C head? We argue that the answer to this question is yes: the C head endowed with C(D)GN-features embeds a phrase that no longer has independent reference, but instead restricts the reference of the noun phrase it is embedded in.

The following table summarizes the different types of C/D heads (Struckmeier 2007, p.95ff):

(56)

	index reference	individual reference
independent	C <sub>main</sub>	Det
restrictive	C <sub>compl</sub>	C <sub>C(D)GN</sub>

Embedding a phrase under a C<sub>C(D)GN</sub> head alone is not sufficient for establishing the attribution structure. One argument in the attributive structure must be coreferential with the head noun for attribution to be possible at all. This coreference can be established syntactically, but it does not have to be. German uses an operator, either defective *op*, or *d-/welch-*, to syntactically signal coreference. Arabic relies on semantic and pragmatic factors, realizing the coreferential argument with a resumptive pronoun: no syntactic relation is established, instead  $\varphi$ -feature compatibility (between resumptive pronoun and head noun) and pragmatic plausibility (in case of ambiguity) must identify the coreferential argument.

These observations establish two parameters operative in attributive constructions: [ $\pm$ IDENT] (i.e., syntactic vs. non-syntactic identification), and [ $\pm\varphi$ -compl] (i.e.  $\varphi$ -complete vs.  $\varphi$ -defective subject-predicate agreement). [ $\pm$ IDENT] generally distinguishes attributive structures in Arabic from those in German. [ $\pm\varphi$ -compl] distinguishes German relative clauses from German adjectival and participial attributes, since in German  $\varphi$ -completeness of subject-predicate agreement depends on the presence of tense. In Arabic,  $\varphi$ -complete agreement can exist in tenseless contexts.

A third parameter that is relevant to attributive structures is [ $\pm$ EPP]: if C(D)GN-C has an EPP feature, it attracts an argument from the attributive clause, identifying this argument as the one that is coreferential with the head noun. Note that the EPP feature is only relevant for structures that are [+IDENT]. The C-head of a [-IDENT] attribute is incompatible with an EPP feature, because raising of the coreferential argument identifies it.

This implication goes one way only, however: [-EPP] does not imply [-IDENT], so that attributes with the feature matrix [ $\varphi$ -complete, +IDENT, -EPP] should be possible. This would require another method to syntactically identify the coreferential argument, but such methods are not inconceivable: relative clauses with *in situ* operators would constitute a relevant example.<sup>38</sup>

However, the combination of [+IDENT, -EPP] only makes sense in  $\varphi$ -complete contexts. If C(D)GN-C is not endowed with an EPP-feature, it does not attract the operator. Given that the attribute is  $\varphi$ -defective, the operator (the highest argument) will fail to have case, leading to ungrammaticality. For this reason, we expect the feature matrix [ $\varphi$ -defective, +IDENT, -EPP] to be impossible.

<sup>38</sup>Note that resumptive pronouns do *not* fall into this class, as they are generally morphologically identical to “normal” pronouns, and therefore cannot uniquely identify the coreferential argument (cf. example (47)).

German has two types of attributes: relative clauses have the matrix [ $\varphi$ -complete, +IDENT, +EPP], while adjectival and participial attributes have [ $\varphi$ -defective, +IDENT, +EPP]. Arabic attributes, as we have seen, always have the feature matrix [ $\varphi$ -complete, –IDENT]. The EPP feature is irrelevant here, as just discussed.

This leaves one feature combination: [ $\varphi$ -defective, –IDENT]. There is no *a priori* reason why this combination should not occur, although with a twist. Recall that the complex attribute's CGN-C projection constitutes a phase boundary. Any  $\varphi$ -defective predicate contained within the CGN-C will leave its highest argument without a valued case feature. The attributive CP being a phase, the argument with the unvalued case feature must be moved to the specifier of CGN-C, in order to receive its value in the phase edge, in accordance with the PIC. Hence, if CGN-C contains no EPP at all, no raising to the edge is possible and the structure is ruled out for reasons of case.

However, if the highest argument of the attributive predicate is PRO, case considerations apply only in very different ways. At first glance, Middle High German seems to be a case in point. Participles in this language seem to allow for something like an arbitrary PRO to occupy their subject position attributively:

- (57) ein lebendez obez  
 a living fruit  
 'a fruit that makes X live'  
 not: 'a fruit that lives'  
 (cf. Thim-Mabrey 1990, 374)

In the same way, cf.:

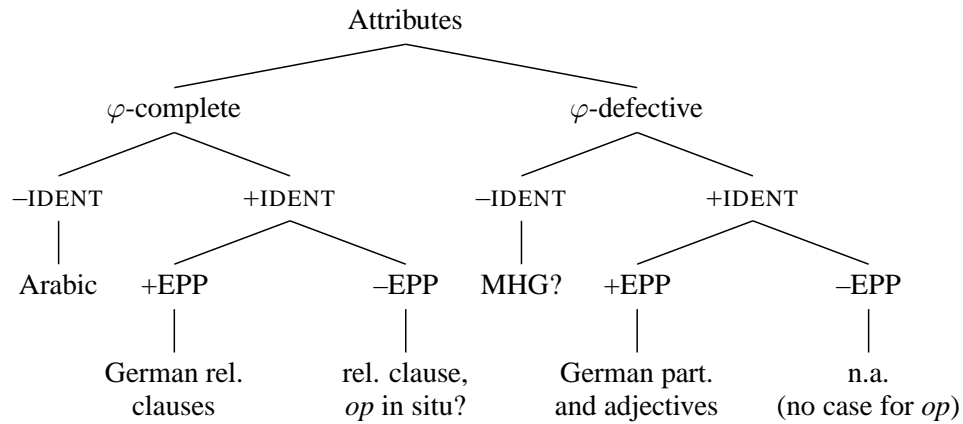
- (58) a. mit [...] lidender bitterkeit  
 with [...] suffering bitterness  
 'with the bitterness that makes X suffer'  
 b. des armen klaengdiu armout  
 the poor's moaning poverty  
 'the poverty that makes X/the poor person suffer'  
 (cf. Thim-Mabrey 1990, 375ff.)

However, these example may not pertain directly to the discussion here. The functional layers found above the lexical projection of the New High German participle seem to be absent: the Middle High German participle, unlike its modern-day counterpart, licenses no object arguments and thus cannot be shown to project  $vP$ , constitute a binding domain etc. Arguably, then, Middle High German attributes do not constitute the complex type of CGN-C projection described in this paper.

However, we consider it very likely that attributes in other languages might project the full argument structure/tense/aspect of a predicate, and still allow for an arbitrary PRO subject. These constructions would work as examples for the feature set [ $\varphi$ -defective, –IDENT, –EPP], insofar as the arbitrary PRO argument need not be assigned a (non-default) case feature at all. The only other option for case valuing of the highest argument of a  $\varphi$ -defective predicate would be to conclude that the phase head itself can value the argument's case. While we do not assume that the CGN-C heads described in this paper can do this, one might wonder whether prepositional heads used in attributive PPs might turn out to show properties of attributive phase heads. We will have to leave the matter open here (but cf. Struckmeier 2007 for some speculative thoughts on these constructions).

The diagram in (59) gives an overview of the various types of attributes that we predict are possible:

(59)



The fact that the relativized element in German must be identified by CGN-C through the latter's EPP feature means that it must be a direct constituent of the predicate, either an argument or an adjunct: the relativized element must be able to raise to Spec,CP, so that the standard restrictions on raising apply. Arabic, on the other hand, does not employ syntactic identification and realizes the relativized element with a  $\varphi$ -complete item. Therefore, no raising restrictions apply, so that not only an argument or adjunct of the predicate itself, but any element embedded in an argument or adjunct can be relativized.

Arabic has this ability by virtue of the fact that it can establish  $\varphi$ -complete subject-predicate agreement in tenseless contexts, unlike German. This also means that the presence or absence of tense plays less of a role in Arabic. It determines whether the resulting attribute is a relative clause or a participle, but nothing more. In German, it also forces  $\varphi$ -defective or  $\varphi$ -complete subject-predicate agreement, resulting in the consequences discussed above.

## 6 Summary and conclusions

In this paper, we have argued for the following points:

- Attribution structures consist of full predicational structures embedded in attributivizing C projections, whose head is endowed with a set of C(D)GN-features.
- Adjectives have an adjectival base, with a functional shell consisting of projections of the heads *a* and I. Participles have a verbal base and a T projection that is non-finite. Relative clauses also have a verbal base, but instead have a finite T head.
- For attribution to be possible, two things must take place: **a)** the predicational structure must be marked as attributive; and **b)** one argument in the predicational structure must be coreferential with the head noun.
- It is the C(D)GN-features of the C head that turn the structure into an attribute by cancelling the independent reference of the phrase.
- Marking an argument as coreferential with the head noun can be done syntactically, by realizing the argument as an operator that moves to Spec,CP (and possibly in other ways as well). Alternatively, it is possible to rely on semantic/pragmatic factors.

- The edge of the attributive CP is permeable for defective Agree: the case feature of the operator in  $\varphi$ -defective contexts is assigned through defective Agree with the probe that assigns the head noun's case feature.

In this way, we come to a unified analysis of attribution structures in the languages discussed. Furthermore, the overview of attributive types given in (59) should provide a starting point for a feature-driven minimalist analysis of attributive structures cross-linguistically.

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