Post-nominal genitives and prepositional phrases in German: a uniform analysis*

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1. Introduction

Adnominal genitives and prepositional phrases (PPs) have a wide range of interpretations. For instance, they may be interpreted as arguments of an event nominalization or a relational noun. They may also express possession or some general associative relation, cf. the German Determiner Phrases (DPs) in (1):

(1) a. *die Zerstörung der / von der Stadt*
the destruction the-GEN / of the city
'the destruction of the city'

b. *die Schwester des Angeklagten*
the sister the-GEN defendant
'the sister of the defendant'

c. *der Rechner meines Kollegen*
the computer my-GEN colleague
'the computer of my colleague's'

In (1a), both the genitive *der Stadt* ('of the city') as well as the *von* ('of') phrase have a preferred interpretation as the object of destruction, whereas in (1b), the genitive *des Angeklagten* ('of the defendant') is most likely to be interpreted as the sibling of the individual referred to by *Schwester* (`sister'). In (1c), the noun phrase *meines Kollegen* ('of my colleague's') is preferably interpreted as the possessor of the computer, or otherwise associated with it, e.g. as someone using it or similar.[1]

There is broad consensus in the literature on adnominal genitives that their interpretation in e.g. (1a) and (1b) is restrained by the head noun of the complex DP, the event noun *Zerstörung* ('destruction') and the relational noun *Schwester* ('sister'), respectively. This can be accounted for by analyzing event nouns and relational nouns as involving argument relations. Simi-

larly, there is widespread agreement that the relatively free relation between the genitive *meines Kollegen* ('of my colleague's') and the head noun *Rechner* ('computer') in (1c) is due to the lack of an argument relation in *Rechner*, which is neither eventive nor relational.

In a number of analyses, the difference between the interpretation of a genitive as corresponding to a theme or agent argument of a verb underlying a de-verbal nominalization on the one hand – henceforth referred to as the agent and theme arguments of the nominalization – and the interpretation of a genitive as a possessor or as more broadly associated with the noun in question, is also assumed to have a syntactic correspondence: The semantic behaviour is accounted for not only by referring to the fact that nominalizations such as *destruction* involve an agent or theme argument semantically, whereas nouns such as *computer* have no arguments, but also by assuming different syntactic positions in these two cases. Thus, for instance, for genitive theme arguments, a syntactic position parallel to that of the direct object of verbal projections is assumed (correspondingly, a separate position may be assumed for agent arguments). For possessives or other associative genitives, however, a different position is assumed, possibly as a sister of a nominal head or adjoined to the noun phrase. This approach is most prominently pursued in work in Distributed Morphology (DM; cf. e.g. Alexiadou 2001).[2]

While I do not dispute the basic semantic insights concerning the above data, I take a different view on the syntax-semantics interface in arguing that in German, post-nominal genitives should all be analyzed uniformly syntactically as well as semantically. More concretely, I assume that there is no syntactic argument position for post-nominal genitives. Instead, they are analyzed as Nominal Phrase (NP) adjuncts in a surface-oriented approach to syntax. The genitives may still be interpreted as arguments semantically, although they are introduced by the same underspecified semantic relation in all cases. The interpretational variation between agents, themes and possessors is due to the fact that the underspecified semantic representation of the genitive may relate differently to the various NPs to which it is adjoined. I also show how the post-nominal PP realization of arguments may be handled in this approach.[3]

The main claims of my approach may be summarized as follows:

– All post-nominal genitives and PPs are adjoined to NPs, assuming DP to be the highest functional projection dominating a noun phrase.

– All post-nominal genitives are represented semantically by the underspecified two-place relation ρ (rho). Being underspecified, this relation may be instantiated differently, which is what gives us the different interpretations of post-nominal genitives. For PPs the semantic picture is somewhat more diverse, but still compatible with this assumption.

My main goal is to show that a uniform semantic analysis is possible for the phenomena under discussion without the complex syntactic machinery which is often assumed. Since I focus only on German data, I have to leave the discussion of an application of the analysis to other languages for future research.[4]

The paper is organized as follows. In Section 2, I present the details of the syntactic analysis, discussing the alternatives sketched above and providing motivation for the approach I pursue. In Section 3, the semantics of post-nominal genitives and argument-introducing PPs is presented in detail. Section 4 concludes the paper.

2. A surface-oriented syntax for German DPs

In this section, I explore some important aspects of the syntax of German DPs, motivating the assumption of a uniform syntactic analysis for post-nominal genitives and argument-introducing PPs. I focus on DPs which embed NPs that are headed by (event) nominalizations derived by means of the suffix *-ung* (sharing properties with e.g. both *-ation* and *-ing* in English).[5]

Such nominalizations are mostly thought of as being de-verbal, inheriting the selectional properties of the underlying predicate (for details on *-ung* nominalizations cf. e.g. Ehrich and Rapp 2000; Roßdeutscher and Kamp this volume): For instance, *Anmeldung* ('registration') may be assumed to be derived from *anmelden* ('to register'). For reasons of space, I only discuss those features of the structure of these DPs that I see as relevant for the semantic analysis which is presented in Section 2. I merely briefly touch upon issues of case marking and I also ignore any functional projections below DP such as Number or Gender Phrases (cf. Alexiadou 2001).

In German, genitives may be post- or pre-nominal. My analysis is restricted to post-nominal genitives since in German pre- and post-nominal genitives have differing distributions: Pre-nominal genitives may be argued to be restricted to involving personal names in Modern German (cf. Hartmann and Zimmermann 2002: 174, and references therein).[6]

On the other hand, I also include such post-nominal PPs which may be associated with the arguments of a nominalization, namely *von* ('of') and *durch* ('by') phrases (excluding PP complements, see endnote no. 3):[7]

(2) a. *die Plünderung der / von der Tankstelle durch Punks*
the looting the-GEN / of the petrol station by punks
'the looting of the petrol station by punks'
b. *die Anmeldung der Kinder durch ihre Mütter*
the registration the-GEN children by their mothers
'the registration of the children by their mothers'

As already stated in Section 1, I treat both the genitives as well as the *von* and *durch* phrases as NP adjuncts. Thus, the DP in (2a) is assigned a structure as in Figure 1 (shown only for the genitive, see the comments on the relation between genitives and *von* phrases below, especially in the discussion of example (7)). Importantly, in the case of a DP such as in (1c), the non-argument genitive *meines Kollegen* is assumed to occupy the same position as the argument genitive *der Tankstelle* in Figure 1.

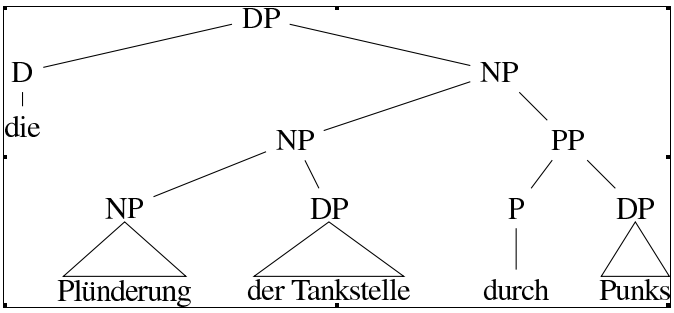

Figure 1: Genitives and prepositional phrases adjoining to NP

It should be noted that an adnominal genitive can only semantically modify a nominal phrase to which it is strictly adjacent. Consequently, the theme argument interpretation of the genitive in (2a) cannot be preserved if the order of *durch* PP and genitive phrase is reversed, cf. (3):

(3) *die Plünderung durch Punks der Tankstelle*
the looting by punks the-GEN petrol station
'the looting by punks from the petrol station'

In (3), the genitive *der Tankstelle* ('of the petrol station') may only be interpreted as the petrol station with which the punks are somehow associated, possibly as the station where they hang around, but crucially not as the theme argument of the nominalization *Plünderung* ('plundering'). One may thus assume that the DP *der Tankstelle* is adjoined to the NP *Punks* ('punks') as part of the *durch* phrase. Consequently, a formalization of this strict adjacency constraint should make reference to the linear order of two noun phrases. See Frank (2003) for an implementation in the surface-oriented framework of Lexical-Functional Grammar.

As mentioned above, I treat post-nominal *von* phrases and genitives as equivalent in German, reducing *von* to a case marker. This is motivated by the fact that since in general no case marking is allowed on bare nouns in German, *von* sometimes has to be used instead of the genitive, as e.g. in some occurrences of mass nouns. This view is certainly somewhat too simplified, but I cannot go into this issue in great detail. See, however, the remarks on PP attachment and c-command in the discussion of example (7) below.

Case marking is assumed to be structural, genitive case being assigned in a uniform way to the DPs strictly adjoined to a NP. Thus, there is no differentiation with respect to case assignment for arguments and non-arguments, respectively (see the below remarks on case assignment in Distributed Morphology for a different approach).

Before discussing the motivation for my own approach, some further remarks on Distributed Morphology analyses and the arguments for assuming different syntactic positions for theme, agent and possessor genitives are in place. One of the main motivations behind the claim that Verbal Phrases (VPs) and DPs involving arguments should be treated in parallel, is the indisputable fact that de-verbal nominalizations share a number of features with the VPs they correspond to. Thus, in German, nominalized infinitives govern accusative case, cf. the DP *den Zylinder* ('the cylinder') in (4a), and for English it has for instance been claimed that *-ation* nominalizations allow adverbs such as *thoroughly* as modifiers, cf. (4b):

(4) a. *das den Zylinder in Drehbewegung Versetzen*
the the-ACC cylinder in rotation setting
'the setting-into-rotation of the cylinder'

b. *His explanation of the accident thoroughly (did not help him)*
(Fu, Roeper, and Borer 2001: 555)

In Distributed Morphology, this is accounted for by assuming that such nominalizations include structures which are verbal in nature. Thus, the nominalizing affix dominates a varying number of verbal projections, cf. the abstract tree structure representation in Figure 2 for the DP in (2a):

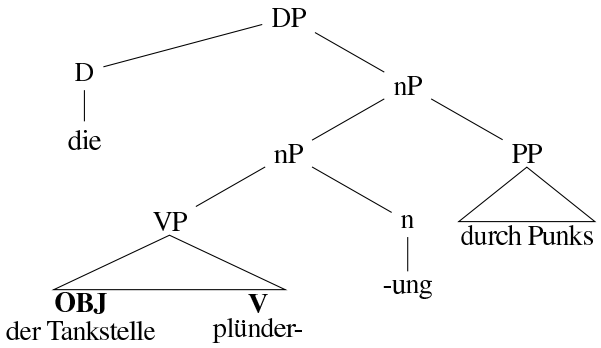

Figure 2: Simplified DM-style structure of de-verbal *-ung* nominalization

In this structure, VP is a shorthand notation for an extended VP, including at least a root Phrase (rP) and (little) vP. In addition, a number of functional projections may be included in the extended VP below the nominalizing n head, depending on the affix in question. Thus, for German, Roßdeutscher and Kamp (this volume) assume that *-ung* nominalizations do not include a Voice projection, whereas Alexiadou, Anagnostopoulou, and Schäfer (2009) argue for the inclusion of VoiceP in "passive" variants of nominalized infinitives, cf. (4a).

Concerning case marking, it may be noted that in Distributed Morphology analyses, assignment of genitive case to theme arguments is assumed to be structural, referring to parallel syntactic positions in VPs and DPs in this case as well. The variation in the assignment of accusative or genitive case is taken to be dependent on the absence or presence of a Determiner head, respectively (although the case feature itself may be located within other projections dominated by the DP, cf. Alexiadou 2001: 177–179). Thus, in Roßdeutscher and Kamp (this volume) a DP in the complement position in the root phrase, which would be the lowermost projection under VP, is assumed to be assigned genitive case *in situ*. As for non-arguments such as

possessives, slightly different case assigning mechanisms will have to be applied to in Distributed Morphology, since they are not assumed to occupy a VP-internal position. One possibility might be to assume a position adjacent to a nominal head (cf. e.g. Sternefeld 2007: 213–217).

The agentive *durch* phrase is assumed to be adjoined to the level of nP in the DM analysis (A. Roßdeutscher, F. Schäfer, personal communication). In the case of *-ung* nominalizations this is motivated by the above-mentioned claim that no VoiceP is included in the extended VP to which the *-ung* affix applies (Alexiadou et al. 2009; Roßdeutscher and Kamp this volume). Assuming that VoiceP is the only projection in the extended VP within which an agentive PP may be realized as an adjunct (Solstad 2007a; von Stechow 1996), there is no projection below nP in an *-ung* nominalization to which the *durch* phrase could be adjoined under the premise of structure-sharing between VPs and de-verbal nominalizations. Following the line of argument of Alexiadou et al. (2009), an nP adjunction site should be possible for agentive *durch* PPs, since *durch* is assumed (as in this paper and in Solstad:2007a) to introduce an agent relation on its own. Thus, it needs not be parasitic on an agentive relation introduced by the VoiceP. It should be remarked that this is not an issue which may be considered to be settled in Distributed Morphology.

The challenge to an approach not exploiting any of the mechanisms assumed in Distributed Morphology is to explain how it comes that in German, genitives in DPs and accusative objects in VPs may both be interpreted as theme arguments and that otherwise nominalizations and verbal projections share a number of features. Whereas the next section is devoted to answering the question of parallelism in interpretation, I have nothing much to say about the sharing of features here, which is a task that goes beyond the objective of this paper. It may be noted, though, that under the assumption of structure sharing between VPs and nominalizations, the fact that arguments are not obligatory realized in DPs – an aspect of nominalizations for which there is to my knowledge no convincing explanation (for discussion cf. Alexiadou 2009) – is rather puzzling. Regardless of these issues, we will see below that there exist widely known syntactico-semantic phenomena for which the current adjunction analysis offers a more straightforward explanation than the Distributed Morphology alternative.

What could count as evidence helping us to decide in favour of one or the other structure in Figure 1 and 2? It seems that one of the most prominent arguments for a split syntactic approach is related to the argument or non-argument status of the genitive. While I believe that it is indisputable that we have to differentiate between arguments and possessors in DPs se-

mantically, I do not think that intuitions concerning the argument status of genitives can be considered such evidence alone (cf. Partee and Borschev 2003: 72).

Relevant data to study involve for instance binding, extraction or quantification phenomena. In the following, I focus on binding phenomena. It may be noted that although extraction phenomena are also used for arguing that the theme argument is more deeply embedded than the agent argument (cf. e.g. Godard 1992) – a view which would be incompatible with the claims put forward in this paper – the proper treatment of the extraction data is far from clear. Thus, Kolliakou (1999) shows that there are numerous counter-examples to the data in Godard (1992) and that they should rather be viewed in light of the distinction between individual and property denotation.

I would like to emphasize that I do not consider the evidence that I present in what follows to be all-decisive with regard to the issue of which syntactic approach should be preferred. Ultimately, the aspects of DP-internal syntax touched upon so far involve theory-architectural issues which will hardly be decided on the basis of any single piece of evidence. However, I contend that the below binding data constitute a real challenge to non-lexicalist approaches such as those within Distributed Morphology. It should be added that these data, although comparable phenomena have been discussed extensively (Jackdendoff 1990; Larson 1988; Pesetsky 1995; Reinhart 1983), are all but trivial.

Turning now to the relevant binding data, consider the examples in (5), where the subscript *i* indicates the intended binding relations:[8]

(5) a. *die Anmeldung* [*der meisten Kinder*]$_i$ [*durch ihre*$_i$ *Mütter*]
the registration [the-GEN most children]$_i$ [by their$_i$ mothers]
'the registration of [most children]$_i$ by their$_i$ mothers'

b. **die Anmeldung* [*ihrer*$_i$ *Kinder*] [*durch* [*die meisten Mütter*]$_i$]
the registration [their-GEN$_i$ children] [by [the most mothers]$_i$]
'the registration of their children by most mothers'

For examples such as those in (5), it is widely agreed that the semantic binding relation between the DP containing the quantifier (e.g. *der meisten Kinder* ('of most children') in (5a)) and the pronoun embedded in the adjoined PP (for instance, *ihre Mütter* ('their mothers') in (5a)) should be re-

flected in a specific structural configuration between the two constituents: The pronoun in the *durch* phrase in (5a) should be c-commanded by the quantifier expression (cf. the seminal work of Reinhart 1983). Thus, according to this line of argument, (5b) is ungrammatical because the quantifier does not c-command the pronoun. One possible formulation of c-command is given below:[9]

> A node α c-commands a node β iff the node which immediately dominates α also dominates β and the following conditions hold: (i) β is not contained in α and (ii) $\alpha \neq \beta$.

If semantic binding is correlated with c-command, the data in (5) require that the genitive phrase containing the quantifier, i.e. the theme argument, should occupy a position structurally higher than that of the agentive *durch* phrase containing the bound pronoun.

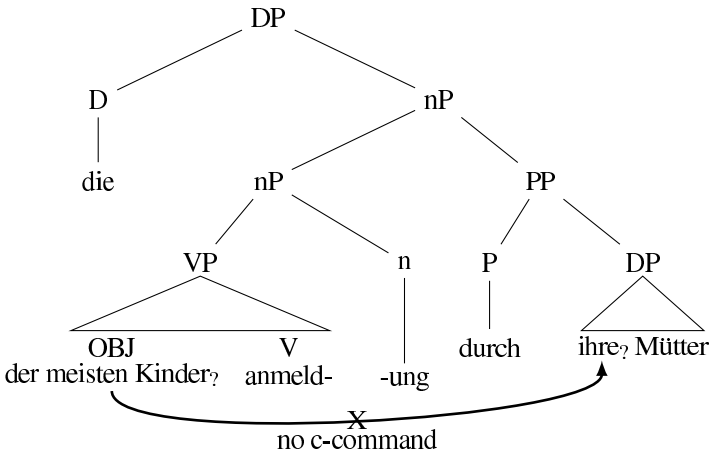

Figure 3: No binding between quantifier and pronoun on DM analysis

However, if we consider the Distributed Morphology structure for (5a) as given in Figure 3, the theme argument genitive is c-commanded by the *durch* phrase, not vice versa, cf. for instance Larson (1988); Jackendoff (1990: 430–436); Pesetsky (1995: 160–167) for discussion. Whether the DP containing the pronoun c-commands the quantifier depends on the status of PPs with regard to c-command, cf. Kuno, Takami, and Wu (2001: 137); Pesetsky (1995: 172–175). If they are considered to be transparent for c-

command relations, i.e. if their presence or absence does not make a difference (see below), binding would be possible. Either way, an analysis of the DP in (5a) such as in Figure 3 would seem to either fail in establishing the desired c-command relation or, even worse, wrongly predict that the grammaticality judgements in (5) should be reversed.

Now, to be sure, there are ways in which one could save the above Distributed Morphology analysis assuming structure sharing. One possible solution is to apply Pesetsky's (1995) cascade structures, akin to Larson's (1988) VP shell structures, which Pesetsky assumes to be relevant for c-command structures:

(6) [$_{vP}$ [$_{v}$ *anmeld-*] [$_{PP}$ [*der meisten Kinder*] [$_{P'}$ *durch* [$_{DP}$ *ihre Mütter*]]]]

In (6), the *durch* phrase complement is dominated by V and c-commanded by the genitive DP, whereby the general principle of "rightward is downward" (Pesetsky 1995: 160–162) is fulfilled. However, this structure is not in line with what we know about the behaviour of agentive PPs headed by *von* or *durch* as being adjoined above the vP level (Solstad 2007a). It would also conflict with our semantic assumptions for VoiceP: whereas *durch* in (6) is most plausibly taken to relate two individuals, Voice is normally assumed to involve a semantic relation between an event and individual (Kratzer 1996; von Stechow 1996): λxλe.AGENT(x)(e).

One could also adopt an approach in the spirit of Hoekstra (1999) or Grosz (2008), who analyze nominalized infinitives in Dutch and German, respectively (cf. example (4a)). For instance, Grosz (2008) assumes that the genitive is actually a-moved to a position higher than the subject *durch* phrase, thus creating a new position for the genitive to bind from. This movement operation would then have to be followed by "predicate fronting" (Grosz 2008) of the nominalization, involving the lower nP node in Figure 2.[10] However, although empirically more adequate than an approach along the lines of Pesetsky (1995), the assumptions of movement which this analysis rests on still seem to be rather thinly motivated, cf. the discussion in Grosz (2008) and the references therein.

Next, I show that the above binding data actually provide an argument in favour of my approach, since on an adjunct analysis they can be neatly analyzed without any movement operations while still applying a standard definition of c-command for the relation between the genitive DP and the *durch* phrase.

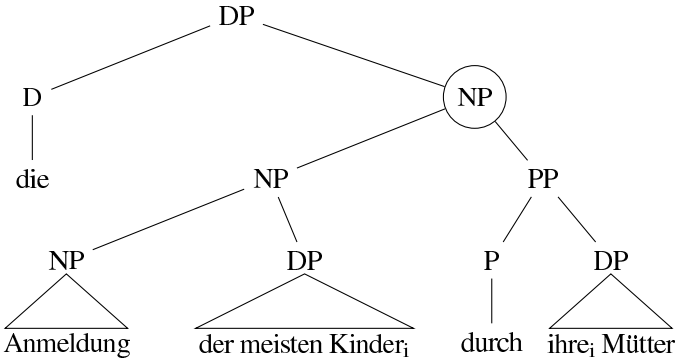

Figure 4: Genitives and PPs adjoining to NP; Structurally lower quantifier binding higher pronoun

In my analysis, the DP in (5a) is assigned a structure as in Figure 4. At first sight, it would seem that also in this tree structure, the genitive DP containing the quantifier would not be able to c-command the pronoun in the *durch* phrase, since the first node dominating the genitive DP does not dominate the PP. Rather, it would seem that it is the PP complement which does c-command the genitive DP, under the assumption of PP invisibility to c-command relations. Thus, the exact opposite grammaticality judgements of the generally accepted ones would be predicted, cf. (5). However, as we will see, it is of great importance that we are dealing with an adjunct structure, since in this case there are several conceptions of c-command not identical to the above, standard definition, which allow us to make the correct predictions with respect to the binding data in (5).

Thus, Chomsky (1986: 7), based on work by May (1985: 57), demands for domination in adjunction structures that it should involve categories as opposed to single nodes or segments: For a node α to be dominated by the category β it must be dominated by every segment of β (see also the discussion in Kayne 1994: 15–22).[11] In Figure 4, the category NP consists of the three NP nodes in the adjunction structure. It is only the topmost, encircled NP which dominates the genitive DP. The other NP nodes are merely segments of the category NP. Thus, the relevant node for domination of the genitive DP in Figure 4 is the encircled NP, and not the one directly dominating the DP, as one would assume for non-adjunction structures. Taking the distinction between categories and segments into account, we follow Kayne (1994: 16) in applying a category-based notion of c-command:

> X c-commands Y iff X and Y are categories and X excludes Y and every category that dominates X dominates Y.

According to this definition, the genitive DP ("X" in Kayne's definition) c-commands the PP complement ("Y" in Kayne's defintion), since they are both categories and the only category that dominates them both is the top-most, encircled NP. It may be noted that in effect, this definition comes close to standard formulations of m-command, which refer to maximal projections instead of immediately dominating nodes.

Alternatively, the definition in Reinhart (1983: 23) would also provide the desired c-command relation between the genitive DP and the PP complement:

> Node A c(onstituent)-commands node B iff the branching node α_1 most immediately dominating A either dominates B or is immediately dominated by a node α_2 which dominates B, and α_2 is of the same category type as α_1.

In this case, the encircled NP in Figure 4 corresponds to α_2, whereas the NP immediately dominating the genitive DP corresponds to α_1. Thus, according to the above definition, the genitive DP (node A in Reinhart's definition) c-commands the PP complement (node B in Reinhart's definition).[12]

It should be emphasized that these amendments to the definition of c-command would not make a difference on the Distributed Morphology analysis in Figure 3, since in that structure the genitive DP is dominated by VP, which is of a different category than nP, to which the *durch* phrase is adjoined. If the theme argument is introduced in the root Phrase embedded under the verbal projections, and the argument is not moved out of this position, adjoining the *durch* phrase to VP would not improve the situation either.

There is one additional issue which has to be solved to the end of claiming that the adjunction analysis can encompass the binding phenomena in (5): According to the definitions of Kayne (1994) and Reinhart (1983), the PP in Figure 4 also c-commands the genitive DP. If the PP is transparent to c-command relations as discussed above, i.e. if it does not constitute a category, the PP complement, which is the DP containing the pronoun, will c-command the genitive DP containing the quantifier. Thus, the above solution seems to buy us the right c-command relation for (5a) at the expense of predicting that the ungrammatical (5b) should also be acceptable. Worse still, if we – in an attempt to exclude (5b) – assume that PPs are actually opaque for c-command relations, i.e. that they do indeed constitute catego-

ries in the relevant sense, there is no way we can treat adnominal genitives and *von* phrases on a par. We would predict that the DP in (7) is ungrammatical, contrary to intuitions, since the quantified DP would now be embedded in the opaque *von* PP, resisting the establishment of a proper c-command relation:

(7) *die Anmeldung* [*von* [*den meisten Kindern*]$_i$] [*durch ihre$_i$ Mütter]*
the registration [of [the most children]$_i$] [by their$_i$ mothers]
'the registration of [most children]$_i$ by their$_i$ mothers'

As far as I can see, it is possible to save the above c-command analysis by assuming that *von* and *durch* phrases differ with respect to their status as categories in c-command relations. However, this assumption immediately raises the question what would motivate such a differentiation.

In the following, I correlate this variation in transparency with the different nature of the semantics of the two prepositions. I already indicated that *von* is a case marker, freely alternating with genitive case (the freeness of variation being subject to dialectal variation). This being so, it is possible to view *von* as semantically empty and its insertion as a phenomenon solely restricted to the level of Phonetic Form (F. Schäfer, personal communication), in which case it would not be part of any syntactic operations at other stages and thus invisible to the establishment of c-command relations. For *durch* however, the situation is quite different. Since *durch* is able to introduce an agent relation in the absence of Voice (Alexiadou et al. 2009; Solstad 2007a), this preposition must be assumed to make a semantic contribution of its own and thus be present at an earlier stage in syntactic representation: Its semantics is relevant to composition, which is what would justify the assumption that the prepositional phrase constitutes a category in the relevant sense. Consequently, the DP in the complement of *durch* would not c-command the genitive DP under any circumstance as *durch* would be opaque and a barrier to c-command relations. On the other hand, the presence or absence of *von* would not – due to the fact that *von* phrases do not constitute categories relevant for c-command relations – matter for the possibility of the DP containing a quantifier c-commanding the pronoun in the *durch* phrase complement.

I should hasten to repeat that I do not think that the above binding data should be seen as ultimately decisive, showing that an analysis in the style of Distributed Morphology is bound to fail and that the adjunct approach is the only viable alternative. It is hardly imaginable that there exists any one specific phenomenon over which the matter of what is the internal structure

of DPs embedding (de-verbal) nominalizations would be decided. Ultimately, one will have to weigh the evidence in terms of overall architectural issues of the two theoretical approaches, i.e. the lexicalist and non-lexicalist ones. However, I do think that it is fair to conclude that, judging from the above binding data, there is some indication that the adjunction alternative has an advantage above the Distributed Morphology alternative.

It is my goal in the remainder of the paper to show how a semantic analysis could be conceived of that is paired with the surface-oriented structure presented above, in which all post-nominal genitives are assumed to occupy the same syntactic position. Accordingly, the semantics of the genitive has to be one which is characterized either by extensive homonymy or by underspecification to encompass the various interpretations involved. I contend that the latter alternative should be chosen.

3. Semantic construction

In this section, I present a semantic analysis of post-nominal genitives and argument-introducing PPs to be paired with the syntactic analysis presented in the previous section. Let me start by elaborating somewhat on the main claims from Section 1 concerning the semantic analysis: All post-nominal genitives are represented semantically by the underspecified two-place relation ρ (rho). This relation may be differently realized, which is what gives us the various interpretations of post-nominal genitives. It may either be identified with a specific semantic role or some other relation as specified by the noun or nominalization in question, or it may be interpreted as for instance a possessor. I also show how argument-introducing *von* and *durch* phrases can be integrated into this analysis.

In the following, I study three different DP configurations in detail. For ease of comparison, they all embed NPs headed by the event nominalization *Beschreibung* ('description'), cf. the examples in (8):[13]

(8) a. *die Beschreibung der / von der Bürgermeisterin*
the description the-GEN / of the mayoress
'the description of the mayoress' or 'the mayoress' description'

b. *die Landschaftsbeschreibung der Bürgermeisterin*
the scenery.description the-GEN mayoress
'the description of the scenery by the mayoress'

c. *die Beschreibung durch die Bürgermeisterin*
the description by the mayoress
'the mayoress' description' (agentive only)

In (8a), the genitive *der Bürgermeisterin* ('of the mayoress') as well as the corresponding *von* phrase may be interpreted both as the described object as well as the describing person. They may also marginally receive a non-argument interpretation under the event reading of *Beschreibung* (more on this below, cf. the discussion of example (20)). In (8b), the genitive cannot be interpreted as the theme argument. Instead, the first part of the noun-noun compound, *Landschaft* ('scenery'), specifies the described object, whereas the genitive *der Bürgermeisterin* ('of the mayoress') is most naturally interpreted as the agent of the event of describing. Finally, I discuss cases with a post-nominal *durch* phrase as in (8c), for which only one interpretation is available, namely that the mayoress is the agent of the describing event.[14]

The semantic analysis is framed in Underspecified Discourse Representation Theory (UDRT; Reyle 1993), applying the DRT formalization outlined in Kamp 2001). The formalization is first and foremost intended to be paired with the specific syntactic analysis presented in this paper.

Although I argue against a syntactic analysis of structure sharing between VPs and DPs as it is assumed in Distributed Morphology, I follow the semantic analysis for *-ung* nominalizations in Roßdeutscher and Kamp (this volume), which leans heavily on Distributed Morphology with respect to the morphology of *-ung* nominalizations. Mostly, I ignore any issues concerning word formation (see Roßdeutscher and Kamp this volume), and many of the details concerning the exact semantic representation of *-ung* nominalizations are left out. I treat the semantic representation for *Beschreibung* as being provided by a lexical component to be inserted at an N head node. Contrary to the Distributed Morphology approach, I do not assume that the word-internal structure is part of (clausal) syntax proper in any sense (for discussion see Roßdeutscher and Kamp this volume).

It should be added that attempts at a uniform semantic analysis of the different kinds of genitives have been undertaken before (see for instance Asher and Denis 2004; Vikner and Jensen 2002). Vikner and Jensen (2002) rely on the semantics of the NP which is modified by the genitive to contain the semantic relation to which the genitive relates, or alternatively to be coerced into including it. To predict the various interpretations, they apply the qualia structures of Pustejovsky (1995). Thus, they assume that all nouns are relational or potentially relational in a wider sense. Asher and

Denis (2004) introduce an elaborate typing system to avoid some problems concerning the qualia-based approach of Vikner and Jensen (2002). Partee and Borschev (2003) discuss – and refute – uniform analyses of adnominal genitives (among them the one of Vikner and Jensen 2002), leaving it open whether the availability of a uniform analysis could be dependent on the language of study. Partly for reasons of space, I only comment occasionally on these analyses in what follows. My aim in this paper is to show how the uniform syntactic analysis above may be paired with an equally underspecified semantics and that a uniform analysis is indeed plausible, at least for German. What sets my analysis apart from the approaches just mentioned is that I (i) specify a surface-oriented syntactic adjunct construction for the phenomena under discussion, (ii) frame my semantic analysis in UDRT, and (iii) include PPs corresponding to external arguments.

The construction principles for the Discourse Representation Structures cannot be discussed in great detail, but hopefully precisely enough to allow the reader to grasp the main ideas of the framework. A bottom-up compositional approach is pursued (cf. e.g. Kamp 2001; Sæbø 2008; Solstad 2007b). The reader is referred to Kamp (2001: 221–231) for further details concerning the formalization. I introduce necessary machinery as I discuss the relevant aspects of the semantic interpretation of the DPs in (8).

The semantic representations for *beschreiben* and *Beschreibung* are basically assumed to be identical, cf. the simplified DRS in (9):[15]

(9)

$$\left\langle \{y, x, e\}, \begin{array}{|l} \hline \\ \hline \text{describe(e)} \\ \text{THEME(y,e)} \\ \text{AGENT(x,e)} \\ \hline \end{array} \right\rangle$$

The representation in (9) is in the general format of a *semantic node representation*. Such representations are made up of a pair of a *content* and a *store* element. The store occupies the left hand side of the representation in (9), consisting of the set of variables y, x, and e in this case. Generally, the store is a set of one or more triples of a variable, a constraint (also a DRS) and a binding condition. Binding conditions provide information on the possible binding relations a variable may enter, and constraints add to this by specifying the semantic content of the variable, such as gender features necessary for the correct binding of pronouns. For the sake of readability, I mostly only display the variables in the present analysis. The motivation for dividing a semantic representation in a store and a content part, as

opposed to just having a main DRS, is that many of the variables which are introduced in (bottom-up) composition cannot be bound right away. A store is needed to handle these variables properly. In DRT, such a store mechanism was first introduced by van der Sandt (1992) in his treatment of presupposition verification and accommodation.

The content part consists of the DRS on the right hand side of the representation in (9). It includes semantic information on the participants of the event, i.e. on the semantic roles involved in events denoted by *beschreiben* and *Beschreibung*. It may be noted that in this case, verb and nominalization share the same set of semantic roles.

Composition is assumed to proceed by way of unification. Thus, semantic node representations, i.e. content-store-pairs attached to different tree nodes, are unified when they are merged (cf. Bende-Farkas and Kamp 2001). Store variables are unified according to their binding conditions, upon which the content DRSs are merged. I return to this below, but first I would like to make some remarks on the relation between verbal projections and their corresponding nominal constructions in my approach.

The verb *beschreiben* and the nominalization *Beschreibung* have identical stores, cf. (9). In other words, no variable binding is involved in the nominalization of the predicate. The variables y, x, and e thus need to be bound at the level of NP or later. With regard to this, there is one crucial point where I differ from Distributed Morphology analyses such as the one of Roßdeutscher and Kamp (this volume): Whereas theme arguments are introduced as adjuncts to the NP node in my analysis, Roßdeutscher and Kamp (this volume) assume that theme arguments are realized where they are introduced semantically, namely in the extended verbal projection. As a result, the theme argument variable y is already bound when nominalization occurs on their analysis.

As already mentioned, the semantic representation of the predicate is not altered after the application of the *-ung* suffix. However, the application of *-ung* makes the modification by the ρ relation possible, the latter of which is introduced by the genitive: It is assumed that the semantics of any noun may be modified by ρ. This is clearly a hypothesis which has to be qualified further, but here I will only remark that this assumption mirrors the empirical fact that any noun may have a genitive attached to it.

The semantics of the relation ρ is specified in (10):

(10) $\left\langle \{u, \rho, z\}, \boxed{\begin{array}{|c|}\hline \\ \hline \rho(u,z) \\ \hline \end{array}} \right\rangle$

The variables u and z are sortally underspecified. While u is bound by the head noun of the genitive phrase, z is unified with the referential argument of the noun to which the genitive phrase is adjoined. ρ may be seen as presuppositional and thus subject to other binding mechanisms than those of u and z, but for the sake of simplicity, I handle the three variables equally.

First, I discuss genitives and *von* phrases. As stated earlier, I assume that these are semantically equivalent. Hence, although I mostly use genitives in the examples below, my comments apply to *von* phrases as well. In the first example, (8a), repeated below for convenience, the genitive *der Bürgermeisterin* ('of the mayoress') may be interpreted both as the theme, i.e. the described object, as well as the agent, i.e. the describing person:

(8a) *die Beschreibung der / von der Bürgermeisterin*
the description the-GEN / of the mayoress
'the description of the mayoress'or 'the mayoress' description'

The representation of the genitive DP *der Bürgermeisterin* emerges as follows:[16]

(11) $\left\langle \{\rho, z\}, \begin{array}{|c|}\hline w \\ \hline \rho(w,z) \\ \text{mayoress}(w) \\ \hline \end{array} \right\rangle$

In (11), the variable u is bound by w which is introduced by the noun phrase *d- Bürgermeisterin* ('the mayoress'), the latter thus providing a specification of the variable u.

In the next step, the representation of the NP *Beschreibung* and the representation of the DP genitive *der Bürgermeisterin* ('of the mayoress') are unified, since they are sister nodes, cf. the general structure in Figure 1 (⊎ is the unification operator):

(12) $\left\langle \{y, x, e\}, \begin{array}{|c|}\hline \\ \hline \text{describe}(e) \\ \text{THEME}(y,e) \\ \text{AGENT}(x,e) \\ \hline \end{array} \right\rangle \uplus \left\langle \{\rho, z\}, \begin{array}{|c|}\hline w \\ \hline \rho(w,z) \\ \text{mayoress}(w) \\ \hline \end{array} \right\rangle$

What we need to accomplish in the case of the noun *Bürgermeisterin* contained in a genitive or a *von* phrase to be interpreted as an argument of the nominalization, is first of all an identification of the relations AGENT or THEME with ρ. Second, depending on the relation with which ρ has been identified, w binds y in the case of a theme interpretation and x in case of an agent interpretation. Finally, z is identified with e, the referential argument of the nominalization. It should be noted that the exact ordering of unification is not crucial (see the discussion of binding possibilities below).

The result of unification in the case of the theme interpretation of the genitive is given in (13). The equations at the bottom of the DRS box specify which discourse referents are unified:

(13)

$$\left\langle \{x,e\}, \begin{array}{|c|}\hline w\ z\ y\ \rho \\ \hline \text{describe}(e) \\ \text{THEME}(y,e) \\ \text{AGENT}(x,e) \\ \rho(w,z) \\ \text{mayoress}(w) \\ \rho=\text{THEME} \\ w=y \\ z=e \\ \hline \end{array} \right\rangle$$

In (13), ρ has been identified with THEME, w with y and z with e. The variables e and x are still unbound. In the absence of an agent, for instance in the form of a *durch* phrase, the variable x will have to be bound existentially or identified in context. Following Roßdeutscher and Kamp (this volume), I assume that the referential argument e of the nominalization is bound at the level of DP, a step which is not shown in this paper.

The agent reading of the genitive only differs from the above analysis insofar as now ρ is identified with the AGENT relation and, consequently, the variable x in the AGENT relation is bound by w of the ρ relation. In this case, unification of the representations of the *-ung* nominalization and that of the genitive DP leave the variable y of the THEME relation unbound.

What has been said so far could be taken to indicate that in the case of nominalizations such as *Beschreibung*, which involve two argument relations, a post-nominal genitive is equally likely to receive a theme or an agent interpretation. However, this is not quite in line with intuitions reported by many native speakers (although some disagreement exists): There

seems to be a slight preference for the theme interpretation of post-nominal genitives with many de-verbal nominalizations.[17] In order to account for such a preference, I have to assume that the variables in the store are ordered or sorted in a way which leads to preferences with respect to binding possibilities. This would be a reflection of bottom-up composition as it is assumed for verbal projections, where the internal argument is bound before the external one.

Additionally, I assume a general principle for interpretation to achieve the correct binding relations: Variables should preferably enter local binding relations as opposed to being bound merely existentially or identified in context, a principle which may be summarized as follows:[18]

Do not overlook binding possibilities.

The preference for an object reading of a genitive should follow from the ordering of the variables, whereas the principle *Do not overlook binding possibilities* makes sure that non-argument readings of a genitive, i.e. where the genitive is interpreted neither as the agent nor as the theme argument, although it would be possible, need special contextual motivation, cf. the discussion of possessive and associative readings below. If the ρ relation of the genitive or *von* phrase is not identified with the THEME or AGENT relation and consequently neither variable y nor variable x are identified with w of the ρ relation, binding possibilities have been overlooked. What is more, the semantic relation introduced by the genitive has to be accommodated as representing some relation different from the THEME or AGENT one, which should also be more costly. This view would fit well with an analysis of the ρ relation as being presuppositional in nature, as similar processes may be observed there, cf. van der Sandt's (1992) preference for presupposition verification over accommodation. However, I have to leave further exploration of these mechanisms to future research.

For reasons of space, I cannot discuss the case of genitives adjoined to NPs headed by relational nouns in any detail, but I would like to show that they may be analyzed in the same fashion as the above nominalizations. Consider example (14):

(14) *der Vater des Studenten*
the father the-GEN student
'the father of the student'

The representation of *Vater des Studenten* (with the genitive adjoined to the NP *Vater*) before unification is given in (15), where the representation of *Vater* ('father') occurs to the left of the unification operator ⊎ and the representation of the genitive *des Studenten* ('of the student') to its right.

(15) $\langle \{y,x\}, \boxed{\text{father(x,y)}} \rangle \uplus \langle \{\rho,z\}, \boxed{\begin{array}{c}w\\ \hline \rho(w,z)\\ \text{student(w)}\end{array}} \rangle$

In (15), identifying a relation for ρ to be unified with is straightforward. There is only one two-place relation with which the ρ relation introduced by the genitive could be identified, as opposed to the case of the nominalization above which involved two such argument relations. Following the analysis of relational nouns in Barker (1995: 50–52), y would be the referential argument of such nouns, thus being the variable that z must be identified with. After unification, the following representation emerges. It should be compared to (13) above:

(16) $\langle \{y\}, \boxed{\begin{array}{c}w\ x\ z\ \rho\\ \hline \text{father(x,y)}\\ \text{student(w)}\\ \rho(w,z)\\ \rho=\text{father}\\ w=x\\ z=y\end{array}} \rangle$

While the variable x is bound by w, y is not bound before the level of DP, as are all referential arguments of noun phrases (see above).

Turning now to a case where an identification of the ρ relation with that of the theme argument is excluded, I discuss an example in which the *-ung* noun is the head of a noun-noun compound (Fabricius-Hansen 1993), cf. example (8b), repeated below for convenience:

(8b) *die* *Landschaftsbeschreibung* *der* *Bürgermeisterin*
the scenery.description the-GEN mayoress
'the description of the scenery by the mayoress'

In (8b), it is not possible to interpret the DP as denoting an event in which someone describes the mayoress. It might thus seem reasonable to assume that the first part of the compound, *Landschaft* ('landscape') binds the variable y, making it inaccessible for entering a binding relation with w which is introduced by the genitive *der Bürgermeisterin*. Such a view is defended by Grimshaw (1990: 14–19; 68–70) who hypothesizes that the first part of the compound is theta-marked by the head of the compound. More recently, Lieber (2004: 54–59) has described the relation between the first part of the compound and its head as one of *co-indexation*, which is in effect a mechanism of argument saturation. However, it is not difficult to find examples which show that these approaches make the wrong predictions. There are cases where both the first part of the noun-noun compound and the post-nominal genitive seem to specify the variable y:

(17) a. *die Personenbeschreibung der Täter*
the person.description the-GEN delinquents
'the personal description of the delinquents'
b. *die Strukturbeschreibung des einfachen Arraymodells*
the structure.description the-GEN simple array model
'the structural description of the simple array model

As in the case of (8b), the first part of the compound in (17a), *Personen* ('personal'), merely specifies the particular sort of *description* we are dealing with. Thus, *Personen* restricts the possible theme arguments of *Beschreibung*. Similar remarks apply to (17b).

I cannot go into great detail concerning noun-noun compounds, for which also incorporation should be discussed. However, in light of the above data, we may conclude that no binding occurs between the theme argument variable y and the first part of the compound. Otherwise, the genitive could not be interpreted as the theme argument in (17a). If the first part of the compound binds the theme argument variable and thus saturates the theme argument role, this argument is no longer available for binding by w which is introduced by the genitive. What rather seems to be the case is that the first part of the compound introduces further selectional or sortal constraints on the binding possibilities of variable y.

As briefly mentioned in the discussion of the representation in (9), such constraints are included in the store part of the representation. The store parts displayed until now only included the variables themselves with no further information on the possible binding relations they could enter. Thus, in order to show how these constraints contribute to the determination of the

possible binding relations between the discourse referents introduced by the genitive and those of a noun-noun compound, it is necessary to expand the representations applied so far. Below, I provide the relevant parts of the extended representations for *Landschaftsbeschreibung* ('description of the scenery') and the genitive *der Bürgermeisterin* ('of the mayoress'). However, for reasons of space I do not show explicitly how these representations are unified. The representation of *Landschaftsbeschreibung* is shown in (18):

(18)
$$\left\langle \left\{ \begin{array}{l} < x, \boxed{\ \mid \text{human}(x)} >, \\ < y, \boxed{\ \mid \text{landscape}(y)} >, \\ \ldots \end{array} \right\}, \boxed{\begin{array}{l} \\ \hline \text{describe}(e) \\ \text{THEME}(y,e) \\ \text{AGENT}(x,e) \end{array}} \right\rangle$$

The store in (18), which only shows the elements relevant to the current discussion, contains two store elements, each consisting of a variable and a constraint in the form of a DRS.[19] The crucial part of the representation are the two DRS constraints, which in the case of noun phrases may for instance provide sortal information, or features of grammatical gender that may be decisive for the establishment of proper binding relations. When variables enter binding relations, their constraints must be obeyed. Thus, the representation in (18) tells us that the agent (x) must be sortally restricted to humans, whereas the theme (y) is restricted to belonging to the ontological category of landscapes. Any discourse referent entering a binding relation with x or y must have features which are compatible with these constraints.

Turning next to the more elaborate store representation for the genitive *der Bürgermeisterin* in (19), we see that the constraint on w is identical to that of variable x, compare (18) above:

(19)
$$\left\langle \left\{ \begin{array}{l} < w, \ \text{human}(w) \ >, \\ \ldots \end{array} \right\}, \begin{array}{c} w \\ \rho(w,z) \\ \text{mayoress}(w) \end{array} \right\rangle$$

Assuming that the constraints human(w) and landscape(y) are ontologically incompatible, the only binding relation which may be established

when the representations in (18) and (19) are unified, is the one between w and the agent variable x.

It was already mentioned that genitives in German may also be assigned other interpretations than agent and theme ones. This is possible also in the case of *Landschaftsbeschreibung der Bürgermeisterin* in (8b), which may refer to a description of a scenery that we somehow associate with the mayoress, as for instance in a case where it is the description of a scenery which was told to the mayoress. This reading is very marginal though, which could be led back to the fact that such a reading would violate the principle *Do not overlook binding possibilities*, since this reading can only be invoked if the genitive ρ relation is not identified with the AGENT relation of the head *Beschreibung*. Another example, where the non-argument reading is more obvious, is given in (20):[20]

(20) *Die Volksabstimmung der Hanf-Initiative steht kurz bevor.*
the popular vote the-GEN hemp initiative stands shortbefore
'The popular vote initiated by the hemp initiative is imminent.'

In (20), the genitive *der Hanf-Initiative* ('of the hemp initiative's') cannot be interpreted as the agent of voting, nor as the matter over which the votes should be cast. Rather, it is most natural to interpret the genitive as denoting the set of individuals who called for the popular vote in the first place.

In these cases of non-argument interpretation of a genitive, there is an important difference to the above binding of ρ: How is the ρ relation specified as some other associative relation if there is no such relation contained in the representation of the NP?

Admittedly, relations such as possession and association are both rather vague. It should be clear that we need to restrict the ρ relation in general. I have no good answer to the question of how the specification and restriction of ρ should be conceived of. For two opposing suggestions, the reader is referred to the aforementioned alternatives Vikner and Jensen (2002) and Asher and Denis (2004), who exploit qualia structures and complex types, respectively. Nevertheless, I would like to make one informal suggestion concerning the emergence of the possessive interpretation (see also Barker 1995: 73–75). It may be assumed that a possessive reading may be instantiated whenever the referential argument z of the noun is an object and the semantic entity which enters a binding relation with y denotes a person. A person and an object may enter a possessive relation, whereas individuals and events do not enter possessive relations.

An additional point to be made is that if the ρ relation, as suggested above, is analyzed as being presuppositional in nature, it would be possible to see the process of its specification as one of presupposition accommodation in the cases of associative or possessive readings. Again, the issue of constraining the interpretational variance is of great importance, since accommodation is such a powerful mechanism. Unfortunately, I cannot discuss this matter any further in this paper.

Next, let us see how the unambiguous case of agentive *durch* phrase modification is analyzed, cf. (8c), repeated below for convenience:

(8c) *die Beschreibung durch die Bürgermeisterin*
the description by the mayoress
'the mayoress' description' (agentive only)

Since *durch* is the default preposition introducing external arguments in nominalizations, I propose to represent its semantics as follows:

(21) $\left\langle \{v, e'\}, \boxed{\begin{array}{|c|}\hline \\ \hline \text{AGENT(v,e')} \\ \hline \end{array}} \right\rangle$

We actually need a more general reference to an external argument role since the external arguments introduced by a *durch* phrase may be for instance both agents and experiencers. However, the AGENT role is sufficient for my current needs.[21] The representation of the *durch* phrase emerges as follows:

(22) $\left\langle \{e'\}, \boxed{\begin{array}{|c|}\hline w \\ \hline \text{AGENT(w,e')} \\ \text{mayoress(w)} \\ \hline \end{array}} \right\rangle$

Again, the representation of the adjunct is unified with the representation of the *-ung* nominalization. (23) shows the semantic representation prior to unification at the NP node to which the PP is adjoined:

(23) $\left\langle \{y, x, e\}, \boxed{\begin{array}{|c|}\hline \\ \hline \text{describe(e)} \\ \text{THEME(y,e)} \\ \text{AGENT(x,e)} \\ \hline \end{array}} \right\rangle \uplus \left\langle \{e'\}, \boxed{\begin{array}{|c|}\hline w \\ \hline \text{AGENT(w,e')} \\ \text{mayoress(w)} \\ \hline \end{array}} \right\rangle$

The AGENT relation of the *durch* phrase may, as opposed to the ρ relation associated with genitives and *von* PPs, only be identified with the agent relation of the predicate *beschreiben*, since the THEME and AGENT relations are semantically incompatible with regard to unification. Thus, the only alternative is to identify the AGENT relation of the *durch* phrase with the AGENT relation of the nominalization. Consequently, x and w as well as the two event variables e and e' are identified. Variable y has to be existentially bound or identified in context, while e is bound at DP level, being the referential argument of the DP. The representation in (24) shows the result of unification:

(24)

$$\left\langle \{y, e\}, \begin{array}{|c|}\hline w\ e'\ x \\ \hline \text{describe}(e) \\ \text{THEME}(y,e) \\ \text{AGENT}(x,e) \\ \text{AGENT}(w,e') \\ \text{mayoress}(w) \\ e=e' \\ x=w \\ \hline \end{array} \right\rangle$$

Rounding off this section on the semantic analysis, I would like to comment on constructions where a genitive and a *durch* phrase both modify the *-ung* nominalization. In this case, there is only one syntactic order which is acceptable, since a genitive may only semantically modify a noun to which it is also adjacent.[22]

(25) a. *die Beschreibung der Landschaft durch die Bürgermeisterin*
the description the-GEN scenery by the mayoress
'the description of the scenery by the mayoress'

b. #*die Beschreibung durch die Bürgermeisterin der*
the description by the mayoress the-GEN
Landschaft
scenery
'The description by the scenery's mayoress'

As already noted, a syntactic adjacency constraint on the occurrence of the genitives is needed to be able to achieve the correct syntactic distribution in these cases (see the discussion of example (3)). The semantic part of the analysis consists of a combination of the two composition procedures presented above. First, the genitive is unified with the representation of the NP *Beschreibung* as illustrated in (13), binding the THEME variable y (with the exception that in that particular case, the genitive DP was *der Bürgermeisterin*), upon which the *durch* phrase is unified with the result of this unification as in (24), binding the variable x, which is unbound when only a theme argument is present, cf. the representation in (13).

4. Conclusion

I have shown that a uniform syntactic and semantic analysis of post-nominal genitives and argument-introducing PPs in German is tenable. More precisely, I have made the following claims:

- All post-nominal genitives and argument-introducing PPs headed by *von* and *durch* are NP adjuncts.
- All post-nominal genitives are related to the head noun via an underspecified semantic relation ρ denoted by the genitive. This relation may be specified as the argument of the (relational) noun or nominalization in question or otherwise be interpreted as more vaguely associated with the NP. The same picture emerges for *von* phrases, whereas *durch* phrases are specified as being agentive in every case.

Referring to evidence involving binding phenomena, I argued against assuming structure-sharing between VPs and their corresponding nominalizations, contrary to current analyses in frameworks such as Distributed Morphology (cf. e.g. Roßdeutscher and Kamp this volume). Related to this, there are two further observations concerning the syntax-semantics interface that can be made in light of the current analysis: Firstly, as long as there is no clear syntactic evidence that post-nominal genitives and PPs should be differentiated syntactically, we should not necessarily let semantic consider-

ations alone, i.e. argument-modifier distinctions, lead us to the postulation of structural differences. Secondly, it may be emphasized that the question of which node a semantic relation should be specified for, i.e. a head or its modifier, is not in every case a question of either-or. Applying unification, such relations may be included in both head and modifier.

The analysis may be viewed as a combination of the split and uniform approaches discussed by Partee and Borschev (2003): All genitives – argument and non-argument ones – are represented the same way and composed with the head noun in a uniform way. However, due to the application of unification as a mode of composition, we are not required to treat the genitives uniformly either as arguments or as mere modifiers of the head noun. De-verbal nominalizations and relational nouns introduce an argument relation with which the ρ relation is identified. In combination with nouns which do not include an argument relation, accommodation of the ρ relation is enforced, the result of which is dependent on both the semantics of the head noun and that of the genitive DP.

Leaving a number of issues for future research, such as for instance the extension of the analysis to pre-nominal genitives and possessive pronouns on the one hand and the application to further languages on the other, I still hope to have shown that the above approach merits further exploration.

Notes

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1. It may be noted that whereas in German the same morphological genitive may be used in all cases, English has two post-nominal constructions corresponding to the German post-nominal genitive: *of* phrases and double genitives, such as *of my colleague's* in (1c). See also endnote no. 4.
2. Similar syntactic and/or semantic dichotomies may be found in other approaches as well. Thus, Hartmann and Zimmermann (2002) use the terms *syntactic genitive* and *semantic genitive*, Barker (1995) makes a parallel

distinction between *lexical* and *extrinsic possession*, whereas Partee and Borschev (2003) speak of *inherent* and *free* readings.

3. I should hasten to add that I will exclude PP complements such as the *an* phrase in (i):

   (i) der metabolische Bedarf des Hundes an Vitamin K
   the metabolic need the-GEN dog for vitamin K
   'the metabolic need of dogs for vitamin K'

   The group of de-verbal nominalizations with which PP complements co-occur is almost exclusively made up of so-called stem nominalizations, i.e. affix-less nominalizations of the verb stem, which do not constitute a productive pattern in contemporary German. However, see endnote no. 12 for a brief discussion of how they fit into my analysis.
4. Let me point to one of the differences between e.g. German and English which would have to be taken into account: In English, postnominal arguments and non-arguments are not realized the same way. Arguments are introduced in an *of* phrase, while non-arguments are introduced by means of a double genitive such as in *the stick of John's* (cf. **the stick of John*). From this, one could conclude that German and English cannot be analysed uniformly (see the discussion in Partee and Borschev 2003). However, I would like to emphasize that I do not think it is justified to refute a uniform analyses of genitives in German based on the situation in English.
5. The limitation to *-ung* nouns is to a large extent a practical matter. It may be noted, though, that e.g. Alexiadou et al. (2009) do not assume that eventive, nominalized infinitives share all the properties of *-ung* nominalizations.
6. See Sternefeld (2007: 212) for a different view.
7. I should hasten to add that *durch* phrases also have other interpretations which are not considered in this paper. They may for instance specify paths or causers. See Solstad (2007a, 2007b) for details.
8. Although I cannot discuss other binding data for reasons of space, I would like to mention that similar data involving Principle C restrictions may be constructed:

   (ii) $[_{DP}$ *die* $[_{NP}[_{NP}[_{NP}$ *Anmeldung*$]$ $[_{PP}$ *von* $[_{DP}[$*Inas*$_i]$ *Sohn*$]]]$
   $[_{PP}$ *durch* $[_{DP}$ *sie*$_i]]]]$
   'the registration of Ina's$_i$ son by her$_i$'
   (iii) *$[_{DP}$ *die* $[_{NP}[_{NP}[_{NP}$ *Anmeldung*$]$ $[_{PP}$ *von* $[_{DP}$ *ihrem*$_i$ *Sohn*$]]]$
   $[_{PP}$ *durch* $[_{DP}[$*Inas*$]_i$ *Kollegin*$]]]]$
   'the registration of her$_i$ son by Ina's$_i$ colleague'
9. The additional conditions in (i) and (ii) are not shared by everyone. Thus, Reinhart (1983: 23–25) assumes that a node may c-command itself.

10. In his analysis of nominalized infinitives in German, Grosz (2008) assumes an argument position also for subjects, which is compatible with the suggestions of Alexiadou et al. (2009) for such nominalizations, but presumably incompatible with the aforementioned claim of Roßdeutscher and Kamp (this volume) that *-ung* nominalizations lack Voice.
11. May (1985: 57) uses the term "entire projection" for *category* and "member" or "occurrence" of a projection for *segment*.
12. Although I have chosen to exclude PP complements from the discussion, it may be noted that the above analysis can also account for the data in Sternefeld (2007: 587–589), cf. (iv), for which Sternefeld claims that the genitive and the PP cannot both be generated to the right of the head noun *Stolz* (bracketing according to my analysis):

    (iv) $[_{DP}\ [_{D}\ der]\ [_{NP}\ [_{NP}\ [_{NP}\ Stolz]\ [_{DP}\ jeden\ Vaters]_i]\ [_{PP}\ auf\ seinen_i\ Sohn]]]$
    $[_{DP}\ [_{D}$ the$]\ [_{NP}\ [_{NP}\ [_{NP}$ pride$]\ [_{DP}$ every father$]_i]\ [_{PP}$ on his$_i$ son$]]]$
    '[every father's]$_i$ pride [for his$_i$ son]'
13. *Beschreibung* has at least two more "object" readings: First, it may refer to the informational content of description. Second, it may also receive an interpretation which may be paraphrased as 'object carrying information which serves as a description' (e.g. a piece of paper containing a description). (8a) and (8b) are ambiguous between event and object readings, but in the following I only focus on the event reading of *Beschreibung*. See Roßdeutscher and Kamp (this volume) for relevant discussion.
14. Recall that adnominal *durch* phrases have other, unrelated interpretations which I do not discuss here, cf. Solstad (2007a).
15. For instance, the representation in (9) is simplified in the sense that it makes no reference to the different semantic components of *be-schreib-en* or *Be-schreib-ung* as they are derived from the stem *schreib*. I also leave out the representation of both definiteness and the temporal anchoring of nouns (Kamp 2001; Tonhauser 2002).
16. The representation in (11) is simplified in the sense that I have eliminated a step showing the identification of u with w to enhance readability in later representations.
17. Below, I discuss noun-noun compounds headed by *Beschreibung* in which the genitive cannot be interpreted as the theme argument. It may be noted that Ehrich and Rapp (2000: 274 ff.) put forward the claim that for *-ung* nominalizations based on change-of-state predicates such as *Absetzung* ('unseating'), a post-nominal genitive may only be interpreted as the theme argument, cf. (v). From the point of view of my analysis, such an observation would be wholly unexpected. However, the restriction discussed by Ehrich and Rapp (2000) apparently does not involve a hard constraint, cf. (vi), where the post-nominal genitive may indeed be interpreted as the agent of the unseating:

(v) *die Absetzung des Bundestages*
the unseating the-GEN Bundestag
'the unseating of the Bundestag'

(vi) *die Kanzlerabsetzung des Bundestages*
the chancellor.unseating the-GEN Bundestag
'the Bundestag's unseating of the chancellor'

18. It may be noted that this principle is related to the DOAP principle of Williams (1997: 603): "Do not overlook anaphoric possibilities".
19. As mentioned above, store elements are actually assumed to be triples, the last element in the tuple being a binding condition, which e.g. is different for indefinites and definites. In this paper, I ignore binding conditions since they are not directly relevant to the present discussion.
20. The authentic sentence continues as follows: "… am 30.11 2008 werden die Schweizer abstimmen, ob Cannabiskonsumenten in ihrem Land weiterhin gegen das Gesetz verstossen werden", which may be translated as "… on November 30th 2008, the Swiss will vote on whether Cannabis consumers will be violating the law in the future as well."
21. There is an interesting difference in distribution between *von* and *durch* in verbal passives and nominalizations with respect to agentivity. Whereas *durch* is the preferred agentive preposition in nominalizations, *von* is clearly the preferred preposition for introducing agents in verbal passives. In these constructions, the agentive use of *durch* is strongly restricted. Unfortunately, I cannot treat this variation in any detail here, cf. the discussion in Solstad (2007a: 299–307).
22. The DP in (25b) is not ungrammatical as such, but it may only, somewhat obscurely, denote descriptions of some unspecified entity by someone who is the mayoress of the landscape, and not descriptions of the landscape.

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