Modifying Event Nominals: Syntactic Surface Meets Semantic Transparency

Sebastian Bücking
Deutsches Seminar
University of Tuebingen

sebastian.buecking@uni-tuebingen.de

Abstract

The paper starts out with the observation that modifiers to eventive *ung*-nominals can both target at the denoted event as a whole and modify it from inside. The internal reading will be shown to challenge iconic mapping between surface-oriented c-command and semantic scope. By using Egg (2006)'s flexible syntax-semantic interface the given ambiguity is analyzed as landing site underspecification allowing for a compositional make-up in both cases: based on a bipartite eventive structure for *ung*-nominals, the internal reading is argued to result from applying the modifier to an event concept fed by the verbal lexical base whereas the external reading emerges if the modifier targets at a concept-correlate introduced by the nominal affix.

1 Introduction

In event semantics, ample evidence has been put forward in favor of correlating syntactic position and interpretation of German adverbial modifiers, cf. e.g. Maienborn (2003), Pittner (2004) and related work. (1) and (2) are indicative:[1]

(1) a. Paul hat die Daten *schnell* verarbeitet.
Paul has the data fast processed.
b. Paul hat *schnell* die Daten verarbeitet.
Paul has fast the data processed.

(2) a. Der Koch hat das Huhn *in einer Pfeffersauce* zubereitet
the cook has the chicken in a pepper-sauce prepared
b. Der Koch hat *in der Küche* das Huhn zubereitet
the cook has in the kitchen the chicken prepared

[1] A close relation between syntax and semantics of adverbials is also suggested by Principle-C-effects, quantifier scope, remnant topicalization, focus projection. I will not discuss these.

Arndt Riester & Torgrim Solstad (eds.)
Proceedings of Sinn und Bedeutung 13, University of Stuttgart, 2009

The adverbials are interpreted event-internally if projected in V-adjacent position as in (1-a) and (2-a). The AP thus specifies the manner of the processing as fast, the PP localizes an integral constituent of the cooking event, i.e. the chicken, in the pepper-sauce.[2] On the contrary, if adverbials are in a higher position next to the VP as in (1-b) and (2-b), they are interpreted event-externally, i.e. they relate holistically to the event. In this case, the AP specifies the time span of the whole processing event or the time span between its initiation and some reference point as short. The PP situates the preparing event in the kitchen.

These findings can straightforwardly be accounted for by mapping syntactic c-command on semantic scope. The according intuition behind a compositional make-up is that adverbials c-command the semantic entity they relate to. Haider (2002, 61) and related work implement this idea by proposing the interface criterion and isomorphic relation given in (3). (4) illustrates the point:

(3) a. Interface criterion: Syntactic c-command domains are mapped monotonically on incrementally structured semantic type-domains.
b. Isomorphic relation:
(i) semantics: Proposition $\subset$ Event $\subset$ Process/State
(ii) structure: ['p-related' ['e-related' ['l-related']]][3]

(4) Paul hat [$_{p-related}$vermutlich [$_{e-related}$am Montag [seine Wohnung
Paul has $_{p-related}$presumably $_{e-related}$on monday his appartement
[$_{l-related}$sorgfältig [aufgeräumt]]]]]
$_{l-related}$carefully cleaned

The sentence adverbial being bound to the proposition is projected higher than the temporal one taking scope over the event; the manner specification being related to the lexical verbal base is embedded most deeply.

The challenge to be addressed in the present paper is the following: event nominals with the affix *-ung* that correspond to the examples in (1) and (2) do not show the same structural effect thus casting doubt on a straightforward mapping between syntactic surface and semantic scope. In case of a prenominal modifying adjective, both l-related internal and e-related external reading are conveyed by the same surface structure, cf. (5) and (6) with their respective readings:

(5) die schnelle *Verarbeit*ung der Daten durch Paul
the fast processing the data$_{GEN}$ by Paul
a. 'the processing activity itself is fast' (internal reading)
b. 'the time span of the whole event or that between its initiation and some reference point is short' (external reading)

[2]Maienborn considers internal locatives semantically underspecified, cf. section 3 for details.

[3]Haider uses the term 'l-related' because he assumes that the verbal lexical base determines the denotation as a process/state.

(6) die dumme *Anbieder*ung
the stupid fawning-on
a. 'event of stupidly fawning on sb.' (internal reading)
b. 'event of fawning on sb. is evaluated as stupid' (external reading)

The holistic external readings are expected by syntax in that the AP c-commands the whole following nominal structure. In their internal reading, however, the modifiers relate to the verbal lexical base italized in the examples above, that is, they apply to just one part of the expression modified syntactically. These thus challenge strict compositionality in the nominal domain.

This mismatch is corroborated by postnominal modifying PP: in case of specifying the l-related manner reading by a postnominal prepositional phrase, the structure differs from the VP in ruling out head-adjacency of the modifier, cf. (7). The same holds for locatives: even if interpreted internally, they do not surface in head-adjacent position but in distance, cf. (8).

(7) a. die *Verarbeit*ung der Daten auf schnelle Weise
the processing the data$_{GEN}$ in fast manner
b. *die *Verarbeit*ung auf schnelle Weise der Daten
the processing in fast manner the data$_{GEN}$

(8) a. die *Zubereit*ung des Huhns in einer Pfeffersauce
the preparation the chicken$_{GEN}$ in a pepper-sauce
b. *die *Zubereit*ung in einer Pfeffersauce des Huhns
the preparation in a pepper-sauce the chicken$_{GEN}$

One might argue that the reason for this is syntactic: German adnominal genitive can only be checked in N-adjacent position, cf. e.g. Sternefeld (2006, 587-589).[4] Note though that this explanation alone does not properly explain the availability of internal postnominal PP-modifiers. First, if one proceeds from surface structure, the interaction of syntactic constraint and mapping hypothesis should simply rule out any internal readings in case of a theme projection in between. But this prediction is obviously wrong. Second, one might weaken the claim of straightforward mapping between surface syntax and semantics by allowing for movement and thus invisible syntactic structure, i.e. the PP could be ascribed an N-adjacent base position. However, even then the PP still

[4]This is not quite the whole story. If the genitive is substituted by a PP with *von* ('of'), the theme argument cannot be projected in distance either, cf.:

(i) *?die Zubereitung in einer Pfeffersauce von Hühnern
the preparation in a pepper-sauce of chickens

One could argue that in such cases *von* functions as a case-like feature since it substitutes for the bare genitive which is ungrammatical here. Or one might account for the distribution by some hierarchy constraint. However, if one relies on a hierarchy, it seems even more urgent to explain why internal modifiers cannot project before the theme's projection as attested in the VP.

c-commands the nominal, but not merely the verbal lexical base it in fact contributes to in its internal reading.[5]

Finally, note that the locative in (8-a) could also be read externally if its pragmatic nonsense is neglected; cf. (9) for a clearly conceivable example:

(9) die *Zubereit*ung des Hühnchens in der Küche
the preparation the chicken$_{GEN}$ in the kitchen

To sum up: the data on modifiers to event nominals are at odds with compositional semantics based on surface structure. In their internal reading, i.e. in their being related to the lexical verbal base, adnominal modifiers apply to just one part of the expression modified syntactically. The present paper aims at compositionally deriving external vs. internal reading via a flexible syntax-semantic interface built upon underspecification. I will first present Egg (2006)'s analysis of well-known bracketing paradoxes as *good dancer* similarly involving internal modification not expected by simple c-command and apply it to the adnominal AP modifiers from above (section 2). Second, I will extend the proposal to PP modifiers by comprising Maienborn (2003)'s free variable approach to internal locatives (section 3).

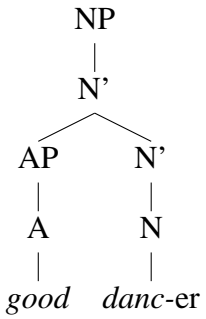
2 Scopally underspecified AP modifiers

2.1 Scope underspecification in Egg (2006)

Examples as *good dancer* are well-known for being ambiguous between reading (10-a) und (10-b).[6] A plausible structure is given in (11).

(10) a. $\lambda x.\mathbf{good}'(x) \wedge GEN[e,y](y \textbf{ in } e \wedge y = x, \mathbf{dance}'(y)(e))$
b. $\lambda x.GEN[e,y](y \textbf{ in } e \wedge y = x, \mathbf{good}'(e) \wedge \mathbf{dance}'(y)(e))$

(11)



In reading (10-a), the modifier has scope over the complex nominal. This is expected by the c-command relations in surface structure (11). Reading (10-b) though is in conflict with an iconic mapping between c-command and semantic scope because the

[5] A movement analysis also has to capture the data on prenominal AP; I do not know how to reasonably argue that they are base-generated in N-adjacent position. Such base position implies the bracketing [A+N] and subsequent movement of this complex constituent.

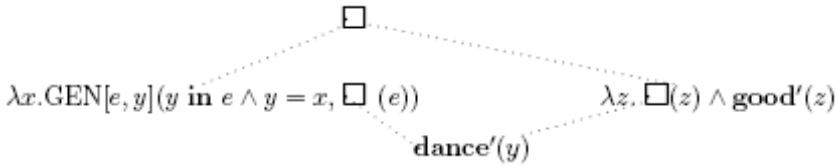
[6] I took Egg (2006)'s representation. *GEN* codes habituality; see Egg (2006, 6) for details.

modifier applies only to a part of the modifie, more specifically, it relates to the word-internal lexical verbal base italized in structure (11). The information carried by the affix thus has wide scope, what is unexpected.

Egg (2006) reconciles surface syntax and scope by using the following ingredients of the underspecification formalism CLLS (= Constraint Language for Lambda Structures) as developed in Egg et al. (1998) and Egg et al. (2001).[7] First, it is assumed that the semantics of constituents C contains a *main* and a *secondary* fragment. Second, built upon surface structure, complex C are construed by syntax-semantic and morpho-semantic interface rules (= SSI and MSI) which can address both fragments. Third, these SSI- and MSI-rules result in dominance diamonds that possibly have different solutions. These different solutions then correspond to the final readings available for the structure computed.

Applying this procedure to *good dancer* leads to the following diamond, cf. Egg (2006) for details:

(12)



The diamond consists of λ-terms representing the semantic fragments involved. 'Holes' (symbolized by □) indicate their unknown, hence underspecified parts. Dominance relations (symbolized by dotted lines) attach fragments and holes to each other and thereby model scope. (12) can be read as follows: the final structure is not fixed; this motivates the hole at the top. The left fragment represents the meaning contribution of the affix *-er*, the fragment on the right side adds the meaning of the modifier *good*. While their scope interaction is not determined (i.e. neither fragment dominates the other), the lexical verbal base has necessarily narrow scope and is thus located at the bottom.

The possible solutions are calculated by monotonically identifying fragments and holes. By first identifying the right-hand hole with the top, the modifier takes scope over the full NP, cf. repeated from above (13-a). Starting from the left, i.e. identifying first the hole in the left fragment with the topmost hole, derives the critical internal reading with wide scope of the affix, cf. (13-b):

(13) a. $\lambda x.\mathbf{good}'(x) \wedge GEN[e,y](y \textbf{ in } e \wedge y = x, \mathbf{dance}'(y)(e))$
b. $\lambda x.GEN[e,y](y \textbf{ in } e \wedge y = x, \mathbf{good}'(e) \wedge \mathbf{dance}'(y)(e))$

The suggested formalism can hence systematically derive both readings on the basis of a uniform surface-oriented syntax and common assumptions on the meaning of the involved lexical items.[8] In the next section, the given analysis will be transferred to the modification of event nominals.

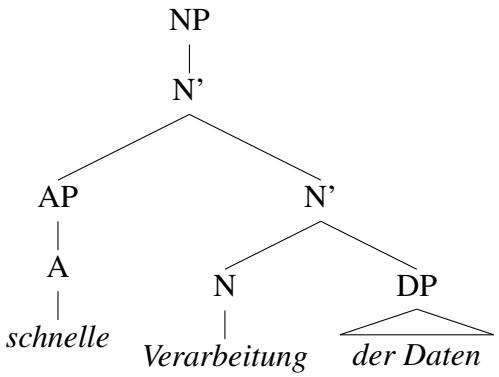
[7] Here, CLLS's underspecified representations will be used in a simplified form.

[8] Taking advantage of a powerful semantic construction, Egg's proposal can do without the assumption of underlying syntactic structure different from surface. This constrasts with e.g. Larson (1998) who ensures iconic mapping at the syntax-semantic interface by postulating an elaborate invisible syntax being the input for semantics, cf. Egg (2006, 7-9) for some discussion.

2.2 Underspecified AP modifiers to event nominals

Recall the task: how can one compositionally derive internal vs. external reading of *schnelle Verarbeitung der Daten* ('fast processing of the data') on the basis of surface structure (14) and standard semantics for the involved lexical units in (15):

(14)



(15) a. $[\![\text{schnell}]\!] = \lambda x.\mathbf{fast}'(x)$
b. $[\![\text{verarbeit}]\!] = \mathbf{process}'$
c. $[\![\text{Daten}]\!] = \lambda x.\mathbf{data}'(x)$
d. $[\![\text{die}]\!] = \lambda Q\lambda P\exists!x.[Q(x)] \wedge P(x)$[9]

The anti-iconic effect in case of internal modification strikes as being very similar to the paradox with agentive nouns discussed by Egg. In order to make his proposal work here, the semantics of the eventive affix *-ung* has to be appropriately defined. Most importantly, its semantics must assure two different landing sites the modifier can pertain to. In case of *-er*, these landing sites, i.e. agent and event, were easy to detect due to their obvious ontological difference. The situation with eventive affixes is more intricate since *-ung* does not pick up a thematic argument but relates to the underlying verbal event itself. What I propose is the following:

(16) a. main fragment: $\lambda P\lambda e.e \approx \lambda E.P(E)$
b. secondary fragment: $\lambda P\lambda x\lambda e.\mathbf{theme}'(e,x) \wedge P(e)$

According to the given proposal, the semantic contribution of *-ung* is split into a main and a secondary fragment. The main fragment entails a bipartite eventive structure. Small e represents the nominal event argument which is associated with a big E variable that stands for an event concept described by the verbal stem. This move presumes a specific perspective on the relation between verbal predicates and their eventive nominalizations. There are two conceivable positions: according to the first, nominalized predicates contribute the identical predicate to logical form as the underlying verbal predicate does, cf. e.g. Parsons (1990). Semantically, *-ung* would merely uncover the silent verbal event argument. The second position instead assumes that nominalized predicates contribute an individual term which is merely correlated with the underlying

[9]This abbreviates Montague's denotation for the definite determiner $\lambda Q\lambda P[\exists x[\forall y[Q(y) \leftrightarrow y = x] \wedge P(x)]]$. Plural is ignored.

verbal predicate, i.e. nominalizations contribute a concept-correlate in Fregean terms, cf. e.g. Cocciarella (1996). The main fragment given above implements the second stance: *e* symbolizes the nominal concept-correlate, the underlying verbal concept describes *E* and $\approx$ stands for their link to each other.[10] *-ung* thus introduces a new event argument embedding the verbally given eventive concept. Crucially, such bipartite structure provides two possible targets for modifiers: if the modifier applies to the underlying concept *E*, it is l-related and thus to be read internally. If it applies to the nominal *e*, it is e-related and hence externally interpreted. The task will be to show how these landing sites can be systematically predicted.

The secondary fragment of *-ung* takes care of the adequate integration of the verbal base it takes. Importantly, I presuppose a Neo-Davidsonian approach (cf. Parsons 1990) in order to conceive of verbs as denoting properties of eventualities with thematic roles being referred to by additional conjuncts. This spares taking along potential verbal arguments throughout the whole computation; instead, it allows for making arguments available by the characteristics of specific affixes. The proposal in (16-b) thus reads as follows: First, *-ung* binds a property of eventualities *P*, regardless of the amount of thematic arguments. Second, *-ung* influences the secondary fragment of the emerging nominalization by introducing the theme argument potentially associated with the verbal base, i.e. the verbal theme argument is made available for binding by a subsequent DP argument.[11]

In order to derive the meaning of *Verarbeitung* ('processing') from the lexically given verbal base and affix, a suitable rule for the interface between morphology and semantics has to be specified, cf.(17):

(17) $[\mathtt{X}\ \mathtt{Bs}\ \mathtt{Aff}] \overset{(\text{morph})}{\Rightarrow} \begin{array}{l} [\![\mathtt{X}]\!] : [\![\mathtt{Aff}]\!](\square) \\ \qquad\qquad\ \vdots \\ [\![\mathtt{X_S}]\!] : [\![\mathtt{Aff_S}]\!]([\![\mathtt{Bs}]\!]) \end{array}$

This MSI-rule retains basic intuitions of the MSI-rule already given in Egg (2006): specifically, affixes are assumed to be functions taking stems as arguments; furthermore, by introducing a yet undetermined hole in the main fragment, the rule ensures the semantic flexibility that is needed for computing the attested scopal interaction with modifiers. Other than the MSI-rule in Egg (2006), (17) is a bit simpler in not explicitly λ-binding thematic arguments of the base in the main fragment. The way thematic arguments are integrated is thus left to the semantics of the affixes themselves.

The ingredients set forth so far yield the following representation for *Verarbeitung* ('processing') via insertion and λ-conversion:

(18) a. $\begin{array}{l} [\![\mathtt{N}]\!] : \lambda P \lambda e.e \approx \lambda E.P(E)(\square) \\ \qquad\qquad\qquad\qquad\ \vdots \\ \qquad\qquad\qquad\qquad [\![\mathtt{N_S}]\!] : [\lambda P \lambda y \lambda e.P(e) \wedge \mathbf{theme}'(e,y)](\mathbf{process}') \end{array}$

b. $\begin{array}{l} = [\![\mathtt{N}]\!] : \lambda e.e \approx \lambda E.\ \square\ (E) \\ \qquad\qquad\qquad\qquad\ \vdots \\ \qquad\qquad\qquad\qquad [\![\mathtt{N_S}]\!] : \lambda y \lambda e.\mathbf{process}'(e) \wedge \mathbf{theme}'(e,y) \end{array}$

[10] It is not trivial to appropriately define the relation $\approx$. For the present purpose, I rely on a merely intuitive grasp: *e* instantiates an *E* being characterized by the underlying verbal eventuality property *P*.

[11] I assume that *-ung* does not introduce the verbal agent; but nothing essential hinges on that.

According to representation (18-b), *Verarbeitung* denotes a set of concept-correlates which are characterized by a set of event concepts. These event concepts are determined as processing events with an open position for a theme argument. The given constraint is underspecified in that there is a dominance relation between the two fragments allowing the integration of additional material in its solutions.

The next step comprises the integration of the DP argument *der Daten* ('of the data'). The following SSI-rule for complementation is a category independent generalization of the rule for verbal DP arguments given in Egg (2005):

(19) $[_{\bar{\mathtt{X}}}\ \mathtt{X}\ \mathtt{DP}] \overset{(\mathrm{SSI})}{\Rightarrow} [\![\bar{\mathtt{X}}]\!]\colon [\![\mathtt{DP}]\!];\ [\![\bar{\mathtt{X}}_{\mathtt{S}}]\!]\colon [\![\mathtt{X}_{\mathtt{S}}]\!]([\![\mathtt{DP}_{\mathtt{S}}]\!])$

The DP semantics in Egg's framework rests upon standard assumptions about the lexical meaning of the respective D head as generalized quantifier. However, their semantic contribution is split into a secondary fragment that is identified with the bound variable and a fragment above that codes the quantificational information. The lexical entries (ignoring plural) are repeated in (20), (21) cites the SSI-rule needed (cf. Egg 2009), and (22) provides the corresponding computation:

(20) a. $[\![\text{die}]\!] = \lambda Q \lambda P \exists!x.[Q(x)] \wedge P(x)$

b. $[\![\text{Daten}]\!] = \lambda x.\mathbf{data}'(x)$

(21) $[_{\mathtt{DP}}\ \mathtt{D}\ \mathtt{NP}] \overset{(\mathrm{SSI})}{\Rightarrow} [\![\mathtt{DP}]\!] : [\![\mathtt{D}]\!]([\![\mathtt{NP}]\!])(\lambda z.\ \boxed{\ }\ )$, with $[\![\mathtt{DP}_{\mathtt{S}}]\!] : z$

(22) a. $[\![\mathtt{DP}]\!] : [\lambda Q \lambda P \exists!x.[Q(x)] \wedge P(x)](\lambda y.\mathbf{data}'(y))(\lambda z.\ \boxed{\ }\ )$, with $[\![\mathtt{DP}_{\mathtt{S}}]\!] : z$

b. $= [\![\mathtt{DP}]\!] : [\lambda P \exists!x.[\mathbf{data}'(x)] \wedge P(x)](\lambda z.\ \boxed{\ }\ )$, with $[\![\mathtt{DP}_{\mathtt{S}}]\!] : z$

c. $= [\![\mathtt{DP}]\!] : \exists!x.[\mathbf{data}'(x)] \wedge \boxed{\ }$, with $[\![\mathtt{DP}_{\mathtt{S}}]\!] : x$

Putting pieces together according to (19), i.e. applying the semantics of *Verarbeitung* in (18-b) to the DP meaning in (22), yields the following constraint for *Verarbeitung der Daten* ('processing of the data'):

(23) $\lambda e.e \approx \lambda E.\boxed{\ }(E)$ $\qquad [\![\bar{\mathtt{N}}]\!] : \lambda e \exists!x.[\mathbf{data}'(x)] \wedge \boxed{\ }\ (e)$

$[\![\bar{\mathtt{N}}_{\mathtt{S}}]\!]\colon \lambda e.\mathbf{process}'(e) \wedge \mathbf{theme}'(e,x)$

The secondary fragment $[\![\bar{\mathtt{N}}_{\mathtt{S}}]\!]$ fixes x as the theme argument via λ-conversion; the main fragment $[\![\bar{\mathtt{N}}]\!]$ is identified with $[\![\mathtt{DP}]\!]$. Additionally, the DP semantics introduce a new λ-abstracted e; this is necessary for providing event variables at the very top of the final representation.[12] The affix information on the left remains unaffected.

[12] This is parallel to the sentential level where adverbials and DPs introduce event variables, needed e.g. for the integration of tempus. For an appropriate typing of event variables see below.

The next step consists of the modifier's integration. Egg (2006) proposes the SSI-rule (24):[13]

(24) $[_{\bar{\mathtt{X}}_1}\ \bar{\mathtt{X}}_2\ \mathtt{Mod}] \overset{(\mathrm{SSI})}{\Rightarrow}$ $[\![\bar{\mathtt{X}}_{1\mathtt{S}}]\!] : \lambda x.[\![\mathtt{Mod}]\!](x) \wedge \Box(x)$; $[\![\bar{\mathtt{X}}_1]\!]$: $[\![\bar{\mathtt{X}}_2]\!]$, $[\![\bar{\mathtt{X}}_{2\mathtt{S}}]\!]$

The idea behind reads as follows: the main fragment of the modifie is inherited by the main fragment of the new complex constituent without any change. The new secondary fragment though integrates the modifier: a hole is applied to the same variable x as the modifier fragment is. Furthermore, this hole dominates the original secondary fragment of the modifie. Crucially, whereas both main and secondary fragment of the resultant constituent hence dominate the modifie's original secondary fragment, their scopal interaction with each other is not determined.

Applying (24) to $\bar{\mathtt{N}}$ *schnelle Verarbeitung der Daten* ('fast processing of the data') yields (25); finally, Egg's SSI-rule for phrasal completion given in (26) generates the complete diamond in (27) for the full NP:[14]

(25) $[\![\bar{\mathtt{N}}]\!] : \lambda e \exists !x.[\mathbf{data}'](x) \wedge \Box(e)$ $\lambda e.e \approx \lambda E.\Box(E)$ $[\![\bar{\mathtt{N}}_{\mathtt{S}}]\!] : \lambda y.\Box(y) \wedge \mathbf{fast}'(y)$, $\lambda e.\mathbf{theme}'(e,x) \wedge \mathbf{process}'(e)$

(26) $[_{\mathtt{XP}}\ \bar{\mathtt{X}}]$ $\overset{(\mathrm{SSI})}{\Rightarrow}$ $[\![\mathtt{XP}]\!] : \Box$, $[\![\mathtt{XP}_{\mathtt{S}}]\!] : [\![\bar{\mathtt{X}}]\!]$, $[\![\bar{\mathtt{X}}_{\mathtt{S}}]\!]$

(27) $[\![\mathtt{NP}]\!] : \Box$, $[\![\mathtt{NP}_{\mathtt{S}}]\!] : \lambda e \exists !x.[\mathbf{data}'](x) \wedge \Box(e)$, $\lambda e.e \approx \lambda E.\Box(E)$, $\lambda y.\Box(y) \wedge \mathbf{fast}'(y)$, $\lambda e.\mathbf{theme}'(e,x) \wedge \mathbf{process}'(e)$

How many solutions, i.e. readings, does this diamond have? In principle, there are 3! (= 6) solutions. However, there seem to be only two readings empirically attested (i.e. the internal vs. the external one). Since this flexibility concerns the fragments coding the meaning of the affix and the modifier, it seems reasonable to block on principled grounds the scopal interaction with the information for the complement DP. In Egg (2006), certain unwanted ambiguities are surpressed by taking advantage of the fact that holes are typed, i.e. not compatible with random fragments but only with those matching type-theoretically. This aspect of semantic construction paves way for blocking in case of (27). The idea is to type the different event variables: I assume that verb semantics (on a par with adverbials) introduce event variables maximally flexible, i.e. a general event type e_g comprising all other types. However, whereas the inner structure of event nominalizations introduce a variable E for event concepts, the DP semantics is assumed to

[13] The version cited rests upon intersective modification as discussed e.g. in Higginbotham (1985). Adjectives are thus of type $\langle e,t\rangle$. Egg prefers a version based on functional application with adjectives typed $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$. The choice between these options is irrelevant here.

[14] The top hole supports possible ambiguities between the fragments below, cf. Egg (2006).

introduce variables e for concept-correlates.[15] With e and E being incompatible with each other, such typing rules out any solution where the fragment on the left – coding the DP semantics – must be identified with the hole in the central fragment. For this hole takes an E type variable. Accordingly, three of six possible solutions are ruled out, specifically those where the affix fragment takes scope over the DP fragment.

There are three well-formed solutions left: let us first look at those two cases where the DP fragment on the left gets widest scope, i.e. is identified with the top hole. The subsequent computation can take two directions: either one first plugs in the affix fragment and then the modifier's fragment or one starts out the other way round, cf. the results (28-a) versus (28-b) after λ-conversion:

(28) a. $\lambda e \exists !x.[\mathbf{data}'(x)] \wedge e \approx \lambda E.\mathbf{theme}'(E,x) \wedge \mathbf{process}'(E) \wedge \mathbf{fast}'(E)$
b. $\lambda e \exists !x.[\mathbf{data}'(x)] \wedge e \approx \lambda E.\mathbf{theme}'(E,x) \wedge \mathbf{process}'(E) \wedge \mathbf{fast}'(e)$

These are exactly those readings aimed at: in (28-a), the modifier pertains to the event concept, thus leading to an internal modification. In (28-b) though, it has wide scope over the concept-correlate, thus displaying the holistic external reading.

What about the third solution compliant to types? It is achieved by first identifying the modifier fragment with the top, then integrating the DP semantics and finally plugging in the affix fragment, cf. (29):

(29) $\lambda y \exists !x.[\mathbf{data}'(x)] \wedge y \approx \lambda E.\mathbf{theme}'(E,x) \wedge \mathbf{process}'(E) \wedge \mathbf{fast}'(y)$

This final third representation is identical to the one for the external reading in (28-b); hence it is not at odds with the empirical evidence for merely two readings.

3 Scopally underspecified locatives

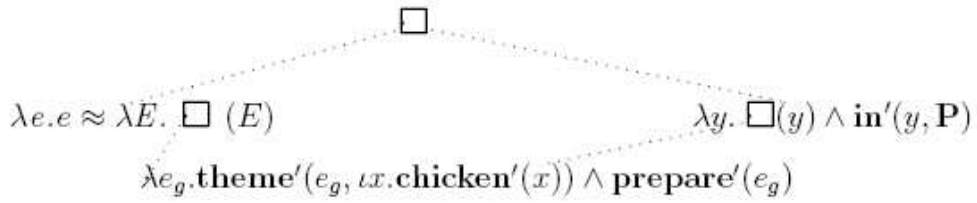
Locative PP modifiers are another instance of the contrast between internal and external modification. As in case of AP modifiers, internally interpreted locatives pose a problem for a 1:1 mapping between c-command and scope since they surface in distance to their modifie, cf. repeated from above (30):

(30) die *Zubereit*ung des Huhns in einer Pfeffersauce
the preparation the chicken$_{GEN}$ in a pepper-sauce

Construing a constraint according to the rules and the procedure above yields diamond (31). It simplifies DP semantics in representing the DP argument as a ι-term and the PP as a simple predicate. (32) lists the constraint's solutions.

[15] Admittedly, such typing is a stipulation. One might argue that DP semantics and nominal concept-correlates are compatible because both are nominal; however, note that at the sentential level, DP arguments must also be compatible with the event argument introduced by the verb.

(31)



(32) a. $\lambda y.\mathbf{in}'(y,\mathbf{P}) \wedge y \approx \lambda E.\mathbf{theme}'(E,\iota x.\mathbf{chicken}'(x)) \wedge \mathbf{prepare}'(E)$
b. $\lambda e.e \approx \lambda E.\mathbf{in}'(E,\mathbf{P}) \wedge \mathbf{theme}'(E,\iota x.\mathbf{chicken}'(x)) \wedge \mathbf{prepare}'(E)$

In the external reading, i.e. (32-a), the preparation event as a whole is localized in the pepper sauce. This is pragmatically deviant but otherwise unproblematic. The internal reading is not that straightforward: according to (32-b), the locative applies to the event concept *E*. This suits the intuition that an internal locative somehow modifies the conceptually specified inner event structure. However, it remains unclear what such localization of the conceptual essence exactly amounts to. Particularly, one has to assure that, finally, it is the chicken that is localized in the pepper sauce. In order to tackle this problem more precisely, I will first sketch Maienborn (2003)'s proposal for corresponding adverbial locatives and then transfer her solution to the nominal case at hand.

Maienborn proposes an abstract modification template MOD* which is accompanied by a structural condition, cf. (33):

(33) MOD*: $\lambda Q\lambda P\lambda x[P(x)\&R(x,v)\&Q(v)]$
Condition: if MOD* applies to categorial type X, R = **part-of′**, otherwise (i.e. in an XP-environment) R is the identity function.

MOD* conforms to common analyses of intersective modification by mapping two properties instantiated by the meaning of modifier and modifie to a conjunction of corresponding predicates. However, it additionally introduces a free relation variable mediating between the resultant predicates. Crucially, its interpretation is conditioned structurally and thus compositional in nature. Applying MOD* to the adverbials in (34-a) vs. (34-b) leads to the respective representations in (35).

(34) a. [$_{VP}$ [$_{PP}$in einer Küche] [$_{VP}$ das Huhn zubereiten]]
[$_{VP}$ [$_{PP}$in a kitchen] [$_{VP}$ the chicken prepare]]
b. [$_{VP}$ das Huhn [$_{V}$ [$_{PP}$in einer Pfeffersauce] [$_{V}$zubereiten]]]
[$_{VP}$ the chicken [$_{V}$ [$_{PP}$in a pepper-sauce] [$_{V}$prepare]]]

(35) a. $\lambda e.\mathbf{prepare}'(e) \wedge \mathbf{theme}'(e,\iota x.\mathbf{chicken}'(x)) \wedge \mathbf{in}'(e,\mathbf{K})$
b. $\lambda e.\mathbf{prepare}'(e) \wedge \mathbf{theme}'(e,\iota x.\mathbf{chicken}'(x)) \wedge \mathbf{part\text{-}of}'(e,v) \wedge \mathbf{in}'(v,\mathbf{P})$

The locative's projection above the VP triggers the identity function for the relation variable and thus yields an external modification with the event as a whole being localized in the kitchen. On the contrary, the interpretation for internal locatives, projected in V-adjacent position, is bound to a mediating variable *v*: *v* is localized in the pepper-sauce and **part-of′** identifies *v* as integral to *e*. Whereas this integrity constraint relies upon semantics, the particular value for *v* is fixed at the conceptual level, thus not part of compositional semantics proper. In the case at hand, the most plausible candidate for *v* is

the chicken; in effect, this leads to the desired interpretation with the chicken referent localized in the peppersauce.[16]

A straightforward transfer to the case at hand is impeded by the fact that internal versus external locatives are not distinguished by surface syntax. Assuming the very same structure for both readings, a truly compositional condition is trivially impossible. However, based upon the derivation along the lines of Egg's interface rules, the different targets of locatives can be paired with respective event types. I thus reformulate MOD* for the adnominal cases as follows:

(36) MOD*: $\lambda Q \lambda P \lambda x[P(x) \& R(x,v) \& Q(v)]$
Condition: if the free variable relates to the verbal concept E, R = **part-of**$'$; if it relates to the nominal concept-correlate e, R is the identity function.

Such reformulation constrains the way locatives are integrated in terms of semantics alone. I do not consider it stipulative but rather intuitively conclusive: if the locative is related via v to the nominal event concept-correlate e, i.e. a variable for concrete whole events, it 'sees' a potential target right from the start. Thus v and e are identified. On the contrary, the abstract verbal concept E is not a conceivable candidate to be localized. Thus it turns out to be necessary to infer an integral part to such a concept that could be a plausible target for localization.

Building (36) into the modificational analysis from above yields the following representations for external vs. internal locatives:

(37) a. $\lambda e.\mathbf{in}'(v,\mathbf{P}) \wedge R(e,v) \wedge e \approx \lambda E.\mathbf{theme}'(E, \iota x.\mathbf{chicken}'(x)) \wedge \mathbf{prepare}'(E)$
b. $= \lambda e.\mathbf{in}'(e,\mathbf{P}) \wedge e \approx \lambda E.\mathbf{theme}'(E, \iota x.\mathbf{chicken}'(x)) \wedge \mathbf{prepare}'(E)$

(38) a. $\lambda e.e \approx \lambda E.\mathbf{prepare}'(E) \wedge R(E,v) \wedge \mathbf{in}'(v,\mathbf{P}) \wedge \mathbf{theme}'(E, \iota x.\mathbf{chicken}'(x))$
b. $= \lambda e.e \approx \lambda E.\mathbf{prepare}'(E) \wedge \mathbf{part\text{-}of}'(E,v) \wedge \mathbf{in}'(v,\mathbf{P}) \wedge \mathbf{theme}'(E, \iota x.\mathbf{chicken}'(x))$
c. $\lambda e.e \approx \lambda E.\mathbf{prepare}'(E) \wedge \mathbf{in}'(\iota x.\mathbf{chicken}'(x),\mathbf{P}) \wedge \mathbf{theme}'(E, \iota x.\mathbf{chicken}'(x))$

The results (37-b) and (38-b) suit the intuitively given readings for *Zubereitung des Huhns in einer Pfeffersauce* ('preparation of the chicken in the pepper sauce').[17] Pragmatically, the internal reading can be strengthened by identifying v and the referent for the chicken, cf. (38-c).[18]

[16]Maienborn builds upon 'Two-Level Semantics' as advanced in Bierwisch (1982) and subsequent related work. Thus she distinguishes the grammatically determined semantic form of a linguistic expression from its conceptual structure being fixed by world-knowledge and context.

[17]To be sure, as before the pragmatic nonsense of external modification in this case is neglected.

[18]One might ask if a free choice between **identity**$'$ and **part-of**$'$ for R would do the same job as the condition in (36). In terms of the given proposal, it would cause two additional readings:

(i) a. 'an entity v being integral to the concept-correlate e is located in the pepper-sauce'
b. 'the event concept E is localized in the pepper-sauce'

As mentioned, the given computation for locatives simplifies DP semantics. There is no harm in simple cases. However, examples with interacting quantifiers as (39) having the readings in (40) enforce a more involved analysis:

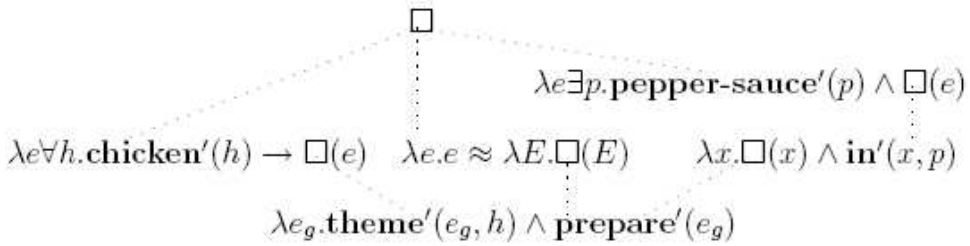
(39) die Zubereitung aller Hühner in einer Pfeffersauce
the preparation all chicken$_{GEN}$ in a pepper-sauce

(40) a. internal with $\exists > \forall$ 'there is a pepper-sauce in which all chicken are prepared'
b. internal with $\forall > \exists$ 'for all chicken there is some pepper-sauce in which they are prepared'
c. external with $\exists > \forall$ 'there is a pepper-sauce in which the preparation of all chicken takes place'
d. external with $\forall > \exists$ 'for all chicken there is some pepper-sauce such that the preparation of these takes place in it'

One might ask if the sketched mechanism can predict exactly these readings.[19]

Adding the quantificational force of DPs to the constraint leads to the diamond (41). I omit the free variable for the locative's integration in order to facilitate readability:

(41)



Taking into account that the embedded event concept of type *E* is incompatible with the *e* introduced by the DP semantics, (41) has four solutions, cf. (42):[20]

Reading (i-b) is the same as (32-b); it thus does not display any explanatory progress. I do not know what (i-a) amounts to since it seems unclear if there is any plausible distinction between an integral part of *E* vs. an integral part of *e*. Maybe, (i-a) just collapses with the internal reading; maybe, it does not make any sense. If one considers (i-a) a possible formulation for the case of internal modification, one might question the whole enterprise taken up here. Instead of modelling internal vs. external reading as landing site underspecification, adnominal locatives could be just dubbed underspecified due to the free variable. Still, formulating a condition for the variable's assignment as done in (36) makes more transparent which assignment to choose during computation by linking it to the difference between concept-correlates and event concepts.

[19]Interestingly, at the sentential level a quantifying internal modifier can scope out notwithstanding the assumed base position next to V, cf. (i) with both '$\forall > \exists$'- and '$\exists > \forall$'-reading:

(i) Er hat alle Hühner in einer Pfeffersauce zubereitet.
He has all chicken in a pepper-sauce prepared

[20]Most importantly, the λ-term for the affix in the middle is not allowed to have wide scope over any DP *e*, i.e. the identification with the top has to first process both quantifier fragments. There are four instead of merely two readings because the PP's semantic contribution – being coded within the two separate λ-terms on the right hand side – can go up as a whole or as separate constraints. If they are identified with the top together, the two external readings are generated; if they are kept apart, the internal readings are built up.

(42) a. $\lambda e \exists p.\textbf{pepper-sauce}'(p) \wedge \forall h.\textbf{chicken}'(h) \rightarrow e \approx \lambda E.\textbf{theme}'(E,h) \wedge \textbf{prepare}(E) \wedge \textbf{in}'(E,p)$

b. $\lambda e \forall h.\textbf{chicken}'(h) \rightarrow \exists p.\textbf{pepper-sauce}'(p) \wedge e \approx \lambda E.\textbf{theme}'(E,h) \wedge \textbf{prepare}'(E) \wedge \textbf{in}'(E,p)$

c. $\lambda e \exists p.\textbf{pepper-sauce}'(p) \wedge \forall h.\textbf{chicken}'(h) \rightarrow [e \approx \lambda E.\textbf{theme}'(E,h) \wedge \textbf{prepare}(E)] \wedge \textbf{in}'(e,p)$

d. $\lambda e \forall h.\textbf{chicken}'(h) \rightarrow \exists p.\textbf{pepper-sauce}'(p) \wedge e \approx \lambda E.\textbf{theme}'(E,h) \wedge \textbf{prepare}'(E) \wedge \textbf{in}'(e,p)$

These are (if supplemented by the free variable account for locatives) exactly those four readings empirically attested.

4 Conclusion and Outlook

The present paper addressed the challenge that AP and PP modifiers to eventive *ung*-nominalizations trigger – besides straightforward event external readings – event internal interpretations not expected by isomorphically mapping surface-oriented c-command on semantic scope. By applying Egg's flexible syntax-semantic interface built upon underspecification to the cases under discussion, both internal and external readings could be derived in a principled compositional manner without resorting to some form of syntactic preprocessing.

Crucially, the analysis relies on a bipartite eventive structure for *ung*-nominalizations: the affix introduces a secondary eventive concept-correlate e being related via $\approx$ to a lexically determined event concept argument E that is fed by the verbal base. This split provides two targets for the modification: whereas external modifiers apply to e and thereby trigger the holistic event modification, internal modifiers apply to E and thus specify event concepts from inside. Supplementary to such landing site ambiguity, the additional flexibility observed for internal locative PP modifiers is captured by introducing a free variable to be instantiated on conceptual grounds.

The most obvious follow-up question in view of the proposed analysis is if it covers other event nominals. Particularly, nominalized infinitives show the same flexibility as *ung*-derivations do although they lack an overt nominal affix, cf. (43):

(43) das schnelle Verarbeiten der Daten
the fast process$_{nominal}$ the data$_{GEN}$

One thus might ask more generally whether there is any other evidence for the assumption that event nominals have a bipartite eventive structure. In other words: it must be shown independently that event nominals do not simply render the verbal event argument visible but trigger some sort of secondary reifying process.

Acknowledgements

I would like to thank Markus Egg, Claudia Maienborn and Maria Averintseva as well as the audience of SuB 13 for helpful comments. Most notably, the present article takes

great benefit from joint work with Markus Egg presented at the 8th workshop on event semantics in Mannheim in december 2009. In particular, I owe Markus Egg the technical amendments to his formal apparatus that are needed in order to handle the cases under discussion here. All remaining errors are mine.

References

Bierwisch, Manfred (1982) "Formal and lexical semantics", *Linguistische Berichte* **80/82**, 3–17.

Cocciarella, Nino B. (1996) "Conceptual realism as a formal ontology", in R. Poli and P. Simons (eds.) *Formal Ontology*, Dordrecht: Kluwer, 27–60.

Egg, Markus et al. (1998) "Constraints over lambda-structures in semantic underspecification", *Proceedings of ACL / COLING '98*, 353–359.

Egg, Markus et al. (2001) "The constraint language for lambda-structures", *Journal of Logic, Language, and Information* **10**, 457–485.

Egg, Markus (2005) *Flexible Semantics for Reinterpretation Phenomena*, Stanford: CSLI Publications.

Egg, Markus (2006) "Anti-Ikonizität an der Syntax-Semantik-Schnittstelle", *Zeitschrift für Sprachwissenschaft* **25**, 1–38.

Egg, Markus (2009) "Semantic underspecification", to appear in C. Maienborn et al. (eds.) *Semantics: An international handbook of natural language meaning*, Berlin: de Gruyter.

Haider, Hubert (2002) "Adverbials at the Syntax-Semantics Interface", in H. Kamp and U. Reyle (eds.) *How we say WHEN it happens*, Tübingen: Niemeyer, 53–70.

Higginbotham, James (1985) "On semantics" *Linguistic Inquiry* **16**, 547–593.

Larson, Richard (1998) "Events and modification in nominals" in D. Trolovitch and A. Lawson (eds.) *Proceedings from SALT VIII*, Ithaca, NY: CLC Publications, 145-168.

Maienborn, Claudia (2003) "Event-internal modifiers: Semantic underspecification and conceptual interpretation", in E. Lang et al. (eds.) *Modifying Adjuncts*, Berlin & New York: de Gruyter, 475–509.

Parsons, Terence (1990) *Events in the semantics of English*, Cambridge: MIT Press.

Pittner, Karin (2004) "Where syntax and semantics meet. Adverbial positions in the German middle field", in J. R. Austin et al. (eds.) *Adverbials. The interplay between meaning, context, and syntactic structure*, Amsterdam: Benjamins, 253–288.

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