

When roots license and when they respect semantico-syntactic structure in verbs

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1 Introduction

In this paper I will investigate the contribution of roots to the syntactic and semantic properties of verbs. From the point of view of a formal semanticist

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like me the leading question of the investigation is "How can the semantics of verbs be constructed from their roots?". My way of tackling this question is by constructing Discourse Representation Structures (DRSes), cf. (Kamp and Reyle 1993), from word-syntactic representation in the spirit of *Distributed Morphology* (DM). Some of the important word-structural assumptions I owe to (Embick 2004) and (Marantz 2005). As far as the semantics of roots is concerned my assumptions aren't much different in spirit from those of (Marantz 2009),(Pylkkänen 2007), and (Levinson 2007, this vol): roots, as Marantz put it, come in three ontological flavors: events, stative properties, entities.¹ Subtle differences show up when it comes to deciding how to implement the consequences of these differences in a syntax-semantics interface. The leading idea of the current approach is this: Roots have a semantics which is the source of argument structure and which determine whether they can be selected by certain functional heads such as v(verbaliser), n(nominaliser), a(adjectiviser) in large numbers. For instance, eventive or 'manner' roots like $\sqrt{\text{run}}$ are simple event types (directly) merging with v; the property root $\sqrt{\text{dry}}$ creates an argument for the bearer of the property 'dry' in the de-adjectival verb *to dry*. In contrast, sortal roots

¹With the latter two authors I also share the methodological commitment to model-theoretic semantics.

ical object, regions, and others typically fill argument slots that are created by other roots. E.g. the sortal root $\sqrt{\text{line}}$ ('line') in *to underline a word* satisfies one of the two argument slots created by the preposition-like root $\sqrt{\text{under}}$. (The other argument is contributed by the direct object of the verb *underline*.) In German, where verb formation of this kind is common, it is common for sortal roots to fill argument slots of preposition-like heads.

Roots, however, may also contribute to words in ways that do not match their basic semantic categorisation. In these cases I will speak of 'unexpected contributions' of roots, whereas 'expected contributions' are those that are in accord with the word-formation principles sketched above. According to my experience, the unexpected contributions are comparatively rare and I will demonstrate the restrictions in the course of the paper.²

So the leading concern of the paper is contrasting expected and unexpected contributions of roots in German verbs. Admittedly, what counts as expected and what as unexpected is a delicate matter, and for two reasons: (i) We must rely on hypotheses on rule based verb formation. (ii) We must rely on collateral evidence indicating which rules apply when. As a conse-

²As a consequence my approach is in line with the contributions of (Alexiadou this vol.), (Levinson this vol) and (Rappaport this vol.) to this volume and supports this view and contra (Borer this vol), (Acquaviva this vol) or (Acedo-Matellán and Mateu this vol).

quence, in order to reveal the contribution of the semantics of the roots to the semantics of the verb we need to make use of analyses which are hypothetical in at least two ways: they involve hypotheses concerning patterns of word-formation in German generally, and, (ii) they must rely on hypotheses about which patterns are instantiated by which particular verb.

Background-hypotheses Some hypotheses on verb formation rules emerged in the context of formulating constraints on the formation on deverbal German nouns ending on *-ung*. The initial hypothesis was stated and defended in (Roßdeutscher and Kamp 2010):182, (s. also (Roßdeutscher 2010)).

Hypothesis 1: Verbs with a bi-eventive structure allow for corresponding *-ung* nouns, verbs with a mono-eventive structure do not.

In formulating this constraint, we rely on the syntactic implementation of bi-eventivity and mono-eventivity in (Marantz 2005), which we understand as an implementation of the dichotomy between 'manner' and 'result' in the verbal lexicon as presented in (Levin 1999). Simplifying a bit, our empirical hypothesis can be re-phrased as follows: German *-ung*-nominalisation mirrors the 'manner'-'result'-dichotomy in verbs. Result-verbs like *den Tisch säubern* ('to clean the table') have *-ung*-nouns (*Säuberung*); 'manner'-verbs

like *laufen* ('to run') or *den Tisch wischen* ('to wipe the table') do not (**Laufung*, **Wischung*). Postponing the details, we can say this much at this point:

If one of two verbs constructed from the same root has an *-ung*-noun while the other hasn't, this fact indicates that the root contributes to a 'result'-verb in one of them and to a 'manner'-verb in the other. Following Hypothesis 1, we take this as an indication that the root alternates in contributing to bi- vs. mono-eventively constructed verbs.

Moreover, if a root belongs to a class which, according to the predicted rules, form verbs bi-eventively and yet happens to be part of a verb that has no *-ung*-noun, then this root occurrence counts as unexpected. Verbs alternating with respect to bi-eventivity have proved a suitable starting point for discussing the role a root can play in a verb.

An introductory example In German there is the following alternation between the forms (1.a) and (1.b) (The same verb does not alternate in English. (cf. (Dowty 1991))).

- (1) a. die Kellnerin füllte ein Glas mit Tequila
the waitress filled a glass with tequila
- b. die Kellnerin füllte Tequila in ein Glas
the waitress filled Tequila into a glass

But the alternates are not equivalent in all contexts. Compare (2.a) and (2.b).

- (2) a. Johnny Depp füllte die Kinokassen (mit Millionen
Johnny Depp filled the cinema's tills (with millions
an Dollar).
of dollars).
- b. (#) Johnny Depp füllte Millionen an Dollar in die
Johnny Depp filled Millions of dollars into the
Kinokassen.
cinema's tills.

(2.b) is grammatical, but sounds a bit strange compared with (2.a), which seems perfectly natural. It suggests a scenario where Johnny Depp moves from one cinema to the next with a gigantic sack of money, pouring its contents into each cinema's till. We all know that Johnny Depp is a famous actor and that his way of filling the coffers of cinemas is by attracting customers, who buy tickets for cinema sessions in which they show the film or films in which his participation has won a high reputation, and (2.b) just isn't the right way to express that Johnny Depp filled the cinema's coffers in that way. (2.a) is different. When it is the tills that are the direct object of *füllen* (and what they are filled with is expressed by an optional *mit*-PP), then any way of causing them to be filled can be reported in this way.

In terms of a 'manner'-'result'-dichotomy *füllen* in (1.a) and (2.a) is a 'result'-verb, whereas it is a 'manner'-verb in (2.b). (1.a) and (2.a) are built

bi-eventively, (1.b) and (2.b) are built mono-eventively; e.g. *füllen* in the (-.a)-examples has an *-ung*-noun *die Füllung des Glases/ der Kassen*; *füllen* in the (-.b) examples has no *ung*-noun, compare **die Füllung des Tequilas/ der Millionen*. According to the implementation of bi-eventivity in the present framework the root $\sqrt{\text{full}}$ denotes a property in (1.a) and (2.a) and an event type in (1.b) and (2.b); in the latter, word formation follows *direct merge* in the sense of (Embick 2004). Direct merge leads to unergative (intransitive) and non-core-transitive verbs. Evidence for this is provided by the fact that mono-eventive *füllen* passes the *und; und*-test from (Kratzer 2004): Mono-eventively built verbs are widely assumed to enter syntax as intransitive verbs. So if *füllen* can be used intransitively we can take this as an indicator that the root $\sqrt{\text{full}}$ contributes to an unergative verb. The second conjunct of (3) is indeed of this form. Moreover, must the unergative verb be an instance of *füllen* in (1.b) and (2.b) and cannot be an instance of *füllen* in (1.a) and (2.a), because verbs following the de-adjectival formation pattern have internal arguments without exceptions.

- (3) die Kellnerin stellte zwei Gläser auf den Tisch und fing
 'the waitress placed two glasses on the table und
 an, den Tequila einzufüllen, und füllte und
 started the tequila [in] [to] [fill] and filled and
füllte.
 filled.
 ['...'] and started to pour in the tequila and was pouring and pouring'.

We account for this fact that bi-eventively constructed *füllen* has no intransitive use by assuming that the property-denoting root $\sqrt{\text{full}}$ contributes a referential and a non-referential argument slot of which the former must be satisfied obligatorily.

'Adjectival roots' in de-adjectival verbs contribute argument slots. We have seen with *füllen* in (3) that $\sqrt{\text{full}}$ can also contribute 'manner' and has no argument slot for any internal argument. If it had, the *und-und-*construction in (3) would be ungrammatical. This is so also for $\sqrt{\text{full}}$ in (3.b) and (2.b), in particular, $\sqrt{\text{full}}$ contributes no argument slots in this case for any internal arguments of the verb. This non-core-transitive (cf. (Levin 1999), (Marantz 2005)) *füllen* exemplified in the (-.b)-cases, is built from an event type denoting root $\sqrt{\text{full}}$ by 'direct merge' with *v, -* in the way that unergative and non-core-transitive verbs are generally built. But there is more to this. On first sight in (1.a), (2.a) and (1.b), (2.b) it looks like whatever is selected as direct object in the bi-eventive alternates becomes a goal argument realised as an *in*-PP in the mono-eventive alternates, while the *mit*-PP of the bi-eventive alternate becomes the direct object. A closer look, however, shows that this isn't all. Whereas the bi-eventive verbs allow for any direct object that can be described as *voll* (instantiating $\sqrt{\text{full}}$ (full)) and the DP in the *mit*-phrase may be whatever the direct object ends up being full of, the direct object of the unexpected mono-eventive alternate

imposes strict selection restrictions: As regards what is poured into the container, only stuff is admitted that can be poured in a more or less literal sense, i.e. liquids or solid matter consisting of parts that are able to move relative to each other (such as sand, salt, pebbles, coins or apples rolling like pebbles). The aggregates (4.a,b) as opposed to (5.a,c) demonstrate this. (4.a,b) are felicitous, whereas (5.a,c) are odd. The asymmetry in (2.a) vs. (2.b) demonstrates the same point.

- (4) a. eine Gans mit Äpfeln füllen
a goose with apples fill
'to stuff a goose with apples'
- b. das Zimmer mit Rauch füllen
the room with smoke fill
'to fill the room with smoke'
- (5) a. # Äpfel in eine Gans füllen
apples into a goose fill
- b. Äpfel in einen Sack füllen
apples into a sack fill
'to sack apples'
- c. # Rauch in einen Raum füllen
smoke into a room fill

As will become more obvious in the course of the paper, this change of selection restrictions typically goes hand in hand with different contributions of the root. There are two points relating to this I would like to make at this early stage of discussion.

First. The description of an action that is constructed by 'direct merge' (cf. (Embick 2004)) thereby using a property root is suitable for describing behaviour which can also be described with the help of corresponding bi-eventive descriptions; for instance mono-eventive *füllen* describes actions suitable for making something full. But not all actions suitable for making something full can be described with the help of mono-eventive *füllen*, only actions that are like pouring. Stuffing a goose with apples is not like that. To let a heap of apples roll into a bag comes close enough to pouring and that is why (5.b) is felicitous. This restriction also explains why (2.b) is odd. The hearer is inclined to understand *Millionen an Dollar in Kassen füllen* as a case of pouring.

Second. The selection restrictions of direct objects in the mono-eventive descriptions of filling events must be suitable for direct manipulation by the agent. With the inclination to interpret filling as pouring comes the inclination to interpret *Millionen an Dollar* (millions of dollars) as concrete — heaps of bills or coins — rather than abstract (money as a figure in a bank account).³ What, out of all actions of making something full, is special

³ This effect makes itself felt more drastically with the root $\sqrt{\text{leer}}$ in alternations analogous to (1), compare (6).

- (6) a. die Heizungsrohre leeren
 the heating-pipes empty
 'to drain the heating pipes'

about pouring? Pouring liquid or stuff of fine grained granularity determines a definite point of termination for the activity under the agent's control, namely the point when the container is full of the liquid or stuff. Apples w.r.t. geese in (4.a) and smoke w.r.t. rooms in (4.c) don't qualify. Pouring is a proto-typical filling action, stuffing isn't.

The two points above, for which more evidence will be provided, support the following theoretical perspective on these alternations: the property root $\sqrt{\text{full}}$ in the mono-eventive alternate is 'coerced' into a predicate of events. As a result of this coercion the semantics of the root must obey the semantico-syntactic requirements of the structural elements the root interacts with.

For the unexpected occurrences of $\sqrt{\text{full}}$ in (2.b) and (3) this means

- (i) The root $\sqrt{\text{full}}$ (full) has no selective power of its own ⁴.
- (ii) 'Direct merge' of $\sqrt{\text{full}}$ and v can only denote prototypical

b. # die Heizungsrohre ausleeren
 the heating-pipes [out]empty
 'to drain the heating-pipes'

The particle verb *ausleeren* is built mono-eventively. (There is no **Ausleerung der Heizungsrohre*.) (6.b) is infelicitous, because the pipes of a heating system cannot be handled in a direct way, like you do with pouring water out of a bucket. They must be drained, i.e. emptied in some indirect way.

⁴ Of course (i) doesn't exclude the possibility that containers like sacks in (5.b) occur in the sentence predication. But when they do, they are selected by the preposition *in*, not by the root $\sqrt{\text{fill}}$.

actions of making something full or fuller.

(iii) All direct objects must be under the agent's direct control.

Arguably (ii) and (iii) can be viewed as a reflection of certain structural requirements: The 'verbaliser', i.e. the head 'little v', selects for agentive event types with which it directly merges.

Another example I would like to dwell on these observations on structural determination a bit longer and discuss another an example of two different semantic contributions of the same root that has received considerable attention in the literature (e.g. cf. (Kiparsky 1997)) in this light; a similar example was recently discussed by (Koontz-Garboden and Beavers n.d.) and (Levin 2009), (Rappaport Hovav and Levin 2010), (Levin and Rappaport Hovav appear.a,b). (7.a-c.) are fine, whereas (7.d) is ungrammatical.

- (7) a. der Drachen stieg (zum Himmel) auf.
the kite ascended (to the sky) [up].
'the kite flew up into the sky'.
- b. der Mann stieg (zum Gipfel) auf
the man ascended (to the summit) [up]
'the man climbed to the summit'
- c. der Mann stieg (vom Gipfel) ab
the man ascended (from the summit) [down].
'the man climbed down from the summit'
- d. * der Drachen stieg (vom Himmel) ab
the kite ascended (from the sky) [down]

(Kiparsky 1997) discusses this and similar examples as cases of *disjunctive meaning*. Verbs like German *steigen* or English *climb* contain in their conceptual representation both a manner component ("clambering motion") [for *climb*, A.R.] and a direction component ("upward"); however, the lexicalisation constraint (LC) permits only one to be lexicalised as part of the Semantic Form of the verb.

(LC) *The lexicalisation constraint*: A verb can inherently express at most one semantic role (theme, instrument, direction, manner, path,...)(Kiparsky 1997):490

The analysis in (Levin and Rappaport Hovav appear.b) is in the same vein, except that *climb* alternates w.r.t. 'manner' vs. 'result'; direction, which instantiates scalar change, is subsumed under 'result'. According to these explanations it seems an accident that (7.c) lexicalises 'manner' and (7.a) lexicalises 'direction'. But there is a structural point: As a matter of fact it is only agentive uses of *steigen*, as in (7.c), where the semantics of $\sqrt{\text{steig}}$ (*climb*) isn't in conflict with 'downwards'. And this restriction correlates with a syntactic difference between (7.a) and (7.b). The latter allows for impersonal passives, whereas the former doesn't, something that is shown by (8), which only has an agentive 'manner'-interpretation. This supports a syntactic analysis according to which the verb in (7.b) has a vP-external

subject; the agent enters syntax in voice (cf. (Kratzer 1996)).

- (8) Je höher gestiegen wird, desto schöner ist die
The higher climb.imp.pass , the more beautiful is the
Aussicht
view
'the higher people climb, the more beautiful is their view'

The verb in (7.a) has a verb-internal subject. The syntactic differences show that the root $\sqrt{\text{steig}}$ that forms the kernel predicate of the verb in (7.a) and (7.d) is not the same as the root in (7.b) and (7.c). The root in (7.a) is a relational predicate which relates a situation (or, in the terminology I will be using, an event) to the verb internal argument that manifests itself as subject. The verb *steigen* formed with this version of the root $\sqrt{\text{steig}}$ says of its event argument that it consists in the rising of its theme argument as an effect of some external natural force such as buoyancy, as we find it with kites, balloons, smoke, etc. This is all the verb says, *upward movement* is an inseparable part of its meaning. (Would we try to subtract it, nothing would be left.) So when we try to combine it with *ab-* (down) we get an irreparable contradiction and the combination aborts. The root $\sqrt{\text{steig}}$ of (7.b,c) on the other hand is a true 'manner'-predicate, a one-place predicate of events, that says of an event *e* that it involves the effort and movements *typical* of someone who moves upwards, and thus in a vertical direction, on his or her own strength. The default meaning in this case is also that of an upward

motion. But the manner-features of such events are quite similar to those of voluntary downward movements, enough for them to be able to become the sole semantic contribution of $\sqrt{\text{steig}}$ when upward movement is taken away from it. This makes it possible for this instance of $\sqrt{\text{steig}}$ to combine meaningfully with *ab-* (down): the upward meaning of $\sqrt{\text{steig}}$ gets overwritten by 'downwards', contributed by *ab-*, but the remainder is retained (and there is enough to survive on its own).

There are some aspects in which the two types of alternations ((1.a) vs. (1.b) and (2.a) vs. (2.b), respectively) on the one hand as opposed to (7.a) vs. (7.b) on the other are analogous and some in which they differ. The alternations are analogous in that in each the two alternates share aspects of meaning: both alternates describe eventualities that are suitable for making something full, or for a change of location. They are also analogous in that there is change in selection and semantico-syntactic behaviour. But the differences are different. The *fllen*-alternates show bi-eventivity vs. mono-eventivity; the *steigen*-alternates show verb-internal vs. voice subjects. This means that our indicator of 'expected' vs. 'unexpected' contribution of a root, namely bi- vs. mono-eventivity is applicable for *fllen*, but not for *steigen*.

This is so, because according to our tests⁵ all verbs in (7) are constructed mono-eventively. As a consequence the basic semantico-syntactic categorisation of $\sqrt{\text{steig}}$ must rely on other heuristics.

(N.B. The refined version of the 'manner'-'result'-opposition from (Rappaport Hovav and Levin 2010), (Levin and Rappaport Hovav appear.a,b) is orthogonal to the notion of bi-eventivity vs. mono-eventivity as used in the present paper (cf. (16), p.31). The present notion is a kin of that of (Levin 1999), but incompatible with Levin's and Rappaport Hovav's current treatment of the dichotomy.)

Overview of the paper In the next section I will put some formal substance into the ideas presented above. To that end, I will review the implementation of bi-eventively and mono-eventively constructed verbs proposed in (Roßdeutscher and Kamp 2010). I will present a construction algorithm for the semantics of the expected and the unexpected uses of the individual property denoting root in *füllen* and for the expected and unexpected

⁵(i) None of the verbs have *-ung*-nouns: * *die Steigung des Mannes*, **die Steigung des Drachens*. (ii) Both pass the *und,und*-test: *der Mann stieg und stieg* (O.K.); *der Drachen stieg und stieg*(O.K.); (iii) both allow for resultative constructions (cf. (Kratzer 2004) on verbs that start out as unergatives): *der hochgestiegene Mann*, (the man who has reached a high point in climbing) *der hochgestiegene Ballon* (the balloon that has risen to a high level)

use of the event property denoting root in *steigen*, both with and without verb-external subject. In section 3 the same will be done for sortal roots. Section 4 will be devoted to examples that point in the opposite direction from those discussed in section 3: event type denoting roots (which I will refer to as 'manner-roots') contribute (i) properties of individuals, (ii) entity denoting roots of the sortal type 'event' or (iii) entity denoting roots of the type 'material object' to the verb.

If we ignore the two syntactic alternates of eventive roots, with the three basic types of roots, property roots, entity roots and 'manner' roots, six pairs of expected and unexpected contributions of a root are logically possible, see

(9)

(9)

expexted contribution	unexpected contribution		
individual property	event type ('manner')	sec. 2	seldom
entity	event type ('manner')	sec. 3	common
event type ('manner')	individual property	sec. 4	common
event type ('manner')	entity	sec. 4	seldom
individual property	entity	—	
entity	individual property	—	

From these six possibilities only four will be discussed in some detail. In section 5 I will give reasons for why the remaining two possibilities are not

discussed. In that section I will also give an outlook on further research, to be focused on the question of relative frequency: "How common are unexpected contributions of roots?". The fourth column in (9) lists tendencies, only.

2 Syntactic structure and semantics construction

2.1 Property roots are coerced to 'manner'-roots

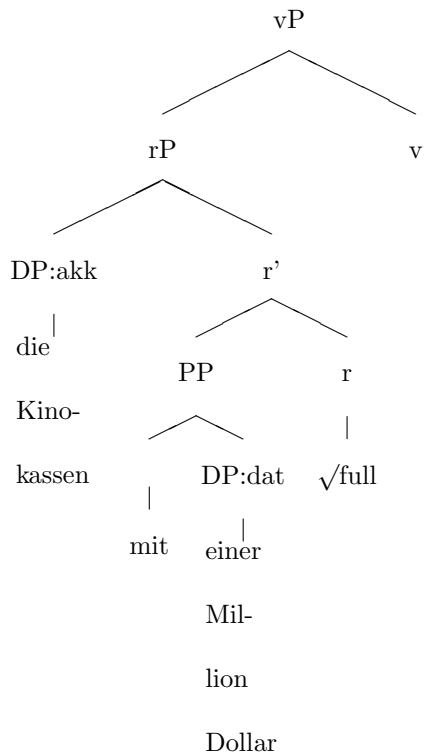
In (11.a,b), I display the syntactic representation of the alternates in (10.a,b) which are slightly modified versions of (2.a,b). In order to keep the representation as simple as possible I have changed the description of the money into a quantized description. This makes the mono-eventive description telic, whereas the original (mono-eventive) description (2.b) was atelic. Note that both (bi-eventive) descriptions (2.a) and (10.a) are telic, irrespective of whether a *mit*-phrase is present.

- (10) a. die Kinokassen (mit einer Million Dollar)
the cinema's coffers (with one Million Dollars)
füllen
fill
- b. eine Million Dollar in die Kinokassen füllen
one Million Dollars into the cinema's tills fill

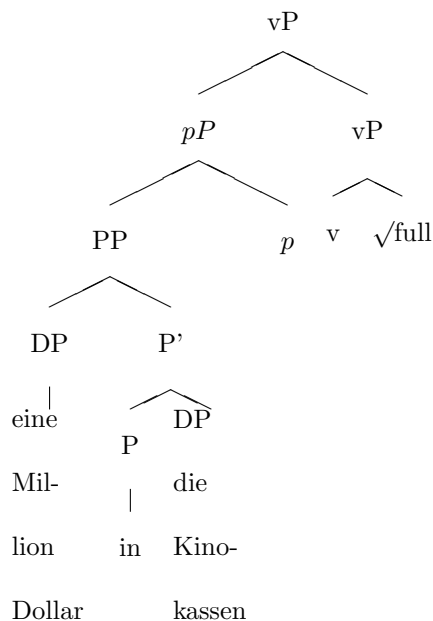
Figure 1 and Figure 2 show the step-by-step bottom-up interpretation of the structures in (11.a,b).

(11)

a.



b.



In (11.a) the root $\sqrt{\text{full}}$ (full) functions as the head of a root phrase, which is selected by v.⁶ As alluded to in the introduction the root contributes two argument slots, one for the container to become full, syntactically realised by

⁶An alternative is to represent the head of rP as a functional adjectival head that is modified by $\sqrt{\text{full}}$. As the differences between the two solutions for the syntactic representation are not relevant to the arguments in this paper, I have opted for the simpler representation. A detailed discussion on principles of the syntax-semantics-interface is left for another occasion.

the direct object and one for a theme in prepositional case. (The second is syntactically optional and when it is not overt it can often be reconstructed from context.) The derivation fails if the former argument slot isn't saturated.

(11.b) shows the syntactic analysis of mono-eventive *füllen*. We have direct merge (cf. (Embick 2004)) of the root with the verbaliser *v*, forming the unergative *füllen*. The direct object and the goal phrase are assumed to be part of a single prepositional phrase⁷.

Figure 1 and Figure 2 show the steps of the bottom up semantics construction on the basis of (11.a) and (11.b).

The semantic representations I am using in this paper have the following form. In general they are triples consisting of (i) a string of lambda abstraction operations (such as e.g. $\lambda x.\lambda y.$); (ii) a store containing one or more discourse referents; and (iii) a DRS. An example is (12).

$$(12) \quad \lambda z. \lambda y. \left\langle s, \begin{array}{c} \boxed{\text{s: FULL}(y,z)} \end{array} \right\rangle$$

⁷I follow the *split-P-hypothesis* of (Svenonius 2003), (van Riemsdijk 1990)

The λ -bound symbols 'z' and 'y' are 'argument slot holders'. Their only other occurrence in the representation is as argument positions of some predicate in some DRS condition – here the first and second argument position following the predicate FULL in the DRS to the right. The symbol 's' to the immediate left of the DRS is a discourse referent, which fills the 'referential' argument slot of the predicate 'FULL', which is here assumed to be singled out by its position to the left of the predicate and separated from it by ':'. Representations with a non-empty lambda-prefix or a non-empty store (or both) can only occur as intermediate representations. It is a well-formed constraint on final representations of complete sentences (and larger pieces of discourse) that (i) all lambda-bound slots have been instantiated by discourse referents (through 'lambda conversion', or 'functional application') and (ii) no discourse referents remain in the store. (A discourse referent is removed from the store when it is bound (in any of the ways allowed for by the given construction algorithm). Binding of a discourse referent always involves placing it in some DRS universe. The most common form of binding is that in which the discourse referent is simply transferred from the store to the universe of the main DRS to its right; this imposes on the discourse referent the existentially quantified interpretation familiar from the version of DRT of, for instance (Kamp and Reyle 1993).

The semantic representations of lexical items I will be using in this paper are simplifications of the general schema in (12) in one of two ways: either they have an empty store or they have an empty lambda-prefix. But when such representations are combined into the representations of syntactically complex expressions, these latter ones may have non-empty stores as well as non-empty lambda-prefixes.

Crucial for the bi-eventive structure in Figure 1 as compared with the mono-eventive structure in Figure 2 are (i) the denotation and (ii) the position of the root $\sqrt{\text{full}}$. As already alluded to on p. 7, the individual property is the head of a $r(\text{oot})P$ which denotes a state s . The verbaliser 'little v ' selects rP . The referential argument e' (contributed by 'litte v ') is interpreted as the causal antecedent of the state s , contributed by rP . The semantics of vP is to be read as follows: There exist e' , s , Y and Z , such that e' brings about s , where s is a state of the cinemas' tills Y being full of one Million Dollars Z .

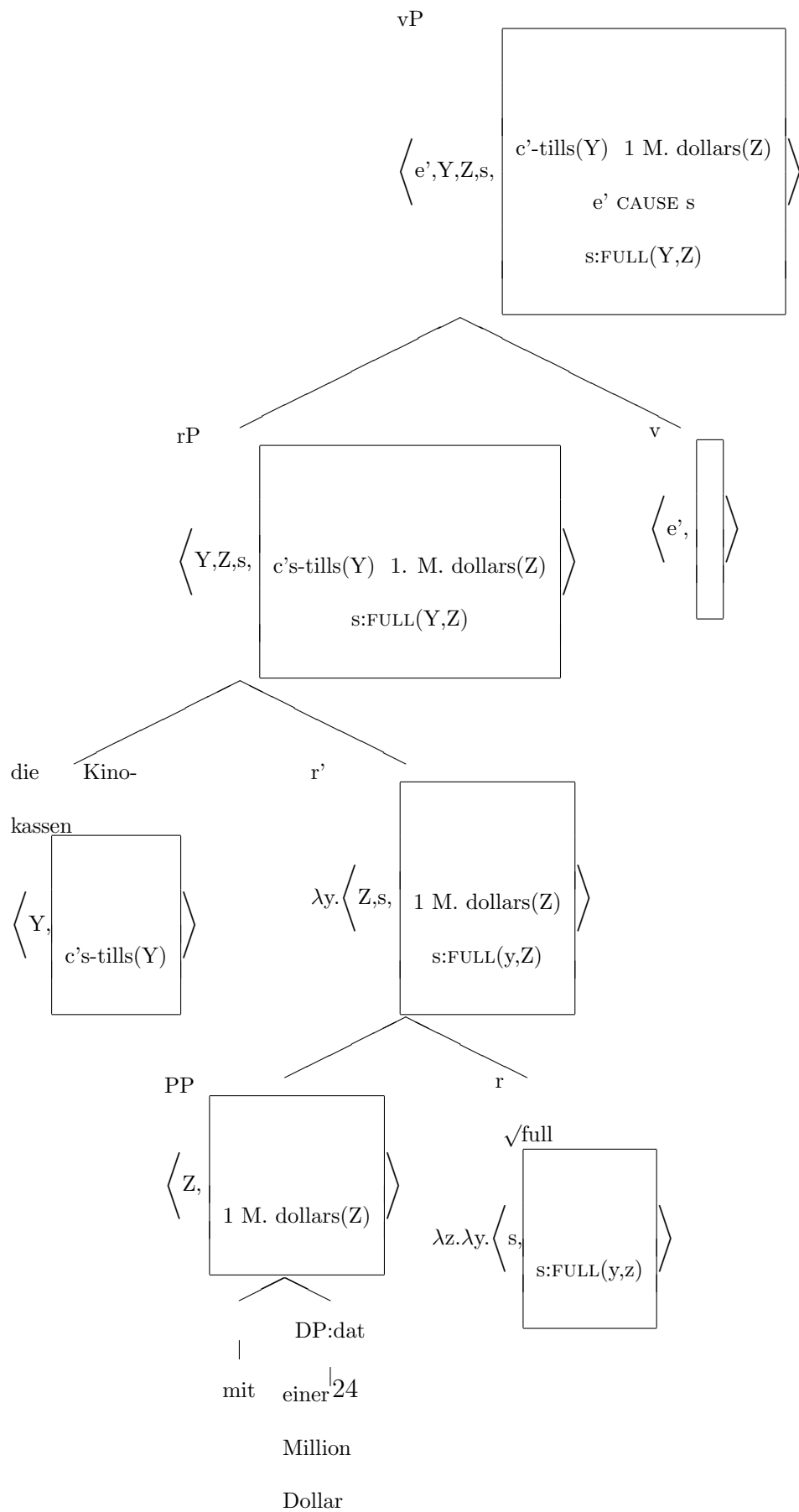


Figure 1. Semantics construction for *die Kinokassen (mit einer Million Dollar) füllen*

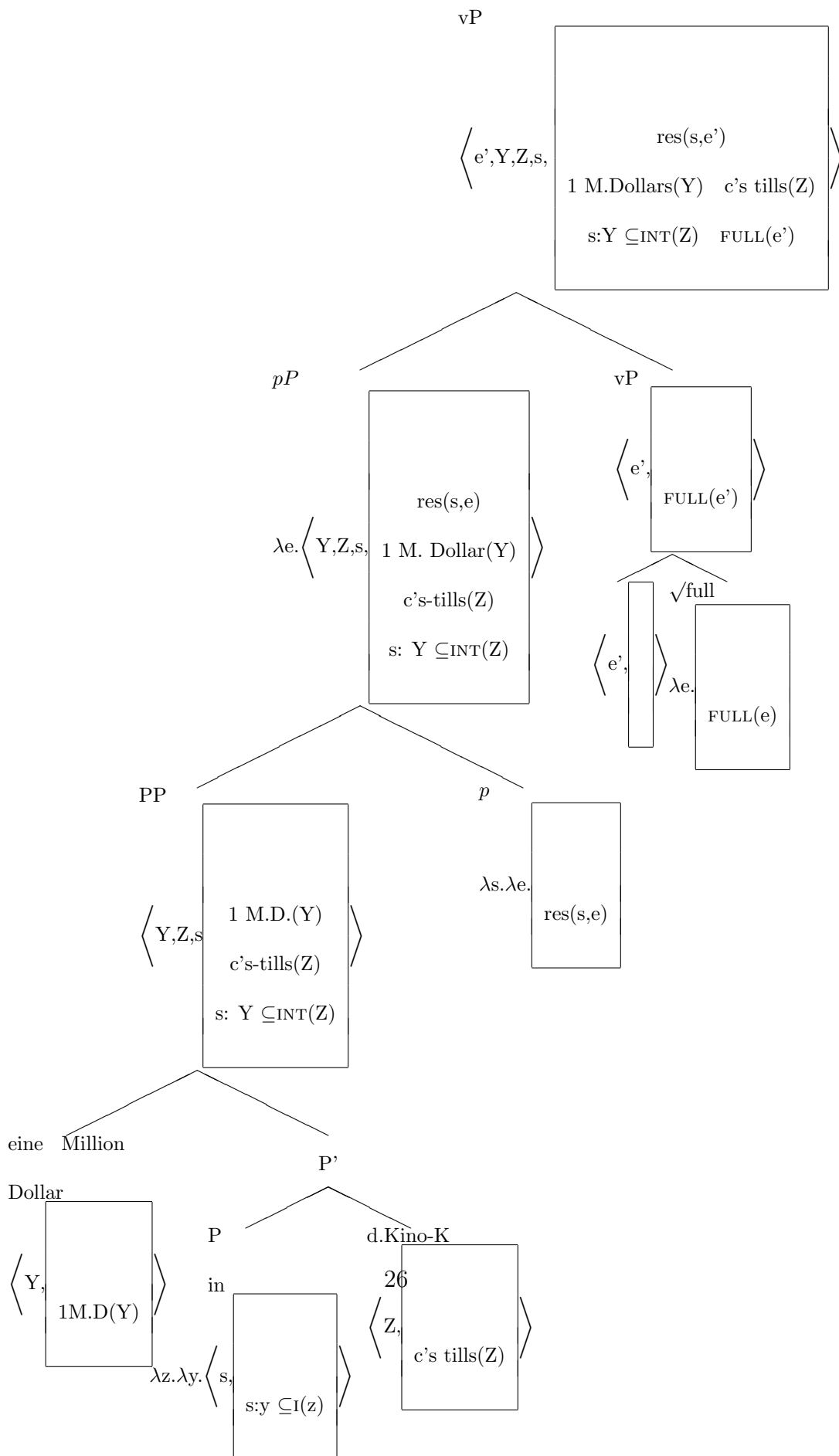
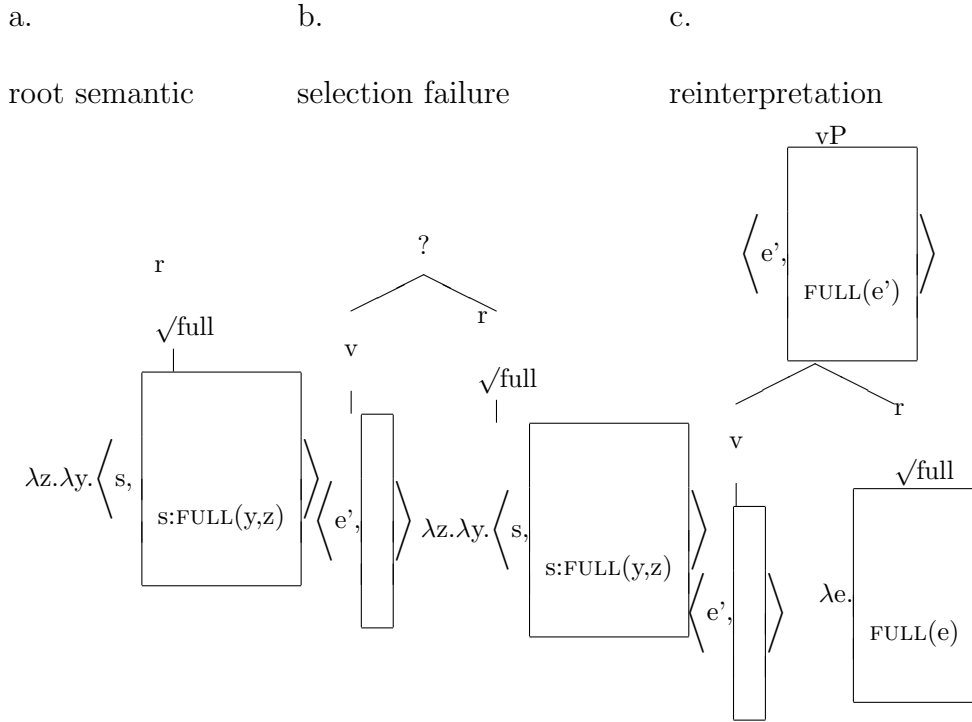


Figure 2. Semantics construction for *eine Million Dollar in die Kinokassen füllen*

The root $\sqrt{\text{full}}$ occurring in Figure 2 the semantics of which is a one-place event predicate is the result of an operation of coercion, which is assumed to have already taken place. The steps involved in this coercion are displayed in (13). The structure in (13.c) cannot be formed in a direct compositional way on the basis of the semantics assumed for the root $\sqrt{\text{full}}$ in (13.a). Therefore the semantics of $\sqrt{\text{full}}$ is modified so that it can combine in the way that merge of v and r requires, viz. as a case of argument insertion (functional application).

(13)



Direct merge (cf. (Embick 2004)) of the root represented in (13.a) with the verbaliser v isn't possible, because v requires specifying conditions for the process e' . It is this structural requirement that triggers the shift in the syntactic and semantic contribution of the root.

The property root $\sqrt{\text{full}}$ can act as a predicate of e' if it is reinterpreted as 'manner' root, i.e. as an event property, as in (13.c). As a side effect of the coercion, the argument slots for y and z are filtered out.

The semantic differences mentioned above are plausible in the light of the structural differences. In the bi-eventive event description (2.a) whatever Johnny Depp did caused the result state of the tills being full. This is an

intrinsic part of the predication expressed by the bi-eventive structure. The bi-eventive predicate is silent about what the agent actually did, if indeed he did anything at all. There is no manner specification of e' . Quite the opposite is true in the case of (2.b) and (10.b). The vP-representation doesn't entail that the cinema tills are full. The mono-eventive description (10.b) of the filling event only commits us to the conclusion that there are one million dollars in the cinemas' coffers. We infer that Johnny Depp's money-pouring action had come to an end at that point. As for mono-eventive filling descriptions Johnny Depp can stop pouring money into the tills at any point, the money being under his immediate control. Whether the event is described as one with a culmination depends on whether or not the direct object is quantized. If no direct object phrase or PP is adjoined to the unergative structure of the vP in Figure 2 (as is the case in the *und-und-* construction *sie füllte und füllte* in (15)(=3)), the sentence supports hardly any result state inferences. Let's look at this last description from an other angle: Assume the following situation. The waitress intends that a certain glass becomes full of Tequila. She starts pouring Tequila into it and stops when the glass is full. (14), a repetition of (1), truthfully describes this entire action. The second conjunct of (15) describes stretches of pouring, beginning anywhere between the time she started pouring and ending anywhere before she stopped.

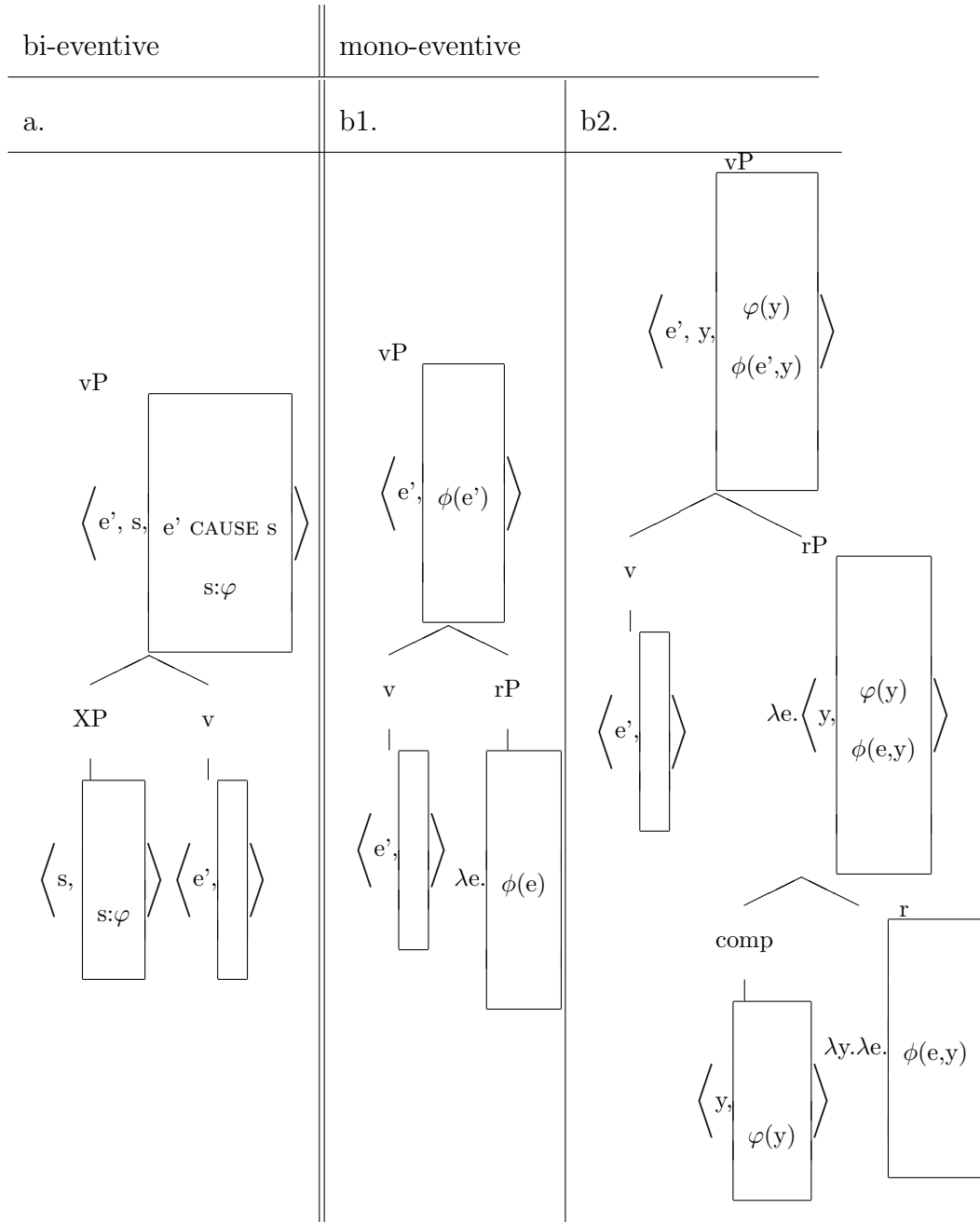
(14) die Kellnerin füllte ein Glas (mit Tequila)
the waitress filled a glass (with Tequila)

(15) [die Kellnerin begann den Tequila einzufüllen] und füllte und
. and filled and
füllte
filled
'the waitress started pouring Tequila poured and poured.'

We can conclude: If there are culmination conditions in mono-eventive structures they must be contributed by quantized direct object phrases. A direct object phrase of the form *zwei Deziliter Tequila* (*two deciliters of Tequila* instead of *Tequila* or a quantized description *eine Million Dollar* (one million Dollar) instead of *Millionen an Dollar* (millions of dollars) do.

Intermediate summary (16) displays the dichotomy between bi-eventive verbal structures (16.a) and mono-eventive verbal structures (16.b1) and (16.b2).

(16)



The semantic characterisation of XP in (16.a) generalises over rPs, aPs and PPs. In the former, the head is a one-place- or two-place-relation intro-

duced by property roots or prepositional roots. Examples involving prepositional roots sort will be given in the next subsection. Functional heads like a(djectival) may also play the role of the heads of such phrases. (16.b1) represents unergative verbs as in (7.b), (16.b2) unaccusative verbs with non-agentive subjects. E.g. the root $\sqrt{\text{steig}}$ in (7.a), repeated as (17.a) instantiates (16.b2).

- (17) a. der Drachen stieg (zum Himmel) auf.
 the kite ascended (to the sky) [up].
 'the kite flew up into the sky'.
- b. der Mann stieg (zum Gipfel) auf
 the man ascended to the summit
 'the man climbed to the summit'

The question that is still to be answered is whether the basic semantic categorisation of the root $\sqrt{\text{steig}}$ has the form in (16.b1) or has the form (16.b2). Assuming that one direction is more basic than the other, which it is and thus: in which direction does reinterpretation takes place? Although the matter cannot be decided straightforwardly, the reinterpretation direction is probably from agentive and simple eventive to non-agentive and relational eventive. This is in line with what has been claimed about English *climb* in (Levin and Rappaport Hovav appear.a) and work cited therein. A point in favour is the fact that the range of suitable subjects for non-agentive *steigen* is apparently more restricted than for non-agentive agentive. The change from

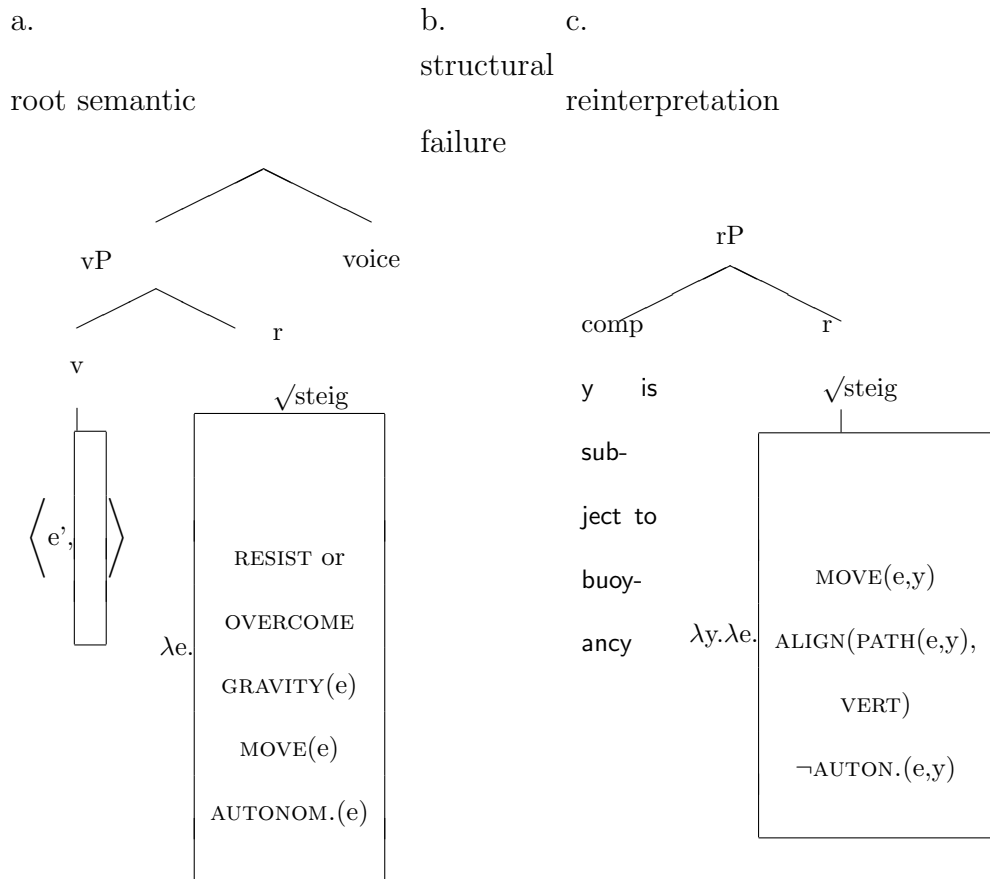
less restricted to more restricted selection restrictions seems to be a general feature of root coercion. Unaccusative *steigen* exclusively selects subjects that are physical objects where upward motion is due to buoyancy.⁸ When

⁸According to the entry of *steigen* in (Grimm and Grimm 2007) $\sqrt{\text{steig}}$ was initially a root suitable to describing autonomous change of location activities, which, like English *climb*, involved "resisting the pull of gravity" (cf. (Levin and Rappaport Hovav appear.a)) but also in the sense of keeping one's ballance. In Goethe's work one finds *er steigt die gefährlichsten Kanten wie im Schlaf*, meaning walking on dangerous edges next to a chasm as when asleep. How the default of upward motion in the agentive use on the one hand and the strict inference to upward motion with the unaccusative *steigen* in (7.a) might have come about is inaccessible to say without an in depth historical investigation, which I am not in a position to undertake. But, apparently the use of *steigen* to speak of flying or swimming animals such as insects, fishes and birds that overcome gravity by their own strength has been a factor. Impersonal passives like that in (8) seem not, or only marginally applicable to flying animals and not to swimming ones. This suggests that the use of *steigen* is already the result of the transition from the one-place $\sqrt{\text{steig}}$ of (7.b) to the two-place $\sqrt{\text{steig}}$ of (7.a). This is an interesting fact, given that the motions of animals that *steigen* can be used to describe are agentive in the fairly strict sense that (usually) they are voluntary and that the agent must itself produce the force that propels it. There thus appears to be at least two distinguishable components to the transition: the transition from a one-place predicate that allows for a voice projection to a two-place-predicate that does not; and (ii) the transition from a predicate that describes its event argument as an activity performed in a certain 'manner' to a predicate that describes its event argument as a motion event with a specific cause (buoyancy) and a direction

this restriction is satisfied, an interpretation of the contribution of $\sqrt{\text{steig}}$ as describing a downward change of location is excluded, because it is now an intrinsic part of the semantics of the root that buoyancy is the cause of motion; and such motions cannot be downward.

The counterpart of (13) for the coercion process of the root occurring in (7.a) = (17.a), is displayed in (18).

(18)



(upwards) that is entailed by this particular kind of causation.

Besides the syntactic differences between the root in its basic categorisation in a. and its coerced categorisation in c., direct merge and a voice projection including an agentive subject, as opposed to a voiceless projection of a verbal predicate which contains an argument slot for the subject from the start we have (i) conflicting conditions between 'autonomous motion' in a. and 'non-autonomous motion' in c. This difference is decisive for the syntactic restructuring involving vP-internal subjects. As we have already seen, the coercion operation also involves strengthening of the conditions conveying the direction of the motion. Whereas in the semantics of $\sqrt{\text{steig}}$ in (18.a) there is an implication that the motion is vertical, which correlates with the manner of motion that animals and humans engage in primarily when they move up, and to some extent also when they move down, the upwards motion has become an essential part of the semantics of the reinterpreted $\sqrt{\text{steig}}$ in (18.b) (cf. $\text{ALIGN}(\text{PATH}(e,y),\text{VERT})$).⁹

⁹(Levin and Rappaport Hovav appear.a) assume that the conditions in a. should determine 'manner', whereas those in c. should lack this determination. In this paper 'manner' is used as a label for 'specifying agentive actions'.

3 More of the same: entity denoting roots are coerced to manner-denoting roots

There is another alternation in German, for which there is no direct counterpart in English. An instance is presented in (19), with the sortal root $\sqrt{\text{deck}}$ instantiated in the nouns (i) *Decke*, (ii) *Deck*, and (iii) *Deckel*. Prototypical instances of the nouns are: (i) either (a) piece of cloth serving as a cover, such as a table cloth or a blanket or bedspread or (b) the ceiling of a room or other enclosed space; (ii) a solid plane that serves as the upper closure of what is below it and at the same time as floor like English 'deck' (as in 'the deck of a ship'); (iii) a cover or lid of a container, such as a jar or a box. $\sqrt{\text{deck}}$ too can enter into a verb both as sortal and as manner root. The most common verb in which it occurs as sortal root is the prefix verb *bedecken* in (19.a) whereas the 'simple' verb *decken* is primarily used as a verb in which $\sqrt{\text{deck}}$ acts as a manner root, s. (19.b)¹⁰

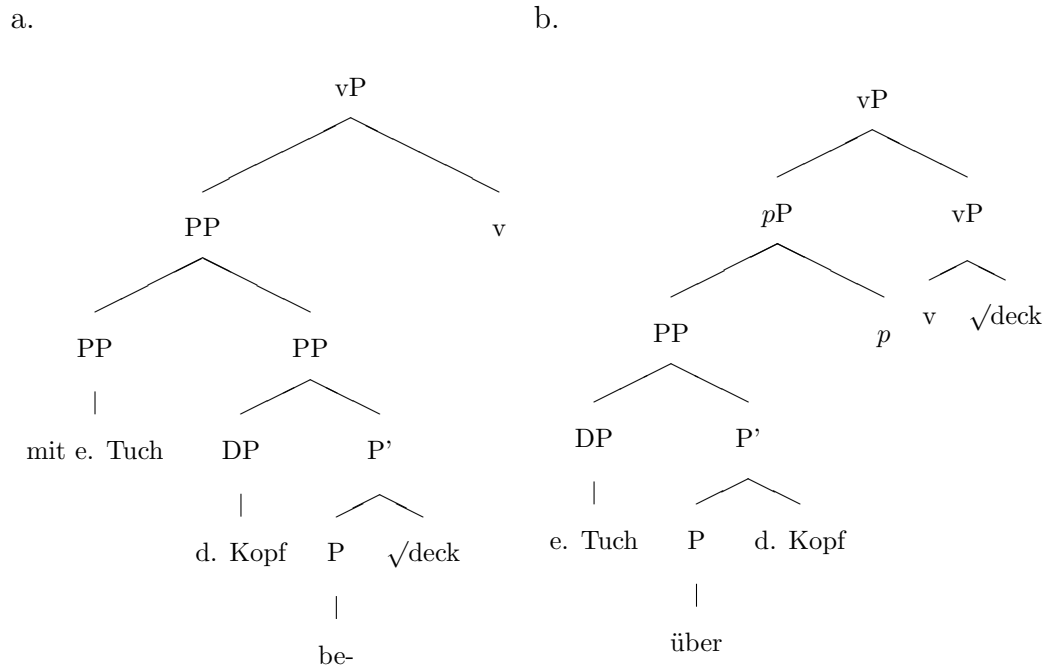
- (19) a. den Kopf (mit einem Tuch) bedecken
the head (with a cloth) pref.cover
'to cover the head (with a cloth)'

¹⁰Evidence for the different structure is *-ung*-nominalisability of the verb in (19.a), but not of that in (19.b). Compare *die Bedeckung des Kopfes* vs. the ungrammatical **die Deckung eines Tuches über den Kopf*.

- b. ein Tuch über den Kopf decken
 a cloth over the head cover
 'to spread a cloth over the head'

For good measure, I briefly repeat the syntax and the semantics construction from (Roßdeutscher and Kamp 2010), (Roßdeutscher 2010) according to (20.a) in Figure 3. The reader is referred to the cited papers for a more detailed discussion and also for the readings of *-ung*-nominalisations of this pattern. (I skip the semantics construction of (20.b) because it much like in Figure 2.)

(20)



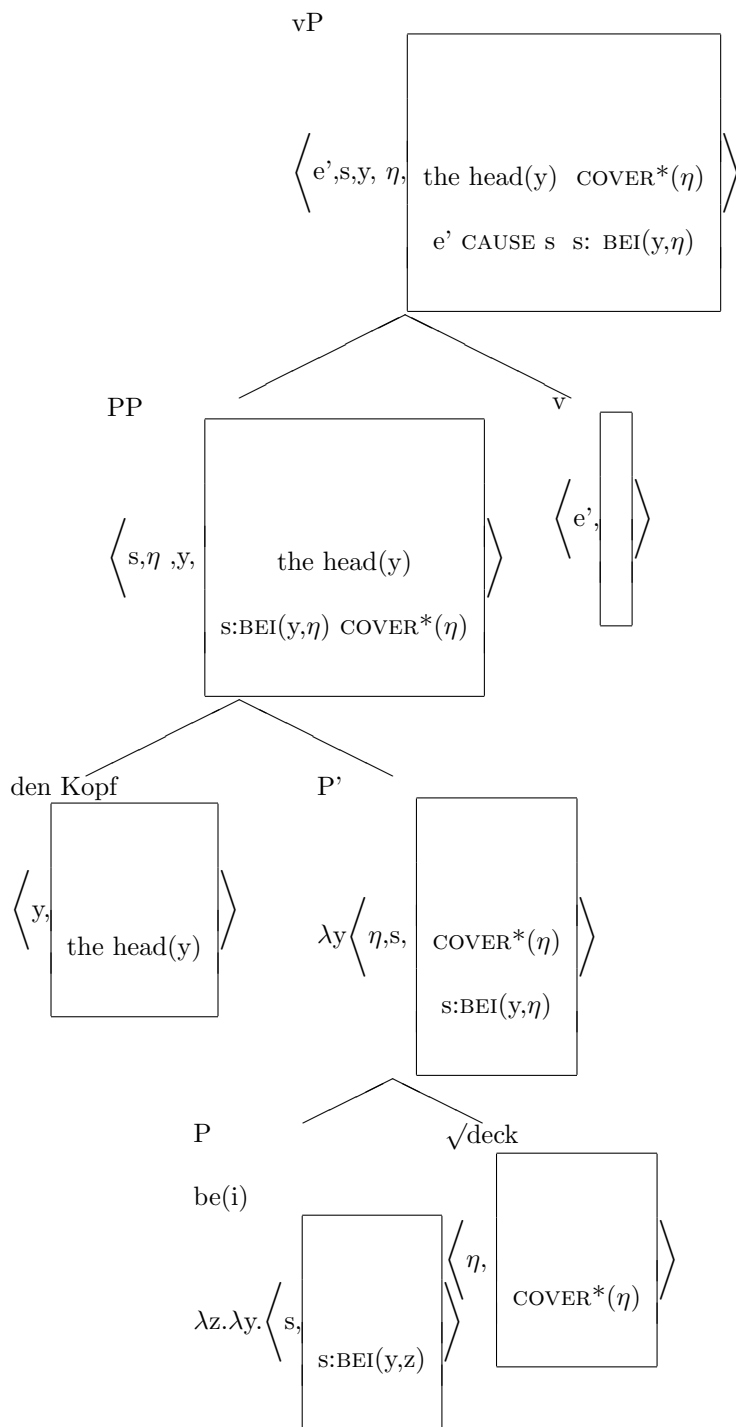


Figure 3. Semantics construction for *den Kopf bedecken*

A brief comment on this construction: The preposition-like prefix *be-* denotes a stative application relation between two individual discourse referents. In (20.a) it selects a sortal root as internal and a DP as external argument. The former contributes both a discourse referent η (of some undetermined mereological type) and the sortal property COVER of η . The semantics of the PP is a state such that the head is provided with a cover. The rest of the construction follows the bi-eventive formation rules.

Here too we can observe the change in the selection requirements for direct objects, s. (21).

- (21) a. den Holzstapel mit einer Plane bedecken /
 the stack of wood with a tarpaulin PREF.cover /
 den Tisch mit einem Tuch bedecken
 the table with a cloth PREF.cover
 'to cover the stack of wood with a tarpauline / the table with a
 cloth'
- b. eine Plane über den Holzstapel decken / ein
 a tarpaulin over the stack of wood cover / a
 Tuch über den Tisch decken
 cloth over the table cover
 'to spread a tarpaulin over the stack of wood / a cloth over the
 table'
- c. den Boden mit Wasser / mit Krümeln bedecken; die
 the ground with water / with crumbs PREF.cover, the
 Hand mit Küssen bedecken
 hand with kisses PREF.cover

'to cover the ground with water / with crumbs'; to cover the hand
with kisses'

- d. *Wasser / *Krümel / über den Boden decken;
water / crumbs over the ground [lit: to cover];
*Küsse über die Hand decken
kisses over the hand cover

While the bi-eventive verbs (21.a) allow arguments in *mit*-phrases that can be conceptualised as ending up in some way or other as a cover of the direct object,¹¹ the direct objects in (21.b) must in addition qualify as two-dimensional material objects just as the prototypical instances of $\sqrt{\text{deck}}$ do. As a consequence tarpaulins and cloths, but not water or crumbs, can be direct objects of the verbs with the coerced root denotation. Again we observe that the coerced root contribution leads to descriptions of situations that can also be described by verbs containing the non-coerced, sortal version of the root; but that it imposes the additional constraint that the direct objects must be prototypical instances of the denotation of the nominal root.

The examples in (22) are also built from a nominal root $\sqrt{\text{lad}}$ (load) the denotation of which shows up in German as the entity-reading of the *-ung*-noun *Ladung* (load). But as the nominal root is ambiguous — either denoting (i) stuff to be transported in or on a vehicle or (ii) ammunition, or (iii) some amount of positive or negative electricity — all direct objects

¹¹Even the set of contours set of lips can be reinterpreted as a 'cover' in this sense.

in (22.d) instantiate the root's denotation and all sentences are acceptable (even if (22.c) is more familiar to most of us).

- (22) a. einen Wagen mit Heu (be-)laden
a wagon with hay (PREF).load
- b. Heu auf einen Wagen laden
hay onto a wagon load
- c. eine Batterie mit 5A(ampere) laden; ein Gewehr mit
a battery with 5A(ampere) load; a rifle with
Munition laden
munitions load
' to charge a condenser with voltage'; to load a rifle with munition;
- d. 5A in die Batterie laden; Munition in ein Gewehr
5A into the battery load; munition into a rifle
laden
load

A comparison of my presentation of the *laden-* or *load-*alternation with solutions in the literature, see e.g. (Dowty 1991),(Basilico 1998), (Hale and Keyser 2002) is called for at this point. However, the details of such a comparison have turned out rather involved. A comparison will therefore has to wait for another occasion.

4 Coercion of event denoting roots

4.1 Event properties coerce to result state properties of individuals

I will mention these cases here informally because they have already been discussed to some extent in the context of the theory of *-ung*-nominalisation (cf. (Roßdeutscher and Kamp 2010) and (Roßdeutscher 2010)). According to (16.b) verbs built from manner roots by direct merge are mono-eventive constructions. Prefix-verbs with the same root, however, are in certain cases bi-eventively constructed, s. (23). The simplex verbs in (23.a,c) have no *-ung*-noun, (23.b) has an *-ung*-noun. Note however that the *be*-verb in (23.d) does not.

- (23) a. der Mann arbeitete
the man worked
- b. der Beamte bearbeitete die Akte
the civil servant PREF.worked the file
- c. der Hund bellte
the dog barked
- d. der Hund bebellte den Briefträger
the dog PREF.barked the postman

In cases like (23.b) where the simplex verb has no *-ung*-noun but the prefix-verb does, judgements often vary as to whether the respective *ung*-nouns are

well-formed. If the complex verb isn't telic (which is more often the case than not, s. section 5) *-ung*-nominalisation is excluded. This general picture gave rise to the idea that the event descriptions are coerced into the following productive pattern in which the prefix *be-* selects properties, which can be supplied by property roots. The pattern yields bi-eventively constructed verbs. An instance of this pattern is (24). The two-place relational prefix selects a property (e.g. $\sqrt{\text{feucht}}$ (humid)) which is applied to the individual discourse referent representing the direct object.

- (24) der Beamte befeuchtete die Briefmarke
 the civil servant **PREF.humid** the stamp
 'the civil servant moistened the stamp'

In brief, (23.b) is reconstructed along the lines 'the file is brought into a state of being done with' (just as (24) means 'the stamp is brought into the state of being humid'). It should be noted that in this case coercion is triggered by the selection restrictions imposed by *be*-¹².

Coercion of roots denoting event types to roots denoting resultant state properties is also accompanied by change of selection properties. This phenomenon doesn't play any role with simple event types where no verb-internal selection takes place. But it shows up when roots contributing relational

¹²Coercion from manner to resultant state properties can also be observed for other German prefixes like *ver-* *zer-* and of particles such as *ein-* and *ab-*.

event types are coerced into roots denoting resultant state properties, for instance in (25).

- (25) a. Aus der Wunde quoll Blut
out of the wound welled blood
- b. Das Holz quoll
the wood swelled

(25.a) describes a change of location of some liquid conceptualised as a simple natural event; it is described in mono-eventive terms (**Quellung des Blutes* is ungrammatical). (25.b) describes an event that is the result of an intervention: the wood expanded by of the humidity. The structure is bi-eventive, (cf. *Quellung des Holzes*). The current account predicts this differences: in (25.b) the root $\sqrt{\text{quell}}$ has lost the selective power that it has in (25.a).

4.2 Event type denotations shift to sortal denotations

4.2.1 Shift to a sortal root of type event

Roots which denote event properties can occasionally enter sub-lexical structures much in the same way that entity denoting roots productively do. This is shown by alternations like those in (26)¹³ and (27).

- (26) a. das Konzert endete
the concert ended

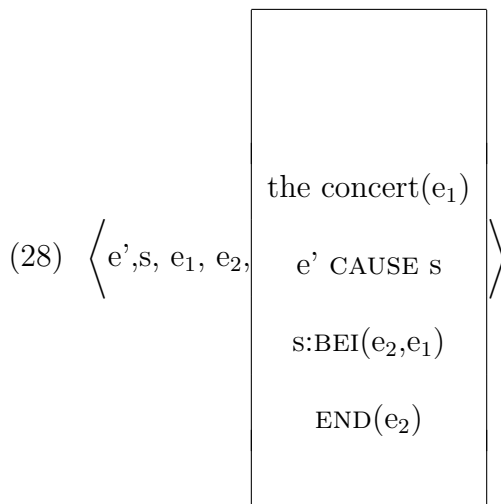
¹³ The example stems from (Bierwisch 2008).

- b. der Pianist beendete das Konzert
 the piano-payer **PREF.ended** the concert
 'the piano-player terminated the concert'.
- (27) a. der Postbote eilte
 the mailman **hurried**
- b. der Postbote beeilte sich
 the mailman **PREF.hurried REFL**
 'the mailman took a hurry'

(26.a) and (27.a) are constructed mono-eventively, (26.b) and (27.b) bi-eventively. (Evidence: **die Endung des Konzerts* is ungrammatical, whereas *die Beendung des Konzerts* is well-formed). The root $\sqrt{\text{end}}$ is a relational eventive root like the root $\sqrt{\text{steig}}$ (i.e. it denotes a relation between an event and an individual, the 'internal subject'). The root selects events with natural endings and, more importantly, these endings are understood to occur without any external intervention: normally concerts, seasons, diseases, punishments come to an end all of their own. But from this open list only concerts and punishments can be 'given' an end. As a consequence verbal predicates of the form **den Winter*, **die Krankheit beenden* (to end the winter, the disease) are ungrammatical.

This is expected regarding the fact that in (26.b) the roots does not act as heads of a root phrase. (The root in (27.a) is a simple eventive root ('manner' root) which is also coerced to an sortal root in (27.b)).

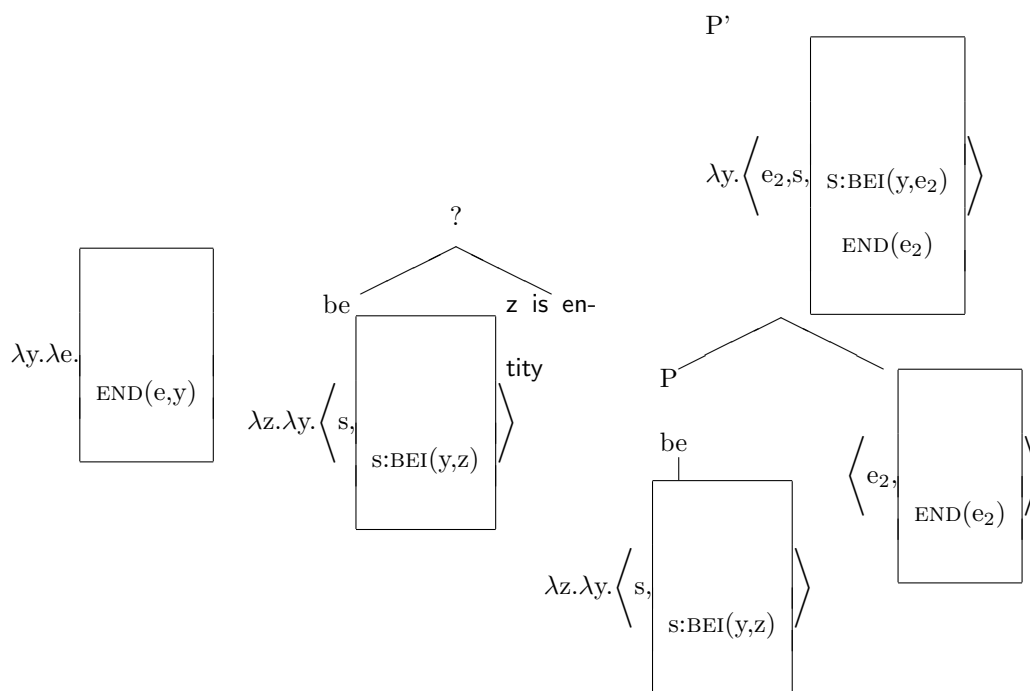
The syntax-semantics interface of (26.b) and (27.b) is as in (20.a) for *bedecken* (to cover). The vP-representation for *das Konzert beenden* (to end the concert) is displayed in (28). (The structure should be read as follows: 'the referential argument e' of the verb, which is contributed by (unmodified) v , brings about the state s . s is a state of the concert e_1 having been provided with an end e_2).



$\sqrt{\text{end}}$ undergoes coercion from a relational event type to a sortal root of an eventuality type. As in cases discussed earlier in this paper coercion of a root is triggered by the selection of the other root it merges with. In (26.b) the selector is *be-*, requiring an entity for its second argument-slot. The slot can be filled with the discourse referent e_2 supplied by the sortal root $\sqrt{\text{end}}$ (a discourse referent representing an eventuality).

(29)

a. b. c.
 root seman- selection failure reinterpretation
 tics



In (26), (27) the sortal information, i.e. the ontological sort 'event' is preserved by the coercion. But are there also cases of coercion from eventive root types to other ontological types? In the next subsection I will discuss examples that can be seen as instances of such coercion.

4.2.2 Shift to sortal roots of non-eventive type

There is a small number of manner roots that can enter syntactic structure like sortal roots denoting material objects, rather than events. Examples

are $\sqrt{\text{bau}}$ (build), $\sqrt{\text{schreib}}$ (write) and $\sqrt{\text{mal}}$ (paint, draw). Collateral evidence for this type of coercion is provided by entity-readings of the *-ung*-nominalisations *Beschreibung (des Potsdamer Platzes)*, *Bebauung (des Potsdamer Platzes)*, *Bemalung (des Potsdamer Platzes)* of the respective *be*-verbs *den Potsdamer Platz bebauen, beschreiben, bemalen*.

The noun *Bebauung* is ambiguous. It can describe an event of building, (say, sky-scrapers) on the square, or the square's state of having those buildings, or else the sky-scrapers themselves. There is a strong empirical correlation between entity-readings and sortal roots in verbal constructions formulated in (Roßdeutscher and Kamp 2010) in the form of as the following hypothesis:

"When an *-ung*-noun refers to an entity, then it has a sortal root and it refers to the entity contributed by this root. Moreover, this entity must be conceptualisable as resulting from the event described by the corresponding verb." (Hypothesis 5, (Roßdeutscher and Kamp 2010):204)

Our finding is in line with Hypothesis 5. Moreover, there is collateral evidence from English counterparts of the German roots in question: The English derived nominals *writing*, *building* and *drawing* also denote entities as well as events. And note that it is true of all these roots, both the German and the

English ones, that the events they denote are production activities, activities that are performed in order to bring about the entities which are denoted by the derived nominals. Nevertheless, $\sqrt{\text{bau}}$, $\sqrt{\text{schreib}}$, $\sqrt{\text{mal}}$ are outliers. I don't know of any other manner-roots that allow reinterpretation as sortal roots of the sort 'material'.

This leads us to a further dimension of the phenomenon described in the last three sections, that of frequency.

5 How common are unexpected contributions of roots?

5.1 Sortal roots functioning as manner roots

5.1.1 Reinterpretation of sortal roots as manner roots is not uncommon

Of the 'frequency' aspect of what I have presented as cases of root coercion: How common are verbs that involve such root coercion as compared with verbs construction does not require root coercion? To obtain a clearer picture of this statistical dimension, it is necessary to carefully inspect large amounts of data. And the problem isn't just that so much data needs to be inspected. For many roots deciding what should be considered their 'original'

meaning is a delicate matter. First sight intuition often has to be revised upon closer scrutiny. One example of this kind is the root $\sqrt{\text{grab}}$ (dig) which we find on the one hand in German unergative *graben* (to dig) and on the other in the transitive prefix-verbs *begraben*(to bury) and *untergraben* (to undermine). Unergative *graben*, meaning 'to dig' has a mono-eventive structure (and, therefore no derived *-ung*-nominalisation **Grabung*), whereas the verbs *begraben* and *untergraben* do have the derived *-ung*-nouns *Begrabung* and *Untergrabung* and thus must be bi-eventive. In these verbs $\sqrt{\text{grab}}$ has a similar semantics as it's English kin $\sqrt{\text{grave}}$ viz. a predicate true of and only of graves. As a consequence, a reconstruction of the unergative *graben* as direct merge of 'little v' with a coerced root as described in sec. 3, seems straightforward. This is not to say that a speaker of current German might be aware of any semantic connection between the verbal constructions. There is no reason to expect this. Roots have a history and verbal constructions have a history, too. And speakers may be expected to know their language without knowing its history. The reader might doubt whether *graben* (to dig) should be viewed as a mono-eventively constructed 'manner'-verb in its own right. This, of course, is an option. $\sqrt{\text{grab}}$ would be homonymous, then. Still, reconstructing the connections along the lines of a single root $\sqrt{\text{grab}}$ might reveal insights into how a lexicon may exploit the semantics of its sub-lexical units. Such insights remain hidden with the homonymy assumption.

There are many alternations along the lines of *den Kopf bedecken* vs. *etwas über den Kopf decken*, recall (21). An extended list of examples from a corpus study is documented in (Roßdeutscher 2010). For each example, I argued there that the interpretation of the mono-eventively constructed verbs can be viewed as parasitic on the bi-eventively constructed ones.

5.1.2 Coercion of sortal roots to eventive roots is restricted

It might be thought that it is quite common for a sortal root to change its semantics to that of a manner root. But in fact not all sortal roots undergo sort-to-manner coercion easily. For instance the root $\sqrt{\text{kleid}}$ (dress) enters German verbs as denoting stuff used to cover the surface of material objects (including persons)¹⁴.

¹⁴ (30) presents a list of verbal constructions with $\sqrt{\text{kleid}}$, none of which is mono-eventive.

- (30) eine Person be-kleiden, (to dress a person)
 ein(e) Ding/Person [ein]kleiden (to dress, to wrap sth entirely)
 ein Brillenetui [aus]kleiden (to back sth. with tissue)
 eine Person [an]kleiden (to dress a person)
 eine Person [um]kleiden (to change clothes)
 einen Kühlschrank ver-kleiden (to cover an (inbuilt) fridge)

Other sortal roots that appear to be reluctant to permit coercion into 'manner'-roots are $\sqrt{\text{sold}}$ (wage) as in *die Beamten besolden* (to give wages to the civil servants); $\sqrt{\text{stuhl}}$ as in *einen Saal bestuhlen* (to apply a hall with seats) and others. (There are no verbs **solden* or **stuhlen* nor mono-eventive particle verbs like **absolden* or **abstuhlen*). The reason for this resistance to manner-coercion seems to be that for these sortal roots it is very difficult to abstract away from the specific information they supply while retaining what is typical of the activities involved (What could be the prototypical manner of events described by verbs like *bestuhlen* or *besolden*?).

However, many more data have to be explored to get a better grip on the facts about coercion of particular roots.

5.2 Roots denoting properties of individuals acting as eventive roots is very restricted

Before discussing the percentages of property roots contributing individual properties and those contributing simple event properties, I would like to recall that de-adjectival verb formation is much more restricted than denominal verb-formation. Although de-adjectival verb formation instantiates a productive pattern (in my conviction), there are tight constraints which to my knowledge are not yet properly understood.

While the (open) list of de-adjectival verbs is relatively small, the list of those that permit alternates along the lines of *ein Glas (mit Tequila) füllen* vs. *Tequila in ein Glass füllen* (recall (1)) is a good deal smaller still. According to my findings there is only a handful of property roots occurring in 'manner'-verbs. This is my tentative list, including German and English roots.

- (31) a. German $\sqrt{\text{full}}$ (full) s. (1); and German. $\sqrt{\text{leer}}$, as in (6) (s. fn. 3); English $\sqrt{\text{empty}}$ as in *to empty water out of a boat*.
 German $\sqrt{\text{schließ}}$ (close, shut) as in the resultative construction *die Tür aufschließen / zuschließen* (lit: to lock a door open or shut)¹⁵; but **not** German $\sqrt{\text{offen}}$ (open);
- b. German $\sqrt{\text{sauber}}$ contributing simple event type ('manner') in intransitive *saubermachen*¹⁶ (Compare *den ganzen Tag saubermachen* (clean all the day); English ($\sqrt{\text{clean}}$ (cf. (Levin 2009), (Levin and Rappaport Hovav appear.a))

¹⁵Resultative constructions indicate that 'the verb enters syntax as atelic' (cf. (Kratzer 2000)) or is a 'manner' denoting predicate (cf. (Levin 1999)). According to the present account secondary predication indicates mono-eventivity;

¹⁶According to my analysis the root $\sqrt{\text{sauber}}$ combines via direct merge with the light verb *machen* (make) in *v* to form *saubermachen*. There is also colloquial *reinemachen* from the property root $\sqrt{\text{rein}}$ (pure). *Reinemachen* is obtained via the same construction, but I know of no other intransitive verbs with adjectival roots of this pattern.

- c. Engl. $\sqrt{\text{clear}}$ (as in *clear the dishes of the table*; but **not** Germ. $\sqrt{\text{klar}}$)

The negative evidence is as significant as the positive evidence: Although *schließen* and *öffnen* are antonymous there is no resultative construction **auföffnen* (to open by unlocking) and German $\sqrt{\text{klar}}$ while obviously cognate to English $\sqrt{\text{clear}}$, doesn't appear to have mono-eventive alternations either. I am convinced that this restriction is not accidental. My hypothesis is as follows:

Hypothesis 2. In order for a property root to undergo coercion to an event-type root it must be (a) relational and (b) involve universal quantification in its non-referential argument.

As we have been assuming, $\sqrt{\text{full}}$ is a binary relation $\text{FULL}(y,z)$ — y is full of z . Moreover, its semantics involves an element of universal quantification: all parts of the denotation of the argument y are occupied by the stuff denoted by z ; likewise $\text{EMPTY}(y,z)$ involves 'negative' universal quantification: for all parts of y there is no stuff z (of the relevant kind) occupying that part. The root $\sqrt{\text{schließ}}$ (closed, shut) is silently relational as well: All apertures if any are closed. The roots German $\sqrt{\text{sauber}}$ and English $\sqrt{\text{clean}}$ involve the "removal of **all** dirt, debris, or other unwanted material" (cf. (Levin and Rappaport Hovav appear.a), [boldface A.R.]). English $\sqrt{\text{clear}}$ is also

relational (cf. *clear of st.*) and apparently universal, — but as we have noted German *klar*, is not.¹⁷ In Standard German the adjective *klar* predicates the property of transparency or brightness; it describes visibility conditions and is **not** relational. The property root $\sqrt{\text{offen}}$ (open), though relational, like $\sqrt{\text{schließ}}$, predicates the existence of a gap *z* in a region *y*, and thus does not involve universal but **existential** quantification. This, I believe, is why German $\sqrt{\text{klar}}$ and $\sqrt{\text{open}}$ do not coerce to event-properties to combine with *v* by direct merge.

Why is it the property-roots which have a relational meaning involving universal quantification that allow for the coercion that enables them to merge directly with *v* in the way of manner roots? This probably has to do with the fact that mono-eventive verbs generally lack culmination conditions. Change of relational properties that involve universal quantification over the second argument of the relation will typically be protracted, going on until the quantification domain has been exhausted. Often such protracted processes take some prototypical form, and these forms can then be incorporated into the root meaning so that a genuine 'manner'-root meaning remains after that step¹⁸.

¹⁷According to (Grimm and Grimm 2007) there has been a North-German regional variant *klären* that is like English *clear* with the meaning of removing dirt or debris, which licenses a *von-phrase* for what is being removed like English *clear* licenses an *of-phrase*.

¹⁸This tentative explanation is somewhat different from the one suggested in (Levin

and Rappaport Hovav appear.b). According to Levin and Rappaport Hovav's account the decisive feature is change along a 'change scale'. These change scales differ from verb (or verb root) to the next with de-adjectival 'result verbs' at one end of the spectrum and 'manner' verbs, which denote change without any reflection to scales, on the other. So the transition from non-'manner' to 'manner' is the loss of "the homomorphic association between the scale of change lexicalized in the verb and the time course of event" (Levin and Rappaport Hovav appear.b):13. To account for the limited occurrence of such shifts Levin and Rappaport Hovav claim "manner uses do not apparently develop whenever this link is lost. We assume that the frequency and ubiquity of cleaning as a household task facilitated this process for the verb *clean*, setting it apart from other de-adjectival verbs" (Levin and Rappaport Hovav appear.b):13.

In the light of the suggested explanation we would assume that selected direct objects of *saubermachen* (or *clean* as a manner-verb) would be disjoint from those of causative *säubern*. Indeed such a disjunction shows up with what the authors diagnose as anti-causative uses of *clean up* (cf. (Levin and Rappaport Hovav appear.b):7 as in *the motorcycle frame cleaned up*). This use goes with material objects, such as metal, guns, carpets, mirrors, glass, but not with kitchens, bathrooms, yards, which go with 'manner'-readings of *clean*. The particle clean-verbs apparently instantiate the same constructions as German *aus*-particle verbs such as *ausreifen* (to fully ripe) which I analysed in (Roßdeutscher 2012). In this paper I show that de-adjectival *aus*-verbs are achievements and that the particle interacts with the degree to which the property denoted by the root applies to the theme. *Clean sth. up* must be analysed as providing sth. with the highest degree of cleanness. This predicate can probably be more naturally predicated on physical objects than on places. But apart from these differences I cannot attest any disjunction between 'manner'

5.2.1 The missing logically possible pairs

Verbs built from property roots, I said, seem to be comparatively rare, and much more seldom than verbs built from sortal roots. But sometimes the distinction between property root based verbs and sortal root based verbs is not easy to draw. Consider the verb *befeuchten*. It is tempting to analyse the verb as derived, from the property root $\sqrt{\text{feucht}}$ (humid) (cf. (24)). The fact that *feucht* is used as an adjective, consisting just of the root plus the morphology of adjectives in German may be seen as supporting this analysis. But how can we be sure? Couldn't $\sqrt{\text{feucht}}$ be just as well a sortal root, denoting humidity (which by the way is the denotation of the German noun *Feuchte*)? In that case the semantic analysis of *befeuchten* would amount to something like 'process which culminates in the state of humidity having been added to the object' (i.e. 'humidity is BEI (at) the object'). That comes to the same thing as when we analyse *befeuchten* as property root based and as describing processes that culminate in the object being humid. Similar doubts can be raised in relation to verbs like *überhöhen* (to increase by too much) and *bestärken* (to reinforce, to support). Should we analyse *überhöhen* as a process that leads to the object being too high (the property based analysis) or as a process that leads to the object having been provided vs. 'result' *clean*, in the set of selected direct objects, at least not for German *saubermachen* vs. *säubern*.

with too much height (the sortal root based analysis)? How can we tell? And the same goes for *bestärken* (from $\sqrt{\text{stark}}$ (strong); for all that I know at this point it could be analysed as describing processes that render the object strong (or stronger) but also as describing processes that culminate in strength having been added to the object. From a purely semantic point of view these are distinctions without a difference and other evidence has to be brought into play if we are to be able to chose between these analyses in a non-arbitrary way.

5.3 Coercion of manner denoting roots to resultant states denotation occurs often, but not normally

So far my understanding of root coercion is based primarily on a study of *be*-verbs (cf. (Roßdeutscher 2010)). We have been looking at a list of two-hundred *be*-verbs for which there are corresponding simplex verbs. Of the two-hundred pairs (consisting each of a simplex verb and a corresponding *be*-verb e.g. $\langle \text{bellen}, \text{bebellen} \rangle$, $\langle \text{arbeiten}, \text{bearbeiten} \rangle$ about eighty of the *be*-verbs are on the same (mono-eventive) side of the mono-eventive / bi-eventive divide as the corresponding simplex verb. In about fifty cases the *be*-verb lies on the other side (i.e. it behaves like a bi-eventive verb). On the account proposed in the present paper these are all cases in which the

'manner'-root of the simplex verb is coerced into a sortal or property root. It should be noted, however, that it isn't always easy to tell whether the *be*-verb really *is* bi-eventive. Informants often diverge in their judgements relating to these verbs. In particular there is a fair amount of disagreement over their *-ung*-nominalisability. If we are right, then speakers who reject the corresponding *-ung*-noun as non-existent or impossible analyse the *be*-verb as mono-eventive; those who accept the *-ung*-noun must assign the *be*-verb a bi-eventive structure. In the terminology introduced earlier in this paper: those who analyse the *be*-verb as a mono-eventive verb give an 'expected' analysis, those that understand it as a bi-eventive verb assign it an analysis that is 'unexpected'.

6 Conclusion

I have presented a number of different patterns of verb-formation. The word-formation pattern of a given verb from a given root is *unexpected*, I postulate, if the formation operations are incompatible with the properties of the root. In such cases the root is coerced into one with properties that are compatible with the operations that define the pattern.

The account I have presented is based on the assumption that there are at least four types of roots that can enter into the construction of verbs:

(i.a) simple event type, (i.b) relational event type, (ii.a) one-place individual property, (ii.b) two-place relational (existential and quantificational) individual property and (iii) sortal. Furthermore the account presupposes that we have ways of telling — at least in some instances — (a) what the construction pattern of a given verb is, and (b) what the type of a given root is. The unexpected contributions are those which are inconsistent with these independently motivated classifications.

As regards the reinterpretations that are needed to make the unexpected constructions possible the following points emerged:

1. Reinterpretation can be reconstructed as triggered by selection requirements of roots or functional heads.
2. The semantics of the roots resulting from coercion can be traced back to the original semantic contribution of the roots.
3. Unexpected occurrences are comparatively rare.

At one point I noted that there is an alternative to the root coercion account I have explored in this paper: rather than assuming that a root can be coerced so that it fits an unexpected construction pattern, one could assume that there is another root, which looks and sounds the same as the first (insofar as roots can look and sound the same) and whose semantics is also

related to the first root, but which nevertheless bears the properties that makes it fit the given 'unexpected' pattern. This is a weaker proposal than the one I have been pursuing here; but it, too, needs to say something about the semantic relations between the two roots and for that the first of the three points above seems as relevant as it is to the coercion story presented here.

It is points 2 and 3 that have persuaded me to go for the stronger hypothesis, according to which one of the two roots can be obtained from the other via general principles of structural and semantic coercion.

References

- Acedo-Matellán, V. and Mateu, J.: this vol., From syntax to roots: a syntactic approach to root interpretation, chapter 1.
- Acquavia, P.: this vol., The roots of nominality, the nominality of roots, chapter 2.
- Alexioudou, A.: this vol, Roots in transitivity alternation: *afto/auto-reflexives*, chapter 2.
- Basilico, D.: 1998, Object position and predication forms, *Natural Language and Linguistic Theory* **16**, 541–595.

- Bierwisch, M.: 2008, Nominalization — lexical and syntactic aspects, *in* A. Giannakidou and M. Rathert (eds), *Quantification, Definiteness, and Nominalization*, Oxford: Oxford University Press.
- Borer, H.: this vol. , The category of roots, chapter 5.
- Dowty, D. R.: 1991, Thematic proto-roles and argument selection, *Language* **67**, 547–619.
- Embick, D.: 2004, On the structure of resultative participles in English, *Linguistic Inquiry* **35**(3), 355–392.
- Grimm, J. and Grimm, W.: 2007, *Deutsches Wörterbuch*, Kompetenzzentrum für elektronische Erschließungs- und Publikationsverfahren in den Geisteswissenschaften an der Universität Trier.
- Hale, K. and Keyser, S. J.: 2002, *Prolegomena to a Theory of Argumentstructure*, MIT Press.
- Kamp, H. and Reyle, U.: 1993, *From Discourse to Logic*, Dordrecht: Kluwer Academic Publishers.
- Kiparsky, P.: 1997, Remarks on denominal verbs, *in* A. Alsina, J. Bresnan and P. Sells (eds), *Complex Predicates*, CSLI Publications, pp. 473–499.

- Koontz-Garboden, A. and Beavers, J.: n.d., Is there is manner-result complementary in verbal roots, Handout presented at the workshop *Roots*. University of Stuttgart, June 2009.
- Kratzer, A.: 1996, Severing the external argument from its verb, *in* J. Rooryck and L. Zaring (eds), *Phrase Structure and the Lexicon*, Dordrecht:Kluwer, pp. 109–137.
- Kratzer, A.: 2000, Building statives, *Proceedings of the Berkley Linguistic Society 26, February 2000*.
- Kratzer, A.: 2004, Telicity and the meaning of objective case, *in* J. Gueron and J. Lecarne (eds), *The syntax of time*, Cambridge, Massachusetts:MIT Press, pp. 389–423.
- Levin, B.: 1999, Objecthood. An event structure perspective, *Proceedings of CLS 35*, Chicago Linguistic Society, pp. 223–47.
- Levin, B.: 2009, The root: A key ingredient in verb meaning, Handout presented at the University of Texas.
- Levin, B. and Rappaport Hovav, M.: appear.a, Lexicalized meaning and manner/result-complementary, *in* B. Gehrke and B. Arsenijevic (eds), *Subatomic Semantics of Event Predicates*, Dordrecht Springer.

- Levin, B. and Rappaport Hovav, M.: appear.b, Manner and result: a view from *clean*, in D. Cuillemmin, R. Pensalfini and M. Turpin (eds), *Language Description Informed by Theory*, Benjamin's.
- Levinson, L.: 2007, *The roots of verbs*, PhD thesis, New York University.
- Levinson, L.: this vol., The ontology of roots and verbs, chapter 9.
- Marantz, A.: 2005, Objects out of the lexicon: Objects as events, Handout. June 11,2005.
- Marantz, A.: 2009, Roots, re- and affected agents: can roots pull the agent under little v?, Handout presented at the Root's workshop at Stuttgart, 2009.
- Pykkänen, L.: 2007, *Introducing Arguments*, PhD thesis, MIT.
- Rappaport Hovav, M.: this vol, Bildung scalar changes, chapter 11.
- Rappaport Hovav, M. and Levin, B.: 2010, Reflections on manner/result complementarity, in M. R. Hovav, E. Doron and I. Sichel (eds), *Lexical Semantics, Syntax and Event Structure*, Oxford University Press, pp. 21–38.
- Roßdeutscher, A.: 2010, German *-ung*-formation. An explanation of formation and interpretation in a root-based account, in S. Olsen (ed.), New

- Impulses in Word-Formation, Special issue 117 of *Linguistische Berichte*, Hamburg: Helmut Buske Verlag.
- Roßdeutscher, A.: 2012, Hidden quantification in prefix- and particle verbs, *Proceedings of Sinn und Bedeutung 16*, MIT.
- Roßdeutscher, A. and Kamp, H.: 2010, Syntactic and Semantic Constraints in the Formation and Interpretation of *ung*-Nouns, in A. Alexiadou and M. Rathert (eds), *The Semantics of Nominalisations across Languages and Frameworks*, Interface Explorations 22, Mouton de Gruyter, Berlin, pp. 169–214.
- Svenonius, P.: 2003, Limits on p: *filling in holes* vs. *falling in holes*, *Nordlyd* **2**, 431–445.
- van Riemsdijk, H.: 1990, Functional prepositions, in H. Pinkster and I. Greenie (eds), *Unity in diversity: papers presented to Simon C. Dik on his 50th birthday*, Foris, Dordrecht, pp. 229–241.