From roots to semantic representations of words and sentences

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3rd March 2007

1 Background: Where we are coming from, where we are now, where we think we ought to get to

Where we come from

- An attempt to provide 'lexical entries' for words and semantically relevant morphemes that support the derivation of 'logically transparent' semantic representations of sentences and bits of discourse. (Kamp and Roßdeutscher 1994b), (Kamp and Roßdeutscher 1994a), (Roßdeutscher 2000) and subsequent work.

- Lexical items (words and morphemes) are treated as 'black boxes', with

    - (a) a phonological/orthographic label;
    - (b) a 'syntax + morphology' (determining where they can occur in well-formed sentences); and
    - (c) a semantic representation that pops out on pushing the 'semantics button'

- Special attention given to:
  (i) event structure, (ii) intentionality; (iii) presupposition.

A more recent concern:

- Word formation operators (derivational morphology): Semantically a word formation operator is a functor which, when applied to a suitable input, provides as output a word with phonological form, syntax+morphology and a semantic representation that results from applying the semantics of the operator to the semantic representation of the input.

- More specifically (in the context of the SFB 732): German nouns ending on *-ung* or *-er* and German verbs with prepositional and other prefixes.

- Problems with *-ung*-nominalisation:

  (i) When is *ung*-nominalisation possible?

  (ii) What are the possible meanings of *-ung*-nouns generally?

  (iii) What are the meanings of particular *-ung* nouns and why does each such noun have just the meaning(s) it does have?

- Our starting assumption: These questions can be answered by looking closely enough at the argument structure and event structure of the 'associated' verbs.

- In particular we took the following hypothesis as a good starting point for an answer to (i):

  Hypothesis H1: In order that an *-ung*-noun can be formed for some associated verb V, V must allow a result state perspective on the event complexes it is used to describe.

Where we are now:

- Argument structure + event structure does not suffice.

- Needed in addition is information about the internal structure of verbs and the corresponding *-ung*-nouns.

- To the best of our present knowledge this is by and large the kind of internal structure that is posited/investigated within Distributed Morphology (DM).

What needs to be done if this impression is correct:

- Determine that or those features of internal structure that allow the formation of *-ung* nouns.

- Develop an account of how internal structure determines the 'semantic lexical entries' for

    - (i) the internal structures that yield both verbs and corresponding *-ung* nouns;
    - (ii) the internal structures that do not permit the formation of *-ung-* nouns but do permit the formation of verbs.

- As always, these 'lexical entries' should:

    - (i) identify the right arguments of the content word (verb, noun,...) in question.
    - (ii) determine its aspectual properties (event structure)
    - (iii) do their job in the construction of sentence and discourse meanings.
    - (iv) In particular, the internal structure should ideally determine the possible readings of individual *-ung* nouns. At this point we are uncertain as to how this is to be accomplished.

What we will do concretely in this talk:

- Present some examples of the internal structure of verbs and some associated *-ung-* nouns.

- Formulate a hypothesis about what properties of internal structure decide whether *-ung* nominalisation is possible.

- Show, at the hand of a number of examples, how the semantic specifications of roots determine the semantic representations ('lexical entries') of the verbs and *-ung* nouns that can be built from them, via the internal structure of those verbs and nouns.

- Integrate these representations into the semantic representations of some sentences.

- A question of central importance for us, and one that we can present here only as a question for discussion:

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Question: How much information about root meaning is required to make such an approach work, and what is the nature of this information?

2   Some examples and questions they raise

1. Some pairs of verbs indicating that traditional aspectual distinctions are not enough.

(1) a. den Tisch säubern/reinigen (to clean the table)   *-ung*-nom.

  b. den Tisch putzen/wischen (to wipe the table)   no *-ung*-nom.

(2) a. eine Kopie fertigen/anfertigen (to produce a copy)   *-ung*-nom.

  b. eine Kopie machen (to make a copy)   no *-ung*-nom.

(3) a. das Blatt mit Zahlen beschreiben
      (to cover, by writing, the sheet with numbers)   *-ung*-nom.

  b. Zahlen auf das Blatt schreiben
      (to write numbers on the sheet)   no *-ung*-nom.

Note that the VPs in the a.-examples and b.-examples:

(i) are very close in meaning,
(ii) can be used to describe the same scenario, and
(iii) both satisfy the standard tests for accomplishment phrases.

But: the a-examples permit *-ung*-nominalsation; the b-examples do not

A further pair pointing to the same conclusion:

(4) a. das Blatt mit Zahlen beschreiben
      (to cover, by writing, the sheet with numbers)   *-ung*-nom.

  b. das Blatt mit Zahlen voll schreiben
      (to cover, by writing, the sheet with numbers)   no *-ung*-nom.

voll-schreiben does, like *schreiben* and in contrast with *be-schreiben*, not have a corresponding *-ung*-noun.

This is important, insofar there is a general tendency in German for prefixation verbs to allow for *-ung* nominalisation, although their stem verbs do not.

no -*ung*-nom	no -*ung*-nom	-*ung*-nom
arbeiten (to work)	*mit-, nach-, durch-*	*ab-, auf-, aus-, ein-, über-, be-, ver-*
machen (to make)	*an-, aus-, durch-, ein-, mit-, nach-, ver-*	*ab-, auf-*
treiben (to drive)	*an-, aus-, durch-*	*aus-, über-, unter-, be-, ver-*
gehen (to go)	*ab-, an-, auf-, aus-, durch-, ein-, mit-, nach-, ent-, er-, ver-, zer-*	*be-, über-*

One of the challenges in this domain is to account for when prefixes create this possibility and when they don't.

2. There are many non-composite verbs that do not permit *-ung*-nominalisation. Among them are verbs with diverse aspectual properties:

(5)   *wissen* (to know),*stehen* (to stand), *gleiten* (to slide), *fallen* (to fall), *kommen* (to come), *sterben* (to die)

Implication: a criterion based on a traditional aspectual classification is unlikely.

Open question: To how many 'simple' verbs does the proposal below apply in a non-circular way?

3. Besides the question when *-ung-* nominalisation is possible there is the question: What are the denotations *-ung*-nouns can have?

Connected with H1 is the conjecture that the possible denotations of *-ung*-nouns are:

(i) the 'event described by the underlying verb'; on the account developed below this is the main event argument of the structure to which -*ung* is applied (a tree whose (tree-) root is vP).

(ii) the result state of that event;

(iii) an object that is part of the semantic representation of the result state, provided this object is 'new' in the relevant sense (i.e. new from the result state perspective spoken of in H1).

What determines which of these options are available for any given -*ung*-noun? (This is not a topic of this talk.)

Important related methodological question: Is it right to separate the question whether-*ung*-nominalisation is possible at all from the question what the resulting -*ung*-nouns can mean?

4. Besides -*ung* nouns whose meanings cover some subset of the three options mentioned under 3, there are also some other denotation patterns that we do not cover in this talk. In particular:

(i) -*ung* nouns denoting groups of people who have been chosen, appointed or the like to do the kind of thing that is described by the underlying verb:

Regierung (government), *Verwaltung* (administration), *Leitung* (mangement), *Bedienung* (serving personnel)

(ii) Mechanical systems designed to perform a certain function:

Heizung (central heating), *Leitung* (conduit, e.g. electrical wire or cable, water or gas pipe), *Rüstung* (armour)

(iii) Special terms for : (a) engineering processes, (b) legal or administrative acts or procedures; (c) medical events

Verrottung (getting rid of refuse through rotting), *Kochung* (a way of making paper), *Anhörung* (a session during which the parties to a law suit are being interviewed by a judge), *Abschreibung* (amortisation) Betreibung (pursuit of a legal action), *Scheidung* (divorce); *Abtreibung* (abortion), *Atmung* (breathing), *Blutung* (haemorrhage), *Beschneidung* (circumcision)

5. Besides the cases mentioned under 4. there are nouns ending on -*ung* which seem to defy systematic treatment.

Zeitung (newspaper), *Gattung* (species), *Böschung* (embankment)

There are also *-ung*-nouns for which there does exist a verb with the same root, but where the meaning of the noun appears to stand in no systematic relation to the meaning of the verb:

Währung (currency), *Spannung* (tension), *Lichtung* (open space in a wood)

3   Constructing lexical entries from their roots

3.1   intransitive activity verbs

(6)   er hustete.   assumed sentence representation
       (he coughed.)
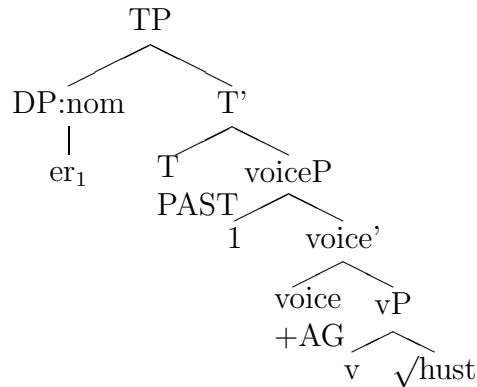
constructing of a semantic representation of (6) and of a lexical entry for *husten*

(7)   √hust ⤳

$\underline{e}\ \underline{x}$
HUST(e)
AGENT(e)=x

                                                     root specification

v introduces an event variable e'. e' instantiates $\underline{e}$ in (7)

(8)   vP ⤳ ⟨ e' |

$\underline{x}$
HUST(e')
AGENT(e') = x

⟩

(9) voice =+AG $\leadsto$ $\left\langle x_1 \mid \boxed{\text{AGENT(e)} = x_1} \right\rangle$ (s. (Kratzer 1996))

The argument x_1 is identified with $\underline{x}$ from the root specification,

(10) voiceP $\leadsto$ [$\left\langle x_1 \mid \boxed{\text{AGENT(e)} = x_1} \right\rangle$ $\oplus$ $\left\langle e' \mid \boxed{\begin{array}{c} \underline{x} \\ \hline \text{HUST(e')} \\ \text{AGENT(e')} = x \end{array}} \right\rangle$]

$= \left\langle x_1, e' \mid \boxed{\begin{array}{c} \text{HUST(e')} \\ \text{AGENT(e')} = x_1 \end{array}} \right\rangle$

(11) Semantic representation of (6)

'Standard DRT' (Kamp and Reyle 1993)

$$\boxed{\begin{array}{c} \text{t' e' } x_1 \\ \hline \text{person}(x_1) \ \text{male}(x_1) \\ \text{t'} \prec \text{n e'} \subseteq \text{t'} \\ \text{HUST(e')} \\ \text{AGENT(e')} = x_1 \end{array}}$$

$$\boxed{\begin{array}{c} \text{t' e } x_1 \\ \hline \text{person}(x_1) \ \text{male}(x_1) \\ \text{t'} \prec \text{n e'} \subseteq \text{t'} \\ \text{e':husten}(x_1) \end{array}}$$

Lexical entries of verbs consist of a construction tree, a semantic representation and selection restrictions.

(12) lexical entry for the verb *husten*.

vP
v √hust

$\left\langle e', \mid \boxed{\begin{array}{c} \underline{x} \\ \hline \text{HUST(e')} \\ \text{AGENT(e')} = x \end{array}} \right\rangle$

	e'	x
SEL.RESTR	event	human

3.2 transitive verbs derived from roots denoting individual properties

(13) er säuberte den Tisch

```
                          TP
             ┌────────────┴────────────┐
         DP:nom                        T'
            │              ┌───────────┴───────────┐
          er₁             T                      voiceP
                        PAST          ┌────────────┴──────┐
                                      1                 voice'
                                              ┌───────────┴─────────┐
                                           voice                    vP
                                                          ┌──────────┴──────┐
                                                          v                 rP
                                                                   ┌─────────┴────────┐
                                                                 COMP            √sauber
                                                                   │
                                                               den Tisch
```
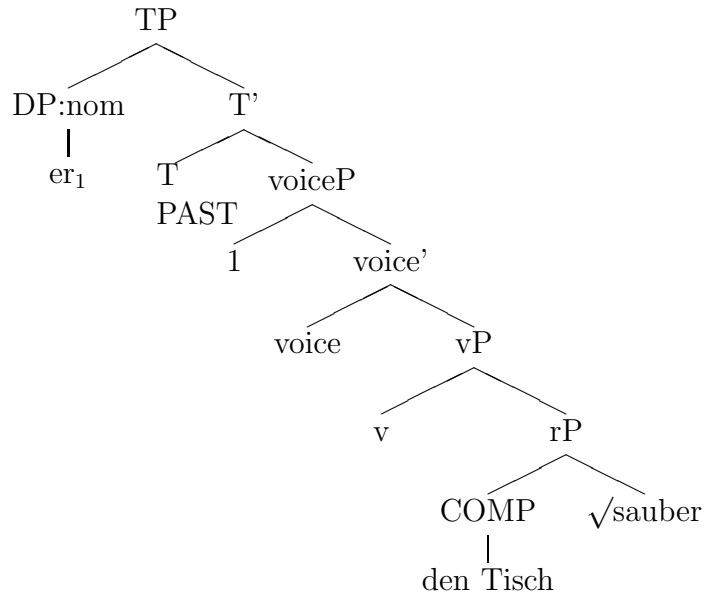
construction of the lexical entry for *säubern* from its root

(14) √sauber ⇝
$$\boxed{\begin{array}{c} \underline{s}\ \underline{y} \\ \hline s: SAUBER(y) \end{array}}$$
root specification

COMP → y_2.

Combination of root √sauber with COMP at rP instanstiates $\underline{y}$ with y_2 and $\underline{s}$ with s.

(15) rP ⇝ $\left\langle\ s, y_2\ \middle|\ \boxed{s: SAUBER(y_2)}\ \right\rangle$

v → e'. Interpreting the complement relation between v and rP yields ' e' CAUSE s '. The causal relation is agentive and thus yields the condition 'AGENT(e') = x'.

(16) $\text{vP} \rightsquigarrow \left\langle \text{e', } y_2 \ \middle| \ \boxed{\begin{array}{l} \text{s } \underline{\text{x}} \\ \hline \text{e' CAUSE s} \\ \text{s:SAUBER}(y_2) \\ \text{AGENT(e')=x} \end{array}} \right\rangle$

(17) lexical entry for *säubern*

```
            vP
           /  \
          v    rP
              /  \
        √sauber   COMP
                   |
                   y
```

$\left\langle \text{e', y} \ \middle| \ \boxed{\begin{array}{l} \text{s } \underline{\text{x}} \\ \hline \text{e' CAUSE s} \\ \text{s: SAUBER(y)} \\ \text{AGENT(e')=x} \end{array}} \right\rangle$
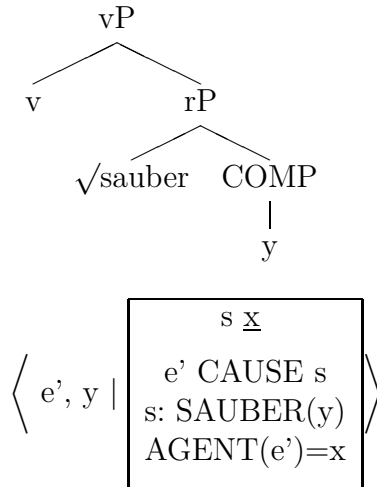
	e'	x	y
SEL.RESTR.	event	capable of intention	material object

Possible and impossible cases of *-ung*-nominalisation

Assumptions:

- (i) *ung* is a 'deverbal' nominalisation operator, in the following sense:

  - (a) *-ung* operates on structures with verbal features.
  - (b) *-ung* yields as output a noun whose referential argument must be identified with some designator that is present in the input structure. (At this point the principles according to which the referential argument is selected are not very well understood.)

- (ii) *ung* operates at a point before inflectional morphology applies.

  More specifically: *-ung* must apply above (what is called in our examples) vP, and not too far above it.

  The details of this assumption will come more clearly into focus as we go along.

- (iii) *-ung* requires as input a 'syntactically transparent' cause-result structure.

  Such a structure is present (at vP) in the case of *säubern*, where the semantic representation of vP contains a condition of the form 'e' CAUSE s' and where this condition results from the combination of one daughter contributing e' and the other daughter contributing s.

  (We leave it as a question whether the transparency of this causal structure should be represented as a syntactic feature that is reflected by the semantics and that is visible at the point where *-ung* is applied.)

(18) lexical entry for *Säuberung*

N.B. In general, different readings for *-ung*-nouns are obtained bz identifying α with different discourse referents from the universe of the DRS that gives the semantics of the vP.

3.3 ' basically intransitive' verbs and direct objects as VP- external arguments

(19) er schrieb (und schrieb);

(20) $\sqrt{}$schreib $\leadsto$

e x
SCHREIB(e)
AGENT(e) =x

For intransitive uses of verbs like *schreiben* we assume the same structure as for *husten*: $\sqrt{}$schreib is a manner root which expresses a property of the event introduced by v.

(21) lexical entry for intransitive *schreiben*

vP

v $\sqrt{}$schreib

$\left\langle\ e'\ \middle|\ \begin{array}{c} \underline{x} \\ \text{SCHREIB(e')} \\ \text{AGENT(e')} = x \end{array}\ \right\rangle$

	e'	x
SEL.RESTR	event	capable of intention
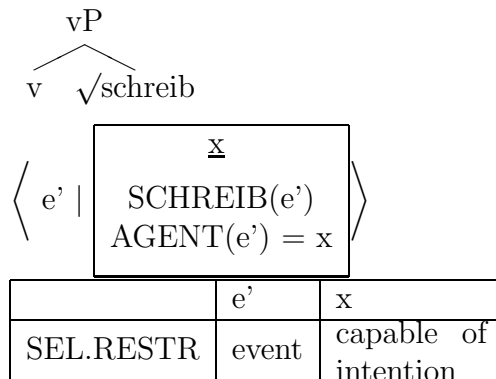
But the transitive use of *schreiben,* — as in *Er schrieb einen Brief* or *Er schrieb einige Zahlen auf einen Zettel* — is at least as prominent as its intransitive use.

The possibility of turning $\sqrt{}$schreib into a transitive verb arises because its semantic specification can be expanded to one which includes the direct object, as the entity that results as the product of the writing activity.

Meaning Postulate: expansion of √schreib

$$
\boxed{\begin{array}{l} \underline{e}\ \underline{x} \\[4pt] \text{SCHTEIB(e)} \\ \text{AGENT(e) = x} \end{array}}
\qquad\Rightarrow\qquad
\boxed{\begin{array}{l} \underline{e}\ s\ \underline{x}\ \underline{y} \\[4pt] \text{SCHREIB(e)} \\ \text{AGENT(e) = x} \\ \text{e CAUSE s} \\ \text{s: EXISTS(y)} \end{array}}
$$

SEL.RESTR	e'	x
	event	capable of intention

y
sign

existing proposals for the structure of (22)

(22) einen Brief scheiben

a. Adjunction to vP (Marantz n.d.)   b. (Kratzer 2002)

```
        vP
       /  \
 einen Brief   v'
             /  \
            v    vP
                /  \
               v   √schreib
```

```
              /\
    einen Brief_1  \
              [acc_1]   VP
                       /  \
                      1   schreib(en)
```
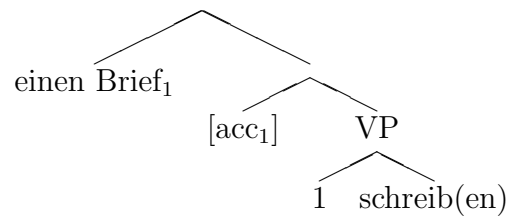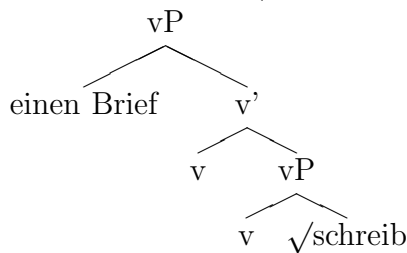
construction of the semantics for (23)

(23) er schrieb einen Brief

```
           TP
          /  \
       er_2   T'
             /  \
            T    \
          PAST    \
            einen Brief_1
                   /   \
               [acc_1]   vP
                        /  \
                       v   √schreib
```

13
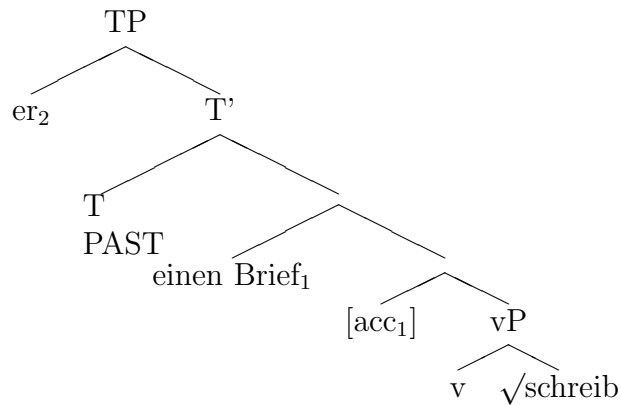
(24) vP $\rightsquigarrow$ $\Big\langle$ e' $\Big|$

s $\underline{x}$ $\underline{y}$
SCHREIB(e')
AGENT(e') = x
e' CAUSE s
s: EXISTS(y)

$\Big\rangle$

(25) [acc] $\rightsquigarrow$ λ R λ x λe [R(x)(e) & $\forall$ x' [x' $\leq$ x $\rightarrow$ $\exists$ e'[e'$\leq$ e & R(x')(e')]]]

(26) . $\rightsquigarrow$ $\Big\langle$ e', y_1 $\Big|$

$\underline{x}$ s
SCHREIB(e')
AGENT(e') = x
e' CAUSE s
s: EXISTS(y)

y'
y' $\leq y_1$

$\Big\langle$ $\begin{array}{c}\forall \\ \text{y'}\end{array}$ $\Big\rangle$

e'' s'
e'' $\leq$ e'
SCHREIB(e'')
AGENT(e'') = x
e'' CAUSE s''
s'': EXISTS(y')

$\Big\rangle$

3.3.1 locative alternation

(27) er beschrieb einen Zettel mit Zahlen

```
                    voiceP
                   /      \
                (er)      voice'
                         /      \
                     voice       vP
                                /    \
                              PP      vP
                              |      /    \
                        mit Zahlen₂ v      SC
                                   / \    /   \
                                  v  √schreib 2   P'
                                                 /    \
                                              be(i)    DP
                                                       |
                                                ein(en) Zettel₁
```
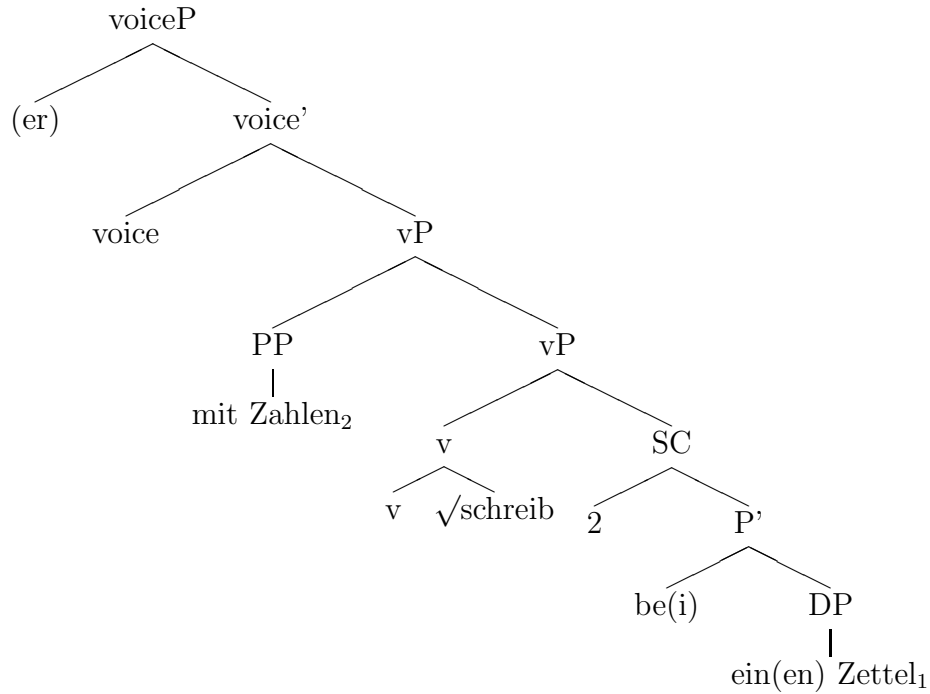
(28) SC $\leadsto$ $\left\langle$ s, z_1 , y_2 | $\boxed{\text{s: BEI}(y_2,z_1)}$ $\right\rangle$

(29) lower vP $\leadsto$ $\left\langle$ e' | $\boxed{\begin{array}{c} \underline{x} \\ \text{SCHREIB}(e') \\ \text{AGENT}(e') = x \end{array}}$ $\right\rangle$

(30) upper vP $\leadsto$ $\left\langle$ e', z_1, y_2 | $\boxed{\begin{array}{c} \text{s } \underline{x} \\ \\ \text{s: BEI}(y_2,z_1) \\ \text{SCHREIB}(e') \\ \text{AGENT}(e') = x \\ e' \text{ CAUSE s} \end{array}}$ $\right\rangle$

As in the case of *säubern ung*-nominalisation is possible for *beschreiben*.

Question: Why are there no *ung*-nominalisations for *voll-schreiben* and *an-schreiben*?
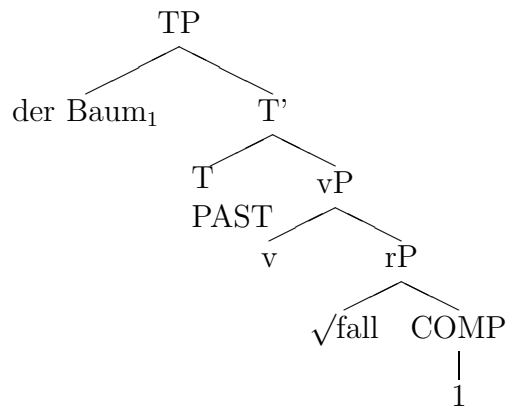
3.4 intransitives vs. causatives: *fallen* vs. *fällen*

Problem: why does *fällen* allow for the ung-nominalisation *Fällung* whereas *legen* does not have a corresponding *ung*-nominalisation **Legung.*

fallen

(31) der Baum fiel
(the tree fell)

(32)

```
                    TP
              ┌──────┴──────┐
        der Baum₁           T'
                       ┌─────┴─────┐
                       T           vP
                     PAST      ┌────┴────┐
                               v         rP
                                    ┌────┴────┐
                                  √fall     COMP
                                             │
                                             1
```

(33) √fall ⤳ $\boxed{\begin{array}{c}\underline{e}\ \underline{y}\\ \text{FALL}(y)(e)\end{array}}$

(34) rP ⤳ $\left\langle\ y_1\ \middle|\ \boxed{\begin{array}{c}\underline{e}\\ \text{FALL}(y_1)(e)\end{array}}\ \right\rangle$

(35) vP ⤳ $\left\langle e',\ y_1\ \middle|\ \boxed{\text{FALL}(y_1)(e')}\ \right\rangle$

(36) lexical entry for *fallen*

```
        vP
    ┌────┴────┐
    v         rP
         ┌────┴────┐
       √fall     COMP
                   │
                   y
```
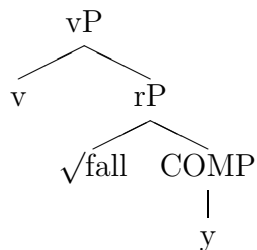
$$\left\langle \text{e',y} \;\middle|\; \boxed{\text{FALL(y)(e')}} \right\rangle$$

	e'	y
SEL.RESTR	event	material object

fällen

(37) sie fällten den Baum,

```
                    TP
                 /      \
              sie₁       T'
                      /      \
                    T        voiceP
                   PAST     /      \
                           1       voice'
                                 /       \
                              voice        vP
                                        /     \
                                      v         v'
                                      |       /    \
                                   morph   v        rP
                                   Umlaut        /       \
                                             √fall      COMP
                                                         |
                                                      den Baum₂
```
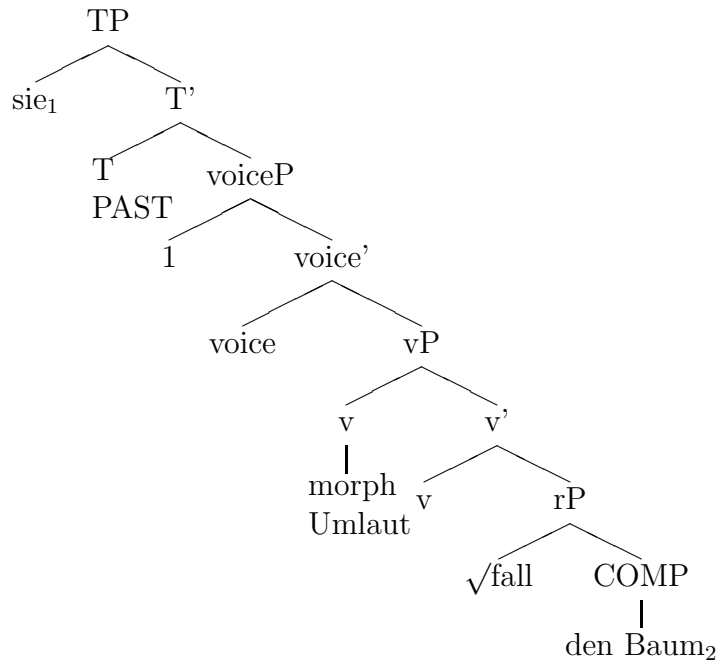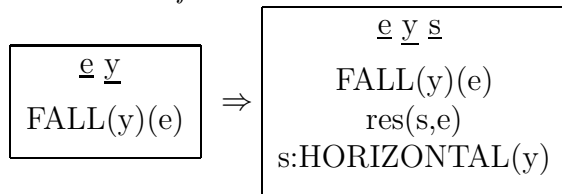
The semantics of the root √fall can be extented as to a telic reading of the the verb:

(38) √fall ⇝
$$\boxed{\begin{array}{c} \underline{\text{e y}} \\ \text{FALL(y)(e)} \end{array}}$$

(39) Meaning Postulate (result expansion)of √fall which permits the construction of *fällen*.

$$\boxed{\begin{array}{c} \underline{\text{e y}} \\ \text{FALL(y)(e)} \end{array}} \;\Rightarrow\; \boxed{\begin{array}{c} \underline{\text{e y s}} \\ \text{FALL(y)(e)} \\ \text{res(s,e)} \\ \text{s:HORIZONTAL(y)} \end{array}}$$

17

The causative v-head selects for v'-sisters that are instantiations of the telic extension of $\sqrt{}$fall.

v → e'.

(40) v' $\rightsquigarrow$ $\Big\langle$ e', y_2 | $\boxed{\begin{array}{c} \text{s} \\[4pt] \text{FALL}(y_2)(\text{e'}) \\ \text{res}(s,\text{e'}) \\ \text{s:HORIZONTAL}(y) \end{array}}$ $\Big\rangle$
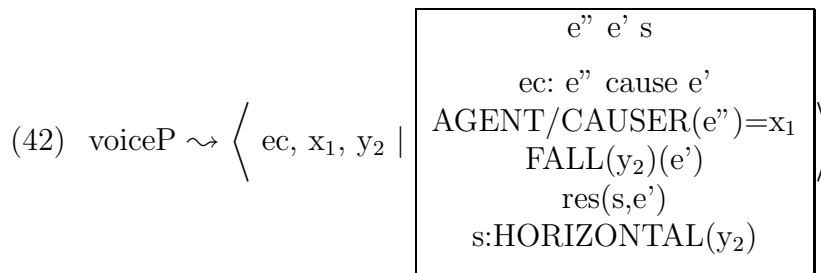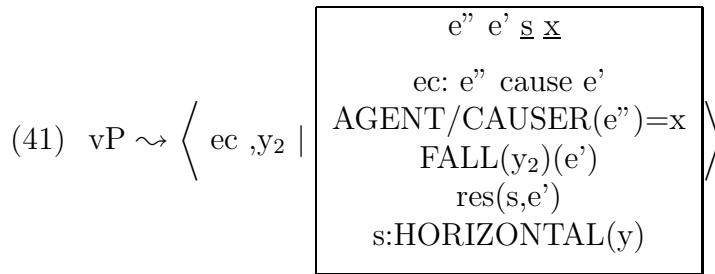
v-Umlaut → e"

(41) vP $\rightsquigarrow$ $\Big\langle$ ec ,y_2 | $\boxed{\begin{array}{c} \text{e" e' } \underline{\text{s}} \ \underline{\text{x}} \\[4pt] \text{ec: e" cause e'} \\ \text{AGENT/CAUSER(e")=x} \\ \text{FALL}(y_2)(\text{e'}) \\ \text{res}(s,\text{e'}) \\ \text{s:HORIZONTAL}(y) \end{array}}$ $\Big\rangle$

(42) voiceP $\rightsquigarrow$ $\Big\langle$ ec, x_1, y_2 | $\boxed{\begin{array}{c} \text{e" e' s} \\[4pt] \text{ec: e" cause e'} \\ \text{AGENT/CAUSER(e")=}x_1 \\ \text{FALL}(y_2)(\text{e'}) \\ \text{res}(s,\text{e'}) \\ \text{s:HORIZONTAL}(y_2) \end{array}}$ $\Big\rangle$

(43) lexical entry for *fällen*

```
              vP
            /    \
           v      v'
                /    \
               v      rP
                    /    \
                √fall    COMP
                           |
                           y
```
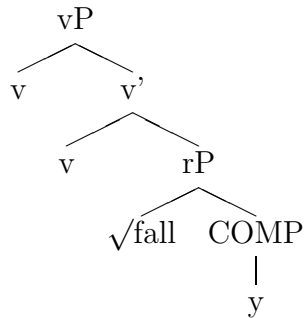
$$\left\langle \text{ec, y } \middle| \begin{array}{c} \text{e'' e' } \underline{x}\text{ s} \\ \hline \text{ec: e'' cause e'} \\ \text{AGENT/CAUSER(e'')=x} \\ \text{FALL(y)(e')} \\ \text{res(s,e')} \\ \text{s: HORIZONTAL(y)} \end{array} \right\rangle$$

	ec	x	y
SEL.RESTR.	event	natural force or individual capable of intention	material object

The *ung*-nominalisation *Fällung* is possible because the input to *ung* involves the bi-eventive structure associated with the upper vP of *fallen* which together with the expansion of in (39) turns the causal relation ' e'' CAUSE e' ' into the causal-resultative relation ' e'' CAUSE s '. Important here is that the relation' e'' CAUSE s ' holds between an event e'' , introduced by some head v, and a *result state* s —-a state which is not introduced by a v-head, but as the state of a result predication. (In the present instance s comes in through the expansion of √fall. In the case of *säubern* it was introduced as a side effect of the predication that results when the predicate SAUBER that is the semantics of √sauber is combined with the argument y provided by COMP. Common between the two cases is that the state is Not introduced *not* as a verbal head.

liegen vs. *legen*

lexical entry for *liegen*

(44) √lieg $\rightsquigarrow$ $\begin{array}{c} \underline{e}\text{ y} \\ \hline \text{LIEG(y)(e)} \end{array}$

(45) Meaning Postulate (expansion of √lieg which permit the construction of *legen*)

(i) $\begin{array}{c} \underline{e}\text{ } \underline{y} \\ \hline \text{LIEG(y)(e)} \end{array}$ $\Rightarrow$ $\begin{array}{c} \underline{e}\text{ } \underline{y}\text{ } \underline{z} \\ \hline \text{LIEG(y)(e)} \\ \text{IN(y,r)} \end{array}$

r
spatial region   SEL.RESTR.

19

(ii) $\boxed{\begin{array}{c} \underline{e}\ \underline{y} \\ \hline \text{LIEG(y)(e)} \end{array}} \Rightarrow \boxed{\begin{array}{c} \underline{e}\ \underline{y}\ \underline{z} \\ \hline \text{LIEG(y)(e)} \\ \text{SUPP(z,y)(e)} \end{array}}$

z
material object   SEL.RESTR.

$$\text{rP} \rightsquigarrow \left\langle y_1, z_2 \ \Big| \ \boxed{\begin{array}{c} \underline{e} \\ \hline \text{LIEG}(y_1,z_2)(e) \end{array}} \right\rangle \left\langle y_1, z_2 \ \Big| \ \boxed{\begin{array}{c} \underline{e} \\ \hline \text{SUPPORT}(z_2,y_1)(e) \\ \text{LIEG}(e) \end{array}} \right\rangle$$
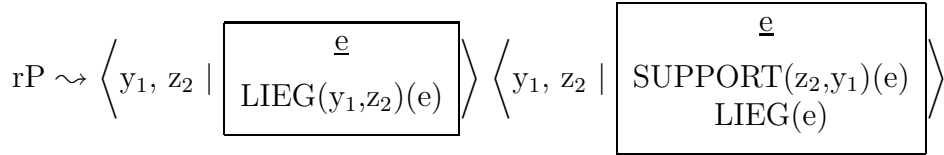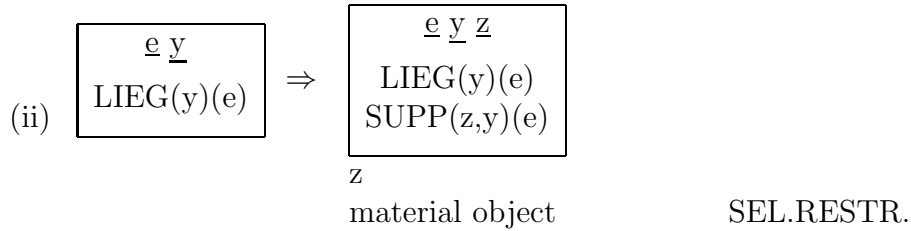
N.B. We are assuming here that $\sqrt{}$ lieg allows for the formation of a genuinely intransitive verb liegen — as in *Er liegt, während sie steht.* Such uses are somewhat marginal, but they do seem possible. More common are uses of the verb liegen that involve a PP that either (i) provides a spatial location for the argument — y is spatially included within the region r or (ii) provides an entity z that supports y — y is on z and z prevents y from falling. Support PPs always involve the presupposition auf, whereas locateion PPs can involve any number of spatial prepositions (*an, auf , hinter neben, unter, etc.*) In the latter case the presupposition has a double role. Consider e.g. the PP *neben dem Teller*. This phase determines a certain region r that covers all positions that qualify as next to the referent z of the DP governed by the preposition neben. (i.e. z is the plate referred to). Furthermore the PP as a whole expresses that the theme argument y is IN the region r (i.e. is spatially included in r).

While *liegen* allows for 'bare intransitive uses', it appears that legen always requires a location PP or support PP. We have no explanation for this difference. The matter seems orthogonal to our concern here: explaining why legen does not have a corresponding *ung-* nominalisation.

legen

Semantics for *legen*. We only consider the construction of legen based on the root expansion (45.i)

(46) lexical entry for *legen*

```
                        vP
                   ┌─────┴─────┐
              V_morph          v'
                           ┌────┴────┐
                           v         rP
                                ┌─────┴─────┐
                                r          PP
                                │      ┌────┴────┐
                              √lieg  COMP        P'
                                      │      ┌───┴───┐
                                      z      P      COMP
                                             │       │
                                            auf      y
```

(47) PP $\rightsquigarrow \left\langle\ y\ ,\ z\ \left|\ \boxed{\begin{array}{c}\underline{R}\\ R(y,\ z)\end{array}}\ \right.\right\rangle$

(48) rP $\rightsquigarrow \left\langle\ y\ ,\ r\ \left|\ \boxed{\begin{array}{c}\underline{e}\\ LIEG(y)(e)\\ IN(\ y,r)\end{array}}\ \right.\right\rangle$

(49) lower vP $\rightsquigarrow \left\langle\ e'\ y\ ,\ r\ \left|\ \boxed{\begin{array}{c}LIEG(y_1)(e')\\ IN(\ y,r)\end{array}}\ \right.\right\rangle$

(50) upper vP $\rightsquigarrow \left\langle\ ec,\ y\ ,\ r\ \left|\ \boxed{\begin{array}{c}\underline{x}\ e''\ e'\\ \\ ec:\ e''\ CAUSE\ e'\\ AGENT(e'')= x\\ LIEG(y)(e')\\ IN(\ y,r)\end{array}}\ \right.\right\rangle$

The reason why the semantics of the upper vP does not licence *ung*-nominalisation is that it fails to provide a causal relation between (i) an event introduced by a verbal head and (ii) a result state that is not introduced by a verbal head. Crucial is here that the event e' occurring as second term of the causal condition ' e" CAUSE e' does not qualify as a result state in the relevant sense, precisely because it has been introduced by the lower v head. This disqualifies the condition e" CAUSE e' as a licenser of

ung notwithstanding the fact that from the traditional perspective of aspect theory, the even e', which is an event of the type 'liegen' (i. e. the kind of event that is described by the verb *liegen*) has many of the properties that are thought distinctive of states. But that is not good enough, e may be a state-like verbal eventuality, but it is precisely its verbal status —- the fact that it is introduced by a verbal head — that disqualifies it as the kind of result state that is required to license *ung*.

*Final remark. One problem to which we have drawn attention but for which we have offered no solution is the difference between the prefix verb beschreiben, for which there exists, as we have seen, the corresponding *ung* noun *Beschreibung*, and on the other hand the compound verbs *an-schreiben* and *voll-schreiben* for which there are no corresponding ung- nouns. Voll-schreiben is a kind a secondary predication with schreiben as verb and voll as secondary predicate. —cf. *Er schrieb den Zettel voll (mit Zahlen)* — He wrote the piece of paper full (with numbers) and it seems a general fact about such combinations

4   Conclusion

- The traditional tools that have been used in Formal Semantics for the analysis of tense, aspect and event structure are insufficient to account for the possibility and semantics of *-ung-* nominalisation.

- Needed for this purpose are assumptions about the ways in which word structures can be built from roots.

- Semantic properties of roots impose constraints on the possibilities of constructing words from them.

- 'Lexical entries' for verbs and deverbal nouns (and presumably for content words in general) can be seen as by-products of the computation of the semantics of phrases and sentences from the semantics of roots.

- The relationship between the mere possibility of constructing an *-ung* -noun and what denotations are possible for it is a matter that needs further clarification.

- To what extent the assumptions that we have been making can be applied in a non-circular way on a larger scale remains to be seen.

5 Some questions arising from this investigation

As things stand, we are uncertain about most aspects of the account sketched in this handout. The one thing of which we are firmly convinced is that something like the internal structure of verbs is needed for an account for when *ung* nominalisation is possible and when it is not; and that this is so even if all more specific assumptions we have made will prove untenable.

To elaborate those assumptions and to test their viability the following partial projects/tasks suggest themselves:

1. Suppose that V is a simplex verb that does not have a corresponding *ung* noun and that P-V is the result of adding a prefix P to V. (Here we use prefix as a cover term for both the separable prefixes (particles in a much used terminology) such as e.g *nach-* or *mit-* and non-separable prefixes like *be-* or *ent-*),

What decides whether P-V allows for *ung* nominalisation or not? What are the different ways in which a prefix can combine syntactically and semantically with a verb?

There are various ways in which this question can be approached: (i) focus on one particular prefix or on some subgroup ; (ii) focus on one verb, or type of verb. It would be natural to choose verbs that are similar in terms of how they are constructed from their roots.

This relates to the second question:

2. What decides whether a simplex verb allows for *ung*-nominalisation? A challenge are in particular those verbs which do have *ung*- nouns, but for which an analysis along the lines of our proposal for *säubern* does not seem obvious. For instance, what about *messen, wirken, ahnen, blenden*?

3. What decides which subset of the set indicated in the handout - (i) event, (ii) result state, (iii) some new entity (that is created or brought onto the scene by the event) — is the set of possible denotations for any given *ung*-noun that does exist?

4. What can be said about the other types of *ung* nouns that exemplified by *Regierung, Führung, Bedienung*, and that exemplified by *Heizung, Wasserleitung, Unterführung, ..* . Can these be seen as systematically related to the *ung*-nominalisations studied in the handout or are they different nominalisation operators that happen to use the same morphological form (i.e. *ung*)?

5. How productive are the different prefixation operations (defined either by the particular prefixes they involve, or, more narrowly, by particular meanings of those prefixes)? Is there any correlation between productivity of the

operation and its potential to create a verb with an *ung*-noun from a verb without an *ung*- noun? (A very productive prefix like mit does not seem to create any new *ung*-nominalisation options, whereas a semantically apparently much less systematic prefix like *be* often does make *ung*-nominalisable verbs out of verbs without u*ung*- nouns.)

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