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Syntactic and semantic structure of German
***-ung*-nominals and their verbs**
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1   Introduction

In the project B4 we are concerned with formation rules and interpretation algorithms for derived nouns and verbs.

- (**Hypothesis 1**) A necessary condition for the possibility of forming an *ung*-noun derived from a verb V is that V must permit a 'result state perspective'.

Central theme of the talk: Fill this hypothesis with substance.
The method of analysis I will use involves the following steps

- Build syntactic representations — trees – of words in accordance with the principles of *Distributed Morphology*. Some of these constructions allow the formation of *-ung*-nouns while others exclude them. What structure(s) can be built from a given root depends on properties of the root.

- Build semantic 'lexical entries' — DRSs — for the words represented by the trees by a compositional process.

- The DRSs thus function as interpretations of the syntactic word structures in a certain DRT-based logical representation language.

1.1   Data expected and not expected on the basis of H1

I. Expectd Data
1. Stative verbs do not have *ung*-nominalisations.

(1)   *lieben* (to love), *hassen* (to hate), *wissen* (to know), *sehen* (to see), *stehen* (to stand),   No *-ung*-nominals.

2. Activity verbs do not have *ung*-nominalisations.

(2)   *arbeiten* (to work), *lachen* (to laugh), *husten* (to cough) , *einen Wagen schieben* (to push a cart)   No -*ung*-nominals

3. Inchoative and causative state change verbs have -*ung*-nouns.

(3)   *(sich) röten* (← red), *(sich) trüben* (← murky); *(sich) ändern* (← other), *erwecken* (← awake) *säubern* (← clean),*fertigen* (← ready)

   (In all these cases we find *ung*-nominalisations: Rötung, Trübung, Änderung, Erweckung, Säuberung, Fertigung.)

But other cases are unexpected.

II. Unexpectd Data
4. Many inchoative verbs do not have *ung*-nominalisations.

(4)   *erröten* (← red (to blush)), *erbleichen* (← *bleich* (=bleak)) *(er)grünen* (← green) *erwachen* (to wake up) (← awake)   No -*ung*-noun. Why?

(5)   *(sich) bilden, sich (formen), sich ausprägen* (all: to come into existence) Bildung

5. Many accomplishment verbs do not have *ung*-nominalisations.
   Moreover, such verbs, or the verb phrases which have them as heads, appear to be often quite close or even identical in meaning to verbs which permit *ung*-nominalisation, or to verb phrases that have them as heads.

(6)   *die Schuhe säubern* (to clean the shoes)   Säuberung

(7)   *die Schuhe putzen* (to shine the shoes)   no -*ung*-noun.

(8)   *eine Couch fertigen* (to make/produce a sofa)   Fertigung

(9)   *eine Couch machen* (to make a sofa)   no -*ung*-noun.
   Similarly:

(10) *einen Brief verfassen* (to compose a letter), *Arbeitsplätze schaffen* (to create jobs), *eine Kartoffelsuppe bereiten* (to make potatoe soup) Verfassung/Schaffung/Bereitung

(11) *einen Brief schreiben* (to write a letter), *eine Suppe kochen* (to cook a soup), *ein Haus bauen* (to build a house), *einen Kuchen backen* (to bake a cake),...   no -*ung*-noun.

6. A notable fact about *-ung*-nominalisation is its sensitivity to alternation. For instance compare *schreiben* with *be#schreiben*

(12)   no *-ung*-noun.

    einige Zahlen   auf   einen Zettel   schreiben
    `some  numbers onto a    piece-of-paper write`

(13)   *-ung*-noun. Yes.

    einen Zettel   mit   einigen Zahlen   be#schreiben
    `a    piece-of-paper with a-few  numbers PREFIXwrite`

    Be#schreibung: event-reading.

    Note also that *beschreiben* is ambiguous between its use above and that in (14)

(14) eine Landschaft be#schreiben
    `a    landscape PREFIX-write`

    In (14) *Be#schreibung* has both an event-reading and an 'object'-reading.

Our first conclusions from these examples:

- The availability of *ung*-nouns is

    - not only a matter of the form of the aspectual properties of the verb as captured by, say, the form of the nucleus of the verb (see (Moens and Steedman 1988)).

    - not only a matter of the 'derivability' of the verb from a word of some other category, such as A(djective), i.e. whether or not the verb is 'deadjectival' (cf. (3), (4))

    - not a matter of such properties of verbs as 'is a verb of creation' (cf. (8),(9))

    - not a matter of the truth-conditional meaning of the verb (cf. (10),(11))

## 1.2 word structure in the spirit of Distributed Morphology (DM) Program

Some basic ideas we will rely on:

- word structures are built by inserting roots and morphological elements (affixes) at certain nodes of syntactically motivated node configurations (trees);

- the well-formedness and the semantics of the resulting word structure is determined by the interaction between (i) properties of the inserted root and affixes and (ii) syntactic/morphological feature bundles associated with functional heads;

- In particular, the constituents CAUSE and BECOME of the semantic representations of verbs and their nominalisations are interpretations of syntactic relations between nodes;

- A vP (corresponding to VP in (Kratzer 1996)) can involve split into a v representing an activity and some additional node, which can be either a S(mall)C(clause) or an Appl(icative)P(hrase);

- all arguments of a verb or other predicate word are introduced by heads and specifiers of its syntactic structure. In particular the referential argument of the verb (the described eventuality in the case of a verb, the predication bearer in the case of a noun or adjective) is introduced by a head. (At the level of clause structure the referential argument is always realised by the XP of which the given word is the head, the other arguments of the word (if any) must be realised by phrases that stand to the XP in a suitable syntactic relation.)

1.3 Easy examples

1.3.1 the verb *husten* and its root

(15) (er) husten
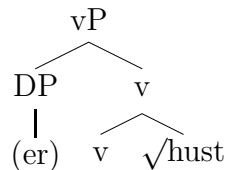
v is a functional head, the "verbalizer". $\sqrt{hust} \in$ MANNER. (What we leave out: voice, tense)

(16) $\sqrt{\text{hust}} \rightsquigarrow$

$$\boxed{\begin{array}{c} \underline{\text{e' x}} \\ \text{MANNER(e')} = \text{HUST} \\ \text{AGENT(e')} = \text{x} \end{array}}$$

root specification

N.B. We underline discourse referents in the universes of root specifications. In any well-formed word structure each such underlined discourse referent must be instantiated by a structurally introduced argument.[1]

e' ← v, e' is identified with $\underline{\text{e'}}$ in (16)

(17) $\left\langle \text{e'}\!\!-\!\! \boxed{\begin{array}{c} \underline{\text{x}} \\ \text{MANNER(e')} = \text{HUST} \\ \text{AGENT(e')} = \text{x} \end{array}} \right\rangle$

v

x ← spec VP, x is identified with $\underline{\text{x}}$ in (16)

(18) $\left\langle \text{x, e'} \longrightarrow \boxed{\begin{array}{c} \text{MANNER(e')} = \text{HUST} \\ \text{AGENT(e')} = \text{x} \end{array}} \right\rangle$

vP

---

[1]Note well that the arguments introduced in word structures are in their turn subject to binding when the word is used in a well-formed-clause. Binding of these arguments can take one of two forms: (i) explicit instantiation by an argument phrase (e.g. a DP), or (ii) implicit interpretation, either existentially or through zero-anaphora. The discourse referents introduced by argument phrases require binding in their turn - presuppositional, quantificational or existential (in the sense in which indefinites allow for existential interpretation.) The notation we use here does not distinguish between the arguments introduced by word structures and the discourse referents introduced by argument phrases. For both we use plain lower case letters.
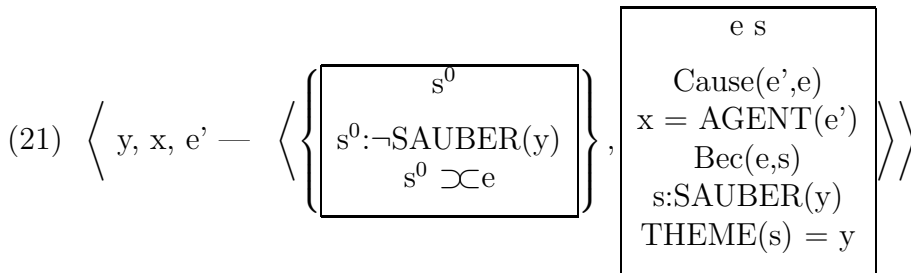
1.3.2 the verb *säubern* and its root
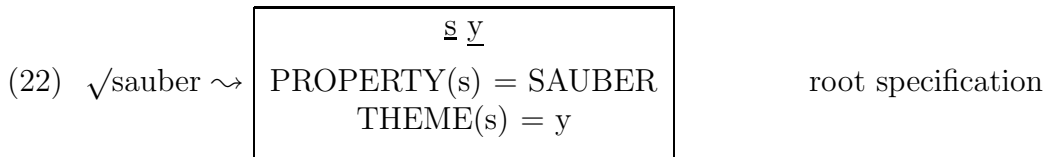
(19) (er) (die Schuhe) säubern

(20)

```
                        vP
              ┌──────────┴──────────┐
             DP                     v
              │           ┌─────────┴─────────┐
            (er)      CAUS-MOR                 v
                          │            ┌───────┴───────┐
                      (Umlaut)         v              SC
                                             ┌─────────┴─────────┐
                                            OBJ              √sauber
                                        ┌────┴────┐
                                      (die    Schuhe)
```
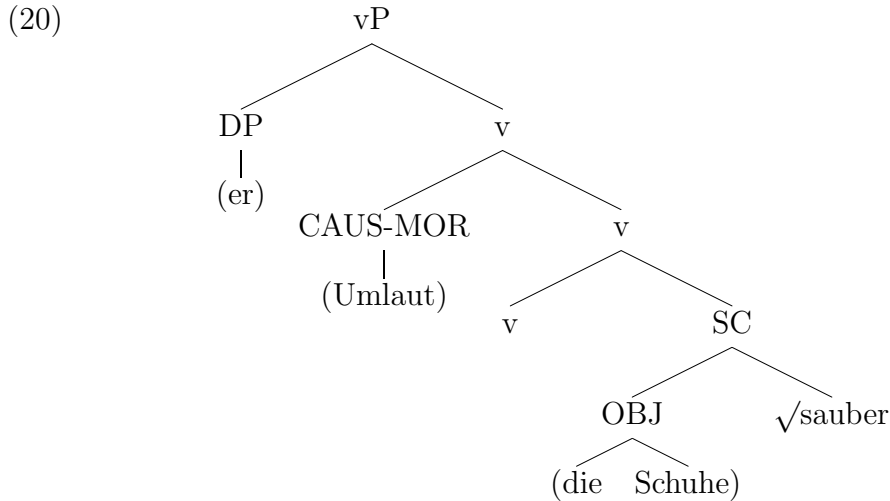
$\sqrt{}$sauber $\in$ (stative) PROPERTY of indivuduals.[2].

semantic interpretation of (20) We aim for the following semantic representation to be associated with the vP node (i.e. the top node) of (20):

$$
(21) \quad \left\langle \text{ y, x, e' } - \quad \left\langle \left\{ \boxed{\begin{array}{c} s^0 \\ \hline s^0{:}\neg\text{SAUBER}(y) \\ s^0 \supset\!\subset e \end{array}} \right\} , \boxed{\begin{array}{c} e\ s \\ \hline \text{Cause(e',e)} \\ x = \text{AGENT(e')} \\ \text{Bec(e,s)} \\ s{:}\text{SAUBER}(y) \\ \text{THEME(s)} = y \end{array}} \right\rangle \right\rangle
$$

Compositional construction of (21) via (20):

$$
(22) \quad \sqrt{}\text{sauber} \rightsquigarrow \boxed{\begin{array}{c} \underline{s\ y} \\ \text{PROPERTY(s)} = \text{SAUBER} \\ \text{THEME(s)} = y \end{array}} \qquad \text{root specification}
$$

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[2]In traditional terms the 'basic semantic role' of *sauber* is that of an Adjective. This correlation - between roots belonging to the category PROPERTY and roots that manifest themselves as adjectives - is common enough, though not universal. It could be informally paraphrased as "we often find elements of the category PROPERTY as roots of adjectival wword structures"

•SC-node
Theme argument y ← OBJ ; y is unified with y̲ in (22).
state s ← [OBJ, √ sauber]; s is unified with s̲ in (22)

(23)   SC

$$\left\langle \text{s, y} - \boxed{\begin{array}{c} \text{PROPERTY(s) = SAUBER} \\ \text{THEME(s) = y} \end{array}} \right\rangle \left(\Leftrightarrow \left\langle \text{s, y} - \boxed{\begin{array}{c} \text{s: SAUBER(y)} \\ \text{THEME(s) = y} \end{array}} \right\rangle \right)$$

• mother of SC.
event e ← v. e is the becoming of the state s in (23). The s-argument in (23) is bound through a λ-abstraction. The combination of SC and its sister is interpreted as BECOME.

Side-effect of this binding: introduction of change a of state presuppositions ((Van Der Sandt 1992), (Kamp 2001).)

(24)   first mother of SC

$$\left\langle \text{y, e} - \left\langle \left\{ \boxed{\begin{array}{c} s^0 \\ s^0 {:} \neg \text{SAUBER(y)} \\ s^0 \sqsupset\!\subset e \end{array}} \right\}, \boxed{e: \text{BEC}(\lambda s. \boxed{\begin{array}{c} s{:}\text{SAUBER(y)} \\ \text{THEME(s) = y} \end{array}})} \right\rangle \right\rangle$$

• mother node CAUS-MOR.
event e' ← CAUS-MOR. e' causes the becoming event e of (24). The combination of CAUS-MOR and its sister is interpreted as CAUSE.

(25)   grand mother of SC

$$\left\langle \text{y, e'} - \boxed{\text{CAUSE}(e', \lambda e. \left\langle \left\{ \boxed{\begin{array}{c} s^0 \\ s^0 {:} \neg \text{SAUBER(y)} \\ s^0 \sqsupset\!\subset e \end{array}} \right\}, \boxed{e{:}\text{BEC}(\lambda s. \boxed{\begin{array}{c} s{:} \text{SAUBER(y)} \\ \text{THEME(s) = y} \end{array}})} \right\rangle)} \right\rangle$$

• VP
x ← DP contributes an agent for the event e' introduced by CAUS-MOR.

(26)   vP

$$\left\langle \text{y, x, e'} \; - \; \boxed{\begin{array}{c} \text{CAUSE(e',}\lambda\text{e.}\left\langle \left\{ \boxed{\begin{array}{c} s^0 \\ s^0{:}\neg\text{SAUBER(y)} \\ s^0 \supset\subset e \end{array}} \right\}, \boxed{e{:}\text{BEC}(\lambda s. \boxed{\begin{array}{c} s{:}\text{ SAUBER(y)} \\ \text{THEME(s) = y} \end{array}})} \right\rangle) \\ \text{AGENT(e') = x} \end{array}} \right\rangle$$
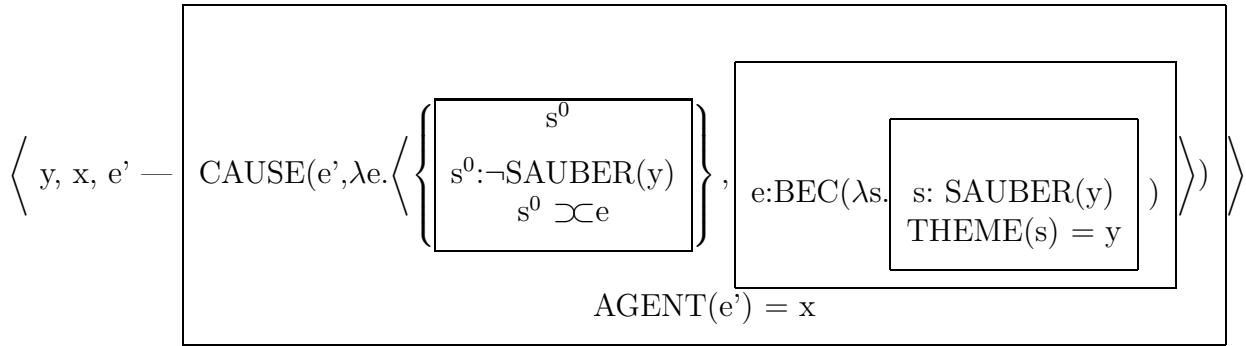
At first sight (26) may look rather different from our target structure (21). But the difference is only superficial. The predicates BEC and CAUS are both veridical in the sense that they hold between an eventuality ev and an eventuality type EV' iff there is an ev' of type EV' such that a corresponding relation between eventualities - Bec in the first, Caus in the second case - holds between ev and ev'. (We omit details.)

1.3.3 'transitive uses' of 'intransitive verbs':*schreiben*

Tests for verbs 'basically intransitive' like *putzen* (to wipe), *bauen* (to build), *schreiben* (to write):
    (i) *und...und*-constructions (see (Kratzer 2005))

(27) er putzte und putzte; baute und baute; schrieb und schrieb;...

(28) # er säuberte und säuberte; # fertigte und fertigte ; # be#schrieb und be#schrieb, ...

    (ii) accessability of the secondary predicate *fertig* as prefix:

(29) fertigputzen; fertigbauen; fertigschreiben;

(30) #fertigsäubern; #fertigfertigen; #fertigbeschreiben

According to (Levin 1999) the transitive uses of the verbs in question have <u>non-core</u> arguments:

(31) [x ACT$_{\langle manner \rangle}$.[CAUSE [BECOME [y $\langle$ STATE $\rangle$]]]]
      [x ACT$_{\langle manner \rangle}$.[CAUSE [BECOME [SCHUHE $\langle$ SAUBER $\rangle$]]]]

      [x ACT$_{\langle manner \rangle}$, y .]

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[x ACT$_{\langle PUTZEN \rangle}$, y .]

$\sqrt{}$schreib,$\sqrt{}$putz,$\sqrt{}$schreib,$\sqrt{}$bau$\in$ MANNER

For intransitive uses of verbs like *schreiben* we assume the same structure as for *husten*: $\sqrt{}$schreib is a manner root which can be integrated. But the transitive use of *schreiben*, as in, say, *Er schrieb einen Brief* or *Er schrieb einige Zahlen auf einen Zettel* is surely as prominent as its intransitive use, and some would see it as primary. The possibility of turning $\sqrt{}$schreib into a transitive verb arises because its specification can be expanded to one which includes the direct object, as the entity that results as the product of the writing activity.

(32) $\sqrt{}$schreib $\rightsquigarrow$

a.

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

$\rightsquigarrow$

b.

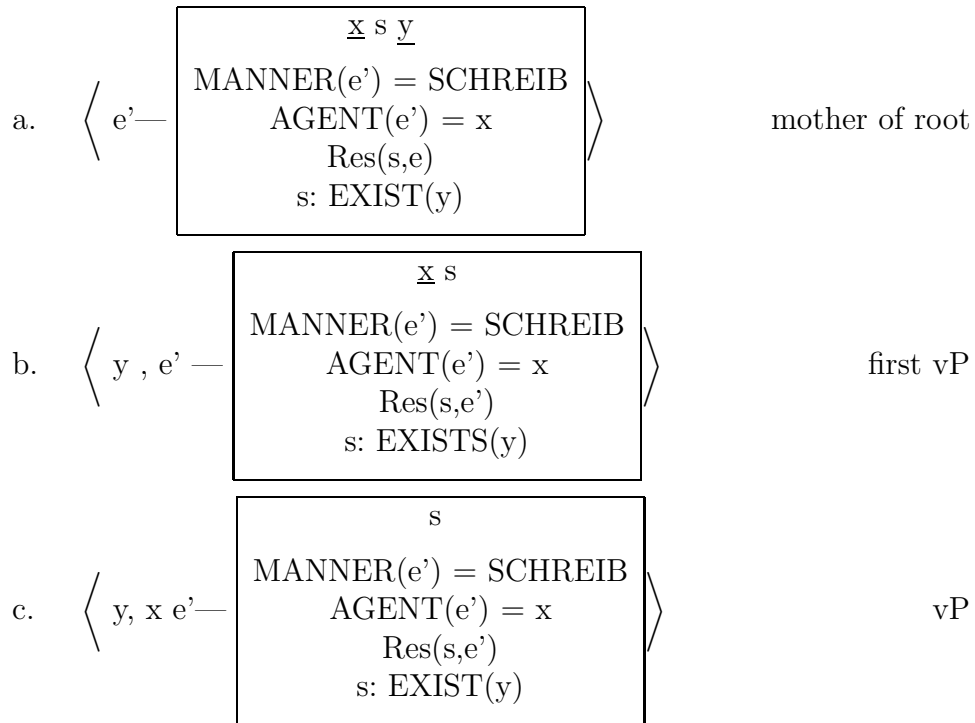| $\underline{e' \ x \ s \ \underline{y}}$ |
| :---: |
| MANNER(e') = SCHREIB |
| AGENT(e') = x |
| Res(s,e') |
| s: EXISTS(y) |

Here 'Res' is the result relation between states and events - s is the result of the occurrence of e - and 'EXISTS' is what it says: a predicate that is true at any time t of those things that exist at t and of no others.

In order to turn (32) into a well-formed word structure with the given root specification we need not only a node that introduces the agent argument x but also one to introduce the theme argument y. We propose the following tree.

(33)

```
                        vP
                     /      \
                  DP          v
                   |        /    \
                   x       v      vP
                        /      \
                     DP          v
                      |        /    \
                      y       v   √schreib
```
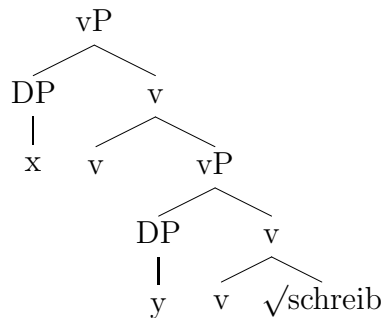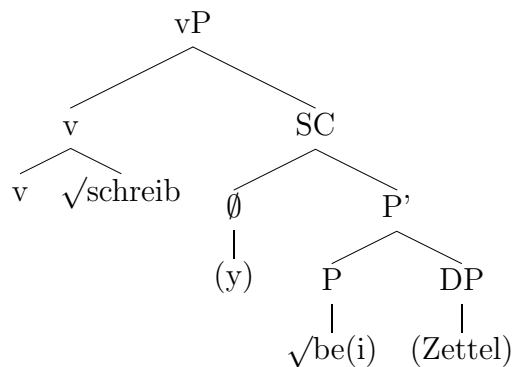
Building the transitive word structure from $\sqrt{}$schreib in (32.b):
e' $\leftarrow$ v. e' is identified with $\underline{e'}$ in (32.b)

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a. $\left\langle e'\text{---}\boxed{\begin{array}{c}\underline{x}\ s\ \underline{y}\\ \hline \text{MANNER(e') = SCHREIB}\\ \text{AGENT(e') = x}\\ \text{Res(s,e)}\\ \text{s: EXIST(y)}\end{array}}\right\rangle$ mother of root

b. $\left\langle y\ ,\ e'\text{ ---}\boxed{\begin{array}{c}\underline{x}\ s\\ \hline \text{MANNER(e') = SCHREIB}\\ \text{AGENT(e') = x}\\ \text{Res(s,e')}\\ \text{s: EXISTS(y)}\end{array}}\right\rangle$ first vP

c. $\left\langle y,\ x\ e'\text{---}\boxed{\begin{array}{c}s\\ \hline \text{MANNER(e') = SCHREIB}\\ \text{AGENT(e') = x}\\ \text{Res(s,e')}\\ \text{s: EXIST(y)}\end{array}}\right\rangle$ vP

1.4   spray-load-alternation; *be(i)*-alternation.

(34) einen Zettel be#schreiben, einen Wagen (mit Heu) (be#)laden, ein Buch be#schmieren

(35) einen Zettel beschreiben

```
                    vP
                   /  \
                  v    SC
                 / \   / \
                v  √schreib  ∅   P'
                           |    / \
                          (y)  P   DP
                               |    |
                            √be(i) (Zettel)
```

- On the internal argument of the preposition *be(i)* a stative property is predicated.

The non-directional preposition introduces a state and two arguments, one of which is optional.

(36) $bei(i) \rightsquigarrow$

$$\boxed{\begin{array}{l} \underline{s}\ \underline{y}\ \underline{z} \\ \hline s:\ BEI(y,z) \\ Ground(s) = z \\ Figure(s) = y \end{array}}$$

root specification

(37) $\left\langle\ s, z \ -\ \boxed{\begin{array}{l} y \\ \hline s:\ BEI(y,z) \\ Ground(s) = z \\ Figure(s) = y \end{array}}\ \right\rangle$

SC

(38)

vP

$$\left\langle\ z, x, e' \ -\ \left\{ \boxed{\begin{array}{l} s^0\ y \\ \hline s^0:\neg BEI(y,z) \\ Ground(s) = y \\ Figure(s) = z \end{array}} \right\}, \boxed{\begin{array}{c} e':BEC\ (\lambda s.\ \boxed{\begin{array}{l} s:\ BEI(y,z) \\ Ground(s) = y \\ Figure(s) = z \end{array}}\ ) \\ MANNER(e') = SCHREIB \\ x = AGENT(e') \end{array}} \right\rangle$$

2 *-ung*-nouns are built from structures including small clauses

- A more precise version of **H1**
  H1'
  (i) The formation of an *-ung* noun requires a structure that can be interpreted as a result state description
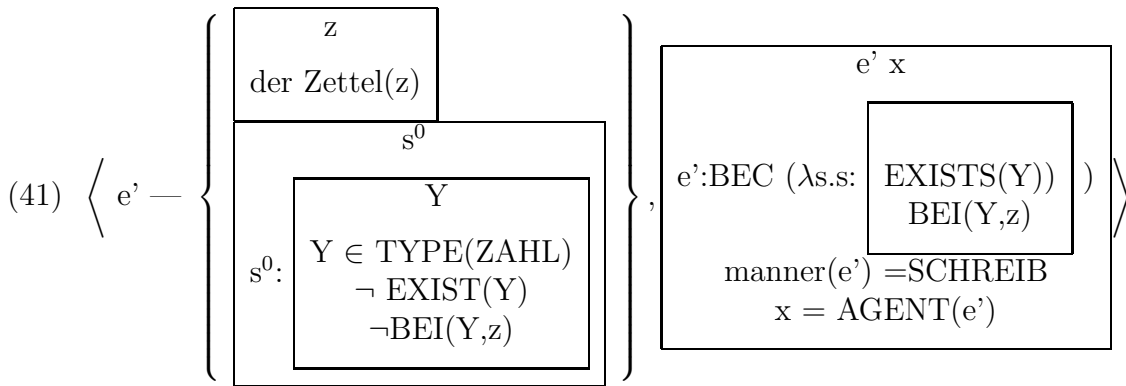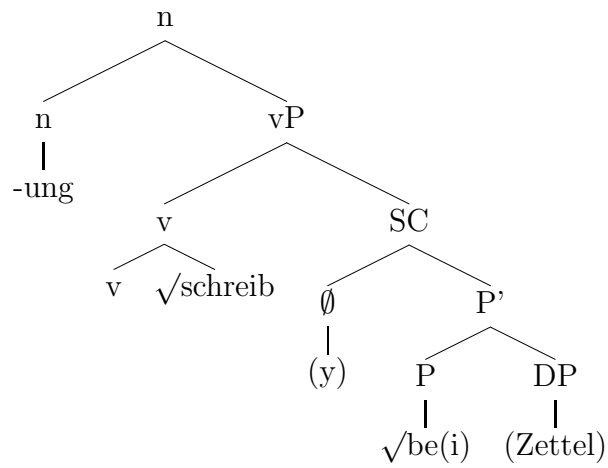
This requirement for *-ung* noun formation is met by the Small Clause structure of *säubern*, in *be# schreiben*, but neither by the structure for *husten* nor by that for *einen Brief scheiben*

- **H1"**: A syntactic structure permits a result state perspective if (and only if ?) it is built from a Small Clause structure.
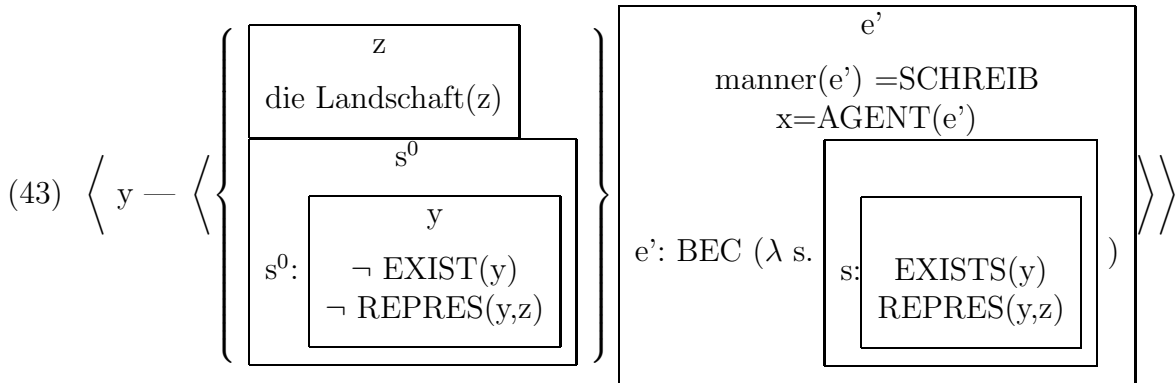
11

(39)

```
            n
          /   \
        n      ·
        |      ┊
      -ung     ┊
               ┊
               ┊
               SC
```
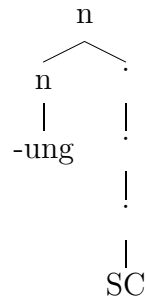
(40) die Be#schreibung (eines Zettels) (mit Zahlen), die Be#ladung (des
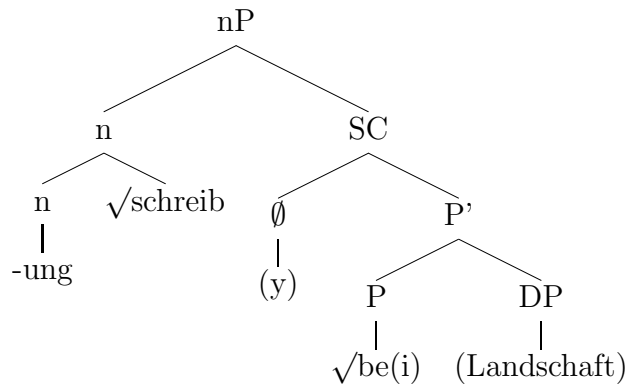   Wagens) (mit Heu)   event reading

```
                    n
                 /     \
               n        vP
               |      /    \
             -ung    v       SC
                   /   \    /   \
                  v  √schreib  ∅    P'
                            |     /   \
                           (y)   P     DP
                                 |      |
                              √be(i)  (Zettel)
```

(41) $\Big\langle$ e' —
$\Bigg\{$
$\begin{array}{|c|} \hline z \\ \hline \text{der Zettel}(z) \\ \hline \end{array}$
$s^0:\begin{array}{|c|} \hline s^0 \\ \hline Y \\ \hline \begin{array}{|c|} \hline Y \\ \hline Y \in \text{TYPE(ZAHL)} \\ \neg \text{ EXIST}(Y) \\ \neg\text{BEI}(Y,z) \\ \hline \end{array} \\ \hline \end{array}$
$\Bigg\}$,
$\begin{array}{|c|} \hline e' \; x \\ \hline e':\text{BEC } (\lambda s.s: \begin{array}{|c|} \hline \text{EXISTS}(Y)) \\ \text{BEI}(Y,z) \\ \hline \end{array}) \\ \text{manner}(e') = \text{SCHREIB} \\ x = \text{AGENT}(e') \\ \hline \end{array}$
$\Big\rangle$

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(42) die Be#schreibung der Landschaft $\qquad\qquad$ object reading

(43) $\left\langle \text{y} - \left\langle \left\{ \begin{array}{c} \boxed{\begin{array}{c} \text{z} \\ \hline \text{die Landschaft(z)} \end{array}} \\ s^0: \boxed{\begin{array}{c} s^0 \\ \hline \boxed{\begin{array}{c} \text{y} \\ \hline \neg\ \text{EXIST(y)} \\ \neg\ \text{REPRES(y,z)} \end{array}} \end{array}} \end{array} \right\} \quad \boxed{\begin{array}{c} \text{e'} \\ \hline \text{manner(e') =SCHREIB} \\ \text{x=AGENT(e')} \\ \text{e': BEC } (\lambda\ \text{s.} \boxed{\begin{array}{c} \text{s:} \begin{array}{c} \text{EXISTS(y)} \\ \text{REPRES(y,z)} \end{array} \end{array}}) \end{array}} \right\rangle \right\rangle$

Question: Could a representation of the following form be viable?

(44)

```
                       nP
                 ┌──────┴──────┐
                 n            SC
              ┌──┴──┐      ┌───┴───┐
              n   √schreib  ∅      P'
              |            (y)   ┌──┴──┐
            -ung                 P     DP
                                 |     |
                              √be(i)  (Landschaft)
```

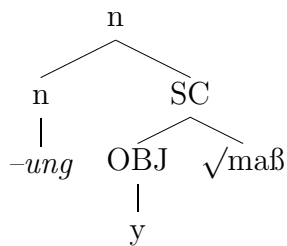This would imply that n introduces an event:

e' ← n. e' is identified with <u>e'</u> of the root-specification of √schreib in (32).

From semantic point of view there is no reason why this possibility should be excluded. This possibility might be of some advantage:

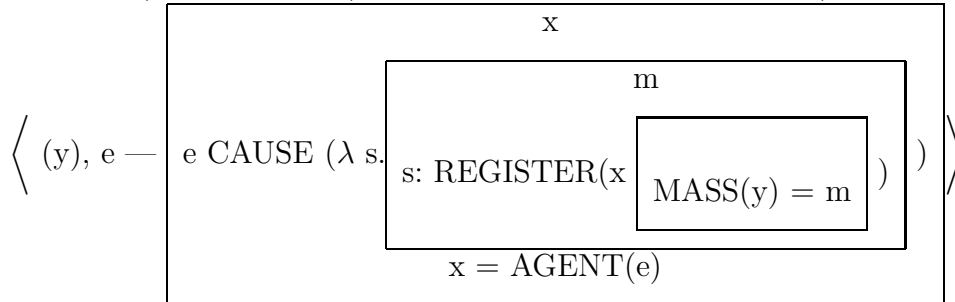(45) (die) Messung $\qquad\qquad$ 'non-ev, non-s' reading

```
          n
       ┌──┴──┐
       n    SC
       |   ┌──┴──┐
     –ung OBJ  √maß
           |
           y
```

√maß ∈ VALUE

(46) √maß ⤳
$$\boxed{\begin{array}{c} \underline{m}\ \underline{y}\ \underline{s} \\ \hline s:\ MASS(y) = m \end{array}}$$
  root specification

(47) $\left\langle\ m \longrightarrow \boxed{\begin{array}{c} s\ y \\ \hline s:\ MASS(y) = m \end{array}}\ \right\rangle$
  nP: Messung

(48) Messung (der Bodengüte) (simplified)

$$\left\langle\ (y),\ e \longrightarrow \boxed{\begin{array}{c} x \\ \hline e\ CAUSE\ (\lambda\ s.\boxed{\begin{array}{c} m \\ \hline s:\ REGISTER(x\ \boxed{MASS(y) = m}\ )\ \end{array}}\ ) \\ \hline x = AGENT(e) \end{array}}\ \right\rangle$$

Question: Are e vs. non-e readings a matter of the level of -ung ?

3

examples revisted: SC or not?

(49) (7) (12) (11) Why not *Putzung, (*)Schreibung *Kochung ?
   Answer: √putz √schreib √koch ∈ MANNER

(50) (10) Why Fertigung/ Bereitung?
   Answer: √fert(ig), √bereit ∈ PROPERTY.

(51) Why Schaffung
   Answer:√schaff implies success, i.e. the resultant state of the presupposed action.

(52) (3)(4). Why Rötung but *Errötung
   Suggestion: √rot ∈ PROPERTY $\overset{!}{\vee}$ [3] ∨ √rot ∈ MANNER

(53) (5) Why Bildung / Formung/ Prägung ?
   Suggestion: √bild, √form, √präg ∈ GESTALT

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[3] underspecified

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(some) immediate challenges for the account we have given

(54)   activities
   Wanderung (= hik(ing)), *Verfolgung* (= follow(ing), persecut(ing)), *Beratung* (= advis(ing)), *Betreung* (= care, supervis(ing)), *Begleitung* (accompagny(ing)), ...

(55) *Meinung* (← to mean), *Hoffnung* (← hope), *Vermutung* (← to speculate), *Ahnung* (premonition), *Erwägung* (← consider),...

   Is 'propositional attitude' a factor for the derivability of *-ung*-nouns? Is the condition in **H1"** not necessary?

4   Agenda for B(4)

- Which roots lead to which word structures? What part do roots play in the determination of argument structure?

  Reconstruction of the subcategorisation frames in (Eckle-Kohler 1999).

- A classification of roots. What relations are there between grammatically significant root classes and Selection Restrictions?

- Syntax and semantics of prefixes and particles in the DM program

- Which *-ung* nouns have which readings (event, resultant state, 'object')? Do *-ung*-nouns with different meanings have different structures at the level of word structure?

- What is the major division between readings: (i) eventuality vs. object or (ii) pre-culmination vs. post-culmination?

- Are word-structural representations a promising basis for constructing U(underspecified) DRSs **?** (D1 Reyle).

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