CRC 1412 REGISTER

Genitive vs. PP arguments in German NPs

Grammatical and Use Conditions

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Outline

Introduction

Introduction

- In German, NP arguments of nominal heads can be marked either with **genitive** or with a ***von*-PP**.

  (1) die Behandlung {des Patienten / vo-m Patienten}
  the treatment the.GEN patient.GEN of-the.DAT patient.DAT
  'the treatment of the patient'

- GEN-NPs and *von*-PP have a different distribution w.r.t. the **contexts** in which they usually appear.
  - **GEN-NPs** are considered "more **educated**" or more formal in comparison to *von*-PPs.
  - ***von*-PPs** are used more in **neutral** or **colloquial** contexts.
  - Similarly, the contexts in which ***ung*-nominalisations** appear are also associated with a **higher degree of education/formality** (nominal vs. verbal style).

Introduction

Goals:

- How can we account for the **variation** between these two forms?

  (Grammatical Conditions)

- How do we need to expand the HPSG architecture to account for **differences in usage**?
- Which type of **data** do we need to build a **predictive model** that reflects usage preferences?

  (Use Conditions)

Describing NP structures

Describing NP structures

- In German, NP arguments of nominal heads are marked with GEN.

  (2) Tim-s Behandlung des Patienten
  Tim-GEN treatment the.GEN patient.GEN
  'Tim's treatment of the patient'

- In the nominal domain, NPs with **structural case** are realised in GEN.

  (Przepiórkowski 1999: 65)

- Hence, NP arguments of **nominalised verbal heads** with structural case (NOM, ACC) are realised with GEN → argument inheritance

  (Bierwisch 1989, Grimshaw 1990, Machicao y Priemer & Müller 2021)

  (3) Tim behandelt den Patienten
  Tim-NOM treats the.ACC patient.ACC
  'Tim treats the patient'

Describing NP structures

- **Alternation:** These inherited arguments with structural case (i.e. GEN) can also be realised with a PP headed by *von* 'of' PP.

(Machicao y Priemer 2017, Kopf & Bildhauer 2024)

(4) a. die Behandlung vo-m Patienten
the treatment of-the.DAT patient.DAT
'the treatment of the patient'

b. die Behandlung von Tim
the treatment of Tim.DAT
'the treatment of Tim'

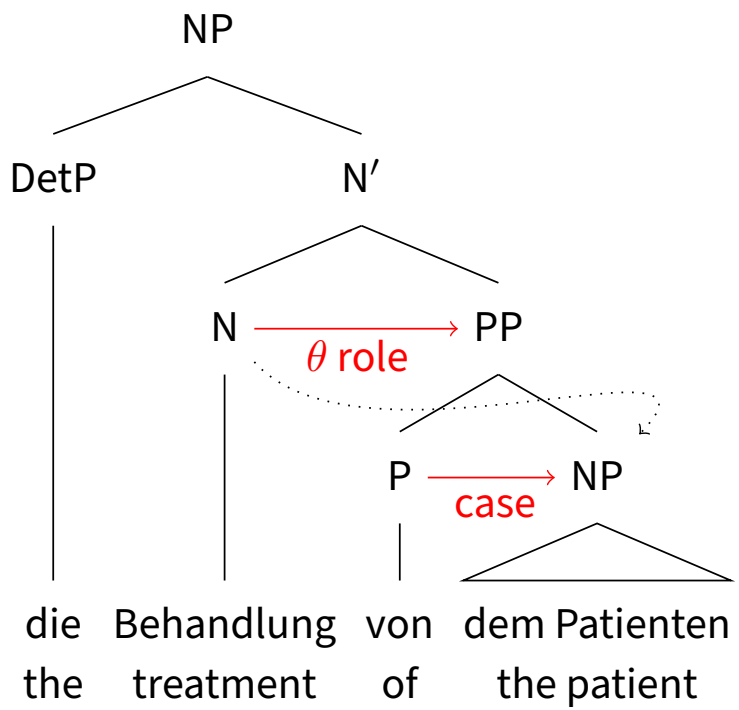
Describing NP structures

- Assuming that selection is **strictly local** …

(cf. selectional localism; Pollard & Sag 1987; 1994, Sag 2007; 2012)

  - while the **case** of the NP (DAT) is **determined by *von*** ‘of’,
  - its **semantic role** is **determined by** the head **N** (i.e. *Behandlung*), i.e., it is necessary that the *index* of the noun is passed up to the PP.

(5)



Describing NP structures

Not all *von*-PPs undergo the **alternation**: (cf. Kopf & Bildhauer 2024)

- In some cases N (e.g. *Abhängigkeit* 'dependency') selects a *von*-PP, cf. (6)
- in other cases the *von*-PP is a (temporal or local) modifier that assigns case and semantic role to NP, cf. (7)

(6) a. Der Student ist von seinen Eltern **abhängig**.
the student is on his parents dependent
'The student depends on his parents'

b. die **Abhängigkeit** von seinen Eltern / *seiner Eltern
the dependency on his parents his.GEN parents.GEN

(7) der Blick {vo-m Turm / *des Turmes}
the view from-the tower the.GEN tower.GEN

→ different lexical entries for *von*

Describing NP structures

Not all selected NPs allow alternation!

(8) die Untersuchung … ‘the examination’

N-heads (e.g. *Untersuchung*) select **full NPs**

(9) des Lehrers
‘the.GEN teacher.GEN’

(10) Tims
‘Tim.GEN’

(11) von dem Lehrer
‘of the.DAT teacher.DAT’ (def. Det)

(12) von Tim
‘of Tim.DAT’ (proper name)

SG bare count Ns are not allowed

(13) * Lehrers
‘teacher.GEN’

(14) * von Lehrer
‘of teacher.DAT’ (sg. bare count N)

Describing NP structures

(8) die Untersuchung … ‘the examination’

SG bare mass and **PL count N** are only allowed with *von*

(15) * Honigs
‘honey.GEN’

(16) * Lehrer
‘teachers.GEN’

(17) von Honig
‘of honey.DAT’ (sg. bare mass N)

(18) von Lehrern
‘of teachers.DAT’ (pl. bare N)

but they are allowed if **N is modified**

(19) süßen Honigs
‘sweet.GEN honey.GEN’

(20) korrupter Lehrer
‘corrupt.GEN teachers.GEN’

(21) von süßem Honig
‘of sweet.DAT honey.DAT’ (mod. sg. bare mass N)

(22) von korrupten Lehrern
‘of corrupt.DAT teachers.DAT’ (mod. pl. bare N)

Describing NP structures

That is,

- *von* combines with NPs (**simple or complex**: LEX ±)
  but **not with N′** (sg. bare count N)

  (14) * Untersuchung von Lehrer — ‘examination of teacher.DAT’

- N selects **complex GEN NP** (LEX −)

  (15) * Untersuchung Honigs — ‘examination honey.GEN’

  (19) Untersuchung süßen Honigs — ‘examination sweet.GEN honey.GEN’

(on LEX, cf. Pollard & Sag 1987, Arnold & Sadler 1992, Deng et al. 2025)

Grammatical constraints for alternation

Grammatical constraints

(23) LR for ***ung*-nominalisation**

$$\left[\begin{array}{l} \textit{stem} \\ \textsc{phon}\ \boxed{1} \\ \textsc{synsem|loc|cat}\ \left[\begin{array}{ll} \textsc{head} & \textit{verb} \\ \textsc{arg-st} & \boxed{2}\ \textit{list(str)} \oplus \textit{list(lex)} \oplus \boxed{3}\ \textit{list(pp)} \end{array}\right] \end{array}\right] \mapsto \left[\begin{array}{l} \textit{ung-n-stem} \\ \textsc{phon}\ \boxed{1} \oplus \langle \textit{ung} \rangle \\ \textsc{synsem|loc|cat}\ \left[\begin{array}{ll} \textsc{head} & \textit{noun} \\ \textsc{arg-st} & \boxed{2} \oplus \boxed{3} \end{array}\right] \end{array}\right]$$

(cf. Machicao y Priemer & Müller 2021)

- The parametrised list of **arguments with structural case** is **inherited** to the derived *ung*-nominal stem.
- Following the **Case Principle**, arguments with structural case are realised with **GEN** in the nominal domain.

(on parametrised lists and Case Principle, cf. Przepiórkowski 1999)

Grammatical constraints

- LEX+ (15) vs. LEX− (19) argument-NPs

  (15) * Untersuchung Honigs ‘examination honey.GEN’

  (19) Untersuchung süßen Honigs ‘examination sweet.GEN honey.GEN’

- We assume constraints **mapping** elements from the **ARG-ST** list to the **valence lists** (e.g. COMPS) → *as-mapping*

  (on mapping constraints: Manning & Sag 1998, Davis & Koenig 2000, Van Eynde 2015, Machicao y Priemer & Fritz-Huechante 2018, Machicao y Priemer & Müller 2021)

- In the nominal domain: Mapping constraint (*n-as-mapping*) needs to **restrict argument-NPs as LEX−** (not only for *ung*-nouns!)

  (24) Constraint on **ARG-ST to COMPS** mapping

$$\left[\begin{array}{l} \textit{n-as-mapping} \\ \textsc{head} \quad \textit{noun} \\ \textsc{arg-st} \quad \left\langle \ldots, \boxed{1}\,\textsc{np}[\textsc{lex}\,-], \ldots \right\rangle \end{array}\right] \Rightarrow \left[\textsc{comps} \left\langle \ldots, \boxed{1}, \ldots \right\rangle\right]$$

Grammatical constraints

- Although arguments realised with *von* are “more widespread” than GEN arguments, the LR for the alternation needs to take the **GEN-NP as input**.
  - → **Not all *von*-PPs** can be realised as GEN-NPs.
  - → preserving generalisation of **Case Principle**

(25) LR for **GEN to *von*-PP** alternation

$$\left[\begin{array}{l} \textit{n-stem} \\ \textsc{cat}|\textsc{arg-st}\ \left\langle \ldots, \textsc{np}[\textit{str}]_{\boxed{1}}, \ldots \right\rangle \end{array}\right] \mapsto \left[\textsc{cat}|\textsc{arg-st}\ \left\langle \ldots, \textsc{pp}[\textit{von}_{f}]_{\boxed{1}}, \ldots \right\rangle\right]$$

Grammatical constraints

- The NP within the *von*-PP gets **case** assigned from the **preposition** (*ldat*) but its **semantic role** is assigned by the **head noun**.
- Among the different types of *von*, we assume a **functional *von*-preposition** (von_f) which takes the INDEX value of its complement NP and makes it its own – a **parasitic head**. (cf. Levine 2010)
- (This functional preposition could also be used for the agent in passives.)

(26) Lexical entry for **functional *von***

$$\begin{bmatrix} \text{PHON} & \langle von \rangle \\ \text{HEAD} & von_f\text{-}prep \\ \text{COMPS} & \langle \text{NP}[ldat]_{\boxed{1}} \rangle \\ \text{INDEX} & \boxed{1} \end{bmatrix}$$

(cf. also functor approach in Van Eynde 2004, Van Eynde & Kim 2022)

Grammatical constraints

- All constraints used are needed for **independent reasons**.
- To account for the data, we just needed to **strengthen the restrictions** on these constraints (e.g. LEX attribute),
- and provide a more adequate description of the **functional *von*-head**.

… How can we provide a more adequate **prediction of the contexts** in which the alternation occurs?

Grammar and use conditions

Grammar and use conditions

Speakers know more than the **structural licensing conditions** for NP arguments
$\rightarrow$ when (and by whom) each type of argument is **preferably used**

How do we **relate** this knowledge to grammatical constraints on NP arguments?

Use-conditional constraints (UCCs) (Varaschin et al. 2025):

(27) *description of linguistic structure* $\mathcal{S} \Rightarrow$ *description of admissible context for* $\mathcal{S}$

Use-conditional knowledge of different variants is part of **linguistic competence**
(Wilcock 1999, Paolillo 2000, Bender 2001; 2007, Asadpour et al. 2022, i.a.)

In the case of register variants, contexts are constrained by **social meanings**
(Bender 2001; 2007, Burnett 2019, Beltrama 2020, Asadpour et al. 2022, Salmon 2022)

Grammar and use conditions

Social Meaning (SM)

Non-at-issue content that indexes some **socially-relevant property** of a context coordinate (s_c, a_c, t_c, etc.)

(28) Die Behandlung des Patienten war gut.
the treatment the.GEN patient.GEN was good

At-issue Meaning: λw. the treatment of the patient was good in w

Social Meaning: λc. s_c is presenting as educated, formal, …

$\rightsquigarrow$ **our focus: educated**

The at-issue meaning of an utterance u (AM_u) defines a **set of worlds**

$\rightsquigarrow$ u is **true** in w iff $w \in AM_u$

A SM of an utterance u (SM_u) defines a **set of contexts**

$\rightsquigarrow$ u is **usable** in c iff $c \in SM_u$

Properties of Social Meanings

Independence: SMs contribute to **separate dimension** of meaning (not at issue)

Indexicality: SMs predicate something of the **utterance situation** (Potts 2007)

Gradability: SMs hold of entities to different **degrees** (McCready 2019)

Underspecification: forms are associated with an **indexical field** of related SMs (Eckert 2008; 2012, Oushiro 2019)

Proposal:

- SMs are values of C(ONVENTIONAL)I(MPLICATURE) attribute inside CONTEXT, at-issue operators (e.g. negation) only take scope over CONT|RELS
- SM *rels* have a C-INDEX value as one of their arguments
- SMs take a DEGREE argument (an interval from 0 to 1)
- UCCs typically relate structures to non-maximal SM types, underspecified SMs are resolved to maximal sorts in concrete communicative situations

Grammar and use conditions

The social meanings of NP arguments

Use conditions of NP arguments

(29) **UCC** for NPs with arguments with structural case (i.e. genitive):

$$\begin{bmatrix} \textsc{head} & \textit{noun} \\ \textsc{arg-st} & \left\langle \ldots, \text{NP}[\textit{str}], \ldots \right\rangle \end{bmatrix} \Rightarrow \begin{bmatrix} \textsc{ctxt} & \begin{bmatrix} \textsc{c-inds}|\textsc{speaker} & \boxed{1} \\ \textsc{ci} & \left\langle \ldots, \begin{bmatrix} \textit{educated} \\ \textsc{arg1} & \boxed{1} \\ \textsc{deg} & [.5, 1) \end{bmatrix}, \ldots \right\rangle \end{bmatrix} \end{bmatrix}$$

(30) **UCC** for NPs with *von*-arguments:

$$\begin{bmatrix} \textsc{head} & \textit{noun} \\ \textsc{arg-st} & \left\langle \ldots, \text{PP}[\textsc{head}\ \textit{von-prep}], \ldots \right\rangle \end{bmatrix} \Rightarrow \begin{bmatrix} \textsc{ctxt} & \begin{bmatrix} \textsc{c-inds}|\textsc{speaker} & \boxed{1} \\ \textsc{ci} & \left\langle \ldots, \begin{bmatrix} \textit{educated} \\ \textsc{arg1} & \boxed{1} \\ \textsc{deg} & (0, .7] \end{bmatrix}, \ldots \right\rangle \end{bmatrix} \end{bmatrix}$$

(31) **UCC** for *-ung* nouns:

$$\textit{ung-n-word} \Rightarrow \begin{bmatrix} \textsc{ctxt} & \begin{bmatrix} \textsc{c-inds}|\textsc{speaker} & \boxed{1} \\ \textsc{ci} & \left\langle \ldots, \begin{bmatrix} \textit{educated} \\ \textsc{arg1} & \boxed{1} \\ \textsc{deg} & [.6, 1) \end{bmatrix}, \ldots \right\rangle \end{bmatrix} \end{bmatrix}$$

- Simplification: *educated* is only one of the possible SMs associated with these structures
- More accurate UCCs would associate these structures with an underspecified sort that includes *educated*
- For a concrete proposal that implements underspecified SMs, see Varaschin et al. (2025)

How do these SMs get integrated into the SM of the clause?

Grammar and use conditions

Social meaning composition

Social meaning composition

Local CI Composition Principle (Part I)

For each phrase, if the CI values of its daughters do not have **repeated predications**, then the CI value of the phrase is the concatenation of the CI values of its daughters.

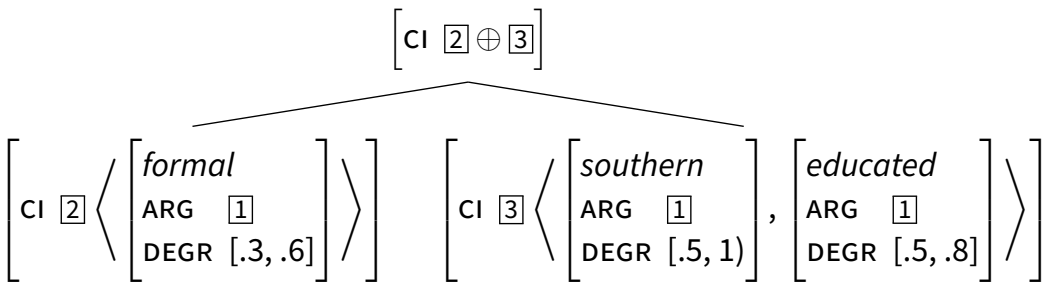


Figure 1: Simple SM composition

Repeated predications: predications of the same type and with the same ARG values but possibly different DEGR values

Local CI Composition Principle (Part II)

For each phrase, if the CI values of its daughters have **repeated predications** $SM_1, \ldots SM_n$ then the CI value of the phrase is the concatenation of the CI values of its daughters.

(i) **minus** $\langle SM_1 \rangle, \ldots \langle SM_n \rangle$

(ii) **plus** a list of predications of the same type and with the same ARG values as $SM_1, \ldots SM_n$, but with a DEGR value consisting in the intersection between the DEGR values of $SM_1, \ldots SM_n$.

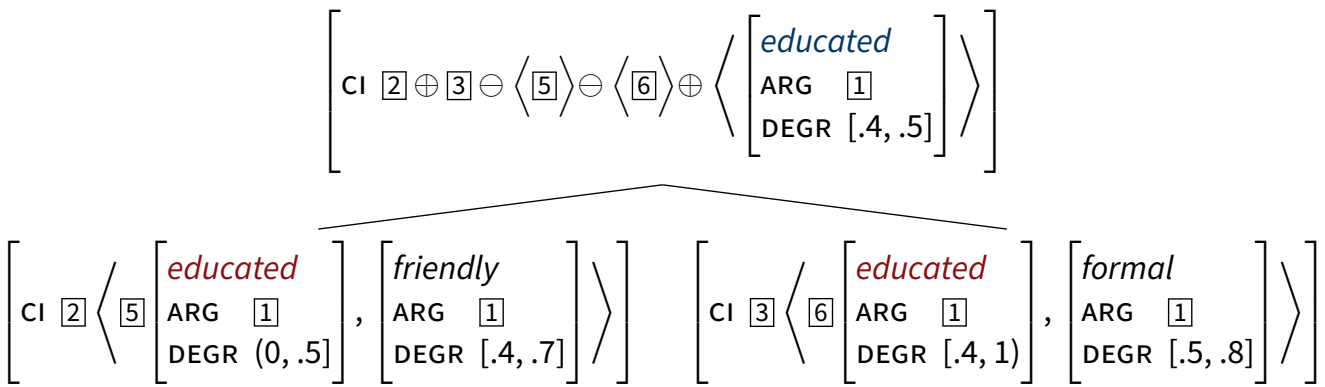


Figure 2: Complex SM composition

Social meaning composition

If repeated SMs **do not intersect**, the mother will have a SM with an **empty** DEGREE value (e.g. honorific mismatches) $\rightsquigarrow$ does not mean **ungrammaticality**

If they **do intersect**, DEGREE values for SMs of the same type get **narrowed**

Narrower DEGREE intervals = narrower set of **admissible contexts**

How does this work in the case of German NPs?

Core empirical prediction: *-ung* nouns and *von*-argument combinations are **more contextually restricted** than combinations between *-ung* and genitives

Social meaning composition

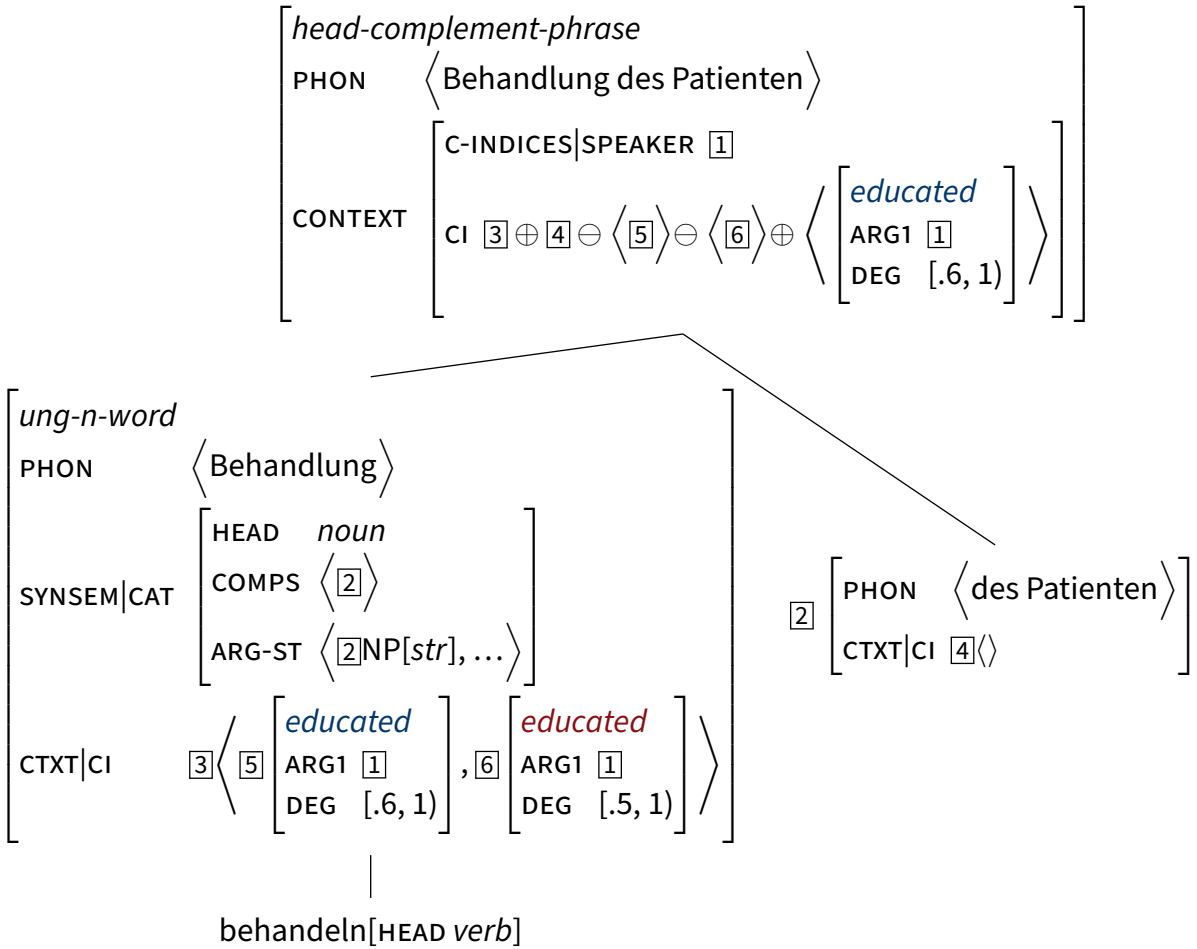


Figure 3: SM composition with *-ung* and genitive arguments

Social meaning composition

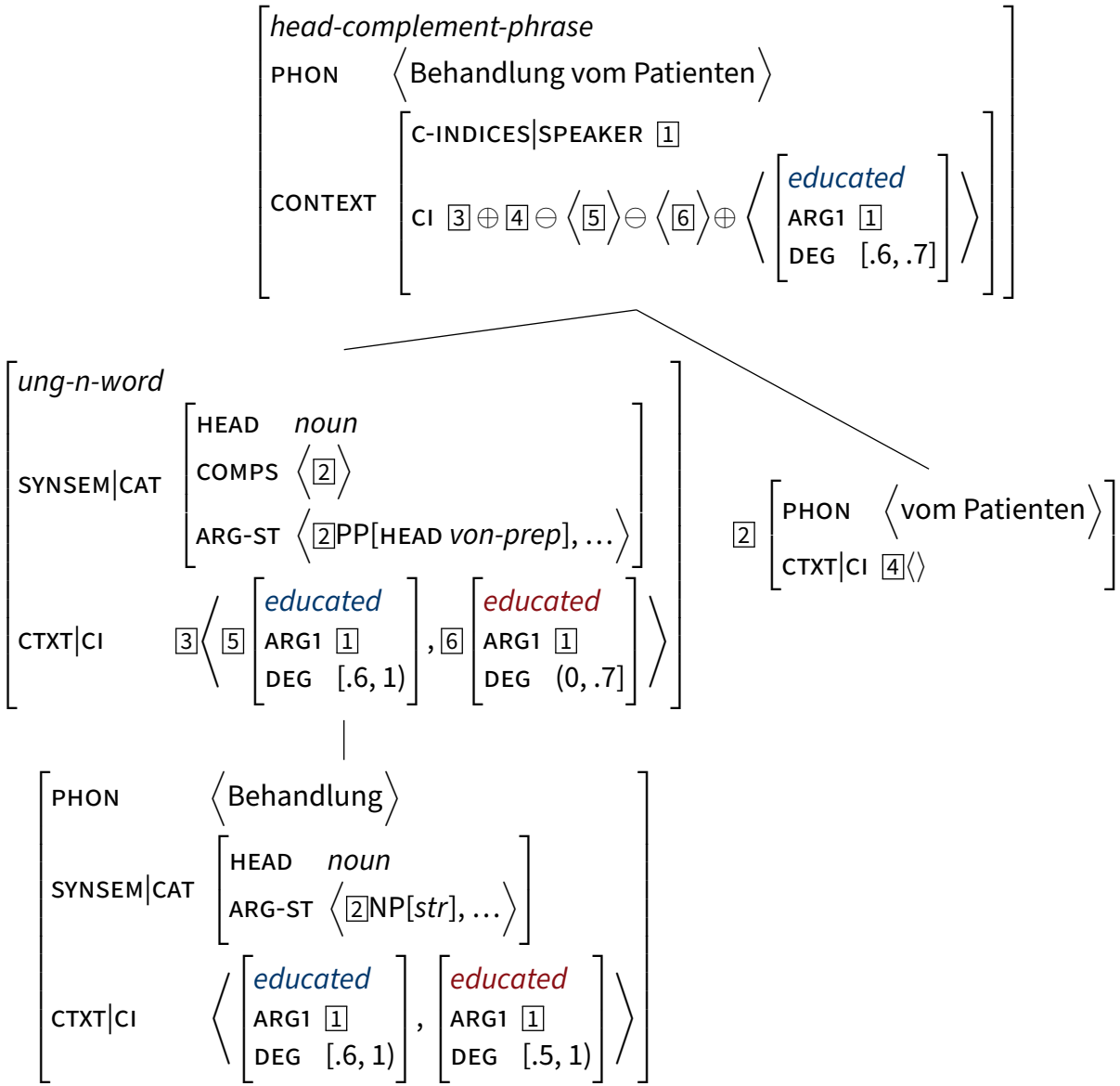


Figure 4: SM composition witth with *-ung* and *von*-arguments

Felicity constraint for Social Meanings

If felicitous, the output of Local CI Composition updates the **global context**

(Paolillo 2000, McCready 2019)

Felicity constraint (McCready 2019: 31)

For every utterance *U* expressing a SM α, if the **prior global context** of *U* is specified as having a SM α', where α and α' are repeated predications, then the DEGREE values of α and α' **have to intersect**.

The **bigger the overlap** between the SMs in the prior global context and those in *U*'s CONTEXT|CI value, the **more appropriate** *U* is with respect to the context

Register

A **cluster of linguistic constraints** whose associated models are required (by virtue of **UCCs**) to carry SMs that are appropriate in the **same global contexts**

Whether or not a form 'belongs' to a register *R* is a matter of **degree** $\rightarrow$ depends on **how much** its SMs overlap with the contextual parameters associated with *R*.

Empirical Validation

Proposal

- Empirically validate theoretical hypotheses concerning the encoding of register-sensitive grammatical structures
- Analyzing corpus data in line with our theoretical analysis
- Testing whether theoretical predictions about register-sensitive structures are empirically supported

Data Collection

PreCOXX25-LDA (Schäfer et al. 2025)

- 21,775,285 tokens and 2,475 documents
- Sources: forums, sports reports, legal texts
- Constructed using a probabilistic framework based on Latent Dirichlet Allocation (LDA) (Blei 2012)
- LDA is employed to discover latent register dimensions (or potential registers =*pregisters*)
- Assigns weights representing the probability that each document is associated with a specific pregister

Data Collection

- Pregisters were validated via a large annotation experiment:
  - Classified according to situational and functional parameters

  $\rightarrow$ *Education, Interactivity, Proximity, Narrativity*
  - Performed by four expert human annotators
  - Achieved substantial inter-rater agreement
- Probabilistic modeling provides a nuanced representation of register mixtures
- Combines LDA-based analysis with human annotation for robust evidence

Analysis

- Focus on *Education* due to its established association with nominal stylistics and genitive constructions (Biber 1988)

1) Pregisters are ranked by education annotation scores on a continuum
   - Pregisters received a high or low *Education*-score depending on the number of relevant documents
   - Serve as proxies for the education parameter
2) Compute whether extracted genitives and *von*-phrases correlate with *Education*-scores

→ This methodology enables comparison with the hypothesized DEGR-values in corresponding constructions

Preliminary Statistical Analysis

- Conducted without further annotation to pre-validate the hypothesis
- A suboptimal but suggestive curve was fitted, linking the studied structures to *Education*-associated registers
- Data indicated weak to moderate correlations in the expected direction:
  - Genitives and *-ung*-nouns trended positively with higher educational pregisters
  - *von*-phrases showed a slight negative correlation

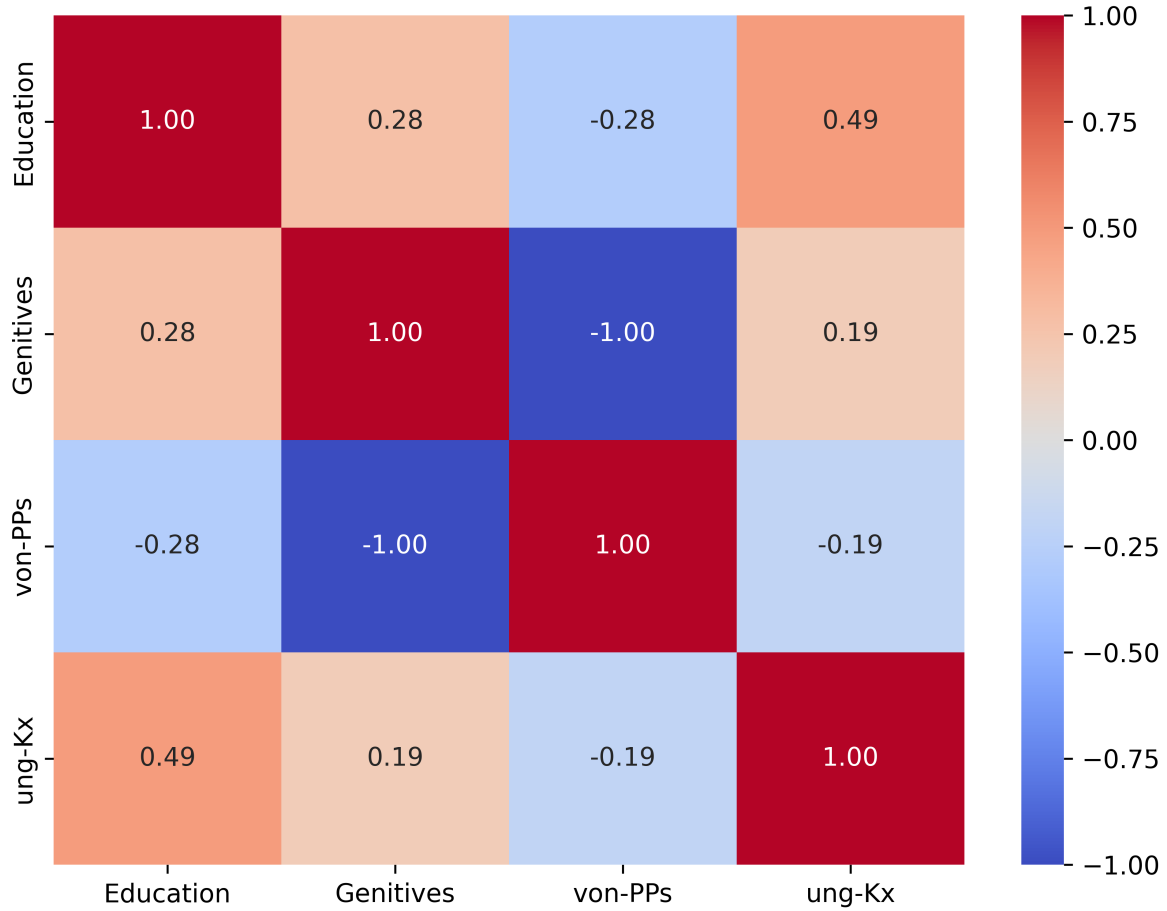


Figure 5: Correlation heatmap of all target variables, based on Spearman's rank correlation coefficient.

Preliminary Statistical Analysis

- Findings support the broader hypothesis of register-sensitive distribution patterns
- Slight negative correlation between *von*-phrases and *ung*-nouns
  - Combinations of *von*-phrases with *-ung* should have small DEGR values for their educated SM, making them more contextually restricted.

$\rightarrow$ Validation via annotation is essential because not every construction choice is entirely optional

Annotation Process

- Annotation performed by two expert annotators
- The study aimed to determine whether speakers truly have the freedom to choose between the genitive and *von*-phrase
- Two annotation rounds were conducted:
  i. **Pre Round** (n=250 x 2): to ensure sufficient inter-annotator agreement and fine tune annotation guidelines
  ii. **Main Round** (n=250 x 3): for pregisters 10, 14, 24
  IRA of Fleiss's κ = .701

Annotation Process

Annotation Guidelines:

i. Filter of False Positives:
    1. Exclusion of proper nouns

ii. Filter of Optionality:
    1. Fixed Constructions/ Idioms
        e.g. *Tag der Arbeit* ('Labour Day')
    2. *von* with local interpretation
        e.g. *der Blick vom Turm* ('the view from the tower')
    3. *von*-phrase without determiner
        e.g. *Beförderung von Hunden* ('transport of dogs')
    4. if *von* is part of the argument structure of the verb
        e.g. *Ausschließung vom Wahlrecht* ('exclusion from voting rights')

Limitations and Future Directions

- Once a larger study has been conducted, the data can be used to model the respective DEGREE values
- This methodology sets a strong foundation for validating the theoretical predictions regarding the encoding of register-sensitive grammatical structures, particularly in relation to education-based register variations
- Our method helps validate register-sensitive grammatical encoding and the corresponding SM DEGR values
- Future work should expand the annotation to establish robust empirical intervals

Concluding remarks

Concluding remarks

We have provided …

- … **structural constraints** that correctly predict when GEN-NPs and *von*-PPs **can** be used,
- … **use conditional constraints** that model when the two forms **would** be used,
- … a new **method** to **empirically validate the predictions** made by our model.

Concluding remarks

Validation: how much a structure appears on an LDA-induced pregister assigned to a particular degree of education reflects how appropriate it is in a context where the speaker presents as having that particular degree of education

Genitive arguments are more frequent in 'more educated' contexts **because** they are grammatically specified to have SMs that largely overlap with these contexts

-ung derived Ns and *von*-PPs are predicted to have a restricted distribution because their hypothesized SMs define sets of admissible contexts with a **narrow intersection**

The preliminary data analysis favors this **intersective approach** to local SM composition (*contra* McCready (2019))

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