Topic drop in German: Grammar and usage

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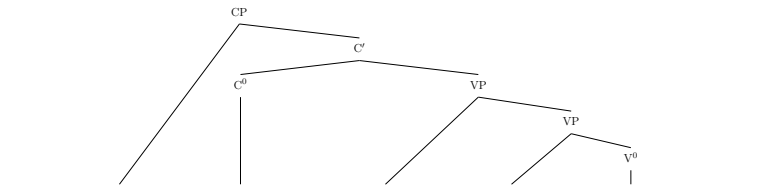
Abstract

German topic drop clauses are a subtype of declarative clauses where the initial position (usually filled by an overt constituent) is left empty. It is often noted that topic drop appears mainly in specific registers (e.g. dialogues), but this claim has neither been previously experimentally validated, nor formally implemented. In this paper, we report the results of a matched-guise study which indicate that the syntactic variation between topic drop and regular V2 declaratives in fact correlates with different social meanings, leading to the register variation postulated in the literature. In order to model German speakers' grammatical and register knowledge about topic drop in HPSG we propose, (i) a unified grammatical constraint that licenses topic drop structures, (ii) a formal theory of register that treats social meanings as a type of use-conditional content subject to compositional rules.

1 Describing topic drop structures

Canonical German declarative clauses consist of a phrase XP in the so called *Vorfeld* (VF) and the finite verb following that constituent in the so called *left bracket* (LB), leading to a verb second (i.e. V2) structure, as Fig. 1 shows (cf. Drach 1937, Wöllstein 2010, a.o.).



Den Aufsatz	*muss*	der Schüler morgen	schreiben.
the essay	must	the student tomorrow	write

'The student must write the essay tomorrow.'

Figure 1: Canonical German declarative clause

The topic drop structure (also called: null topic, pronoun zap, pre-field ellipsis, etc.) being investigated in this paper is a subtype of declarative clauses in German, cf. Fig (1), with a V1 structure (1a), similar to polar questions (1b), but with assertive meaning (cf. Huang 1984, Fries 1988, Cardinaletti 1990, Wöllstein 2010, Müller 2014, Frick 2017, Schäfer 2021).

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(1) a. [—]$_{\text{VF}}$ muss der Schüler ~~den Aufsatz~~ morgen schreiben.
must the student the essay tomorrow write
'The student must write the essay tomorrow.'

b. [—]$_{\text{VF}}$ Muss der Schüler den Aufsatz morgen schreiben?
must the student the essay tomorrow write
'Does the student have to write the essay tomorrow?'

In contrast to canonical declarative clauses, cf. Fig. (1), one constituent must be dropped (1a), otherwise making the clause ungrammatical (2a). Furthermore, the VF must be left empty in these structures (1a) vs. (2b), although in canonical declaratives this position can be filled by any constituent, see for instance (2c). In movement based analyses (cf. Huang 1984, Cardinaletti 1990; a.o.), this fact has been taken as evidence for an empty element occupying the VF in topic drop structures, and hence not allowing another constituent to occupy this position – hence (2b) – since the German VF can be occupied by only one XP (cf. Machicao y Priemer 2022).[1]

(2) a. * [—]$_{\text{VF}}$ muss der Schüler *den Aufsatz* morgen schreiben.
must the student the essay tomorrow write

b. * [*Morgen*]$_{\text{VF}}$ muss der Schüler ~~den Aufsatz~~ schreiben.
tomorrow must the student the essay write

c. [*Morgen*]$_{\text{VF}}$ muss der Schüler den Aufsatz schreiben.
tomorrow must the student the essay write
INTENDED: 'The student must write the essay tomorrow.'

A further restriction for this construction concerns the information-structural status of the deleted constituent. The dropped XP has to be contextually salient for the purpose of recoverability, cf. (3a) vs. (3b), but it can't be focal, cf. (4). It must be known in the utterance situation, cf. context in (3). Hence, the dropped XP is assumed to be a topic. This differentiates topic drop from pro-drop, which does not posit a topic restriction on the dropped constituent.[2]

(3) A: What's going on with *the essay*?

a. B: [—]$_{\text{VF}}$ muss der Schüler ~~*den Aufsatz*~~ morgen schreiben.
must the student the essay tomorrow write

b. B: * [—]$_{\text{VF}}$ muss ~~der Schüler~~ *den Aufsatz* morgen schreiben.
must the student the essay tomorrow write
INTENDED: 'The student must write the essay tomorrow.'

[1] It is also worth mentioning that topic drop is only possible in main clauses, i.e. when the verb is in the LB, and not in embedded clauses with a complementizer in the LB.

[2] It has been assumed that the German VF is a preferred position for topics (cf. Fries 1988: 24; Wöllstein 2010: 89).

(4) A: Who has seen Lou?

B: * [—]$_{VF}$ hab' ~~*ich*~~ sie gesehen.
have I her seen

INTENDED: '(I) have seen her.'

Even when two constituents are previously mentioned and contextually salient, in a topic drop construction only one constituent (5) can be deleted (cf. Ross 1982, Huang 1984).

(5) A: What's *the student* doing with *the essay*?

B: [—]$_{VF}$ muss *er* ~~*den Aufsatz*~~ morgen schreiben.
must he the essay tomorrow write

B: [—]$_{VF}$ muss ~~*der Schüler*~~ *ihn* morgen schreiben.
must the student it tomorrow write

B: * [—]$_{VF}$ muss ~~*der Schüler*~~ ~~*den Aufsatz*~~ morgen schreiben.
must the student the essay tomorrow write

INTENDED: '(The student) must write (the essay) tomorrow.'

There are also restrictions w.r.t. morphosyntactic and semantic properties of the elements that can(not) be dropped. For instance, while personal pronouns can be omitted (6a), anaphors cannot (6b). From a semantic point of view, pronouns without semantic content cannot be deleted either (7).

(6) A: I've shaved Tim and Tom already, and what about you?

a. B: [—]$_{VF}$ hab' ~~*ich*~~ mich schon rasiert.
have I myself already shaved

b. B: * [—]$_{VF}$ hab' ich ~~*mich*~~ schon rasiert.
have I myself already shaved

INTENDED: 'I have already shaved myself.'

(7) A: How is the weather over there?

B: * [—]$_{VF}$ schneit ~~*es*~~ im August!
snows it in August

INTENDED: '(It) snows in August!'

Therefore, to provide an adequate analysis of topic drop, all of these restrictions must be accounted for. In Sec. 2, we present our analysis dealing with the grammatical aspects of the construction. In Sec. 4, we complement this analysis with constraints concerning the usage of the construction.

2 Licensing topic drop

There are two main ways to account for the grammatical properties of topic drop structures. The first proposal consists of assuming a phonologically

empty category in the VF (*pro* or *Op*), as shown in Fig. 2.[3] This empty category then binds another empty element inside the VP, i.e. the deleted XP (cf. Huang 1984, Cardinaletti 1990; a.o.). There are several difficulties with this approach, for instance how to avoid the realisation of several empty pronouns, how to avoid reflexives and semantically empty expletive pronouns to be realized as phonologically empty elements, and how to restrict the presence of an empty element only to the VF.

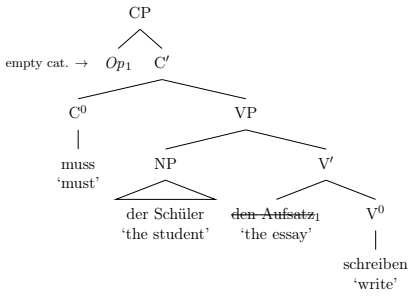


Figure 2: Empty pronoun

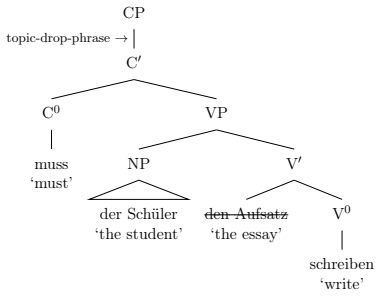


Figure 3: Phrasal constraint

The other proposal, the one followed here, assumes a phrasal constraint named *topic-drop-phrase* (based on Müller 2014: 101), cf. Fig. 3. We enhance this constraint with information-structural details and with restrictions for the deleted element, in order to account for the data presented in Sec. 1, and in Sec. 4.2, it will be further complemented by constraints on usage.

(8) *topic-drop-phrase* ⇒

$$\left[\begin{array}{ll}
\textsc{synsem}|\textsc{context}|\textsc{infostr}|\textsc{topic} & \langle \boxed{2} \rangle \\
\textsc{head-dtr}|\textsc{synsem} & \left[\begin{array}{ll}
\textsc{local}|\textsc{cat} & \left[\begin{array}{ll} \textsc{head} & \left[\begin{array}{ll} \textit{verb} & \\ \textsc{vform} & \textit{fin} \\ \textsc{initial} & + \end{array}\right] \\ \textsc{comps} & \langle\rangle \end{array}\right] \\
\textsc{nonloc} & \left[\begin{array}{ll} \textsc{inher}|\textsc{slash} & \left\langle \boxed{1} \left[\textsc{cont} \left[\begin{array}{ll} \textit{ppro} & \\ \textsc{index} & \boxed{2}\ \textit{ref} \end{array}\right]\right] \right\rangle \\ \textsc{to-bind}|\textsc{slash} & \langle \boxed{1} \rangle \end{array}\right]
\end{array}\right] \\
\textsc{non-head-dtrs} & \langle\ \rangle
\end{array}\right]$$

The *topic-drop-phrase*, cf. (8), is reminiscent of the Head-Filler Rule, proposed in Pollard & Sag (1994: 164), binding off the trace of an element that is being expected in the structure ('the essay' in Fig. 3). In contrast to structures licensed by the Head-Filler Rule, where the LOCAL value of the non-head daughter is token identical with the element in the SLASH list of the head daughter – i.e. a filler and a head are combined, the *topic-drop-phrase* binds

[3] Contrary to Cardinaletti (1990), we do not assume a different syntactic treatment for subject and object topic drop. But, as we show, the two have different use conditions.

off the trace of the element in the SLASH list of the head daughter ('the essay' in Fig. 3), but without combining the head daughter with another element.[4] The Non-Local Feature Principle (Pollard & Sag 1994: 164) guarantees that the mother node in a topic drop structure has an empty SLASH value. In other terms, the *topic-drop-phrase* just eliminates the requirement to overtly attach an XP (co-indexed with the trace), hence the VF is left empty and no empty category is needed, cf. (2). Due to the restriction of the SLASH list to a singleton list (cf. Pollard & Sag 1994: 161, 170) it is ensured that only one constituent can be dropped, cf. (2) & (5), and multiple topics (be they dropped or not) are not allowed in a clause.

The constraint in (8) restricts topic drop structures to main clauses due to the restriction of the HEAD value of the head daugther to INITIAL +. Therefore, embedded clauses in German, i.e. with verb final position, cannot show a topic drop structure (cf. footnote 1). We also adopt the theory of information-structure features in Paggio (2009), where attributes like TOPIC take indices as their values and impose the restriction that the dropped constituent must be a topic in the clause, and for instance not focal, cf. (3) & (4). Furthermore, restricting the CONT value of the element in the SLASH list to *personal-pronoun* (*ppro*) ensures that reflexives (i.e. elements of type *anaphoric*) are ruled out, cf. (6). We also account for the fact that semantically empty pronouns cannot be deleted in a topic drop structure by constraining the INDEX value of the dropped XP to *ref*(*erential*), cf. (7).

That is, only the constraint in (8) is needed in order to account for the grammatical aspects of the construction. The *topic-drop-phrase* restricts quite precisely the realisation of topic drop structures in German, and every other part of the clause up to the verb in second position (cf. C′ in Fig. 3) follows the general constraints related to the German grammar. That is, besides the *topic-drop-phrase* no further stipulations are needed. Furthermore, as will be shown in Sec. 4 the empirical facts related to the usage of the construction and its association with register (cf. Sec. 3) can be formalised within a single model, as has been discussed in Bender (2001, 2007), Paolillo (2000), Asadpour et al. (2022), Machicao y Priemer et al. (2022); a.o.

3 A matched-guise experiment

3.1 Hypotheses and predictions

To investigate the social meanings of topic drop in German, we conducted a matched-guise experiment (Lambert et al. 1975, Bender 2005, Campbell-Kibler 2007). Specifically, we hypothesize that listeners assign different characteristics to topic drop users as opposed to full form users. Thus, we

[4] As a side note, Fries (1988: 24–25) assumes a transformation rule deleting the constituent in the VF, i.e. also without a base-generated empty element.

expect a main effect of topic drop on the ratings of the characteristics of the speakers. Furthermore, we predict that the ratings for speakers who drop the subject are different from those who drop the object, i.e. showing an interaction between the variables topic drop and the topicalized argument.

3.2 Design and procedures

The experiment has a 2×2 within-subjects, within-items design with two independent variables with two levels each: TOPIC DROP (topic drop (TD) vs. full form (FF)) and the topicalized ARGUMENT (subject (S) vs. object (O)). The conditions are illustrated in (9). The materials consist of 8 items (each appears in the four different conditions) and 32 fillers. All items are in the form of written dialogues like (9)[5] and were presented to each participant in a fully randomized order. Participants were tasked to rate speaker B in each dialogue on a 6-point scale (1 = e.g. not friendly at all, 6 = e.g. very friendly) in terms of the following characteristics: *höflich* 'polite', *formell* 'formal', *gebildet* 'educated', *wortgewandt* 'articulate', *freundlich* 'friendly', *pingelig* 'pedantic', *arrogant* 'arrogant', *locker* 'relaxed'. The choice of these characteristics is based on those used in the matched-guise experiment in Beltrama (2018) and on results of prior qualitative interviews with a small group of native speakers addressing attitudes towards topic drop. The experiment was conducted online on the platform Ibex farm.[6]

(9) A: Hast du letzte Woche den Brief geschrieben?
have 2SG.NOM last week DEF.SG.ACC letter written
'Did you write the letter last week?'

B: a. Ich kann ihn morgen schreiben. [FF×S]
1SG.NOM can 3SG.ACC tomorrow write

b. Kann ihn morgen schreiben. [TD×S]
can 3SG.ACC tomorrow write

c. Den kann ich morgen schreiben. [FF×O]
DEM.3SG.ACC can 1SG.NOM tomorrow write

d. Kann ich morgen schreiben. [TD×O]
can 1SG.NOM tomorrow write

'I can write (it) tomorrow.'

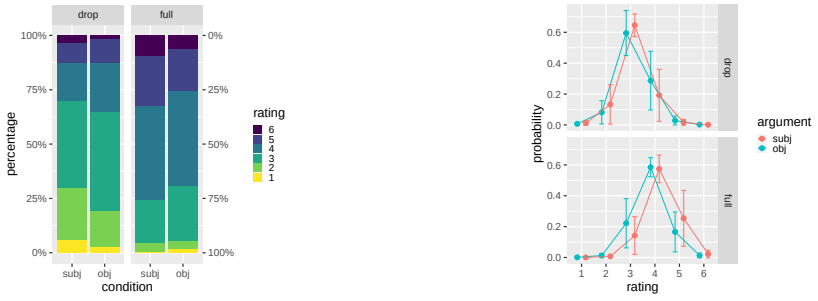
[5] As a reviewer points out, the use of written instead of spoken stimuli may have an influence on participants' perception of topic drop, as it is arguably a phenomenon associated with conceptually spoken language. As a first step, the dialogue form adopted here aims to simulate a spoken conversation as far as possible. Further studies using spoken stimuli are definitely worth carrying out. However, as several corpus studies show, topic drop is also widely used in the medium of informal written communication, e.g. text messages, chats, mails (Frick 2017, Schäfer 2021, a.o.). The stimuli we used are also compatible with such kinds of contexts.

[6] `https://korpling.german.hu-berlin.de/ibex/`

23 self-reported German native speakers (17 female, 3 male, 1 diverse, 2 not specified) participated in the experiment. 21 are between the age 18 and 25, one is between 36 and 45 and another between 56 and 65.

3.3 Data analysis and results

The data is analyzed in R (R Core Team 2023) with cumulative link mixed models (CLMMs) for ordinal data (Christensen 2022). The model includes TOPIC DROP and ARGUMENT as main effects, the effect of their interaction, and PARTICIPANTS and ITEMS as random effects, including both by-participant and by-item random intercepts and slops, based on the maximal random effects approach recommended by Barr et al. (2013).[7] The ratings on each scale are analyzed in a separate univariate analysis. The results show a main effect of TOPIC DROP for the scales polite ($\chi^2 = 15.30$, $p < 0.01$), formal ($\chi^2 = 20.51$, $p < 0.01$), educated ($\chi^2 = 18.99$, $p < 0.01$), articulate ($\chi^2 = 22.12$, $p < 0.01$), friendly ($\chi^2 = 246.38$, $p < 0.01$) and pedantic ($\chi^2 = 4.71$, $p = 0.03$), but not for the scales arrogant and relaxed. Specifically, participants find speakers who use topic drop less polite, less formal, less educated, less articulate, less friendly and less pedantic compared to their counterparts who use the full form. Furthermore, we only find an interaction between TOPIC DROP and ARGUMENT for the scales polite ($\chi^2 = 7.66$, $p < 0.01$) and formal ($\chi^2 = 4.89$, $p = 0.03$). Participants rate speakers who use subject topic drop as even less polite and less formal than those who use object topic drop. Figure 4–11 illustrate the data of each scale. The (a) figures show the percentage of each rating by condition. The (b) figures present the predicted probability for each rating.

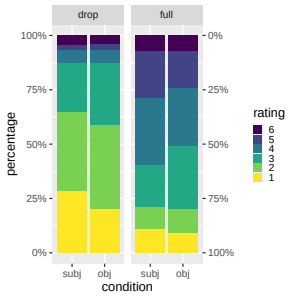


(a) % of rating by conditions

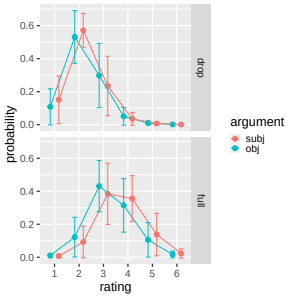
(b) Predicted probability for rating

Figure 4: Data of the polite scale.

[7] clmm(ratings ~ conddrop * condarg + (1 + conddrop * condarg | participant) + (1 + conddrop * condarg | item), data = data_polite)

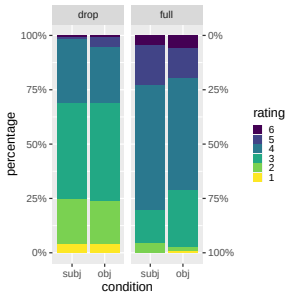


(a) % of rating by conditions

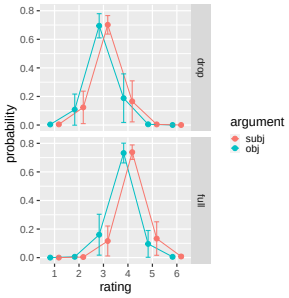


(b) Predicted probability for rating

Figure 5: Data of the formal scale.

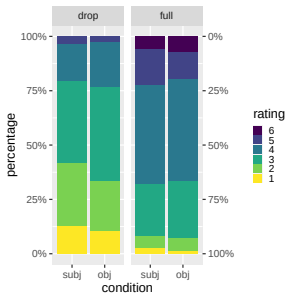


(a) % of rating by conditions

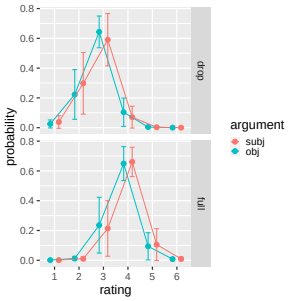


(b) Predicted probability for rating

Figure 6: Data of the educated scale.

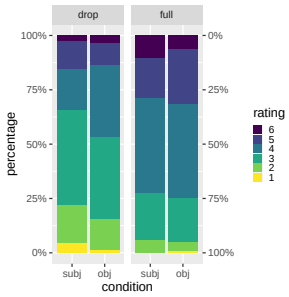


(a) % of rating by conditions

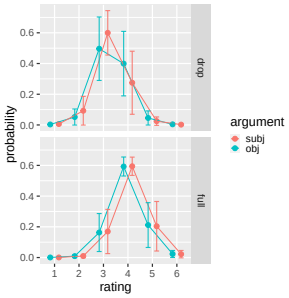


(b) Predicted probability for rating

Figure 7: Data of the articulate scale.

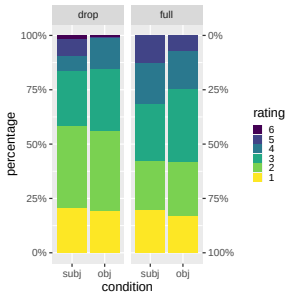


(a) % of rating by conditions

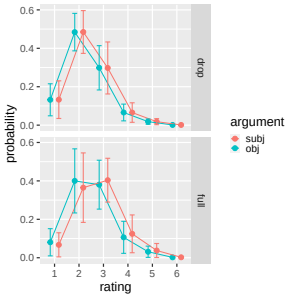


(b) Predicted probability for rating

Figure 8: Data of the friendly scale.

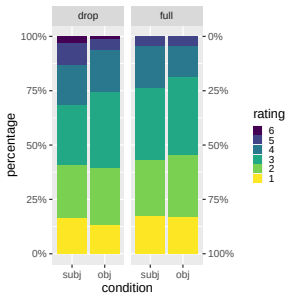


(a) % of rating by conditions

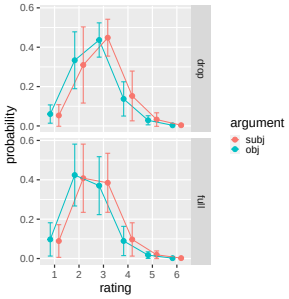


(b) Predicted probability for rating

Figure 9: Data of the pedantic scale.

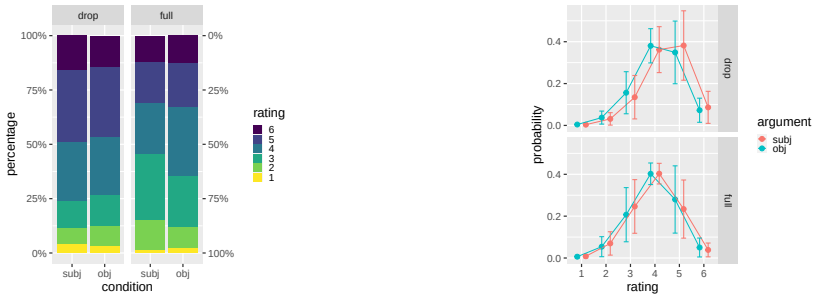


(a) % of rating by conditions



(b) Predicted probability for rating

Figure 10: Data of the arrogant scale.



(a) % of rating by conditions

(b) Predicted probability for rating

Figure 11: Data of the relaxed scale.

4 A model of register competence

These results make it clear that German speakers know more about topic drop than what the structural licensing conditions proposed in Sec. 2 suggest. In addition to being able to form grammatical topic drop sentences with a corresponding at-issue meaning, speakers also know how and by whom topic drop is typically used. In this section, we propose a model that allows us to unify these two kinds of knowledge – structural and use-conditional register knowledge – under a single competence theory using HPSG.

4.1 Grammar and use conditions

In order to attach register information to linguistic structures we assume that, along with constraints like (8) above, grammars of natural languages include use-conditional constraints (UCCs), with the overall form in (10).

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

The descriptions in the antecedent of a UCC specify a class of independently licensed structures on which the consequent imposes a contextual appropriateness condition. The antecedents need not always be primitive types, but can be complex descriptions, since use-conditional content can be indexed by structures that are larger than the minimal pieces needed for basic grammatical rules (cf. Bender 2001: 281–282; Bender 2007: 368–370).

The contextual descriptions in the consequent of UCCs can be modeled as restrictions on the values of the CONTEXT attribute, in line with previous formalizations of register in HPSG (Wilcock 1999, Paolillo 2000, Bender 2001, 2007, Asadpour et al. 2022). Crucially, we assume that register-sensitive forms like topic drop constrain their contexts through the expression of conventionalized social meanings (SMs) (Bender 2001, 2007, Burnett 2019, Taniguchi 2019, Beltrama 2020, Asadpour et al. 2022, Salmon 2022).

We use the term SM in a broad sense to denote any kind of non-at-issue content that indexes some socially relevant property of (at least) one of the context coordinates, i.e. the values for C-INDEX features (SPEAKER, ADDRESSEE, etc). According to the results of our experiment, an utterance like B's in (11), conveys both the at-issue meaning (11a) and a SM that can be paraphrased as (11b). Since we take SMs to be conventionalized, it is not necessary for B to have a conscious intention to convey (11b) – all that matters is that (11b) is consistently associated with topic drop by speakers.

(11) B: Muss sie morgen verkaufen.
must 1SG.F.NOM tomorrow sell
a. 'She must sell (it) tomorrow.'
b. 'I am not formal, not friendly, or not articulate...'

The appropriateness of SMs in a situation depends on interlocutors' beliefs, goals and intentions. We can think of a register as a cluster of linguistic constraints whose associated models carry SMs that are appropriate in the same types of situations. For example, the constraints responsible for topic drop and other constructions/lexical items compatible with SMs like those in (11b) could be thought of as belonging to a common 'informal' register.[8]

With respect to their projective and compositional properties, SMs pattern with expressive meanings and other types of conventional implicatures (McCready 2019, Taniguchi 2019, Asadpour et al. 2022, Salmon 2022). The following are some of the formal properties of SMs that we want to capture.

(12) a. **Independence**: SMs contribute to a dimension of meaning that is separate from the at-issue content of the utterance. This means that the basic content of an utterance can remain the same regardless of which SM is expressed and that SMs are not affected by truth-conditional operators (e.g. modals, negation).
b. **Indexicality**: SMs predicate something of the present utterance situation or its participants. That is, SMs always describe an individual/situation that is contiguous with the utterance.
c. **Gradability**: Contexts can be distinguished in terms of SMs at a fine-grained level. The applicability of a SM is not a matter of all-or-nothing; rather, SMs hold of individuals to different degrees, which may change gradually as the dialogue progresses.

[8]Most constraints are underspecified for register because UCCs only associate SMs to a small subset of linguistic objects. So, for example, the combination of the definite determiner *das* and *Buch* 'book' as a *head-specifier-structure* is arguably register neutral. This view of registers is more flexible and multidimensional than the one in Machicao y Priemer et al. (2022), because the grammar signature does not need to commit to a finite set of registers. Registers are epiphenomenal to SMs and any combination of SMs can potentially be used to define a register, provided the SMs are appropriate in similar contexts. Furthermore, in contrast to Wilcock (1999), there is no grammar-internal requirement that different parts of a sentence need to share exactly the same SM or register.

d. **Underspecification**: Forms subject to register variation are not associated with a unique and specific SM, but with a set of inferentially related SMs – i.e. an indexical field (Eckert 2008)

Property (12a) is modeled by representing SMs as values of the C(ONVENTIONAL)I(MPLICATURE) attribute inside CONTEXT, following Asadpour et al. (2022).[9] We assume that operators over at-issue content (e.g. negation, modals, interrogatives) only pick out their scopal arguments from the set of relations under CONTENT|RELS. Property (12b), which is related to the nondisplaceability property in Potts (2007: 169–173), is captured by requiring all SM relations to have a C-INDEX value as one of their arguments. We can have SMs that predicate something of the SPEAKER, the ADDRESSEE, and possibly also of the TIME and SITUATION where the utterance took place; e.g. forms like *thou* in English, which (for present speakers) arguably encode a SM to the effect that the utterance has taken place in the distant past.[10]

In order to model property (12c), we require SMs to take a DEGR(EE) argument (an interval from 0 to 1), similar to the approach in Potts & Kawahara (2004: 261) and McCready (2019: 29). This non-discrete continuous encoding captures the fact that we can make comparative judgments about SMs (e.g. speaker S_1 is more formal than speaker S_2) and even have an intuition that an expression has a particular SM to a higher extent than another expression. Finally, we address property (12d) by representing the indexical field conventionally associated to each linguistic variant as multiple inheritance hierarchy of SMs, like the one in Fig. 12.[11] To enforce (12d), all we need to do is state our grammar so that UCCs always associate structural descriptions with abstract SM types. These types are only resolved to maximal SM sorts in concrete communicative situations, in accordance with probabilistic principles (see Burnett 2017, 2019 for a proposal).

[9] Asadpour et al. (2022) also propose that the ascription of a SM is embedded under attitude predicates expressing that such ascription is relative to the speakers' beliefs about what the communicative norms in a linguistic community are (Green 1994). For reasons of space, we do not explore this possibility here and assume simpler SM structures.

[10] This does not imply that *thou* can only be used in the distant past. Rather, we can exploit the association between *thou* and *pastness* to convey a stylistic effect, which can be interpreted as ironic given the incongruence between this SM and the present context.

[11] We opted for a simple formulation of the hierarchy where each of the adjectives we tested reflects a property of the speaker (given the nature of the matched-guise task) and is also a maximal sort. This is intended as a crude approximation only – there are arguably more realistic alternatives. It is likely that *polite* is underspecified, in that it can be interpreted either as property of the speaker (e.g. as equivalent to *formal*) or as a relational property indicating (social or psychological) distance (McCready 2019: 28–29). Similarly, *friendly* can plausibly be reduced to something like *psych-prox*. Manfred Sailer (p.c.) also suggested to us the idea that some of the *cognitive* traits are contextual inferences drawn from a single general SM – e.g. something like *explicit-expression*. The fact that many of the maximal SM sorts in Figure 12 tend to occur together could also follow from a theory of communicative stereotypes, which should be part of the story about how speakers resolve underspecified SM sorts in concrete communicative situations.

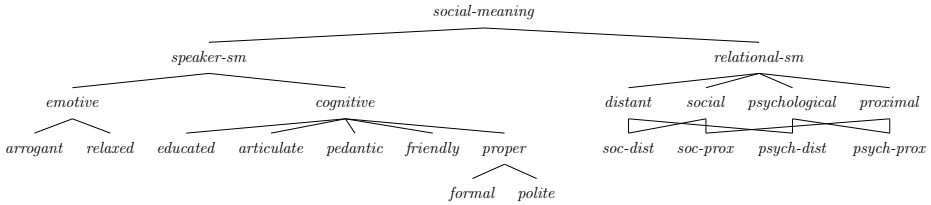


Figure 12: Social meaning hierarchy

The major distinction in Fig. 12 is between SMs that concern the way the speaker presents themselves (*speaker-sm*) and those that say something about the relation between speaker and some other individual, typically the hearer (*relational-sm*). The SM of topic drop is of the former kind, while the latter is arguably what is grammaticalized by honorific pronouns. This explains, for instance, why we do not see a SM clash when topic drop structures are used in conjunction with honorific forms like the 2P pronoun *Sie*; see (18) below. Kaur & Yamada (2022) make a similar proposal to explain the interaction between allocutive markers and 2P honorifics in Japanese.

4.2 The social meanings of topic drop

With this basic toolkit in place, we can begin to state our account of the usage preferences and SMs of topic drop. Since our analysis of topic drop appeals to a new phrasal type (as opposed to a phonologically empty pronoun), we cannot attach the SM of topic drop to a lexical item. Rather, we have to associate the SM to the phrasal type itself. In the case of topic drop with subjects, we need not introduce an ad hoc phrasal type, but can simply identify the range of structures that grammaticalize the relevant SMs as structures of the type *topic-drop-phrase* with NP_{nom} in their SLASH list.

In order to represent SMs introduced at a phrasal level, we introduce a C(ONSTRUCTIONAL)-CI feature taking a list of SMs as value. This feature plays an analogous role to C(ONSTRUCTIONAL)-CONT in the composition of at-issue content (Copestake et al. 2005: 319–321). We propose to model the results of the experiment in Sec. 3.1 by means of the UCCs in (13)–(14). These constraints act solely on the situational level, requiring a *n(on-)e(mpty)* list of SMs to be present inside the CONTEXT attribute of signs.[12]

(13) *topic-drop-phrase*⇒
$$\left[\text{CTXT}\left[\begin{array}{l}\text{C-INDS}|\text{SPEAKER}\ \boxed{1}\\ \text{C-CI}\ \textit{nelist}\left(\left[\begin{array}{ll}\textit{cognitive}\\ \text{ARG}\ \ \boxed{1}\\ \text{DEGR}\ \ (0,\ .5]\end{array}\right]\right)\end{array}\right]\right]$$

[12]Different maximal sorts of the relevant SM types may be chosen for each utterance (but always at least one such sort), depending on the particulars of the situation. For instance, if a speaker is talking to close friends, it is likely that an utterance of topic drop would merely convey low levels of *pedantic* or *formal* – as opposed to low *education*.

(14) $\left[\begin{array}{l}\textit{topic-drop-phrase}\\ \textsc{hd-dtr}|\textsc{slash}\ \left\langle \mathrm{NP}_{\textit{nom}} \right\rangle\end{array}\right] \Rightarrow \left[\textsc{ctxt}\ \left[\begin{array}{l}\textsc{c-inds}|\textsc{speaker}\ \boxed{1}\\ \textsc{c-ci}\ \textit{nelist}\left(\left[\begin{array}{l}\textit{proper}\\ \textsc{arg}\ \ \boxed{1}\\ \textsc{degr}\ (0,\ .3]\end{array}\right]\right)\end{array}\right]\right]$

The UCC in (13) captures one half of the main effect we observed for the TOPIC DROP variable in our experiment: namely, the association of topic drop structures with contexts where the speaker is presenting as having a low degree for at least one of the *cognitive* traits in Figure 12. The UCC in (14) captures the overall interaction effect between our two experimental variables (TOPIC DROP and ARGUMENT).

Regarding association between V2 structures and a high degree of *cognitive* traits (the other half of the main effect we observed in our experiment), there are two alternatives. The most straightforward one would be to posit a UCC parallel to (13) but where the antecedent identifies declarative V2 and the consequent requires CIs with *cognitive* predications whose DEGR values are on the opposite of those required by topic drop. One of the reviewers of this paper has convinced us that this is probably not the best approach. First of all, the fact that the two variants of the variable (V2 and topic drop) are associated with complementary intervals on the same scale ends up being entirely accidental. This fails explain why SMs are generally tied to variability, with each variant of a variable expressing a different partition of the scalar property corresponding to the SM (Eckert 2008, Oushiro 2019).

Following the reviewer's suggestion, we model this effect in pragmatic terms. We propose that declarative V2 is neutral with respect to SMs as far as the grammar is concerned. The perception that V2 structures index higher degrees for *cognitive* traits than topic drop is an implicature that emerges from an interaction between the SMs of its salient alternative (topic drop) and an extension of *Maximize Presupposition!* (Heim 1991, Singh 2011) to all non-at-issue meanings – as proposed in McCready (2019: 53) and Oshima (2021: 179). We can state the principle informally as follows:

(15) **Maximize Non-At-Issue Content!**
If an expression $\mathcal{E}_1$ has the same at-issue content as $\mathcal{E}_2$ and the conventional non-at-issue content of $\mathcal{E}_2$ is stronger than that of $\mathcal{E}_1$ and appropriate in a context c, then $\mathcal{E}_1$ should not be used in c.

Topic drop and filler-gap constructions are equivalent in terms of descriptive at-issue CONTENT because neither of the schemas licensing these structures introduce constraints on this level. Therefore, they are alternatives subject to (15). Since topic drop has a stronger CI content than V2 (i.e. it expresses a low degree for *cognitive* SMs, while the CI content of V2 is vacuous), topic drop must be used when appropriate. If it is not used, the hearer can infer that it is not appropriate – i.e. that the context is not such that the speaker is presenting as having a low degree for *cognitive* SMs.

Now that we know what SMs look like and which SMs are expressed by topic drop, we turn to the question of how SM projection works – i.e. how the SMs words and constructions interact to form the SM of a full utterance.

4.3 Social meaning composition

Taking this into account, we propose the principle in (16) to account for the projection of SMs at the level of a single utterance. Following Potts' (2007, 185) theory of expressive meanings, our principle distinguishes two basic cases of SM composition: one where the SMs to be composed are independent and another when they involve repeated predications. By repeated predications we mean SM predications of the same type (as per Figure 12) and with the same ARG values, but possibly different DEGR values.

(16) **Local CI Projection Principle**

a. For each phrase, if its C-CI value and 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 and its own C-CI value.

b. For each phrase, if its C-CI value and 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 and its C-CI value **minus** $\langle SM_1 \rangle, \ldots \langle SM_n \rangle$ **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 13 illustrates a case where (16a) is relevant. Figure 14 shows a case where (16b) applies, giving rise to a structure where the degree of formality of the mother is an intersection of that of its daughters. The intersection of DEGREE values δ_1, δ_2 is the set of points that are in both δ_1 and δ_2. Clause (16b) also imposes consistency requirement on SMs: repeated SMs in the C-CI of a phrase or in the CI values of its daughters must intersect, otherwise no CI value is defined for the mother, cf. Figure 15.[13]

[13]Since our UCCs (13)–(14) only require non-empty lists of SMs predications of the relevant types, it is in principle possible to circumvent clashes by simply resolving the underspecification to a different maximal sort. For instance, if one structure is required to have a *formal* SM with a DEGRE value [.7, .9], it is in principle still possible to use it in combination with topic drop as long as the underspecified SMs of topic drop are resolved to other maximal sorts (e.g. low degrees for *polite* or *friendly*). The result might still be pragmatically odd due to our stereotypes about communicative situations – i.e. it is not common for a person to be at the same time very formal and very impolite. But this outcome is not blocked by the grammar itself. We think this flexibility is desirable, especially when we compare the SMs of topic drop with more 'grammaticalized' SMs like those of Thai honorifics (McCready 2019). In the latter case, conflicting forms are much

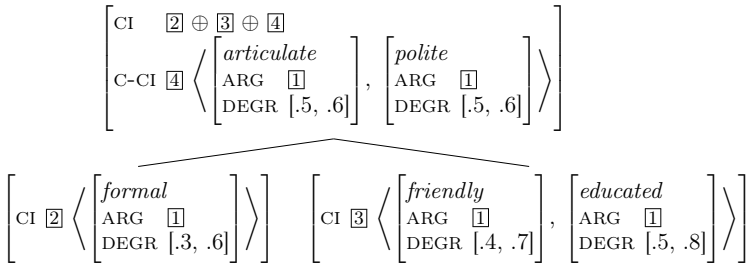


Figure 13: Simple SM composition

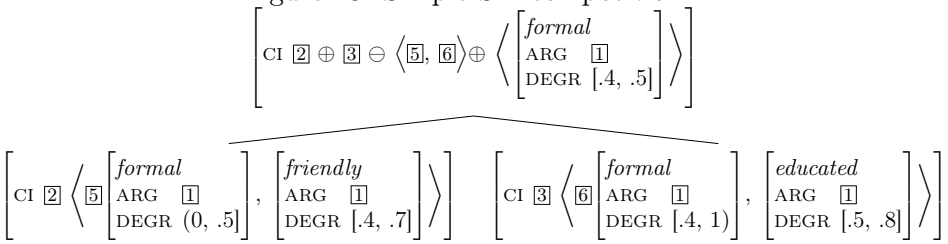


Figure 14: Complex SM composition

According to both clauses in (16), the amount of information in CI values increases monotonically as one moves upwards in the tree. The constraint in (16a) preserves the SMs of the daughters and adds them to the mothers. (16b) either preserves or narrows the DEGREE interval in the (repeated) SMs of the daughters, imposing further constraints on the contexts where the mother can be admissibly uttered. This captures another property of SMs, namely, the fact that repetition of SMs does not give rise to redundancy, but to reaffirmation or specification, unlike what we see when at-issue meanings are repeated (Potts 2007, Smith et al. 2010). This property can be tested with a context like (17), adapted from Taniguchi (2019: 19–20). A's impatient response only makes sense if A perceives B as being redundant. This is not the case when topic drop is used twice, as in B's reply.

(17) B: Muss sie verkaufen. Kann ihr vielleicht helfen.
must 3SG.F.NOM sell can 3SG.F.DAT maybe help
'She must sell (it). Maybe I can help her (with it).'

A: # Ja ja, ich verstehe. Du sprichst informell!
INTER 1SG.NOM understand 2SG.NOM speak informally
'Ugh. I get it already! You are speaking informally.'

As an illustration of how SM composition works in a specific structure, consider the example of object topic drop in (18).

more prone to give rise to ungrammatical clashes. We can model this by stating UCCs that assign to alternative honorific forms fully specified SMs pertaining to complementary intervals in a single dimension (e.g. low and high degrees of *polite*). In that case, it would not be possible to avoid a clash by resolving the SMs to a different maximal sort.

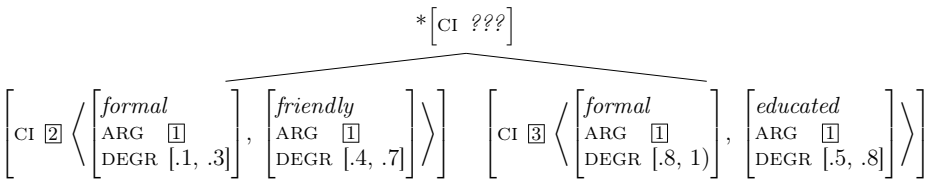


Figure 15: Undefined social meaning composition

(18) B: Muss sie Ihnen morgen geben.
must 3SG.F.NOM 2SG.DAT tomorrow give
'She must give (it) to you tomorrow.'

For the sake of simplicity, we omit most of the syntactic details, and focus on the core parts of the CI composition in Figure 16. In the middle field, there is an honorific 2P pronoun (*Ihnen*), which we assume encodes as a SM a moderate-to-high degree of social distance. In the CI value of the mother, this CI is appended to the CI enforced by the topic drop construction itself (13) – i.e. a non-empty list of *cognitive*-typed predications.

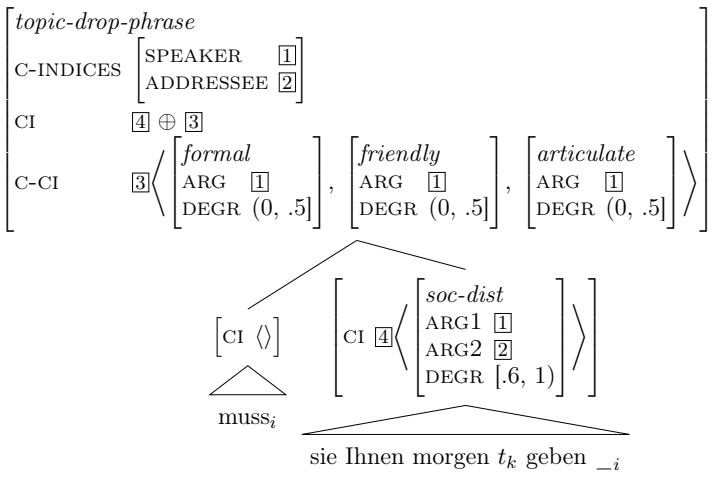


Figure 16: SM composition with Object Topic Drop

Subject topic drop (19) functions in a similar way. Figure 17 illustrates how the SMs project. We assume a context where two *formal* SMs are chosen as part of the C-CI value, corresponding to (13) and (14).

(19) B: Muss es heute verkaufen.
must 3SG.NEUT.ACC today sell
'(She) must sell it today.'

As Paolillo (2000) notes, there is only one type of context where SMs do not project from daughters to their mothers: direct speech reports or

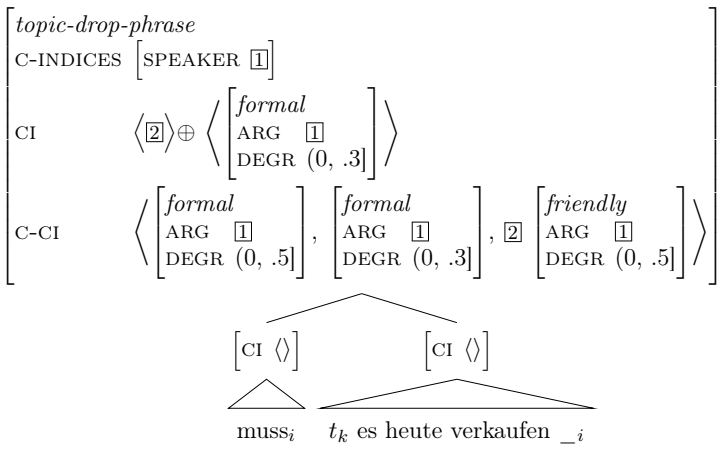


Figure 17: SM composition with Subject Topic Drop

quotation. This exceptional behavior follows from (16) if we assume that such contexts involve some kind of unary rule that shifts the C-INDEX of a clause to some individual other than the speaker of the full utterance (e.g. the AGENT of a quotative verb like *say*). Since SMs get their ARG value from C-INDEX|SPEAKER, the SM under the CI of a quote will not get attributed to the speaker of the full utterance, but to the speaker of the quotation itself.

The felicity of SMs is constrained by the prior global context, which we can think of as containing a list of SMs. The 'register appropriateness' of utterances carrying SMs is constrained by the context in the following way:

(20) **Felicity constraint** (based on McCready 2019: 31)
For every utterance U expressing a SM α, if the **prior context** of U is contains a SM α', where α and α' are repeated predications, then the DEGREE values of α and α' **have to intersect**.

All things being equal, the more the SMs in the prior global context and those in U's CONTEXT|CI value match (the more SM predications they have in common and, for each of these, the more their DEGREE intervals overlap relative to their total size), the more appropriate U is with respect to the context. On this view, topic drop is more frequent in 'less formal' contexts because it is grammatically constrained to have SMs that largely match with the SMs that define these contexts (e.g. low values for *educated* or *formal*). We assume that if the output of Local CI Composition for an utterance U is felicitous, it updates the global context, dynamically pushing it in the direction of the SM contribution of U (McCready 2019).[14]

[14]We called the SM composition principle in (16) "local" because we assume that the way SM composition works locally (i.e. in the context of a single utterance) is fundamentally different from the way it works in the context of a larger discourse. The latter needs to be

This view entails that registers are not theoretical primitives. The only primitives are SMs, which are features of situational contexts and are also contributed by linguistic signs (and constrained by UCCs). However, registers can be reconstructed as clusters of linguistic constraints whose associated models are required (by virtue of UCCs) to carry SMs that are appropriate in the same global contexts. Since SMs are gradable, whether or not a form 'belongs' to a register R, is also essentially a matter of degree: it depends on how much its SMs match the contextual parameters associated with R.[15]

5 Concluding remarks

In this paper, we proposed an HPSG model that integrates structural and usage knowledge into a single theory of linguistic competence, building on previous efforts (Paolillo 2000, Bender 2007, Asadpour et al. 2022). We explored these issues in connection to a specific instance of variation: the realization of declarative clauses in German with and without topic drop.

On a grammatical level, the analysis we proposed here entails that a single grammar licenses both attested variants of a variable (topic drop, V2) as different phrasal constructions. To account for the usage preferences we proposed a mapping between linguistic features and situational parameters that uses the same descriptive vocabulary used for grammatical constraints. These UCCs relate independently licensed structures to underspecified SMs, which function as abstractions over the details of particular situations.

Note that the schemas that constrain SMs are kept separate from those responsible for the basic aspects of the form and meaning of utterances – i.e. the 'core grammar' of a language. For instance, we do not build in the SMs of topic drop directly into the schema (8); rather, we posit the separate UCCs in (13)–(14). Though the two options are often extensionally equivalent, there are good reasons for keeping things separate in this way.

First, as we mentioned above, the pieces of structures SMs get attached to are not always ones that are described by independently required constraints

handled by a separate principle that takes the yield of (16) as its input, and outputs a modified global context. This immediate context-shifting effect is what makes SM-bearing elements similar to performatives (Potts 2007: 179–181). A distinction between sentence-level and discourse-level composition of SMs is also proposed in Paolillo (2000: 243) and McCready (2019: 31–33). For instance, SM clashes (e.g. mixing formality and informality markers) are much more prone to give rise to reduced acceptability at the utterance level than across longer stretches of discourse (Wilcock 1999). For discourse, something like the averaging approach that McCready (2019: 32) proposes for local composition could turn out to be better than the intersective approach we formulate in (16).

[15]This is an idealization. Other factors are arguably relevant to define which SMs are appropriate in which situations in addition to overlap with the prior context in the sense of the Felicity Condition in (20). One important additional set of such factors are speakers' goals and beliefs, which are estimated on probabilistic grounds, as described in Burnett (2017, 2019). If we take these into account, registers have to be inferred on the basis of the cues provided by SMs and their probabilistic interplay with such situational parameters.

on lexical or phrasal types. For example, as far as we can see, there is no constraint in the core grammar of German that specifically needs to refer to subject topic drop structures. Nonetheless, such structures are still targeted for the expressions of particular SMs, as (14) makes clear.

Second, keeping constraints on SMs in a separate 'corner' of the grammar is more in line with what is known about how register is processed in real time. The perception of register incongruence tends to come about later (and with less intensity) than that of grammatical errors (Münster & Knoeferle 2018, Almeida 2023, Plesca et al. 2024, i.a.). One way of capturing this is by formulating a model of processing where speakers first parse utterances according to their core grammar and only then evaluate them according to UCCs, checking for contextual felicity – an inherently graded notion.

In spite of this separation, UCCs use the same descriptive vocabulary and implicational format as standard HPSG rules. In this sense, use-conditional 'register' knowledge and core grammar are subsumed under one and the same competence theory. Insofar as SMs are modeled as part of individuals' linguistic competence, we predict speakers to be capable of manipulating variants in order to actively construct new registers and personal linguistic styles. Furthermore, the division of labour between the grammar (which deals with SMs) and probabilistic usage preferences (which relate SMs to concrete situations) simplifies the task of defining the register potential of complex expressions from that of their parts – one of the main challenges for register modeling in HPSG noted by Machicao y Priemer et al. (2022).

The analysis we propose here also has consequences for the standard view about which linguistic variables are visible to sociolinguistic evaluation. Since topic drop is licensed by a phrasal construction, our results imply that speakers' evaluations are sensitive to abstract syntactic variables (see also Bender 2007, Robinson 2022). This is a departure from some sociolinguistic literature (Labov 2001, Meyerhoff & Walker 2013, Eckert & Labov 2017, i.a.), which claims that only phonological or lexical variables can be socially monitored. Our analysis is also incompatible with a model of grammar that only attaches SMs and other CI-meanings to vocabulary items or surface realizational patterns in PF (Adger 2006, Saab 2021). Rather, we require a more flexible architecture that can represent the social information speakers indexically associate with any linguistic structure.

HPSG is especially well-suited for this, given the fact that all types of linguistic information are modeled with a single unified formalism. Therefore, it can naturally express the fact that any linguistic unit (words, unary lexical projections, phrases and even PHON strings) can be associated with a SM. Furthermore, HPSG allows SMs to be arranged in a sortal hierarchy, which makes it possible to capture the fact that variants are often underspecified with respect to the conditions they can be felicitously used in.

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