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Accounting for the Role of Situation in Language Use in a Cognitive Semantic Representation of Sentence Mood

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Abstract
Many linguistic forms are part of systems of linguistic choices that differ only in subtle cognitive-functional respects, which often concern their appropriateness in, and association with, particular situations. While such relationships have traditionally been described in terms of register, in a usage-based model such aspects have to be represented as part of their cognitive semantic description.

However, situation is not objectively given but individually construed, and thus both inter- and intrapersonal variation can be found in speakers' linguistics choices; the key problem then becomes to identify the speakers' own cognitive models of the situation and to relate the occurrence of linguistic features to these models in order to tease out the subtle cognitive-functional aspects that distinguish the usage of the linguistic forms of a linguistic subsystem.

In this paper I show the merits and limitations of quantitative and qualitative methods in the analysis of the role of situation in language use. I present a detailed study of grammatical mood in a corpus of human-robot interaction that provides an (objectively) identical situation for all speakers. In the corpus, mood choice can be shown to be significantly related to the speakers' different concepts of the human-robot interaction situation, as well as to other linguistic features indicating differing cognitive representations of the artificial communication partner. I then propose a cognitive semantic analysis of grammatical mood, using Embodied Construction Grammar (ECG). This formalism has been designed specifically to account for the relationship between schematic, extralinguistic knowledge and grammatical choice (Chang et al. 2002).

1. Introduction: Language and Situation

In spite of the strong influence the context of situation may have on language use,[1] situation has so far been hardly dealt with in cognitive linguistics, with a few exceptions. For instance, with respect to lexical semantics and idiomatic expressions, Fillmore (1982, 1988, Fillmore et al. 1988) has argued that the semantics of understanding, the semantics cognitive linguistics is concerned with, cannot be separated from encyclopedic knowledge and that semantic representations of lexical items have to include references to schematic situations. In *Frame Semantics* (e.g. Fillmore, Johnson and Petruck 2003), whole scenes with their typical participants are taken to constitute the meanings of verbs. Similarly, nouns like *orphan, breakfast,*

[1] For instance, Biber (1993, 2006; Biber et al. 1998) has shown that register functions as a reliable predictor of language use, as much as language use predicts register.

weekend or *vegetarian* (Fillmore 1982) or the days of the week (Fillmore and Atkins 1992) may have to be viewed in the broad context of encyclopedic knowledge that provides the frame in which the meanings of the individual items are located. Thus, the meanings of these items consists in schematic representations of complex situations.

Recently, Chang and Mok (2006) and Mok and Byrant (2006) have also proposed models of situation in child-directed speech for pronoun resolution and argument omission respectively. The authors demonstrate how situation may be modeled using Embodied Construction Grammar, describing situational properties as schemata with slots and fillers in which situation can function as a resource for semantic specification and inference. Thus, situation functions here as a background resource for the interpretation of utterances.

Another aspect of the relationship between language and situation, that speakers choose the linguistic features of their utterances on the basis of what they consider to be situationally appropriate, has however been largely neglected in cognitive semantics. Although cognitive linguists emphasize the usage-based perspective, this does not generally include "**that** kind of usage" (Newman, this volume, emphasis original). This may have several reasons (cf. Langacker 1999); first of all, cognitive linguists have concentrated for a long time on the influence of cognition on the structure, not on the use, of language. Moreover, ubiquitous findings on categorization show that categories are not objective, but that humans construe them on the basis of cognitive predispositions, embodiment, task and scene perception, or centrality (e.g. Lakoff 1987, Lakoff and Turner 1989, Rosch et al. 1976). Such a perspective precludes the simple association of distributional regularities with given situations. This is in contrast to register-based approaches to the relationship between situation and language use (e.g. Biber 1993, 2006), in which predefined situational categories are employed and in which the use of quantitative methods is commonplace: the task is to analyze the probability of a given linguistic feature in a particular situation by means of statistical procedures. Additional qualitative methods may subsequently be used to identify the functional properties of the linguistic feature that explain its occurrence in that situation of use (e.g. Biber 2006). However, there is currently no situation typology which a register description could be based on yet, and while the notion of 'situation' itself suggests an identifiable entity with clear boundaries, there is now a considerable body of evidence that situations may rather be subjectively or interactively construed (Gumperz 1982, Lakoff 1987, Schegloff 1997, Prevignano and diLuzio 2003). That is, while particular situations may make certain linguistic features conventionally or functionally relevant, speakers may also employ these features to define the situation (Tannen 1979). Thus, language use may also contribute to conceptualizing the situation. However, if situation is not a given, there is nothing that language use could be matched with. Finally, recording probabilities of occurrence does not have much explanatory value by itself. Thus, cognitive linguists generally insist on providing cognitive-functional explanations for observable patternings and do not satisfy themselves with recording probabilistic distributional regularities, be they situational, sociolinguistic or other, for their lack of explanatory value (e.g. Kay and McDaniel 1979, 1981).

We can conclude that although situation has been found to influence language use quantitatively to a great extent, it has so far been neglected in cognitive linguistic research, due to methodological issues that contradict key cognitive linguistic assumptions. Nevertheless, cognitive linguistic ideas provide a useful framework for the treatment of situational influence on language use, for instance, the core assumption that language construal is subjective; that semantic and encyclopedic knowledge cannot be reliably distinguished; that linguistic knowledge and language acquisition are usage-based and that language acquisition consists in a step-wise decontextualisation process (cf. Langacker 1999). Finally, within the cognitive linguistic tradition, a computational model has been developed that seems well-suited to account for the relationship between language and situation, namely Embodied Construction Grammar (Chang et al. 2002, Bryant 2004, Bergen and Chang 2005, Feldman 2006). Embodied Construction Grammar (ECG) provides a formal specification of the interaction between central cognitive linguistic concepts, in particular constructions, schemata, maps, and spaces.

Constructions are form-meaning pairs that together constitute the grammar of a language (cf. Goldberg 1995, 2006; Kay 1997: 123; Kay and Fillmore 1999; Fillmore 1988). Schemata are representations of all kinds of schematic knowledge, such as frames or scripts. By maps, ECG refers to metaphoric and metonymic relationships between domains. And spaces allow the modeling of blending operations (Fauconnier and Turner 2002). At the same time, ECG assumes that understanding is simulation-based (Bergen and Chang 2005) and that conceptual and linguistic knowledge interact in producing the semantic specification of an expression. This specification is simulated in a particular situation, which then creates a rich representation of a scene and allows for numerous inferences to be drawn.

In the current paper, I provide a model of grammatical mood that is consistent with cognitive linguistic findings, including the subjective nature of conceptualizations of the situation, and that accounts for the interaction between linguistic choice and situational features. For that aim, I extend current work in ECG to capturing situation as a determining factor for linguistic choice. The general properties of ECG, I suggest, provide a unified formalism to modeling the aspects of situation as well as allowing the representation of the properties of the conditioning factors of mood choice identified in the linguistic analysis.

2. Empirical Study

2.1. Sentence Mood

Sentence mood constitutes a system of linguistic choices that provides different options to reach the same goal. For instance, if your aim is to get someone to move somewhere, you may say *go straight,* as in (1). Alternatively, you could say (2)-(10):

(1) um -- go straight?
(2) please go to - goal bowl - number one?
(3) I want you to go to the first object to your right
(4) you should be going to the north-west
(5) the correct object will be the first
(6) the next object that you will go to (2) is (3) three (1) three metres in front of you
(7) could you go towards the (at=prominent)cup(/a) please.

(8) now you should, turn (at=prominent)left(/a)

(9) that cup there. I want you to take please.

(10) do you see the glass object, -- that is, (2) three metres away from you?

The question arising in the face of this variability is what the choice of sentence mood, for instance, imperative, declarative, interrogative, depends on. While the trivial answer is that it depends on what the current speaker considers to be situationally appropriate, the question arises what the situation consists in and what makes one mood construction more appropriate than another. These two aspects of the question have usually been dealt with in isolation; in studies of sentence mood, situation has usually been treated as a given. The most common proposal is to associate a given mood construction with a particular speech act. For instance, one might argue that an imperative clause means something like "I order you"; thus, many scholars have proposed an intimate relationship between sentence mood and speech acts (e.g. Halliday 1985, Wierzbicka 1988, Han 2000).

However, there is no direct relationship between speech acts and sentence mood; above we have seen that speakers may use very different mood constructions to fulfil the same task, to instruct a robot to move somewhere. Moreover, individual sentence mood constructions can be associated with different speech acts; for example, as numerous scholars have pointed out (e.g. Wilson and Sperber 1988, Sbisá 1987), the imperative can be used with several different speech act functions (cf. Brown and Levinson 1987):

get out	(command)
get well	(wish)
watch out	(warning)
have some tea	(invitation)

If however sentence mood is not directly related to a speech act and many different mood constructions can be used to carry out the same request, it is open which factors condition speakers' choices in a given situation. The task is thus to tease out the subtle cognitive-functional aspects that distinguish the usage of the linguistic forms of a linguistic subsystem depending on the speaker's construal of the situation. I focus here on the communicative task of giving instructions and the bases for speakers' choices of one instructional strategy over another.

2.2. Methods and Data

The procedure taken in this study is to determine first how the participants themselves conceptualize the situation. This requirement imposes constraints on data selection and elicitation. In order to identify participants' understanding of the situation, the external situation itself should be objectively identical for all participants. For interactive tasks, this is not trivial, since the coparticipants generally contribute to the definition of the situation as much as the participant under consideration. However, without interactive scenarios certain types of data do not occur; for example, certain sentence moods, such as the imperative, only occur if there is a coparticipant.

The solution proposed here is to use human-robot interaction scenarios. The behavior of a robot as a communication partner can be, unlike other humans, manipulated at the experimenter's will. It can be kept identical for all participants; the robot may even behave independently from the participants' utterances. In this case, heterogeneity in participants' linguistic behavior cannot be due to different situational features but has to be attributed to speakers' differing preconceptions of what the robot or the human-robot interaction situation may consist in.

Quantitative analyses determine the influence of the participants' conceptualization of the situation on language use. In the current analysis, the question is whether differences in the speakers' understanding of the situation correlate with different probabilities of use of the linguistic phenomenon under consideration. Quantitative methods allow us to identify statistical relationships between cognitive representations of the situation and probabilities of linguistic choice.

Participants

The participants in this study were exchange students from various English speaking countries at the University of Bremen. The corpus consists of eleven native speakers of English, seven female and four male. Interactions took about 30-45 minutes.

Data Elicitation

The data used here are human-robot interaction dialogs elicited in the framework of the Collaborative Research Centre *Spatial Cognition* at the University of Bremen. The dialogs were elicited in a Wizard-of-Oz scenario (Fraser and Gilbert 1991), in which participants were asked to train a robotic wheelchair on their personal preferences regarding the use of a flat furnished for a handicapped person. Participants were told that the robotic wheelchair, the Bremen autonomous robot Rolland (Lankenau et al. 2003), would learn the labels for particular locations the respective participant uses to refer to the locations in question. There were four tasks: Task 1 constituted in familiarizing the robot with useful locations in the flat, such as ‘the kitchen’ but also ‘in front of the TV’. The second task was to summarize the locations taught to the robot from a static position for the robot. Task 3 was to familiarize the robot with particular locations in the building, like the room with the photocopying machine. The final task, task 4, was to instruct the robot to take the user to one of the locations in the building the robot had been familiarized with previously. Only the last task is instructional, so that the linguistic analysis will focus on the speakers’ instructions in this fourth task.

During the teaching situation, participants had to steer the Rolland like a normal electric wheelchair. Only at the end of the dialogues the robot was meant to take the user to the location indicated itself. Yet, since the speech-driven version of Rolland was not available at the time of the experiments, Rolland would claim that it had to be recharged first and would ask for fresh batteries.

During the experiments, participants interacted verbally with the robot. Its utterances were played according to a fixed schema by a human ‘wizard’ behind the scene. In a pre-study, typical locations, labels and strategies employed by users had been identified, on the basis of which the schema of robot utterances for the elicitation of the data used here was designed for each possible location. The wizard’s task was to check to which location the user had moved the wheelchair and to play the presynthesized utterances specified for this location in a prespecified order. Although this procedure seems quite unnatural, the resulting dialogs are in fact quite smooth, and it is important to understand that for the participants themselves, the situations are interactional; the perspective that the robot is 'not really interacting' is therefore an etic view taken from the outside. The fact that all participants are exposed to the same utterances in the same sequence allows us to compare the dialogues across participants. A questionnaire study involving pre- and post-questionnaires revealed furthermore that a) participants had indeed believed to be talking to an automatic speech-processing system, b) they found the interactions pleasant, and c) their attitude towards robots in general improved significantly during the interactions (Andonova 2006). The following sample dialog illustrates the relative smoothness of the interactions:

(11) R022: to go to the stugaroom, (1) turn, (4) onehundred'neighty degrees, (2), exit, -- room three four four zero. turn, -- left. (3) go **straight**, (1) ahead.
Rolland: up to which point do I go straight?
R022: to:: the:: I don't know, (1) um (4) what's the place there, (6) go straight, - turn **left** to the, (3) to the copy room. go s+
Rolland: When I'm left of the room with the photocopying machine, what do I do?
R022: you: go: **straight** until, you get to the stugaroom.
Rolland: okay, I think I got it. I'm taking you to the stugaroom now.
R022: okay, (5) go,
Rolland: I'm sorry, my batteries are too low. Please recharge them first.

Data coding

The subjective construal of the situation needs to be operationalized in some way. My suggestion is to use the dialog openings since these are places that indicate speakers' preconceptions about their artificial communication partner as well as their definition of the situation. Moreover, previous studies have shown that the users' attitude towards the system is the most influential factor in the predictability of user behavior throughout the dialogs, much more influential than sociolinguistic variables or scenario differences (Fischer 2006ab).

The dialogs were manually coded for dialog beginnings in the following way: The first utterance of the robot is always 'yes, hello, how do you do?'. This utterance allows relevant contributions at different levels: speakers can react to the greeting (e.g. providing 'hello'), to the question (e.g. by replying to it with, for instance, 'fine'), to the polite function of the question (e.g. by replying 'thank you'), or to the pragmatic act as a whole (e.g. by responding with the counter question 'and how do you do?'). Dialog beginnings were now simply coded for the number of strategies employed by each speaker; the coding thus provides the raw score. For instance, the dialog beginning for R004 was coded as 0:

(12) Rolland: Yes, hello, how do you do?
R004: (4)
Rolland: You can take us now to a place you want to name.
R004: (2) table. (laughter)

R017 was coded as 1 for the minimal reaction to the content of the question (*I'm good*):

(13) Rolland: Yes, hello, how do you do?
R017: (2) I'm good,
Rolland: You can take us now to a place you want to name.
R017: (3) I would like to go::: to the::: computer. straight.

R051 was coded as 2, since the speaker answers the question (*fine*) and recognizes the polite function of the robot's question (*thanks*):

(14) Rolland: Yes, hello, how do you do?
R051: (laughter) fine thanks. okay so,
Rolland: You can take us now to a place you want to name.
R051: (1) we are now going to – the table.

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R043 was coded as 3 since the speaker reacts to the contents of the question (*I'm fine*), to its polite function (*thank you*), and she reciprocates it (*hello, how are you*):

(15) Rolland: Yes, hello, how do you do?
R043: (1) hello. (1) I'm fine thank you how are you?
Rolland: You can take us now to a place you want to name.
R043: -- wait a minute, I haven't finished reading (...) okay, um -
Rolland: You can take us now to a place you want to name.
R043: (2) do you see the plant on the left forty five degrees, a green plant?

These different dialog beginnings reflect the considerable differences in how speakers understand the situation in terms of the relationship between the participants; while some speakers reply to the polite greeting of the robot, others do not react to the social aspects of the robot's messages at all. Speakers therefore conceptualize the situation differently, varying in the degree to which they understand the situation as social. The most suitable interpretation of these findings is that speakers may, or may not, enter a level of joint pretense (Clark 1996, 1999; cf. Fischer 2006a).

Moreover, the instructions from the instructional fourth task of the dialogs were coded for the instructional strategy chosen. The variable comprises the grammatical moods declarative, imperative, and interrogative. In addition, speakers also produced instructions without overt verbs; instead we find adverbial phrases, prepositional phrases and just noun phrases by means of which speakers instruct the robot. In particular, the following instructional strategies were distinguished:

	Example
declarative	R013: so we are going out of , - this room,
imperative	R017: turn around and leave the room
adverbial phrase	R017: straight,
prepositional phrase	R048: to the sofa?
noun phrase	R004: table.
interrogative	R043: (2) do you see the **plant** on the **left** forty five degrees, (1)

In addition, dialogs elicited in the instructional fourth task were manually coded for several linguistic properties, covering a spectrum of morphosyntactic, lexical and pragmatic features. Features were chosen based on their relative frequency; moreover, previous research has shown them to be good indicators of the communication partner's suspected competence. Each users' linguistic behavior was coded in the following way:

1. number of **structuring cues** (see also Fischer and Bateman 2006), comprising implicit (for instance, *now* or *so*) and explicit (for instance, *first of all, the next step* or *and then*) structuring cues; the individual tokens were counted for each speaker and, since their occurrence is relevant for the relationship between utterances, divided by the number of utterances;
2. number of **relative clauses** used divided by the number of utterances; relative clauses have previously been identified as indicators of high ascribed competence (cf. Fischer 2006);
3. number of **politeness formulas**, such as *please, thank you* or *sorry* divided by the number of utterances of each speaker;
4. the **number of utterances** uttered by each participant in the task under consideration; the number of utterances tells us about speakers' linguistic effort spent on the instruction.

The statistical description and analysis was carried out using the *Statistica* software package.

2.3. Results of the empirical analysis

The task of the statistical analysis is to show that the different conceptualizations of the situation as indicated by the different dialog openings correlate with different linguistic behaviors, including different choices of grammatical mood. Therefore, the correlation between dialog openings and linguistic features was calculated.

Table 1 shows the average frequency, range and standard deviation (sd) for the features investigated. The table shows that the imperative is the most frequent construction in this instructional task for many speakers, as can be expected from the literature in which the imperative is associated with requesting. Yet other instructional strategies are also frequent as well. Just the instruction by means of nouns and adverbs was so infrequent (in contrast to other corpora of human-robot interaction, see Fischer 2006a) that even combined they make up only 7% of the utterances per speaker.

	mean	range	sd
Imperative	0.456320	0% - 100%	0.288339
Declarative	0.441694	0% - 80%	0.271049
Prepositional Phrase	0.065754	0% - 25%	0.085747
Interrogative	0.014354	0% - 16%	0.047607
Noun/Adverb	0.011778	0% - 7%	0.026761

Table 1: Descriptive statistics for instructional strategies; n = 11

Table 2 shows the mean, range and standard deviation for dialogue beginnings and for structuring cues, relative clauses, politeness formulas and number of utterances for the eleven participants.

	mean	range	Sd
structuring cues	0.642634	0 - 1.33	0.471420
relative clauses	0.041270	0 - 0.2	0.073497
politeness formula	0.062839	0 - 0.33	0.106116
utterances	10.1818	2 - 19	4.729021
dialog beginning	2.090909	0 - 3	1.044466

Table 2: Descriptive statistics for dialog openings and other features; n = 11

Quantitative analyses of the data using a Pearson product-moment correlation matrix show that the different conceptions of the human-robot situation as either social or nonsocial correlate significantly with the choice of a broad spectrum of different linguistic features, including sentence mood.

	Imp	Decl	PP	Interr	N/adv	struct	relcl	polite	begin	utts
Imp		-0.93*	-0.35	-0.10	0.10	-0.28	-0.33	-0.31	-0.70*	-0,59
Decl	-0.93*		0.07	-0.03	-0.32	0.25	0.46	0.21	0.72*	0.35
PP	-0.35	0.07		-0.25	0.14	0.12	-0.28	-0.09	-0.01	0.40
Interr	-0.10	-0.03	-0.25		0.51	-0.16	-0.19	0.30	0.29	0.62*
N/adv	0.10	-0.32	0.14	0.51		-0.11	-0.27	0.01	-0.13	0.54

struct	-0.28	0.25	0.12	-0.16	-0.11		0.50	0.31	0.34	0.09
relcl	-0.33	0.46	-0.28	-0.19	-0.27	0.50		0.37	0.21	-0.18
polite	-0.31	0.21	-0.09	0.30	0.01	0.31	0.37		0.27	0.19
begin	-0.70*	0.72*	-0.01	0.29	-0.13	0.34	0.21	0.27		0.64
utts	-0.59	0.35	0.40	0.62*	0.54	0.09	-0.18	0.19	0.64*	

Table 3: Correlations between the features investigated; * = p < .05, n = 11; abbreviations: Imp = imperative, Decl = declarative, PP = prepositional phrase, Interr = interrogative, N/adv = noun and adverbial instruction, struct = structuring cues, relcl = relative clauses, polite = politeness formulas, begin = dialog openings, utts = number of utterances in task 4

The analysis reveals a significant negative correlation between the declarative and the imperative mood, indicating that speakers who tend to use the one do not use the other. Moreover, the declarative is significantly correlated with social concepts of the human-robot interaction situation as indicated by the high attention to social aspects of communication in the dialog openings. Conversely, the imperative mood is negatively associated with the social aspects of dialog beginnings.

The declarative is furthermore positively associated with the number of turns and relative clauses, relationships that however do not reach statistical significance. The imperative mood in contrast is associated with rather short dialogs and with fewer relative clauses and politeness formulas.

The type of greeting correlates significantly with the declarative (positively) and the imperative (negatively), as well as with the number of utterances produced, indicating that those who regard the human-robot interaction situation as more social also invest more effort in the dialogs. Furthermore, there is a tendency for speakers who greet the robot to use structuring cues, interrogative clauses and politeness formulas.

To sum up, speakers who use the declarative judge the robot's linguistic and social capabilities higher than those who use the imperative. The conditions of use for the declarative comprise the understanding of the situation as social, reciprocal and solidary. In contrast, for the imperative there is no such correlation. So the quantitative analysis reveals interdependencies between linguistic features, which in turn provide information on the subtle cognitive-functional differences between the different mood constructions.

To conclude, the analysis presented has shown that although the task participants are presented with has traditionally been associated with the imperative mood, several different grammatical mood constructions are being employed; in their grammatical choices, speakers rely on aspects of the situation present, such as the task, which is taken to be common ground between both interactants; the variability in mood choice corresponds to participants' differing conceptionalizations of the situation and their communication partner as social or non-social, as reciprocal and solidary or as non-reciprocal and nonsolidary. These findings have several implications for a cognitive linguistic model of sentence mood:

- it needs to rely on conceptual representations of the situation (a situational frame or schema);
- it needs to represent the general understanding of the task as common ground;
- it needs to account for the interaction between concept of situation and grammatical choice.

3. Model

The proposal I want to make is to represent a general aspect of the situation, namely the task, which has been set by the experimenters, as a schema. That is, the task really seems to be a given for all participants. None of them attempted to inform the robot what the task consists in and what the interaction will be about. On the basis of the givenness of this task, the use of adverbs, PPs and noun phrases as requests to move somewhere can be explained. That is, only if it is situationally available for all participants that the speaker wants the addressee to move somewhere, an instruction like "a turn to the left" can be identified as an instruction. Thus, the first element of the model proposed will be the **S wants A to X Schema**.

This schema corresponds to the idealized cognitive model proposed by Panther and Thornburg (1998) who argue that requests can be understood as scenarios with sequentially ordered parts, such that there are preconditions, coded in the before-component, the core-component and an after-component, describing the result. Panther and Thornburg's point is that the before- and after-components may metonymically stand for the core-component, thus giving rise to indirect speech acts, for instance, *can you pass the salt* (question about the ability, i.e. precondition of the before-component) or *now you walk straight* (description of the result, i.e. an aspect of the after-component).

Before:	S wants A to do X
	A is able to do X
Core:	S puts A under obligation to do X
Result:	A is under obligation to do X
After:	A will do X.

This model can be transferred into an ECG representation:[2]

schema SwantsAtoX
    subcase of Wanting
    evokes SpeechSit as s
    roles
        before
        core
        after
    constraints
        wanter ↔ s.Speaker
        wanted-of ↔ s.Addressee
        before ↔ ability
        core ← "S wants A to do X"
        after ← "A will do X"

This schema relates to two more general schemata. On the one hand, the S wants A to X schema constitutes a subcase of Wanting. On the other, it evokes the speech situation schema in which the roles of speaker and addressee are defined, as well as the possible relationship between the two:

schema Wanting
    subcase of Action
    roles
        wanter : Human
        wanted-of : Human
        wanted : Event
        costs
        benefit

[2] With the exception of the after-for-core map, which is not yet implemented, the model presented here was tested for formal correctness using John Bryant's construction analyzer (Bryant 2004). In addition, since *before* constitutes a keyword in the analyzer, the spelling of the before slot in the request-scenario had to be changed temporarily.

ability

schema SpeechSit
subcase of Schematic-Form
roles
Speaker
Addressee
Relationship

The schemata are taken to be shared by all participants, and thus they are inherited into participants' personal situation models (PSMs). These models however differ with respect to the perception of the interpersonal relationship between human user and robot. Thus, while some speakers pretend the situation to be like normal conversation (henceforth: the 'players'), others do not enter this level of joint pretense (Clark 1999). Since we had been able to identify user groups for which these assumptions hold, we can take these situation models to be partly schematic, but ECG would in principle also allow personal, idiosyncratic models of the situation.

schema PSMPlayer
subcase of SpeechSit
constraints
Relationship ← reciprocal, solidary

In contrast to the 'players', there are 'non-players' who will define and understand the human-robot situation as non-reciprocal and as non-solidary.

schema PSMNonplayer
subcase of SpeechSit
constraints
Relationship ← non-reciprocal, non-solidary

As described above, Panther and Thornburg (1998) hold that the subparts of the request-scenario may serve instead of others, in particular, that before- and after-components may give rise to indirect speech acts. In ECG this can be represented in maps, which specify which roles from which schemata may be combined in source-target pairs, for instance:[3]

[3] The After-for-Core-Map is of course not the only possible mapping; for instance, also the wish itself (as in 'I'd like you to go straight') or the addressee's ability (as in 'Can you pass the salt?')

map After-for-Core
evokes SwantsAtoX as w
roles
    source → w.after
    target → w.core
pairs
    w.after → w.core

Further components of the model are self-evidently the different sentence mood constructions[4] and their instantiations as requests. The model proposed reflects Langacker's (2008) position that the grammatical moods differ with respect to the construals that invoke discourse participants in different ways. The declarative, for instance, refers to the epistemic level, that is, it describes conceptual content (2008: 474). Thus, in order for the declarative to work as a request, it describes the result of a request scenario, which is modeled here as the mapping between the after-component and the core-component.

construction DeclRequest
    constructional
        constitutents
            agt : Ref-Expr
            v : Verb
    form
        agt.f before v.f
    meaning
        evokes SpeechSit as s
        evokes SwantsAtoX as w
        evokes AfterforCore as a
        evokes PSMPlayer as p
            v.m.agent ↔ s.Addressee
            v.m ↔ w.core
            s.Relationship ↔ p.Relationship

In contrast, the imperative construction encodes no reciprocal or solidary relationship with the communication partner. When this construction interacts with the situational

can metonymically stand for the request (cf. also Ruiz de Mendoza and Baichi 2006).

[4] In this paper, the focus is on the interaction between situational features and the semantics of constructions. For a more comprehensive CxG account of grammatical mood, see Stefanowitsch (2003).

concept, the result is a construction that can be used for making requests and which evokes the non-player situation model, avoiding any interpersonal commitments:

construction ImperativeRequest
    constructional
        constitutents
            v : Verb
    form
        v.f
    meaning
        evokes SpeechSit as s
        evokes AfterforCore as a
        evokes SwantsAtoX as w
        evokes PSMNonplayer as p
            v.m.agent ↔ s.Addressee
            v.m ↔ w.core
            s.Relationship ↔ p.Relationship

Since the two different mood constructions encode links to particular situation models, use of these constructions can contribute to the definition of the situation as social, reciprocal and solidary or not. Thus, the model accounts not only for the choice of sentence mood in a given situation but also explains how the use of a given construction can contribute to the situational construal as well.

4. Conclusion

To sum up, we have seen how both qualitative and quantitative corpus analyses can be helpful for the creation of cognitive semantic representations involving situationally determined language use. Even though cognitive linguistics does not assume objectively-given categories, quantitative and statistical analyses of situation-specific use can be useful if they are appropriately combined with qualitative investigations.

Moreover, it was shown how cognitive semantic concepts, such as constructions, schemata, and metonymic mappings, may interact to account for language use appropriate for a situation as it is conceived of by the participants themselves. Thus, we were able to specify interactions between different types of information in accordance with the major principles of cognitive linguistics. These interactions provide useful extensions to the ECG model, which has proven suitable for the flexible modeling of the empirical findings of this study on situation as a factor influencing language use and which previously had been used to model situation as a resource, for instance, for pronoun resolution (Chang and Mok 2006, Mok and Bryant 2006).

We can conclude that the influence of situation on language use can be investigated by means of quantitative methods if there is an orientation towards speakers' own understanding of the situation. Thus qualitative and quantitative methods can be usefully combined. In the case of understanding the subtleties of functions of particular sentence moods, quantitative methods proved crucial for identifying the interdependencies between particular linguistic choices that allow inferences about the cognitive models of the situation evoked by the participants.

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