

Sentence mood constitution and indefinite noun phrases¹

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Abstract

Sentence mood in German is a complex category that is determined by various components of the grammatical system. Verbal mood, the position of the finite verb and the wh-characteristics of the so-called 'Vorfeld'-phrase in particular play a prominent role in constituting sentence mood in German. This article proposes a theory of sentence mood constitution in German and investigates the interaction determined by binding theory between pronouns and indefinite noun phrases which are semantically analysed as choice functions. It is shown that the semantic objects determined by sentence mood define different kinds of domains which have to be uniquely accessible as the range of the choice function. The various properties of the pronominal binding of indefinites can be derived by the interplay of the proposed theoretical notions.

I. Introduction

In this paper I propose a theory about the determination of sentence mood which brings together various components of syntactic, semantic, morphological and lexical information. The leading ideas are based on assumptions about a uniform syntactic domain in which mood determination takes place. This domain is supplied by a functional mood category the content of which is provided by the morphological category verbal mood in a fashion that is similar to Tense and Agr. The two syntactic positions (head and specifier) of this mood phrase and the different phrase types that may fill them correspond to semantic processes which create semantic objects suitable to adequately represent intuitions about the meanings of the various sentence moods. Therefore, the theory is based on abstract syntactic structures which, however, are based on morphological information and movement processes which in both cases are visible at the surface. As a result, sentence mood constitution is related to abstract principles of syntactic and semantic composition, and evidence for the application of the necessary computations can be read off from the surface of the given sentence.

Since at least Frege (1892), the sentence is analysed as a mood operator that is combined with a proposition. Whilst Frege introduced only an assert operator ($()$), Stenius (1967), followed by Lewis (1970), Bierwisch (1980) and others², proposed that sentences generally contain two components: a mood or attitude component and a propositional component, the sentence radical.

¹ In: von Stechow, Klaus & Schwegler, Kerstin (eds.) (2001). *Theoretical Linguistics 27.2/3. Special Issue "NP Interpretation and Information Structure"*. 187-214.

² See Altmann (1993), Bäuerle/Zimmermann (1991), Grewendorf/Zaefferer (1991) to get an overall view about the topic of sentence mood.



Montague (1974) claimed that the formulation of truth conditions for declaratives have to be extended to fulfilment conditions in order to provide a satisfactory account of imperatives and interrogatives. Using the Montegovian framework, Hausser (1980) proposed a semantic analysis for various sentence moods which tries to explain the differences by assigning to each sentence mood a different logical type. Brand et al. (1992), Reis/Rosengren (1992) developed a compositional system of sentence moods which attempts to account for the various kinds of wh-constructions in a compositional fashion by using exclusively grammatical means for deriving the semantic effects for interpretation. Their theory makes crucial use of abstract sentence type features which are annotations of the left peripheral positions in the underlying (D-) structures. Because the authors start out from the so called difference hypothesis, which assumes different syntactic structures for main- and embedded clauses, respectively, they do not assume a uniform syntactic domain with respect to which sentence mood is determined. Rather, they reconstruct sentence mood by supposing that there must be a c –command relation between the abstract sentence type feature and the $[\pm \text{ wh}]$ -feature of the phrase being moved into the left peripheral sentence position. The different sentence types are derived on the basis of the possible feature combinations. Their semantic interpretation is determined by various operators. In the case of declaratives the existence operator is used to express the assertion that the situation expressed by the proposition is a fact, interrogatives are modelled by an Operator OFFEN (engl.: OPEN) expressing that the proposition has one or more open places in the case of (multiple) wh- interrogatives or, in the case of a Y/N-question, whether or not the situation expressed by the proposition exists.

Cheng (1991) and Brandner (2000) analyse wh-movement in terms of sentence type marking. The purpose of clausal typing is to mark the illocutionary force of a sentence. I suggest that the force phrase mentioned in Chomsky (1995) and Rizzi (1997) without further comment requires a similar interpretation.

Lohnstein (2000) develops a compositional theory of sentence mood which uses the category *verbal mood* and the syntactic operations of A-bar- and head movement. This theory takes verbal mood to be a functional category which projects a mood phrase MP as the highest projection of the clause. It licenses a specifier position and takes as its functional argument a tense phrase TP. The different lexical items that are allowed in the head position M° and the specifier position SpM of the MP, lead to different sentence moods and their respective interpretations in a strictly compositional fashion. The ingredients of the composition belong to the interpretation of the different verbal moods, the index partitioning property of propositions, the semantic characteristics of $[\pm \text{ wh}]$ -phrases (being A-bar moved to the position SpM) and the contribution of head-movement of the finite verb from the base position V° to M° passing T° . As a result, there is no violation of the head movement constraint (HMC) first proposed by Travis (1984).

It is shown that verbal moods, in analogy to the temporal interpretation of tense, determine relations between the actual world and alternatives to it. The differences in interpretation are related to different conversational backgrounds in the sense of Kratzer (1978, 1991).

In this article the basic elements and operations which appear to be necessary for a theory of sentence mood are introduced and the semantic properties of the regular grammatical means are related to the semantic components and their composition in a 1:1 fashion. This leads to a direct mapping between the syntactic structures and the objects of the semantic interpretation.

The referential accessibility of indefinite noun phrases by pronominal binding depends on the choice of sentence mood. As proposed in Egli (1991) and von Stechow (1996, 1997, 1999) noun phrases can be interpreted by a term building ϵ -operator, which is interpreted as a choice function mapping the denotation of a noun (i.e. a set of individuals) to some member of that set. Various data belonging to the interaction between sentence mood and the binding of indefinite NPs allow for an explanation in terms of the proposed theory of sentence mood constitution and the interaction with the theory which treats NPs as choice functions. As will be shown, indefinite NPs can only be bound by a pronoun if the range of the choice function is uniquely given. This is not the case if the indefinite NP occurs in interrogative contexts. If the indefinite NP appears in a declarative, imperative, or some other construction, its referential binding is less problematic.

II. Syntactic assumptions

In German as well as in English (and the other Germanic languages, too) not all verbal moods allow for question formation. First of all, the imperative verbal mood is incompatible with fronted [+wh]-phrases.

- (2) *Wen bring zum Bahnhof?
(Who take? to the station?)

Clauses marked with subjunctive I behave similarly.

- (3) *Wen bringe er zum Bahnhof?
Who bring (–subj I) he to the station?

These sentences are well formed if the verbal mood is changed to the indicative or subjunctive II.

- (4) Wen bringt/brächte Peter zum Bahnhof?
(Who brings/(would bring) Peter to the station?)

Furthermore, subjunctive I and imperative clauses do not form sentences which can be interpreted truthfunctionally. That is, even if a [-wh]-phrase has been moved to sentence initial position no truthfunctional evaluation is possible. Note that although [+wh]-movement is prohibited in the case of imperatives –see (2) and (3)–, [-wh]-movement is not, as shown by (5).

- (5) (i) Den Kollegen bring zum Bahnhof!
(The colleague bring to the station!)
Bring the colleague to the station!
- (ii) Den Kollegen bringe er zum Bahnhof!
(The colleague bring (-subj I) he to the station!)

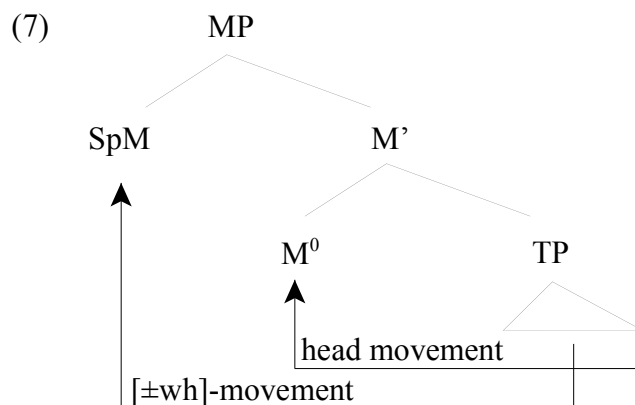
Again, the corresponding sentences with verbal mood changed to indicative or subjunctive II may be evaluated in terms of their truth or falsity.

If we look at long wh-movement from a complement clause into an imperative matrix clause (so called wh-imperatives) we see that the wh-phrase may occur at the left periphery of imperative clauses. However, the scope of the [+wh]-phrase is restricted to the embedded clause.³

- (6) (i) Wohin, sag mir, dass Du nie wieder gehst!
(To which place tell me that you will never go again!)
- (ii) Sag mir, wohin Du nie wieder gehst!
(Tell me to which place you will never go again!)

These data provide strong evidence for a systematic interaction between verbal mood in German and other syntactic operations - [$\pm$ wh]-fronting in particular- that are relevant to the sentence mood distinctions.

In order to relate the category *verbal mood* to the fronting of wh-phrases I assume that verbal mood in German establishes a functional category MP with a specifier position SpM. This functional category replaces the traditional CP-projection, which is motivated on purely positional grounds for main clauses. On the one hand, replacing these projections by a morphologically motivated functional category meets the need to derive syntactic structures from morphological and lexical units. On the other hand, this provides a syntactic domain in which sentence type and sentence mood distinctions can be expressed, thanks to there being the possibility of a systematic interaction of the various components can take place in both a uniform system and a uniform fashion. This is a necessary requirement for all natural languages, as Cheng (1991), Brandner (2000), Lohnstein (2000) have pointed out. The consequences for syntactic A'-movement and head movement are minimal in that A'-movement targets SpM instead of SpC and head movement of the finite verb targets M⁰ instead of C⁰. As a result, the structure of the left periphery of German main clauses will be that described in (7).



³ See Reis/Rosengren (1992).

The theoretical advantage of these assumptions about the left periphery of German main clauses lies in both the uniform domain in which the sentence mood is determined and the interaction of its constituting components, which meet in a well defined domain of syntactic structure.

Since Thiersch (1978) and den Besten (1977) it has been assumed that main clauses in German are derived by two root transformations, one moving the finite verb to the left periphery, the other moving one constituent from the middle field to a position in front of the finite verb. Depending on the [$\pm$ wh]-characteristics of this so called ‘Vorfeld’-phrase a wh-question results if this phrase contains a [+wh] feature. A declarative sentence results if the phrase is marked [-wh], or is unmarked with respect to the wh-specification. If the SpM position remains empty a y/n-question results. These options are available only if the verbal mood is either indicative or subjunctive II. If the verbal mood is either imperative or subjunctive I the formation of questions and declaratives is blocked, yielding other types of modal interpretation.⁴

Before going into the details of the semantic interpretation of syntactic movement processes let us take a closer look at the relational properties of verbal mood. As pointed out in Farkas (1992) and Quer (1998) a mood shift involves a shift in the model of interpretation of the proposition in question.

As far as main clauses are concerned, it can be observed that propositions marked with imperative mood are only interpretable with a progressive reading, while sentences marked with subjunctive I allow for a present and a progressive reading. In both cases the respective proposition allows for an interpretation with a word to world direction of fit only.⁵ If the verbal mood is indicative or subjunctive II the direction of word-world-fit is reversed, because the words have to fit the world. Note that these distinctions originally used by Searle (1975) for the pragmatic classification of speech acts are also reflected in the morphological system of verbal inflection.

These elementary distinctions suggest that verbal moods divide into at least two classes with respect to the word-world direction of fit together with their modal interpretation. Each class supplies a specific contribution to sentence mood. The differences are listed in table (8):

(8)

indicative subjunctive II	imperative subjunctive I
y/n-question	* y/n-questions
wh-question	* wh-questions
assertion	* assertion

As shown by this table, questions and assertions are possible with the indicative or subjunctive II verbal mood only. The other moods, imperative and subjunctive I, do not allow question formation or assertions.

Elaborating still further on our semantic intuitions, we can assume that the two classes of verbal mood relate propositions to different kinds of conversational

⁴ Although the theory proposed in Lohnstein (2000) covers these cases too, I will not go into further detail here.

⁵ The motion direction of fit between world and words was originally proposed by Searle (1975) in order to distinguish classes of speech acts. Thus, for instance in a representative speech act the words have to fit the world, while in a commissive speech act the world has to fit the words.

backgrounds in the sense of Kratzer (1978,1991). In Lohnstein (2000) I argued that at least two such domains have to be identified in order to account for the relevant distinctions: an epistemic and a factive domain. Propositions marked with imperative or subjunctive I are related to the factive domain, while propositions marked with indicative or subjunctive II are related to the epistemic domain.⁶ In model theoretic terms we can identify the factive domain with the definition of the model and the epistemic domain with knowledge about it.

These two domains are interrelated in systematic ways. Take the factive domain to include all facts in the past, the present and the future of the actual world, and take the epistemic domain to include all contents which are knowable. Assume further that human beings distinguish well between the outer world (of facts) and the inner world (of knowledge). This distinction goes back at least to Descartes' 'res extensa' and 'res cogitans'.

However, relating the two domains to the word-world-direction of fit, the notion of *making something actual(present?)* plays a major role. The states of affairs we know about the actual world belong to the past or present, but the future ones are not accessible epistemically. Furthermore, the states of affairs in the past will never become actual (present??) again. On the other hand, we do not know things which will be facts in the future of our world, but exactly these things will become actual (present?). The distinction between epistemic and factive domain is intended to provide a precise account of these intuitions.

It now follows that only propositions from the epistemic domain can be true or false, and that propositions from the factive domain cannot be evaluated from a truthfunctional point of view. The main properties of imperative and subjunctive I-clauses are then derivable from the properties of the factive domain, together with general principles of interpretation.

III. The semantics of sentence mood

Let us now take a closer look at the semantics of questions and declaratives. According to Groenendijk/Stokhof (1982, 1984, 1996), Higginbotham (1996), questions denote exhaustive partitions of the class of possible answers. For a y/n-question like (9)(i) this partition is given as in (9)(ii).

- (9) (i) Did Peter stroke the cat?
(ii) {Peter stroked the cat | Peter did not stroke the cat}

Since every proposition induces a bipartition of the set of indices (i. e. pairs of world-time points), the proposition from (9) separates the class of indices for which the proposition 'Peter stroked the cat' is true from the class of indices for which the proposition 'Peter did not stroke the cat' is true. That is, every proposition leads to a bipartition of possible world states.

In general, a bipartition contains two classes of indices. One class contains those indices at which the proposition is true, the other all indices at which the proposition is false (or rather the negation of the proposition is true).

⁶ Further elaboration is necessary to account for the main use of the subjunctive I in German, namely its use in indirect speech. Several suggestions regarding this can be found in Bredel/Lohnstein (2001a/b). See also Farkas (1994), Quer (1998).

The essential and general characteristic of a partition from a set is that it divides its members into disjoint (equivalence-) classes, which unite into the whole set under set union. The elements in each class are equivalent with respect to some property.

It follows that a proposition resembles a y/n-question in that it leads to a similar semantic object, namely a bipartition. This object P is shown in (10).

$$(10) \quad P = \{x \text{ stroked the cat} \mid x \text{ did not stroke the cat}\}$$

Together with a wh-phrase, a wh-question as in (11) (i) leads to a more differentiated partition as in (11) (ii), where Peter, Fritz and Clara are the relevant individuals in the context of discourse.⁷

(11) (i) Who stroked the cat?

(ii)	Peter stroked the cat & Fritz stroked the cat & Clara stroked the cat
	Peter stroked the cat & Fritz stroked the cat & Clara did not stroke the cat
	.
	.
	.
	Peter did not stroke the cat & Fritz did not stroke the cat & Clara did not stroke the cat

(11) (ii) has the structure of a boolean lattice which is closed under negation and conjunction. This lattice is formed from the semantic content of the proposition together with the semantic content of the wh-phrase. It remains to be determined how the semantic contribution of the proposition interacts with the semantic contribution of the wh-phrase to yield the lattice in (11)(ii).

The proposition –as we have just seen- corresponds to a bipartition of possible states of affairs (or indices). Now, assume that a wh-phrase denotes a partition as well. Then the wh-phrase WHO denotes the exhaustive set of equivalent classes of people, WHERE denotes the exhaustive set of equivalent classes of locations, WHEN denotes the set of all temporally equivalent intervals, and so on. The denotation of WHO from our earlier context of discourse looks like (12).

$$(12) \quad WH = \{\text{Peter} \mid \text{Fritz} \mid \text{Clara}\}$$

If we now combine each element from the propositionally induced bipartition P in (10) with each element from the partition WH in (12) building the cartesian product $P \times WH$, we obtain the partition in (13).

$$(13) \quad WH \times P = \{\text{Peter} \mid \text{Fritz} \mid \text{Clara}\} \times \{x \text{ stroked the cat} \mid x \text{ did not stroke the cat}\} \\ = \{\text{Peter stroked the cat} \mid \text{Peter did not stroke the cat} \mid \\ \text{Fritz stroked the cat} \mid \text{Fritz did not stroke the cat} \mid \\ \text{Clara stroke the cat} \mid \text{Clara did not stroke the cat}\}$$

⁷ See Groenendijk/Stokhof (1982, 1984, 1997), Higginbotham (1996).

This partition still does not build the lattice we are aiming at. We furthermore have to extend each class with all other classes in such a way that each class contains all but the contradicting propositions. That means that we may combine the elements ‘Peter stroked the cat’ and ‘Fritz did not stroke the cat’ which are compatible, but we are not allowed to combine ‘Peter stroked the cat’ with ‘Peter did not stroke the cat’, because the latter combination would lead to a contradiction. This operation -closure under conjunction- yields exactly the lattice in (11)(ii).

We are now able to derive the semantic object which corresponds to a wh-question from the semantic content of the wh-word and the semantic content of the proposition, using the concept of the partition in a unique manner.

Correspondingly, an assertion may be viewed as being formed by making use of exactly the same material and processes, except that we use a [-wh]-phrase instead of the [+wh]-phrase. A [-wh]-phrase denotes a partition of exactly one class. For instance, the [-wh]-phrase ‘Peter’ denotes the (trivial) partition $WH^- = \{ \text{Peter} \}$. If we combine this partition with the bipartition given by the proposition in the same way as we combined the [+wh]-phrase with the proposition, we must build the cartesian product. We therefore obtain the structure in (14).

$$\begin{aligned} (14) \quad WH^- \times P &= \{ \text{Peter} \} \times \{ x \text{ stroked the cat} \mid x \text{ did not stroke the cat} \} \\ &= \{ \text{Peter stroked the cat} \mid \text{Peter did not stroke the cat} \} \end{aligned}$$

Again, we have built a cartesian product, in this case from WH^- and P . The operation of forming all classes by combining those elements which do not contradict the others is now a trivial matter, there being no possibility of forming any combinations without encountering contradictions. By using the [-wh]-phrase the bipartition in (14) is reduced to the class of indices at which P applied to ‘Peter’ is true, leading to an assertion, as required.

Let us now look more closely at a topic dealt with by Gottlob Frege (1892) in his ‘Logical Investigations’ (Logische Untersuchungen). Frege (1986³:35) writes: ”Wir erwarten ja zu hören oder nein. Die Antwort ‘ja’ besagt dasselbe wie ein Behauptungssatz; denn durch sie wird der Gedanke als wahr hingestellt, der im Fragesatz schon vollständig enthalten ist. So kann man zu jedem Behauptungssatz eine Satzfrage bilden. [...]

das Denken	-	das Fassen des Gedankens
das Urteilen	-	die Anerkennung der Wahrheit des Gedankens
das Behaupten	-	die Kundgabe des Urteils

Indem wir eine Satzfrage bilden, haben wir die erste Tat schon vollbracht.”⁸

Frege therefore distinguishes three different acts forming an assertion. First, the capturing of the idea (das Fassen des Gedankens) corresponds to the structure of a proposition, by being related to a y/n-question (Satzfrage).

Second, the acknowledgement of the truth (Anerkennung der Wahrheit des Gedankens) is built by committing oneself to the truth of the proposition. In terms of a bipartitioned space of indices, ‘committing oneself to the truth of the proposition’ is

⁸ We expect to hear ‘yes’ or ‘no’. The answer ‘yes’ means the same as the assertion, because it claims that the thought, which is entirely contained in the question, is true. Therefore it is possible to form a question from every assertion. [...]

thinking	-	the capturing of the thought
judgement	-	the acknowledgement of the truth of the thought
claiming	-	the announcement of the judgement

By forming a y/n-question, the first act is already achieved.”

tantamount to reducing the bipartitioned set of indices to that class in which the proposition is true.

Third, the announcement of the judgement (*Kundgabe des Urteils*) corresponds to the process of adding the reduced bipartition to the context of discourse. In order to provide a theory accounting for this process we can use a notion originally proposed by Stalnaker (1978) and elaborated in more detail in discourse representation theory.⁹ The basic operation we need here is modeled by an update function of the information state of a discourse.

Take CG to be the common ground in a discourse. CG is the set of all propositions the participants take for granted. This set defines the set A of all indices at which all propositions from CG are true. In order to add new information to the discourse new propositions have to be added to CG, thereby reducing the indices in A. By adding more information to CG the indices compatible with all this information shrink. This means that if there is more information available the set of possible alternatives compatible with this information is smaller. Updating a given CG with some semantic object p to CG' is performed by the update function ' $\oplus$ ', as in (15)(i). The set A of indices reduces through set theoretic intersection, because the indices in A' have to be compatible with the further proposition p. This is shown in (15)(ii).

- (15) (i) $CG' = CG \oplus p = CG \cup \{ p \}$
(ii) $A' = A \cap p$

As is clear from the outset, the information state in a discourse is not only influenced by assertions (the usual case) but also by questions, imperatives, etc.

Since the information state in a discourse is not only influenced by new assertions, but also by questions, imperatives and so on, it is necessary to allow the update function perform the addition of objects representing these other sentence moods.

Especially in the case of questions the context of discourse has to be updated with the set of alternatives supplied by the partition denoted by the question.

Returning now to the three acts Frege found in assertions, I want to show that the essential properties of these acts are apparent not only in assertions but that they are constitutive in forming *all* sentence moods.

As we have already seen the compositional process of forming a wh-question contains the proposition together with the wh-phrase. In order to *ask* a question, the question has to be added to the discourse. As a result, the situation is such that the discourse is not updated with a single proposition, but with a set of alternatives given by the boolean lattice, with each class of elements allowing for the updating of the information state of the discourse.

For instance, if the question 'who stroked the cat' is added to the discourse, every class from (11)(ii) becomes a possible element in the discourse. One task of the participants of the discourse is to reduce the alternatives introduced by the question. If this reduction does not take place, the set of possible continuations in the discourse increases. It is easy to see that too many questions lead to a degeneration of the discourse, because the amount of the available alternatives exceeds some crucial limit. A discourse containing only questions comes close to the situation in which all

⁹ See Haas-Spohn (1991) for a detailed summary.

participants have lost their bearings. But if the questions receive answers, the amount of alternatives decreases, enabling the participants to focus their orientation.

In the case of our question ‘who stroked the cat’, the discourse can –for instance– be updated by the class ‘Peter stroked the cat and Fritz and Clara did not stroke the cat’. Then the information state updates the discourse in another way, as if the class ‘Peter did not stroke the cat and Fritz and Clara stroked the cat’ had been added to the discourse.

Discourses that do not reduce these alternatives do not have a proper structure, because too many possible continuations are left open. It follows that questions need answers. As a result, questions in general allow for several possibilities to update the discourse. These updated alternatives are usually reduced by answers from other participants of the discourse.

Since the formation of a y/n-question does not need any other element than the propositionally induced bipartition, this semantic object is added to the discourse without reduction, differentiation or any other semantic operation to modify its structure. It discloses exactly two options of continuation.

To form a declarative sentence a [-wh]-phrase has to combine with the propositionally induced bipartition. A [-wh]-phrase, which appears in the SpM position at the left periphery of the clause modifies the propositionally induced bipartition in such a way that the class of indices at which the proposition is false is erased, thereby deriving the judgement in Frege’s sense. This yields the reduction of the bipartition of the set of indices to the class of those indices at which the proposition is true. Making an assertion, then, means adding a reduced bipartition (the judgement in Frege’s sense) to the discourse.

The following table contains the relevant objects, features and operations, which are necessary to derive the respective semantic properties of y/n- and wh-questions as well as declaratives.

(16)

features	[±wh]-objects	bipartition	operation
+wh	Peter Fritz Clara	p ¬p	bipartition becomes differentiated
∅	∅	p ¬p	bipartition remains unmodified
-wh	Peter	p ¬p	bipartition becomes reduced

From this table, it can be seen which elements are necessary in order to derive the respective objects. Furthermore, it becomes clear that the variation in mood specification depends on the difference of the features involved only. The sentence mood results as the outcome of the operation.

It is important to note that the compositional processes work if, and only if, the verbal mood is indicative or subjunctive II. They do not work if the verbal mood is imperative or subjunctive I as is suggested by the following examples from German.

- (17)
- (i) indicative/subjunctive II
 - (a) Wem gibt/gäbe Maria ein Buch?
(To whom gives/would give Mary a book?)
 - (b) Gibt/gäbe Maria ihrer Freundin ein Buch?
(Does/would Mary give her girl friend a book?)
 - (c) Ein Buch gibt/gäbe Maria ihrer Freundin.
(A book gives/would give Mary (to) her girl friend.)

- | | | |
|-------------------------------|---|--|
| (ii) imperative/subjunctive I | | |
| (a) | *Wem gibt/gebe Maria ein Buch?
(*To whom give Mary a book?) | *deiner Freundin
(* (to) your girlfriend) |
| (b) | Gib/Gebe Maria ein Buch?
(Give/give –subj I Mary a book?) | *Ja/Nein
(*yes/ no) |
| (c) | Deiner Freundin gib/gebe ein Buch.
((To) your girlfriend give/give-subj I a book?) | *wahr/falsch
(*true/ false) |

The example in (17)(ii) (a) is ungrammatical because, as we have already seen, the [+wh]-phrase is incompatible with a proposition related to the factive domain.

Fronting the finite verb in (17)(ii) (b) does not lead to a y/n question as in (17)(i) (b). Again, this is because the factive domain does not allow for a bipartition at all.¹⁰ In (17)(ii) (c) no assertion derives by fronting a [-wh]-phrase as opposed to (17)(i)(c). Again the reason is that there can be no partitioning on the factive domain. Although the construction is well formed the sentence mood remains unaffected.

Summing up the discussion so far, we have seen that propositions marked with indicative or subjunctive II can combine with a [+wh]-phrase to form a wh-question. The semantic composition thereby leads to a boolean lattice representing the meaning of the wh- question. The assertion is derived by the same operations by substituting the [+wh]-phrase with the [-wh]-phrase. Therefore, the only difference between these two kinds of sentence formation rests with differences in the [$\pm$ wh]-specification of the participating phrases, reducing the differences between these two sentence moods to properties of the participating lexical items. Y/N-questions are formed from the propositionally induced bipartition without the need of any further lexical material.

Turning to propositions marked with imperative or subjunctive I we see that these combinations fail to supply any of the above-mentioned effects. This can be explained in quite a simple manner, starting from the observation that only epistemic contents can be true or false and therefore allow for a bipartition of the set of indices. Since this does not hold for the factive domain (facts cannot be true or false, they're just facts) no bipartition is possible. It follows that question formation with propositions from the factive domain is generally impossible, and that assertive clauses cannot be formed because there is no partition to reduce. Note that in all these constructions, the possibility of forming declarative or interrogative objects is blocked for the same reason.

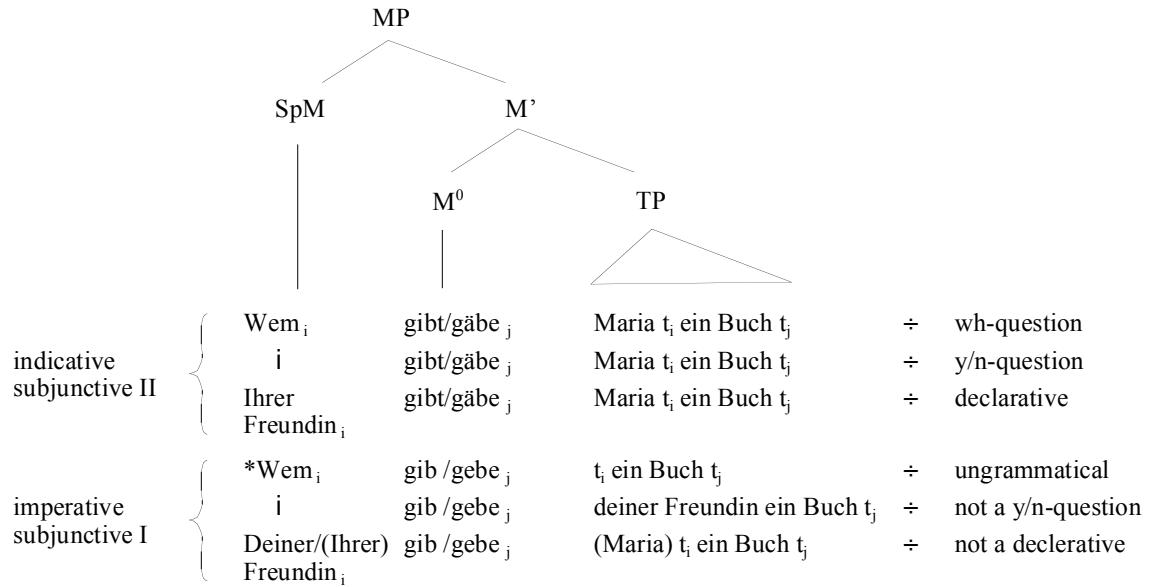
IV. On the interaction of syntax and semantics

Let us now relate the concepts of a compositional semantics for questions, declaratives and imperatives to the syntactic principles of sentence formation in German.

Focussing on independent root clauses for the moment, we see that the distribution according to effects on the sentence mood constitution of lexical and phrasal elements in the left periphery of German clauses yields the following general picture.

¹⁰ The reason for the impossibility of truth or falsity is therefore the same as for the impossibility of forming a y/n question.

(18)



The position SpM (the former SpecCP position) can be filled by a [+wh]-phrase, a [-wh]-phrase or can remain empty. This holds for all verbal moods except for the imperative mood, which does not allow for a [+wh]-phrase in the SpM-position.

It is obvious that only lexical or phrasal material in the SpM position plays a role in determining the resulting sentence mood in combination with the (temporally specified) proposition represented here as a TP. This means that A-bar-movement of a [$\pm$ wh]-phrase serves the purpose of specifying the properties of the sentence mood if the verbal mood is indicative or subjunctive II. Although these structural options are available for all verbal moods (except for the imperative, which we will return to below) the sentential mood effects arise for the indicative or subjunctive II only.

We now arrive at the point at which the syntactic structures can meet the semantic objects and we can see how the syntactic structure and the syntactic processes involved in sentence formation lead to the relevant objects of semantic interpretation.

In German, two root operations have to be assumed to derive the various sentence types illustrated in (18), namely A-bar-Movement of a [$\pm$ wh]-phrase into the position SpM and head movement of the finite verb into the position M⁰. This allows us to relate the semantic operations to the moved constituents in a 1:1 fashion.

The [$\pm$ wh]-phrases are the phrasal elements which interact with the propositional bipartition to yield the wh-question or the declarative sentence respectively. If no phrase is moved to the SpM-position the unmodified bipartition remains, deriving the y/n-question as desired.¹¹

¹¹ So-called verb-first declaratives, which exist in German, seem to be a problematic case for this analysis.

- (1) Kommt ein Mann in die Kneipe...
(Comes a man into the pub...)

Önnerfors (1997: 48ff) discusses several alternative analyses for this construction (empty position, deleted elements, empty operator etc.).

However, as is shown by the short dialogue in (2), verb-first declaratives do not allow for assertions and they are not suitable to reject other statements

Again, we have to restrict these operations to the indicative or subjunctive II verbal mood. In the other cases an ungrammatical structure results or no modal effect arises.

But note that long extraction of a [+wh]-phrase into an imperative main clause is possible in German, as shown by example (6), repeated here as (19) for convenience.

- (19) (i) [Wohin]_j sag mir, t_j dass Du nie wieder t_j fährst!
 ([To which place]_j tell me, that you will never go again t_j!)
 (ii) Sag mir, wohin_j du nie wieder t_j fährst!
 (Tell me, [to which place]_j you will never go again t_j!)

In (19)(i) the matrix clause is marked with imperative and is at the same time compatible with a [+wh]-phrase. The sentence mood does not change and the scope of the wh-Operator is restricted to the embedded clause. (19)(i) has the same interpretation as (19)(ii) in terms of sentence mood. We therefore have to conclude that the SpM-position in imperative clauses is available even for [+wh]-phrases and that the reason for the ungrammaticality of short wh-movement in imperative clauses is due to conditions on interpretation. Furthermore, there seems to be a last resort principle for the interpretation of wh-chains which allows the chain to be interpreted at the position of the intermediate trace.

Let us now look more closely at the distribution of the finite verb and the act Frege called the announcement of the judgement (Kundgabe des Urteils). As can be seen from the examples in (20), all independent root clauses reveal the verb-second pattern, which means that the finite verb is in M⁰ position.¹² Contrasting these patterns with embedded clauses in German, we generally find the finite verb in clause final position, following the OV-order of German.¹³

The following structural description shows that embedded clauses in German are generally verb final.

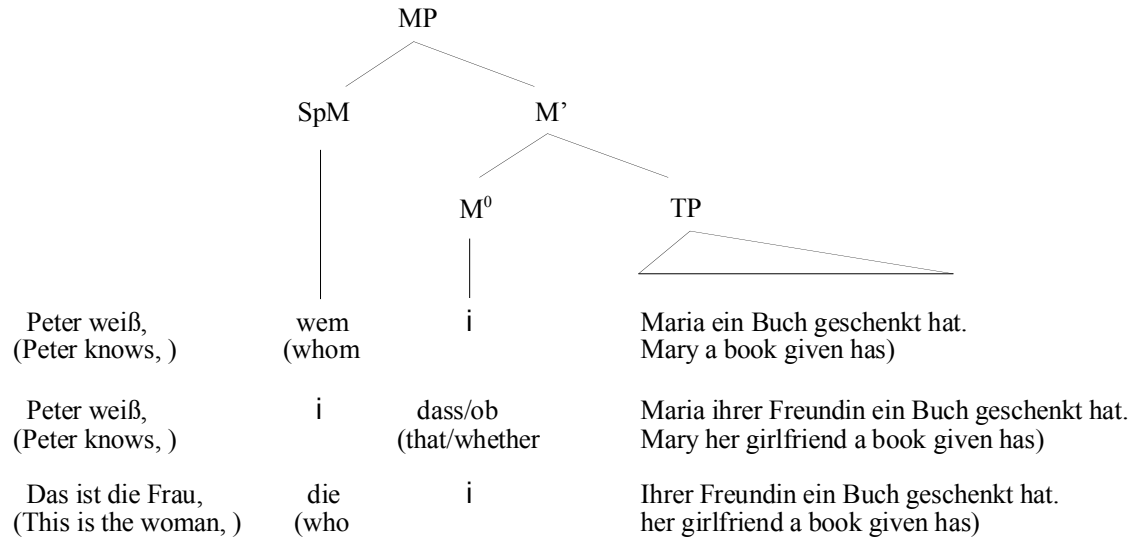
-
- (2) A: Eine Frau geht in die Kneipe
 (A woman enters the pub)
 B: Nein, das ist nicht wahr. *Kommt ein Mann in die Kneipe.
 (No, that isn't true. *Comes a man into the pub)

On the other hand, every verb-first declarative allows for an Y/N-interrogative reading under some suprasegmental modification. But the exact nature of the phenomenon is still unclear and I will not explore this topic any further.

¹² See Vikner (1994, 1995) and Schwartz / Vikner (1996).

¹³ An apparent exception are V/2-complement clauses which are assumed to exist in German. But, as Reis (1997) has pointed out, these constructions behave on nearly all counts entirely differently from 'that'-complement clauses. Furthermore, V/2-complement clauses are only found with bridge verbs, i.e. verbs which allow for extraction out of their complement clause. These properties suggest that V/2-complement clauses in German have another status as completely integrated complementizer clauses and, therefore, do not have to be treated in the same way as usual verb final complement clauses.

(20)



This regularity suggests that the position of the finite verb marks the distinction between embedded vs. independent clauses. But how do these two kinds of clause structure differ in terms of sentence mood?

First of all, the M^0 position seems to be the position relevant for marking the place of the modal anchoring of the proposition in question. This can either be the context of discourse or the grammatical context. Take modal anchoring to be a two place relation between a proposition and some kind of context. For every proposition the relevant context has to be specified by some regular grammatical means. Since propositions expressed by independent clauses are anchored in the context of discourse, and the propositions expressed by embedded clauses are anchored in the grammatical context, it appears to be the case that the position of the finite verb marks the anchoring place of the proposition in question.

Let us take this to be the case. Then, we can assume that if the finite verb occupies the M^0 position, the modal anchoring of the proposition takes place in the context of discourse and otherwise (if it remains in its final position) the proposition is anchored in the grammatical context.

Now notice that the anchoring of a proposition in the context of discourse is interpretable as another formulation for Frege's announcement of the judgement (Kundgabe des Urteils). We therefore end up with the hypothesis that placing the finite verb in the head position M^0 is a device enabling the modal anchoring of the proposition in the discourse. This expresses the observation that a proposition with declarative mood is announced, that one with interrogative mood is asked, and that one with imperative mood is requested.

The position of the finite verb does not appear to correlate with distinctions in the verbal mood. All independent clauses have the finite verb in M^0 irrespective of verbal mood specification. The restrictions necessary to block the occurrence of some verbal moods (for instance imperative) in embedded clauses have to be formulated with respect to properties of the epistemic/factive domain. As pointed out in Bredel/Lohnstein (2001a) further properties of the verbal inflectional system of German allow us to account for some of these cases.

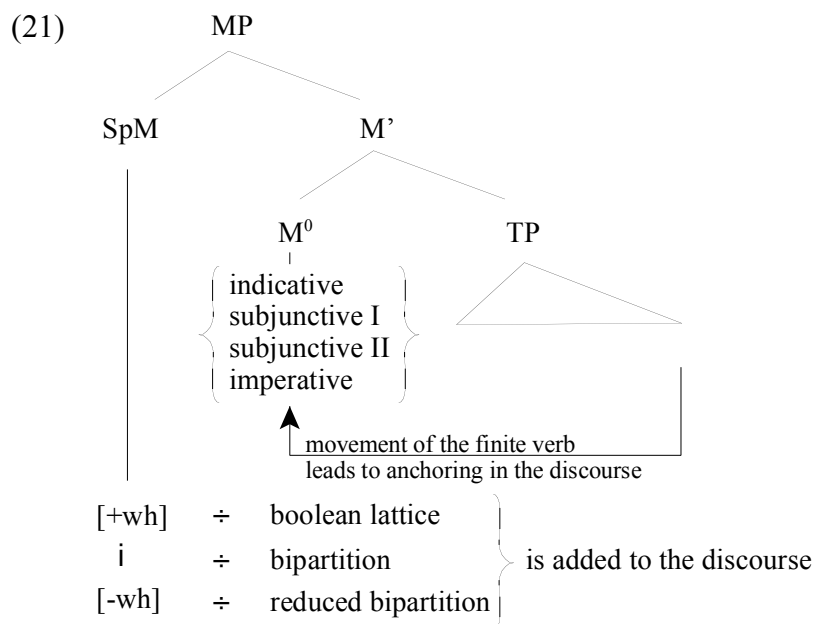
This leads us to the conclusion that there is a theory of sentence mood that captures the three acts of Frege's Judgement (Urteil) and generalizes to the main

sentence moods (declarative, interrogative, imperative) which seem to appear in all languages of the world.¹⁴

Especially for German (but, with some minor modifications, the claim applies to the whole class of the Germanic V/2 languages) the theory allows for the derivation of the relevant sentence mood distinctions in a compositional fashion, not only with respect to the semantic objects but also with respect to the syntactic structures and the distribution of the elements which are relevant for sentence mood constitution.

This happens in a uniform way in the single left peripheral system of the syntactic structure which is provided by the mood phrase MP.

We therefore arrive at a language specific parametrization for sentence mood constitution in German, as expressed in the following structure:



To sum up: the assumption that the verbal mood is a restriction¹⁵ of the index domain with respect to which the proposition is to be evaluated leads to the following claims. If the evaluation is restricted to the epistemic domain the proposition itself induces a bipartition. This bipartition becomes reduced to the class of indices at which the proposition is true if a [-wh]-phrase is moved to the position SpM. In this case Frege's judgement results. If a [+wh]-phrase fills the position SpM the bipartition becomes differentiated with respect to the semantic content of the wh-phrase leading to a wh-interrogative. If the SpM-position remains empty the bipartition survives unmodified, leading to a Y/N-interrogative

If the evaluation is restricted to the factive domain the proposition does not induce a bipartition on the index domain and filling the SpM position does not affect sentence mood determination.

In the event of the head position M⁰ being filled by the finite verb, it can be seen that (a) if the finite verb remains in its final position (which is the case in embedded clauses) the (un-) modified semantic object is anchored in the grammatical environment ; (b) if the finite verb is in M⁰ position this object becomes anchored in the

¹⁴See Saddock/Zwicky (1985).

¹⁵ For some further details of the relevant restrictions see Lohnstein (2000: 121).

context of discourse. From this it follows that verb movement to M° position is a device for expressing announcement in Frege's sense.

V. Indefinite noun phrases and sentence mood

In the preceding sections we have pointed out that the basic element of the sentence mood is a bipartition of the set of indices, which can either become reduced / differentiated or remain empty.

We now want to look at some data concerning sentence mood distinctions and indefinite noun phrases. As the data in (22)-(24) suggest, there seems to be a dependency between the mood of a sentence containing an indefinite noun phrase and the referential binding of this very noun phrase by a pronoun.

- (22) *A dog* was in the garden.
(i) Peter has fed *it*.
- (23) Who has seen *a dog*?
(i) *Peter has fed *it*.
(ii) Peter was at the poodle show.
(iii) Peter. He has fed *it*.
(iv) *Peter was at the poodle show. He has fed *it*.
- (24) Has there been *a dog* in the garden?
(i) *Peter has fed *it*.
(ii) Usually, the garden is locked.
(iii) Yes. Peter has fed *it*.
(iv) *Usually, the garden is locked. Peter has fed *it*.

What is crucially important about these data is the fact that the pronoun *it* can bind the indefinite *a dog* if the mood is declarative (22), but not if the mood is interrogative, irrespective of whether the clause is a y/n- or a wh-question. This can be seen from the examples (23)(i) and (24)(i).

The reason why these answers are inappropriate has nothing to do with the fact that (23)(i) and (24)(i) are only *partial* answers.¹⁶ This can be seen from the examples (23)(ii) and (24)(ii) which, though being partial answers as well, are entirely adequate. Rather, the reason seems to be that (23) and (24) provide interrogative contexts into which pronominal binding seems to be not allowed. On the other hand, if a *complete* answer has been given, pronominal binding is possible, as is suggested by examples (23)(iii) and (24)(iv). Notice, moreover, that pronominal binding is also excluded, if only a partial answer has been given, as is apparent from the ungrammaticality of instances (23)(iv) and (24)(iv).

These data suggest that it is only the interrogative sentence mood that blocks the binding of the pronoun from outside. We shall therefore have to consider the essential properties of interrogative contexts, which –as we have already mentioned in what precedes - is a partition of the set of all indices. It is therefore reasonable to relate the concept of partition to binding abilities of pronouns.

¹⁶A partial answer does not reduce the space of all answers to exactly one, but reduces it some degree. Only complete answers yield only one possibility. See Higginbotham (1996) for details.

To achieve this end, let us first explore the relevant properties of indefinites in some more detail. In Egli (1991) and von Stechow (1996, 1997) a noun phrase is translated into a term-building ε -expression which is interpreted as a choice function, which takes a set of individuals as argument and maps it onto a member of this set¹⁷.

In the case of indefinite noun phrases the choice function takes the set of individuals given by the N-denotation and maps it onto an element of this set. This element, then becomes the most salient individual of its kind. On the other hand, definite noun phrases as are on a par with pronouns are interpreted as choice functions that map the set of individuals given by the N-denotation onto the most salient individual of its kind. In short, with an indefinite noun phrase an individual of some kind is introduced into the discourse and becomes salient. With a definite noun phrase this very individual is selected. In our example the choice function corresponding to the indefinite noun phrase *a dog* introduces one element out of the set of all dogs into the discourse and makes it the most salient dog. The choice function corresponding to the pronoun *it* picks up this very dog.

Returning to our examples in (22) to (24), the expression *a dog* introduces a new dog into the discourse, making it the most salient one, and the choice function corresponding to the pronoun *it* has to select exactly this newly introduced dog, in order to derive the intuitive interpretations. This is possible in example (22), because the indefinite noun phrase occurs in a declarative sentence, but it is impossible in (23) and (24), because the indefinite noun phrase appears in a y/n- or wh-question respectively. As the examples (23)(iii) and (24)(iii) show, pronominal binding is possible once the question has received a complete answer.

Let us now concentrate on how to explain these facts with respect to the proposed theory of sentence mood?

As we have seen, in the case of declaratives a one class object is added to the discourse. So, if for instance, the common ground CG of the discourse gets updated by the declarative sentence *A dog is in the garden*, a reduced bipartition (i.e. a one-class object, a judgement in Frege's sense) updates the discourse.

The proposition *that a dog is in the garden* induces the bipartition π of the set of all indices in (25).

$$(25) \quad \pi = \{ \lambda i [p(i) = \text{true}] \mid \lambda i [\neg p(i) = \text{true}] \}$$

In the case of declaratives this bipartition is reduced to the class of indices at which the proposition is true. Putting it differently, a process like that in (26) takes place by removing the class of indices at which the proposition is false. The judgement (in Frege's sense) results.

$$(26) \quad \{ \lambda i [p(i) = \text{true}] \mid \lambda i [\neg p(i) = \text{true}] \}$$

This one-class object now updates the common ground $cg(k)$ of the discourse to $cg(k')$ in the following way, thereby realizing Frege's announcement of the judgement.

$$(27) \quad cg(k') = cg(k) + \pi = cg(k) \cup \{ p \}$$

¹⁷ The concept of a choice-function is based on the Axiom of Choice which was used in the theory of theorem proving by Hilbert/Bernays (1937).

Let us now look at interrogatives. A y/n-question corresponds –as we have seen in the former chapters- to an unmodified bipartition of the set of all indices as in (28)(i), and it updates the discourse as in (28)(ii).

$$(28) \quad (i) \quad \pi = \{ \lambda i [p(i) = \text{true}] \mid \lambda i [\neg p(i) = \text{true}] \} \\ (ii) \quad \text{cg}(k') = \text{cg}(k) + \pi = \{ \text{cg}(k) + p \mid \text{cg}(k) + \neg p \}$$

The result of this operation partitions the discourse itself into two classes, one corresponding to the existing discourse together with the proposition p , and the other corresponding to the existing discourse together with the proposition $\neg p$. The y/n-question therefore introduces two (incompatible) ways to continue the discourse. Note now, that the indefinite is contained in each of these two classes.

The number of classes, and therefore the number of different continuations of the discourse, increases in the case of wh-interrogatives. Given this fact the boolean lattice corresponding to the space of possible answers to a wh-question contains n elements, which means that the discourse allows for a n -fold continuation, since there are n different possible answers.

$$(29) \quad \text{cg}(k') = \text{cg}(k) + \pi = \{ \text{cg}(k) + p_1 \mid \text{cg}(k) + p_2 \mid \dots \mid \text{cg}(k) + p_n \}$$

It now becomes clear that the common ground $\text{cg}(k')$ results itself in a n -fold partition after $\text{cg}(k)$ has been updated by a wh-interrogative. It is important to note that the indefinite noun phrase is contained in each class of discourse partitioned in that way. Note furthermore that it does not matter whether the indefinite noun phrase has a specific or unspecific reading, a distinction elaborated in a more finegrained manner by von Heusinger (this volume). In both cases the indefinite noun phrase is contained in n classes and this is, as I will argue in due course- the reason for the impossibility of pronominal binding. The sole apparent exceptions are those cases where the partition has been reduced by a complete answer (which occurs if a reduction to a one-class object has taken place).

To sum up the discussion so far: An indefinite noun phrase inside a declarative is introduced into the discourse with a one class object and pronominal binding is possible. In the case of interrogatives a multiple class object is added to the discourse, each class containing the indefinite noun phrase. In the latter case, pronominal binding is blocked, as (23) and (24) show. However, if there is a complete answer, pronominal binding is possible again. Therefore there must exist a condition that requires indefinites to be introduced into the discourse in a unique fashion (viz. with a one-class objects).

This generalisation suggests that the following condition C for pronominal binding must hold.

- (C) Pronominal binding is possible only if the referent in the discourse is introduced in a uniquely given class.

On the basis of this condition the data in (22) to (24) are fully accounted for.

Let us now have a closer look at the properties of choice functions and pronominal binding. Like every other function a choice function has a domain and a range.

$$(30) \quad f: \quad \text{domain} \quad \rightarrow \quad \text{range}$$

The domain is given by the set of individuals denoted by the noun of the respective noun phrase. The article specifies either whether a new individual is introduced or whether the most salient individual is being selected. The latter option is on a par with the behaviour of pronouns.

Now, if the indefinite noun phrase is introduced into the discourse by being embedded in a question, it is represented in every class of the corresponding partition. Therefore, the range of the choice function corresponding to the pronoun is not uniquely given until the question is answered. In terms of choice functions the condition (C) can now be reduced to a general condition of functional evaluation, namely, that every function (especially every choice function) need a uniquely given range in order to be defined properly. This condition, together with the proposed theory of sentence mood, is sufficient to derive the binding differences in (22) to (24).

From these observations we can conclude that choice functions, in order to work properly, need a uniquely defined range. From this generalization it may be taken to follow that even pronominal binding into imperatives should work well. The reason is that imperatives do not allow for partitioning at all, since they are to be evaluated with respect to the factive domain. As the example in (26) shows, this is indeed the case.

- (31) Feed a dog in the morning, Peter!
You will see it will follow you during the whole day.

To sum up, I have presented a theory of sentence mood which derives the main sentence mood and sentence type distinctions in German (and the other Germanic V/2-languages as well) in a compositional fashion both with respect to their syntactic and semantic properties and their systematic interaction. This theory, along with the assumptions about pronominal binding and choice functions, make it possible to account for binding differences of indefinites in differently marked sentence types.

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