Kerstin Schwabe and Robert Fittler

Syntax and logical consistency conditions for German matrix predicates
Preliminary version[1]
(Kerstin Schwabe & Robert Fittler)

1 Introduction

The paper discusses particular logical consistency conditions of German proposition-embedding matrix predicates which determine particular properties of the syntactic structure the predicate may project:

i. the clause type(s) of the embedded clause and thus the clause type of the whole construction, i.e. the *that*-form which embeds a declarative, the *ob*-form which embeds a polar interrogative, or the *wh*-form which embeds a constituent interrogative – cf. *wissen* 'know', *sagen* 'tell', and *bedenken* 'consider' all displaying the *that-*, *whether-* and *wh*-form, *fragen* 'ask' only exhibiting the *whether-* and *wh*-form, *zweifeln* 'doubt' which is restricted to the *that-* and *ob*-forms, and *bedauern* 'regret' displaying the *that-* and *wh*-form;

ii. the possible correlate type: *es* (*es*-cor) which indicates nominative or accusative case – cf. *Frank glaubt es, dass Maria kommt* 'Frank believes it that Maria will come' – and/or the prepositional correlate (ProPP) indicating the oblique case – cf. *F denkt darüber nach, dassM zurückkehrt* 'F thinks about it that M is coming back' and *F glaubt es/daran, dass M zurückkehrt* 'F believes it/in it that M is coming back';

iii. the legitimate embedding of declarative root clauses (Verb Second in German) – cf. *Frank glaubt/*bedenkt Maria kehrt zurück* 'Frank believes/*considers Maria will return' (see Meinunger 2006);

iv. obligatory subject-control with respect to ditransitive predicates – cf. *Frank verspricht Maria zu kommen* 'F promises M to come' with subject control (see Stiebels 2007);

v. the legitimacy of the so-called *weiterführende Wenn-Sätze* (here called "*wenn*-forms"), i.e. of conditionals where the antecedent expresses the (sometimes *negated*) embedded propositional argument of the matrix verb in the consequence - cf. *Frank akzeptiert es/zieht es vor/*bedenkt es, wenn Maria kommt* 'F accepts it/*prefers it*/*considers it if M will come' (see F.-Hansen 1980);

Additionally, it will be shown that the consistency conditions determine different logical forms of the *whether-* and *wh*-forms of predicates like *i. wissen dass* 'know', *ii. darüber nachdenken dass* 'think about' and iii. *davon hören ob* 'hear about whether'. *Wissen dass* 'know' like *sagen dass* 'tell' exhibit what we call the *external ob-form* and *exhaustive wh-form* – cf. (1a, b), paragraph 4 as well as Groenendijk & Stokhof's (1982) question extensions embedding predicates, Hintikka (1975), Ginzburg & Sag (2000), and Schwabe & Fittler (2009). *Darüber nachdenken dass* 'think about' like (*es*)*bedenken dass* display the *internal ob-form* and the non-exhaustive *wh*-form – cf. (1d, e) and §4. *Davon hören dass* 'hear about' like *davon sprechen dass* 'talk about', on the other hand, exhibit, besides the non-exhaustive *wh*-form, the *neutral ob-form* – cf. (1c,e) and §5.

(1) a. ***external and restricted external ob-form*** *of verb dass*
(for an appropriate class of verbs) (§§4 and 5)
x verb ob σ ⇔ (x verb dass σ ∨ x verb dass ¬σ)

---

b. ***exhaustive wh-form*** (for an appropriate class of verbs) (§4)
   x verb wh σ ⇔ ∀y [x verb dass σ (y) ∨ x verb dass ¬σ (y)]

c. ***neutral ob-form*** *of certain dass-verbs with ProPP* (§5)
   x verb ProPP ob σ is true iff *σ* is a formula in the recursive build-up of some embedded formula *φ* for which *x verb ProPP dass φ* is true.
   (If, for example, *φ* is '*x hears about that P will come if M comes*', then '*x hears about whether M will come'* and '*x hears about whether P will come'*.)

d. ***internal ob-form*** *of verb dass* (for an appropriate class of verbs) (§7)
   x verb ob σ ⇔ x verb dass (σ ∨ ¬σ), where σ submits to particular restrictions

e. ***non-exhaustive wh-form*** (for an appropriate class of verbs) (§5)
   F pred wh σ ⇔ F pred ∀y μ(y),
   with *μ* being a contextually given predicate from the language of embeddable propsitions, e.g. *Frank denkt darüber nach, wer kommt* 'F thinks about who will come' means *Frank denkt darüber nach, dass/ob nur Kinder kommen* 'Frank thinks about that/whether only children are coming'
   The *μ(y)* we choose is (*σ(y) ⇒ ch(y)*) for (*y comes ⇒ y is a child*). Then∀*y (y comes ⇒ ch(y))* expresses *only children are coming* and *F verb dass/ob ∀y μ(y)* reads as *'Frank thinks about that/whether only children are coming'.* The choice between *dass* and *ob* depends on the context, too, as long as *verb dass* licences both clauses.

Lahiri (2002), Égré & Spector (2007), and Égré (2008) also discuss aspects of verbs displaying what we call the internal *ob*-form. Our approach explains, however, why *believe* and *regret* do not license any *ob*-form, how the *ob*-form of *know* differs from the one of *think about* logically, and why *regret*, which is not semi-implicative [x verb dass σ ⇒ σ] becomes semi-implicative and even factive if it embeds a *wh*-clause without recurring to functional notions like "responsive" or "rogative". Furthermore, it includes the neutral *ob*-form which, as far as we know, has not been discussed yet.

The empirical grammatical rules we are going to formulate referto matrix-predicatesinthird person indicative and tonon-modalized embedded propositions.

2 Basics

In order to investigate the grammatical rules concerning the embedding of propositions into matrix predicates we start with a first order predicate logic language L representing the embedded propo-sitions like *x kommt* 'x comes' {σ (x)} or *x ist verheiratet mit y* 'x is married to y' {τ(x, y)} or the more complex proposition *φ Kein Verheirateter kommt* 'No married person will come' {∀x∀y [τ(x,y) ⇒ ¬ (σ(x) ∨ σ(y))]}. Matrix verbs like *wissen* 'know' and *glauben* 'believe' with or without their legitimate correlate (cor: *es* or ProPP) and with their legitimate *dass-, ob-* or *wh-* complement clause serve to build formal matrix clauses like *x weiß* (es) (*nicht*)*, wer kommt* 'x knows (it)(not) who is coming)' {x weiß (es)(nicht) wh σ} and *x glaubt daran, dass kein Verheirateter kommt* 'x believes ProPP that no married person will come' {x glaubt daran, dass ∀z∀y [τ (z, y) ⇒ ¬ (σ(z) ∨ σ(y))]}.The legitimate matrix propositions *x verb (cor)(¬) dass/ob/wh φ* are formulas of a fragmental language *M*(L). Their syntactical legitimation depends upon conditions associated with the matrix verb. We call them consistency conditions. The semantic interpretation of the matrix propositions are represented by paraphrases which are ruled by the very same consistency conditions determining the syntactic legitimating.The matrix propositions indicated in this way constitute the fragmental language *M*(L), the *matrix language.*

A semantic structure ℵ, called *M*(L)-constellation serves as model for the matrix language *M*(L). It consists *i.* of a structure for the first order language L of embedded propositions and *ii.* of a two-valued function assigning a truth value from {*true = valid, false = invalid*} in accordance with the consistency conditions of its matrix predicate (pred) to each matrix sentence from *M*(L), where the free variables of the matrix-proposition are substituted by parameters in ℵ (cf. §§ 3, 4, and 6).

The distribution of truth values for a matrix verb *x dass/ob σ* in a constellation ℵ generally depends on *pred, σ* and the value of *x* in ℵ. It is restricted by the intended meaning of the respective matrix predicate. For instance, if *σ* is invalid, *x weiß, dass σ* 'x knows that σ' has to be false, too. If, however, *σ* is valid, *x weiß, dass σ* can have either truth values. Restrictions of this kind (and some others) are what we call consistency conditions.

An important role will be played by the set KN(α) of embedded statements the individual *α* in ℵ knows {KN(α): = [σ∈L[ℵ] |α *weiß dass* σ holds in ℵ]]. Here, L[ℵ] denotes the set of all statements where parameters from ℵ are assigned to the free variables of *σ*. The set of all the matrix predicates and all the individual constants, predicate constants from L as well as all the parameters appearing in KN(α) will be denoted by V(α), the *vocabulary* of the individual α in the constellation ℵ.

3 Some fundamental consistency conditions

In order to describe the embedding behaviour of a matrix verb *x verb dass/ob σ*, we first introduce four major consistency conditions:

(2) i. WITNESS EXISTENCE CONDITION (WEC) in ℵ:
$\exists x$ (*x pred dass/ob σ*) $\vee \exists x$ (*x pred dass/ob*[¬σ]),for every σ in every constellation ℵ
There are verbs that do not fulfil WEC in all constellations, but in some. I.e. they are *consistent with WEC* – cf. *wissen dass/ob* 'know', *fragen ob* 'ask', *bedenken dass* 'consider'. Unlike these verbs, there are ones that do not satisfy WEC in any constellation – cf. *bedauern dass* 'regret', *beweisen dass* 'prove' or *kontrollieren ob* 'check'.

ii. SEMI-IMPLICATIVITY (SI):
$\forall x$ (*x pred dass σ* $\Rightarrow$ *σ*), for every σ in every constellation ℵ.
E.g. *wissen dass* 'know', *erreichen dass* 'manage', *beweisen dass* 'prove'. Verbs like *glauben dass* 'believe', *hoffen dass* 'hope', *bedauern dass* 'regret', *zweifeln dass* 'doubt' are not in every constellation semi-implicative.

iii. NEGATION-INVARIANCE (NI):
$\forall x$ [*x pred dass σ* $\Leftrightarrow$ *x pred dass* (¬ *σ*)]
E.g.*wissen ob, fragen ob*, *zweifeln ob* 'doubt', *kontrollieren ob* 'check', *bedenken ob* 'consider', *darüber nachdenken ob* 'think about'. All legitimate *ob*-forms of matrix-verbs will turn out to be negation-invariant. Notice that there is a *dass*-verb *zweifeln dass* 'doubt' which is negation-invariant only in some constellations.

iv. ANTI-SEMI-IMPLICATIVITY (AI)
$\forall x$ [*x verb dass σ* $\Rightarrow$ ¬σ]
(*sich*) *irren* (*darin*) *dass* 'be wrong', *hindern daran dass* 'prevent', *es vorziehen dass* 'prefer'.

v. Weak KN-consistency of *verb dass/ob*:
x verb dass/ob σ is consistent with *x weiß ob σ*

4   Objective verbs, the external *ob*-formand the exhaustive *wh*-form

4.1   Objective verbs

A verb is called *objective* if it does not exhibit any correlate and if it is simultaneously consistent with WEC *and* either SI or NI or AI. Predicates with these properties we call SI-, NI-, or AI-objective – cf. §3 i to iv.

Objective predicates are, for example, *wissen dass* 'know that', *hören dass* 'hear', *sagen dass* 'tell' (SI-objective) *wissen ob*, *hören ob*, *zweifeln dass* 'doubt' (consistent with NI-objective!), *fragen ob* 'ask' (NI -objective), and (*sich*) *irren dass* 'be wrong' (AI-objective).

As shown in (Ia, c, d), an *ob*-form may arise in connection with some verbs exhibiting a *dass*-form. But obviously, there are verbs with *ob*-forms which do not have a *dass*-form, e.g. *fragen ob* 'inquire' and *kontrollieren/aufpassen ob* 'check'. The latter are negation-invariant. Since *fragen* is additionally consistent with WEC, it is NI-objective.

4.2   The external ob-form (1a)

If the verb-*dass* in *A verb dass/ob* is consistent with WEC, the disjunction *A verb dass/ob σ ∨ A verb dass/ob* (¬σ) is consistent with WEC, too. Under the restriction that *A verb dass* be SI- or NI-objective the disjunction just mentioned is what we call an external *ob*-form *A verb ob σ* of *A verb dass/ob σ* and it paraphrases precisely the intended meaning of the *ob*-version of a German SI-objective matrix-verb. Since it is negation-invariant it is NI-objective. As to the *ob*-verb *fragen ob* 'inquire', it is not the *ob*-version of any German SI-objective matrix-verb. However since *x fragt ob σ* is logically equivalent to *x fragt ob σ ∨ x fragt ob* (¬σ), it belongs to the *external ob-forms*. Thus, any NI-objective verb is an external *ob*-form which in turn is either the external *ob*-form of a SI- respectively NI-objective *dass*-verb (e.g. *hören dass/ob*'hear' respectively *zweifeln dass/ob* 'doubt') or it is a NI-objective *ob*-verb that does not have a *dass*-form (e.g. *fragen ob* 'ask').

The SI-objective verb *wissen dass*'know' is *inherently* semi-implicative. In contrast to the SI-objective *hören dass* 'hear' and *sagen dass* 'tell',it is semi-implicative in every constellation.There are constellations where *hören dass* or *sagen dass* are not semi-implicative. However, they all are interpreted semi-implicatively in the explicit paraphrasing of the external *ob*-form – cf. also Égré & Spector (2007) for a similar opinion. Notice that all external *ob*-forms (as well as all other *ob*-forms) are *inherently negation-invariant*.

 Erreichen dass 'manage' and *beweisen dass* 'prove' are inherently semi-implicative, but they are not consistent with WEC. *Glauben dass* 'believe' is consistent with semi-implicative but not simultaneously with WEC. These verbs are not objective and do not allow an external *ob*-form (nor any other *ob*-form, as will be seen below).

4.3   The exhaustive wh-form (1b)

The *wh*-form *x verb wh σ* is syntactically legitimate iff *verb dass/ob* is SI- or NI-objective and *verb dass/ob* is weakly KN-consistent (cf. 2v).

For example *x hört/sagt/fragt, wer kommt* 'x hears/tells/inquires who is coming' is syntactically legitimate since *hören*, *sagen* and *fragen* are SI- and NI-objective or *x hört/sagt/fragt ob y kommt* is consistent with *x weiß, dass y kommt* 'x knows that y is coming', respectively.

A *wh*-form like *x zweifelt/irrt,wer kommt* 'x doubts/is mistaken who will come' is illegitimate because *x zweifelt, ob y kommt* is inconsistent with *x weiß, ob y kommt* and *irren dass* does not have an *ob*-form. The latter is the case because *irren dass* is AI-objective*.*

A *wh*-form *x verb wh σ* can be paraphrased by ∀y (*x verb ob σ(y)*). A *wh*-form *x verb wh σ* paraphrased this way is called *exhaustive wh-form.* For example *x hört/sagt/fragt, wer kommt* isparaphrased as *for all y, x hears/tells/asks whether y will come.*

4.4   Basically objective predicates

Any matrix-predicate *verb cor dass* will be called *basically* (*SI/NI/AI-*)*objective* if *verb dass* without the correlate is (SI/NI/AI -)objective, e.g. *es/davon hören dass/ob* 'hear it/about' or *daran zweifeln dass/ob* 'doubt', respectively.

5   Objective predicates: *ProPPs, es*-correlates, the neutral *ob*-form and the non-exhaustive *wh*-form

5.1   ProPPs, deductive closure of SI-objective matrix-verbs,

Any *dass/ob*-matrix-predicate *pred* with a correlate or without a correlate gives rise to *the range of validity* **val**(*pred;* α, $\aleph$):= {$\sigma \in$ L[$\aleph$]|α *pred* σ holds in $\aleph$)}, i.e. to the set of the (embeddable) formulas σ which validate α *pred* in $\aleph$(for every <α, $\aleph$>, where $\alpha \in \aleph$). The vocabulary of val(*pred;* α, $\aleph$) is understood to be the set of all individual and predicate constants from L as well of all parameters appearing in the formulas of val(*pred;* α, $\aleph$). The range of validity val (*pred;* α, $\aleph$) is called **deductively closed** if it contains at least all its own non-tautological consequences expressed in the vocabulary of val (*pred;*α,$\aleph$).Otherwise it is called *deductively open*. The 'deductive closure' val(*pred; α, $\aleph$*) of val(*pred;* α, $\aleph$) denotes the set of formulas in the vocabulary of val(*pred;* α; $\aleph$) entailed by val(*pred;* α, $\aleph$), with the exception of all the tautologies not already contained in val(*pred;* α, $\aleph$).Every val(*pred;*α, $\aleph$) has a uniquely determined deductive closure val(*pred; α, $\aleph$*).The set val(*pred; α, $\aleph$*) can be viewed as the range of validity of a possibly artificial matrix-predicate PRED , i.e. val(PRED ; α, $\aleph$) = val(*pred; α, $\aleph$*), not necessarily represented in the matrix language *M*(L). We call PRED the deductive closure of the predicate *pred* from *M*(L).

A matrix-predicate *pred* is called **deductively open** if val(*pred;* α, $\aleph$) is deductively open for some <α,$\aleph$>, where $\alpha \in \aleph$. Otherwise the predicate is called *deductively closed*. The SI-objective verbs *wissen dass/ob* 'know'*, hören dass/ob* 'hear'*, sagen dass/ob* 'tell'*,* are deductively open, while SI-objective verbs like *merken dass* 'notice' and *fühlen dass* 'feel' are deductively closed, e.g. if 'F is ill´ is entailed by what F feels, then 'F feels that he is ill'.

Obviously, a matrix verb is deductively closed iff it is not deductively open.

5.2   Syntactic realization of deductive closures of si-objective matrix-verbs

In connection with deductively open SI-objective matrix-verbs in German, it is important to note that its deductive closure can be linguistically marked: <u>Either</u> there is an appropriate ProPP such that *verb ProPP dass* is the deductive closure of *verb dass,* e.g. F weiß/hört davon, dass M kommt 'F knows/ hears ProPP that M will come' meaning *'M is coming'* is entailed by what *F knows/hears,* <u>or</u> there is an appropriate suppletive expression *pred ProPP dass* representing the deductive closure. For instance, *darüber sprechen* 'speak about' and *darüber reden* 'talk about' can be regarded as suppletive predicates for the deductive closure of *sagen dass* 'tell'. *Or* the SI-objective matrix verb itself is deductively closed and thus representing its deductive closure – cf. *merken* 'notice'.

Notice that a ProPP generally does not turn a non-inherently SI-objective *dass*-verb into an inherently SI-objective one. For instance, *Frank hört davon, dass Maria kommt* 'Frank hears ProPP that Maria is coming' entails ´Maria is coming´ only if all statements heard by Frank and implying 'Maria is coming' are true.

Notice that all AI-objective as well as all NI-objective predicates *verb dass/ob* lacking an SI-objective *dass*-form license appropriate ProPPs – e.g. (*sich*) *darin irren dass* and *sich darin täuschen dass* 'be mistaken' as well as *danach fragen ob* 'ask' and *daran zweifeln dass/ob* 'doubt'*.* Semantically, the ProPPs restrict the range of validity val(*verb dass/ob;* α, $\aleph$) of AI- and NI-objective matrix-verbs to its

subset of all σ which are contingent. Furthermore, all basically AI-objective predicates like (*sich*) *darin irren dass* and *sich darüber täuschen dass* 'be mistaken' do have an *ob*-form (cf. the *neutral ob-form* in 5.3) in contrast to their correlate-free versions – cf. §4.

5.3   Neutral ob-form (1c)

The *neutral ob-form* of a *basically objective* predicate *F verb PP-cor dass σ* is syntactically licensed iff either
   i.   *verb dass* is SI-objective but not inherently SI-objective, e.g. *davon hören ob* 'ProPP hear', but not *davon erfahren/wissen ob* 'find out/know' or
   ii.   *verb* is the deductive closed suppletive of an SI-objective *verb* – cf. *davon/darüber sprechen/ reden ob* 'ProPP talk' or
   iii.   *verb* is AI-objective – cf.(*darin*) *irren ob, sich* (*darin*) *täuschen ob* 'be mistaken about whether'

As for its semantics, *x verb ProPP ob σ* is true iff *σ* is a formula in the recursive build-up of some embedded formula *φ* for which *x verb ProPP dass φ* is true.
For example, if *φ* is '*x is mistaken ProPP that Pauline will come if Maria will come*', then '*x is mistaken about whether M will come*'.

5.4   Es-correlates and restricted external ob-form (1a)

An *es*-correlate is syntactically licensed for an objective matrix-predicates as well as for the latter's external *ob*-forms if the predicate is SI-objective. For example, *es wissen dass/ob* 'know that/ whether', *es hören dass/ob* 'hear', *es sagen dass/ob* 'tell', but neither *es zweifeln dass/ob* 'doubt', nor *es fragen ob* 'inquire', nor *es irren dass* 'be wrong', which all are NI-objective. The syntactically legitimate presence of the *es*-correlate semantically restricts the range of validity val(*verb ob*; α,ℵ) of *verb ob* to its subset of all σ which are contingent. The *ob*-form *verb es ob* of a basically SI-objective *verb-dass* with *es* will therefore be called a *restricted external ob*-form.

5.5   Factivity and anti-factivity

The use of the *es*-correlate turns many SI-objective predicates into factive ones. A predicate *x pred* (*y*) *dass σ* is called *factive* if it is semi-implicative and if it is semi-implicative also within the scope negation, i.e. *x pred* (*y*)(*nicht*) *dass σ ⇒ σ* – cf. *es wissen dass* 'know', *es erfahren dass* 'be told about', *es hören dass* 'hear', *es sehen dass* 'see', *es merken dass* 'notice', *es fühlen dass* 'feel' but not *es sagen dass* 'say'. There is no matrix-predicate that is factive without a correlate.

   Besides many SI-objective verbs getting factive in the presence of an *es*-correlate, there are also numerous non-objective verbs that become factive in the context of a correlate – cf. *es bedauern dass* 'regret', *dafür dankbar sein dass* 'be grateful' and §7.2.

   A predicate *x pred dass σ* is called *anti-factive* if it is anti-semi-implicative with or without negation, i.e. *x pred* (y) [*nicht*] *dass σ ⇒ ¬σ* – cf. *es vorziehen dass* 'prefer'.

   Since predicates are only (anti-)factive if they co-occur with a correlate, we can formulate the *General* (*Anti-*) *Factivity Rule*: There is no matrix-predicate that is (anti-)factive without a correlate.

5.6   Non-exhaustive wh-form of objective predicates (1e)

The *wh*-form *x verb cor wh σ* of a basically objective verb *x verb cor dass/ob σ(y)* is syntactically legitimate without further restrictions. For example *F zweifelt daran, wer kommt* 'F doubts ProPP who comes'.

   As for the semantics of the *wh*-form x *verb cor wh σ* of a basically objective verb *x verb cor dass/ ob σ(y)*, it is non-exhaustive. If it contains the *es*-correlate as in *es hören dass* 'hear', it is para-phrasable as *x verb cor dass/ob ∀y µ(y)*, where the choice between *dass* and *ob* and the choice of

the *specification μ(y)*, wich is a formula of the basic embedding language L involving *σ(y)* are given contextually. If the correlate is a ProPP and *verb dass* is SI-objective and licenses both, the *dass-* and the *ob-*form, in the presence of the correlate (e.g. *davon hören dass*), the paraphrase is again *x verb cor dass/ob* $\forall y\mu(y)$ with the same freedom of choice as in the case of the *es-*correlate. However, if *x verb ProPP dass* does not license the *ob-*form (e.g. *davon wissen dass* 'know') or *x verb ProPP ob* does not originate as an SI-objective *dass-*form (e.g. *zweifeln daran dass* 'doubt' and *fragen danach ob* 'ask'), the paraphrase *x verb ProPP dass/ob* $\forall y\,\mu(y)$ does not allow a free choice between *dass* and *ob* anymore – cf. *F zweifelt daran, wer kommt* 'F doubts *ProPP* who will come' can only be paraphrased by *F zweifelt daran, <u>ob</u>* $\forall y\,\mu(y)$.

6   Non-objective verbs: consistency levels and consistency degrees

To present the semantic conditions ruling the syntactic behavior of non-objective verbs, we take the first order language L[ℵ] of the embedded propositions dealing with any constellation ℵ as a starting point (cf. §2) and develop the concept of *consistency levels* of embedded propositions and the concept of *consistency degrees* of matrix verbs.

6.1   *Absolute consistency levels*

$\perp_\aleph$	$\stackrel{\perp}{=}_\aleph$	$\blacksquare_\aleph\square_\aleph$	$\overline{\top}_\aleph$	$\top_\aleph$
absolute propositional contradictions	contradictions\ absol.prop. contradictions	invalid valid (contingent)	tautologies\absol. propositional tautologies	absolute propositional tautologies

inL[ℵ]

An absolute consistency level consist for each ℵ, of a set of embeddable propositions from L[ℵ] having a logical property as indicated. For example $\overline{\top}_\aleph$ ($\stackrel{\perp}{=}_\aleph$) consists of the all *tautologies* (*contradictions*) with the exception of all propositional *tautologies* (*contradictions*), i.e. except all formulas arising from purely propositional formulas which are *tautologies* (*contradictions*) in replacing the propositional variables by contingent first order formulas. An example for an absolutely propositional tautology may look like: *jemand kommt oder niemand kommt* 'somebody is coming or nobody is coming' arising from the propositional tautology *σ ∨ ¬σ* by replacing the propositional variable σ by $\exists x(x\ kommt)$.

6.2   *The relative consistency levels*

$\dashv_{\alpha\in\aleph}$	$\stackrel{\perp}{\dashv}_{\alpha\in\aleph}$	$=_{\alpha\in\aleph}$	$\models_{\alpha\in\aleph}$	$\vdash_{\alpha\in\aleph}$
relative propositional contradictions	contradictions to KN(α)\relat. prop. contradictions	contingent with KN(α)	consequences of KN(α)\relat. prop. tautologies	relative propositional tautologies

all in the vocabulary V(α) – cf. §2

A relative consistency level depends upon both ℵ and α, α∈ℵ. Each relative consistency level consists of a set of embeddable propositions from L[ℵ] in the vocabulary V(α) of KN(α) and it depends explicitly upon the knowledge KN(α) of the respective individual α (cf. §2). E.g. for each α∈ℵ, the relative consistency level $\vdash_{\alpha\in\aleph}$($\dashv_{\alpha\in\aleph}$) consists of the *relative propositional tautologies* (*contradict-*

tions) that arise from purely propositional tautological (contradictory) formulas by replacing the propositional variables by formulas which are contingent with the knowledge KN(α) (cf. §2). E.g., *jemand kommt oder niemand kommt* 'somebody is coming or nobody is coming' is a relative propositional tautology with respect to the individual α, provided that *jemand kommt* is contingent with α´s knowledge KN(α).

For each α, the relative consistency level $\vDash_{\alpha \in \aleph}$ comprehends those embeddable formulas from V(α) ⊂ L[ℵ] which follow from the knowledge KN(α) and do not belong to the consistency level $\vdash_{\alpha \in \aleph}$.

The relative consistency level $=_{\alpha \in \aleph}$ consists of all embeddable propositions from V(α) inL[ℵ], which are contingent with KN(α).

6.3   Range of validity and the consistency degree of non-objective matrix predicates

Like objective matrix-verbs, any non-objective predicate *x pred dass/ob* with an individual variable *x* [and possibly a second individual variable y] gives rise to *the **range of validity*** val(*pred;* α,[ß,] ℵ) for every <α,[ß,] ℵ>, where α [ß] ∈ℵ. The range of validity val(*pred;* α,[ß] ℵ):= {σ | α *pred* [ß] *dass/ob* σ holds in ℵ)} is the set of the (embeddable) formulas *σ* which validate α *pred* [ß] *dass/ob* σ in ℵ - cf. §5. For instance, the range of validity of *bedauern* 'regret' val(*bedauern dass;* α, ℵ) is contained as a subset in the union of the three sets in {■$_\aleph$, □$_\aleph$, $\mp_\aleph$} as a subset, for each pair <α, ℵ>, where α∈ℵ. On the other hand, the range of validity of *drohen dass* 'threaten' val(*drohen dass,* α, ß, ℵ) is contained in the union ∪{$\vdash_{\alpha \in \aleph}$,$=_{\alpha \in \aleph}$, $\vDash_{\alpha \in \aleph}$} as a subset, for every <α, ß, ℵ>, where α, ß∈ℵ.

There are ditransitive predicates α *pred ß dass/ob σ* like *ärgern* 'annoy' the consistency level of which is related to the object variable *ß*, e.g. *Frank belasted Maria damit, dass er schnarcht* 'Frank stresses Maria ProPP that he is snoring'. Here, val(α, *damit belasten dass,*ß,ℵ) is a subset of the consistency level $\vdash_{ß \in \aleph}$ for every triple <α, ß, ℵ>, where αß ∈ℵ. In such a case we supply the consistency level involved with an upper cross #, e.g. $\vdash^{\#}_{ß \in \aleph}$.

A family {$\kappa v^1_\aleph$, .. ,$\kappa v^r_\aleph$; $\kappa v^{r+1}_{\alpha \aleph}$, .. ,$\kappa v^{r+s}_{\alpha \aleph}$} of consistency levels is called a *covering* of a matrix-predicate *pred* if val(*pred;* α, ℵ) ⊆ ∪{$\kappa v^1_\aleph$, .. ,$\kappa v^r_\aleph$; $\kappa v^{r+1}_{\alpha \aleph}$, .. ,$\kappa v^{r+s}_{\alpha \aleph}$} for all ℵ and all α∈ℵ. For example, {$\stackrel{\perp}{=}$, ■, □, $\mp$} covers *bedauern dass* 'regret' and {$=^{\#}$, $\vDash^{\#}$} covers *belasten damit dass* 'stress'.

A covering of a non-objective predicate will be called the ***consistency degree*** of the predicate *pred* CD(*pred*) if it is the only covering of *pred* which by dropping any of its consistency levels loses its covering property with respect to *pred.* For example *bedauern dass* 'regret' has the consistency degree CD(*bedauern dass*) = {■, □, $\mp$}.

A non-objective matrix-verb *verb dass/ob* is said to have an ***absolute*** or ***relative consistency degree***, respectively, if its consistency degree contains only absolute or relative consistency levels. For example, *bedauern dass* 'regret' with CD = {■, □, $\mp$} is of absolute consistency degree, while *sich freuen dass* 'be glad' has the relative consistency degree CD = {$=$, $\vDash$ }.

A non-objective matrix-verb *verb dass/ob* is said to have a combined ***consistency degree***, if the latter contains both, absolute and relative, consistency levels. For example, *glauben dass* 'believe' with CD = {$\stackrel{\perp}{=}$, $=$, □, $\vDash$} and *hoffen dass* 'hope' with CD = {$\stackrel{\perp}{=}$, ■, $=$,$\mp$}.

Non-objective verbs like *flüstern dass* 'whisper' and *schreien dass* 'shout' do not submit to any consistency conditions. Thus, for every possible consistency level κv, there is a constellation ℵ, an individual *α∈ℵ* and an embedded expression *σ∈κv$_{\alpha \aleph}$* such that α *flüstert/schreit dass σ* is valid in ℵ. Therefore, these verbs do not have a consistency degree.

7 Non-objective verbs: *Es-* and *ProPPs, internal ob-form and non-exhaustive wh-form*

The absolute, relative and combined consistency degrees reflect the correlates the particular matrix predicate license. *Es*-correlates are licensed by predicates with an absolute or combined consistency degree, e.g. (*es*) *bedauern dass* 'regret'with CD = {■, □, ⊤̸}, (*es/darüber*) *diskutieren dass* 'discuss' with CD = {■, □, ⊤̸, ⊨, ⊢}, (*es/daran*) *glauben dass* 'believe' with CD = {⊥̸, =, □, ⊨} and (*es/darauf*) *hoffen dass* 'hope' with CD = {⊥̸, ■, =, ⊤̸}. ProPPs, on the other hand, are licensed with a relative consistency degree, e.g. (*darüber*) *traurig sein dass* 'be sad'with CD = {⊨, ⊢} and, again, by predicates having a combined consistency degree.

   Due to reasons of argument linking, *es*-correlates are optional whereas ProPP are either optional or obligatory. Predicates requiring an obligatory ProPP are, for instance, *sich darauf stützen dass* 'draw upon' and *sich daran stören dass* 'be bothered by', both with CD = {⊨}, or *bestehen darauf dass* 'insist on' with CD = {=}. Predicates with optional ProPPs are, for instance, *sich darauf/darüber freuen* 'look forward/be glad', where CD(*sich freuen dass*) = {=, ⊨}, while CD(*sich freuen darauf dass*) = {=} and CD(*sich freuen darüber dass*) = {⊨}.

7.1   Internal ob-form (1d)

If a non(basically)-objective predicate *pred* displays a consistency degree containing ⊤ or ⊨, the restriction of its domain to the subset {(σ ∨ ¬σ) | σ is contingent} of ⊤ or to the subset {(σ ∨¬σ) | σ is contingent with the subject's/object's knowledge} of ⊨, respectively, is called the **internal ob-form** of *pred* cf. (1d). Furthermore, *x pred*(σ ∨ ¬σ) is denoted by *x pred ob σ*. A simple example is *kontrollieren ob* 'check'. Its very domain is {(σ ∨ ¬σ)|σ∈L[ℵ] and σ is contingent}. Thus, the matrix-verb *kontrollieren* is its own internal *ob*-form. More general examples are *x bedenkt es, ob σ* 'x considers *es*-cor whether σ' denoting *x bedenkt es dass* (σ ∨ ¬σ) and *x denkt darüber nach, ob σ* 'x thinks ProPP whether σ' denoting *x denkt darüber nach, dass*(σ∨¬σ).

   The consistency degree of an internal *ob*-form is either ⊤ or ⊨, depending on whether the matrix verb is an absolute or relative one.

   There are non-objective matrix-verbs *x verb dass* like *ignorieren dass* 'ignore' exhibiting an internal *ob*-form like *x verb ob σ* which can be paraphrased by *x verb ob σ ∨ x verb ob ¬σ* in analogy to the external *ob*-form, but with the range of validity is restricted to contingent σ's – cf. §4. Therefore this *ob*-formis called *restricted external ob-form*. Notice that a ProPP which is obligatory in a *dass*-form may be omitted in the corresponding *ob*-form, e.g. *nachdenken* (*darüber*) *ob* 'consider'.

7.2   Semantic impact of the es-correlate and the ProPP

The legitimate use of the *es*-correlate may restrict the range of validity of the verb by strengthening its consistency degree – cf. *bedauern dass* 'regret' with CD = {■, □, ⊤̸} which gets strengthend to CD = {□, ⊤̸}, *bedenken dass* 'consider' with CD = {■, □, ⊤̸, ⊤} which is restricted to CD = {□, ⊤̸, ⊤}, *in Betracht ziehen dass* 'take into consideration' with CD = {⊥̸, ■, □} which is restricted to CD = {■, □} whenever the *es*-correlate is used. Notice that *bedauern dass* 'regret' and *bedenken dass* 'consider' have been turned into semi-implicative predicates by dropping the consistency level ■ when exhibiting the *es*-correlate.

   As to the verb *erreichen dass* with CD = {□} the *es*-correlate does not have any semantic impact. Predicates with a combined consistency degree CD = Δ_abs ∪ Γ_rel, where Δ_abs consists of absolute consistency levels and Γ_rel of relative consistency levels, assume the absolute consistency degree Δ_abs when exhibiting their *es*-correlate, e.g. *hoffen dass* 'hope' with CD = {⊥̸, ■, =, ⊤̸}which is restricted to CD = {⊥̸, ■, ⊤̸} by the *es*-correlate.

   The presence of a legitimate optional ProPP strengthens the relative consistency degree of a non-objective matrix verb by restricting its range of validity. For instance, the consistency degree of *sich*

freuen dass 'be happy', which is {=, ⊨}, is limited to {=} if it exhibits the ProPP *darauf* – cf. *sich darauf freuen dass* 'look forward'. If it displays the ProPP *darüber* as in *sich darüber freuen dass* 'be glad about', it is restricted to CD = { ⊨}. The effect of a legitimate ProPP on a matrix-verb with combined consistency degree Δ$_{abs}$∪ Γ$_{rel}$ is to restrict it to the relative part Γ$_{rel}$, e.g. *glauben dass* 'believe' with CD = {⊥, =, □, ⊨} is turned into *glauben daran dass* with CD = {=, ⊨} – cf. 7.6.

7.3   Factivity and non-objective predicates

A non-objective verb with an absolute consistency degree that is not semi-implicative but becomes semi-implicative only in the presence of the *es*-correlate becomes also **factive** – cf. *es bedauern dass* 'regret', *es bedenken dass* 'consider' and §§5 and 7.2. But neither es *erreichen dass* 'manage' nor *es beweisen dass* 'prove', which are semi-implicative without their *es*-correlate, nor *es annehmen dass* 'assume'and *es ausschliessen dass* 'exclude', which do not become semi-implicative in the presence of their *es*-correlate, are turned into factive predicates by the latter.

7.4   Definitions of cognitence and cognitivity of non-objective predicates

Predicates *pred dass* with CD(*pred dass*)= { ⊨} like *sich darüber freuen* 'be glad about' will be called *cognitent* predicates. Their characteristic property is by definition of ⊨ in §6.2 that *x pred dass σ* entails that *σ* follows from the subject *x´s* knowledge KN(x) – cf. §2. In analogy to the concepts of semi-implicativity and factivity (cf. §5), we call a cognitent predicate *pred dass* a *cognitive* predicate if the it entails that *σ* follows from KN(x) also if it is in the scope of negation.

7.5   Rules concerning cognitence and cognitivity of non-objective predicates

A predicate without a ProPP cannot be cognitent. For instance, the verb *sich freuen dass* 'be glad', with CD = { =, ⊨} is not cognitent without its ProPP. It becomes cognitent with the ProPP *darüber* meaning 'be glad about'. The reverse assertion does not generally hold. If, for instance, the very same predicate *sich freuen* 'be glad' exhibits the ProPP *darauf* as in *sich darauf freuen dass* 'look forward', it has CD = { =} and is not cognitent by definition.

Any cognitent predicate is cognitive iff its ProPP is optional. For example, the correlate *darüber* in the cognitive *sich darüber freuen dass* 'be glad about' is optional, while *sich daran stören dass* 'be bothered by' with its obligatory ProPP is cognitent but not cognitive.

7.6   Modified consistency degrees of non-objective matrix-verbs

If, in addition, a matrix verb *verb* has CD(*verb*) = {κν^1, …, κν^m, … , κν^n} and assumes the consistency degree CD(*verb cor*) = {κν^1, …, κν^m} with a legitimate correlate *cor*, we indicate the modification of CD(*verb*) by underlining the pertaining consistency levels. The *modified* consistency degree is written as MCD$_{cor}$(*verb*) = {κν^1 , … ,κν^m, …, κν^n}. Take for instance *bedauern dass* 'regret', there the *modified* consistency degree is MCD$_{cor}$(*bedauern es dass*) = {■, □}, or *vorziehen dass* 'prefer', its *modified* consistency degree is MCD$_{cor}$(*vorziehen dass*) = {■, □}, and finally *glauben dass* 'believe', it has MCD$_{cor}$ (*glauben dass*) = {⊥ , =, □, ⊨}.

If *verb cor* is factive, anti-factive or cognitive in addition, we indicate this by prefixing the pertaining consistency level □, ■ or ⊨ with @. The modified consistency degree *supplemented* in this way becomes SCD$_{cor}$(*verb*) = {@κν^1, …, κν^m, …, κν^n}. As for *bedauern* 'regret', which is factive with the *es*-correlate, the *supplemented* consistency degree is SCD$_{es}$(*bedauern dass*) = {■, @□, ⫤}, *vorziehen dass* 'prefer', which is anti-factive with the *es*-correlate, has SCD$_{es}$(*vorziehen dass*) = {@■, □}, *glauben dass* 'believe' has SCD$_{daran}$(*glauben dass*) = MCD$_{daran}$(*glauben dass*) = {⊥ , =, □ , ⊨} and *sich freuen dass* 'be glad', which is cognitive with its ProPP *darüber* as in *sich darüber freuen dass* and is not cognitive with the ProPP *darauf* as in *sich darauf freuen* 'look forward' the *supplemented* consistency degree is

either SCD$_{darüber}$(*sich freuen dass*) = {$=$, @$\underline{\models}$} or SCD$_{darauf}$(*sich freuen dass*) = MCD$_{darauf}$(*sich freuen dass*) = {$\underline{=}$, $\models$}.

7.7 The non-exhaustive wh-form of non-(basically) objective predicates (1e)

The *wh*-form *x verb cor wh σ* of a non-(basically) objective predicate *verb cor* is syntactically legitimate iff

i. predicate *verb cor* allows an internal or a restricted external *ob*-form, cf. *darüber nachdenken wh* 'think about', *es kontrollieren wh* 'check' **or**

ii. predicate *verb cor* is factive or cognitive, respectively, in the context of the legitimate *es*- or ProPP – cf. *es bedauern wh* 'regret' and *sich darüber freuen wh* 'be glad'.

The non-exhaustive *wh*-form is not licensed by *es beweisen dass* 'prove'*,* which is not factive, or by *es/darauf hoffen dass* 'hope', which are neither factive nor cognitive*.*

As to the meaning of the non-exhaustive *wh*-form, it relates to a contextually given specification and to a contextually given choice between *dass*- and *ob*-form if both are licensed syntactically by *verb cor* – cf. (1e) and §5.6.

8 Further applications of consistency conditions

8.1 Embedded root declaratives (verb second)

Embedded root declaratives as given in i in §1 are licensed by a matrix-predicate if and only if it is **either**

i. SI-objective, e.g. *wissen dass* 'know', *erfahren dass* 'find out', *sagen dass* 'tell', *fühlen dass* 'feel'
   or

ii. it is non-objective and submits to one of the following conditions

   a. the union of its consistency degree $\cup$ CD(*verb dass*) contains ($\dashv \cap \stackrel{\perp}{=}$) $\cup$ ($\models \cap \overline{\top}$) as a subset, e.g. *versprechen dass* 'promise'*, verkünden dass* 'announce' both with CD = { $\stackrel{\perp}{=}$,$\blacksquare$,$\square$, $\overline{\top}$}; *drohen dass* 'threaten' with CD = {$\dashv$,$=$, $\models$}; *annehmen dass* 'assume' with CD = {$\stackrel{\perp}{=}$,$\blacksquare$,$\square$, $\overline{\top}$ }; *glauben dass* 'believe' with CD = {$\stackrel{\perp}{=}$, $=$, $\square$, $\models$} and *hoffen dass* 'hope' with CD = {$\stackrel{\perp}{=}$, $\blacksquare$, $=$,$\overline{\top}$}
   or

   b. it has a supplemented consistency degree SCD = {@$\blacksquare$, $\square$}, e.g. *vorziehen dass* 'prefer', which is anti-factive with the *es*-correlate
   or

   c. it does not have a consistence degree, e.g. *flüstern dass* 'whisper'.

Embedded root declaratives are thus not licensed by predicates like: *beweisen dass* 'prove' with CD = {$\square$, $\overline{\top}$, $\top$}, *bedauern* 'regret' with CD(*bedauern dass*) = {$\blacksquare$, $\square$, $\overline{\top}$}, *bedenken* 'consider' with CD = {$\blacksquare$, $\square$, $\overline{\top}$, $\top$}, *widerlegen* 'refute' with CD = {$\perp$, $\stackrel{\perp}{=}$, $\blacksquare$}*,* *ablehnen dass* 'reject' with CD = {$\blacksquare$, $\square$}.

Notice thatthe rules entail that no matrixverb licenses verb second in the presence of a correlate.

8.2 Subject control

A ditransitive predicate *x verb* (*cor*) *y dass* imposes obligatory subject control (cf. §1 iv) if and only if it is not objective or basically objective and it has **either**

i. the absolute SCD$_{es}$(*verb dass*) = {$\stackrel{\perp}{=}$, $\blacksquare$, $\square$, $\overline{\top}$}$^+$ or {$\stackrel{\perp}{=}$, $\blacksquare$, $\square$, $\overline{\top}$}$^{++}$ or {@$\blacksquare$}$^{+++}$ or {@$\square$}$^{++++}$, e.g. *versprechen dass*$^+$ 'promise', *verkünden dass*$^+$ 'announce', *anbieten dass*$^+$ 'offer', *schwören dass*$^{++}$

'swear', *schulden dass*[+++] 'owe', (*es*) [*ver-*]*danken*[++++] in contrast to *befehlen dass* 'command', *erlauben dass* 'permit', *unterstellen dass* 'insinuate', *verweigern dass* 'refuse' all with SCD_{es} = {■, □}

or

ii. the relative $\text{SCD}_{\text{ProPP}}$(*verb dass*) = {⊣, =, ⊨}[+] or {⊣, =, ⊨}[++], e.g. *antworten dass*[+] 'answer', *drohen dass*[++] 'threaten', in contrast to *zwingen dass* 'force' and *bitten dass* 'ask', both with $\text{SCD}_{\text{ProPP}}$ = {⊣, =} and *beneiden dass* 'envy' and *danken dass* 'thank', both with $\text{SCD}_{\text{ProPP}}$ = { =, @⊨}

or

iii. the relative $\text{SCD}_{\text{ProPP}}$(*verb cor dass*) = ⊨#} having an obligatory ProPP (see §6.3) – cf. *ärgern damit dass* 'annoy', *belasten damit dass* 'stress', *behindern dadurch dass* 'impede' in contrast to *betrauen damit dass* 'entrust', *verführen dazu dass* 'entice' both with $\text{SCD}_{\text{ProPP}}$ = {⊣} and obligatory ProPP.

8.3   *Wenn*-form

The *wenn*-form *x pred (cor) wenn σ*, as mentioned in §1 v, is syntactically licensed iff *pred* is **either**

i.
   a. basically SI-objective, e.g. *es/davon hören* 'hear', *es/davon wissen* 'know', *es sagen/ davon sprechen* 'tell it/talk about' but not (*daran*) *zweifeln dass* 'doubt', (*danach*) *fragen ob* 'inquire', which both are NI-objective and *irren/sich täuschen* (*darin*) *dass* 'be wrong' which are AI-objective

   or

   b. non-objective and not basically objective and factive or cognitive with its legitimate correlate and licenses an internal *ob*-form only if the latter is a restricted external one (cf. (1a) and §5.4), e.g. *es bedauern* 'regret', *sich darüber freuen* 'be glad', *es ignorieren* 'ignore' but neither *annehmen* 'assume', *hoffen/glauben dass* 'hope/ believe', *drohen dass*, which are all non-objective, non factive, non-anti-factive and non-cognitive with their correlate,[2] nor (*es*) *bedenken dass* 'consider' and *darüber nachdenken dass* 'think about', which both are factive or cognitive, respectively, and the internal *ob*-form of which is not a restricted external one.

   or

ii. non-objective and anti-factive (cf. §5.5), e.g. *es vorziehen* 'prefer'.

As for the verb classes ia and b, the *wenn*-form *x pred (cor) wenn σ* is semantically determined by the paraphrase *σ ⇒ x pred (cor) dass σ*. For instance, *Frank hört es/ bedauert es, wenn Max kommt* 'F hears it/regrets it if M comes' is paraphrased by *Wenn M kommt, hört es/bedauert es F, dass M kommt* 'if M comes, F hears it/regrets it that M comes'

As for verb class ii, the *wenn*-form is paraphrased by *¬σ ⇒ x pred (cor) dass σ*. For instance, *Frank zieht es vor, wenn M kommt* 'F prefers it if M comes' is paraphrased by *Wenn M nicht kommt, zieht es F vor, dass M kommt* 'if M does not come, F prefers it that M comes'.

8.4   *Nominalization*

A matrix-predicate *pred* licenses a nominalization if and only if one of the following properties hold:

i. *pred* is SI-objective but not inherently SI-objective, e.g. *hören dass* 'listen' but not *wissen/ erfahren dass* 'know/find out'.

---

[2] Notice that the correlate of a predicate like *sich freuen* 'be glad' is optional and can be dropped.

ii. *pred* exhibits a legitimate ProPP, e.g. *wissen/hören davon dass* 'know/hear about', *drohen damit* 'threaten', *glauben daran* 'believe' and *hoffen darauf* 'hope'.

iii. *pred* is non-objective, not basically objective, of absolute consistency degree and $\text{SCD}_{es}(pred)$ does not contain $\overset{\perp}{=}$, e.g. *akzeptieren dass* 'accept' with $\text{SCD}_{es} = \{\blacksquare, \square, \overline{\top}\}$, *ausschließen dass* 'exclude' with $\text{SCD}_{es} = \{\blacksquare, \square\}$, *versprechen dass* 'promise' with $\text{SCD}_{es} = \{\overset{\perp}{=}, \blacksquare, \square, \overline{\top}\}$ but not *schwören dass* 'swear' and *annehmen dass* 'assume', which both have $\text{SCD}_{es} = \{\overset{\perp}{=}, \blacksquare, \square, \overline{\top}\}$, *glauben dass* 'believe' with $\text{SCD}_{es} = \{\overset{\perp}{=}, =, \underline{\square}, \vDash\}$ and *hoffen dass* 'hope' with $\text{SCD}_{es} = \{\overset{\perp}{=}, \blacksquare, =, \overline{\top}\}$, which all contain $\overset{\perp}{=}$ in their SCD_{es}.

REFERENCES

Égré, P. (2008), "Question-Embedding and Factivity", *Grazer Philosophische Studien* 77, 85-125.

Égré P. & Spector B. (2007), "Embedded Questions Revisited: An Answer, not necessarily The Answer". Ms, Harvard & IJN.

Fabricius-Hansen, C. (1980), "Sogenannte ergänzende wenn-Sätze. Ein Beispiel syntaktisch-semantischer Argumentation". In: Festschrift für Gunnar Bech zum 60. Geburtstag. *Kopenhagener Beiträge zur germanistischen Linguistik*, Sonderband 1. København.

Ginzburg, J. & Sag, I. A. (2000), Interrogative Investigations, The Form, Meaning, and Use of English Interrogatives . CSLI Publications: Stanford.

Groenendijk J. & Stokhof M. (1982), "Semantic Analysis of Wh-Complements", *Linguistics and Philosophy* 5, 117-233.

Lahiri, U. (2002), Questions and Answers in Embedded Contexts. Oxford Studies in Theoretical Linguistics, Oxford.

Meinunger, A. (2006), The discourse status of subordinate sentences and some implications for syntax and pragmatics', In V. Molnár & S. Winkler (Hrsgs): 'Architecture of Focus. Mouton de Gruyter: 459-487.

Schwabe K. & Fittler R. (2009), "Semantic Characterizations of German Question-Embedding Predicates", in: P. Bosch, D. Gabelaia, and J. Lang (eds.): TbiLLC 2007, LNAI 5422, 229-241. Springer-Verlag Berlin Heidelberg.

Stiebels, B. (2007), Towards a typology of complement control. In: Barbara Stiebels (ed.), *ZAS Papers in Linguistics* 47, 1-80