Syntactic force of consistency conditions for German matrix predicates

The paper presents particular semantic properties of German proposition embedding verbs – the so-called *consistency conditions*. They determine:

i) the clause type of the embedded clause: declarative, *whether*- or *wh*-interrogative [cf. *wissen* 'know'/*sagen 'tell'/bedenken dass* 'think about' that/whether/wh vs *fragen* 'ask' *that/ whether/wh vs *zweifeln* 'doubt' that/whether/*wh vs *bedauern* 'regret' that/ *whether/wh] and

ii) the correlate type [cf. *F denkt darüber nach dass* 'F thinks about that' vs *F glaubt es, dass* 'F believes it that '].

They also explain why *wissen dass* and *darüber nachdenken dass* 'think about' differ with respect to the logical forms of their *whether*-forms as well as of their *wh*-forms. *Know* like *tell* exhibit what we call the *external ob-form* and the *exhaustive wh-form*. *Darüber nachdenken dass*, on the other hand, shows the *internal ob-form* and the *non-exhaustive wh-form*.

(1) a. e*xternal ob-form*
Frank weiß/sagt/fragt, ob σ
F knows/tells whether σ ↔ (F knows that σ ∨ F knows that ¬σ)

b. *exhaustive wh-form*
Frank weiß/sagt/fragt, wer kommt
F knows/tells/asks who is coming ↔ ∀x (F knows/tells/asks whether x is coming)

(2) a. *internal ob-form*
Frank denkt darüber nach ob σ
F thinks about whether σ ↔ F thinks about that (σ ∨ ¬σ)

b. *non exhaustive wh-form*
Frank denkt darüber nach, wer gekommen ist
F thinks about who has come ↔ F thinks about that/whether μ,
with μ being a contextually given proposition.

Our approach towards verbs licensing *that*- and external or internal *whether*-complements differs from Groenendijk & Stokhof (1982) and Ginzburg & Sag (2000) in including verbs admitting the internal *whether*-form. Unlike Lahiri (2002), Égré & Spector (2007), and Égré (2008), our approach explains, without recurring to functional notions like "responsive" or "rogative", how the *whether*-form of *know* differs from the *whether*-form of *think about*, why *believe* and *regret* do not license any *whether*-form, and why *regret*, which is not semi-implicative (Schwabe & Fittler 2009) or non-veridical (Égré 2008), respectively, becomes semi-implicative or veridical, respectively, and even factive if it embeds a *wh*-clause.

The underlying semantic models – called *constellations* – consist each of a first order structure modeling the embedded propositions (e.g. *x kommt* 'x comes') upgraded by the embedding verbs with their appropriate clause- and correlate-types (e.g. *F glaubt daran, dass M* kommt 'F believes in that M is coming').

As to the consistency conditions, very basic ones are the *Witness Existence Condition* (*WEC*) and *Negation-Invariance*:

(3) *Witness Existence Condition* (*WEC*)
∃x (x *verb dass/ob* σ) ∨ ∃x (x *verb dass/ob* ¬σ), for all σ

(4) *Negation-Invariance*
x *verb dass/ ob* σ ↔ x *verb dass/ob* ¬σ

Verbs fulfilling WEC are *wissen dass/ob, fragen ob, glauben dass* 'believe', but not *bedauern dass*, *beweisen dass* 'prove' or *kontrollieren ob* 'check'. Predicates that are negation-invariant are *wissen ob, fragen ob, kontrollieren ob*, *es bedenken ob* 'consider' und *darüber nachdenken ob* 'think about'. *Zweifeln ob* 'doubt' is only consistent with negation-invariant.

Further consistency conditions are subdivided into *absolute, relative,* and *combined* consistency conditions**.** Absolute ones correlate the possible truth values of the matrix verb and the possible truth values or consistency properties of the embedded proposition *σ*. Relative ones,

on the other hand, correlate the possible truth values of the matrix verb with the consistency properties of the embedded *σ* and the set [KN(x)] of statements the matrix-subject x knows.

- *Absolute consistency conditions*

(5) a. *semi-implicative* x *verb dass* σ → σ
b. *anti-semi-implicative* x *verb dass* σ → ¬σ
c. *absolutely intautological* x *verb dass* σ → σ is not tautological
d. *absolutely consistent* x *verb dass* σ → σ is consistent
e. *absolutely contingent* x *verb dass* σ → σ is contingent

Verbs being semi-implicative are *wissen dass* and *sich darüber beklagen dass* 'complain about', but not *bedauern dass* 'regret' – cf. Égré's (2008). Verbs that are anti-semi-implicative are *(sich) irren dass* 'be wrong', *widerlegen dass* 'refute' and *verhindern dass* 'prevent'. Predicates that are absolutely intautological are *rechtfertigen dass* 'justify', *annehmen dass* 'assume', *sich freuen dass* 'be glad', *es glauben dass* 'believe it', but not *bedenken dass* 'consider'. Verbs being absolutely consistent are *wissen dass* and *bedenken dass*, but not s*agen dass* 'tell' and *glauben dass*. Examples for absolutely contingent predicates are *bedauern dass, verdrängen dass* 'repress', and *kontrollieren ob*.

- *External whether-form*

A predicate licenses the external *ob*-form [cf. (1a)] if and only if it is *objective*:

(6) *Objectivity Condition*
Verb dass/ob is consistent with either the semi-implicativity & WEC or anti-semi-implicativity & WEC or the negation-invariance & WEC.

Predicates which are consistent with semi-implicativity & WEC are *wissen dass, sagen dass,* but not *bedauern dass*, *sich beklagen dass,* and *beweisen dass*. *Bedauern dass* and *sich beklagen dass* are neither semi-implicative nor consistent with WEC. *Sich darüber beklagen dass* and *beweisen dass*, which are semi-implicative, are not consistent with WEC. *Glauben dass* is consistent with semi-implicative as well as with WEC, but not with both simultaneously. Predicates being consistent with anti-semi-implicative & WEC are *(sich) irren dass*, but not *glauben dass, widerlegen dass* or *verhindern dass* 'prevent'. Verbs which are consistent with negation-invariant & WEC are *fragen ob* and *zweifeln dass/ob*, but not *kontrollieren ob* which is not consistent with WEC.

Whereas *wissen dass* is inherently semi-implicative, *sagen dass,* like *hören dass* 'hear', is non-inherently semi-implicative, i.e. there are constellations where they are not semi-implicative, but they are necessarily semi-implicative if they exhibit the external *whether*- or exhaustive *wh*-form – cf. Égré & Spector (2007) for a similar opinion.

- *Exhaustive wh-form*

The exhaustive *wh*-form is licensed iff the verb is objective and consistent with *wissen dass*, i.e. *wissen wh*, *sagen wh*, *fragen wh*, but not *zweifeln wh*.

- *Relative consistency conditions*

(7) a. *relatively cognitent* x *verb dass* σ → [σ follows from KN(x)]
b. *relatively consistent* x *verb dass* σ → [σ is consistent with KN(x)]
c. *relatively contingent* x *verb dass* σ → [σ is contingent with KN(x)]
d. *relatively incognitent* x *verb dass* σ → [σ does not follow from KN(x)]

Verbs that are relatively cognitent are *sich darüber freuen dass* 'be glad about', *daran denken dass* 'think of', *sich darauf konzentrieren dass* 'concentrate upon' and *darüber nachdenken dass* 'think about'. Verbs being relatively consistent are *sich freuen dass* 'be glad', *darüber diskutieren dass* 'discuss', *daran interessiert sein* 'be interested in'. A predicate that is relatively contingent is *sich darauf freuen dass* 'look forward'. Verbs that are relatively incognitent are, for instance, *sich bemühen dass* 'make an effort' and *darauf hoffen dass* 'hope for'.

To take into account that the internal *whether*-form is only licensed by non-objective predicates which do not exclude tautologies, the relatively consistent predicates are subcategorized as follows:

(8) a. *improperly relatively consistent*
x *verb dass* σ → [σ is consistent with KN(x) & σ is absolutely intautological]
b. *properly relatively consistent*
x *verb dass* σ → [σ is consistent with KN(x) & σ is not absolutely intautological]

A predicate that is improperly relatively consistent and thus excluding tautologies is *sich freuen (darüber) dass* 'be glad'. Predicates that are properly relatively consistent and thus licensing tautologies are *darüber diskutieren dass*, *spekulieren dass* 'speculate on'.

- *Combined consistency conditions*

Combined consistency conditions have a form we denote by $\alpha \# \beta$, where α is an absolute and β is a relative consistency condition. Examples for predicates with combined consistency degrees are *hoffen dass* 'hope' (9a), *diskutieren dass* (9b), and *glauben dass* (9c):

(9) a. *absolutely contingent # relatively incognitent*
x verb dass σ → (σ is contingent ∨ [σ does not follow from KN(x)])
b. *absolutely consistent # properly relatively consistent*
x verb dass σ →
(σ is consistent ∨ [σ is consistent with KN(x) & σ is not absolutely intautological])
c. a*bsolutely intautological # improperly relatively cognitent*
x verb dass σ →
(σ is not tautological ∨ [σ is consistent with KN(x) & σ is absolutely intautological])

- *Partial order of consistency conditions*

As to the classes of absolute, relative and combined consistency conditions, each of them is partially ordered by logical implication, e.g. *absolutely contingent* implies *absolutely consistent*. Thus, a matrix predicate satisfying a certain consistency condition α, β, or α # β, respecttively, fulfills also all weaker consistency conditions γ, δ, or γ # δ implied by α, β, or α # β, respectively. The strongest consistency condition satisfied by the matrix predicate is the *consistency degree* of the matrix predicate.

- *Internal ob-form*

The internal *ob*-form [cf. (2a)] is only defined for at most those non-objective verbs that do not exclude tautologies. More specifically, the internal *ob*-form is licensed by just those predicates the consistency degree of which is either i) absolutely consistent (without any correlate) or ii) properly relatively consistent or cognitent. *Bedenken dass* (absolutely consistent), *spekulieren dass* (properly relatively consistent), *darüber nachdenken dass* (properly relatively cognitent) exhibit the internal *ob*-form. *Bedauern dass* (absolutely contingent), *beweisen dass* (semi-implicative), *sich freuen dass* (improperly relatively consistent), and *sich darauf freuen* (relatively contingent), on the other hand, do not. As to verbs with combined consistency degrees, the internal *ob*-form is licensed if α and β both do not exclude tautologies. Thus *glauben dass* (absolutely intautological # properly relatively consistent) excludes it whereas *diskutieren dass* (absolutely consistent # properly relatively cognitent) does not.

- *Non-exhaustive wh-form*

The non-exhaustive wh-form [cf. (2b)] is licensed by a non-objective verb if i) the verb allows an internal *ob*-form – cf. *es bedenken wh*, *es/darüber diskutieren wh,* or if ii) the verb is factive or relatively cognitent with the legitimate *es*- or *da*-correlate – cf. *es bedenken wh, es bedauern wh, es/darüber diskutieren wh and sich darüber freuen wh.* It is not licensed by *es beweisen,* which is not factive, or *es hoffen* or *darauf* hoffen, which are absolutely contingent or relatively incognitent, respectively.

- *Es-correlates*

Es-correlates are licensed just by the non-objective verbs having an absolute or combined consistency degree and by the (non-)inherently semi-implicative objective verbs, cf. *es bedauern dass, es diskutieren dass/ob, es kontrollieren ob* and *es wissen dass/ob, es sagen dass/ob. Sich freuen dass* and *darüber nachdenken dass/ob*, which have a relative consistency degree, as well as *fragen ob* and *(sich) irren dass/ob*, and *zweifeln dass/ob*, which are objective and not (non-)inherently semi-implicative, do not license an *es*-correlate.

As to non-objective predicates, the legitimate use of the *es*-correlate generally strengthens their consistency degree by restricting their range of validity. Verbs like *bedenken dass* and *bedauern dass* with an absolutely consistent or contingent consistency degree are rendered semi-implicative and become even factive. Predicates with an absolutely intautological degree become absolutely contingent – cf. *es sich vorstellen dass* 'imagine' and *es annehmen dass* ′assume′. Semi-implicative non-objective predicates like *beweisen dass* ′prove′ and *erreichen dass* 'succeed' do not lift their consistency degree if they exhibit an *es*-correlate and do not become factive.

As to objective, (non-inherently) semi-implicative verbs they become factive by the *es*-correlate, if they are absolutely consistent – cf. *wissen dass*, *hören dass* but not *sagen dass.*

- *Da-correlates*

Da-correlates are allowed just for all non-objective *dass*-verbs having a relative or a combined consistency degree – cf. s*ich* (*darauf/darüber*) *freuen dass 'be glad'/'look forward'* and (*darauf*) *hoffen dass.* And they occur with objective *dass/ob*-verbs which are absolutely consistent and the range of validity of which is not *deductively closed*. *"Deductively closed"* means that for all embedded clauses in the range of validity of the verb, their logical consequences (except tautologies) belong to this range, too. Verbs which are not deductively closed, i.e. *deductively open*, and absolutely consistent objective verbs are *wissen dass/ob, hören dass/ob, fragen ob,* and *zweifeln dass/ob.* They allow a *da*-correlate in contrast to the deductively closed *merken dass* 'notice' and the deductively open and not absolutely consistent *sagen dass.*

As to non-objective verbs, the use of an optional *da*-correlate strengthens their relative consistency degree in that it restricts the range of validity of the verb. For instance, *sich freuen dass* with the degree 'relatively consistent' becomes either relatively contingent – cf. *sich darauf freuen dass* 'look forward' – or it becomes improperly relatively cognitent – cf. *sich darüber freuen dass* ′be glad′. A relatively cognitent predicate is even relatively cognitive in that the validity of the negated matrix-predicate-expression with the *da*-correlate implies that the embedded *dass*-clause follows from the subject's knowledge KN(x) – cf. x *denkt nicht darüber nach, dass σ* entails that *σ* follows from what *x* knows. Relatively cognitent predicates always exhibit a *da*-correlate.

Predicates with a combined consistency degree α # β get the consistency degree α in the presence of an *es*-correlate and the consistency degree β if there is a *da*-correlate.

As to absolutely consistent, (non-)inherently semi-implicative objective verbs the *da*-correlate renders them inherently semi-implicative and closes their range of validity deductively, e.g. *x hört davon, dass σ* means: from the (true) evidence that x hears, it follows that *σ*.

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.

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.

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.