Consistency conditions ruling German question embedding
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1   Aim of the talk

The paper presents **purely logical conditions** – the **consistency conditions** – which determine the different syntactical behavior of German proposition embedding predicates with respect to the embedding of polar- and *wh*-interrogatives.
Exemplified list of behavior

   i. *F **weiß**/hört/fragt, **ob** M kommt* 'F knows/hears/inquires whether M is coming' and *F **weiß**/hört/fragt, **wer** kommt* 'F knows/hears/inquires who is coming' [cf. Groenendijk & Stokhof's (1982) Question Extension Embedding Predicates and Schwabe & Fittler 2009];

   ii. *F **hört es/davon, ob** M kommt* 'F hears it/about whether M is coming' and *F **hört es/davon, wer** kommt* 'F hears it/about who is coming';

   iii. *F **bedenkt, ob** M kommt* 'F considers whether M is coming' and *F **bedenkt** (**es**)**, wer kommt*** 'F considers (it) who is coming' [cf. Lahiri's (2002) responsive, non-veridical predicates] and *F **bedauert es, wer** kommt* 'F regrets it who is coming'.

Furthermore, the consistency conditions determine the **correlate types** a verb licenses and their impact onto the meaning of the matrix predicate – cf. *es bedenken* 'it consider' and *davon hören* 'ProPP[about] hear'.

2   Approaches to question embedding predicates

Our approach towards verbs licensing *ob*-forms differs from Groenendijk & Stokhof and Ginzburg & Sag (2000) in taking into account German predicate classes like ***davon hören*** 'hear ProPP[about]' and ***es bedenken*** 'it consider' licensing the **neutral ob-form** or **internal ob**-form, respectively – cf. the definitions below. (A list of approximately 1500 German proposition embedding verbs each with its consistency conditions is in preparation).
      Unlike Lahiri, Égré & Spector (2007), and Égré (2008) who recur to functional notions like "responsive" or "rogative", our approach explains which **consistency conditions determine** the **choice of** the **external** (i), the **neutral (ii)**, the **internal *ob***-form (iii)*,. the **exhaustive** (i)**, and *v.* the **non-exhaustive *wh*-form** (ii and iii).
      Our approach explains in what respect the ***ob*-form** of *zweifeln dass* 'doubt' differs from the *ob*-form of ***darüber nachdenken*** *dass* 'think about', why **believe** and **regret** do **not license** any ***ob***-form, and that ***bedauern*** 'regret', which is not semi-implicative, becomes semi-implicative and even factive in the presence of its correlate *es* 'it' so that it is able to **embed** a **wh-clause** (cf. below).

3 Basics

To fix a formal **framework**, we deal with semantic models – called ***constellations*** – each consisting of a first order structure $\aleph$ supplemented with an "appropriate" truth-valuation of the set of matrix sentences *'α verb (es/ProPP) dass/ob σ'*. Notice that ***pred*** denotes **both, verbs not showing** any of their possible **correlates and** verbs *verb es/pro-PP* **showing** a legitimate **correlate**.

An important tool for our purposes is the concept **range of validity** of *verb/pred* with respect to an individual α in $\aleph$ val(*verb/pred;*α, $\aleph$): = {σ|α *pred σ* is valid in $\aleph$}, where the σ´s are the embeddable formulas with parameters in $\aleph$ having no free variables.

4 Objective predicates (OP) – cf. pt. i on page 1.

The most elementary consistency conditions are:

(1) ***semi-implicativity* (SI)**: **[*x pred dass σ* $\Rightarrow$ *σ*],**
e.g. *wissen dass* 'know', *beweisen dass* 'prove'

(2) ***anti-implicativity*(AI)**: **[*x pred dass σ* $\Rightarrow$ $\neg σ$],**
e.g. *sich irren* 'be mistaken', *widerlegen* 'refute'

(3) ***negation-invariance*(NI)**: **[*x pred dass σ* $\Leftrightarrow$ *x pred dass* ($\neg σ$)],**
e.g. *fragen ob* 'inquire', *kontrollieren ob* 'check'.

(4) **Definition:** a verb *verb dass* is called ***objective*** if **either**
   a. *verb dass* is consistent with
      [*verb* is SI and $\cup$\{val(*verb;*α, $\aleph$)|α$\in\aleph$} equals {σ|σ is valid in $\aleph$}]   **or**
   b. *verb dass* is consistent with
      [*verb* is AI and $\cup$\{val(*verb;*α, $\aleph$)|α$\in\aleph$} equals {σ|$\neg σ$ is valid in $\aleph$}]   **or**
   c. *verb dass* is consistent with **[*verb* is NI and $\cup$\{val(*verb;*α, $\aleph$)|α $\in$ $\aleph$} equals the set of all σ´s].**

The **three** resulting **classes** of objective verbs are labeled ***SI*-objective**, ***AI*-objective** and ***NI*-objective.** The first placed examples for the SI-, AI- and NI-conditions (see i-iii above) *wissen dass* 'know', *sich irren* 'be mistaken', and *fragen ob* 'inquire' are SI- or AI- or NI-objective, respectively, in **contrast to** the second placed ones *beweisen dass* 'prove' and *widerlegen dass* 'refute' or *kontrollieren ob* 'check', respectively. The SI- and NI-objective verbs belong to pt. **i** on page 1, the AI-objective verbs are omitted there since they do not allow *ob*- and *wh*-forms. Notice that verbs in conjunction with correlates are by definition never objective and most verbs are not objective. Predicates that are not objective are labeled *non-objective predicates* (NOP).

5 Non-objective predicates (NOP)

❖ **Objectively based predicates (OBP) -** cf**.** pt. ii on page 1.

An ***objectively based*** predicate (cf. pt. ii on page 1) consists of an objective verb in conjunction with a legitimate correlate. E.g. *es wissen dass/ob* 'know it that/whether', *irren darin dass/ob* 'be mistaken about that/whether' are objectively based in contrast to *es*

beweisen dass 'prove it that'. Notice that objectively based predicates are non-objective predicates.

Which objective verbs allow what types of correlates and how the latter modify the former semantically is determined by additional concepts. The first one, the **deductive closure** $pred^{cl}$ of a predicate *pred* is determined as follows:

val($pred^{cl}$; α, $\aleph$) = val(*pred*; α, $\aleph$) ∪ {σ|σ follows from val(*pred*; α, $\aleph$) & σ is no tautology}.

This enables the formulation of the ***ProPP-rule for SI-objective verbs***:

- An **SI-objective** *verb dass* **licenses** a ***ProPP*** or a *suppletive* form with a *ProPP* **iff** *verb dass* is **not** its **own deductive closure**.
  E.g. *davon wissen dass* 'know about' represents the deductive closure of *wissen dass, darüber sprechen dass* 'talk about' represents the deductive closure of *sagen dass* 'tell' with the help of a suppletive. *Fühlen dass* 'feel' and *merken dass* 'notice', on the other hand, coincide with their own deductive closures. They do not allow *PP-correlates*.

❖ **Non-objectively based predicates (NOBP) -** cf**.** pt. iii on page 1.

Definition: a proposition embedding predicate is called ***non-objectively based*** if it consists of a non-objective verb showing or not showing a legitimate correlate. Notice that the class **NOP** is the disjoint union **OBP** ∪ **NOBP**.

As to non-objectively based non-objective predicates, two types of consistency conditions are relevant: the *absolute* and the *relative* consistency conditions.

The ***absolute*** ones comprehend beside others the SI-condition (1), the *factivity* condition (5) and the *absolute propositional tautology condition* APTC (6).

(5) **Factivity**:
∀x ∀σ **[**(x *pred* σ ⇒ σ) & (x **[not** *pred*] σ ⇒ σ)**],**
e.g. *es bedauern* 'regret it', and *es bedenken* 'consider it'

(6) **APTC**:
∃x ∃ σ **[**x *pred* (σ ∨ ¬σ) & σ is contingent**],** e.g. (*es*) *bedenken* 'consider (it)',
but **neither** (*es*) *bedauern* 'regret (it)' **nor** (*es*) *glauben* 'believe (it)'

The ***relative*** consistency conditions comprehend beside others the *cognitence* condition (7), the *cognitivity* condition (8) and the *relative propositional tautology condition* RPTC (9):

(7) **Cognitence**:
∀x ∀σ **[**(*pred* σ ⇒ σ follows from what x knows**],**
e.g. *danken dafür* 'thank for'

(8) **Cognitivity**:
∀x∀σ **[**(*pred* σ ⇒ σ follows from what x knows**]** &
∀x∀σ **[[not** *pred*]σ ⇒ σ follows from what x knows**],**
e.g. *danken dafür* 'thank for'

(9) **RTPC**: ∃x ∃ σ **[** x *pred* (σ∨ ¬σ) & σ is contingent with what x knows**],**
e.g. *darüber nachdenken* 'think about'

We are now in a position to formulate the essential rules governing the syntactic and semantic behavior concerning German question embedding along the lines of the *exemplified list of behavior* at the beginning of this paper.

6   Syntactic and semantic rules

❖ **Objective predicates (OP)** – cf. pt. ii. on page 1.

Every SI-objective *verb dass* entails an NI-objective *verb ob* e.g. *wissen dass/ob* 'know that/whether', *hören dass/ob* 'hear that/whether'.

- All SI-objective *dass*-verbs license an *ob*-form we call the ***external ob-form***. It is paraphrased by

  '*x verb dass σ ∨ x verb dass ¬σ*'.

- Each SI- and NI-objective *verb dass/ob* which in addition is consistent with *wissen dass* 'know' licenses the ***exhaustive wh-form***. It is paraphrased by

  '*x verb $wh_y σ_y$ ⟺ ∀y [x verb ob σ(y)]*'.

  This additional condition ist fulfilled by *fragen* 'inquire', but not by *zweifeln* 'doubt'. Notice that **AI**-objective verbs do **not license** any *ob*- or *wh*-form.

❖ **Objectively based predicates (OBP)** – cf. pt. ii. on page 1.

- All **SI-objective** predicates license an *es*-correlate. In the presence of the correlate, they are not objective anymore. But nevertheless, they license an **ob**-form. This modification of the external *ob*-form is called the ***bounded external ob-form.*** It can be paraphrased by

  x verb es-cor ob σ ⟺ [σ is contingent & x verb ob σ].

  Predicates exemplifying this *ob*-form are, for instance, *es wissen ob* 'it know whether', *es hören ob* 'it hear whether', *es merken ob* 'it notice whether'. *F hört es, ob σ* means that σ is contingent and F hears whether σ.

- Objectively based predicates based on an SI-objective verbs exhibiting a legitimate ***ProPP* license** the ***neutral ob-form*** iff **without correlate** they are **not inherently SI**, but only consistent with SI. This **includes** *davon hören ob* 'hear about whether' and *darüber sprechen ob* 'talk about whether' and **excludes** *davon wissen ob 'know about whether'. The neutral *ob*-form ***x verb ProPP ob σ*** can be paraphrased by
  x verb ProPP dass φ, where σ is some **subformula** of φ .
    - For instance, if *F hört davon, dass φ* 'F ProPP hears that φ' with φ ≡ 'M only comes if L will come', then F hört davon ob σ 'F ProPP hears whether σ' with σ ≡ 'M comes'.

- All **objectively based** predicates with an *es*-correlate or ProPP **license** a ***wh***-form – *F verb es/ProPP $wh_y σ_y$* we call the ***non-exhaustive wh***-form. If *verb dass* is **SI-objective,** the ***wh***-form *F verb es/ProPP $wh_y σ_y$* can be **paraphrased** either by
    - *A verb es/ProPP dass ∀y μ(y)*, where **∀y μ(y)** is a **contextually** given **answer** to the question **$wh_y μ(y)$** or

- *A verb es/ProPP ob $\forall y\ \mu(y)$*, where $\forall y\ \mu(y)$ is a **contextually** given **answer** to the question **wh$_y$ $\mu(y)$**

  For instance, *F weiß es/hört davon, wer anwesend ist* 'F knows it/hears ProPP who is present' can mean 'F knows it/hears about whether only **women are present'.**

❖ **Non-objectively based predicates (NOBP)** – cf. pt. iii. Page 1.

Non-objectively based predicates licensing *es*-correlates or ProPPs or both types of correlates can be **completely characterized** by **absolute** consistency conditions or by **relative** consistency conditions or by a **combination** of both types.

▪ Any non-objectively based predicate *pred* **allows** an *ob*-form (which we call the ***internal ob-form***) iff *pred* is **factive/cognitive** with **es/ProPP** and **submits to ATPC/RTPC** – cf. (5), (8) and (6), (9) and *es bedenken* 'consider it' (ATPC), *es kontrollieren* 'consider it' (ATPC), and *darüber nachdenken* 'think about' (RTPC). The **paraphrasing** of the internal *ob*-form ***x pred ob σ*** is given by ***x pred dass($\sigma \vee \neg\sigma$).***

  For instance, *F bedenkt es, ob M kommt* 'F considers it whether M will come' is praphrased by 'F considers it that: M comes or M does not come'.

▪ Any **non-objectively based** predicate **supplemented** by a legitimate **correlate** admits ***wh***-question embedding **iff** it admits the ***ob***-form **or** if it is **factive or cognitive – cf. (5) and (8)**. The corresponding ***wh***-form is again the ***non-exhaustive*** one – cf. Objectively based predicates (OBP) on page 4 and case ii on page 1.

References

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