Engaging Questions
***wohl* in German V$_{end}$-questions**

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1. Verb-end questions
2. *wohl*: nonmonotonic inferences
3. might and compatriots
4. Engaging questions — an analysis

1. Verb-end questions

German allows matrix questions in subordinate clause syntax.

(1) main clause syntax
*Wo **ist** der Bahnhof?* ('where is the train station?')

(2) subordinate clause syntax
*Wo wohl der Bahnhof **ist**?*

Verb-end (V$_e$) questions:

"deliberative" question, do not request an answer, do not aim at an addressee

invitations to enter conversation on a certain topic (Grohne, p.c.)[1]

(3) *Ob Karl (wohl) immer noch diese schwarzen Zigarren raucht?*
whether Karl (wohl) still these black cigars smokes

'I wonder whether Karl still smokes these black cigars'

(4) *Wo es *(wohl) zum Bahnhof geht?*
where it (wohl) to-the station goes
'In which direction might be the train station, I wonder.'

- Does *wohl* contribute to the pragmatics of V$_e$ questions?
- Constituent V$_e$ questions: Why can *wohl* alternate with *mag*, but one of them has to appear?
- What's the effect of V-end syntax in questions?

2. *wohl*

2.1 Zimmermann (2011, 2006)

wohl orients to different speakers in assertions and questions.

In assertions: *wohl S*

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[1] Verb-end questions can also be used as „repeat questions" to ask back on the speaker. These will play a role later.

the speaker (sp) asserts *S*
non-at-issue: ASSUME(x,*S*) (ASSUME less certain than KNOW)

In questions: *wohl Q?*

the addressee (ad) requested to provide answer to Q
$p \in$ Q and ASSUME(ad, p) then ad can answer p.

Uniform epistemic content of *wohl* in assertions and questions.

wohl is blocked/marked in contexts where the respective speaker knows proposition p for sure (Max o. Quantity).

(5)   Policeman at the border control:
        # *Wie heißen Sie wohl?*

        ≈ # 'Can you give a guess as to what's your name?'

2.2   More data

Intuition: In assertions, *wohl* indicates that sp has unreliable evidence in favour of *p*. (Eckardt 2012, 2015)

(6)   *Wo ist eigentlich die Oma jetzt?* (Where is Granny?)
        Die ist wohl einkaufen. (She's gone shopping I guess)

        Evidence: (a) it is Friday afternoon and she usually goes shopping on Friday afternoon, (b) her slippers are in the hall, (c) the shopping bag is missing.

Statistic likelihood can not be expressed by *wohl*.

(7)   Granny is on a bus trip with 60 people. I know that 50 of them will be accommodated in *Hotel Viktoria,* 8 will stay in *Pension Erika* and 2 in some other little pension. My sister asks: *Where will Granny stay?*

        √ *Sie ist **wahrscheinlich** im Hotel Viktoria.*

        √ *Sie ist **höchstwahrscheinlich** im Hotel Viktoria.*

        # *Sie ist **wohl** im Hotel Viktoria.*

        'she is probably / highly likely / #wohl in hotel Viktoria'

sp has general statistical information that chances are 5:1 for Granny to be in HV, sp lacks *specific* clues that she is staying there.

(8)   Imagine a box that contains 9 white marbels, 1 black marbel. I draw one and keep it in my closed hand. I can not see its colour.[2]

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[2] The example was set up by Nicholas Allott at the workshop NAIS, Oslo 2017; judgments were confirmed by all of ≈10 native German participants.

√ Ich hab **wahrscheinlich** eine weiße Murmel in der Hand.

"I probably have a white marbel in my hand"

Ich hab **wohl** eine weiße Murmel in der Hand.

"I have wohl a white marbel in my hand"

(9)   The same box with 9 white marbels, 1 black marbel. I draw one and keep it in my closed hand. You watched me drawing, and — unlike me — you were able to see the colour. *I see your unsurprised face.* I can now say:[3]

Ich hab **wohl** eine weiße Murmel in der Hand.

"I have wohl a white marbel in my hand"

Negative facts can count as weak evidence:

(10)   Granny is still on her bus trip. I am phoning places to find out where she'll stay. I first reach the owner of *Pension Erika* who has never heard her name. Next I call the other little place, where Granny is neither. I can now tell my sister:

*Die Oma ist **wohl** im Hotel Viktoria. (The other two pensions know of no person of her name.)*

Evidence: *Granny is not in Erika. Granny is not in little place.*

Unreliable: people on the phone, in particular in small places, may not know all guests. I have not positively spotted Granny.

2.3   Hypothesis: *wohl* marks defeasible inferences

For individual *a*, let $Bel_{A,w}$ be the beliefs of *A* in index *w*. For sets of propositions M and proposition p, let M $|\approx$ p be the shorthand for: p follows from M as a non-monotonic inference.

Speaker sp asserts: wohl p $\Leftrightarrow$ $Bel_{SP,w}$ $|\approx$ p

Possible paraphrase: "I have evidence that suggests *p* holds true. But further evidence may entail that *p* is false."

Non-monotonic (defeasible) inference: *p* entails *r* but *p&q* entails ¬*r*.

Classical examples:

Tweety is a bird $|\approx$ Tweety can fly.
Tweety is a bird and Tweety is a penguin $|\approx$ Tweety can not fly.

Non-monotonic logic was developed to model *generic sentences, commonsense reasoning* etc. "Given what we know now, can we infer anything about *p*? — Possibly, if

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[3] Thanks to Sven Lauer who provided this minimal pair.

we knew more we'd infer other things." (See Gabbay et al. 1987 for the basics of non-monotonic logic).

Entailment relations always rest on relations between propositions: If for some set X, X $|\approx$ p, then there is a finite subset $x \subset$ X such that x $|\approx$ p.

> "I have evidence …" = "there is a specific belief x that defeasibly entails …"

Non-monotonic entailment extends classical entailment

> If A $|=$ p then A $|\approx$ p.

Prediction: Assertions *wohl S* are subject to scalar implicatures.

> "*Wohl S"* asserts that *Bel(sp)* $|\approx$ p.
> Given that *Bel(sp)* $|=$ p would be more informative,
> the utterance implicates *Bel(sp)* $|\neq$ p.

This prediction is borne out by the data (see also Zimmermann and (5))

(11)   Alternative search scenario. In search of Granny, I reach Hotel Viktoria and am told by the confident and competent manager that Ms. Eckardt senior has checked in.

> *Die Oma ist im Hotel Viktoria.* ("Granny is in Hotel Viktoria")

> #*Die Oma ist **wohl** im Hotel Viktoria.* ("Granny is wohl in Hotel Viktoria")

(What counts as evidence?)

- basic facts
- habits, generics
- negative facts
- *not:* chance probabilities, likelihoods

More on this: see final section on model construal of non-monotonic inference.

2.3   wohl in questions

(12)   Speaker SP asks: *wohl Q?* $\Leftrightarrow$
   Addressee AD is requested to provide proposition p
   with $p \in$ Q and $Bel_{AD,w}$ $|\approx$ p

= Zimmermann's analysis of *wohl* in questions.

- Addressee is not obliged to literally assert "*wohl p.*"
- $Bel_{AD,w}$ $|=$ p entails $Bel_{AD,w}$ $|\approx$ p

Prediction: AD can provide certain answers as well as weak answers. √

2.4   V$_e$-wohl-questions invite speculations with shared knowledge

Inference is *additive*: A and B pool information — draw more or better inferences than A alone or B alone.

Let *Joint-Bel*(A,B) := { T | T $\subset$ $Bel_{A,w}$ $\cup$ $Bel_{B,w}$ and T consistent }

If $Bel_{A,w}$ |≈ p, there can be
T ∈ *Joint-Bel*(A,B) such that T |≈ ¬p

If $Bel_{A,w}$ |≈/≈ p, there can be
T ∈ *Joint-Bel*(A,B) such that T |≈ p

(13)   Granny on the road again. I have called Pension Erika and learned that she doesn't
stay there. My sister has called the other little place where Granny is neither.
Together we can conclude*:*
Oma wohnt wohl im Hotel Viktoria.
'Granny is staying wohl in Hotel Viktoria'

Note: Likelihoods are not additive.

A first analysis (what we'd like to achieve)

If speaker sp utters V_e + *wohl* + Q
she raises Q and
proposes to resolve Q by finding T ∈ *Joint-Bel$_w$*(sp, ad) and a ∈ Q
such that T |≈ a.

"Deliberation": *Let us pool our private beliefs as far as they can lead to answers to Q.*

(14)   Granny on the road (last variant).
a. *Wo ist Oma wohl untergekommen?*
= 'Do you know things that allow you to guess Oma's whereabouts?'

b. *Wo Oma wohl untergekommen ist?*
= 'Can we guess where Oma is staying if we pool our knowledge?'

Reminder: V-end constituent questions require *wohl* or the modal *mag*.

3. might and compatriots

3.1   von Fintel & Gillies (2011): 'might' made right

(15)   In search for the car key.

A: *It might be in the car.* — B: *that's right. / No, I still had it in the house.*

vF & G: Let *Bel* be sets of worlds (modal base; worlds that code the beliefs of agents)

might(*Bel*) (ϕ) = in some worlds in B, ϕ holds true

might (Bel_A) (ϕ) = in some belief-worlds of A, ϕ holds true.

might (Bel_{A+B}) (ϕ) = in some of the belief worlds shared by A and B, ϕ holds true.

B's reactions are not about A's beliefs but about B's beliefs or about A+B's beliefs
(Fintel&Gillies: DEFEASIBLE CLOSURE).

A asserts: might (Bel_A) ('it is in the car')

B replies   (yes,) might (Bel_B) ('it is in the car')
or, stronger: (yes), might (Bel_{A+B}) ('it is in the car')

Implementation (Fintel&Gillies, def (19), (20), (22)):

- Utterances with epistemic *might* put into play a "cloud" of possible interpretations
- these readings arise by anchoring *might* to various possible contexts, (specifically) different speakers or groups of speakers
- speaker X can only assert one of the readings if she is in the position to do so (has sufficient knowledge to assert it; e.g. know the beliefs referred to)
- speaker X is (usually) interpreted as making the strongest assertion that she is in the position to assert. Reactive turns (usually) rest on more knowledge than initial turns.

The same semantic computations are possible for questions.

- Questions with epistemic *might* put into play a "cloud" of possible question interpretations
- these readings arise by anchoring *might* to various possible contexts, (specifically) different speakers or groups of speakers
- speaker can only request the addressee X to resolve a question if X is in the position to do so (has sufficient knowledge to assert any of the answers; specifically: know the beliefs referred to)

(16) *Who might have taken the car key?*
      "Which are persons X such that 'X took the key' is compatible with your beliefs?"

von Fintel & Gillies: Shared beliefs yield stronger claims (AGGREGATION, def. (10)): For two groups G ⊆ G', the belief worlds of the larger group are included in the belief worlds of the smaller group:

> G ⊆ G' then $Bel_{G'} \subseteq Bel_G$.

Plan: Extend this idea to (a) defeasible inferences from less/more beliefs, and (b) the issue raised by V-end questions.

(17) *Wo   Oma   wohl ist?*
      where granny wohl is

(18) *Wo   Oma   sein mag?*
      where granny be   might

4. *mag*-questions and V_{end} syntax

(19) *Wo   mag   Oma   sein?*
      where might Granny be

A Fintel&Gillies analysis: If (20) is uttered in C by A, addressing B, it introduces the following set of questions. As before, Bel_x = belief worlds of x.

(19.a) [[Mag_x (*Wo ist Oma?*)]]^C =
       { { might (**Bel_A**)('Oma is at place z') | z possible location for Granny},
         { might (**Bel_B**)('Oma is at place z') | z possible location for Granny},
         { might (**Bel_{A+B}**)('Oma is at place z') | z possible location for Granny} }

If (19) initiates discourse: B does not know anything about A's belief about Granny. A+B have no shared belief about Granny's whereabouts. The only type of assertion that B can provide is in the second line: "*Where do you believe Granny might be?*"

Verb-end syntax in questions can code *Deliberation*: Invitation to pool knowledge in pursuit of question.

Verb-end syntax triggers restriction of (19.a) to strongest possible question: *Where do we two together believe that Granny might be?*

Implementation:

- Assume a DELIB operator in C_o of Verb-end questions.
- DELIB is semantically licensed iff the interpretation of its sister is a cloud of questions (i.e. of type $\langle\langle\langle s,t\rangle,t\rangle,t\rangle$ and arises from interpreting the sister nodes against different contexts.)
- DELIB (M) restricts the interpretations in M to the one with the maximal set of speakers.

(20)　$[_{CP}$ DELIB *Wo Oma sein mag*]

(20.a) [[*Wo Oma sein mag*]]^{A,B} =

　　　{ { might (***Bel_A***)('Oma is at place z') | z possible location for Granny},
　　　　{ might (***Bel_B***)('Oma is at place z') | z possible location for Granny},
　　　　{ might (***Bel_{A+B}***)('Oma is at place z') | z possible location for Granny} }

(20.b) DELIB ([[*Wo Oma sein mag*]]^{A,B}

　　　= DELIB (　{ { might (***Bel_A***)('Oma is at place z') | z possible location for Granny},
　　　　{ might (***Bel_B***)('Oma is at place z') | z possible location for Granny},
　　　　{ might (***Bel_{A+B}***)('Oma is at place z') | z possible location for Granny} })

　　　=　{ might (***Bel_{A+B}***)('Oma is at place z') | z possible location for Granny}

=> Question can only be resolved by A, B together. Possible reactions:

　　　joint speculation

　　　B acknowledges interest of A, does not answer *because s/he could not possibly.*

5. *wohl*-Questions and V-end syntax

A semantics for *wohl*.

Following vF & G, for any context C let $g \subseteq C$ be a set of possible individuals involved in the context C (e.g. speaker, addressee, both, bystanders, …)

Assertions

(21)　[[*wohl S*]]^C ≔ { λ w.$Bel_{g,w}$ |≈ [[S]] ; $g \subseteq C$ }

Example: Let C be the context where A talks to B.

(22)　*Oma ist wohl im Hotel Viktoria.*

(22.a) [[*wohl (Oma ist im Hotel Viktoria)*]]^C
　　　= { λ w.$Bel_{A,w}$ |≈ 'Granny is in hotel Viktoria'*,*

　　　　　λ w.$Bel_{B,w}$ |≈ 'Granny is in hotel Viktoria'*,*

$$\lambda w.\text{Bel}_{A+B,w} \mid\approx \text{'Granny is in hotel Viktoria'} \}$$

Speaker A is only authorized to assert the first proposition (under normal circumstances).

Questions

(23) $[[\ wohl\ Q\ ]]^C := \{\ \{\ \lambda\ w.Bel_{g,w} \mid\approx p \mid p \in [[\ Q\ ]]^g\ \}\ \mid\ g \subseteq C\ \}$

Example: Let C be the context where A talks to B.

(24) *Wo ist Oma wohl?*

(23.a) $[[\ wohl\ (Wo\ ist\ Oma?)\ ]]^C$

$= \{\ \{\ \lambda w.\text{Bel}_{A,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^A\ \},$

$\{\ \lambda w.\text{Bel}_{B,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^B\ \}$

$\{\ \lambda w.\text{Bel}_{A+B,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^{A+B}\ \}\ \ \}$

$= \{\ \{\ \text{'A defeasibly believes that Granny is at loc}_i\text{' | loc}_i \text{ possible places }\},$

$\{\ \text{'B defeasibly believes that Granny is at loc}_i\text{' | loc}_i \text{ possible places }\}$

$\{\ \text{'A+B defeasibly believe that Granny is at loc}_i\text{' | loc}_i \text{ possible places }\}\ \}$

It is B's turn to react to the question. B is only authorized to respond to the question

$\{\ \text{'B defeasibly believes that Granny is at loc}_i\text{' | loc}_i \text{ possible places }\}$

Questions and V-end syntax

Verb-end questions involve the operator DELIB in C_o. DELIB is defined for the semantic type of *wohl*-questions. We consider context C with speakers A, B.

(25) [DELIB *Wo Oma wohl ist*]

(25.a) $[[\ Wo\ Oma\ wohl\ ist\ ]]^C$

$= \{\ \{\ \lambda w.\text{Bel}_{A,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^A\ \},$

$\{\ \lambda w.\text{Bel}_{B,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^B\ \}$

$\{\ \lambda w.\text{Bel}_{A+B,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^{A+B}\ \}\ \ \}$

(25.b) DELIB ($[[\ wo\ Oma\ wohl\ ist\ ]]^C$)

$= \{\ \lambda w.\text{Bel}_{A+B,w} \mid\approx q\ ;\ q \in [[\ Wo\ ist\ Oma?\ ]]^{A+B}\ \}$

=> Question can only be resolved by A, B together. Possible reactions:

joint speculation

B acknowledges interest of A, does not answer *because s/he could not possibly.*

6. Summary and discussion

  o German V-end constituent questions: require *wohl* or *mag*
  o German V-end polar questions: allow *wohl, mag.*

Evidence: *wohl*-assertions convey that the speaker *knows* something that defeasibly *entails* the prejacent S.

- *wohl S* = x's belief defeasibly entails *S*
- dependent on agent's belief; subject to the phenomena observed for *might*
- adopt the von Fintel & Gillies analysis for *mag Q*-questions
- extend the von Fintel & Gillies analysis for *might S* to *wohl* S and *wohl Q*
- uniform contribution of V-end syntax to (*) questions in German: The speaker puts up the version that is anchored to the maximal set of speakers.

6.1   Entailment vs. probability

Most particles and adverbs of uncertain knowledge / private likelihood … can not switch between speaker and addressee in questions/assertions.

(26)   *Oma   ist   **bestimmt**   im   Hotel Viktoria*
         *Granny   is   **certainly**   in-the   hotel   Viktoria*

(27)   **Wo   ist   Oma   **bestimmt**?*
         *where   is   Granny   **certainly***

(28)   **Wo   ist   Oma   **vielleicht / sicher / wahrscheinlich** … ?*
         *where   is   Granny   **perhaps, certainly, probably***

Likelihoods are not additive:

"A considers it 60% probable that Granny is at X.
B considers it 80% probable that Granny is at X.

=/=> A+B together consider it _____% likely that Granny is at X"

Hypothesis (to be tested). The cloud reading and re-orientation from speaker to addressee only make sense when joint uncertain belief automatically leads to better belief.

- further argument in favour of *wohl* as defeasible knowledge indicator.
- further support of speaker's judgments that *wohl* does not indicate statistical likelihoods

6.2   V-end questions without *wohl*

(29)   A to B: *Guck mal, eine Hütte. Ob wir dort was zu trinken kriegen?*

         'Look, a mounition hut. Whether we get something to drink there I wonder.'

- viewed as the standard case of V-end question in the literature (Zimmermann xxxx, Truckenbrodt 2006 though see discussion in Gutzmann 2011)
- Common view: empty C_o in German = "no speech act", "no addressee oriented speech act", "no request to addressee", "do not require an answer"
- Counterevidence: Repeat V-end questions:

(30)   A to B: *Wo   ist   der   Autoschlüssel?*
                  where   is   the   car key

         B: *(does not react)*

         A: *Hallo. Wo   der   Autoschlüssel ist ?!*
   *hallo. where the   car key   is*

Grone (2017, ongoing): Syntax of V-end questions. Urgent requests to addressee.

=> Verb-end syntax alone does not have a specific pragmatics in its own right.

Bare V-end polar questions seem to require specific licensing contexts.

Cat-Questions: Anchored V_e polar questions; suggest a **non-monotonic inference from a present observation**.

(31) A and B watch a cat, eagerly sniffing at the bag of its owner
      A to B: Ob ein Würstchen in der Tasche ist?
      'Is there sausage in the bag I wonder'
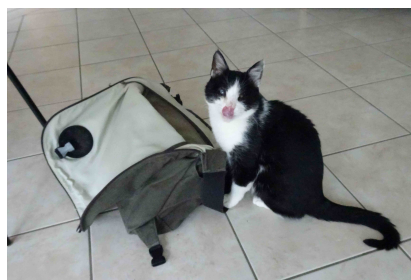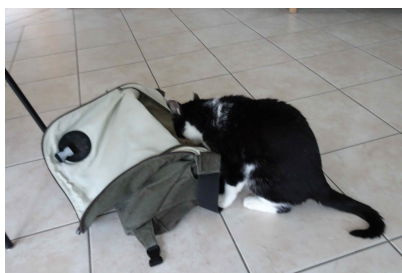
        Present observation Φ: 'the cat takes great interest in the bag'
        Non-monotonic inference *q*: 'there is sausage in the bag'.

            Φ |≈ *q* and *q* is the positive answer to *Q*.

Examples can be multiplied. Analysis yet to be developed.

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Appendix: A reconstruction of defeasible inferencing in modal logic (Lewis 1972)

Def.1: Let **F**: $D_{<s,t>}$ x $D_{<s,t>}$ → $D_{<s,t>}$ be a function from sets of worlds x propositions into sets of worlds with the following properties:

i. If *Bel* set of worlds, and *p* proposition, then **F**(*Bel, p*) ⊆ *p*.
ii. For all *p, p'* with *Bel* ⊆ *p* and *Bel* ⊆ *p'* there is **F**(*Bel,p*) = **F**(*Bel,p'*) = **F**(*Bel,*T).
iii. If *Bel* ⊆ CG and **F**(*Bel,* T) ⊆ *q* then there is a proposition *r* (finite conjunction of basic facts?) such that *Bel* ⊆ *r* and **F**(CG, *r*) ⊆ *q*.
iv. If *B* ⊂ *Bel* and *B* ⊂ *q*, then **F**(*B, T*) = **F**(*Bel, q*)

Then we will call **F** a normal-worlds function on $D_{<s,t>}$.

(Idea: **F** maps each set of words *B* to the normal worlds for proposition *p* in *B*.)

Def. 2: Let **F** be a normal-worlds function. We define the defeasible entailment relation |≈ on $D_{<s,t>}$ as follows:

$\qquad$ *Bel* |≈ *p* iff **F**(*Bel,* T) ⊆ *p*

It is possible that *Bel* |≈ *p* but *Bel* |=/= *p,* but not vice versa. (classical entailment is stronger than |≈.)

We can now provide a modal analysis of *wohl*:

$\qquad$ [[*wohl S*]]^C ≔ { λw.**F**(*Bel$_{A,w}$*,T) ⊆ [[*S*]]^g ; g ⊆ C }

Finite basis: If speaker A defeasibly believes *p*: **F**(*Bel$_A$,* T) ⊆ *p* and the common ground CG is a superset of *Bel$_A$*, then there is a proposition *r* (a finite conjunction of basic facts?) such that **F**(CG, *r*) ⊆ *p*.

"If A defeasibly believes *p* then A can provide a reason *r* such that the common ground CG, together with this assumption *r*, defeasibly entails *p*."

All definitions in section 5 can be rewritten as modal statements about the speakers' belief worlds *Bel$_A$, Bel$_B$* and *Bel$_{A+B}$*.

(further details to be explored.)