Flexible necessity, the future, and the German *wohl*[1]

Anastasia GIANNAKIDOU — *University of Chicago*
Alda MARI — *Institut Jean Nicod, CNRS/ENS/EHESS/PSL*

Abstract. The paper offers a new analysis of the German particle *wohl* as akin to Italian futuro. They are both, we argue, necessity modals, but without bias. They are therefore more flexible than MUST and useable in situations with less reliable evidence or heightened uncertainty such as in reflective questions where they create Socratic inquisitiveness, a self- directed state of inquisitiveness with the goal to introspect rather than seek information.

Keywords: *wohl*, future, episemic modality, bias, question, reflection, aporia

1. Introduction: German *wohl* and future modals

In recent work, Regine Echardt (Eckardt and Beltrama, 2019; Eckardt, 2020) discusses the German modal particle *wohl*. Eckardt (2020) suggests an analysis of *wohl* as an inferential necessity modal; but in their analysis of *wohl* in questions (which they call "conjectural"), Eckardt and Beltrama (2019) propose an analysis parallel to English MIGHT. In this paper, we address the seemingly puzzling behavior of the particle in assertions and questions, and propose a new analysis of *wohl* as a non-biased necessity epistemic modal akin to Italian futuro which, we have argued, denotes flexible necessity that may or may not convey evidential bias (Giannakidou and Mari 2021). We will draw on a number of empirical similarities between *wohl* and futuro.

As background, we start with the assumption that future expressions in a variety of languages (henceforth FUT) are epistemic necessity modals (for Italian see Bertinetto (1979); Pietrandrea (2005) and Giannakidou and Mari (2013, 2016, 2018b, a, 2021, 2023) henceforth G&M; see also Mari (2009, 2010, 2021, 2024), Giannakidou (2012), and references in all these works); for Spanish see Rivero (2014); Falaus and Laca (2014); Rosique (2015); Escandell-Vidal (2021)).[2] The observation that the Italian futuro has epistemic usage goes back to Bertinetto (1979), and the parallelism is illustrated in (1)-(2); as we see epistemic uses have also been observed for the English modal *will* (3):

(1) Gianni sarà a casa. (Italian)
Gianni be.FUT.3SG at home
'Gianni must be at home.'

[1]We thank the editors Mingya Liu and Eva Csipak for inviting us to write this article, as well as Manfred Krifka and Mingya for recent discussions on *wohl*. And last but not least, we want to express our profound appreciation to Regine Eckardt for her careful and inspiring work on so many topics in semantics. Alda Mari gratefully thanks ANR-17-EURE-0017 FrontCog.

[2]As previously, we use capital letters for cross-linguistic expressions belonging to the grammatical class future (FUT), and upper case MUST and MIGHT for expressions of epistemic necessity and possibility respectively. We use italics to refer to specific expressions within a specific language.

©2025 Anastasia Giannakidou and Alda Mari. In: Eva Csipak, Johanna David and Mingya Liu (eds.). 2025. *A Festschrift in Honour of Regine Eckardt*, 124-138. Berlin: Humboldt-Universität zu Berlin. https://doi.org/10.18452/33383

(2) Gianni deve/può a casa. (Italian)
Gianni must/might.FUT.3SG at home.
'Gianni must/might be home.'

(3) That will be the mailman (Palmer 1987) = That must be the mailman.

G&M translate the FUT statements with MUST. The evidence we presented for the epistemic necessity analysis of FUT relied on similarities between MUST and FUT in a number of crucial diagnostics— including incompatibility with knowledge of the prejacent.

(4) Deve essere/Sarà a casa, ma non sono totalmente sicuro.
Must.PRES.3SG be/Be.FUT.3SG at home, but not be.PRES.3SG entirely sure.
'He must be home, but I am not entirely sure.' (Italian)

In Giannakidou and Mari (2016), we used "but I am not entirely sure" as a diagnostic for lack of knowledge or certainty. As illustrated in (5), the bare positive assertion (5a) and the knowledge predicate (5b) which do not accept uncertainty continuation; certainty (5c) and belief predicates (5d) (at least in their *solipsistic* interpretation (see footnote 2) behave like knowledge and are not compatible with the "but I am not entirely sure" continuation:

(5) a. #He is at home but I am not entirely sure.
b. #I know that he is at home but I am not entirely sure.
c. #I am certain that he is at home but I am not entirely sure.
d. #I believe that he is at home but I am not entirely sure.

Belief and certainty predicates can convey veridical commitment (albeit subjectively)[3]; knowledge is, of course, objectively veridical since it is true belief.[4] FUT and MUST like all modals have nonveridical modal bases and are therefore compatible with uncertainty:

(6) a. Ariadne might be at the party.
b. Ariadne must be at the party.

In both cases, the speaker is uncertain about Ariadne being at the party, and leaves open the possibility that she might not be. The uncertainty is neutral – or in *nonveridical equilibrium* – with possibility modals: the speaker has no evidence to believe that Ariadne being in the party is a better possibility than Ariadne not being at the party. Possibility modals are very much like information seeking questions (*Is Ariadne going to the party?*) in this regard: in both cases the speaker is in a state of nonveridical equilibrium, and entertains equally two alternatives.[5]

When a necessity modal is used, the nonveridical equilibrium is manipulated towards the content of the prejacent being considered more likely by the speaker. Why? Because the speaker has some evidence supporting the prejacent as a better possibility. We have called this 'evidential bias of necessity modals' (see especially Giannakidou and Mari 2021):

[3]Mari (2016) and Giannakidou and Mari (2021) argue that belief predicates can have a solipsistic and a conjectural interpretation. Only the first is subjectively veridical. The latter involves lack of knowledge as a presupposition.
[4]In Giannakidou and Mari (2021) we offer a detailed semantics of knowledge, belief and certainty predicates that render them veridical, and we refer the reader to these works.
[5]See Liu et al. (2021) for recent discussion and experimental results. Giannakidou (2013) coined the term *inquisitive assertion* intending to capture precisely the nonveridical semantic core shared by modal assertions and questions.

(7) *Evidential bias of modals* (Giannakidou and Mari, 2021)
A modal statement is biased iff the two possibilities – p and $\neg p$ – are ranked, and p is considered a better possibility than $\neg p$.

The speaker is biased in favor of the prejacent but still not veridically committed to it by knowledge, belief, or certainty. Modal bias reveals an epistemic state supported by some evidence in favor of the proposition, and biased modals have a strong inferential character; and because they presuppose evidence, they often correlate with the class of expressions known as evidentials cross-linguistically (see in particular Matthewson et al. 2007).[6] In Giannakidou and Mari (2025a) we analyze evidentiality as epistemic modality following a common thread in the literature.

What we describe here are pretty much the observations found in Eckardt (2020) about *wohl* in assertions: "*wohl p* is infelicitous when the prejacent *p* is known to be true [9:6](Eckardt, 2020); and "I propose that the declarative sentence *wohl p* conveys that the prejacent *p* is defeasibly entailed by the speaker's knowledge. The proposition *p* is presented not as secure knowledge but as a reasonable assumption by the speaker." [9:6](Eckardt, 2020). And the affinity between the *wohl*, MUST, and FUT has not gone unnoticed; Giannakidou and Mari (2018b) treated *wohl* as a member of the class of FUT modals based on data from Zimmermann (2011):

(8) Max ist wohl auf See. (German; example from Zimmermann (2011))
Max is particle on sea.
'Max must be at sea.'

Zimmermann asserts that with *wohl* the epistemic commitment of the speaker is *weakened* compared to the non-modalized sentence (i.e, nonveridical judgment) while also conveying a confidence — in our jargon, *bias* — that the proposition is likely to hold.

Eckardt and Beltrama (2019), additionally, notice a parallel between *wohl* and Italian futuro in questions, and translate it below as "I assume":

(9) Der Schlüssel ist wohl in der Küche. (German)
the key is WOHL in the kitchen
'The key is in the kitchen, I assume.'

(10) Wo ist wohl der Schlüssel? (German)
where is WOHL the key
'Where, do you assume, is the key?'

(11) La chiave sarà in cucina. (Italian)
the key be.FUT in kitchen
'The key will be in the kitchen./The key is in the kitchen, I guess.'

(12) Dove sar (mai) la chiave? (Italian)
where be.FUT ever the key
'Where (on earth) is the key? (I have no clue.)'

In questions, Eckardt (2020) and Eckardt and Beltrama (2019) claim *wohl* adds a "conjectural" flavor that seems to weaken the question. In Giannakidou and Mari (2025b) we call such

[6] See Karttunen (1972); Von Fintel and Gillies (2010); Giannakidou and Mari (2016).

questions *reflective*, and their hallmark property is that they express Socratic inquisitiveness, i.e., the speaker asks them with the awareness that inquisitiveness will persist and no definitive answer will be given.

We will focus on Socratic inquisitiveness in the paper, but the point here is that the parallel between FUT and *wohl*, on the one hand, and MUST, on the other, breaks down in questions:

(13) Where #must/might the key be?

If FUT, MUST and *wohl* belong to the same class of epistemic necessity modals, then why do we observe this discrepancy in the reflective question? For Eckardt and Beltrama (2019), the discrepancy motivates a weakening in the semantics of *wohl* as MIGHT; for us, it provides evidence that while *wohl* is indeed a necessity modal it is one with flexible bias like futuro (Giannakidou and Mari 2023). We start with the analysis of future modals as having flexible bias in Section 2, and then address the behavior of *wohl* in reflective questions based on Giannakidou and Mari (2025b).

2. Futuro and *wohl* as a flexible necessity in assertions

In Giannakidou and Mari (2023) we observed that some FUT modals appear weaker in that they can be used in contexts with less evidence and with mere guesses, indicating absence of bias. We call this 'flexible bias', and we take Italian futuro to be the paradigmatic case.

2.1. Absence of bias with Italian futuro

Futuro appears to be 'weaker' than MUST-*dovere* in the following cases. First, futuro can very easily combine with adverbs of possibility (37a), as already noted by Bertinetto (1979), see (14).

(14) a. Gianni sarà forse in piscina. (Italian)
John be.FUT.3SG maybe in pool
'John will perhpas be at the pool.'
b. Gianni sarà probabilmente/sicuramente in piscina. (Italian)
John be.FUT.3SG probably/certainly in pool
'John will probably/certainly be at the pool.'

Futuro, of course, also combines with bias inducing adverbs PROBABLY and DEFINITELY (14b) appearing with the whole gamut of modal adverbs in structures known as *modal spread* (Giannakidou and Mari 2018a).

Secondly, consider the example below with reliable evidence (also discussed in Ippolito and Farkas 2021):

(15) Maria is at the doctor, who has reviewed her test results. She asks her doctor what is wrong with her. The doctor replies:
a. Deve essere narcolessia. (Italian)
must.PRES.3SG be narcolepsy
'It must be narcolepsy.'
b. #Sarà narcolessia. (Italian)
be.FUT.3SG narcolepsy

'It will be narcolepsy.'

Here the doctor is drawing a conclusion based on available evidence. In Giannakidou and Mari (2013) it was already suggested that unlike MUST, futuro needs to rely on evidence that is not *reliable*, thus allowing a broader modal base that enables mere guesses or expectations. This explains the contrast here.

Thirdly, while less compatible with concrete evidence than MUST, futuro is not equivalent to MIGHT.[7]

(16) a. Sono le 5. #Sarà a casa e sarà al lavoro.
Be.PRES.3PL the 5. Be.FUT.3SG at home and be.FUT.3SG at the work
(Italian)

'It is 5pm. #She will be home and she will be at the office.'

b. Sono le 5. Potrebbe essere a casa e
Be.PRES.3PL the 5. Can.COND.PRES.3SG be at home and
potrebbe essere al lavoro. (Italian)
can.COND.PRES.3SG be at the work
'It is 5pm. She might be at home and she might be at the office.'

Futuro, therefore, cannot be mere possibility, a conclusion reached also in Ippolito and Farkas (2021). Following standard practice, Giannakidou and Mari (2023) assume that as an epistemic modal, FUT will take a modal base, which is dependent on the speaker who is the individual anchor *i*. All epistemic modality is subjective in our system, in the sense that it is anchored to an individual. The modal base M(*i*) is both objective and subjective in the sense of Nuyts (1992), in that it comprises both propositions that describe facts and propositions that describe beliefs and personal preferences. In other terms, the modal base of an epistemic modal contains what *i* **knows** or **believes**.[8]

(17) *Epistemic state of an individual anchor i* (Giannakidou 1999: (45))
An epistemic state M(*i*) is a set of worlds associated with an individual *i* representing worlds compatible with what *i* knows or believes.

M(*i*) is a private space encompassing *i*'s knowledge and beliefs relevant to the prejacent proposition (in addition to which it is relative to updates in time). M(*i*) is a nontrivial, non-singleton set; Giannakidou (1998, 1999), and Giannakidou and Mari (2021) define various kinds of such states for different types of modalities. Giannakidou and Mari (2021) do not distinguish between credence (belief) and knowledge: individual anchors judge the truth of sentences typically based both on what they know and what they believe, including public knowledge and beliefs. Every epistemic modal operator combines with M(*i*), hence all epistemic modality is subjective.

Another important premise of Giannakidou and Mari (2021) is that the modal base M(*i*) is

[7]Note that in the example from Ippolito and Farkas (2021) the verb *potere* is in the conditional (*condizionale*). The same observation holds for *potere* in the indicative.

[8]See earlier formulations in Giannakidou (1998, 1999) and Giannakidou (2013). The idea that epistemic modality contains a doxastic component is pretty standard also in Kratzer's (1981; 1991) original analysis and in Portner (2008). A distinction between belief and knowledge is done only if it matters in a given context.

nonveridical, that is to say, it contains p and $\neg p$ worlds, and it therefore does not entail p:

(18) Nonveridical epistemic state:
An epistemic state $\mathrm{M}(i)$ is nonveridical about p iff $\mathrm{M}(i)$ contains both p and $\neg p$ worlds.

Nonveridical epistemic states $\mathrm{M}(i)$ are uncertainty spaces. When a speaker chooses to modalize, she considers both options – and the requirement that modal bases be nonveridical is known as the Nonveridicality Axiom of modals (Giannakidou and Mari 2018a, 2021).[9]

Since p and $\neg p$ are open possibilities in the modal base, modals as a class are *anti-knowledge* markers, and this explains the well-known paradigm below:

(19) Context: i is standing in front of the window and sees the rain.
a. #It must be raining.
b. #Starà piovendo. (Italian)
be.FUT.3SG rain.GERUND
c. #Deve star piovendo. (Italian)
Must.3SG be.FUT.3SG rain.GERUND

MUST and FUT are infelicitous here because if I see the rain, I *know* that it is raining. It can thus be concluded that futuro and MUST, as modals, are incompatible with knowledge of p.[10]

Giannakidou and Mari (2018b) further define a secondary modal base $\mathrm{Ideal}_{\mathscr{S}}$ as a function over $\mathrm{M}(i)(t_u)(w_0)$ in the spirit of Portner (2008). The output $\mathrm{Ideal}_{\mathscr{S}}$ is a subset of $\mathrm{M}(i)(t_u)(w_0)$.

(20) $\mathrm{Ideal}_{\mathscr{S}}(\mathrm{M}(i)(t_u)(w_0)) = \{w' \in \mathrm{M}(i)(t_u)(w_0) : \forall q \in \mathscr{S}(w' \in q)\}$

So defined, $\mathrm{Ideal}_{\mathscr{S}}$ delivers the worlds in the modal base in which all the propositions in $\mathscr{S}$ are true. The truth condition for MUST/FUT says that p is true in the $\mathrm{Ideal}_{\mathscr{S}}$ set of $\mathrm{M}(i)$. Given a set $\mathrm{Ideal}_{\mathscr{S}}$ and the utterance time t_u,

(21) (non-final) $[\![\text{prepi/dovere/must/FUT (PRES } (p))]\!]^{M,i,\mathscr{S}}$ is defined only if $\mathrm{M}(i)$ is nonveridical and is partitioned into $\mathrm{Ideal}_{\mathscr{S}}$ and $\neg\mathrm{Ideal}_{\mathscr{S}}$ worlds.
If defined, $[\![\text{prepi/dovere/must (PRES } (p))]\!]^{M,i,\mathscr{S}} = 1$ iff $\forall w' \in \mathrm{Ideal}_{\mathscr{S}} : p(w', t_u)$

At this stage, there is universal quantification over $\mathrm{Ideal}_{\mathscr{S}}$ worlds – and up to here, Eckardt (2020)'s proposal for *wohl* and ours are quite similar. Ranking (or lack thereof) is the main divergence between MUST and futuro (see also Baranzini and Mari (2019), Mari (2021)).

Giannakidou and Mari (2018a) introduces the idea that $\mathrm{Ideal}_{\mathscr{S}}$ and $\neg\mathrm{Ideal}_{\mathscr{S}}$ worlds are ranked by an ordering source $\mathscr{O}$ and that $\mathscr{O}$ is a 'meta-evaluation' that compares $\mathrm{Ideal}_{\mathscr{S}}$ to its complement in $\mathrm{M}(i)$ and ranks them as better possibilities (in the sense of Kratzer (1991) and Portner (2008)), therefore producing bias. The meta-evaluation does not correspond to a conversational background in the sense of Kratzer (1991) and Portner (2008). It is a layer in the modal skeleton, which, we argued, is present in all modal structures and is realized by modal adverbs which often are overt creating modal spread.

[9] An exception to this is aleithic modality which Giannakidou and Mari (2016) argue is outside the purview of linguistic modality.

[10] For extended discussion, see a.o. Karttunen (1972); Von Fintel and Gillies (2010); Giannakidou and Mari (2016); Lassiter (2016); Goodhue (2017); Mandelkern (2019).

If $\mathscr{O}$ is empty, as is the case with possibility modals (which are, furthermore, existential quantifiers), we have no ranking, therefore, no bias:

(22) She might possibly be the winner.

If is not empty, and Ideal$_{\mathscr{S}}$ worlds are ranked as higher than ¬Ideal$_{\mathscr{S}}$ as in the case of necessity modal MUST, bias is produced.

(23) Bill must probably be a doctor.

By default, the adverb and the modal tend to agree but incongruent construals are also possible, and this is a measure of the modal operator's flexibility. We have called congruent and incongruent combinations of modal verbs and adverbs *modal spread* (Giannakidou and Mari, 2018a). The MUST modal structure, we argued, contains a default null PROBABLY, which ranks Ideal$_{mathcalS}$ (where p is true) as better possibilities than the ¬Ideal$_{\mathscr{S}}$ worlds:

(24) For any Ideal$_{\mathscr{S}}$, $[\![\text{Probably/Probabilmente/Mallon}]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = \lambda q$. Ideal$_{\mathscr{S}}$ is a better possibility with respect to ¬Ideal$_{\mathscr{S}}$ relative to M(i) and $\mathscr{O}$ & q

(25) $[\![\emptyset\text{MUST (PRES }(p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}}$ is defined only if the modal base M(i) is nonveridical and it is partitioned into Ideal$_{\mathscr{S}}$ and ¬Ideal$_{\mathscr{S}}$ worlds. If defined,
$[\![\emptyset\text{MUST (PRES }(p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = 1$ iff: Ideal$_{\mathscr{S}}$ is a better possibility with respect to ¬Ideal$_{\mathscr{S}}$ relative to M(i) and $\mathscr{O}$ & $\forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u)$

Positive bias is thus derived as an effect of association of MUST with a default PROBABLY that, based on contextual or other evidence, ranks the p worlds as better possibilities than the $\neg p$ worlds. With possibility adverbs, on the other hand, $\mathscr{O}$ is empty and produces no ranking. Possibility adverbs do occasionally occur with necessity modals, as in the following spontaneous example cited from Giannakidou and Mari (2018a):

(26) I **must maybe** be stupid since I can't see anyone else asking my question, but where the ... is the revision's page? Reply.

The construal *must maybe*, we argued, is one where the positive bias of MUST is weakened because the adverb *maybe* introduces an empty $\mathscr{O}$. This occurs only occasionally with MUST and is marked; but FUT and *forse* are quite unmarked and common. In Giannakidou and Mari (2025a) we define the category flexible necessity — members of which include, besides futuro, the Gitkasan unitary modal (Matthewson, 2013), and propose a semantics for futuro with a default empty $\mathscr{O}$ *forse* defined below. The lexical entry for futuro is in (28), which is equivalent to (29):

(27) $[\![\text{Maybe/Forse/Isos}]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = \lambda q$. $\mathscr{O}$ is empty & q

(28) $[\![\emptyset\text{ FUT (PRES }(p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}}$ is defined only if M(i) is nonveridical and is partitioned into Ideal$_{\mathscr{S}}$ and ¬Ideal$_{\mathscr{S}}$ worlds. If defined,
$[\![\emptyset\text{ FUT (PRES }(p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = 1$ iff $\mathscr{O}$ is empty & $\forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u)$

(29) $[\![\text{MAYBE FUT (PRES }(p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}}$ is defined only if M(i) is nonveridical and is partitioned into Ideal$_{\mathscr{S}}$ and ¬Ideal$_{\mathscr{S}}$ worlds. If defined,
$[\![\text{MAYBE FUT (PRES }(p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = 1$ iff $\mathscr{O}$ is empty & $\forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u)$

Bias can also be strengthened (see earlier discussion of these entries in Mari (2021)):

(30) $[\![\text{PROBABLY FUT (PRES } (p))]\!]^{\mathscr{O},\mathrm{M},i,\mathscr{S}}$ is defined only if M(i) is nonveridical and is partitioned into $\text{Ideal}_{\mathscr{S}}$ and $\neg\text{Ideal}_{\mathscr{S}}$ worlds. If defined,
$[\![\text{PROBABLY FUT (PRES } (p))]\!]^{\mathscr{O},\mathrm{M},i,\mathscr{S}}$ = 1 iff
$\text{Ideal}_{\mathscr{S}}$ is a weak necessity with respect to $\neg\text{Ideal}_{\mathscr{S}}$ relative to M(i) and $\mathscr{O}$ & $\forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u)$

In sum, futuro is a flexible necessity modal with no inherent bias— therefore useable in a wider range of situations including those with less reliable evidence or heightened uncertainty about the prejacent.

It differs from MUST and MIGHT in that MUST lexicalizes universal quantification (like FUT) and positive bias and MIGHT lexicalizes an empty metaevaluation (like FUT) and existential quantification.

2.2. *Wohl* in assertions as futuro

We will now argue that the data discussed in Regine Eckardt's 2020 paper support the analysis of it on a par with futuro. Recall some basic data from Eckardt (2020) (ex. (4):

(31) Der Schlüssel ist wohl im Auto. (German)
The key is wohl in.the car
'The key is in the car, I assume.'

Eckardt (2020) writes "While the translation follows M. Zimmermann 2004, 2008, I argue that his analysis must be refined. I propose that the declarative sentence *wohl p* conveys that the prejacent *p* is *defeasibly entailed* [emphasis ours] by the speaker's knowledge. The proposition *p* is presented not as secure knowledge but as a reasonable assumption by the speaker." For this reason, *wohl p* is infelicitous when *p* is known to be true (Eckardt (2020), ex. (8):

(32) #Ich weiß wo Hein ist: Hein ist wohl auf See. (German)
I know where Hein is Hein is wohl on sea
Unavailable: 'I know where Hein is: Hein is wohl at sea.'

Additionally, Eckardt (2020) notes that *wohl* is excluded when the prejacent is a witnessed fact understood as direct evidence. She proposes the following analysis:

(33) Eckardt (2020) Analysis of *wohl p*.
a. **Presuppositions:** (i) c determines an issue Q and $q(c)$, the maximal body of knowledge of sp(c) relevant for Q. (ii) q must include witnessed facts.
b. **Presuppositions:** $[\![\text{wohl}]\!] = \lambda p.\forall w(STEREO((sp(c), w_0, q(c), w) \rightarrow p(w))$
c. **Updates**. The utterance *wohl p* asserts the at-issue content p. The CG is updated by *wohl(p)* as non-at-issue content in the sense of Murray (2014).

And here we see a contrast with our account, where MUST and FUT do *not* add p to the common ground (as the 'I am not entirely sure test' reveals, see also Lassiter 2016). The assumption c is therefore too strong; p cannot be challenged or refused (see discussion in Giannakidou and Mari 2018b) because the speaker can always argue that they never asserted p. The following dialogue (34) extends to futuro (35).

(34) There is a wet umbrella in the hallway.

a. A: It must be raining.
b. B: It is not true, it is not raining.
c. A: I never said it was raining !

(35) There is a wet umbrella in the hallway.
a. A: Starà piovendo. (Italian)
b. B: It is not true, it is not raining.
c. A: I never said it was raining !

Finally, note that, in assertions, *wohl* is also very flexible and can be combined with both weak and strong adverbs.

(36) a. Dazu muss ich **wohl vielleicht** auch noch sagen, dass mein Hase eher ruhig ist, sich sogar von den Schweinchen vom Futtertrog und Heu verjagen ließ und niemals markiert hat. (German)
'I should probably also add that my rabbit is rather quiet, even let the piggies chase him away from the feeding trough and hay and never marked him.'
(`kaninchenforum.de/`)
b. Ich habe hier ein King Tenorsaxophon, **wohl wahrscheinlich** aus den späten 60er Jahren, goldfarben, mit silberfarbigen Klappen. Die Seriennummer kann ich nirgends zuordnen. (German)
'I have a King tenor saxophone here, probably from the late 60s, gold-colored, with silver-colored keys. I can't find the serial number anywhere.'
(`https://www.saxophonforum.de`)

These data are parallel to those of Italian, which were discussed earlier in the paper.

(37) a. Gianni **sarà forse** in piscina. (Italian)
John be.FUT.3SG maybe in pool
'John will perhaps be at the pool.'
b. Gianni **sarà probabilmente/sicuramente** in piscina. (Italian)
John be.FUT.3SG probably/certainly in pool
'John will probably/certainly be at the pool.'

The semantics, we argue, is akin to Italian futuro. Our entry for *wohl* will thus be as follows:

(38) $[\![\emptyset \text{ WOHL } (p)]\!]^{\mathscr{O},\mathrm{M},i,\mathscr{S}}$ is defined only if M(i) is nonveridical and is partitioned into $\text{Ideal}_{\mathscr{S}}$ and $\neg\text{Ideal}_{\mathscr{S}}$ worlds. If defined,
$[\![\emptyset \text{ WOHL } (p)]\!]^{\mathscr{O},\mathrm{M},i,\mathscr{S}} = 1$ iff $\mathscr{O}$ is empty & $\forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u)$.

In pictures, the semantics of Italian and *wohl* is Figure 1.

We now move to questions which show further the no-bias property of *wohl* and its deviation from MUST.

3. Wohl and FUT in reflective questions

The addition of *wohl* or futuro to a question creates what we have characterized in recent work as reflection (Giannakidou and Mari, 2021; Mari, 2021), *aporia* (Giannakidou and Mari, 2025b) or Socratic inquisitiveness (Giannakidou, 2009, 2017). We call questions with *aporia*

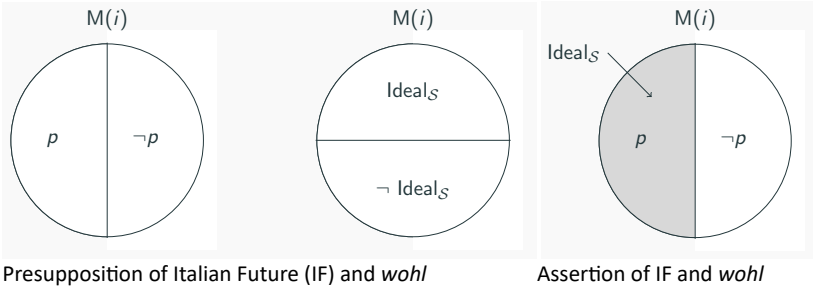

Figure 1: Semantics of Italian future and German *wohl*

reflective, and noted that in Greek and Italian we find an array of modal particles— possibility ones, the subjunctive, disjunctions, and futuro— that produce reflection, including *wohl*:

(39) *Na* kimate (*araje*) i Ariadne? (Greek)
SUBJ sleep.3SG (araje) the Ariadne
Might Ariadne be sleeping?
Is Ariadne perhaps sleeping?
Ariadne is sleeping, I wonder?

(40) Dove saranno i miei occhiali? (Italian)
where be.FUT.3PL the my glasses
'Where might my glasses be?'

(41) Pu *na* evala (araje) ta gialia mou? (Greek??)
where SUBJ put.PAST.1SG PRT the glasses mine
'Where might I have put my glasses?'

(42) Wo wohl der Schlüssel ist? (German)
where PRT the key is?
'Where might the key be?.'

(43) Wo ist der Schlüssel? (German)
where is the key?
'Where is the key?'

This type of question is typically self-addressed and does not need an addressee. For instance, an absent-minded speaker is looking around as she can't find her glasses, or she can't find the key. The question seems also unanswerable at the time of asking, in contrast to the information seeking question.[11]

Importantly, as we noted at the beginning, necessity modals are typically excluded from the reflective use:

(44) Dove *devono essere i miei occhiali? (Italian)
where *must be the my glasses
Where must my glasses be?

[11]The reflective question is well documented in many languages including also Salish, Japanese and Korean (see a.o. Littell et al. (2009); Kang and Yoon (2018, 2019); Matthewson (2010); Von Fintel and Iatridou (2019).

(45) Where #must Ariadne be?

It becomes clear therefore that *wohl* patterns with futuro rather than MUST in the question, i.e., it is allowed to express enhanced inquisitiveness which a MUST modal cannot do. Enhanced inquisitiveness is characteristic of Plato's dialogues where Socrates poses questions – e.g., what might the nature of knowledge be? – in order to introspect rather than seek an answer, i.e., knowing that at best we can produce tentative or partial answers, or perhaps no answers at all. We have argued that while it is expressed with an interrogative sentence, the perlocutionary effect of reflection is not to give an answer but to entertain and negotiate possibilities.

In Giannakidou and Mari (2025b) we establish three strategies for *aporia* but we will consider here only the one that concerns the use of futuro. We call it the *scope taking strategy* presented in Mari (2024, 2025), and it involves (a) treating the question as a disjunction, and (b) having FUT scope above it:

(46) $[\![\text{FUT (QUES } (p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}}$ is defined only if:
$\text{M}(i)$ is nonveridical and is partitioned into $\text{Ideal}_{\mathscr{S}}$ and $\neg\text{Ideal}_{\mathscr{S}}$ worlds.
$[\![\text{FUT (QUES } (p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = \forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u) \vee \neg p(w', t_u)$

The modal FUT scopes over QUES and thus over a set of propositions rather than a proposition. The picture is as in Figure 2.

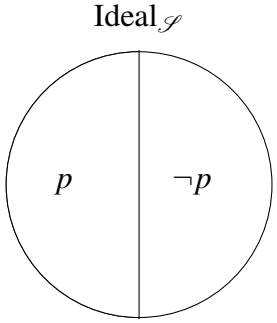

Figure 2: FUT > QUES, Mari (2024)

QUES is not a speech act operator, but a nonveridical operator akin to disjunction; and reflection is derived because the inner mental state is represented as partitioned. When FUT scopes over the disjunction, it quantifies over all the worlds of the modal base with none of the subsets in the partition standing out as an $\text{Ideal}_{\mathscr{S}}$ set. Both p (*Flavio is home*) and $\neg p$ (*Flavio is not home*) worlds are $\text{Ideal}_{\mathscr{S}}$. Inquisitiveness persists, no matter what supplementary information (as $\mathscr{S}$) I happen to resort to. The analysis also predicts that biased universal modals cannot appear in reflective questions, as in this case one option would have to be favored over the other.[12]

The same analysis applies to *wohl* and as a result our final proposal is as follows:

(47) $[\![\text{WOHL}p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}}$ is defined only if:
$\text{M}(i)$ is nonveridical and is partitioned into $\text{Ideal}_{\mathscr{S}}$ and $\neg\text{Ideal}_{\mathscr{S}}$ worlds.
$[\![\text{WOHL (QUES } (p))]\!]^{\mathscr{O},\text{M},i,\mathscr{S}} = \forall w' \in \text{Ideal}_{\mathscr{S}} : p(w', t_u) \vee \neg p(w', t_u)$

[12]For extended discussion of why MUST cannot appear even in biased questions, see Giannakidou and Mari (2019).

This view of reflection contrasts with Eckardt (2020)'s understanding where reflective questions create a group composed of the speaker and the hearer and the group collectively is in a state on uncertainty. Eckardt's group creating function is SHARE. By point-wise application to the set of possible answers, the analysis of conjectural questions in Eckardt (2020) is in (48). In the example, the location of Hein is a question under discussion for both the speaker and the hearer ($q_{sc} \wedge q_{ad}$) and they act as a unique speaker.

(48) Wo Hein wohl ist? (German)
Where Hein wohl is
Where Hein might be, I wonder.

$$
\begin{aligned}
&[\![\text{SHARE}[\text{wohl [wo Hein ist?]}]]\!]^c \\
&= [\![\text{SHARE}]\!]^c + [\![\text{wohl [wo Hein ist?]}]\!]^c \\
&= \{\lambda w_0.\forall w(\text{STEREO}(sp(c)\oplus ad(c), w_0, q_{sp(c)} \wedge q_{ad(c)}, w) \\
&\qquad \rightarrow \text{HEIN-AT-SEA}(w)), \\
&\quad \lambda w_0.\forall w(\text{STEREO}(sp(c)\oplus ad(c), w_0, q_{sp(c)} \wedge q_{ad(c)}, w) \\
&\qquad \rightarrow \text{HEIN-ON-HAWAII}(w)), \\
&\quad \lambda w_0.\forall w(\text{STEREO}(sp(c)\oplus ad(c), w_0, q_{sp(c)} \wedge q_{ad(c)}, w) \\
&\qquad \rightarrow \text{HEIN-AT-HOME}(w))\}
\end{aligned}
$$

These two visions of what reflection means are quite different. We submit that the scope strategy is more faithful to the idea that reflection is typically a monological, self-directed process (Kang and Yoon (2020) call them 'feigned monologues', and see more discussion in Giannakidou and Mari (2025b)). A reflective question is issued typically without a hearer or an addressee. At the same time, collective uncertainty is indeed compatible with Socratic inquisitiveness, but imposing it as a condition on reflecting is too strong. The reflective question reveals primarily internal wondering and is not necessarily directed to an addressee.

4. Conclusion

In this paper, we offered a new analysis of the German particle *wohl* as akin to Italian futuro. They are both, we argued, necessity modals, but without bias, therefore more flexible than MUST and useable in situations with less reliable evidence or heightened uncertainty such as in reflective questions. We have shown how these questions create Socratic inquisitiveness, a self- directed state of inquisitiveness with the goal to introspect rather than seek information.

References

Baranzini, L. and A. Mari (2019). From epistemic modality to concessivity: Alternatives and pragmatic reasoning per absurdum. *Journal of Pragmatics 142*, 116–138.

Bertinetto, P. M. (1979). Alcune ipotesi sul nostro futuro (con alcune osservazioni su potere e dovere). *Rivista di grammatica generativa 4*, 77–138.

Eckardt, R. (2020). Conjectural questions: The case of German verb-final *wohl* questions. *Semantics and Pragmatics 13*, 9–1.

Eckardt, R. and A. Beltrama (2019). Evidentials and questions. *Empirical issues in syntax and semantics 12*, 121–155.

Escandell-Vidal, V. (2021). The semantics of the simple future in romance: Core meaning and parametric variation. In *In Aspects of Tenses, Modality, and Evidentiality*, pp. 9–31. Brill.

Falaus, A. and B. Laca (2014). Les formes de l'incertitude. le futur de conjecture en espagnol et le présomptif futur en roumain. *Revue de linguistique romane 78*, 313–366.

Giannakidou, A. (1998). *Polarity sensitivity as (non)veridical dependency*. John Benjamins Publishing Company.

Giannakidou, A. (1999). Affective dependencies. *Linguistics and Philosophy 22*, 367–421.

Giannakidou, A. (2009). The dependency of the subjunctive revisited: Temporal semantics and polarity. *Lingua 119*, 1883–1908.

Giannakidou, A. (2012). The Greek future as an epistemic modal. *In the Proceedings of ICGL 10*, 48–61.

Giannakidou, A. (2013). Inquisitive assertions and nonveridicality. *The dynamic, inquisitive, and visionary life of φ A feestschrift for Jeroen Groenendijk, Martin Stokhof and Frank Veltman, ed. by Maria Aloni, Michael Franke, F. Roelofsen*, 115–126.

Giannakidou, A. (2017). Evaluative subjunctive and nonveridicality. *Tense, mood, and modality: New answers to old questions*.

Giannakidou, A. and A. Mari (2013). The future of Greek and Italian: An evidential analysis. *Sinn und Bedeutung 17*, 255–270.

Giannakidou, A. and A. Mari (2016). Epistemic future and epistemic must: Nonveridicality, evidence, and partial knowledge. In *Mood, Aspect, Modality Revisited. New answers to old questions, ed. by Blaszack, J. et al., University of Chicago Press*, pp. 75–124.

Giannakidou, A. and A. Mari (2018a). The semantic roots of positive polarity: epistemic modal verbs and adverbs in English, Greek and Italian. *Linguistics and Philosophy 41*(6), 623–664.

Giannakidou, A. and A. Mari (2018b). A unified analysis of the future as epistemic modality: The view from Greek and Italian. *Natural Language & Linguistic Theory 36*, 85–129.

Giannakidou, A. and A. Mari (2019). Modalization and bias in questions. *University of Chicago and Insitut Jean Nicod*.

Giannakidou, A. and A. Mari (2021). *Truth and veridicality in grammar and thought: Mood, modality, and propositional attitudes*. University of Chicago Press.

Giannakidou, A. and A. Mari (2023). The Italian futuro as a non-biased epistemic necessity: a reply to Ippolito and Farkas. *Linguistics and Philosophy 46*(6), 1269–1284.

Giannakidou, A. and A. Mari (2025a). *Modal Sentences*. to appear with Cambridge University Press.

Giannakidou, A. and A. Mari (2025b). Three strategies for aporia in reflective questions. *Ms. to appear in Lingustics Vanguard*.

Goodhue, D. (2017). Must φ is felicitous only if φ is not known. *Semantics and Pragmatics 10*, 14–EA.

Ippolito, M. and D. F. Farkas (2021). Assessing alternatives: the case of the presumptive future in Italian. *Linguistics and Philosophy*, 1–42.

Kang, A. and S. Yoon (2018). Two types of speaker's ignorance over the epistemic space in Korean. *Proceedings of the Linguistic Society of America 1*, 1–15.

Kang, A. and S. Yoon (2019). Modalized questions in Korean. *Studies in Generative Grammar 29*(3), 459–483.

Kang, A. and S. Yoon (2020). From inquisitive disjunction to nonveridical equilibrium: modalized questions in Korean. *Linguistics 58*(1).

Karttunen, L. (1972). Possible and must. In *Syntax and Semantics Volume 1*, pp. 1–20.

Kratzer, A. (1981). The notional category of modality. In *H. J. Eikmeyer H. Rieser (eds.) Words,Worlds, and Contexts. New Approaches in Word Semantics*, pp. 38–74. Berlin: de Gruyter.

Kratzer, A. (1991). Modality. *In von Stechow, A. and Wunderlich, D., editors, Semantics: An international handbook of contemporary research*.

Lassiter, D. (2016). Must, knowledge, and (in) directness. *Natural Language Semantics 24*, 117–163.

Littell, P., L. Matthewson, and T. Peterson (2009). On the semantics of conjectural questions. *Paper presented at the MOSAIC Workshop (Meeting of Semanticists Active in Canada), Ottawa.*.

Liu, M., S. Rotter, and A. Giannakidou (2021). Bias and modality in conditionals: Experimental evidence and theoretical implications. *Journal of Psycholinguistic Research 50*(6), 1369–1399.

Mandelkern, M. (2019). What 'must' adds. *Linguistics and Philosophy 42*, 225–266.

Mari, A. (2009). Disambiguating the Italian future. *Proceedings of generative lexicon, Pisa*, 2009–216.

Mari, A. (2010). On the evidential nature of the Italian future. *Unpublished manuscript. Institut Jean Nicod*.

Mari, A. (2016). Assertability conditions of epistemic (and fictional) attitudes and mood variation. In *Semantics and Linguistic Theory*, pp. 61–81.

Mari, A. (2021). Epistemic future in questions: evidence quality and the mirativity effect of *mica*. *Proceedings of IATL 26 (Invited talk), Bar-Ilan, Israel*.

Mari, A. (2024). On Italian future questions: scope ambiguities and reflexivity. *Proceedings Sinn und Bedeutung 28*, 559–576.

Mari, A. (2025). Disconfirmational mica in surprise questions (and some notes on concessivity). In S. R. Rosique (Ed.), *Expressing Surprise at the Crossroads*, pp. 39–60. Berlin, Boston: De Gruyter Mouton.

Matthewson, L. (2010). Cross-linguistic variation in modality systems: The role of mood. *Semantics and Pragmatics 3*, 1–74.

Matthewson, L. (2013). Gitksan modals. *International Journal of American Linguistics 79*(3).

Matthewson, L., H. Davis, and H. Rullmann (2007). Evidentials as epistemic modals: Evidence from st'át'imcets. *Linguistic variation yearbook 7*(1), 201–254.

Murray, S. E. (2014). Varieties of update. *Semantics and Pragmatics 7*, 2–1.

Nuyts, J. (1992). Subjective vs. objective modality: What is the difference. *Layered structure and reference in a functional perspective*, 73–97.

Pietrandrea, P. (2005, 01). *Epistemic Modality. Functional Properties and the Italian System.* John Benjamins Publishing.

Portner, P. (2008). *Modality*. Oxford University Press.

Rivero, M. L. (2014). Spanish inferential and mirative futures and conditionals: An evidential gradable modal proposal. *Lingua 151*, 197–215.

Rosique, S. R. (2015). Distance, evidentiality and counter-argumentation: Concessive future in Spanish. *Journal of Pragmatics 85*, 181–199.

Von Fintel, K. and A. S. Gillies (2010). Must... stay... strong! *Natural language semantics 18*, 351–383.

Von Fintel, K. and S. Iatridou (2019). Unasked questions. *A paper presented at WAFL 15*.
Zimmermann, M. (2011). Discourse particles. In *K. von Heusinger, C. Maienborn, and P. Portner (eds.). Semantics (HSK 33.2)*, pp. 2012–2038. De Gruyter Mouton.