The negatively biased Mandarin belief verb *yǐwéi*

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Abstract

The Mandarin belief verb *yǐwéi* strongly suggests that the belief it embeds is wrong or questionable. Based on original data, I propose that this sense of negative bias stems from a postsupposition that the reported belief must not be accepted in the Common Ground following an update with *yǐwéi*. When a belief is reported using a neutral, nonfactive verb such as *rènwéi* 'think', it is possible for the content of that belief to become Common Ground if the belief or belief-holder are considered reliable; but the postsupposition of *yǐwéi* explicitly blocks such an inference, giving rise to its negative bias. By heading off a potential inference, this postsupposition is further argued to serve a function common to other proposed postsuppositions in the literature. Zooming out, this investigation illuminates the complex calculations triggered by belief reports in discourse, and the linguistic resources used to guide them.[1]

1 Introduction

As a window into the pragmatic complexity of belief reports in discourse, this paper analyzes the sense of negative bias associated with the Mandarin belief verb *yǐwéi*.

In many contexts, *yǐwéi* strongly suggests that the belief it embeds is false, as in (1). Whereas the neutral verb *rènwéi* 'think' would leave the issue open, the use of *yǐwéi* is taken to convey that the speaker is *not* sick.

(1) Māma yǐwéi wǒ bìng le
Mother yǐwéi I sick ASP
'Mom is under the impression that I'm sick.' (LineDictionary)

§2 presents the inferences triggered by *yǐwéi* in different contexts, contrasting it with neutral alternatives such as *rènwéi* 'think'. To derive the effect of *yǐwéi*, §3 analyzes sentences of the form *x yǐwéi p* using an at-issue meaning of *x believes p* and a projecting, backgrounded postsupposition requiring the output context to be consistent with not-*p* – the mirror image of a presupposition, which instead places a requirement on the input context. This postsupposition is argued to prevent a potential inference arising from the pragmatic calculations involved in belief reports.

Zooming out, belief reports present a coordination problem for speakers and hearers (Karttunen 1973, Heim 1992, Simons 2007, Chemla 2008, Beaver 2010, de Marneffe et al. 2012, Anand & Hacquard 2014, Özyıldız 2017, Lauer 2017). Semantically, a

[1]I am very grateful to many people for data and guidance on this project. Their names are redacted for review. Errors are the author's.

nonfactive belief report of the form *x believes p* conveys no information about *p* except that *x* believes it. Pragmatically, however, hearers reason about how the speaker views *p*, how reliable the belief-holder *x* is, and how *p* should be overlaid with the Common Ground. If the belief is implausible, if the belief-holder is unreliable, or if the hearer senses skepticism in the speaker's choice to report a belief rather than making a more direct claim, then the reported belief will not enter the Common Ground, as in (2).

(2) My daughter thinks she's a mermaid. [web example]

In contrast, if the belief is plausible, if the belief-holder is informed or authoritative, and if the speaker seems to cite the belief-holder's belief in *p* as evidence for it (what Simons 2007 calls an 'evidential' use, building on Urmson 1952), then the belief may be taken as true, as in (3) – where the ensuing context shows that the author goes on to take it for granted that the motorcyclist hit something. More generally: although *x believes p* is itself silent on whether *p* is true or not, it can convey *p* in combination with other contextual assumptions about the credibility of the belief-holder and the belief (de Marneffe et al. 2012). On the proposed analysis, this potential inference is what *yǐwéi*'s postsupposition serves to prevent.

(3) The investigators think [the motorcyclist] hit something in the road. They don't know what he hit. Whatever he hit, he flipped the bike. [web example]

By blocking one inference (from *x*'s belief that *p* to *p*), a speaker's choice to use *yǐwéi* over a neutral alternative (such as *rènwéi* 'think') triggers others. Depending on who the belief-holder *x* is and what the speaker knows about the belief *p*, hearers infer different reasons that the speaker explicitly wishes to prevent the belief from being taken up: perhaps because the speaker thinks the belief is false or unreliable, or because the speaker questions the belief-holder's credibility, giving rise to the context-dependent notions of wrongness and skepticism associated with *yǐwéi* (§4).

§5 steps back to situate the proposed analysis of *yǐwéi* among other uses of postsupposition in the literature. Currently, postsuppositions have been invoked for a variety of phenomena, with no clear unifying principle. §5 argues that *yǐwéi* fits into a larger class of postsuppositions used to block an inference which might otherwise arise from the main assertion. The result is a unified, intuitive understanding of several otherwise heterogeneous uses of this device. §6 concludes.

2 Data

In descriptive work on Mandarin, it is observed that *yǐwéi* is often used for false beliefs, while *rènwéi* 'think' is more neutral (Lü 1999). In research on child language, it has been found that the sense of wrongness associated with *yǐwéi* is so striking that children perform better in false-belief tasks when *yǐwéi* is used instead of a more

neutral alternative such as *rènwéi* 'think' (Lee et al. 1999).

To pinpoint the source of this negative bias, *yǐwéi* must be further tested in contexts involving different assumptions about the status of the reported belief, the credibility of the belief-holder, and the speaker's reason for reporting a belief in the first place. To that end, this section presents a theory-neutral description of original data on *yǐwéi*, collected in consultation with about fifteen native speakers of Mandarin Chinese (all young adults who were educated in Mainland China through high school or college) at a United States university.

2.1 Non-first-person

Since *yǐwéi* is a belief verb, its effect on the discourse depends on who the belief-holder is, particularly whether the belief-holder is the speaker (as in the case of first-person *yǐwéi*) or someone else. Therefore, I first focus on *yǐwéi* in non-first-person contexts, and then turn to the first person. The effect of *yǐwéi* also depends on whether the content of the reported belief is settled in the discourse or not, so I go through different possibilities.

When the belief has not been settled either way in the discourse, *yǐwéi* strongly suggests that the belief is wrong. If it's not known whether the speaker is sick or not but it is assumed that the speaker has an opinion one way or the other (Bartsch 1973), (4) (repeated from above) is taken to convey that the speaker is *not* sick.

(4) Māma yǐwéi wǒ bìng le
Mother yǐwéi I sick ASP
'Mom is under the impression that I'm sick.' (=(1); from LineDictionary)

When the reported belief is already established as true, *yǐwéi* cannot be used. If all interlocutors know that the speaker *is* sick, a sentence such as (4) is rejected. The best verb in this context would be *zhīdào* 'know'. A neutral verb such as *rènwéi* 'think' is less preferred (perhaps relating to the 'Maximize Presupposition' principle of Heim 1991, requiring speakers to use the presuppositionally strongest lexical item compatible with the context; see §5.2), but still much better than *yǐwéi*.

When the reported belief is known to be false, *yǐwéi* is perfectly felicitous. If all interlocutors know that the speaker is *not* sick, (4) is a natural utterance. In this context, *zhīdào* 'know' is incoherent, because it requires its complement to be true when the context already establishes that it is false. *Rènwéi* 'think' and *juéde* 'feel' are felicitous, but said to be less 'critical' towards the mother than *yǐwéi*, describing the situation from 'her perspective'.

Because *yǐwéi* so saliently conveys that the reported belief is wrong, it cannot be used to report a third party's belief neutrally. If a politician feels optimistic about an upcoming election, (5) could not be used by a neutral newspaper, but only by a highly biased pundit. In contrast, if *yǐwéi* were replaced with *rènwéi* 'think,' (5) could be used impartially.

(5) tā yǐwéi tā huì yíng
3sg yǐwéi 3sg will win
'She is under the impression that she's going to win.'

As another consequence of its strong negative bias, *yǐwéi* often comes across as rude or aggressive when used in the second person. Like (5), (6) could not be used by a detached interviewer, but only by someone willing to antagonize the addressee. Again, (6) would become neutral if *yǐwéi* were replaced with *rènwéi* 'think.'

(6) A presidential candidate says, 'I'm feeling very confident about the election.' A reporter follows up:

suǒyǐ nǐ yǐwéi nǐ huì yíng
so you yǐwéi you will win

'So you're under the impression that you're going to win.'

While *yǐwéi* often suggests that the speaker thinks the reported belief is false, it can also be used in a context in which the speaker does not know whether the reported belief is true or not, but wants to signal that the belief-holder's evidence for it is somehow incomplete or defective. (7) could be used in a scenario in which an American football player catches the ball in the end-zone right on the sideline, and begins visibly celebrating – oblivious that the officials are congregating to debate whether the catch counted or not. The athlete may indeed have scored, but since he doesn't know that the officials are debating the catch, his information is incomplete. (7) still conveys a sense of negative bias towards the reported belief, but the effect is no longer to convey that the reported belief is false – only that it is not fully informed.

(7) wǒ bù zhīdào yǒu-méi-yǒu défēn, dànshì zhège qiúyuán yǐwéi défēn
I not know have-not-have score, but this-CL ball-player yǐwéi score
le
ASP
'I don't know whether the player scored or not, but he's under the impression that he did.'

If the speaker doesn't know whether the reported belief is true or not, but has no reason to question the belief-holder's reasoning, then it does not make sense to use *yǐwéi*. If we just see the athlete catch the ball on the sideline and begin celebrating, Mandarin consultants reject (7), saying things like, 'if you don't know, why are you saying he's wrong?'

Since (7) already shows that the belief embedded by *yǐwéi* does not have to be false, it is perhaps not surprising that this inference of falseness behaves like a conversational implicature, in that it can be reinforced without redundancy (8). Here, the second clause confirms the expectation raised by the first clause – that the reported belief is

wrong.

(8) rénmén yǐwéi tā shì yìwànfùwēng, dànshì tā bú shì
person-PL yǐwéi 3sg be billionaire but 3sg not be
'People are under the impression that she's a billionaire, but she's not.'

The sense of falseness evoked by *yǐwéi* also behaves like a conversational implicature in that it can be cancelled, although the effect of doing so is more surprising than the effect of reinforcing it. The first clause of (9) alone would convey that this person is *not* a billionaire; but the second clause is a coherent, non-contradictory (though marked) continuation.

(9) rénmén yǐwéi tā shì yìwànfùwēng ...ér tā díquè shì
person-PL yǐwéi 3sg be billionaire ...and 3sg indeed be
'People are under the impression that she's a billionaire ...and she actually is.'

(9) is an unusual discourse move, in that it first leads hearers to infer that this person is not a billionaire, and then abruptly tells them that she is. For this reason, sentences like (9) are generally only felicitous with a veracity emphasizer such as *díquè* 'indeed' or *zhēnde* 'really' in the second clause. Such sentences also only make sense when the speaker has a specific rhetorical goal. A speaker might say, 'I have a friend who invented a really famous app. People *yǐwéi* she's a billionaire – and she actually is (=(9)), but she never made a cent on that app. She just inherited a fortune from her parents.' The person is indeed a billionaire – but not for the reason you might think. *Yǐwéi* makes sense here as a way of highlighting the tension between the appearance and the reality of how this person acquired her wealth. In such a context, (9) suggests that it would be incorrect to conclude that this person is a billionaire on the grounds that other people think she is – but that she is a billionaire anyway.

To recap, non-first-person *yǐwéi* strongly suggests that the speaker views the reported belief with skepticism. Sometimes, *yǐwéi* conveys that the speaker rejects the reported belief; but other times, the speaker simply finds it questionable or unwarranted, even if it may be true.

2.2 First-person

So far, we have only considered beliefs that the speaker attributes to another party (second or third person), in which case it makes sense for these beliefs to be doubted or rejected by the speaker. The situation is different when the belief-holder and the speaker are one and the same, as in first-person belief reports (*I think*). Given that it is incongruous to both believe something and want to flag it as mistaken[2], it is

[2]This observation has a long history in the philosophy literature: Hintikka 1962 works to explain why *It's raining but I don't believe it's raining* is an absurd assertion (Moore's Paradox, Moore 1993

perhaps surprising that *yǐwéi* can be used in the first person at all. But in fact, *yǐwéi* has two distinct first-person uses, each involving a different way of reconciling the speaker's reported belief with the skepticism signaled by *yǐwéi*.

Most commonly, first-person *yǐwéi* communicates that the speaker previously believed the embedded proposition, but now either thinks it is false or is confused as to whether it is true, as in (10).

(10) wǒ yǐwéi jīntiān yǒu ge jiǎngzuò
I yǐwéi today have CL talk
'I thought there was a talk today.'

If it is already established that there is no talk, (10) would simply convey that the speaker used to think there was a talk and now knows there isn't. If it is not established whether there is a talk or not, (10) would suggest that the speaker used to think there was a talk, and now either realizes there isn't one, or has become confused as to whether there is one or not – for example, upon discovering that the room where the talk was supposed to be held is empty.

This 'past' understanding of *yǐwéi* can be understood in light of the way temporal information is conveyed in Mandarin more generally. Past is not morphologically distinct from the present; atelic verbs such as *yǐwéi* are interpreted as present by default, but can be shifted around depending on the context (Lin 2003, Smith & Erbaugh 2005, Lin 2006). In (10), it seems that the meaning of the sentence itself provides enough context for it to be understood as past even though it is atelic. Without backshifting, (10) would describe a conflicted mental state: the speaker both believes there is a talk and wants to suggest that there is not. But when (10) is understood as past, it is much more coherent: the speaker used to think there was a talk, and now realizes there isn't or has become confused. Interestingly, *yǐwéi* is the only belief verb to give rise to this backshifting. With *rènwéi* 'think,' *zhīdào* 'know' or *juéde* 'feel that' substituted for *yǐwéi*, (10) would by default be interpreted as a statement about the speaker's *current* belief.

In addition to the 'past' understanding of first-person *yǐwéi*, there is also a 'present' understanding, in which the speaker holds the belief at speech-time but welcomes the hearer to disagree. In (11), the speaker is understood to currently believe that 'you should do this,' but wants to frame the advice as a suggestion which might be wrong, and which the hearer is free to disregard. (In comparison to the past understanding of *yǐwéi*, the hedged-present understanding is less common and requires more contextual support.)

(11) wǒ gèrén yǐwéi nǐ yīnggāi zhèyàng zuò
I personally yǐwéi you should this-way do

[1942]); Wittgenstein 1953 observes that 'If there were a verb meaning 'to believe falsely,' it would not have any significant first person, present indicative' (para. 470).

'Personally, I would think you should do this.'

(11) is described as 'tentative,' 'conservative,' and 'hedged,' since this use of *yǐwéi* seems to diminish the speaker's confidence in the assertion. Such sentences would be 'stronger' if *rènwéi* 'think' were used instead.

Summing up again, first-person *yǐwéi* can be understood as past or hedged – two different ways for the speaker to hold (or to have held) the reported belief while also wanting to flag it as questionable.

2.3 Projection

To diagnose the source of *yǐwéi*'s negative bias, it is also important to consider its behavior under entailment-cancelling operators such as questions, conditional antecedents, possibility modals, and negation (e.g., Karttunen 1973). These operators are said to suspend entailments (at-issue content; Potts 2005, Simons et al. 2010) while allowing presuppositions and conventional implicatures (backgrounded content) to survive.

Looking first at questions, (12) most saliently conveys that the speaker believes there is no test. (12) would make sense if all interlocutors already know that there is no test. If it is not yet settled in the discourse whether there is a test or not, (12) conveys that the speaker thinks there is no test. If *rènwéi* 'think' were used instead, the issue would be open.

(12) tā yǐwéi míngtiān yǒu kǎoshì ma?
3sg yǐwéi tomorrow have test QUESTION
'Is he under the impression that there's a test tomorrow?'

As another example, (13) is understood as aggressive, suggesting that the hearer is mistaken in thinking that their actions are acceptable. (14) (using *rènwéi* 'think') could come across as similarly aggressive, but could also be a neutral question about one's self-concept.

(13) nǐ yǐwéi nǐ shì shéi?
you yǐwéi you be who
'Who the hell do you think you are?'

(14) nǐ rènwéi nǐ shì shéi?
you think you be who
'Who do you think you are?'

Turning to conditional antecedents, (15) conveys that in the speaker's view, the belief-holder would be incorrect to think there is a test tomorrow (while the issue would be open with *rènwéi* 'think'). Here as well, *yǐwéi*'s sense of wrongness survives

(15) rúguǒ tā yǐwéi míngtiān yǒu kǎoshì, tā yīnggāi zài xuéxí
if 3sg yǐwéi tomorrow have test, 3sg should PROG study
'If she thinks there's a test tomorrow, she should be studying.'

As for possibility modals, (16) is taken to convey that there is no test, or at least that this belief is somehow questionable or defective. Again, *yǐwéi*'s sense of wrongness persists. Again, if *rènwéi* were used, (16) would be much more neutral.

(16) tāmen kěnéng yǐwéi míngtiān yǒu kǎoshì
they may yǐwéi tomorrow have test
'They might be under the impression that there is a test tomorrow.'

While (12)–(16) are quite clear, the data become more elusive when we turn to the question of whether the sense of wrongness signaled by *yǐwéi* also projects out of negation.

For some reason, *yǐwéi* is generally rejected under the most common Mandarin negation morpheme, *bù*: (17) is judged unacceptable, no matter whether there is a test or not.

(17) #tā bù yǐwéi míngtiān yǒu kǎoshì
3sg not yǐwéi tomorrow have test
'#He's not under the impression that there's a test tomorrow.'

To explain why (17) is rejected, I believe we would need a deeper understanding of negated attitude verbs in Mandarin more generally, as well as the associated phenomenon of neg-raising (Horn 1971, Bartsch 1973, Horn 1978, Horn 1989) in the language – issues that are currently not well understood (see Xiao & McEnery 2008, Xiang 2013, Popp 2016)[3].

Apart from *bù*, the other major sentential negator in Mandarin is *méi*. *Méi* is much more acceptable with *yǐwéi* than *bù* is, although about a third of my Mandarin consultants still find it marked and say they never use it. But although it is possible to elicit *méi yǐwéi*, the data must be interpreted carefully. *Méi* argued to comprise not just negation, but also perfective aspect (for example, *méi* is in complementary distribution with the perfective marker *le*; Huang 1988). Therefore, *méi yǐwéi* is predicted to trigger complex inferences arising from the interaction of negation and perfective aspect (which often signals information about tense as well as aspect, triggering 'cessation implicatures' that past states do not continue into the present; Altshuler & Schwarzschild 2013), along with whatever negative bias is conveyed by *yǐwéi*. Perhaps thanks to this blend of aspect/tense, negation, and negative bias, Mandarin consultants disagree vehemently on when *méi yǐwéi* can be used and what

[3]For example, speakers even disagree as to whether the neutral *rènwéi* can be negated (*bú rènwéi*), with many preferring to place the negation in a lower clause; Xiao & McEnery 2008 suggest that neg-raising is much less common in Mandarin than in English.

it conveys.

Because *yǐwéi* cannot be directly negated with *bù*, and because the perfective aspect of *méi* adds an additional confound, it is best to find another way testing whether the negative bias of *yǐwéi* projects out of negation. One strategy is to investigate *yǐwéi* under negated modals, such as *zuìhǎo búyào* 'better not'. In such a context, *yǐwéi* is still semantically 'under negation,' in that a negation morpheme scopes over it, providing an alternative way of testing its projection behavior.

As predicted, (18) is only coherent if the attorney believes that the defendant did *not* buy a knife – if she thinks he did buy one, it is rejected. Therefore, the negative bias of *yǐwéi* projects here, consistent with its behavior in other entailment-suspending contexts.

(18) *Context:* An attorney is defending a client who has been falsely accused of murder. The defendant's credit card records indicate that he purchased some goods at a grocery store on the night of the murder. The grocery store also sells knives, and the prosecution is trying to insinuate that he purchased a knife. The attorney tells her colleagues,

tāmen zuìhǎo búyào yǐwéi tā mǎi le dāo
they better not-shall yǐwéi 3sg buy ASP knife

'They'd better not get the impression that he bought a knife.'

2.4 Discussion

Table 1 recaps the effect of *yǐwéi* in different contexts.

Context	**Effect**
1st person *yǐwéi p*	understood as past or hedged
2rd person *yǐwéi p*	typically rude because it suggests hearer is in error
3rd person *yǐwéi p*	typically conveys that speaker is skeptical towards *p*
3rd person *yǐwéi p* and in fact *p*	subverts expectations
under embeddings	sense of wrongness persists

Table 1: Effect of *yǐwéi* in different contexts

Facing these data, the question is: What blend of semantics and pragmatics derives *yǐwéi*'s negative bias? On the one hand, at least some part of its effect clearly arises pragmatically, because it is the context which determines whether the speaker rejects the belief, finds it unwarranted, used to believe it, wants to hedge it, and so on, and because the inference that the belief is false can be reinforced and cancelled like a conversational implicature (Grice 1989, Hirschberg 1985). On the other hand, at least some part of *yǐwéi*'s negative bias seems tied to its semantics. First, its projection behavior is reminiscent of various types of non-at-issue content, such

as presuppositions and conventional implicatures. Moreover, *yǐwéi* is unique among Mandarin belief verbs – even verbs of weak or fallible belief such as *juéde* 'feel that' – in strongly conveying that its complement is false. So even though *yǐwéi*'s negative bias is pragmatically flexible, it seems that these pragmatic calculations must ultimately be grounded in some semantic difference between *yǐwéi* and its alternatives.

3 Analysis

The proposed analysis is situated in a framework in which sentences serve as updates to the Common Ground (the set of propositions already mutually agreed on by interlocutors), or equivalently to the 'context set', the set of worlds consistent with the propositions in the Common Ground (Karttunen 1974, Stalnaker 1979). Formally (drawing on Heim 1982: Chapter 3), when an assertion S is accepted in a context c, the new context $c + S$ is restricted to only the worlds in c in which S is true – adding information to the Common Ground by narrowing the context set of worlds considered possible.

3.1 Definedness conditions on input and output contexts

In this setup, a presupposition can be stated as a definedness condition on input contexts. To capture the longstanding idea that *know* presupposes its complement (Kiparsky & Kiparsky 1970, Stalnaker 1974), a sentence of the form *x knows p* is analyzed to update the context with *x believes p* (its entailed, at-issue content; Potts 2005, Simons et al. 2010), and is defined only if the input context already entails *p* (its presupposed, projecting content). According to (19), a speaker uses *know* (Mandarin *zhīdào*) to signal that they take its complement *p* to already be Common Ground[4].

(19) at-issue and presupposed content of *zhīdào* 'know'

a. $c+$ *x zhīdào p* $= c+$ *x believes p*

b. defined only if $\forall w[w \in c \rightarrow p(w) = 1]$

To capture the negative bias associated with *yǐwéi*, I propose that *yǐwéi* has a different sort of definedness condition: that there exists at least one not-*p* world in the Common Ground, so that speakers and hearers must mutually entertain the possibility that *p* is false. Moreover, I argue, it is not enough for this definedness condition to be stated on the input context, as a presupposition. If a sentence of the form *x yǐwéi p* simply required its input context to be compatible with not-*p*,

[4]Of course, speakers often bend the rules, using *know* to signal that they think *p* should be 'accommodated' as Common Ground even if it is not yet so (Stalnaker 1979, Lewis 1979, von Fintel 2008, Schlenker 2012), especially if the speaker's belief in *p* (signaled by their use of a presuppositional lexical item) serves as evidence that the hearer should take it up too. Please see §5.2 for arguments that *know* could also be analyzed in terms of a postsupposition.

then – recalling the pragmatic complexity of belief reports – in a situation where x is authoritative and p is plausible, following the assertion, p might become Common Ground on the evidence that x believes it.

3.2 *Yǐwéi* and its proposed postsupposition

To derive the effect of *yǐwéi*, I argue that speakers and hearers must continue to entertain the possibility that p is false not just prior to the assertion, but also afterwards. More formally: not just the input context, but also the output context, must be compatible with not-p. In an update framework, such a definedness condition is called a postsupposition, using a term from Brasoveanu 2009 and Lauer 2009 which builds on an idea from Farkas 2002a, Farkas 2002b. In other words, *yǐwéi* is analyzed as in (20). *Yǐwéi* updates the context with x *believes* p, and is defined only if the output context is consistent with not-p: a postsupposition.

(20) at-issue and postsupposed content of *yǐwéi*

a. $c+ \; x \; yǐwéi \; p = c+ \; x \; believes \; p$

b. defined only if $\exists w \in (c + x \; believes \; p) : p(w) = 0$

Of course, since an output context is always a subset of its input context, then if there is a not-p world in the output context, then there must have been one in the input context as well. In that sense, the postsupposition of *yǐwéi* also serves as a presupposition, requiring a not-p world in the input as well as the output (which is why *yǐwéi* is rejected if p is already taken to be true; §2). But in a discourse where x's belief in p serves as evidence for p, a presupposition requiring a not-p world in the input context would still allow p to become Common Ground following the assertion, as in (21).

(21) **Initial context:** Not sure what happened to the motorcyclist; maybe he hit something, maybe not (CG includes p worlds and $\neg p$ worlds, where p is the proposition that the motorcyclist hit something).
Utterance: The investigators think the motorcyclist hit something in the road.
Output context: We assume the motorcyclist hit something (we trust the investigators; CG includes only p worlds).

In contrast, the proposed postsupposition of *yǐwéi* serves to explicitly prevent this effect. No matter how credible the belief, or how authoritative the belief-holder, it is not to become Common Ground. Informally, (20) can be paraphrased as: 'x believes p – but we won't take their word for it.'

In contrast to *yǐwéi*, a neutral belief verb such as *rènwéi* 'think' is given no definedness condition at all: x *rènwéi* p simply yields the worlds in c where it is true that x *believes* p (just (20a), without (20b)). Therefore, *yǐwéi* can be used in a subset

of the contexts where *rènwéi* can: *rènwéi* but not *yǐwéi* can be used when p is taken as true or where p is considered true if x believes it. The speaker's choice to use *yǐwéi* therefore provides information about what they take to be Common Ground both before and after the utterance.

3.3 Updating with *yǐwéi* and *rènwéi* in an uncertain Common Ground

In order for *yǐwéi* to provide information about what the speaker takes to be Common Ground, it is important to establish that both speakers and hearers may be at least slightly uncertain as to what the Common Ground contains. Common Ground is defined as the propositions that all interlocutors believe and believe that they all believe; but beliefs can be uncertain, and people may mistake, forget, or fail to pay attention to what they have previously agreed on. This idea has a long precedent: Beaver 2001 suggests that, instead of assuming that all propositions in the Common Ground are equally definitive, some should be considered more or less likely than others, introducing uncertainty by making the CG probabilistic; Stalnaker 2002 discusses how 'defective' or misaligned assumptions between interlocutors may come to light or be corrected; Horton & Gerrig 2005 show empirically that Common Ground depends on fallible human memories of prior discourse; Schlenker 2012 derives the principle of 'Maximize Presupposition' (Heim 1991, Percus 2006) in Gricean terms of quantity on the grounds that there is a non-zero chance of people forgetting previously agreed-upon information ('Fallibility'); and Crone 2018 explains seemingly-redundant reminders of what's already Common Ground because people may forget or fail to pay attention to these commitments.

In light of this uncertainty, lexical items such as *zhīdào* 'know' and *yǐwéi* that place definedness conditions on the Common Ground do not just reflect established information, but may also add information by reducing uncertainty regarding the Common Ground. Even if definedness conditions are 'backgrounded', non-at-issue meanings (in that they 'project' and don't directly address the Question Under Discussion in the sense of Roberts 2012), they can still provide information about what the speaker takes as Common Ground.[5]

To illustrate the proposal, I go through several different possible states of the Common Ground before and after it is updated with the postsuppositional x *yǐwéi* p versus the neutral x *rènwéi* p.

When p is already in the Common Ground before the assertion, x *rènwéi* p is a consistent update, but x *yǐwéi* p would create a contradiction: p is incompatible with *yǐwéi*'s requirement that the Common Ground be consistent with not-p. Therefore, a speaker who uses *yǐwéi* signals that they do not take p to already be Common

[5]See Schlenker 2012 for arguments that the presupposition of *know* can be informative for this reason.

Ground. This signal is redundant if there is no uncertainty about the CG; but if there is any uncertainty, it can be informative.

(22) c = { ... p ... }
  a. c+x *rènwéi* p = { ... p, x believes p ... }
  b. c+x *yǐwéi* p = { ... p, x believes p, possibly not p ... } – **contradictory; undefined.**

When it is Common Ground that p is true if x believes it, then x *rènwéi* p leads the Common Ground to be updated with p (as illustrated in the 'evidential' uses of belief verbs from §1, like *the investigators think the motorcyclist hit something*). In contrast, x *yǐwéi* p again yields a contradiction (requiring both p and possibly not-p to be Common Ground). Therefore, a speaker who uses *yǐwéi* signals (again, redundantly or informatively) that they do not take *if x believes p, then p* to be part of the Common Ground.

(23) c = { ... if x believes p, then p ... }
  a. c+x *rènwéi* p = {if x believes p, then p; x believes p ... }
  b. c+x *yǐwéi* p = {if x believes p, then p; x believes p; possibly not p} – **contradictory; undefined.**

When not-p is already in the Common Ground before the assertion, then both x *rènwéi* p and x *yǐwéi* p are consistent updates, but *yǐwéi*'s postsupposition reiterates the possibility that p is false. Again, given that people may mistake or forget or fail to attend to what's in the Common Ground, *yǐwéi*'s signal that p is not Common Ground may be redundant or informative.

(24) c = { ... not p ... }
  a. c+x *rènwéi* p = { ... not p, x believes p ... }
  b. c+x *yǐwéi* p = { ... not p , x believes p, possibly not p ... }

When the Common Ground is compatible with both p and not-p before the assertion, then both x *rènwéi* p and x *yǐwéi* p are consistent updates. Redundantly or informatively, *yǐwéi* flags that p may be false, and thus also that x's belief in p cannot constitute definitive evidence for it; while the neutral *rènwéi* does not signal any such skepticism.

(25) c = { ... possibly p, possibly not p ... }
  a. c+x *rènwéi* p = { ... possibly p, possibly not p, x believes p ... }
  b. c+x *yǐwéi* p = { ... possibly p, possibly not p, x believes p, possibly not p ... }

When it is Common Ground that the speaker either believes p or believes not-p ('opinionatedness'; Bartsch 1973), then x *rènwéi* p leaves both options open. However,

a speaker who uses *yǐwéi* signals that they want the Common Ground to be compatible with 'possibly not-p', most likely because their own beliefs are compatible with p being false. Assuming that they either believe p or believe not-p, a speaker who signals that they believe 'possibly not-p' ultimately conveys not just that they believe p might be false, but that they believe p actually is false. (To reiterate: if a speaker either believes p or believes not-p, then if they believe possibly not-p, it follows that they believe not-p).

(26) c = { ... S believes $p \vee S$ believes not-p ... }

a. c+x *rènwéi* p = { ... S believes $p \vee S$ believes not-p, x believes p ... }

b. c+x *yǐwéi* p = { ... S believes $p \vee$ S believes not-p, x believes p, possibly not p ... }

Finally, imagine that the hearer is totally confused about the speaker's assumptions, so the Common Ground is fully uncertain. Here, *yǐwéi* informs the hearer that the speaker thinks neither p nor x's authority should taken for granted (because then *yǐwéi*'s postsupposition would create a contradiction), while *rènwéi* leaves those possibilities open.

(27) c = { ... ? ... }

a. c+x *rènwéi* p = { ... ?, x believes p ... }

b. c+x *yǐwéi* p = { ... ?, x believes p, possibly not p ... }

In sum, *yǐwéi* can be used in a subset of the contexts where its neutral alternative *rènwéi* 'think' can. With no definedness condition on its input or output contexts, x *rènwéi* p provides no information about p except that x believes it, allowing that p may be or may become Common Ground. Even if it is not definitively agreed that p is true or that x is informed about p, interlocutors might still entertain those possibilities, since *rènwéi* does not reduce any uncertainty about this. Therefore, an update of x *rènwéi* p leaves open the possibility that x and/or p may be considered reliable.

In contrast, a speaker's choice to use x *yǐwéi* p signals that we are definitely not in a context where p is taken as true, nor in a context where x is considered authoritative. A speaker's choice to use *yǐwéi* reduces uncertainty about both the input and output Common Grounds in a way that signals skepticism towards x and p. If everyone already knows not-p or agrees that p or x are questionable, then *yǐwéi* just reiterates that information; but if anyone was confused or forgetful, *yǐwéi* raises awareness that p and x's belief in it are to be treated with skepticism.

I argue that these effects explain the negative bias associated with *yǐwéi*.

4 Explaining the data

4.1 Inference that p is false

Recall that when a reported belief is not settled in the discourse, *yǐwéi* strongly suggests that it is false, as in (28).

(28) Māma yǐwéi wǒ bìng le
Mother yǐwéi I sick ASP
'Mom is under the impression that I'm sick.' (=(1), (4))

The proposed analysis explains why. Presumably, the speaker has an opinion as to whether they are sick or not; they either believe p or believe not-p (26). In such a context, 'possibly not-p' (signaled by the speaker's choice to use *yǐwéi*) is strengthened to 'not-p' when combined with the assumption that the speaker either believes p or its negation – deriving the inference that the speaker is not sick (that the mother is wrong).

The proposed analysis also explains why (28) is nonsensical if the speaker *is* known to be sick. Following the frame in (22), it is a contradiction for *yǐwéi* to require a not-p world in the output context if the input context contains only p-worlds.

4.2 Inference that p is questionable even if possibly true

In many cases, the speaker can be assumed to have an opinion about the reported belief, leading to the inference that the speaker who uses *yǐwéi* thinks the belief is false. But sometimes this assumption of opinionatedness is called off, as in (29), in which the speaker explicitly claims not to know whether the athlete scored or not (following the frame in (25): the Common Ground is compatible with both p and not-p).

(29) wǒ bù zhīdào yǒu-méi-yǒu défēn, dànshì zhège qiúyuán yǐwéi défēn le
I not know have-not-have score, but this-CL ball-player yǐwéi score ASP
'I don't know whether the player scored or not, but he's under the impression that he did.' (= (7))

Empirically (§2), (29) is only felicitous if there is at least some reason to question the football player's reasoning. If the speaker just sees the athlete catch the ball on the sideline and begin celebrating, (29) is unusual (although it would be fine if *rènwéi* 'think' were used), since it seems to cast doubt on the athlete's belief without justification. In contrast, if the speaker sees the officials congregating to discuss whether the catch counted, (29) is felicitous, since the speaker has reason to suspect

that the athlete's belief is not fully informed.

I argue that the proposed analysis explains these facts. First, *yǐwéi* explicitly signals that the speaker takes neither p nor *if x believes p, then p* to be Common Ground (22)–(23). Second, when the Common Ground is compatible with both p and not-p (as indicated by 'I don't know whether he scored or not'), then the postsupposition of *yǐwéi* reiterates and highlights the possibility of not-p (25). The effect is to flag p as questionable rather than simply unknown.

One might object that if the Common Ground is compatible with p and not-p (following the frame in (25)), the postsupposition of *yǐwéi* should be vacuous: it simply restates the possibility that not-p. So why does *yǐwéi* have a different effect than *rènwéi* in such a context? Again, the explanation begins with the claim that people may mistake, forget, or fail to attend to what is Common Ground (even within the same sentence; Schlenker 2012); and that the definedness condition of *yǐwéi* reduces such uncertainty by drawing attention to the possibility that p may be false – in turn triggering pragmatic inferences about why the speaker chose to do so using the relatively infrequent and marked *yǐwéi* rather than the frequent, unmarked *rènwéi*. That, I argue, is why (29) is rejected when the speaker simply sees the athlete catch the ball and begin celebrating (with no reason to question him), but is accepted when the speaker sees the officials congregating to debate the catch (and thus sees his belief as insufficiently informed).

4.3 Reinforcement and cancelation

Moving forward, the inference that p is false is derived pragmatically, by the way its postsupposition interacts with the assumptions that the speaker has an opinion regarding p and wants the Common Ground to be consistent with not-p because they themselves believe p is false. Therefore, it is no surprise that this inference can be reinforced without redundancy (30), and cancelled without contradiction (31) – two hallmarks of pragmatic inferences (Grice 1989; elaborated by Hirschberg 1985 and Potts 2007). In (31), the speaker suggests that 'she is a billionaire' should not be taken up on the grounds that other people believe it, because their reasoning is faulty (*if x believes p, then p* is not Common Ground) – but that it is true anyway[6].

(30) rénmén yǐwéi tā shì yìwànfùwēng, dànshì tā bú shì
person-PL yǐwéi 3sg be billionaire but 3sg not be
'People are under the impression that she's a billionaire, but she's not.' (= (8))

[6]Schematically: to start, the Common Ground is compatible with both 'she's a billionaire' (p) and 'she's not a billionaire' (not-p); then the speaker uses *yǐwéi* to add the information that *people believe she's a billionaire* while signaling that *if they believe she's a billionaire, she is one* (*if x believes p, then p*) is not Common Ground (conveying that other people are not to be taken as authorities on her wealth); then the speaker proceeds to update the Common Ground with *she is a billionaire* – a consistent series of updates.

(31) rénmén yǐwéi tā shì yìwànfùwēng . . . ér tā díquè shì
person-PL yǐwéi 3sg be billionaire . . . and 3sg indeed be
'People are under the impression that she's a billionaire . . . and she actually is.' (= (9))

4.4 First-person *yǐwéi*

When the belief-holder and the speaker are the same, as in first-person *yǐwéi*, hearers infer different reasons that the speaker chose to use *yǐwéi*. Rather than deciding that the speaker both believes p and wants to flag it as false or questionable (an incongruous mental state), hearers may determine that the speaker used to believe p and now finds it false or questionable (an available understanding of (32), because of the past/present underspecification in Mandarin).

(32) wǒ yǐwéi jīntiān yǒu ge jiǎngzuò
I yǐwéi today have CL talk
'I thought there was a talk today.' (= (10))

Or the hearer may infer that the speaker does currently believe p, but does not want it to become Common Ground in case the hearer disagrees (or because they to flag their opinion as fallible by signaling that *if I believe p, then p* should not be considered Common Ground), as in (33). Normally, if a speaker wants to prevent p from being Common Ground, it is because the speaker disbelieves it; but in the 'hedged' case, I argue that it is because the speaker does not want to presume that the hearer believes p even if the speaker does.

(33) wǒ gèrén yǐwéi nǐ yīnggāi zhèyàng zuò
I personally yǐwéi you should this-way do
'Personally, I would think you should do this.' (= (11))

4.5 Projection

The proposed analysis also explains why the negative bias associated with *yǐwéi* projects. As definedness conditions, postsuppositions project – but not exactly the same way as presuppositions (Lauer 2012).

Looking first at questions, I adopt for concreteness the analysis of Groenendijk & Stokhof 1984, Groenendijk & Stockhof 1996. On this analysis, a polar question such as (34) (repeated from above) partitions the Common Ground into worlds in which the proposition (*he yǐwéi there is a test*) is true, and those in which it is false. Regardless of whether it is true or false, if that proposition is defined, the postsupposition of *yǐwéi* requires there to be some worlds in the Common Ground in which there is no test. Thus, both among the worlds in which he believes there is a test, and among the worlds in which he does not believe there is a test, there are required to be some

worlds in which there is no test: if he thinks there is a test, he might be wrong. The postsupposition of *yǐwéi* is therefore predicted to project, consistent with the data.

(34) tā yǐwéi míngtiān yǒu kǎoshì ma?
3sg yǐwéi tomorrow have test QUESTION
'Is he under the impression that there's a test tomorrow?' (= (12))

Turning to conditionals, it is common in the literature (Karttunen 1974, Heim 1983) to assume that the antecedent of a conditional is added to a version of the Common Ground first, and then the consequent of the conditional is added to a Common Ground that has already been updated with the antecedent. In (35) (repeated from above), a version of the Common Ground would first be updated with the antecedent *she yǐwéi there is a test*. The result of that update is required by the postsupposition of *yǐwéi* to contain some worlds in which there is no test: in other words, if she thinks there is a test, she might be wrong. Thus, in a conditional antecedent, *yǐwéi* continues to suggest that the belief-holder is not a reliable source regarding the reported belief.

(35) rúguǒ tā yǐwéi míngtiān yǒu kǎoshì, tā yīnggāi zài xuéxí
if 3sg yǐwéi tomorrow have test, 3sg should PROG study
'If she thinks there's a test tomorrow, she should be studying.' (=(15))

As for negation, negation in dynamic semantics is generally analyzed as a two-step process (Heim 1983, Beaver 2001): first the assertion A is added to the context c in the usual way (by intersecting them); then the result of that update is subtracted from the original context c.

(36) $c + \neg A =_{def} c - (c + A)$ Heim 1983

If A has a postsupposition, this postsupposition applies to the intermediate context set, $c + A$ (Lauer 2012).

To see how this analysis applies to *yǐwéi*, imagine that the full, negated sentence ($\neg A$) is $\neg(x$ *yǐwéi* $p)$. To update the context with this sentence, the first step is to calculate $c+(x$ *yǐwéi* $p)$: the worlds in c in which x *yǐwéi* p is true. Thanks to the postsupposition of *yǐwéi*, some of these worlds are required to be not-p worlds – conveying that in some of the worlds in which x does believe p, p is false. These worlds (the $c+A$ worlds) are then subtracted from the original context set, leaving only worlds in which it is not true that x believes p. Although the postsupposition of *yǐwéi* does not directly apply to these remaining worlds, the negative bias of *yǐwéi* is still predicted to persist, in a counterfactual sense: if x did believe p (in the hypothetical $c + A$ worlds), the postsupposition of *yǐwéi* signals that p would not necessarily be true. In (37), if the jury *were to* believe that the defendant had bought a knife, then they might be wrong.

(37) tāmen zuìhǎo búyào yǐwéi tā mǎi le dāo
they better not-shall yǐwéi he buy ASP knife
'They'd better not get the impression that he bought a knife.' (=(18))

In sum, Table 2 overviews the way the different effects of *yǐwéi* are captured.

Context	**Effect**	**Explanation**
1st person *yǐwéi p*	understood as past or hedged	two different ways of reconciling speaker's belief in p with signal that p is not to be taken up
2rd person *yǐwéi p*	typically rude because it suggests hearer is in error	speaker indicates that p is not to become Common Ground, perhaps because it is wrong
3rd person *yǐwéi p*	typically conveys that speaker is skeptical towards p	speaker indicates that p is not to become Common Ground, perhaps because it is wrong
3rd person *yǐwéi p* and in fact p	subverts expectations	by signaling that p should not become Common Ground, speaker implicates that p is questionable; then goes on to endorse it
under embeddings	sense of wrongness persists	postsuppositions project

Table 2: Effect of *yǐwéi* in different contexts, and how this effect is derived on the current analysis

4.6 Alternative analyses

Before proceeding, it is worth briefly comparing the proposed analysis of *yǐwéi* to alternatives which could be imagined or which have recently been proposed for other negatively-biased belief verbs.

First, it is clear that *yǐwéi* does not mean 'falsely believe' (proposed by Hsiao 2017 for Southern Min *liah-tsun* and by Anvari et al. 2018 for Spanish *creer se*), because the reported belief may not be false; it could be unknown (as in the football example), true (the billionaire example), or hedged but endorsed by the speaker (the hedged first-person use). Nor does it convey that the speaker doubts the belief (proposed by Kierstead 2013 for Tagalog *akala*), because the speaker sometimes holds that belief (as in the billionaire example and the hedged first-person example).

Nor, I argue, is *yǐwéi* an evidential (e.g., Aikhenvald 2004) signaling questionable evidence for x's belief in p. Of course, questionable beliefs are generally based in questionable evidence, just as questionable evidence generally leads to questionable beliefs, so it is not obvious which of these is primary and which follows from the other. But if *yǐwéi* were primarily a signal of questionable evidence, one would expect it to primarily trigger inferences about the source of the belief-holder's evidence, when in fact it primarily triggers inferences about the credibility of the belief itself. Moreover,

yǐwéi can be used to report both strongly and weakly held beliefs grounded in all sorts of strong and weak evidence – inference, statements from other people, visual observation, experimentation, and so forth. Therefore, I conclude that *yǐwéi* primarily provides information about how to overlay the reported belief with the Common Ground rather than about the belief-holder's evidence for it.

5 Postsuppositions as inference-blockers

On the proposed analysis, *yǐwéi*'s postsupposition serves to block a potential inference from x's belief in p to p – and in doing so, triggers pragmatic reasoning about why the speaker wished to prevent p from becoming Common Ground. While this analysis is argued to capture the data, the central device of postsupposition may not seem intuitive.

5.1 Unifying (some) postsuppositions in the literature

Without a general theory of postsuppositions, the phenomena for which they have been invoked may appear rather miscellaneous. Most commonly, postsuppositions have been used to analyze noun phrases in various languages that are characterized as 'nonspecific' or related to 'free choice' (Farkas 2002a, Farkas 2002b, Lauer 2009, Lauer 2012, Condoravdi 2015) – those that can be roughly paraphrased as 'some or other.' Here, the proposed postsupposition ensures that the Common Ground is compatible with multiple different referents for the noun phrase following the update. In a different vein, Constant 2012 uses a postsupposition to capture inferences associated with a particular intonation contour he calls 'rise-fall-rise': rise-fall-rise is argued to convey that the speaker is not willing to assert any alternative proposition that would be consistent and informative in the Common Ground following the assertion uttered with rise-fall-rise intonation.

Brasoveanu 2009, Brasoveanu 2012, and Charlow to appear use postsuppositions to ensure the correct scope of various numerals in sentences involving multiple plurals. Brasoveanu & Szabolsci 2013 invoke a postsupposition to explain why the presuppositional word *too* (or its equivalent, in various languages) can occur before the information that satisfies its presupposition. Henderson 2014 uses a postsupposition to explain why a Kaqchikel morpheme which typically presupposes multiple referents for a noun phrase can be satisfied by information later in the sentence (disputed by Kuhn 2017). Champollion 2015 uses a version of Henderson's analysis for dependent numerals (*two sausages each*) in English.

Finally, this paper uses a postsupposition to explain why the Mandarin belief verb *yǐwéi* conveys skepticism towards the reported belief, the first use of postsupposition to handle an open-class lexical item rather than a function word or an intonation pattern.

I argue that many of these uses of postsupposition can be understood together as ways of blocking a potential inference which might result from a neutral, non-postsuppositional alternative utterance – thereby triggering further pragmatic reasoning about why the speaker wished to prevent the original inference. In other words, the analysis of *yǐwéi* is used to unify a class of proposed postsuppositions in the literature.

For concreteness, consider the English data of Lauer 2009 as an example of the use of postsuppostions to handle 'nonspecific/free choice' noun phrases (also proposed, for other data and languages, by Farkas 2002a, Farkas 2002b, Lauer 2012, and Condoravdi 2015). Lauer observes that (38a) leaves it open whether or not the speaker knows what Arlo is cooking, whereas (38b) strongly suggests that the speaker doesn't know (or doesn't care, or doesn't want to say). For Lauer, (38a) places no requirements on its input or output contexts, while (38b) has a postsupposition requiring the output context to be compatible with multiple different referents for the thing Arlo is cooking.

(38) a. **What** Arlo is cooking smells delicious.
(allows that the speaker might be able to identify the referent)
b. **Whatever** Arlo is cooking smells delicious.
(signals that the speaker cannot or will not identify the referent – triggering further inferences about why not)

This use of postsupposition is strikingly parallel to the one proposed for *yǐwéi*:

(39) a. Māma **rènwéi** wǒ bìng le
Mom **thinks** I sick ASP
'Mom **thinks** I'm sick.'
(allows that the mother's belief may be taken up)
b. Māma **yǐwéi** wǒ bìng le
Mom **yǐwéi** I sick ASP
'Mom **is under the impression that** I'm sick.'
(signals that the mother's belief should not be taken up – triggering further inferences about why not)

(38a) is cast as postsuppositionally (and presuppositionally) neutral, just like *yǐwéi*'s unbiased alternative *rènwéi* (39a). In the right context, an utterance of (38a) might lead hearers to believe that this noun phrase has a specific referent (that the speaker can identify what Arlo is cooking), parallel to the way *x rènwéi p* may be taken to convey *p*. The postsupposition of (38b) explicitly prevents this outcome, just as the postsupposition of *yǐwéi* is argued to prevent a potential outcome of *x rènwéi p*. Moreover, in choosing the postsuppositional variant (38b) over the neutral alternative, the speaker triggers further reasoning about why they explicitly do not want the hearer to infer that they can identify a unique referent for the thing Arlo is cooking – because they don't know, don't care, or don't want to say. In the same way,

the speaker's choice to use *yǐwéi* triggers further inferences about why the speaker does not want p to become Common Ground – because they think is questionable or false.

The same picture also encompasses the postsupposition proposed by Constant 2012 for the English 'rise-fall-rise' intonation pattern. Constant observes that (40a) leaves it open whether the speaker can go on to list more people beyond Alex who liked the film; whereas (40b) (with rise-fall-rise intonation) signals that the speaker has answered the question as fully as they can, and cannot add more. Constant gives (40b) a postsupposition requiring that no alternative answer to the question would be 'assertable' (true and informative) in the output context following the assertion marked with rise-fall-rise.

(40) **A:** Who liked the film?

a. **B: Alex**$_{neutral}$ liked it.
(allows that the speaker might go on to identify more people who liked it)

b. **B: Alex**$_{RFR}$ liked it.
(signals that the speaker cannot identify more people who liked it – triggering further inferences about why not)

Like *rènwéi*, (40a) is said to place no restrictions on its input or output context. Hearers may infer from (40a) that the speaker has more information to add, just as they may infer from *x rènwéi p* that *p*. The postsupposition of (40b) explicitly prevents this outcome, the same way the postsupposition of *yǐwéi* prevents a potential outcome of *x rènwéi p*. Moreover, the speaker's choice to use (40b) over its neutral alternative cues pragmatic reasoning about why the speaker cannot say more – because they don't know who else liked the film, because they know that no one else liked it, because they have some particular reason to be cagey about other people's opinions. These inferences parallel the ones triggered by a speaker's choice to use *yǐwéi* over *rènwéi*.

Although there are many differences between belief reports, nonspecificity, and intonation, these phenomena all make use of postsupposition in similar ways: to prevent an inference which would have resulted from a neutral alternative, thereby triggering further inferences about why the speaker wanted to prevent that inference. This understanding helps to profile further linguistic items to be analyzed postsuppositionally. Such an item will probably compete with a more common, neutral alternative; will trigger inferences which seem semantic in their strength but pragmatic in their context-sensitivity; and will only be understood in light of the inferences which might result from its alternative.

Some other proposed postsuppositions from the literature do not fit this picture; those proposed by Brasoveanu, Szabolsci, Henderson, Champollion, and Charlow serve as ways of achieving obligatory wide scope and/or satisfying presuppositions out of order, but do not subvert potential inferences in the same way as *yǐwéi*, free-

choice items, and rise-fall-rise are argued to. It may not be possible to connect all of these uses of postsuppositions, but we have made progress by unifying some of them.

5.2 Postsuppositions vs. presuppositions and *yǐwéi* vs. *zhīdào* 'know'

To further illuminate the theory of postsuppositions, one might also ask whether *zhīdào* 'know' could be handled using a postsupposition rather than a presupposition: requiring all of the worlds in the output context to be p-worlds whether or not the input context satisfied that requirement, as in (41):

(41) (hypothetical) at-issue and postsupposed content of *zhīdào* 'know'
   a. $c+$ *x zhīdào* p = $c+$ *x believes* p
   b. defined only if $\forall w[w \in (c{+}x \textit{ zhīdào } p) \rightarrow p(w) = 1]$

(41) would ensure that the belief embedded by *zhīdào* 'know' must be Common Ground after the assertion. Perhaps it is already Common Ground before the assertion and stays that way, or perhaps it only becomes so afterwards on the grounds that the speaker wants it to be and the hearer is willing to accept it, considering the speaker an authority on the matter (Stalnaker 2002, von Fintel 2008, Schlenker 2012).

In fact, the analysis in (41) is essentially already advocated in prose by several researchers interested in presupposition accommodation – how new information can become Common Ground when a speaker presupposes it (as when *you know I'm engaged* introduces the fact that I am engaged; Lewis 1979, Stalnaker 1979, Stalnaker 2002, von Fintel 2008, Schlenker 2012). Analyzing such facts, Stalnaker 2002, von Fintel 2008, and Schlenker 2012 all argue that even if it's not initially Common Ground that the speaker is engaged, the factive *know* signals the speaker wants it to become so (believing it and wanting the hearer to do so too); and then it does become Common Ground when the hearer takes it up on those grounds. This process essentially amounts to the claim that presuppositions like the complement of *know* are actually postsuppositions.[7] So there is actually some precedent for analyzing presuppositional items *know* in terms of a postsupposition rather than a presupposition.

But even if both *zhīdào* 'know' and *yǐwéi* were analyzed using postsuppositions, their effects would be different because the definedness condition of *zhīdào* 'know' (41) is universal while that of *yǐwéi* is existential. For a postsuppositional *zhīdào* 'know' (41) (see Figure 1), its universal requirement that all worlds be p-worlds either already holds of the input context (and therefore also the output context); or, if the input

[7]Describing postsuppositions without invoking them by name, von Fintel 2008 writes that 'The prior context that is relevant to the interpretation of a speech act [and the satisfaction of its presuppositions] is the context as it is changed by the fact that the speech act was made' (emphasis added).

context contains both p and not-p worlds, then the assertion itself removes the not-p worlds to leave only p-worlds in the output context. Whether it is is framed as an (accommodatable) presupposition or as a postsupposition, the universal definedness condition of (41) therefore restricts the worlds under consideration, ensuring that certain worlds (the not-p worlds) are removed.

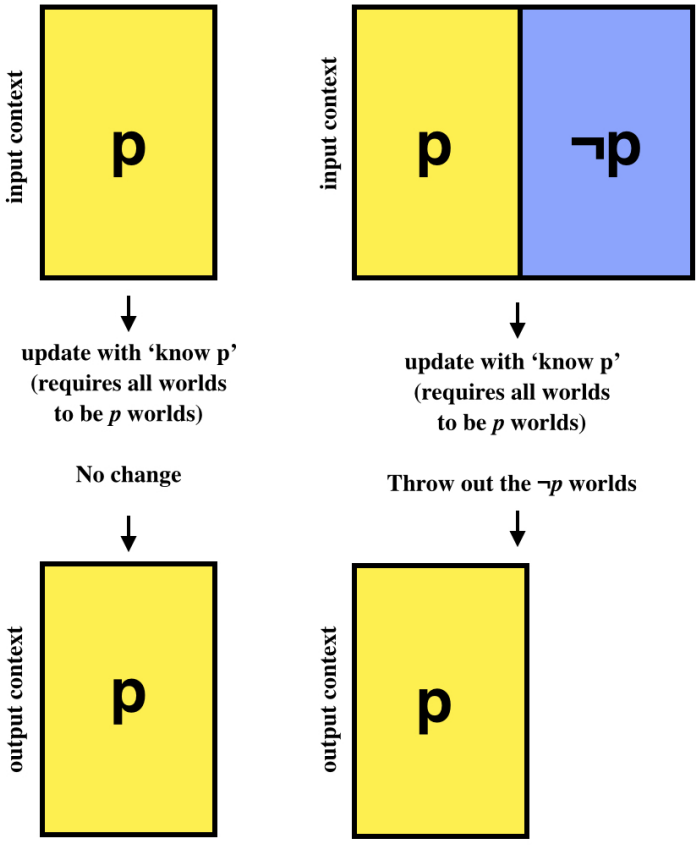

Figure 1: Effects of updating with a postsuppositional *zhīdào* 'know' (41) given different states of the input context.

In contrast, for postsuppositional *yǐwéi*, its existential requirement that some of the output worlds be not-p worlds must already be true of the input context (of course, there must already be not-p worlds in the input context for them to be in the output context). The assertion itself not only reminds hearers that not-p is a live possibility (in case they have forgotten), but also ensures that these not-p worlds must remain present in the output context (see Figure 2; note that this figure only represents the effects of *yǐwéi*'s postsupposition, not any further conversational inferences drawn from its use). The existential postsupposition of *yǐwéi* therefore restricts the way the

context can change, ensuring that certain worlds (the not-p worlds) are not removed. In this sense, the postsupposition of *yǐwéi* – but not the postsupposition that could be attributed to *zhīdào* 'know' – can be seen as preventing a potential change in the context. Its timing is more consequential because it restricts changes to the context rather than restricting the context itself.

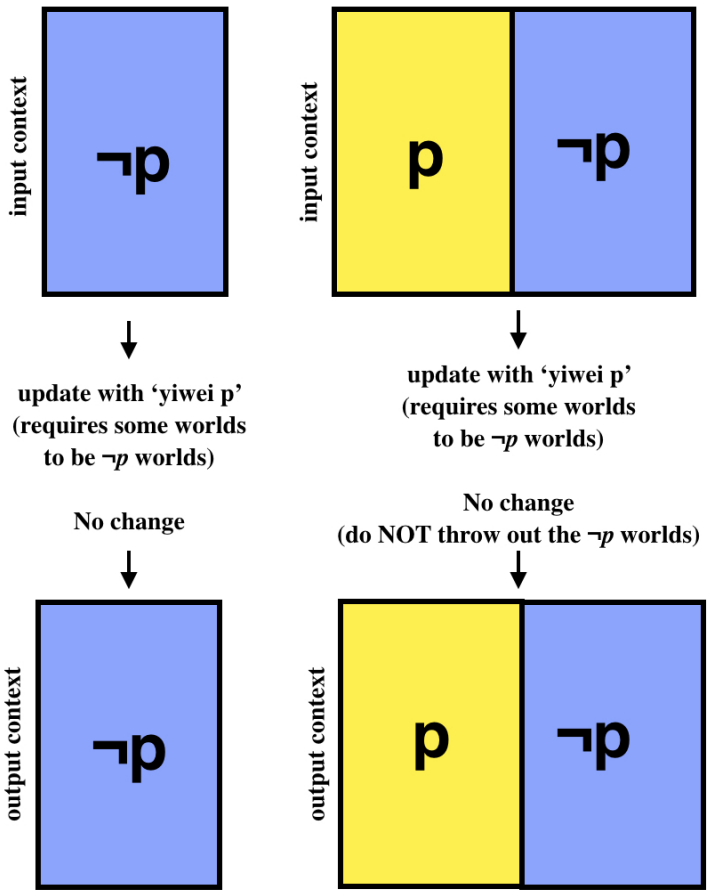

Figure 2: Effects of updating with *yǐwéi* given different states of the input context. These figures only represent the effects of *yǐwéi*'s postsupposition, not any further conversational inferences drawn based on the speaker's choice to use it (i.e., the inference that p is false).

To recap, I do not take a position on whether *zhīdào* 'know' should be analyzed in terms of an accommodatable presupposition or a postsupposition. Regardless of how *zhīdào* 'know' is analyzed, the postsupposition of *yǐwéi* has a unique effect in restricting changes to the context rather than restricting the context itself. That is the sense in which it can be seen as preventing an inference (and in so doing, giving

rise to further inferences about why the speaker chose to do that) – the function that I have suggested is shared by other proposed postsuppositions in the literature.[8]

Stepping back, this section has situated the proposed analysis of *yǐwéi* within a larger class of postsuppositions. While there are many open questions about this relatively newfangled device, this paper has offered the seeds of a unified, intuitive conception which may help to give postsuppositions a home in semantic and pragmatic theory.

6 Conclusion

Using Mandarin *yǐwéi* as a case study, this paper has argued for a unified and intuitive understanding of postsuppositions as ways of blocking potential contextual inferences.

As for *yǐwéi*, its negative bias is semantically grounded in a postsupposition requiring the output context to be compatible with not-p; and pragmatically derived as hearers reason about why the speaker chose to explicitly signal that x's belief is not to be taken up. This exploration engages the complex reasoning involved in deciding what to think about what other people think, and the linguistic resources used to guide it. It is well known that some belief reports are factive, conveying that the speaker endorses the reported belief, while others are nonfactive, silent on what the speaker thinks about it. Enriching this picture, *yǐwéi* exemplifies a rela-

[8]Along the lines of comparing *yǐwéi* to *zhīdào* 'know', one might also ask whether *yǐwéi* is governed by the principle of 'Maximize Presupposition' argued to pressure speakers to use *know* rather than *believe* when the belief is already Common Ground (Heim 1991; further discussed in Percus 2006, Sauerland 2008, Schlenker 2012, Lauer 2016, and elsewhere). Stepping back, 'Maximize Presupposition' is the observation that it is most felicitous to use the presuppositionally strongest alternative compatible with the context: given that there is only one sun, *the sun* (which presupposes uniqueness) is preferable to *a sun* (which does not). Since postsuppositions are cousins of presuppositions, one might expect the same principle to encompass postsuppositions as well, pressuring a speaker to use *yǐwéi* over *rènwéi* when the belief is known to be false or questionable.

But descriptively, *yǐwéi* does not strictly follow this constraint. Even when everyone knows the speaker is sick, a sentence of the form *Mom rènwéi I'm sick* is accepted alongside *Mom yǐwéi I'm sick* (§2), although the version with *rènwéi* is said to be more neutral and sympathetic to the mother's perspective. Theoretically, whether this finding is surprising or not depends on how one decides to motivate 'Maximize Presupposition'. I am inclined to conceive of it a defeasible preference (Schlenker 2012, Lauer 2016). For example, even if it is known that the company is losing money, *believe* can be used over *know* in (i) to indicate that Buffett does not have any insider information (Schlenker 2012), so that 'Maximize Presupposition' is outweighed by a competing desire to convey Buffett's thought process.

(i) If Buffett <u>believes</u> we are losing money, he will sell even more shares tomorrow.

In the same way, I argue, a speaker might choose *rènwéi* 'think' over *yǐwéi* to describe the belief-holder's thought process when speaker and belief-holder have different information; or to avoid emphasizing the belief-holder's mistake for social reasons. In sum, if Heim's 'Maximize Presupposition' constraint is to be extended to postsuppositions like the one proposed for *yǐwéi*, it must be as a defeasible preference, not an absolute rule, in order to fit these data.

tively less-studied class of strategies for reporting beliefs that the speaker views with skepticism.[9]

Turning to postsuppositions, these are cast as ways of semantically blocking one inference, thereby pragmatically triggering others. Just as the postsupposition of *yǐwéi* can only be understood in light of the inference it prevents, which in turn can only be understood within the complex calculations involved in reported beliefs, postsuppositions in general can only be understood in the context of the inferences that would arise without them. There is thus a mutually illuminating symbiosis between the study of postsuppositional lexical items, their non-postsuppositional alternatives, and the discourse effects of each one.

[9]Recently, analyses have been offered of several negatively biased belief verbs – Kierstead 2013 for Tagalog *akala*, Hsiao 2017 for Southern Min *liah-tsun*, Anvari et al. 2018 for Spanish *creer se* – which appear quite similar to *yǐwéi*, although these authors analyze them to mean 'believe falsely'. In the philosophy literature, Holton 2017 claims that he has encountered no language with a lexical item meaning 'believe falsely' Finally, English *be under the impression that* serves quite a similar discourse function to *yǐwéi* – but perhaps through different semantic and pragmatic means (perhaps a Gricean manner implicature based on the speaker's choice to describe a belief as an *impression*?).

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