The negatively biased Mandarin belief verb *yǐwéi*[1]

Abstract

This paper attempts to explain some puzzling data regarding the Mandarin Chinese belief verb *yǐwéi*, which strongly suggests that the belief it embeds is false. *Yǐwéi* is analyzed in terms of a *postsupposition* requiring that the Common Ground remain consistent with the *negation* of the reported belief. Zooming out, *yǐwéi* is situated into a larger class of strategies for conveying skepticism towards reported beliefs. Finally, the current use of postsuppositions is synthesized with previous literature, and a unified understanding of (some) postsuppositions is proposed.

1   Introduction

The Mandarin belief verb *yǐwéi* is often used to report a third party's belief while conveying that this belief is mistaken or questionable. For example, (1) conveys that the speaker is *not* sick. In contrast, *rènwéi* "think" would report the mother's belief more neutrally.

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

The data on *yǐwéi* raise several puzzles. Generally, *yǐwéi* very strongly suggests that the reported belief is false; but the source of this negative bias is not obvious. Because it can be cancelled, *yǐwéi*'s negative bias may seem like a conversational implicature (Grice 1989 [1975]); but because it generally projects, it may also seem like a form of conventional, non-at-issue content (Simons *et al.* 2010). In the first person, *yǐwéi* also has two distinct interpretations that are difficult to reconcile with one another. Finally, even though *yǐwéi*'s sense of wrongness projects out of all other entailment-cancelling operators, it surprisingly does not project out of negation.

Ultimately, a two-part analysis is proposed for *yǐwéi*, involving a conventional component that gives rise to a cancellable conversational implicature. Conventionally, it is argued that *x yǐwéi p* has an at-issue meaning of *x believes p*, and a non-at-issue requirement – what I call a

---

postsupposition in the sense of Lauer 2009, Brasoveanu 2009, and others[2] – that the Common Ground (Stalnaker 1979) remain compatible with not-p after the update. This postsupposition ensures that, no matter how reliable the belief-holder or the belief might be, the belief is *not* to be taken up. Depending on the context, this conventional meaning gives rise to a conversational implicature that the speaker thinks p is false, or at least that the speaker finds the belief-holder unreliable as to whether p. It is argued that this analysis can explain the data on *yǐwéi*.

Significance   Beyond analyzing one word in one language, this investigation also sheds light on the largely unexplored issue of negatively-biased belief-reporting strategies across languages. Many languages have ways of reporting a belief while conveying skepticism towards it, but not all of these strategies can be given the same semantics as *yǐwéi*. Instead, there seems to be a diverse range of semantic and pragmatic pathways for achieving a similar functional end, ripe to be explored in the growing literature on semantic variation across languages (Bittner 1994, von Fintel & Matthewson 2008, Deal 2011, and others)

This investigation also leads us to explore the concept of postsuppositions. In a dynamic system (Heim 1982, Beaver 2001), we can state a condition on an output context (a postsupposition) just as easily as we can state a condition on an input context (a presupposition). Yet presuppositions can be grasped intuitively, and are usually used for a coherent class of phenomena; whereas it is much harder to grasp the intuition of a postsupposition, perhaps because it is not clear what unifies the various phenomena for which they have been invoked. In fact, postsuppositions have been used in two ways in the literature: for preventing some sort of pragmatic inference that the hearer may otherwise have made (Farkas 2002a, Farkas 2002b, Lauer 2009, Lauer 2012, Constant 2012), and for achieving obligatory wide scope (Brasoveanu 2009, Brasoveanu & Szabolsci 2013, Henderson 2014). The present analysis of *yǐwéi* fits into the former group, in that *yǐwéi* prohibits hearers from inferring p from the information that *x believes p*. It is suggested that at least this use of postsuppositions can be understood intuitively as well as formally.

Road map   §2 lays out the data on *yǐwéi*, highlighting the puzzles that it raises. §3 proposes the analysis – a postsupposition that gives rise to a conversational implicature – and explains the data in these terms. §4 zooms out to consider the larger issues evoked by *yǐwéi*:

---

[2]The term "postsupposition" is from Brasoveanu 2009 and Lauer 2009, but the idea dates back to Farkas 2002a, Farkas 2002b

crosslinguistic variation in negatively biased belief reports (§4.1) and the nature of postsuppositions (§4.2). §5 concludes.

2 Data

Yǐwéi is not well described in the formal semantics literature. One contribution of this paper is to provide a thorough description of its behavior.

Yǐwéi has received some attention, however, in the descriptive literature on Mandarin, much of which is written in that language. For example, *yǐwéi* makes an appearance in Lǚ 1999, (p. 624–625, translated by [[a colleague whose name is redacted for review]]). In that work, the negative bias of *yǐwéi* is highlighted. Comparing *yǐwéi* and *rènwéi* (the neutral word for "think"), Lǚ writes: "Both involve making some judgment, but *yǐwéi* has a lighter tone. *Yǐwéi* is mostly applied to judgment that is contrary to fact. *Rènwéi* is usually used with a more positive judgment."

Lǚ gives an example, (2), in which *yǐwéi* conveys skepticism towards a reported belief. (2) most saliently means that in the speaker's view, the hearer *does* agree with the current strategy, but is behaving in a way that leads others to incorrectly think otherwise.

(2) nǐ   de tàidu   ràng biérén   yǐweí nǐ bù tóngyì
    you DE attitude make other-people yǐwéi you not agree
    zhèyàng bàn
    this-way handle
    "Your attitude gives others the impression that you don't agree with doing it this way"

This section presents further data on *yǐwéi*, collected in consultation with about a dozen native speakers of Mandarin Chinese (all educated in China/Taiwan through high school or college) at a US university. Throughout, I highlight the questions that I believe any analysis of *yǐwéi* must answer.

2.1 Non-first-person

Since *yǐwéi* is a belief verb, its effect on the discourse depends on whether or not the belief-holder is the speaker. Therefore, I first focus on *yǐwéi* in non-first-person contexts, and then turn to its first-person uses.

In the third person, *yǐwéi* often strongly conveys that the reported belief is false. For example, (3) (repeated from above) is taken to mean that the speaker is not sick. This sense of wrongness is so salient 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).

(3)   Māma   yǐwéi wǒ bìng le
        Mother yǐwéi I   sick ASP
        "Mom is under the impression that I'm sick"

One might compare *yǐwéi* to the German Konjunktiv I (Potts 2005), a strategy for reporting a belief or speech act that the speaker does not want to commit to either way. However, the Konjunktiv I can be used by newspapers to maintain a neutral stance towards the reported proposition (4), whereas a newspaper would come across as highly biased against the belief-holder, not neutral, if it used *yǐwéi* (5).

(4)   Sheila behauptet, dass sie krank sei
        Sheila maintains   that she sick   be.KONJ
        "Sheila maintains that she is sick"
        Potts 2005: 1.26

(5)   tā   yǐwéi tā   huì yíng lādīng de xuǎnjǔ
        3sg yǐwéi 3sg will win Latino DE vote
        "She is under the impression that she will win the Latino vote"

Because *yǐwéi* conveys such clear negative bias towards the reported belief, second-person *yǐwéi* can come across as rude or even threatening. For example, (6) would be inappropriate from a neutral reporter, and would only be expected from a highly biased pundit. In contrast, (6) would be neutral if *yǐwéi* were replaced with *rènwéi*.

(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"

Based on what we have seen so far, it might appear that *yǐwéi* simply entails or presupposes that the reported belief is false. However, when we turn to the first-person data in the next subsection, we see that the reality is more complicated.

2.2   First person

It may seem surprising that *yǐwéi* has a first-person use at all, given its strong suggestion that reported belief is false. [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). But in fact, *yǐwéi* has *two* distinct first-person uses, each involving a different way of reconciling the speaker's reported belief with her apparent skepticism towards it.

Past first-person use   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. For example, (7) would be appropriate if the speaker has just discovered that the talk has been cancelled, or if she is confused as to why the room where the talk is supposed to take place is empty.

(7)   wǒ yǐwéi jīntiān yǒu ge jiǎngzuò
       I   yǐwéi today   have CL talk
       "I previously thought there was a talk today"

In Mandarin, the 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 2003b](#), [Smith & Erbaugh 2005](#), [Lin 2006](#)). Therefore, it seems that the belief time of first-person *yǐwéi* is shifted backwards in order to rescue a sentence that would otherwise convey that the speaker both believes the embedded proposition and wants to suggest that it is false.

It's important that *yǐwéi* is the only belief verb to require this back-shifting; with *rènwéi* "think," *xiāngxìn* "believe," or *juéde* "feel that" substituted for *yǐwéi*, (7) would be interpreted as a statement about the speaker's *current* belief.

Hedged first-person use   In the second, distinct first-person of *yǐwéi*, the speaker is understood to *currently* hold the reported belief, but to welcome the hearer to disagree:

(8)   wǒ gèrén   yǐwéi nǐ   yīnggāi zhèyàng zuò
       I   personally yǐwéi you should this-way do
       "Personally, I think you should do this"

(9)   While doing homework with a friend, Jiayu has just proposed a half-baked idea; she follows up with:

zhìshǎo wǒ xiànzài   yǐwéi shì zhèyàng
at-least I   right-now yǐwéi be that-way

"At least that's my impression so far"

(8)–(9) are described as "tentative," "conservative," and "hedged," since this use of *yǐwéi* seems to diminish the speaker's confidence in her assertion. For example, (8) would be interpreted as "stronger" if *rènwéi* "think" were used instead.

These two first-person uses of *yǐwéi* pose several problems for the eventual analysis. The "past" first-person use of *yǐwéi* is noteworthy because only *yǐwéi* requires this temporal backshifting. So any analysis will have to explain why *yǐwéi* differs from other belief verbs in this regard.

Moreover, the "hedged" first-person use of *yǐwéi* conflicts with the other uses we've seen, because the speaker is not exactly suggesting that the reported belief is false. In order to fold this use in with the others, we will have to posit a meaning for *yǐwéi* that is more subtle than simply entailing or presupposing that the reported belief is false.

2.3   Cancellation

As I have emphasized, *yǐwéi* is unique among Mandarin belief verbs in its strong suggestion that reported belief is false. It is also the only Mandarin belief verb to give rise to a past inference in the first person. To capture these facts, I believe we will need to propose some difference in *conventional* meaning between *yǐwéi* and its alternatives. But there are also cases where *yǐwéi*'s sense of wrongness seems to behave like a conversational implicature, in that it can be cancelled. It is therefore a difficult question for the analysis which parts of the information conveyed by *yǐwéi* are to be explained conventionally, and which parts conversationally.

(10) shows a case where *yǐwéi*'s sense of wrongness is cancelled. The first clause of (10) alone would convey that this person is *not* a billionaire; but the second clause is a coherent, non-contradictory continuation.

(10)   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"

(10) 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, such sentences are generally only felicitous with a veracity emphasizer such as *díquè* "indeed" or *zhēnde* "really" in the second clause, to acknowledge that it subverts expectations.

Such sentences also only make sense when the speaker has a very specific rhetorical goal. For example, the speaker might say, "I have a friend who invented a really famous app. People *yǐwéi* she's a billionaire – and she actually is (=(10)), but she never made a cent on that app. She is just an heiress to her parents' massive shampoo company."

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, (10) would suggest that it would be incorrect to conclude that someone is a billionaire simply because she invented an app – but that in this particular case, the person is indeed a billionaire anyway.

Although sentences like (10) subvert hearers' expectations, they are not contradictory, nor are they self-corrections. Truly contradictory sentences such as (11) are judged incoherent in a way that (10) is not.

(11)   #tā shì ge yìwànfùwēng . . . ér   tā díquè bú shì
       3sg be CL billionaire   . . . and 3sg indeed not be
       "#She's a billionaire . . . and she's actually not"

The only way to make sense of (11) is to posit that the third-person pronouns in each clause do not refer to the same person; or to find some way that she could be a billionaire in one sense but not another. In contrast, (10) makes sense without such pragmatic rescue strategies.

Beyond making *yǐwéi*'s negative bias seem like a conversational implicature, (10) also shows that *yǐwéi* cannot be analyzed in the way that Kierstead 2013 handles a similar belief verb in Tagalog, *akala*. Kierstead argues that *akala* conventionally implicates that the speaker doubts the reported belief; but (10) shows that *yǐwéi* can be used when the speaker is fully committed to the belief, which would not be compatible with a conventional implicature that she doubts it.

2.4   Projection

Any analysis of *yǐwéi* will also have to explain its conflicting projection behavior. *Yǐwéi*'s sense of incorrectness projects out of questions, conditional antecedents, and possibility modals (following the "family of sentences" diagnostics from Chierchia & McConnell-Ginet 1990); but

under negation, seems to disappear. It is not obvious why *yǐwéi* would behave differently under negation than under other operators.

Questions   Looking first at questions, (12) is only appropriate if the speaker believes that there is no test. If the speaker does believe that there is a test, *rènwéi* "think" or *zhīdào* "know" would be used instead. Therefore *yǐwéi*'s sense of incorrectness projects.

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

Conditional antecedents   Similarly, (13) conveys that the belief-holder would be incorrect to believe there is a test tomorrow, showing that *yǐwéi*'s sense of wrongness projects out of conditional antecedents:

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

Possibility modals   Turning to possibility modals, (14) suggests that "actually this is a bad idea" – showing that *yǐwéi*'s sense of wrongness projects here as well.

(14)   tāmen kěnéng yǐwéi zhè shì yígè   hǎo bànfǎ
they   may   yǐwéi this be one-CL good method
"They might think this is a good strategy"

Negation   Whereas *yǐwéi*'s sense of wrongness projects out of questions, conditional antecedents, and possibility modals, it does not appear to project out of negation. There are several types of negation in Mandarin: *bié/búyào*, *bù*, and *méi*. *Bié* and *búyào* (compositionally, "not-shall") are used only in negative imperatives ("don't"). *Bù* is described in second-language instructional materials (e.g. Chinese Grammar Wiki) as the negation used for present and future events, whereas *méi* is described as the negation used for past events – and, for some reason, always used with *yǒu* "have/exist." In the theoretical literature, there are many analyses of *méi* vs. *bù* available; as one example, Lin 2003a argues that *méi* negates events whereas *bù* negates states.

Bié and **búyào**   When *yǐwéi* is negated under *bié* or *búyào* (the negations for imperatives) as in (15)[3], the hearer is being told not to believe the embedded proposition, so the entire context conveys bias against the reported belief. Therefore, such contexts make it difficult to isolate the negative bias of *yǐwéi*.

(15)   nǐ bié yǐwéi zìjǐ de qíyì   zuì gāo
       you NEG yǐwéi self DE chess-skill most high
       "Don't go thinking you're the best at chess"

Even in a carefully constructed context, the effect of *yǐwéi* under *búyào* and *bié* remains elusive. (16)[4] could be uttered if the speaker has no idea whether it is raining or not, but just wants to ensure that the hearer does not take Xiao Wang's soaked clothing as evidence for rain.

(16)   rúguǒ nǐ   kànjiàn Xiǎo Wáng quànshēn shītòule huílái,
       if   you see   Xiao Wang all-over   soaked   return,
       bié   yǐwéi wàimiàn xiàyǔ, tā   qù dǎ shuǐ   zhàng le
       don't yǐwéi outdoors rain,   3sg go do water battle ASP
       "If you see Xiao Wang come back soaking wet, don't think it's raining outside. He was in a water fight."

While (16) does not necessarily suggest that the embedded proposition (that it's raining) is false, it still conveys that "it's raining" would not be a good inference. So in this context as well, it is difficult to separate any contribution of *yǐwéi* from the bias conveyed by instructing the hearer not to believe the embedded proposition.

Bù   For some reason, *yǐwéi* is generally rejected by speakers under *bù*, the negation roughly characterized as specific to present and future predicates. *Yǐwéi* itself can certainly describe a belief event that takes place in the present or future, so it is unclear why it is incompatible with the present/future negation – especially when other belief verbs can be used with *bù*. I leave this issue for future work.

Méi   The final type of negation is *méi*, the negation used for past predicates and always used with *yǒu* "have/exist." *Yǐwéi* is much more acceptable under *méi* than under *bù*, although speakers sometimes say it is still a bit marked.

In order to assess the behavior of *yǐwéi* under *méi*, we first have to

---

[3]adapted from the Chinese language-learning website LineDictionary

[4]from [[a colleague whose name is redacted for review]]

establish whether *yǐwéi* is a neg-raiser in the sense of e.g. Horn 1989[5]. In other words, does *x not yǐwéi p* mean that it is not the case that *x* believes *p* (perhaps *x* has no opinion at all re *p*; this is the non-neg-raised interpretation); or does it mean that *x* believes not-*p* (the neg-raised version)?

Based on examples like (17), it seems that *yǐwéi* is indeed a neg-raiser.

(17) wǒ cónglái méi yǐwéi tā hěn cōngmíng
       I   ever   NEG yǐwéi 3sg very smart
       "I've never thought s/he was smart"

If *yǐwéi* were not a neg-raiser, then we expect (17) to simply mean that the speaker has never had any opinion about whether this person is smart or not ("It is not the case that I have thought s/he was smart") – but that is not how (17) is interpreted.

If *yǐwéi* is a neg-raiser, we expect (17) to mean that the speaker has always found this person to be rather dull ("I've always thought s/he was *not* smart") – which is indeed how (17) is understood.

Given that *yǐwéi* is a neg-raiser, our analysis of neg-raising determines what predictions we make about the behavior of *yǐwéi* under negation.

On the one hand, we might assume that neg-raising is a syntactic process[6], such that the negation underlyingly sits in the embedded proposition even though it surfaces outside the belief verb. In that case, if *yǐwéi* behaved under negation the way it behaves under other emdeddings, we might expect negated *yǐwéi* to convey skepticism towards the embedded proposition NEG *p*.

On the other hand, we might assume that neg-raising is a pragmatic process[7], in which case the negation semantically sits where it appears: outside the embedded proposition. In that case, if *yǐwéi* behaved under negation the way it behaves under other emdeddings, we might expect negated *yǐwéi* to convey skepticism towards the embedded proposition

---

[5]Horn 1989 dates the central observation behind neg-raising to of St. Anselm in the eleventh century, also mentioned in Quine 1960: 145, Hintikka 1962: 15; the first linguistic analysis is from Fillmore 1963; the term appears to be from Horn 1975

[6]This was the original analysis of Fillmore 1963: 220, and widely accepted by others at the time; it was later defended in e.g. McCawley 1998: 598 and most recently revived in Collins & Postal 2014

[7]The pragmatic analysis was first articulated by Jackendoff 1971; Bartsch 1973, written in German, is also often cited as an early endorsement of this view. It is also favored by e.g. Horn 1989, Gajewski 2005, Gajewski 2007 (although Gajewski adds a semantic "homogeneity presupposition" to the pragmatic calculation) and many, many others

p.

(18) **Underlying form** of *x* NEG *yǐwéi p*: *x yǐwéi* [NEG *p*]
Predicted effect: skepticism towards [NEG *p*]

(19) **Underlying form** of *x* NEG *yǐwéi p*: *x* NEG *yǐwéi* [*p*]
Predicted effect: skepticism towards [*p*]

However, contrary to the data on *yǐwéi* under all other entailment-cancelling operators, *yǐwéi* under *méi* does *not* convey skepticism towards *either* NEG *p* or *p*. Instead, it is perceived as neutral.

If *yǐwéi* conveyed bias against NEG *p*, we would expect (20) to bias against the idea that the noise was *not* gunfire – thereby suggesting that the noise *was* gunfire. If *yǐwéi* conveyed bias against *p*, we would expect (20) to bias against the idea that the noise *was* gunfire – thereby suggesting that the noise was *not* gunfire. However, (20) has no clear bias in either direction, and can be used equally easily whether the noise was indeed gunfire or not.

(20) tā méi yǐwéi nà shì qiāngshēng
      3sg NEG yǐwéi that be gunshot
      "He didn't think it was gunfire"

To see the data more clearly, we can put (20) into different contexts: where the noise is indeed gunfire (21), and where the noise is in fact a firework (22). In both cases, (20) is equally natural, showing that it conveys no bias about whether the noise was or was not really gunfire.

In (21), Xiao Wang was mistaken in not realizing that the noise was a gun, and *yǐwéi* is perfectly acceptable.

(21) A gun was fired outside Xiao Wang's house. The police come and ask him about it. At the time, Xiao Wang had not realized the sound was a gun, because he believed it was a firework.

      tā méi yǐwéi nà shì qiāngshēng, dànshì nà díquè shì
      3sg NEG yǐwéi that be gunshot,   but   that indeed be

      "He didn't think it was gunfire, but it actually was"

In (22), Xiao Wang was correct not to interpret the noise as gunfire; and again, *yǐwéi* is perfectly acceptable.

(22) Xiao Wang heard a loud popping noise, but he knew his neighbors like to play with fireworks, so he wasn't worried. In fact, the sound was indeed just fireworks.

11

tā	méi	yǐwéi	nà	shì	qiāngshēng,	ér	nà	díquè	bú	shì
3sg	NEG	yǐwéi	that	be	gunshot,	and	that	indeed	NEG	be

"He didn't think it was gunfire, and in fact it wasn't"

Under other embeddings, *yǐwéi* conveys bias against the embedded proposition, and is much more natural when the embedded proposition is false than when it is true. But under negation, *yǐwéi* is equally acceptable whether the embedded proposition is true or not. Its negative bias seems to disappear.

2.5   Summary of data and puzzles

The data, summarized in Table 1, raise several puzzles for the analysis of *yǐwéi*:

1. **What is the source and nature of *yǐwéi*'s negative bias – and is it conventional, or conversational?** On the one hand, *yǐwéi*'s negative bias seems conventional. *Yǐwéi* is the *only* belief verb that gives rise to a past inference in the first person, so there must be something unique in its conventional meaning that separates it from other belief verbs. Because *yǐwéi*'s negative bias projects out of most entailment-cancelling operators, it may seem to be some sort of backgrounded conventional content, such as a presupposition or a conventional implicature (Simons *et al.* 2010). But on the other hand, because it can apparently be cancelled, it also may seem like a conversational implicature.

2. **How can *yǐwéi*'s two distinct first-person uses be unified?** The analysis of *yǐwéi* should be able to explain why *yǐwéi* can be either past or hedged in the first person.

3. **Why does *yǐwéi*'s negative bias project out of all entailment-cancelling operators *except negation*?** The sense of negative bias associated with *yǐwéi* cannot be a run-of-the-mill presupposition or conventional implicature, because those types of content reliably project out of negation as well as out of other operators.

	rènwéi	*yǐwéi*
1st person ___*p*	present by default, not hedged	understood as past or hedged
2rd person ___*p*	typically not rude	typically rude because it suggests hearer is in error
3rd person ___*p*	*p* might or might not be true; an unbiased way to report another party's opinion	typically conveys that speaker disbelieves or doubts *p*; a highly biased way to describe another party's opinion
3rd person ___*p* and in fact *p*	unsurprising	subverts expectations
under embeddings	no sense of wrongness in the first place, so nothing projects	sense of wrongness appears to project (but does not project out of negation!)

TABLE 1: *yǐwéi* vs. the more neutral *rènwéi* "think"

3 Analysis

To address these questions, I propose a three-part analysis of *yǐwéi*:

1. an at-issue meaning of *believe*;

2. a backgrounded (projecting) "postsupposition" that the Common Ground, after the update, remain compatible with not-*p* ...

3. ...which in turn gives rise to a flexible conversational implicature that *p* is false, unwarranted, or otherwise questionable

By splitting *yǐwéi*'s negative bias into two parts – a conventional postsupposition that gives rise to a conversational implicature – I argue that we can make sense of *yǐwéi*'s conflicting behavior.

3.1 The postsupposition and the implicature

Conditions on inputs and outputs A postsupposition ([Farkas 2002a](), [Farkas 2002b](), [Lauer 2009](), [Brasoveanu 2009]()), in a dynamic update framework ([Heim 1982](), [Beaver 2001]()), is the mirror image of a presupposition. A presupposition imposes a definedness condition on inputs, whereas a postsupposition imposes a definedness condition on inputs.

In a dynamic framework, sentences are understood both as propositions and as functions from input contexts to output contexts. A

context, also known as a Common Ground (Stalnaker 1979), is a set of worlds compatible with interlocutors' mutual public beliefs.

When a sentence S is uttered and accepted in a context c, the output context c' includes only those worlds in c where the proposition S is true. Just as c denotes a set of worlds consistent with interlocutors' mutual public beliefs, a proposition such as S denotes a set of worlds: those in which S is true.

Therefore, more formally, when S is uttered in a context c, the new context c', written as $c + S$, is defined as $c \cap S$: all those worlds in the set of worlds c that are also in the set of worlds denoted by S.

(23) $c + S =_{def} c \cap S$

Presupposition   In such a framework, a *presupposition* is analyzed as a condition on input contexts. For example, *know* is often taken to presuppose that the proposition it embeds is true (Stalnaker 1974). *Know* therefore has an at-issue meaning of *believe* and a backgrounded requirement that the input context c entail the embedded proposition p.

(24)   at-issue and presupposed content of *know*
         $c+$ *x knows* $p = c' = c+$ *x believes* p
         defined only if $\forall w[w \in c \rightarrow p(w) = 1]$

Postsupposition: the mirror image of a presupposition   In such a framework, we can just as easily state a definedness requirement on *output* contexts as on *input* contexts: a postsupposition. For *yǐwéi*, the proposed postsupposition is that the Common Ground remains consistent with not-p: that there is at least one world in the Common Ground where p is false. As with *know*, the at-issue meaning is taken to be *believe*.

(25)   at-issue and postsupposed content of *yǐwéi*
         $c+$ *x knows* $p = c' = c+$ *x believes* p
         defined only if $\exists w \in c' : p(w) = 0$

Yǐwéi therefore reports a belief while flagging that this belief is not to be taken as true. No matter how reliable the belief-holder or how credible the belief, *yǐwéi* ensures that we do not conclude p from the fact that x believes it. Crucial to this analysis is the idea that although belief verbs are nonfactive (Kiparsky & Kiparsky 1970), reported beliefs can be taken up into the Common Ground under the right pragmatic conditions (e.g. Karttunen 1973, Simons 2007, Anand & Hacquard

2014). For example, when the belief-holder is reliable, the belief is credible, and there is some reason for the speaker to report a belief about p rather than p itself, hearers may infer p from the information that x believes it. The effect of *yǐwéi* is to head off such a potential inference.

In contrast, a neutral belief verb such as *rènwéi* "think" is argued not to have any backgrounded requirements about how the reported belief relates to the Common Ground, leaving hearers free to draw their own conclusions about p. A factive verb such as *zhīdào* "know" is assumed to require the belief to already be in the Common Ground (although see Simons 2007 for objections). Therefore, on this analysis, *rénwéi*, *zhīdào* and *yǐwéi* all have the same at-issue meaning of *believe/think*, but different backgrounded requirements about how that belief relates to the Common Ground.

Why not just use a presupposition? For there to be a not-p world in the output context, there has to have been a not-p world in the input context as well. Therefore, *yǐwéi*'s postsupposition is stronger than a presupposition, comprising a presupposition and more.

If *yǐwéi* only *presupposed* a not-p world in the *input* context instead of postsupposing one in the output context, then *yǐwéi* would simply inform hearers that p was unsettled in the Common Ground before the announcement that x believes it. In that case, hearers would be free to infer p if x is an authority and p is credible. Such a presupposition would no longer have the effect of preventing an inference from *x believes p* to p.

The postsupposition gives rise to a conversational implicature The speaker who uses *yǐwéi* wants to make sure that the reported belief p is not taken up. As a result, the choice of *yǐwéi* (over a neutral belief verbs such as *rènwéi* "think" or *juéde* "feel that") comes to conversationally implicate negative bias towards p. Depending on the context, the choice of *yǐwéi* can convey pragmatically that p is false, questionable, unwarranted, hedged, and so on, as seen in the examples in §2. These diverse implicatures of negative bias against p, I argue, are all grounded in *yǐwéi*'s requirement that p not be taken up.

In some contexts, p is implicated to be false, as in (26) (reproduced from above).

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

In these contexts, the speaker generally clearly has an opinion about whether p is true (here, the speaker is assumed to know whether or not she is sick). The implicature that p is false (that the speaker is not sick) is therefore calculated according to the following logic:

1. *From semantics of yǐwéi*: Speaker explicitly does not want p to be added to CG

2. *From context:* Speaker has an opinion as to whether p

3. *Generally:* If Speaker believed p, Speaker would have no objection to p being added to the CG

4. *But since the speaker **does** object to p being added to the CG:* Speaker believes p is false

When the speaker does not have a clear opinion as to whether p, the use of *yǐwéi* does not directly convey that p is false. However, *yǐwéi* continues to suggest that, for one reason or another, it would be incorrect to take up p simply based on the evidence that x believes it.

For example, in $(27)^8$, the speaker explicitly declares that she does not have an opinion as to whether p (whether Xiao Li has arrived or not). Out of the blue, (27) is rejected: "If you don't know [if Xiao Li is here or not], how do you know Wang Peng is wrong?"

(27) wǒ bù zhīdào Xiǎo Lǐ dào   le   méiyǒu,   dànshì Wáng
      I   not know   Xiao Li arrive ASP NOT-have, but   Wang
      Péng yǐwéi tā dào   le
      Peng yǐwéi 3sg arrive ASP
      "I don't know if Xiao Li has arrived or not, but Wang Peng is under the impression that she has"

However, (27) is felicitous in a context in which Wang Peng is a small child who has just pointed to another woman and said, "There's Xiao Li!" In such a context, the speaker still doesn't know if Xiao Li is really here or not, but does know that Wang Peng's belief is based on a misperception. Here, the implicature is of *yǐwéi* is something like, "Wang Peng is not reliable about p." It is calculated according to the following logic:

1. *From semantics of yǐwéi*: Speaker explicitly does not want p to be added to CG

2. *From content of (27):* Speaker has no opinion as to whether p

3. *From content of (27):* Wang Peng believes p

---

[8]suggested by an anonymous reviewer of a previous version of this project

4. *Since the speaker explicitly does not want Wang Peng's belief to become CG:* Speaker believes that Wang Peng's belief that p is not good evidence for p

Although p may be independently true, the speaker uses *yǐwéi* to ensure that no one takes up p as a belief based on the information that Wang Peng believes it.

Out of the blue, (27) may be puzzling (and therefore, seem infelicitous) because it is difficult to imagine why the speaker would view Wang Peng as an unreliable source as to whether Xiao Li has arrived or not. If the speaker has no idea whether Xiao Li is here or not, then what evidence does she have for suggesting that Wang Peng's belief is unreliable?

But in a context where we know why Wang Peng's beliefs are not to be taken seriously, (27) makes sense. The speaker still does not know whether Xiao Li is here or not, but has independent evidence for not trusting Wang Peng on this point.

These examples illustrate that depending on the context, *yǐwéi* can give rise to a variety of conversational implicatures, all centered on the idea (grounded in *yǐwéi*'s postsupposition) that p is not to be taken up based on the information that x believes it. Perhaps p is not to be taken up because it is false, or perhaps, if x is known to be unreliable as to whether p, p should not be taken up based on x's belief in it even if p could still be true.

It is argued that this dual-pronged approach to *yǐwéi*'s negative bias (a conventional postsupposition, and a flexible conversational implicature) can explain much of the puzzling data surrounding *yǐwéi*.

3.2   Explaining the data

The conventional and conversational sources of *yǐwéi*'s negative bias   Above, it was emphasized that *yǐwéi*'s negative bias behaves in some ways like a conventional part of its meaning, and in other ways like a conversational implicature. The two-pronged analysis captures both of these aspects of *yǐwéi*.

On the one hand, *yǐwéi* is the *only* Mandarin belief verb that gives rise to a past inference in the first person because it is the only Mandarin belief verb with a postsupposition that the Common Ground remain consistent with not-p. *Yǐwéi*'s negative bias generally projects (more on that later) because this negative bias is grounded in a backgrounded, projecting component of *yǐwéi*'s content.

On the other hand, *yǐwéi*'s negative bias manifests differently in different contexts – sometimes as a suggestion that the embedded propo-

sition p is false, sometimes as a suggestion that the belief-holder is unreliable whether or not p is false – because these inferences are flexible, context-dependent conversational implicatures. *Yǐwéi*'s suggestion that p is false can be cancelled as in (29) (repeated from above) because it is a conversational implicature.

(28) 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"

This analysis predicts that the conjuncts in (29) cannot be felicitously uttered in the reverse order. Because the postsupposition of *yǐwéi* requires some not-p worlds in the input context in order for them to be in the output context, *yǐwéi* should be impossible when p is already common ground. As predicted, (29) is indeed infelicitous when the conjuncts are reversed:

(29) #tā shì yìwànfùwēng ... ér rénmén   yǐwéi tā shì
      3sg be billionaire   ... and person-PL yǐwéi 3sg be
      "#She's a billionaire ... and people are under the impression that she is"

The two first-person uses On this analysis, *yǐwéi*'s two first-person uses can also be reconciled. Looking first at the first-person past use of *yǐwéi*, Mandarin does not distinguish past from present (Lin 2003b, Smith & Erbaugh 2005, Lin 2006)); atelic predicates are present by default but can be shifted around pragmatically. With first-person *yǐwéi*, the speaker is both stating that she believes p and conveying that p should not be taken up – an unusual rhetorical position. One way to make sense of the tension is to backshift the time at which the speaker believed p, so that she *previously* believed it but now views it with skepticism: accounting for sentences such as (30) (repeated from above).

(30) wǒ yǐwéi jīntiān yǒu ge jiǎngzuò
      I   yǐwéi today have CL talk
      "I previously thought there was a talk today"

Turning to the hedged first-person use of *yǐwéi*, the speaker is again in the unusual position of both stating that she believes p and conveying that p should not be taken up. But here, when there are other cues that the speaker is hedging, another way to make sense of the speaker's

18

strange belief-state is to infer that the speaker does not want her belief
to be taken too seriously. This analysis accounts for examples like (31)
and (32), repeated from above:

(31)   wǒ gèrén   yǐwéi nǐ   yīnggāi zhèyàng zuò
       I   personally yǐwéi you should this-way do
       "Personally, I think you should do this"

(32)   While doing homework with a friend, Jiayu has just proposed
       a half-baked idea; she follows up with:

       zhìshǎo wǒ xiànzài   yǐwéi shì zhèyàng
       at-least I   right-now yǐwéi be that-way

       "At least that's my impression so far"

Projection out of negation vs. other operators   Finally, the
proposed analysis also explains why *yǐwéi*'s sense of negative bias ap-
pears to project out of every entailment-cancelling context except nega-
tion. The explanation hinges on the way postsuppositions behave under
negation versus other operators (Lauer 2012).

To make predictions about the behavior of *yǐwéi* under entailment-
cancelling operators, we have to investigate such operators from a dy-
namic perspective, because the postsupposition of *yǐwéi* is defined in a
dynamic manner.

Looking first at **questions**, I adopt for concreteness the question-
modeling framework of Farkas & Bruce 2010, expanded by Malamud &
Stephenson 2014. The framework is built on proposals from Hamblin
1971, Stalnaker 1979, and Gunlogson 2004.

In such a framework, the Common Ground is joined by several the-
oretical constructs modeling other aspects of the discourse. In addi-
tion to the Common Ground, we also have (adapted from Malamud &
Stephenson 2014):

(33)   a. DC_X: for each participant X, a slate of X's public dis-
                 course commitments
       b.   the Table, which is a stack of issues (propositions, ques-
                 tions) to be resolved in a top-first order
       c.   the Projected Set, the set of potential Common Grounds
                 corresponding to possible resolutions of the next issue on
                 the Table

When one party asks a polar question such as (34) (repeated from
above), the proposition corresponding to the at-issue content of the

question (here, whether or not he believes there is a test tomorrow) is added to the Table as the next issue to be resolved.

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

Next, the Projected Set (containing all the possible Common Grounds resulting from all potential resolutions of this issue) is split into two possible Common Grounds: one in which the proposition (that he believes there is a test tomorrow) is true, and one in which it is false. I assume that any *postsuppositions* of the question, as conditions on output Common Grounds, will be reflected in all the potential Common Grounds in the Projected Set.

So, when a question such as (34) is asked, the Projected Set contains two possible Common Grounds, one in which he believes there is a test tomorrow and one in which he doesn't; but both of them are required, by the postsupposition of *yǐwéi*, to contain worlds in which there is no test.

Next, no matter how the question is answered, the new Common Ground will also be one in which there might not be a test tomorrow. This update process is illustrated in Table 2 (modeled after Malamud & Stephenson 2014: 285). Following Malamud and Stevenson, I posit that the Common Ground already contains one proposition, q, and that A has committed to an additional proposition, r, which B has not committed to. I use $\diamond$ *no test* to model the requirement that the post-update Common Ground remains compatible with there not being a test tomorrow.

Using this analysis of questions, the postsupposition of *yǐwéi* is correctly predicted to project.

	(i) A asks	(ii) B answers	(iii) A accepts
DC_A	{r }	{r }	{r }
DC_B	{ }	{ he believes there is a test }	{ }
Table	<he believes there is a test>	<he believes there is a test>	<>
Common Ground	{q}	{q }	{q, he believes there is a test, ◇ no test}
Projected Set	{ {q, he believes there is a test, ◇ no test}, {q, he does not believe there is a test, ◇ no test}}	{ { q, he believes there is a test, ◇ no test } }	{ { q, he believes there is a test, ◇ no test } }

TABLE 2: asking and answering a question containing *yǐwéi*

Turning to **conditionals**, I invoke the dynamic analysis of Heim 1983. In Heim's analysis, a context c updated with a conditional *If A then B* is defined as in (35), where the plus sign means set intersection and the minus sign means set subtraction:

(35) $c+$ *if A then B* $=_{def} c - (c + A - (c + A + B))$

The effect of this conditional is to subtract from c any worlds in which A is true and B is false. Beyond that holistic effect, the intermediate steps are also important for determining the projection behavior of any presuppositions of A or B. In particular, A has to be added to c, whereas B only has to be added to c once c has already been updated with A. For A to be added to c, any presuppositions of A must be satisfied in c. Therefore, the fact that A must be added directly to c ensures that any presuppositions of A must hold in c. Heim's analysis therefore explains why any presuppositions of a conditional antecedent "project" to become presuppositions of the full conditional statement *If A then B*.

The system works differently with postsuppositions, because the postsuppositions constrain the output context $c + A$ rather than the input context c. To update with a conditional, c is first updated with A, giving us all the worlds in c where A is true: both $A\neg B$ worlds and AB worlds. If A has a postsupposition, the postsupposition is applied here, to the result of $c + A$. Next, the $c + A + B$ worlds are subtracted from the $c + A$ worlds, leaving behind only the $A\neg B$ worlds. Finally, the result of that calculation ($A\neg B$) is subtracted from c, leaving us with only the $AB, \neg A\neg B, and \neg AB$ worlds: the worlds that satisfy a material conditional analysis of *If A then B*.

This process is illustrated in (36)–(38), using a prose version of Heim's theory articulated by Beaver 2001: 86:

(36) "Find the set of worlds where the antecedent is true . . . [underlined]" (giving us $c + A$)
(Any **postsuppositions** of A, marked with $\star$, are applied to these $c + A$ worlds)
   a. $\underline{AB}\ \star$
   b. $\underline{A\neg B}\ \star$
   c. $\neg AB$
   d. $\neg A\neg B$

(37) ". . . take away those worlds where both the antecedent and consequent are true . . ." (take away the AB worlds); giving us $c + A - (c + A + B)$
   a. $\underline{\cancel{AB}}\ \star$
   b. $\underline{A\neg B}\ \star$
   c. $\neg AB$
   d. $\neg A\neg B$

(38) "and subtract the result from the original context"
giving us $c - (c + A - (c + A + B))$
   a. $AB\ \star$
   b. $\cancel{A\neg B}\ \star$
   c. $\neg AB$
   d. $\neg A\neg B$

Therefore, at the end of the update, the postsupposition of A applies to the remaining A worlds: the AB worlds. In the case of *yǐwéi*, the AB worlds are required to contain at least one not-p world[9]. In other words, if the conditional antecedent A is true, the postsupposition holds.

We saw that any presuppositions of A end up holding in *all* worlds in c (meaning that any postsuppositions of A project). In contrast, any *postsuppositions* of A only end up holding in the c worlds that are also A worlds. But this condition, too, gives rise to a type of "projection." Consider the conditional (39) (repeated from above).

---

[9]Of course, one might object that the not-p worlds may have been only among the $A\neg B$ worlds. Thus the remaining AB worlds would not necessarily contain any not-p worlds. But for this to be true, we would have to assume that B and not-p are related in some way, such that not-B entails p. In the cases considered here, the requirement for not-p worlds is generally independent of the conditional consequent. Therefore, in general, I assume that the requirement for not-p worlds applies to the AB worlds *and* the $A\neg B$ worlds.

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

The worlds in which Kate thinks there is a test tomorrow (the A worlds) are required to be compatible with there *not* being a test tomorrow (the postsupposition required of $c + A$). Semantically, this postsupposition is not applied to the worlds in which she does not think there is a test tomorrow (the not-A worlds); but based on pragmatic reasoning, there is no reason to think that the fact that there might not be a test tomorrow should depend on whether Kate believes there is a test; so perhaps we might infer that not-p applies to c as a whole, not just $c + A$ as required by the semantics.

In any case, (39) conveys that if Kate thinks there is a test (and also, perhaps, if she doesn't), there might not be a test tomorrow. Therefore, the sense that Kate is wrong or unreliable persists when *yǐwéi* appears in a conditional antecedent. This analysis correctly predicts that (39) should convey that the speaker believes Kate is mistaken or confused about whether there is a test.

Turning to **possibility modals**, I invoke the dynamic analysis of Veltman 1996: 228 (adapted by Beaver 2001: 207, von Fintel & Gillies 2007: 53). For them, *might* ϕ is a "test" on the Common Ground, true if ϕ is indeed compatible with the Common Ground and false if it is not. In other words, *might* ϕ, if true, has the effect of informing us that ϕ is compatible with the Common Ground.

(40) $c+ \text{ } might \text{ } \phi = c$ if $c + \phi \neq \emptyset$;
                    $\emptyset$ otherwise

Any postsuppositions of ϕ will be applied to $c + \phi$. If *might* ϕ is true, then there are ϕ worlds in c, to which the postsupposition applies. As a result, any postsupposition of ϕ will "project" in the sense that it applies to any ϕ worlds in c.

For example, (41) (repeated from above) "tests" whether the Common Ground contains any worlds in which "they think this is a good strategy."

(41)   tāmen kěnéng yǐwéi zhè shì yígè   hǎo   bànfǎ
          they   may   yǐwéi this be one-CL good method
          "They might think this is a good strategy"

If the test succeeds (if (41) is true), then c contains some worlds in which "they think this is a good strategy;" and that set of worlds ($c + \phi$ worlds) is postsupposed to also include at least one world in which it is *not* a good idea (not-p). As in the case of conditionals, semantically, we are not told whether the remaining worlds in in which they do *not* think it is a good idea (the not-ϕ worlds) also include not-p worlds; but pragmatically, we might infer that p ("it is a good strategy") does not depend on ϕ ("they think it is a good strategy"), meaning that there are not-p worlds among the not-ϕ worlds as well.

In any case, (41) conveys that there are ϕ worlds in the Common Ground (worlds in which they think this is a good strategy), and that at least those ϕ worlds comprise at least some not-p worlds (worlds in which it is *not* a good strategy). If they think it is a good idea – and maybe even if they don't – it might not be a good idea. Therefore, the negative bias associated with *yǐwéi* is correctly predicted to persist when *yǐwéi* is embedded under a possibility modal.

Turning finally to **negation**, we can now explain why the negative bias associated with *yǐwéi* disappears. In dynamic semantics (e.g. Heim 1983: 400), the effect of updating with not-A is to first update c with A, and then subtract that result from c. Again, the plus sign indicates set intersection; the minus sign indicate set subtraction.

(42) $c +$ not-$A =_{def} c - (c + A)$

As shown in Lauer 2012: 22, this definition means that postsuppositions, unlike presuppositions, do *not* project out of negation. Any postsupposition of A is a requirement on $c + A$; but $c + A$ is then subtracted from c, leaving no A worlds for the postsupposition of A to apply to.

To illustrate, consider (43), repeated from above.

(43)   tā méi yǐwéi nà   shì qiāngshēng
        3sg NEG yǐwéi that be gunshot
        "He didn't think it was gunfire"

To update with (43), we first update the Common Ground with "he thought it was gunfire," at which point the postsupposition (that this new Common Ground contain some not-gunfire worlds) applies. Then that new Common Ground is subtracted from the original Common Ground, leaving only worlds in which he did *not* think it was gunfire, and taking away the worlds to which the postsupposition would apply. The sense of negativity associated with *yǐwéi* is thus correctly predicted to disappear under negation.

24

3.3 Section summary

I have argued that *yǐwéi* contributes an at-issue meaning of *believe* along with a non-at-issue *postsupposition* that the output context remain consistent with the negation of the embedded proposition. Because this postsupposition indicates that the speaker does not want the Common Ground to be updated with p, *yǐwéi* gives rise to a conversational implicature that x is unreliable as to whether p, whether because the speaker believes p is false or because she mistrusts x's view on p.

It is argued that this analysis makes sense of the data on *yǐwéi*. We now see why the negative bias associated with *yǐwéi* appears both conventionalized and conversational: because the pragmatic inferences associated with *yǐwéi* are shaped by both conventionalized meaning of *yǐwéi* and the particular discourse context. We have a way of unifying the two first-person uses. Finally, we now understand why the negative bias of *yǐwéi* appears to project out of every entailment-cancelling context except negation.

4 Significance

Having proposed an analysis of *yǐwéi*, I now zoom out to consider the significance of this discussion for our understanding of belief reports across languages (§4.1) and of postsuppositions (§4.2).

4.1 Belief verbs across languages

When hearers encounter a reported belief, they engage in rich pragmatic calculations to assess its veracity (Karttunen 1973, Simons 2007, Anand & Hacquard 2014). Knowing this, speakers may want to guide this reasoning process. One widely-recognized strategy is for the speaker to choose a factive verb (*know, discover, find out*) when she thinks the belief is or should be accepted and a nonfactive one (*think, believe, feel*) when she does not. In Mandarin as well, the speaker can choose between *zhīdào* "know" and *rènwéi* "think."

This paper proposes a different, much less discussed strategy for directing the inferences associated with a reported belief: choosing a *negatively biased* belief verb such as *yǐwéi*. By widening the range of stance-cuing belief verbs under study to include negatively biased verbs as well as positively biased and neutral ones, we open several new avenues for research.

First, negatively biased belief verbs such as *yǐwéi* raise issues for the calculation of pragmatic alternatives. By competition with *know, believe*

and *think* are sometimes said to implicate *not-know* (e.g. Sauerland 2008, Schlenker 2012 discuss this issue in the context of the *Maximize Presupposition* principle of Heim 1991). However, in a language where *think* also competes with a salient negatively biased belief verb like *yǐwéi*, this calculation may become more complicated. This would be the reverse of the situation discussed in Deal 2011. Deal shows that Nez Perce only has a model meaning *can*, but no modal meaning *have to/must*. Therefore, the Nez Perce version of *can* does not implicate *not-must* because it has no stronger competitor with which to form a scale. Here, I am suggesting that *think* might not implicate *not-know* if it had a salient *weaker* competitor such as *yǐwéi*. I leave this prediction to be tested for future work.

Moreover, negatively biased belief verbs constitute an area where we may identify variation in the semantic resources available in different languages (a program promoted by e.g. Bittner 1994, Faller 2002, Matthewson 1999, von Fintel & Matthewson 2008, Deal 2011, and very many others). It seems that many languages have strategies for reporting a belief that the speaker views with skepticism; but that these strategies may achieve this shared pragmatic end through different semantic or pragmatic means.

For example, in English, speakers can cast doubt on reported beliefs by using the phrase *under the impression that*; emphasizing (focusing) the word *think* or *believe*; using mental verbs with more specific meanings such as *assume, imagine*; using a construction with *seem*; and so on.

(44) a. She's under the impression that he's on his way
      b. She *thinks* he's on his way
      c. She assumes he's on his way
      d. It seems to her that he's on his way

It is not clear that any of these strategies should be analyzed using a postsupposition as invoked for *yǐwéi*. For example, *under the impression* and *it seems* may be more appropriately handled as Manner implicatures (Grice 1989 [1975]); focused *think* might be treated as a scalar implicature via competition with *know*. The subtle negative bias of *assume* might arise because assumptions are often based on incomplete evidence.

In other languages, still other strategies may be available: Kierstead 2013 discusses the Tagalog verb *akala*, which he claims has a conventional implicature that the speaker doubts the embedded proposition; the German Konjunktiv II can be used in an embedded clause to suggest counterfactuality; the Finnish *luulla* "suppose" can convey

mistakenness; and so on. I would not expect all of these strategies to be analyzed in the same way as *yǐwéi*. Instead, like the English examples (44), they might achieve the same end via different means.

In fact, the negatively biased side of the belief-verb continuum seems more semantically diverse than the positively biased side. Many languages share a word for *know*, a belief verb with a factive presupposition, for indicating that the reported belief is or should be Common Ground. But on the negatively biased side, there seems to be more variety in the semantic strategies used for ensuring that a reported belief does not make it into the Common Ground. Upon careful investigation, each of these strategies may offer its own puzzles and insights.

4.2   Postsuppositions

The concept of a postsupposition, invoked in the current analysis, remains poorly understood in comparison to presuppositions. Lauer 2012 notes that from a formal perspective, "postconditions are just as natural to define" (p. 16–17) as presuppositions, but acknowledges that from an intuitive perspective, presuppositions may still seem "slightly odd" (p. 16). Perhaps this is because postsuppositions, to the extent that they are used at all, have been invoked for a seemingly heterogeneous range of phenomena, so that it is difficult to identify the core intuition behind them.

In the proposed analysis of *yǐwéi*, the postsupposition serves to head off a pragmatic inference that might have gone through if the speaker had chosen a more neutral alternative belief verb such as *rènwéi* "think." I would like to suggest that this function of *preventing a pragmatic inference* is actually common to several earlier analyses invoking postsuppositions, allowing for a unified understanding of many uses of this theoretical device[10].

"Nonspecific" noun phrases   The most common use of postsuppositions in the literature is to analyze certain noun phrases that are characterized as "nonspecific" or related to "free choice" (Farkas 2002a, Farkas 2002b, Lauer 2009, Lauer 2012). Analyzing unstressed *some* ("sm") in English, Farkas 2002b proposes that after *sm* is added to a context c, the new context c' is required to vary in the value assigned to the variable. For example, *some book* requires that the output Common Ground does not settle the identity of the book. In contrast, the unmarked indefinite *a(n)* simply introduces a variable, without any conditions on its input or output contexts. Looking at *vreun* indefinites in

---

[10]This point was brought to my attention by a person whose name is redacted for review

Romanian, Farkas 2002a suggests that the output context must be consistent with the possibility that *no* value can verify the indefinite, so that *vreun* + "book" describes a possibly-nonexistent book.

Similarly, Lauer 2009 handles free relatives such as *whatever Arlo is cooking* with a requirement that the output context vary in the values it assigns to the thing Arlo is cooking. Lauer 2012 extends the analysis to German *irgend-* and Spanish *algun*, indefinites that can be paraphrased as "some X or other."

In all of these cases, I would like to suggest that the postsupposition is used to prevent a pragmatic inference that might have gone through if a more neutral noun phrase had been used instead. If a speaker uses the relative clause *what he's cooking* (which I assume has no postsuppositions), she leaves it open whether she can identify the thing cooked or not, which is why it is felicitous to follow up by identifying the dish or wondering what it is (45).

(45)   a.   What he's cooking smells good. I love paella.
       b.   What he's cooking smells good. I wonder what it is.

Under certain pragmatic conditions, e.g. when it seems that the speaker should have evidence about what is being cooked, the use of *what he's cooking* therefore might lead the hearer to infer that the speaker can identify the dish.

In contrast, if a speaker uses *whatever he's cooking*, the output context is required to vary in how the dish is identified (Lauer 2009). That is why it is felicitous to follow up by wondering what the dish is, but infelicitous to go on to name the dish.

(46)   a.   Whatever he's cooking smells good. #I love paella.
       b.   Whatever he's cooking smells good. I wonder what it is.

In such a context, even if there is other evidence that the speaker *should* be able to identify the dish, the use of *whatever* prevents such an inference. Just as *yǐwéi* was paraphrased above as "In case you were going to infer p from the fact that x believes it, don't," *whatever* (and *sm, irgend-,* and *algun*) can be paraphrased as "In case you thought I could identify a referent for this noun phrase, I can't."

In other words, the choice between the unmarked *what* versus the postsuppositional *whatever* mirrors the choice between the unmarked *rènwéi* and the postsuppositional *yǐwéi*. If *rènwéi* is used, then under the right pragmatic conditions, hearers might infer p from the knowledge that x believes it. But if *yǐwéi* is used, then no matter how reliable the belief-holder nor how credible the belief, that inference is headed off.

Rise-Fall-Rise Constant 2012 also invokes postsupposition in his analysis of the "Rise-Fall-Rise" ("RFR") intonation contour in English. This contour is the one that forces *I can't do anything* to mean *I'm not all-powerful* (p. 408):

(47)   I can't do anything
        $\approx$ There is nothing I can do

(48)   I can't do *anything$_{RFR}$*
        $\approx$ I am not all-powerful

Constant analyzes RFR(ϕ) to mean that the speaker is not willing to assert any alternative proposition (generated by replacing the focused constituent with another constituent) that would be assertable in the output context generated by updating with ϕ. *Assertable* is argued to mean *consistent* and *informative* in the context. For example, RFR(*Jane liked the movie*) means that the speaker is not willing to assert, for any alternative person, that they liked the movie – either because they didn't like it, or because the speaker doesn't know if they did or not.

RFR(ϕ) is not felicitous when ϕ fully resolves all of the alternative utterances. For example, RFR is not felicitous in (49b) (adapted from Constant) because *it's purple* makes any alternative utterances of the form *it's [color]* unassertable (inconsistent; assuming that cars generally are monochromatic). RFR indicates that the speaker does not want to assert any other assertable alternative propositions. For this condition to be meaningful, Constant says, there have to be actual, assertable alternatives. Since *it's purple* makes these alternatives inconsistent, there are no true assertable alternative propositions for the speaker to decline to assert. Therefore, RFR is infelicitous.

(49)   a.   Is John's car white?
        b.   # It's *purple$_{RFR}$*

Crucially, these alternative utterances *it's [color]* were assertable (consistent and informative) *before* the utterance of *it's purple*; they only become unassertable (inconsistent) after the context is updated to reflect that the car is purple. Therefore, RFR's requirement for assertable alternatives has to hold of the output context rather than the input context: a postsuppositional analysis.

Although Constant's data is quite different from the indefinites and relatives discussed by Farkas and Lauer, I believe his use of postsuppositions fills the same function of preventing a potential pragmatic inference.

For example, if the speaker uses regular intonation (which I assume has no postsuppositions) instead of RFR, she leaves it open whether she would also be willing to assert any alternative utterances (50)–(51). Therefore, the speaker can continue by saying she is not willing to assert any other utterances of the form *X liked it* (50), or by going on to assert another utterance of the form *X liked it* (51).

(50) a. Who liked the movie?
      b. John liked it. I don't know about anyone else.

(51) a. Who liked the movie?
      b. John liked it. Jessica, Max, and Chelsea liked it too.

Under the right pragmatic conditions, this unmarked intonation could therefore lead the hearer to expect that the speaker would also be willing to assert alternative utterances of the form *X liked it*.

In contrast, if the speaker uses RFR intonation, the postsupposition associated with RFR indicates that the speaker is *not* willing to assert any alternative utterance *X liked it*. Therefore, if she goes on to do so as in (53b), infelicity is predicted (I am not sure I agree with this judgment, but it is predicted by Constant's theory).

(52) a. Who liked the movie?
      b. $John_{RFR}$ liked it. I don't know about anyone else.

(53) a. Who liked the movie?
      b. $John_{RFR}$ liked it. #Jessica, Max, and Chelsea liked it too.

RFR can therefore be paraphrased as, "In case you thought I could say more, I can't." Like the choice between *rènwéi* and *yǐwéi*, and the choice between a regular noun phrase and one beginning with *whatever* or *sm*, the choice between regular intonation and RFR involves an unmarked item that might give rise to a pragmatic inference, and a marked (postsuppositional) item explicitly preventing that inference.

Therefore, I believe we can fold in the analysis of *yǐwéi* with all of these previous uses of postsuppositions: as ways of blocking a pragmatic inference that an unmarked alternative item could have allowed.

Other uses of postsuppositions There are other uses of postsuppositions that do not fit this profile. Brasoveanu 2009 uses postsuppositions to analyze the cumulative reading of (54). He analyzes *books* and *books* as maximal plural individuals using maximality operators, but wants the cardinality conditions of *exactly five* and *exactly seven* to outscope those maximality operators. As a way of achieving obligatory

wide scope, these cardinality conditions are checked postsuppositionally.

(54)   Exactly five boys read exactly seven books

Similarly, Brasoveanu & Szabolsci 2013 invoke postsuppositions in their analysis of the construction (found in Hungarian, Japanese, Romanian, Russian, and elsewhere) *A-too B-too PRED*, meaning *both A and B PRED*. The usual analysis of *too*, a presupposition that some other individual also did *PRED* (Karttunen & Peters 1979), does not work here. At the time we encounter *A too*, such a presupposition of *too* would fail, because we do not yet know that *B* underwent *PRED*. In order for the "presupposition" of *A too* to be satisfied by *B*, it actually has to be a postsupposition: checked after the whole sentence has been processed.

Henderson 2014 analyzes "dependent indefinites" in Kaqchikel, which are realized by reduplicating the indefinite article, as in *all of them looked for one-one book*, which requires that multiple different books were looked for. Henderson proposes that dependent indefinites are required to be "evaluation-plural," meaning that they are verified by more than one distinct variable assignment. But sometimes this plurality condition is only satisfied by information later in the sentence. In Henderson's English example, *John baked a personalized cupcake for every girl*, we don't know that *a personalized cupcake* is evaluation-plural (i.e., the cupcakes covary with the girls) until we get to *for every girl*. Such cases are handled by allowing the evaluation-plurality condition to be checked late: postsuppositionally.

These uses of postsupposition do not involve a choice between a neutral item giving rise to a pragmatic inference and a marked item that prevents it. There is no neutral alternative to *exactly five* or *A-too B-too*. The regular indefinite in Kaqchikel is not a true alternative to the dependent indefinite because it is unavailable in contexts where the dependent indefinite is used (Henderson 2014: 6:13). Instead, these uses of postsupposition seem to fit a different profile, in which postsuppositions are used to achieve the correct ordering between multiple ordering-sensitive operators.

Summary This paper adds one more expression to the diverse group of phenomena that have been analyzed in terms of a postsupposition. I have suggested that the postsupposition proposed for *yǐwéi* fits in with several other proposed postsuppositions, in that it is used to prevent a pragmatic inference that an unmarked (nonpostsuppositional) alternative would have allowed.

5 Conclusion

This paper began by setting out some superficially puzzling data on Mandarin *yǐwéi*. In particular, it was not obvious what division of labor between conventional meaning and conversational implicature would derive *yǐwéi*'s negative bias. Nor was it clear how *yǐwéi*'s two distinct first-person uses could be unified; nor why *yǐwéi*'s sense of negative bias appears to project out of every context except negation.

To make sense of these issues, it's been argued that *yǐwéi* has a conventionalized postsupposition that the Common Ground remain compatible with the negation of the reported belief. In context, this postsupposition can give rise to various conversational implicatures: that the belief is false or questionable, that the belief-holder is unreliable, or that the speaker (in the case of first-person *yǐwéi*) is hedging. This analysis solves the puzzles raised by *yǐwéi*.

To put the present investigation in context, it's also been suggested that *yǐwéi* constitutes one of many crosslinguistically available semantic strategies for casting doubt on a reported belief, which are ripe to be explored in future work. Moreover, it's been proposed that the current use of postsuppositions fits into a larger pattern of preventing potential pragmatic inferences. *Yǐwéi* is therefore placed in a larger picture of semantic resources used to manage the Common Ground.

References

Anand, Pranav, & Hacquard, Valentine. 2014. Factivity, Belief and Discourse. *Pages 69–90 of:* Crnič, Luca, & Sauerland, Uli (eds), *The Art and Craft of Semantics: A Festschrift for Irene Heim.* MIT Working Papers in Linguistcs.

Bartsch, Renate. 1973. 'Negative transportation' gibt es nicht ('Negative transportation' does not exist). *Linguistische Berichte*, **27**, 1–7.

Beaver, David I. 2001. *Presupposition and Assertion in Dynamic Semantics.* Stanford University: CSLI Publications.

Bittner, Maria. 1994. Cross-Linguistic Semantics. *Linguistics and Philosophy*, **17**(1), 53–108.

Brasoveanu, Adrian. 2009. Modified numerals as post-suppositions. *In: Proceedings of the Amsterdam Colloquium.*

Brasoveanu, Adrian, & Szabolsci, Anna. 2013. Presuppositional too, postsuppositional too. *In:* Aloni, Maria, Franke, Michael, & Roelofsen, Floris (eds), *The dynamic, inquisitive, and visionary life of φ, ?φ, and ◇φ: A festschrift for Jeroen Groenendijk, Martin Stockhof, and Frank Veltman.* Institute for Logic, Language, and Computation, Universiteit van Amsterdam.

Chierchia, Gennaro, & McConnell-Ginet, Sally. 1990. *Meaning and Grammar.* MIT Press.

Collins, Chris, & Postal, Paul M. 2014. *Classical NEG raising: an essay on the syntax of negation.* Linguistic Inquiry Monographs. MIT Press.

Constant, Noah. 2012. English rise-fall-rise: A study in the semantics and pragmatics of intonation. *Linguistics and Philosophy*, **35**(5), 407–442.

Deal, Amy Rose. 2011. Modals without scales. *Language*, **87**(3), 559–585.

Faller, Martina. 2002. *Semantics and pragmatics of evidentials in Cuzco Quechua.* Ph.D. thesis, Stanford University, Stanford, CA.

Farkas, Donka, & Bruce, Kim. 2010. On reacting to assertions and polar questions. *Journal of Semantics.*

Farkas, Donka F. 2002a. Extreme non-specificity in Romanian. *Pages 127–151 of:* Beyssade, Claire (ed), *Romance languages and linguistic theory.* Amsterdam: John Benjamins.

Farkas, Donka F. 2002b. Varieties of indefinites. *Pages 59–83 of: Semantics and Linguistic Theory*, vol. 12.

Fillmore, Charles J. 1963. The position of embedding transformations in a grammar. *Word*, **19**(2), 208–231.

Gajewski, Jon Robert. 2005. *Neg-raising: Polarity and presupposition.* Ph.D. thesis, Massachusetts Institute of Technology.

Gajewski, Jon Robert. 2007. Neg-raising and polarity. *Linguistics and Philosophy*, **30**(3), 289–328.

Grice, H. P. 1989. Logic and Conversation. *In: Studies in the way of words*. Cambridge, MA: Harvard University Press.

Gunlogson, Christine. 2004. *True to form: Rising and falling declaratives as questions in English*. Routledge.

Hamblin, Charles Leonard. 1971. Mathematical models of dialogue. *Theoria*, **37**.

Heim, Irene. 1982. *The Semantics of Definite and Indefinite Noun Phrases*. Ph.D. thesis, University of Massachusetts, Amherst.

Heim, Irene. 1983. On the Projection Problem for Presuppositions. *Pages 114–125 of:* Flickinger, Dan (ed), *Proceedings of the Second West Coast Conference on Formal Linguistics*. Reprinted in Formal Semantics: The Essential Readings (Blackwell, 1988), edited by Paul Portner and Barbara Hall Partee.

Heim, Irene. 1991. Artikel und definitheit. *Semantik: ein internationales Handbuch der Zeitgenössischen forschung*, 487–535.

Henderson, Robert. 2014. Dependent indefinites and their postsuppositions. *Semantics and Pragmatics*, **7**(6), 1–58.

Hintikka, Jaakko. 1962. *Knowledge and belief*. Ithaca, NY: Cornell University Press.

Horn, Laurence. 1989. *A natural history of negation*. Chicago: University of Chicago Press.

Horn, Laurence R. 1975. Neg-raising predicates: Toward an explanation. *Page 94 of: Proceedings of the Chicago Linguistic Society 11*, vol. 11.

Jackendoff, Ray S. 1971. Gapping and related rules. *Linguistic Inquiry*, **2**(1), 21–35.

Karttunen, Lauri. 1973. Presuppositions of compound sentences. *Linguistic Inquiry*, **4**(3), 169–193.

Karttunen, Lauri, & Peters, Stanley. 1979. Conventional Implicature. *In: Syntax and Semantics, Volume 11: Presupposition*.

Kierstead, Gregory. 2013. *Shifted indexicals and conventional implicature: Tagalog akala 'falsely believe'*. Talk presented at SALT 23, University of California, Santa Cruz.

Kiparsky, Paul, & Kiparsky, Carol. 1970. Fact. *In:* Bierwisch, Manfred, & Heidolph, Karl E. (eds), *Progress in Linguistics*. The Hague: Mouton. Reprinted in L. Jakobovits and D. Steinberg (eds.), Semantics: An Interdisciplinary Reader. Cambridge University Press, 1976.

Lauer, Sven. 2009. *Free relatives with -ever: Meaning and use*. Manuscript, Stanford University.

Lauer, Sven. 2012. *Some news about irgend-and algún.* Manuscript, Stanford University.

Lee, Kang, Olson, David R., & Torance, Nancy. 1999. Chinese children's understanding of false beliefs: the role of language. *Journal of Child Language*, **26**, 1–21.

Lin, Jo-Wang. 2003a. Aspectual selection and negation in Mandarin Chinese. *Linguistics*, **41**(3), 425–460.

Lin, Jo-Wang. 2003b. Temporal reference in Mandarin Chinese. *Journal of East Asian Linguistics*, **12**(3), 259–311.

Lin, Jo-Wang. 2006. Time in a language without tense: The case of Chinese. *Journal of Semantics*, **23**, 1–53.

Lǚ, Shūxiāng. 1999. *Xiàndài Hànyǔ Bābái Cì (800 Words in Modern Chinese).* Shāngwù yìn shūguǎn (Commercial Press).

Malamud, Sophia, & Stephenson, Tamina. 2014. Three ways to avoid commitments: Declarative force modifiers in the conversational scoreboard. *Journal of Semantics*, **0**, 1–37.

Matthewson, Lisa. 1999. On the Interpretation of Wide-Scope Indefinites. *Natural Language Semantics*, **7**(1), 79–134.

McCawley, James D. 1998. *The syntactic phenomena of English.* Chicago: University of Chicago.

Potts, Christopher. 2005. *The Logic of Conventional Implicatures.* Oxford Studies in Theoretical Linguistics. Oxford University Press.

Quine, Willard Van Orman. 1960. *Word and object.* MIT press.

Sauerland, Uli. 2008. Implicated presuppositions. *Pages 581–600 of: The discourse potential of underspecified structures.* Berlin: de Gruyter.

Schlenker, Philippe. 2012. Maximize presupposition and Gricean reasoning. *Natural Language Semantics*, **20**(4), 391–429.

Simons, Mandy. 2007. Observations on embedding verbs, evidentiality, and presuppositon. *Lingua*, **117**(6), 1034–1056.

Simons, Mandy, Tonhauser, Judith, Beaver, David, & Roberts, Craige. 2010. What projects and why. *Pages 309–327 of: Semantics and Linguistic Theory (SALT) 20*, vol. 20. Ithaca, NY: Cornell Linguistics Club Publications.

Smith, Carlota S., & Erbaugh, Mary S. 2005. Temporal interpretation in Mandarin Chinese. *Linguistics*, **43**, 713–756.

Stalnaker, Robert. 1974. Pragmatic presuppositions. *Pages 197–213 of: Semantics and philosophy.* New York: New York University Press.

Stalnaker, Robert. 1979. Assertion. *In:* Cole, Peter (ed), *Syntax and Semantics 9.*

Veltman, Frank. 1996. Defaults in update semantics. *Journal of Philosophical Logic*, **25**(3), 221–261.

von Fintel, Kai, & Gillies, Anthony. 2007. An opinionated guide to epistemic modality. *Oxford studies in epistemology*, **2**, 32–62.

von Fintel, Kai, & Matthewson, Lisa. 2008. Universals in semantics. *The Linguistic Review*, **25**(1-2), 139–201.

Wittgenstein, Ludwig. 1953. *Philosophical Investigations*. Wiley-Blackwell.