

Attested versus unattested contrafactive belief verbs *

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Abstract While factive belief reports (x knows p) are said to presuppose p , Holton (2017) suggests that no language shows the opposite: there appear to be no CONTRAFACTIVE belief verbs presupposing not- p . Recent work seeks to explain why not. In this squib, I suggest that a contrafactive could be defined in two different ways: (i) it could *require* not- p (i.e., that *all* worlds in the Context Set are not- p worlds); or (ii) it could require that the Common Ground is *compatible* with not- p (i.e., that *some* worlds in the Context Set are not- p worlds). So far no verb of type (i) has been demonstrated, but those of type (ii) arguably do exist – for example, Mandarin *yǐwéi*, analyzed by Glass (2023). Refining the typology of (un)attested belief verbs, the question of “Why are there no contrafactives?” becomes: “Why are there belief verbs requiring that p is or is not Common Ground, but none requiring that not- p is Common Ground?”

Keywords: factive, contrafactive, clause-embedding verbs, presupposition

1 Introduction

Belief reports (x believes p) trigger rich pragmatic inferences¹ — about why the speaker reported x 's belief rather than making a direct claim; whether x is informed; and whether p should be taken as Common Ground or not.

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¹ Please see, e.g., Karttunen 1973, Heim 1992, Simons 2007, Beaver 2010, de Marneffe, Manning & Potts 2012, Anand & Hacquard 2014, Hunter 2016, Özyıldız 2017, Lauer 2017, Lewis, Hacquard & Lidz 2017, Tonhauser, Beaver & Degen 2018.

Such inferences are shaped by the lexical semantics of the belief verb. **FACTIVES** (*know*) are said to presuppose *p* (Kiparsky & Kiparsky 1970). In (1), the inference that there's a meeting typically projects through entailment-suspending contexts (Chierchia & McConnell-Ginet 1990) such as questions and negation.

- (1) a. Alex *knows* there's a meeting. \rightsquigarrow There's a meeting.
 b. Does Alex *know* there's a meeting? \rightsquigarrow There's a meeting.
 c. Alex doesn't *know* there's a meeting. \rightsquigarrow There's a meeting.

In contrast, **NONFACTIVES** (*think*, *believe*) leave *p* open. (2) does not determine whether there's a meeting; instead, that inference depends on Alex's trustworthiness and the plausibility of a meeting in context.

- (2) a. Alex *thinks* there's a meeting.
 b. Does Alex *think* there's a meeting?
 c. Alex doesn't *think* there's a meeting.

Holton (2017) proposes that there are no stative, mono-morphemic **CONTRAFACTIVES** like the hypothetical *contra* (3), presupposing that *p* is false rather than true.

- (3) a. Alex *contras* there's a meeting. \rightsquigarrow There's no meeting.
 b. Does Alex *contra* there's a meeting? \rightsquigarrow There's no meeting.
 c. Alex doesn't *contra* there's a meeting. \rightsquigarrow There's no meeting.

Elaborated in Section 2, some researchers have proposed candidates for a verb meaning *contra*, but none of them fit all the desired criteria. Holton's **CONTRAFACTIVE GAP** (so named by Roberts & Özyıldız 2025) has elicited various proposed explanations (Section 3). This squib aims to reframe the contrafactive gap (Section 4). I propose that there are two different potential structures for a contrafactive, depending on how one negates the factive presupposition attributed to *know*: a contrafactive could require that not-*p* is Common Ground; or could require that not-*p* is *compatible* with the Common Ground. I posit that the logically weaker version — requiring that not-*p* is compatible with the Common Ground — is attested in the Mandarin belief verb *yǐwéi*, as analyzed by Glass 2023. Thus, we find verbs like *know* requiring that *p* is Common Ground, and those like *yǐwéi* requiring that *p* is *not* Common Ground, but none like *contra* requiring that not-*p* is Common Ground.

More broadly (Section 5), this squib illuminates the cross-linguistic lexical semantics of belief verbs, and thus the nature of the contrafactive gap, by refining what it would mean for a verb to be contrafactive.

2 The contrafactive gap

Typologists such as Goddard (2010) find that most or all languages offer belief verbs such nonfactive *think* and factive *know*.² Holton (2017) claims that no known language, or at least no Indo-European language, offers a simplex stative belief verb like the hypothetical *contra*, presupposing not-*p*.

This claim is challenged by verbs across languages argued to describe false beliefs (please see Roberts & Özyıldız 2025 for more data). Within Indo-European, Holton (2017) addresses the now-obsolete German *wähnen* ‘to fancy,’ discussed by Frege (1948) and Sander (2025); Holton suggests that its associated inference of falsity is, at least among contemporary speakers, pragmatically cancelable. He dismisses English *misremember* because it does not take clausal complements and because the prefix *mis-* contributes falsity compositionally. Just as *know* encodes belief and factuality in a morphologically atomic word, Holton says that a verb meaning *contra* should describe belief and falsehood together, without any morpheme transparently contributing falsehood.

Wish and *hallucinate* are dismissed because they are not stative (they can occur in the progressive) and because their complements can be true (Holton’s example: *I wished that I had been chosen, and it turned out that I had*). In a survey of 517 English clause-embedding verbs, White & Rawlins (2018) find a “near-categorical lack” of verbs whose complements are judged to be false; the rare exceptions (*pretend, lie, fake*) would be characterized by Holton as non-stative verbs of communication rather than belief.

Hoeksema (2021) mentions the German/Dutch cognates *weismachen/wijsmaken* (lit. ‘to make wise’), which mean ‘to fool (someone) into thinking that.’ Holton might reply that *weismachen/wijsmaken* are not typical belief verbs because they include a syntactic argument for the agent of deception as well as the belief-holder.

As for the Spanish reflexive *creerse* ‘to believe oneself’ (Shatz et al. 2003, Anvari, Maldonado & Soria Ruiz 2019), Holton says it’s not simplex because it’s

² Factive and nonfactive belief verbs show interesting differences in syntax; in both Turkish (Özyıldız 2017) and the Washo language of Lake Tahoe (Bochnak & Hanink 2022), factivity is correlated with the ability to embed a definite nominal complement.

reflexive, and Roberts & Özyıldız (2025) note that the inference of falseness does not project through negation, as expected for a presupposition.

Outside Indo-European, a meaning of false belief has been proposed for Turkish *san* and *zannet* (Shatz et al. 2003); Tagalog *akala* (Kierstead 2015); and within the Sinitic family, *liah8-tsun2* in Taiwanese Southern Min (Hsiao 2017) as well as Mandarin *yǐwéi* (Lee, Olson & Torance 1999) and its Cantonese cognate *ji5wai4*³ (Tardif, Wellman & Cheung 2004).

Excerpting Mandarin data from Glass 2023, in an out-of-the-blue context, a sentence of the form x *yǐwéi* p strongly suggests that p is false. (4) makes sense if the speaker faked illness to avoid school. It is nonsensical if the speaker is definitely sick, or thinks she may well be.

- (4) Māma *yǐwéi* wǒ bìng le
 Mom *yǐwéi* 1sg sick ASP
 ‘Mom *is under the impression that* I’m sick.’ (Glass 2023: p. 2)

In contrast, a neutral nonfactive such as *rènwéi* ‘think’ leaves the issue open. (5) is sensible if the speaker faked illness to avoid school, but can also be used if the speaker feels exhausted and thinks she may indeed be sick, citing the mom’s belief as evidence (Simons 2007).

- (5) Māma *rènwéi* wǒ bìng le
 Mom *think* 1sg sick ASP
 ‘Mom *thinks* I’m sick.’ (adapted from Glass 2023: p. 2)

In entailment-suspending contexts, the negative bias of *yǐwéi* projects. In questions, (6) conveys that Lili would be wrong to think there was a test. As for negation, it is very difficult to negate *yǐwéi*, like other similar verbs (Hsiao 2017, Bossi 2023); see Glass 2023.

- (6) Lìlì *yǐwéi* míngtiān yǒu kǎoshì ma?
 Lili *yǐwéi* tomorrow have test QUESTION
 ‘Is Lili *under the impression that* there’s a test tomorrow?’
 (Glass 2023: p. 10)

From these data, one might conclude that x *yǐwéi* p presupposes that p is false. But in cases of “explicit ignorance” (Simons 2001), p need not be false.

³ For Sinitic languages, phonemic tones are represented by numerals in the Romanization or diacritics on vowels.

- (7) wǒ bù zhīdào yǒu-méi-yǒu défēn, dànshì zhège qiúyuán yǐwéi
 I not know have-not-have score, but this-CL ball-player yǐwéi
 défēn le
 score ASP
 ‘I don’t know whether the player scored or not, but he’s *under the impression that* he did.’ (Glass 2023: p. 6)

If the speaker has no reason to question the athlete’s belief, (7) is odd. But if we see the athlete catch the football on the edge of the end-zone and begin celebrating while referees congregate to debate the catch, (7) makes sense to signal that, while p may be true, x is not fully informed about it.

(7) shows that x yǐwéi p does not presuppose that p is false, because a presupposition of not- p would contradict the ignorance expressed in the first clause of (7). (7) further shows that some verbs purportedly describing false beliefs actually only pragmatically implicate falsity (Holton 2017). For a true instance of *contra*, examples such as (7) would need to be contradictory across all contexts. No such data has been shown for the candidate contrafactive verbs mentioned above. Thus, Holton (2017) claims, there appear to be no contrafactives like *contra*, which calls for an explanation.

3 Proposed explanations

Holton (2017) argues that factives (*know*) embed facts, and that contrafactives don’t exist because there is no such thing as a contra-fact for them to embed. It is not fully satisfying to explain the absence of contrafactives by raising new questions about the absence of contra-facts. Moreover, Roberts & Özyıldız (2025) point out, negated eventualities can be defined and invoked semantically (Bernard & Champollion 2023), so perhaps contra-facts exist after all.

An alternative explanation leverages the insight (Steinert-Threlkeld & Szymanik 2020) that meanings are typologically rarer when they are difficult to learn. Experiments with both humans (Maldonado, Culbertson & Uegaki 2022) and artificial neural networks (Strohmaier & Wimmer 2022, 2023) suggest that *contra*-type verbs are harder to learn than those like *know*. To complicate matters, though, Strohmaier & Wimmer (2022, 2023) find that nonfactives (*think/believe*) — which are typologically abundant — are also hard to learn, because the truth/falsity of p constitutes noise that the system must learn to ignore; and Strohmaier & Wimmer (2025) find no asymmetry between factives and contrafactives in a machine learning study focused on production rather than comprehension.

Roberts & Özyıldız (2025) argue that the not- p presupposition of *contra* would violate rules about the relation between presupposed and asserted content. Roberts & Simons (2024) propose that the presupposition of a lexical item should be a precondition of its at-issue meaning: *know p* presupposes p because truth is a precondition for knowledge. Roberts & Özyıldız (2025) argue that the truth of p can lead to evidence and thus belief that p , yielding factives like *know*. There are no contrafactuals because not- p generally cannot lead to evidence of p nor belief in it.

Sander (2025) sees German *wähnen* ‘to fancy’ as a true contrafactive, but suggests that contrafactuals may at least be rarer than factives because we default to viewing other people’s beliefs with charity rather than skepticism.

These explanations may be on the right track, but I propose first to clarify the full set of facts to be explained.

4 Proposed reframing

Holton’s question — “why do we find factives such as *know*, but not contrafactuals such as *contra*?” — frames factives and contrafactuals as complementary. Factive *know* is said to presuppose p ; contrafactive *contra* would presuppose not- p . I propose a third possibility: a contrafactive could also explicitly require that the Common Ground is *compatible* with not- p .

4.1 Defining the factive presupposition of *know*

To say that *know* presupposes p is to say that p is taken as true in the Common Ground (Stalnaker 1978, 2002). Reflecting Grice’s maxim of Quality (H. P. Grice 1989) and the truism that we aim to understand the world accurately, we hope that the propositions in our Common Ground also hold in the actual world. But erroneous information can be Common Ground if interlocutors are mutually committed to it (Stalnaker 2002). Thus, although many philosophers claim that knowledge entails truth (reviewed by Hannon 2013), linguists frame the factive presupposition attributed to *know* in terms of Common Ground rather than objective truth.

Spenader (2003) finds that in corpora, *know* often embeds discourse-new information (*he doesn’t know he looks funny*), which may seem surprising if its complement is supposed to be Common Ground. But this fact is expected if we acknowledge that such informative presuppositions can be ACCOMMODATED (Karttunen 1974, Lewis 1979, Abbott 2000, Stalnaker 2002, von Stechow 2008,

Chemla 2008, Schlenker 2012). In brief: speakers flag a discourse-new proposition p as presupposed when they expect to be taken as an authority regarding p — that is, when they expect that hearers will accept p as Common Ground on the basis that the speaker wishes to treat it as such. Thus, idea that x *knows* p presupposes p is consistent with the fact that p is sometimes discourse-new.

When *know* is embedded under speech reports (8), I assume that its presupposition characterizes the Common Ground of the reported speech, which may or may not overlap with the matrix Common Ground (Karttunen 1973, Potts 2015). (8) describes a situation in which Alex presupposes that there's a meeting; the speaker who utters (8) may or may not agree.

(8) Alex *told* Bea that Cora *knows* there's a meeting.

As for why x *knows* p would presuppose p , some researchers seek general theories about which elements of meaning are asserted versus presupposed (Simons et al. 2010, 2017, Abusch 2010, Abrusán 2011, Romoli 2015, Roberts & Simons 2024). Such theories assume that, in view of the conventional meaning of *know*, x *knows* p conveys both that (i) x believes p and (ii) p is true; the puzzle is to explain why the inference (ii) about p 's truth projects while the inference (i) about x 's belief does not.

Consistent with claims that presupposition projection is pragmatic rather than lexical, p actually does not project in contexts where it is at-issue (Stalnaker 1974, Simons et al. 2010, 2017, Roberts & Simons 2024). In (9), it is a live question whether the hearer is dropping out of college for a good reason — suspended by the entailment-suspending operator *if*.

(9) I still have no idea why you're [dropping out of college], and I'm glad you're going to tell me. If I *know* that you're doing it for a good reason, I'll feel more comfortable. (Roberts & Simons 2024: p. 733)

As this literature argues, the longstanding idea that x *knows* p presupposes p may stem from pragmatic principles that explain exceptions such as (9) as well as the general rule. But this literature agrees that x *knows* p commits the speaker to p ; that p typically projects; and that in such cases (since p not proffered for discussion), the hearer is expected to take p as Common Ground as well. Therefore, while acknowledging its deeper motivations and exceptions, I base my discussion on the agreed-upon fact that x *knows* p typically presupposes p .

I assume that factives (*know*), nonfactives (*think/believe*), and contrafactives all share the same at-issue meaning of 'believe' — while differing in their pro-

jective requirements about the status of p in the Common Ground. Regarding nonfactives (*think/believe*), I assume that these place no conditions on the Common Ground at all, and are thus compatible with p being taken as true, false, or unknown. For factive *know*, defining the context set c as the set of worlds compatible with the propositions in the Common Ground (Stalnaker 1978), its factive presupposition can be formalized by saying that *know* has an at-issue meaning of ‘believe,’ and a presupposition (10) that p is Common Ground:

- (10) Factive presupposition of *know*
 $\forall w[w \in c \rightarrow p(w)]$
 “ p is true in all worlds in c ; i.e., p is Common Ground.”

4.2 Defining contrafactualives

There are therefore two potential ways to define a contrafactive, corresponding to two different placements of negation in (10). A contrafactive could require the Common Ground to *entail* not- p (11), or could require the Common Ground to be *compatible* with not- p (12).

- (11) Could require not- p .
 $\forall w[w \in c \rightarrow \neg p(w)]$
 $\leftrightarrow \neg \exists w[w \in c \wedge p(w)]$
 “Not- p is Common Ground.”
 “It’s not possible that p .”
- (12) Could require compatibility with not- p .
 $\neg \forall w[w \in c \rightarrow p(w)]$
 $\leftrightarrow \exists w[w \in c \wedge \neg p(w)]$
 “ p is not Common Ground.”
 “It’s at least possible that not- p .”

These two possibilities (11) – (12) are familiar from neg-raising (Fillmore 1963, Bartsch 1973, Horn 1989): the observation that a sentence such as (13) could in principle have two interpretations (13a) – (13b), depending on whether negation is interpreted structurally lower or higher.

- (13) I don’t want to go.
 a. I want to not go.
 b. It is not the case that I want to go; I have no opinion.

4.3 Mandarin *yǐwéi* as a contrafactive

Verbs with the logically stronger presupposition (11) are argued to be unattested (Section 2). But the logically weaker (12) is proposed by Glass (2023) as the projective content of Mandarin *yǐwéi* (14).

- (14) At-issue and *postsupposed* content of *yǐwéi* (Glass 2023: p. 17)
- a. $c + x \textit{yǐwéi } p = c + x \textit{ believes } p$
 - b. Defined only if $\exists w \in (c + x \textit{ believes } p) : p(w) = 0$

For Glass (2023), $x \textit{yǐwéi } p$ includes a projective definedness condition that Common Ground is compatible with not- p .⁴ Glass frames this condition as a POSTSUPPOSITION (Brasoveanu 2009, Lauer 2009, 2012, Constant 2012, building on Farkas 2002a,b): defined with respect to a context that has already been updated with the at-issue meaning $x \textit{ believes } p$. Not- p must be consistent with the Common Ground both before *and after* the utterance that x believes p . Following a pattern shared by other proposed postsuppositions in the literature, this postsupposition blocks a potential pragmatic inference — allowed in some contexts (15) (Simons 2007) — that x 's belief in p might serve as evidence for p .

- (15) The investigators *think* the motorcyclist hit something.
 \rightsquigarrow The motorcyclist hit something. (adapted from Glass 2023: p. 3)

This proposed meaning (14) explains why $x \textit{yǐwéi } p$ often conveys that the speaker sees p as false. If the speaker has an opinion about p (Bartsch 1973) — they either believe p or believe not- p — and further signals with *yǐwéi* that they believe possibly-not- p , then they believe not- p . When the speaker instead sees p as unsettled, (14) still signals that x 's belief in p cannot be taken as evidence for p . Thus (14) also explains why $x \textit{yǐwéi } p$ can report possibly-true beliefs that are poorly-evidenced or hedged (Glass 2023). Beyond Mandarin, a similar meaning is proposed for the verb *par* in the Kipsigis language of Kenya (Bossi 2023), and might suit other negatively-biased belief verbs discussed above.

⁴ Definedness conditions such as (14b) are considered by Percus (2006) to explain why a nonfactive such as *Alex believes that there's a meeting* typically conveys that the speaker does not believe that there's a meeting (an ANTI-PRESUPPOSITION; thanks to Deniz Özyıldız for suggesting this paper). Percus rejects (14b) for nonfatives to avoid a slippery slope to undesirably unconstrained definedness conditions. I agree that (14b) is not suitable for *believe*, but I see it as empirically justified as a postsupposition for *yǐwéi*. As for further definedness conditions, I would want to evaluate each one on its merits, rather than dismissing them based on a slippery slope.

Defined as a requirement that the Common Ground is compatible with not- p (12), a contrafactive exists after all.

Utterance	Projective content	p	$\diamond p \wedge \diamond \neg p$	not- p
x knows p	requires p	✓	✗	✗
x thinks p	(none)	✓	✓	✓
x yǐwéi p	requires $\diamond(\text{not-}p)$	✗	✓	✓
x contra p	requires not- p	✗	✗	✓

Table 1 Possible states of the Common Ground *after* updating with each utterance on the proposed analysis.

Table 1 visualizes the proposed analysis by laying out the possible states of the Common Ground after updating it with utterances using *know*, *think*, *yǐwéi*, and *contra*. While the *presuppositions* of *know* and *contra* theoretically restrict the Common Ground *prior* to the acceptance of an assertion, Table 1 depicts the Common Ground *following* the acceptance of that assertion in order to capture the *postsupposition* attributed to *yǐwéi*, and to sidestep questions about how to accommodate the informative presupposition attributed to *know* in contexts where it embeds new information (Section 4.1). As the table shows:

- After x knows p is accepted as Common Ground, the Common Ground must entail p .
- After x thinks p is accepted, anything is possible; the Common Ground may entail p , may entail not- p , or may leave p unsettled.
- After x yǐwéi p is accepted, the Common Ground must not entail p .
- After *contra* p is accepted, the Common Ground must entail not- p .

In other words, *know* and *contra* have complementary effects on the Common Ground (*know* requires p , *contra* requires not- p); but these options leave a gap where p is unsettled. *Know* and *yǐwéi* have complementary effects too (*know* requires that p is Common Ground, *yǐwéi* requires that p is *not* Common Ground); but this time, the options exhaust the space. On this definition, contrafactive exists after all.

5 Discussion

In light of these data, Holton's question ("Why are there no contrafactives?") becomes: "Why are there belief verbs like *know* requiring that *p* is Common Ground and those like *yǐwéi* requiring that *p* is not Common Ground, but none like *contra* requiring that not-*p* is Common Ground?" This reframing of Holton's question opens new avenues for answering it.

If there are no contrafactives because there are no contra-facts for them to embed (Holton 2017), then what type of object is embedded by *yǐwéi*? Claims about learnability would need to explore whether *yǐwéi*-type verbs are easier to learn than *contra*, which would require considering cases where *p* is unsettled as well as true/false. (That setup may help unravel surprising findings about the learnability of nonfactives such as *think/believe*.) And if *contra* would violate rules on the relation between projective and asserted content, then one would have to explain how *yǐwéi* follows such rules.

As shown in Table 1, *yǐwéi* fulfills a similar function to *contra*, in that it can be used (in conjunction with the assumption that the speaker has an opinion about *p*) to signal that the speaker believes *p* to be false; but *yǐwéi* can be used in a wider set of contexts than *contra* can, namely when *p* is questionable as well as when it's false. Moreover, if the social FACE (Goffman 1959, Brown & Levinson 1987) of a belief-holder is threatened when their beliefs are characterized as false, then perhaps *yǐwéi* is preferred because it diplomatically flags *p* as questionable. The same argument is made by Prince (1976) for why the neg-raised form *I don't want to go* may be preferred over the unambiguously negative *I want to not go*. *Yǐwéi* is logically weaker than *contra*, but this weakness may strengthen its utility.

Zooming out, Holton's contrafactive gap engages larger questions about discourse (how do we overlay reported beliefs with our Common Ground?), lexical semantic typology (which plausible meanings are attested or not?), and communicative function (how does the lexicon encode distinctions that people find useful?). By refining the typology of (un)attested belief verbs, this squib opens new paths for work on such questions.

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