

Bad attitudes: Impossible presuppositions and the false belief gap

Deniz Özyıldız (Konstanz) and Tom Roberts (Amsterdam, ILLC)

Introduction. Much work in the domain of attitude reports aims to establish the range of meanings that attitude predicates may or may not encode (Roelofsen & Uegaki 2020, the MECORE project). Here, we focus on the general absence of *contrafactive belief verbs*. That is to say, there is no verb *shknow* defined such that *a shknows p* asserts that *a* believes *p* and presupposes that *p* is false, displaying the inference patterns in (1) (Holton 2017; Strohmaier & Wimmer 2022).

- (1) a. Al shknows that it's raining. $believe(a, rain) \wedge \neg rain$
b. Al doesn't shknow that it's raining. $\neg believe(a, rain) \wedge \neg rain$
c. #I shknow that it's raining. $believe(speaker, rain) \wedge \neg rain$
d. I don't shknow that it's raining. $\neg believe(speaker, rain) \wedge \neg rain$

This gap is especially surprising given that factive belief predicates (*know*, *regret*, ...) and anti-veridical predicates (*be wrong*, *pretend*, ...) are both widely attested. Holton (2017) explains the gap on ontological grounds: The complements of factives denote facts. By analogy, the complements of contrafactives should denote 'contrafacts.' There are no contrafacts, hence, no contrafactive. However, this proposal is difficult to justify or to falsify: Semantic analysis often appeals to negative events and individuals (Bernard & Champollion 2018, Bledin 2022), and false beliefs exist, which makes the absence of contrafacts and the validity of Holton's argument less obvious.

We concur with Holton's generalization, but propose that it arises from a general constraint on the internal organization of a lexical item's meaning, namely that the truth of its presupposition *normally causes* the truth of its at-issue content. *Shknow*, we argue, is unlexicalizable because it presupposes $\neg p$ and asserts belief that *p*, but, under normal conditions, the fact that $\neg p$ does not provide support for such a belief. Familiar presuppositional attitudes like *know*, but also *be wrong*, *surprise* and *reply*, do not violate this constraint, and are correctly not predicted to be unattested.

There really are no contrafactive. Holton's claim concerns attitude verbs that are (a) stative, (b) monomorphemic, (c) doxastic, and (d) contrafactive, i.e., the bizarro version of a 'factive mental state' (Williamson 2000). A number of attitude verbs in a variety of languages seem, at first, to satisfy the conditions (a–c), in addition to being contrafactive, like Tagalog *akala* or Spanish *creerse* (Kierstead 2013; Anvari et al. 2019, a.o.) Upon closer inspection, these putative contrafactive each seem to fall short of the standard (see, e.g., Glass 2022 and Bossi 2023). This could be for different reasons: For *akala*, while Kierstead (2013) argues that the predicate encodes false belief (2), we find that the inference is suspended in contexts of speaker ignorance, in (3)—hence, that it is not a semantic presupposition. For *creerse*, not shown in the abstract, not only is the predicate reflexive (hence, not monomorphemic), but negation turns the predicate into being factive.

- (2) **Akala** ni Kim [na may party].
AKALA IND Kim COMP exist party
'Kim falsely believes that there is a party.' Kierstead (2013), confirmed by authors
- (3) Di ko alam kung nakascore siya, peru **akala** niya [siguro nakascore siya].
NEG I know Q was.able.score 3SG, but AKALA 3SG perhaps was.able.score 3SG
'I don't know whether he was able to score, but he thinks that he might have scored.'

Furthermore, in a large-scale (1000-predicate) acceptability study of English, only a handful of attitude verbs which seem to presuppose that their complement is false were found (White & Rawlins 2018). Of those verbs, we find verbs that describe events, not states (*hallucinate*), contra desideratum (a), and verbs which do not encode belief that *p* (*pretend*), contra desideratum (c).

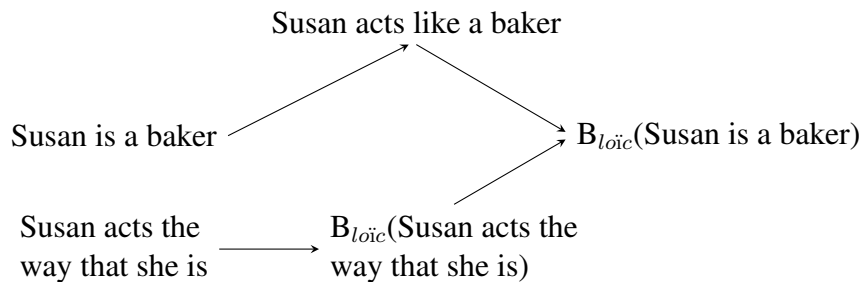
Proposal. There is a constraint on how much information can be packed into a single lexeme V and how: The presuppositions of V must *bear on* V 's main point entailment in that the former normally causes the latter, as stated in (4)–(5) (for ‘normally,’ Yalcin 2016, ‘causes,’ Mackie 1965).

- (4) **The Lexical Coherence Constraint (LCC):** The presupposition(s) p of an attitude verb V is s.t. the situation denoted by p normally causes the situation denoted by V 's assertion q .
- (5) **Normal causation:** A situation s normally causes a situation s' given a set of ‘normative propositions’ N iff $\forall w \in \bigcap N : s \sqsubseteq w$ is an INUS condition of $s' \sqsubseteq w$.

Here, N is a set of propositions that describe normative facts about the actual world, similar to a circumstantial modal base. Intuitively, the LCC says that in worlds that are maximally like the actual world (‘normal’), an attitude verb’s presupposition contributes to its assertion being true (INUS = is **I**nufficient but **N**ecessary part of an **U**necessary but **S**ufficient condition).

Attested predicates obey the LCC. For attested predicates, there is always a way of establishing a normal causal chain between their presuppositions and their at-issue content. We focus on *know* here, but the result extends to other presuppositional attitude predicates like emotive factives, response-stance predicates (Cattell 1978), and *be right* or *be wrong* (Anand & Hacquard 2009, 2014). Assuming the LCC, for a sentence like (6a) to be true, Susan must be a baker, Loïc must believe that Susan is a baker, and under normal circumstances, there has to be a causal chain that links these facts (cf. Goldman 1967)—this ordinary case is illustrated in (6), where each node is a fact and the arrows are read as ‘causes.’ Note that this does not preclude additional requirements on what constitutes a felicitous and true knowledge ascription.

- (6) a. Loïc knows that Susan is a baker.
 b. A successful normal causal connection between the fact that p and the belief that p
 ✓ Loïc knows that Susan is a baker.



To illustrate that a failure of the third condition makes a knowledge ascription false, consider a context in which Susan is indeed a baker, but where Loïc forms his beliefs on the basis of something irrelevant—like the words of a third person which accidentally happen to be true. Then, (6a) is judged false. This situation will be schematized in (7).

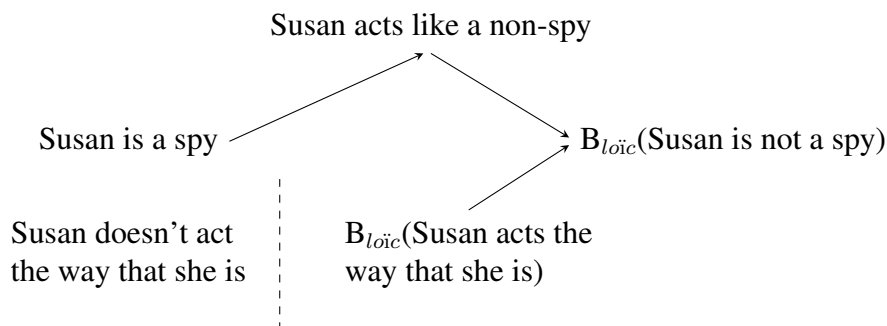
Shknow violates the LCC. *Shknow* presupposes that $\neg p$ but asserts its subject believes p . This configuration systematically violates the LCC, as $\neg p$ can never initiate a causal chain that normally leads to the belief that p . Consider, for example, the fact that $\neg p$ can never serve as evidence for (the belief that) p , or that in a case where the belief that p arises spontaneously, it is not motivated by any fact, and in particular, not by the fact that $\neg p$. Cases where $\neg p$ appears to lead to the belief that p are all based on contexts that involve deception—and are thus abnormal—like (7a).

- (7) a. Context: Susan is a spy, but she is behaving in a way so as not to arouse suspicion. Loïc falls for her act and believes that she is not a spy as a result of her behavior.

Intended: Loïc shknows that Susan is not a spy.

- b. A failed normal causal connection between the fact that $\neg p$ and the belief that p (The dashed line indicates a failed causal connection.)

✗ Loïc shknows that Susan is a spy.



Here, $\neg p$ initiates a causal chain resulting in the belief that p , but this situation is abnormal if the proposition that people act sincerely, not pretending to be what they are not, is in N . This happens to be false in this context, which is what is abnormal about *this* chain. Idiosyncratic examples can be constructed where the LCC is almost satisfied from $\neg p$ to Bp (e.g., ones with intentional deception), but $\neg p$ never seems to initiate a causal chain normally resulting in Bp for arbitrary p .

Other unattested LCC violating predicates. Although we focus on the predicate *shknow*, the LCC can explain other logically possible but (to our knowledge) unattested attitude predicates, such as the possible but apparently unattested factive *speech act* predicates (Anand & Hacquard 2014). In terms of the LCC, the reason for this gap would be that the truth of a proposition p does not normally lead to an utterance that p , although the two are compatible events. Similarly, predicates that presuppose p but assert unopinionatedness ($\neg Bp \wedge \neg B\neg p$) also seem to be unattested.

We note, however, that attitudes which don't violate the LCC still might not exist for independent reasons. Take a predicate that combines with a proposition p , presupposes $\neg p$ and asserts $B\neg p$ ($= know\neg p$). It is not conceptually problematic that the truth of $\neg p$ normally causally leads to the forming the belief that $\neg p$. But while the LCC does not rule out this specific predicate, we believe another constraint like Myopia might be in effect (Graff & Hartman 2011), which rules out predicates that introduce a relation to the (semantic) complement of their (syntactic) complement.

No Gricean source for the FB gap. We consider two alternative Gricean explanations for the *shknow* gap and argue that the LCC is currently a more viable analysis.

False Belief Inferences can always be derived as implicatures? One alternative is that *shknow* is not lexicalizable given the lexicon $\{know, believe\}$, as false belief meanings are systematically derivable for *believe* via implicature. *Believe* implicates that its complement is false because of a *Maximize Presupposition!*-driven competition with *know*, the preferred alternative in contexts where the complement is true (Percus 2006, a.o., cf. Horn 1989 on *xor*). The cross-linguistic absence of *shknow* raises the question of whether all languages have factive *know*, which the competition based account relies on, and whether there are languages with the lexicon $\{shknow, believe\}$, where *true belief* is derived pragmatically. As far as we know, such languages are unattested.

False Belief Verbs are not utilitarian? We also consider the idea that *shknow* is not lexicalized because it is non-utilitarian, i.e., because it systematically fails to optimize informativity and cost (cf. Enguehard & Spector 2021). This may well be a fruitful line of inquiry, but such an analysis runs into operational challenges: we would need to determine the relative informativity of *shknow*

and counterparts like *know*. But this is difficult to achieve, as it requires that we know the frequency at which agents form (or talk about) false beliefs versus true beliefs.

Open issues. A notion of lexeme-internal coherence constrains the inventory of logically conceivable lexemes. But this does not yet explain *why* such a constraint should exist. One hypothesis worth pursuing is that LCC-violating verbs are too challenging to learn, aligning with findings that contrafactuals are difficult to learn both by artificial neural networks (Strohmaier & Wimmer 2022) and adult humans (Maldonado et al. 2022). This hypothesis also suggests promising connections with recent work explaining lexical gaps in domains like Boolean connectives (Bar-Lev & Katzir 2022), indefinite pronouns (Denić et al. 2022) and modals (Imel & Steinert-Threlkeld 2022).

Finally, a limitation of this work is the focus on attitude predicates, as the LCC does not obviously extend to every kind of presupposition, such as gender presuppositions on pronouns or additive presuppositions of particles like *too*. This may indicate that the LCC tells us something about the ontological limitations of attitude situations, as suggested by Roberts & Simons (2022), but future work should also investigate the validity of the LCC outside the attitudinal domain.

Selected References

- Anand, Pranav & Valentine Hacquard. 2009. Epistemics with attitude. In Tova Friedman & Satoshi Ito (eds.), *Proceedings of Semantics and Linguistic Theory 18*, 37–54. Ithaca, NY: Cornell University.
- Anand, Pranav & Valentine Hacquard. 2014. Factivity, belief and discourse. In Luka Crnić & Uli Sauerland (eds.), *The Art and Craft of Semantics: A Festschrift for Irene Heim*, vol. 1, 69–90. Cambridge, MA: MIT Working Papers in Linguistics.
- Anvari, Amir, Mora Maldonado & Andrés Soria Ruiz. 2019. The puzzle of reflexive belief construction. In M. Teresa Espinal et al. (ed.), *Proceedings of Sinn und Bedeutung 23*, 57–74.
- Bossi, Madeleine. 2023. Negative bias, reminding, and pragmatic reasoning in Kipsigis belief reports. Ms., University of California, Berkeley.
- Enguehard, Emile & Benjamin Spector. 2021. Explaining gaps in the logical lexicon of natural languages: A decision-theoretic perspective on the square of Aristotle. *Semantics and Pragmatics* 14.
- Glass, Lelia. 2022. The negatively biased Mandarin belief verb *yǐwéi*. *Studia Linguistica* 1–46.
- Graff, Peter & Jeremy Hartman. 2011. Impossible Predicates. GLOW 34 abstract.
- Holton, Richard. 2017. Facts, factives, and contrafactuals. *Aristotelian Society Supplementary Volume* 91(1).
- Horn, Laurence R. 1989. *A natural history of negation*. CSLI.
- Kierstead, Gregory. 2013. Shifted indexicals and conventional implicature: Tagalog *akala* ‘falsely believe’. Slides from SALT 23.
- Mackie, J.L. 1965. Causes and Conditions. *American Philosophical Quarterly* 2(4). 245–264.
- Maldonado, Mora, Jennifer Culbertson & Wataru Uegaki. 2022. Learnability and constraints on the semantics of clause-embedding predicates. In *Proceedings of the Cognitive Science Society annual meeting (CogSci) 2022*, .
- Percus, Orin. 2006. Antipresuppositions. In A. Ueyama (ed.), *Theoretical and empirical studies of reference and anaphora: Toward the establishment of generative grammar as an empirical science*, Japan Society for the promotion of science.
- Roelofsen, Floris & Wataru Uegaki. 2020. Searching for a universal constraint on the denotations of clause-embedding predicates. In *Proceedings of SALT 30*, .
- Strohmaier, David & Simon Wimmer. 2022. Contrafactuals and learnability. In Marco Degano et al. (ed.), *Proceedings of the Amsterdam Colloquium 2022*, 298–305.
- Williamson, Timothy. 2000. *Knowledge and its limits*. Oxford University Press.
- Yalcin, Seth. 2016. Modalities of normality. In Nate Charlow & Matthew Chrisman (eds.), *Deontic Modality*, 230–255. Oxford University Press.