An Argument for a Strong Force Semantics of *Believe*

Abstract: The English verb *believe* is usually taken to encode universal quantification over possibilities and carry a strong modal force (Hintikka 1969). Faced with the intuition that *believe* feels weaker than strong modals like *sure*, Hawthorne et al. (2016) instead propose that *believe* carries a weak modal force, requiring that the agent's degree of certainty exceed some vague standard and drawing a parallel to relative gradable adjectives like *tall*. This contribution takes to heart the idea that *believe* is gradable but shows that its scale properties argue against a weak force semantics: the scale of *believe* is upper closed and so its default standard must be the scale maximum (Kennedy and McNally 2005). This results in a strong modal force, suggesting that the felt weakness of *believe* may be rooted in its 'subjective' modal flavor (cf. Lyons 1977; Kratzer 1981).

Keywords: *believe*, modal strength, gradability, subjectivity

1 The weakness of *believe*

Ever since Hintikka (1969) it has become standard to analyze *believe* as encoding universal quantification over possibilities. More specifically, a belief attribution has been taken to state that the prejacent (the clausal complement of *believe*) is true across all of the agent's doxastic alternatives. This is usually rendered as in (1), where $Dox_{x,w}$ stands for the set of x's doxastic alternatives in a world w.

(1) $[\![\text{believe}]\!]^w = \lambda p \lambda x . \forall w' \in Dox_{x,w} : p(w')$

Due to the presence of a universal quantifier, this semantics ascribes to *believe* a strong modal force.

Faced with examples like (2), Hawthorne et al. (2016) (see also Rothschild 2020) point out that *believe* appears to convey a lower degree of certainty than do uncontroversially strong epistemic modals like *sure*.

(2) I believe the Patriots will win, but I'm not sure they will.

Contra the traditional Hintikkan analysis, Hawthorne et al. (2016) propose that *believe* owes its weakness to its non-maximal modal force, requiring that the agent's degree of certainty exceed some vague threshold and invoking a parallel to relative gradable adjectives like *tall*. This view is summarized in (3).[1]

(3) *x believes p* is true if and only if the degree of certainty that *x* assigns to *p* exceeds some contextually supplied threshold.

When translated into a standard degree-based semantics (Cresswell 1976; a.m.o.), this view amounts to analyzing *believe* as a relation between individuals, propositions, and degrees. This is formalized in (4), where Cr is a measure that maps propositions to 'credences' (degrees of belief). Following the gradability literature, in the absence of overt degree morphology the relevant standard is selected by the covert degree morpheme POS, as shown in (5).

(4) $[\![\text{believe}]\!]^w = \lambda p \lambda d \lambda x . Cr_{x,w}(p) \succeq d$

(5) a. [$_{\text{TP}}$ Alex [$_{\text{DegP}}$ POS [$_{\text{VP}}$ believes it is raining]]]

b. $Cr_{alex,w}(rain) \succ \theta_{bel}$ (w = evaluation world; θ_{bel} = belief threshold)

[1] Hawthorne et al. (2016: 1400) additionally require that the prejacent be (significantly) more likely than its salient alternatives. Here I will ignore this second truth condition since the main argument presented below already puts into question the weaker version stated in (3).

The current contribution argues that the core intuition of Hawthorne et al. (2016) is on the right track: *believe* behaves like a gradable predicate and can plausibly be assigned the meaning in (4). However, its scale properties turn out to posit a challenge to the proposed weak force semantics. The main argument is based on the observation that *believe* can be modified by maximality modifiers (*fully*, *completely*, *entirely*, etc.), suggesting an upper-closed scale. If so, given the strong correlation between scale boundedness and standard of comparison (Kennedy and McNally 2005; Kennedy 2007), *believe* must be an absolute predicate that takes the scale maximum as a default standard, thus conveying a strong modal force. It follows that the felt weakness of *believe* is due to its modal flavor, one possibility being that *believe* lexicalizes 'subjective' epistemic modality (cf. Lyons 1977; Kratzer 1981; Nuyts 2001; Papafragou 2006) and so it is inherently weak.

2 The argument from scale boundedness

Prior work has suggested that *believe* is grammatically gradable (Bolinger 1972: ch.9; Lassiter 2021), and indeed this verb can participate in various degree constructions, including equatives, comparatives, and superlatives. The naturally occurring examples in (6)–(8) provide an illustration.

(6) Each [farmer] believes as strongly as the other that his crops will not survive another week without water, and each cares as much as the other about the survival of his crops.

(7) He believes more strongly than I do that the organization of the executive branch of the federal government matters a great deal.

(8) What group on this map most strongly believes that climate change is not real?

As a sidenote, notice that in the above examples *believe* is accompanied by *strongly*. Although this is a common pattern, *strongly* is not always required in order to compare degrees of belief. As the two naturalistic examples in (9) demonstrate, in comparatives *believe* may also occur on its own.

(9) a. No one believes more than me that fitness should be a top priority in our lives.

b. What do you believe more, that the CIA killed JFK or that the government did 9/11? (cited in Lassiter 2021)

There are two possible lines of analysis here. We could say that gradable VPs interact directly with degree morphemes, although in the case of *believe*-VPs this is generally dispreferred for some reason. We could also say that *strongly* in VP comparison is always present but may be covert, as in the case of VPs headed by gradable verbs such as *like*, *matter*, *trust*, etc. Whichever line is chosen, the key point is that the distribution of *strongly* does not correspond with an obvious semantic contrast as we seem to be comparing degrees of belief either way.

The fact that *believe* is gradable does not prejudge the issue of whether this verb carries a weak or a strong modal force. The reason is that, in the absence of overt degree morphology, gradable predicates may pick different standards of comparison. Unger (1971) was the first to distinguish between two kinds of gradable adjectives, depending on how the default standard is chosen. The standard

of 'relative' adjectives like *tall* is vague and falls somewhere in the middle of the scale, while the standard of 'absolute' adjectives like *bent*, *certain*, *full* is fixed as the minimum or the maximum of the scale. For *believe*, the relative–absolute distinction corresponds to taking a vague (weak force) or a maximal (strong force) standard, respectively.

Kennedy and McNally (2005) and Kennedy (2007) convincingly argue that the relative–absolute distinction boils down to differences in scale boundedness. They classify gradable predicates depending on whether the associated scale has open or closed ends, deriving the typology in (10).

(10) a. totally open scale ○——————○ *tall*, *short*

b. lower-closed upper-open scale ●——————○ *bent*, *straight*

c. lower-open upper-closed scale ○——————● *certain*, *uncertain*

d. totally closed scale ●——————● *full*, *empty*

This typology is empirically supported by the distribution of degree modifiers that make reference to scale endpoints. That is, minimality modifiers (like *slightly*) typically only occur with adjectives that encode lower-closed scales, maximality modifiers (like *perfectly*) are only compatible with adjectives that encode upper-closed scales, and proportional modifiers (like *half* or *mostly*) require adjectives with totally closed scales. Adjectives with totally open scales are generally incompatible with any of these modifiers.

Kennedy and McNally (2005) establish the following key generalization regarding the link between scale boundedness and standard of comparison: adjec-

tives with totally open scales take vague standards, whereas adjectives with (partially or totally) closed scales take fixed standards. For example, *tall* is associated with a totally open scale (it does not occur with minimality or maximality modifiers like *slightly* or *completely* without a shift in meaning) and takes a vague standard that depends on the given comparison class. By contrast, *full* has an upper-closed scale (e.g., it accepts modification by *completely*) and takes the scale maximum as a default standard. The explanation for the first part of the Kennedy–McNally generalization is straightforward: if a scale lacks endpoints, an adjective associated with it needs contextual support in order to find an appropriate standard. The explanation for the second part of the generalization requires an optimization principle called Interpretive Economy (Kennedy 2007), according to which truth conditions favor conventional meaning over contextual information. Given this principle, if a scale provides endpoints, an adjective must use these when picking a standard before it involves the context.

We can now employ the Kennedy–McNally generalization to determine whether *believe* takes a vague or a fixed standard. The key question is, what kind of scale is *believe* associated with? The naturalistic data in (11) argues for an upper-closed scale, due to compatibility with maximality modifiers like *fully*, *completely*, or *entirely*.

(11) a. Theresa fully believes that we all have the inner ability to achieve what we desire and sometimes it takes input from others to kick start that process.

b. For one, I completely believe that Wal-Mart is a monopoly, if you

thought I was defending Wal-Mart.

c. But Kathleen didn't entirely believe it.

Given that its scale is upper closed, the Kennedy–McNally generalization predicts that *believe* associates with a fixed rather than a vague standard. This prediction is in line with *believe* taking as its default standard the scale maximum rather than some degree from the middle part of the scale. We may conclude that *believe* carries a strong modal force, contra Hawthorne et al. (2016).[2]

Two remarks are in order here. The first is that the above argument is as good as the Kennedy–McNally generalization itself, which has been further qualified (McNally 2011; Toledo and Sassoon 2011; Solt 2012) or directly challenged (Lassiter 2017, 4.2). However, even if this generalization is not entirely correct, then there would be at least a strong expectation that *believe* carries a strong modal force, judging by the overall behavior of other gradable predicates.

The second remark is that, as long as *believe* has a unique meaning across different contexts, it does not matter whether its measure and pertaining scale are native to the verb (Hawthorne et al. 2016) or are introduced externally by degree morphology (cf. Pasternak 2019; Wellwood 2019). That is, since *believe* does not carry the hallmarks of multidimensionality (cf. *?Kim believes in some/most/all respects that it is raining outside*), this verb must be associated with a single scale

[2]The conclusion that unmodified *believe* targets the scale maximum begs the question of what maximality modifiers as in (11) contribute to its meaning, if anything at all. While I will not stake out a position here, two options are that such modifiers (i) remove potential imprecision (Lasersohn 1999; Sauerland and Stateva 2011; Solt 2014; Klecha 2018) or (ii) access extreme values that fall outside the standard scale (Morzycki 2012). Crucially, this issue extends to other maximum-degree predicates (e.g., *full* vs. *completely full*) and so it asks for a general solution.

that exhibits the properties just described.

3 Further evidence

Three tentative pieces of evidence further strengthen the empirical parallel between maximum-degree predicates and *believe*. The first piece of evidence involves insertion of a phrase that restricts the comparison class (Klein 1980; Kennedy 1999, 2007; a.o.). Since relative predicates like *tall* pick flexible standards, such overt phrases are expected to delimit the range of options and increase informativity. By contrast, absolute predicates like *full* select a fixed standard, so trying to restrict the comparison class should lead to redundancy. The contrast in (12), from Lassiter (2017: 101), confirms these predictions.[3]

(12) a. Bill is tall for a fourteen-year-old.

b. ?? This room is full for a classroom.

Believe behaves like an absolute predicate in this respect: an unmodified form of this verb may not co-occur with a phrase that specifies a comparison class. This contrasts with relative modals such as *likely* (Yalcin 2010; Klecha 2014; Lassiter 2017), which more readily allow for overt comparison phrases. (13) illustrates.

(13) a. (?) Compared to an invasion of another neighboring country, an invasion of Ukraine is likely.

[3] Absolute predicates may be sensitive to the kind of object being ascribed to—e.g., a wine glass would be considered full if it is filled to about half of its capacity. However, even such cases are not natural with comparison class restrictors (cf. *??This glass is full for a wine glass*). The explanation proposed in the literature is that the standard for absolute predicates is based on rules (McNally 2011) or intensional counterparts of the object of predication (Toledo and Sassoon 2011), rather than based on similarity to some class of extensional objects denoted by the restrictor phrase.

b. # Compared to an invasion of another neighboring country, I believe that Ukraine will be invaded.

A second piece of evidence involves antonym pairs. It has been pointed out that the negation of an absolute adjective entails its antonym, while the negation of a relative adjective does not entail its antonym (Cruse 1986: ch.9; Kennedy 2007; Lassiter 2017). Similarly, one cannot negate both an absolute adjective and its antonym, although one can negate a relative adjective and its antonym. The rationale behind these contrasts is that absolute antonym pairs cover complementary portions of the same scale, while relative antonym pairs leave a 'gray zone' between the two denotations. The examples in (14)–(15) are taken from Lassiter (2017: 100) and illustrate these contrasts for the absolute antonym pair *bent–straight* and the relative antonym pair *tall–short*.[4]

(14) a. The rod is not bent. $\rightsquigarrow$ The rod is straight.

b. # The rod is not bent, but it is not straight either.

(15) a. Bill is not tall. $\not\rightsquigarrow$ Bill is short.

b. Bill is not tall, but he is not short either. (He is just average.)

Notably, *believe* and its apparent antonym *doubt* seem to pattern with absolute adjectives in this respect. To see that, let us assume that Jack is 'epistemically engaged' with a given proposition p in some way (by finding p impossible, pos-

[4]To be precise, the reported patterns about absolute predicates hold only for maximum–minimum antonym pairs. Importantly, *believe–doubt* fit the bill, assuming that *believe* is maximum-degree and *doubt* is minimum-degree (see below). Lassiter cites *full–empty* as an example of a maximum–maximum absolute pair that does not obey the reported patterns.

sible, likely, or certain), so that we may not judge sentences of the form *Jack believes/doubts p* false merely because Jack has not entertained p at all. Assuming epistemic engagement, Jack's not doubting p entails Jack's believing p, and Jack cannot simultaneously not believe and not doubt p. This is illustrated in (16).[5]

(16) a. Jack doesn't doubt Jill is at the party. $\rightsquigarrow$ Jack believes Jill is at the party.

b. # Jack doesn't believe Jill is at the party, but he doesn't doubt it either.

As shown in (17), relative modals exhibit the opposite behavior to *believe*, as expected. That is, since Jill's being at the party could be exactly 50 percent likely, both of the following hold for the antonym pair *likely–unlikely*.

(17) a. It's not likely that Jill is at the party. $\not\rightsquigarrow$ It's unlikely that Jill is at the party.

b. It's not likely that Jill is at the party, but it's not unlikely either.

A third piece of potential evidence involves interaction with percentage modifiers. Klecha (2014) and Lassiter (2017) notice that maximum-degree modal adjectives prefer percentage modifiers that are close to the top of the scale, whereas relative modal adjectives impose no clear preference. This is illustrated for *certain* and *likely* in (18).

[5]Notice that (16a) is stated as an entailment from $\neg doubt(p)$ to $believe(p)$ rather than as the logically equivalent entailment from $\neg believe(p)$ to $doubt(p)$. The reason is that in an upward-entailing context $doubt(p)$ is usually taken to mean not just 'not believe p' but 'believe not p' (Anand and Hacquard 2013), thus seemingly invalidating the latter entailment. Crucially though, this strengthened meaning has been attributed to exhaustification arising from the fact that English *doubt* lacks a stronger scalemate that means 'believe not p' (Uegaki 2021). This explains why the strengthened meaning of *doubt* melts away in downward-entailing contexts like (16a).

(18) a. It's ??5 / ?50 / 99 percent certain that Biden will win.

b. It's (?)5 / 50 / 99 percent likely that Biden will win.

While most speakers I consulted rejected all combinations of percentage modifiers and *believe*, some speakers found *believe* quite acceptable with high percentage modifiers. This divergence in judgments is shown in (19).[6]

(19) I believe #5 / #50 / %99 percent that Biden will win.

Although I do not know why such a restriction on percentage modifiers should be in place, its existence suggests that—at least for some speakers—*believe* belongs in the same class as less controversial instances of maximum-degree predicates.

4 Conclusion and outlook

There is a pervasive intuition that English *believe* conveys some sense of epistemic weakness, in contrast to strong epistemic modals like *sure*. In spite of this intuition, I have developed an argument against a weak force semantics for *believe*, based on the observation that its scale is upper closed and so it must take the scale maximum as a default standard (Kennedy and McNally 2005). This places the empirical picture on *believe* somewhere in between the classical analysis of Hintikka (1969) and the recent proposal in Hawthorne et al. (2016). That is, as predicted by the former account, unmodified *believe* conveys a strong modal force and leaves its intuitive weakness entirely to its modal flavor. At the same time, as

[6] To corroborate these findings, three counterpart sentences to (19) were presented on Prolific to nine native speakers of American English, asking them to rate these on a scale from 1 (very unnatural) to 5 (very natural). Participants consistently rejected the combinations *believe 5 percent* (mean = 1.3) and *believe 50 percent* (mean = 1.5), but the results for the combination *believe 99 percent* seemed to follow a bimodal distribution: two participants found it fully acceptable (a ceiling effect) while the remaining seven participants found it quite unacceptable (a bottom effect).

expected on the latter account, *believe* behaves like a gradable predicate, although it shares properties with maximum-degree predicates like *full* rather than relative predicates like *tall*. Is there a way to preserve the virtues of these two views?

Here I outline one potential direction, leaving the details for future research. One attractive possibility is that, while maximum-degree, *believe* lexicalizes modal flavor that is subjective and thus 'weak' in some intuitive sense. This idea builds on prior literature that has made a broader distinction between 'subjective' and 'objective' epistemic modality. Lyons (1977: ch.17) was the first to point out that (epistemic) *must* and *might* can be read subjectively or objectively, where the former reading is based on less reliable evidence and merely voices an opinion, while the latter reading is based on knowledge and entails commitment to truth. For example, *Alfred must be unmarried* could be uttered as a somewhat risky conclusion after learning that Alfred is dating someone, or it could be the result of a logical deduction (e.g., exactly one faculty member is unmarried, every faculty member but Alfred is married, so Alfred must be unmarried). The subjective–objective distinction has been fleshed out in various ways, depending on whether the pertaining evidence is taken to be publicly defendable (Kratzer 1981), accessible to all speech participants (Nuyts 2001; Papafragou 2006), or both (Portner 2009: 4.2). Whatever the correct analysis, endowing *believe* with subjective modal flavor could potentially reconcile the intuition of weakness with its strong modal force.

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