# Assertions as Degree Relations

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**Introduction**: This paper builds on two main ideas in the literature. First, that some epistemic modal expressions are gradable (*similarly to tall/clean*), specifically that they are not quantifiers over possible worlds (Kratzer 1981, 1991, 2012) but rather denote relations between propositions and degrees of subjective probability / belief, *aka* credence. This has been claimed, for (some) modal adjectives *(e.g. possible/likely)* (Yalcin 2005, 2007, Lassiter 2010, 2015, to appear) for particles like the German *eh-* (Herburger & Rubinstein 2014, 2017, Goncharov & Irimia 2017), and motivated by the ability of such expressions to be compared (*more likely/ eher*), and / or to be modified by e.g. degree modifiers / questions (*How likely?*). Second, that Speech Acts (SA) can participate in the compositional interpretation and be embedded (e.g. Krifka 2014, 2015, 2017, Cohen & Krifka 2014, Thomas 2014, Beck 2016)[1]. We focus on assertions and on the speech act operator *ASSERT*.

**Our proposal** is to examine a way to integrate these two ideas, and move them one step forward so that (bare) assertion speech acts are modeled as gradable, and are compositionally modifiable by (overt and covert) degree modifiers.

The starting point motivation for our proposal relies on existing claims concerning Modal adverbs: Piñón 2006, Wolf & Cohen 2009, Wolf 2015 observe that, unlike modal adjectives (MADJs), modal adverbs (MADVs) act as modifiers of assertion speech acts. E.g.

**(A)** MADVs, but not MADJs can only be embedded in the consequent but not the antecedent of conditionals (cf. Bellert 1977, Nilsen 2004, Piñón 2006, Ernst 2009):

*(1) a. #If John possibly/probably arrived at the office early, I will call the office.*
   *b. If it's possible/probable that John arrived at the office early, I will call the office.*
*(2) a. If John is in the office, it is possible / probable that he arrived there early.*
   *b. If John is in the office, he possibly / probably arrived there early.*

We support such contrasts by data from COCA (Davies, 2008), as seen in e.g. (4):

*(3)*a. *If it is/it's possible* (243) vs. *If it is/it's/he is/he's/she is/she's possibly* (0)
   b. *If possible* (1725) vs. *If possibly* (14; 12 out of these are non-conditional *ifs* as *whether*)

**(B)** Only MADVs are speaker-oriented (Nuyts, 2001, Ernst 2009, Nilsen 2004):

*(4) A: It is probable that they have run out of fuel. B: Whose opinion is this?*
*(5) A: They have probably run out of fuel. B: #Whose opinion is this?*

Following Piñón 2006, Wolf & Cohen 2009 and Wolf 2015 conclude that MADVs combine with *ASSERT* and lower/raise the speaker's credence degree regarding the propositional content she asserts.

**Analysis:** We adopt Wolf's 2015 conclusion, and suggest that if MADVs indeed lower / raise the degree of credence in assertions, then assertions, crucially, even those containing no modal expression, should involve credence degrees to begin with. There are several ways to implement this idea, depending on the specific entry for *ASSERT* one favors. Suppose, for example, we follow Thomas' 2014 and Beck's 2016 implementation of Krifka 2014, where *ASSERT* is type $<<s,t>, <c,c>>$ as in (6), (c is the type of contexts, including a speaker, hearer, time of utterance and Common Ground ($c_{sp}, c_h, c_t, C_w$)):

*(6) [[ASSERT]] = $\lambda p.\lambda c.\ \iota c'$: $c'=<c_{sp}, c_h, c_t, C_w \cap \{w: assert\ (p)(c)\}>$   Where assert (p)(c)*
*is true iff in w $c_{sp}$ is committed to behave as though she believes that p at $c_t$*

We now proceed by making two moves. First, we take bare assertions to denote degree

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[1] But cf. Han 1998, Palmer 1986, Platzack and Rosengren 1997, Rivero and Terzi 1995, Sadock and Zwicky 1985, Condoravdi and Lauer  2012, Lauer 2015 for a non / extra compositional view of speech acts.

relations, by adding a credence degree argument to the denotation of *ASSERT*. Adopting, for example, the entry for *ASSERT* as in (6), this will result in (7), with *ASSERT* being now type $<<s,t>, <d, <c,c>>>$:

(7) [[ASSERT]]: $\lambda p.\ \lambda d.\lambda c.\ \iota c'$: $c'=<c_{sp}, c_h, c_t, C_w \cap \{w: \text{Assert } (p)\ (d)(c)\}>$, *Where assert (p)(d)(c) is true iff in w the speaker of c, $c_{sp}$, is committed to behave as though she believes that p to a degree d, at the time $c_t$, and the hearer $c_h$ is a witness to this commitment.*

Second, we propose that similarly to degree modifiers over adjectives (e.g. *completely*,), MADVs are degree modifiers over gradable speech acts, G. Within the framework in (7), for example, we will end up with (8)-(10):

(8) [[Probably]]: $\lambda G.\ \lambda p.\ \lambda d.\ \lambda c.\ \iota c'$: $c'=< c_{sp}, c_h, c_t, C_w \cap \{w: \exists d\ d>0.5 \wedge G(p)(d)(c)\}>$

[[Possibly]]: $\lambda\ G.\ \lambda p.\lambda d.\ \lambda c.\ \iota c'$: $c'=< c_{sp}, c_h, c_t, C_w \cap \{w: \exists d\ d> 0 \wedge G(p)(d)(c)\}>$

(9)(a) *John is probably a thief*      b. [Probably(Assert)] (John is a thief) (c)

(10) $\iota c'$: $c'=< c_{sp}, c_h, c_t, C_w \cap \{w: \exists d\ d >0.5 \wedge \text{Assert (John is a thief)}(d)(c)\}>$

      I.e. (9b) combines with a context c and yields a context c' which is just like c except that the CG is updated with the information that the speaker, $c_s$, in c is committed at the time $c_t$, to behave as though her credence in "John is a thief" is greater than 0.5.

**Predictions:** We discuss several predictions of our proposal:

**a. MADVs and degree questions.** Our proposal predicts that unlike gradable MADJs, which have been shown to be modifiable by degree questions (11), MADVs will not be felicitous with such questions. This is because unlike gradable MADJs (analyzed in the literature as denoting degree relations, and modifiable by degree modifiers), under our analysis MADVs, are themselves degree modifiers (of *ASSERT*) and hence should not be modified by other degree questions due to type mismatch. Indeed, as seen in (12), this prediction is borne out:

(11) *How probable is it that John left?* (12) *#How (much) probably is it that John left?*

      We discuss the better status of MADVs with e.g. *very* (as in *very possibly*) and following Kennedy & McNally (K&M) 2005, and Lassiter (to appear) who suggest that *very* is not a 'true' degree modifier. Rather, it can apply to [*possibly ASSERT*].

**b. MADVs and (some) epistemic comparatives:** Goncharov & Irimia 2017 propose that some cases of epistemic comparatives in e.g. Rumanian, Bulgarian and Russian are instantiations of the comparative morpheme –*er* in the left periphery of the sentence, operating over a high epistemic covert operator, EPIST, expressing degree of speaker's credence of the proposition (cf. Rubinstein & Herburger 2014, 2017 on German *eher*). Taking this epistemic operator to be, in fact, *ASSERT*, our analysis predicts that such epistemic comparatives, being degree modifiers, will be compatible with propositional, 'low', modal expressions (expressing degree relations), but not with MADVs, which are themselves degree modifiers. This prediction seems to be borne out, at least for Russian, as seen in the contrast between (13b) with the 'low' modals and (14b) with MADVs ( Goncharov, p.c.):

(13) a. *Ivan mozhet byt' na rabote.*
     *Ivan may    be   at work* - *"Ivan may be at work"*
b. *Ivan mozhet byt' skoree na rabote chem doma.*
   *Ivan may    be    sooner at work    than home* "It is more plausible that Ivan may be at work than that he is at home"
(14) a. *Vozmozhno Ivan na rabote.* (Modal adverb)
      *Maybe-adv   Ivan   at work* – *"Maybe / perhaps Ivan is at work"*
b. *\*/?? Vozmozhno Ivan skoree na rabote chem doma.*
       *maybe      Ivan sooner at   work than home*
Intended: *"It is more plausible that maybe/perhaps Ivan is at work than that he is at home"*

**c. The contextual variability of apparently unmodified assertions.** If *ASSERT* denotes a degree relation, and is modifiable by MADVs (and some epistemic comparatives), what

happens when assertions appear 'bare', i.e. when they do not seem to be modified by any overt degree modifiers?

Our analysis predicts that in such cases apparently unmodified assertions cannot stay unmodified. Instead, they will be modified by a **covert** degree modifier, which will help set the value for the degree argument of *ASSERT*. We suggest that this is indeed the case, and that such a covert degree modifier behaves in a similar way to *POS* with apparently unmodified (upper closed) adjectives.

This prediction is supported by existing observations about the contextual variability of assertions. Following Lewis 1976 Potts 2006 and Davis et al. 2007 propose that pragmatically, Grice's maxim of quality should be relaxed, as speakers do not always assert propositions with complete certainty, i.e. with subjective probability of 1. Moreover, they suggest that subjective probability varies with context. We make a similar observation i.e. that the probability that the speaker takes assertions wuch as *John is a crook* to have may be higher when this proposition is asserted, for example, as part of a testimony in court than in a casual conversation in a bar.

We now propose that the (apparent) variability of $C\tau$ with assertions is strikingly similar to the (apparent) variability found with upper-closed gradable adjectives in their 'positive form'. In general, contextual variability with adjectives is often captured by taking apparently unmodified adjectives to be modified by a covert *POS*, setting the standard of comparison, as in (15):

(15) $||POS|| = \lambda G. \lambda x. \exists d\ d \geq$ **standard (G,C)** $\wedge G(x,d)]$ (e.g. von Stechow 1984, K&M 2005)

We propose that apparently unmodified assertions are also modified by a covert *POS*, identical in type to MADVs. For example, using the framework for *ASSERT* in (7) above, such a covert *POS* operator will have the denotation in (16), as illustrated in (17)-(18):

(16) $[[POS]]:\lambda G.\ \lambda p.\ \lambda c.\ \iota c':\ c'=< c_{sp},\ c_h,\ c_t,\ C_w \cap \{w:\ \exists d\ d \geq$ **standard (G,C)** $\wedge G(p)(d)(c)\}>$

(17) a. *John is a thief*   b. [POS (Assert)] (John is a thief) (c)

(18) $\iota c':\ c'=< c_{sp},\ c_h,\ c_t,\ C_w \cap \{w: \exists d\ d \geq$ **stand (ASSERT,C)** $\wedge$ Assert (John is a thief)(d)(c)$\}>$

In words, (17b) combines with a context c and yields a new context c' which is just like c except that the common ground is updated with the information that the speaker, $c_s$, in c is committed at the time $c_t$, to behave as though her credence in "John is a thief" is at least as high as the standard of credence for assertions in the context.

A potential problem with this suggestion is how the contextual variability of assertions, observed in Davis et al and Potts, is compatible with the total closeness of the credence scale, given K&M's 2005 claim that with upper closed adjectives (like *clean*) the standard of comparison is always at the maximal point. Notice, though, that K&M themselves point out cases where the positive form with such adjectives is used with an (apparently) non-maximal standard (e.g. *The theatre is empty today* when several people are present), and that contextual variability is found there too (compare *The glass is clean* when uttered by a pedant lab worker vs. by a child). This has been either accounted for by insisting on the maximal endpoint standard and deriving apparently lower standards in the positive form from imprecision, using e.g. pragmatic halos (Lasersohn 1995) as in K&M 2005, (cf. Burnett 2014 for an elaborated view), or by dissociating the standard from scale structure, allowing the former to be contextually supplied after all. In the latter direction the standard can be restricted to the upper interval of the scale, but is still allowed to vary and be lower than the maximum (as in McNally 2011. cf. also Lassiter (forthcoming) on modal adjectives with probability scales, cf. Klecha 2012).

The crucial point for us is that the contextual variability found with apparently unmodified assertions is indeed similar to the one found with Upper closed adjectives. Thus, no matter which strategy is chosen for capturing contextual variability with apparently

unmodified upper-closed gradable adjectives, we suggest that the same choice can be made for apparently unmodified assertions, with the upper closed credence scale.

**To conclude:** In this paper we are not committed toward any specific entry for *ASSERT*, but rather suggest **a general recipe: Take your favorite entry for *ASSERT*, supplement it with a credence degree argument, and allow degree modifiers to operate over it and manipulate this degree in direct and indirect ways.**

A more general point, though, concerns the fact that our proposal that assertions are gradable and that they are modifiable by (overt and covert) degree modifiers, is to a large extent inspired by similarities with well-studied propositional constructions involving modified and (apparently) unmodified gradable predicates, which are part of the compositional process. A general take home message of our proposal, then, is that such similarities lend support to the view that speech acts should be part of the compositional process as well (e.g. Krifka 2014, 2015, 2017, Cohen & Krifka 2014, Thomas 2014, Beck 2016).

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