# Composing attitudes: Why knowing people is not believing them

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## 1 Introduction

In the Hintikkan tradition, attitude verbs are standardly analysed as quantifiers over worlds: if Mary believes that Jane won, then all of Mary's belief-worlds have to be worlds in which Jane won:

(1)    a.    $[[\text{believe}]]^w = [\lambda p_{<st>}.[\lambda x_e.\text{DOX}\,^w_x \subseteq p]]$, where
         $\text{DOX}^w_x = \{w': w'$ conforms to what x believes in w$\}$
   b.    $[[\text{Mary believes that Jane won}]]^w = 1$ iff $\text{DOX}^w_m \subseteq \{w':$ Jane won in w'$\}$

*know* vs. *believe*:

- On this approach, the primary semantic difference between *know* and *believe* is the type of *accessibility relation* that determines the set of worlds quantified over (DOX/EPIST).
- They differ additionally in that *know*, like other factives, presuppose that p is true in *w*.

(2)    a.    $[[\text{know}]]^w = [\lambda p_{<st>}[\lambda x_e: \underline{p(w){=}1}.\text{EPIST}^w_x \subseteq p]]$, where:
         $\text{EPIST}^w_x = \{w':$ w' conforms to what x knows in w$\}$
   b.    $[[\text{Mary knows that Jane won}]]^w = 1$ iff $\text{EPIST}^w_m \subseteq \{w':$ Jane won in w'$\}$
                               defined if Jane won in w; otherwise #

In terms of the compositional semantics and the selectional properties of *know* vs. *believe*, this suggests that both types of verbs combine with propositions (or perhaps sets of propositions).

- Considering only cases where these verbs take declarative complements, this nicely captures the intuition that the main difference between *know* and *believe* in (3) is that with *know*, unlike with *believe*, the speaker assumes that Anna has reason to believe p, and also takes p to be true:

(3)    Sue believes/knows [$_P$ that Anna won].

This uniform picture is challenged by cases where *know* and *believe* combine with DPs, e.g.

(4)    Sue believes/knows the claim.

Previous work on *know* vs. *believe* with CONTENT DPs have analysed *know DP/CP* in terms of polysemy.

**Today:**[1]

- New observations about a different kind of DP, describing a Source of p (*I believe you that p*).
- Challenges for a polysemy based approach to *know*, and for a uniform analysis of *know* vs. *believe*.
- Propose that *know* and *believe* differ fundamentally at the level of argument-structure and internal composition, and thus combine with DPs via different routes:
  - Derivational relationship between *know DP* and *know CP*, s.t. both involve acquaintance;
  - Hintikkan approach to *believe*-verbs, whereby DPs are externally licensed or type-shifted.

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[1] The core observations of this talk are from Djärv (2019: Ch. 4).

## 2  Data

### 2.1  Source DPs

Doxastics, like *believe*, unlike epistemics like *know*, allow for a special kind of DP, describing the SOURCE of the information provided by the embedded clause (5).[2]

(5)    Djärv (2019: 209)
    a.   I {believe, trust} **you** [$_P$ that Anna is to blame].        (doxastics)
    b.   *I {know, discovered} **you** [$_P$ that Anna is to blame].      (epistemics)

A similar contrast arises in cases when these verbs take *only* a DP complement.
- With *believe*-verbs (6-a), the DP is understood as the source of some contextually provided proposition ($p_C$), as in(5-a).
- For *know*-verbs (6-b), there is no inference of a relation to propositional content. Here, the DP is understood to denote an ordinary individual, which the subject is acquainted or familiar with.

(6)    Djärv (2019: 210)
    a.   I believe **you**. ≈ I believe that you are right about $p_C$.
    b.   I know **you**. ≈ I am familiar/acquainted with you.

This is not a lexical quirk of English *believe* – more on German below.

### 2.2  Content DPs

The contrast in the licensing of Source DPs turns out to track a previously observed contrast between verbs like *know* and *believe*; in terms of whether the verb+Content DP entails the verb+CP (e.g. Prior 1971, Pietroski 2000, Ginzburg 1995, King 2002, Moltmann 2013, Uegaki 2016, Elliott 2016) (see Djärv 2019 Ch. 4.1):

(7)    Sue {believes, trusts} [$_{DP}$ the rumor/claim that Anna is to blame].    ✓ DP-to-CP entailment
    ⊨ Sue {believes, trusts} [$_{CP}$ that Anna is to blame].

(8)    Sue {knows, discovered} [$_{DP}$ the rumor/claim that Anna is to blame].    ✗ DP-to-CP entailment
    ⊭ Sue {knows, discovered} [$_{CP}$ that Anna is to blame].

### 2.3  Source DPs and Content DPs

In English, a Source DP cannot co-occur with a Content DP:

(9)    *I believe you the claim that Anna is to blame.

This might lead us to think that the two DPs saturate, and thus compete for, the same (type $e$) argument slot of *believe*, and that the exact interpretation of the DP depends on pragmatic factors (e.g. plausibility).

However, German data shows us that this is not the right explanation!

In German, a Source DP *can* co-occur with a Content DP:

(10)    German (Djärv 2019: 235)

    Ich glaube ihm    die    Behauptung, dass Hans Maria das Buch gab.
    I    believe him.DAT the.ACC claim        that Hans Maria the book gave

    *I believe the claim, that he told me, that Hans gave Maria the book.*    German

Note here that in German, Source DPs have Dative case, and content DPs have Accusative case. This is true also in cases where they do not co-occur:[3]

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[2]Hence, this Source DP is neither the topic of the attitude, the *res*, nor the content of the belief.

[3]Thanks to Florian Schwarz, pc., for these observations and judgements.

(11)     German (Djärv 2019: 235)

    a.    Ich glaube ihm/*ihn,      dass Hans Maria das Buch gab.
         I    believe him.DAT/*ACC that Hans Maria the book gave

         *I believe him that Hans gave Maria the book.*             Source: DAT/*ACC

    b.    Ich glaube die/#dem      Behauptung, dass Hans Maria das Buch gab.
         I    believe the.ACC/#DAT claim      that Hans Maria the book gave

         *I believe the claim that Hans gave Maria the book.*    Vessel/container: ACC/#DAT

The contrast between (9) and (10) follows immediately from the fact that German, unlike English, has Source Applicatives, as shown in (12):[4]

(12)     Djärv (2019: 236); from Schäfer (2008: 76)

    a.    *John stole Mary a book. (Intended: John stole a book from Mary.)        English

    b.    Hans       stahl Maria      das Buch.
         Hans.NOM stole Maria.DAT the book.ACC

         'Hans stole the book from Maria.'                       German

**What we can learn from Source DPs in German:**

1. The fact that a Source DP and a Content DP cannot co-occur in English is not because they are competing for the same (type $e$) argument slot of *believe*, but follows from syntactic reasons (case).
2. The fact that the Source DP is always introduced by an external head in German (Appl$^o$, which assigns it Dative), suggests that the Source DP is not part of the lexical meaning of *believe*.

    • Thus, if we want to maintain a uniform analysis of the semantics of *believe* in English and German, we should assume that it is not part of the lexical meaning of *believe*, also in English.

Further motivation for not treating the Source DP as part of the lexical meaning of *believe* comes from the observation that while *I believe you* implies belief of some contextually salient proposition, *I believe that p* does not imply the existence of some contextually salient source of information, as shown in (13):

(13)     a.    I believe that [$_P$ Anna won].                   ⇝̸ $x_C$ is the source of p

       b.    I believe you.                             ⇝ you are the source of $p_C$

Finally, while the belief inference gets cancelled under negation, the Source-of-p inference *projects*; a behaviour typical of presuppositions (as opposed to truth-conditional meaning):

(14)     I **don't** believe you that [$_P$ Anna won].                ⇝̸ I believe that p
                                                   ⇝ you are the source of p

**Analytical conclusions: Source vs. Content DPs:**

- Source DPs:
    - The German data (10)–(12) suggests that they must be licensed by an external (potentially case-licensing) head, and are not part of the lexical meaning/argument structure of *believe*.
    - The observations in (13)–(14) suggests that they when they *are* licensed, they are not part of the truth-conditional/*at-issue* content of their host-sentences, but behave like presuppositions.
- Content DPs:
    - Taken together, the DP-to-CP entailment and the fact that they get Accusative case (from *believe*) suggest that these DPs *do* saturate the internal argument slot of *believe*.

➤This suggests different derivational paths for Source and Content DPs with *believe*.

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[4] English only has Goal applicatives, e.g. *John gave Mary a book.*

## 3 Analysis: *believe*-verbs

I treat *believe* as selecting for complements of type <st,t>, and declaratives and interrogatives as both being of this type, following e.g. Theiler et al. (2019).[5]

(15)    $[[\text{believe}]]^w = [\lambda P_{<st,t>}.[\lambda x_e.\exists p \in P[DOX^w_x \subseteq p]]]$

### 3.1 Deriving *believe* + CP

This allows *believe* to combine straightforwardly with declaratives:

(16)    $[[\text{Sue believes that Anna won}]]^w = [\lambda P_{<st,t>}.[\lambda x_e.DOX^w_x \in P]](\{\lambda w'.\text{won}(anna)(w')\})(\text{Sue})$
        $= 1$ in w iff $\exists p \in \{\lambda w'.\text{won}(anna)(w')\}[DOX^w_{sue} \subseteq p]$

### 3.2 Deriving *believe* + DP

#### 3.2.1 *believe* + Content DP

Our analysis of Content DPs follows Uegaki (2016): to combine with Content DPs, I propose a (modified version of his) content retrieval function:

(17)    $[[\text{CONT}\!\uparrow]]^w(x) = \{\lambda w'.w' \in \text{CONT}_w(x)\}$          $\left\{ \begin{array}{l} \textit{defined if } \text{CONT}_w(x) = \text{CONT}_{w'}(x) \\ \# \textit{ otherwise} \end{array} \right\}$

(Assuming the Kratzer-Moulton [9, 10, 12, 13] analysis of content nominals, as individuals of type e: the intentional content of a contentful individual is derived via the CONT-function in (18-a):)

(18)    a.    $\text{CONT}_w(x) = \{w': w'$ is compatible with the intentional content determined by x in w$\}$
        b.    $[[\text{the claim that Anna won}]]^w = \iota x[\text{claim}_w(x) \,\&\, \text{CONT}_w(x) = \{w': \text{Anna won in } w'\}]$

This allows *believe* to combine directly with the content DP; thus accounting for the DP-to-CP entailment.

#### 3.2.2 *believe* + Source DP

In German, the Source DP is introduced by a Source Appl$^o$ head. In English, this is not an option. We have also seen that whatever the nature of this head, it does not assign case.

To account for the interpretation of English Source DPs, I propose that they are licensed by the Assert operator A() from Farkas and Bruce (2010) (merged in the embedded CP):

(19)    A($S[D]$, a, $K_i$) = $K_o$ such that                                    (Farkas and Bruce 2010: 92)
        a.    $DC_{a,o} = DC_{a,i} \cup \{p\}$
        b.    $T_o = push(<S[D]; \{p\}>, T_i)$
        c.    $ps_o = ps_i \,\overline{\cup}\, \{p\}$

A() takes as its input a declarative sentence *S[D]* with denotation $\{p\}$, an *author* a, and a context $K_i$, and is a function from input contexts $K_i$ to output contexts $K_o$ s.t. S[D] and $\{p\}$ are at the top of the conversational Table and p is part of *a*'s public discourse commitments ($DC_a$).

Two levels of composition:

- At the level of truth-conditional/*at-issue* meaning, *believe* combines directly with the denotation of the embedded clause:
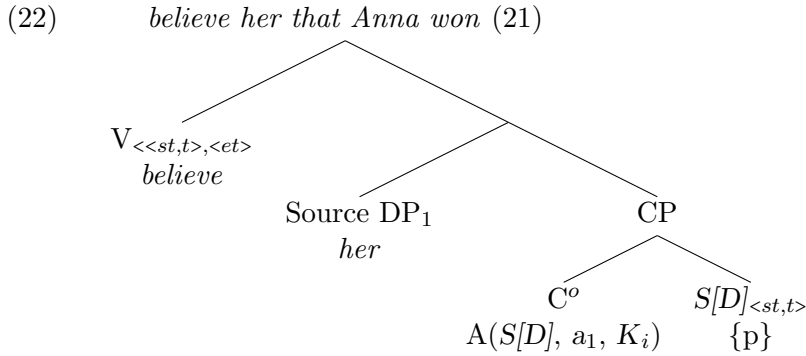
(20)    $[[\text{Sue believes Mary that Anna won}]]^w = 1$ in w iff $\exists p \in \{\lambda w'.\text{won}(anna)(w')\}[DOX^w_{sue} \subseteq p]$

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[5]Assuming that the incompatibility of *believe*-verbs with questions follows from independent properties of their meaning; see Theiler et al. (2019); not from their selectional requirements, as on Uegaki's (2016) analysis.

- At the level of non-truth-conditional/*not at-issue* meaning, $A()$ takes the embedded clause as its *S[D]* argument, and the Source DP as its *author* argument:

(21)    $[[\text{Sue believes Mary that Anna won}]]^w = 1$ in w iff $\exists p \in \{\lambda w'.won(anna)(w')\}[DOX^w_{sue} \subseteq p]$

$$\left\{ \begin{array}{l} \textit{defined if} \\ \text{a. } DC_{mary,o} = DC_{mary,i} \cup \{\lambda w'.won(anna)(w')\} \\ \text{b. } T_o = push(<\text{`Anna won'}; \{\lambda w'.won(anna)(w')\}>, T_i) \\ \text{c. } ps_o = ps_i \sqcup \{\lambda w'.won(anna)(w')\} \\ \# \textit{ otherwise} \end{array} \right\}$$

LF to illustrate:

(22)    *believe her that Anna won* (21)



$V_{<<st,t>,<et>}$
*believe*

Source DP$_1$ — *her*

CP

$C^o$ — $A(S[D], a_1, K_i)$

$S[D]_{<st,t>}$ — $\{p\}$

Thus, in English (unlike in German), the Source DP is pragmatically, but not syntactically, licensed, and is not part of the truth-conditional content of their host-sentences.

**In summary, this analysis captures:**

- the interpretation of the Source DP as having claimed or proffered p;
- the not *at-issue* status of this inference;
- the fact that English Source DPs don't get case, and thus the contrast between English (9) and German (10).

**And allows us to make new predictions!**

- Given that the $A()$ operator should only be able to anchor to one author, this correctly predicts that Source DPs should be in complementary distribution with complex speaker assertions.[6]

(23)    a.    I believe that Anna won. / No, she didn't!                    CP-complement only
        b.    I believe you that Anna won. / #No, she didn't!              Source DP + CP

- As shown in (22), the Source DP effectively blocks the $A()$ operator from anchoring to the speaker.

## 4  *know*: polysemy?

At the core of the observations in Sections 2.1–2.2 is that DP-complements of *know*-verbs trigger an acquaintance reading of the verb, s.t. the DPs is interpreted as an OBJECT OF ACQUAINTANCE:

(24)    a.    Sue {knows, discovered} [$_{DP}$ Anna].
        b.    Sue {knows, discovered} [$_{DP}$ the rumor that Anna is to blame].

A natural way to capture this is to say that *know*-verbs are ambiguous between a propositional verb and an acquaintance verb (e.g. King 2002, Moltmann 2013, Uegaki 2016, for the entailment contrast):[7]

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[6]The argument that complex speaker assertions involve the $A()$-operator comes from Djärv (2020) and Woods (2016). As Djärv (2020) points out, the assumption that the $A()$ operator operator operates only at the not *at-issue* level is a necessary assumption for applying the table model to complex *speaker*-assertions like (23-a) to begin with, given that these are not interpreted semantically as "I believe that I assert p". Thanks to Maribel Romero, p.c. for raising this point.

[7]As Uegaki (2016) correctly points out, this is not enough: if we assumed (i) that $know_{EPIST}$ and *believe* both select for propositional arguments (as in (1)–(2)), and (ii) that there exists a mechanism for extracting propositions from the content

(25)    Polysemy of *know* (to be rejected):
   a.   $[[\text{know}_{EPIST}]]^w = [\lambda p_{<st>}.[\lambda x_e: \underline{p(w)=1}.\text{EPIST}_x^w \subseteq p]]$
   b.   $[[\text{know}_{AQ}]]^w = [\lambda y_e.[\lambda x_e.\overline{\text{acquainted}_w(x)}(y)]]$

Intuitive support for this idea comes from the fact that languages like German, French, and Swedish use different forms for these two meanings:

(26)   a.   Sara vet     att   Lisa vann.
             Sara knows that Lisa won

             *Sara knows that Lisa won.*                    Propositional *know* (Ger. *wissen*, Fr. *savoir*)
       b.   Sara känner Lisa.
             Sara knows  Lisa

             *Sarah knows Lisa.*                            Aquaintance-*know* (Ger. *kennen*, Fr. *connaitre*)

# 5    Problems with polysemy

1. A polysemy-based approach does not capture the strong intuition that the CP-taking and DP-taking versions of *discover, resent, like, fear, imagine, notice*, etc. share a semantic core. If they were truly differnt lexical items, there would be nothing to guarantee this. On the approach offered here (§6), the two cases involve the same lexical root; thus automatically capturing this shared semantic core.

2. While (26) seems to support the claim that the English verb *know* is polysemous between $know_{AQ}$ and $know_{EPIST}$ as in (25), the acquaintance-reading of DPs doesn't just arise with *know*, but with essentially all factives and responsives (e.g. *notice, discover, see, hear, like, resent, appreciate, mention, predict, report, fear, explain*, etc.).

(27)   a.   Sara {upptäckte, märkte, hörde, nämnde}     att   Lisa vann.
             Sara {discovered, noticed, heared, mentioned} that Lisa won

             *Sara {discovered, noticed, heared, mentioned} that Lisa won.*          Propositional V
       b.   Sara {upptäckte, märkte, hörde, nämnde}     Lisa.
             Sara {discovered, noticed, heared, mentioned} Lisa

             *Sarah {discovered, noticed, heared, mentioned} Lisa.*                   Aquaintance V

   - An polysemy-based account would therefore have to posit lexical ambiguity for *all* of these verbs.
   - Besides *know*, I am not aware of any language that systematically distinguishes between CP-selecting forms and DP-selecting forms of these attitude verbs.

3. At closer inspection, the Swedish *know*-data actually seems to speak against polysemy:

   - In more complex predicates, *känna* (by hypothesis $know_{AQ}$; (25-b), <e,et>) can combine with both individuals (e) and questions (<st,t>).

(28)   a.   Jag **känner** till $[_{DP}$ Anna]$/[_Q$ vem som gjorde vad].
             I     know     to      Anna/    who that did      what

             *I'm aware of Anna/who did what. (Implies acquaintance with Anna.)*

> I reject the polysemy analysis and propose instead a decompositional analysis of *know*-verbs, whereby the DP and CP-selecting forms of these verbs are derivationally related.

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DPs they are embedded in, then we would predict, wrongly, that both *know* and *believe* should license the entailment. The same reasoning applies to the licensing of the Source DPs. Hence, Uegaki (2016) proposes that while *believe* selects for propositions (<st>), *know* is polysemous between $know_{AQ}$ (25-b), which selects for individuals, and $know_{EPIST}$, which selects for questions (<st,t>). This account is thus able to capture both the entailment contrast, as well the fact that *believe* and *know* differ wrt. to their ability to combine with interrogatives and declaratives. Here, however, for reasons given in Section 5, I reject polysemy and propose instead that $know_{EPIST}$ and $know_{AQ}$ are derivationally related.

## 6  Analysis: *know*-verbs

I propose that *know CP* ($know_{EPIST}$) and *know DP* ($know_{AQ}$) both involve the root $\sqrt{AQ}$ (<e,<et>>):[8]

(29)    $[[\sqrt{AQ}]]^w = [\lambda y_e.[\lambda x_e.AQ_w(x)(y)]]]$

The acquaintance reading of *know* arises if an individual saturates the internal argument slot of $\sqrt{AQ}$:

(30)    $[[know_{AQ}]]^w = [[\sqrt{AQ}]]^w$

(31)    a.  $[[\text{Sue knows Anna}]]^w = [[\sqrt{AQ}]]^w(\text{Anna})(\text{Sue}) = 1$ iff $AQ_w(sue)(anna)$
        b.  $[[\text{Sue knows the claim that Anna won}]]^w = [[\sqrt{AQ}]]^w([[[18\text{-b}]]])(\text{Sue}) = 1$ iff
            $AQ_w(sue)(\iota x[\text{claim}_w(x)\ \&\ \text{CONT}_w(x) = \{w': \text{Anna won in } w'\}])$

(Like polysemy) this correctly predicts:

- ✓ No Source-of-p reading in (31-a).
- ✓ No DP-to-CP entailment in (31-b).

Epistemic, CP-selecting, *know*, I propose, involves an additional head, EPIST (<<e,<et>>,<<st,t>,<et>>>):

(32)    *Minimal denotation/template for epistemic relations:*[9]
        $[[\text{EPIST}]]^w = [\lambda R_{<e,<et>>}.[\lambda P_{<st,t>}.[\lambda x_e.\exists s\exists p \in P[[s \text{ is a situation exemplifying } p \wedge R(s)(x)]]]]]$

$know_{EPIST}$ is derived by EPIST taking $\sqrt{AQ}$ as its first (R) argument, as shown in (33):[10]
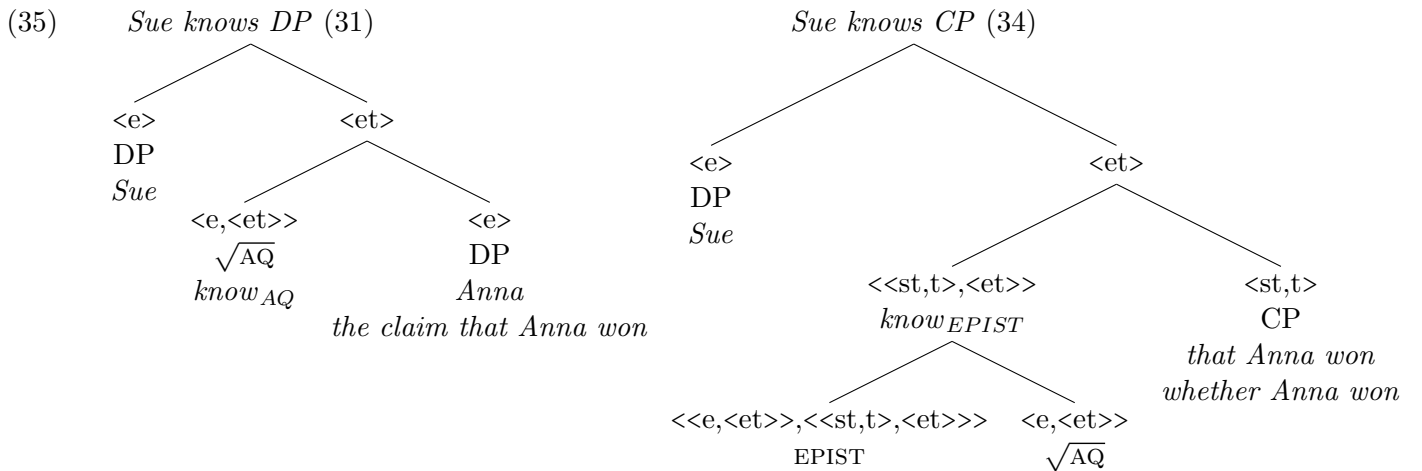- this causes the type e argument slots of $\sqrt{AQ}$ to be saturated with a situation pronoun s, the *res* (a particular of the more general type *e*), and an individual variable x.
- the resulting predicate $know_{EPIST}$ (<<st,t>,<et>>) (33) thus states that there exists a situation s and a proposition $p_{<st>}$ in $P_{<st,t>}$, such that s exemplifies p, and x is acquainted with s.

(33)    $[[know_{EPIST}]]^w = [[\text{EPIST}]]^w([[\sqrt{AQ}]]^w) =$
        $[\lambda P_{<st,t>}.[\lambda x_e.\exists s\exists p \in P[[s \text{ is a situation exemplifying } p \wedge AQ(x)(s)]]]]$

The final meaning of *know CP* is given in (34), with declarative and interrogative complements:

(34)    a.  $[[\text{Sue knows that Anna won}]]^w = 1$ iff
            $\exists s\exists p \in \{\lambda w'.\text{won}(anna)(w')\}[[s \text{ is a situation exemplifying } p \wedge AQ_w(sue)(s)]]]$
        b.  $[[\text{Sue knows whether Anna won}]]^w = 1$ iff
            $\exists s\exists p \in \{\lambda w'.\text{won}(a)(w'),\lambda w'.\neg\text{won}(a)(w')\}[[s \text{ is a situation exemplifying } p \wedge AQ_w(sue)(s)]]]$

LFs to illustrate:

(35)    *Sue knows DP* (31)                                    *Sue knows CP* (34)



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[8]For other *know*-verbs like *discover*, I assume that there are different *flavours* of $\sqrt{AQ}$. The key aspect of the current proposal is that these verbs too are semantically complex in the same way as proposed here for *know*.

[9]Further conditions must be included to capture inferences about belief, exhaustivity, etc.

[10]In the case of $know_{AQ}$ vs. $know_{EPIST}$ in German and Swedish, etc., I assume contextually triggered allomorphy, such that *veta/vissen* is triggered in the context of the EPIST head, whereas *känna/kennen* is the default form of the verb.

Like polysemy-based accounts, this analysis captures the above observations about *know DP*:

- The obligatory acquaintance-reading: no entailment and no Source-of-p reading.

But we also avoid the challenges faced by polysemy accounts:

1. The fact that the DP and CP selecting forms of *know*-verbs share a semantic core. I propose that this shared core is *acquaintance*.
2. The fact that DP and CP selecting forms of *know*-verbs *in general* share the same form.
3. The fact that Sw. *känna* (by hypothesis, $know_{AQ}$) can occur with questions in more complex forms.

We are also able to account for a separate observation about *know* vs. *believe* (Djärv 2019: 246):

- On our analysis, every state of *knowing p* (unlike a state of *believing p*) is predicated on an event of being acquainted with a situation s which in turn justifies/motivates knowing p;
- in (36), *how* is modifying the acquaintance event in *know*; in *believe*, there is no such event.

(36)   a.   **How/#why** do you know that Anna won?   ≈ *in what manner did you come to know p?*
       b.   **Why/#how** do you believe that Anna won?   ≈ *what is the reason for believing p?*

**Finally, a note on related work on factivity...**

- The current approach shares with Bondarenko (2019) (on Barguzin Buryat) and Özyildiz (2017) (on Turkish) the idea from Kratzer (2002) that acquaintance with some situation, the *res*, plays a role in deriving factivity.[11]
- Note, however, that these authors deal with very different kind of data: alternations between factive nominalized clauses and non-factive CPs.
- The accounts are thus not straightforwardly comparable, given that what I propose here is a systematic derivational relationship between *know DP* and (factive) *know CP*, where both involve acquaintance – either with a regular individual (with DPs) or with a situation, the *res* (with CPs).
  - Note also that this account has potential to extend to non-factives like *fear*. If so, we are not *deriving* factivity *per se*, but rather capturing *part* of the core meaning of factive verbs.

# 7   Summary

I have (i) offered new observations about DP-complements of *know* vs. *believe*-verbs, (ii) related them to previous observations about content DPs, and (iii) argued against a polysemy-based approach to *know*.

I proposed instead that *know* and *believe* differ fundamentally at the level of argument-structure and internal composition, and thus combine with DPs via different routes:

- I proposed a derivational approach to *know*-verbs that avoids polysemy: *know*-verbs *always* combine with individuals as part of their argument structure (with both DP and CP complements);
- *believe*-verbs are fundamentally Hintikkan: they combine only with propositions. To combine with DPs, they thus require either type-shifting (for Content DPs), or an external licensing head (for Source DPs: the A() operator in English and $Appl^o$ in German).

While *believe*-verbs invariably describe relations to propositions, *know*-verbs describe complex relations, anchored in the attitude holder's acquaintance with abstract or concrete individuals in the world.

# 8   Acknowledgements

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[11]According to Kratzer (2002): "S knows p if and only if S believes p de re of some fact exemplifying p." (p. 657). The denotation assigned to $know_{EPIST}$ (33) captures part of that statement; see footnote 9.

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