

Source and Content DPs: Belief-Verbs as Optionally Ditransitive Hintikkan Attitudes

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1. Introduction

In the Hintikkan tradition, attitude verbs are standardly analysed as relations between individuals and propositions. That is, they quantify over worlds: if Mary believes that Lisa won, then all of Mary's belief-worlds ($\text{DOX}_{\text{mary}}^w$) are worlds in which Lisa won, as shown in (1).

- (1) a. $\llbracket \text{believe} \rrbracket^w = [\lambda p_{\langle st \rangle} . [\lambda x_e . \text{DOX}_x^w \subseteq p]]$ $\langle \langle st \rangle, \langle et \rangle \rangle$
b. $\llbracket (\text{that}) \text{Lisa won} \rrbracket^w = \{w' : \text{Lisa won in } w'\}$ $\langle st \rangle$
c. $\llbracket \text{Mary believes that Lisa won} \rrbracket^w = 1$ in w iff $\text{DOX}_{\text{mary}}^w \subseteq \{w' : \text{Lisa won in } w'\}$

A question for the Hintikkan approach concerns how verbs like *believe* combine with DPs, of type $\langle e \rangle$. To date, there has been a lot of research into the behaviour of attitude verbs when they combine with CONTENT DPs, like *the claim* or *the rumour*, as shown in (2) (e.g. Vendler 1972, Pietroski 2000, Ginzburg 1995, King 2002, Moltmann 2013, Uegaki 2016, Elliott 2016, Djärv 2019, 2021, Bondarenko 2020).

- (2) Mary believes $[\langle e \rangle$ the {rumour/claim/idea} that $[_P$ Lisa won]]

Guiding a lot of this work is the observation that attitude verbs differ in terms of their entailments, when they combine with Content DPs, as shown in (3).

- (3) Content DPs
a. Mary believes $[_{DP}$ the rumour that $[_P$ Lisa won]]. \models Mary believes that p
b. Mary knows $[_{DP}$ the rumour that $[_P$ Lisa won]]. $\not\models$ Mary knows that p

However, as noted by Djärv (2019), this contrast also tracks a separate contrast with respect to DPs. *Believe*, unlike *know*, allows for what Djärv refers to as a SOURCE DP. Unlike Content DPs, these DPs are interpreted as the source of the propositional information provided the embedded clause — which, as shown in (4b) may be either explicitly or contextually given. This contrast is illustrated in (4).¹

- (4) Source DPs (Djärv 2019: 209–210)
a. I believe the referee (that Lisa won).
b. I know the referee (*that Lisa won).

These contrast raises a number of analytical puzzles regarding the composition of the verb and the DP, as well as about the semantics of verbs like *know* and *believe*. On the Hintikkan perspective, these verbs

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¹ Some speakers report finding heavier NPs clunky in Source-positions. However, most speakers I've consulted allow a range of DPs, given appropriate context. The following example is from COCA (Davies 2008-), and seems fully natural to all speakers I've consulted: *Sometimes the patient doesn't believe the doctor that he's sick, until. . .*

do not differ in terms of their argument-structure; rather, they differ in terms of the type of accessibility relation (DOX/EPIST), as well as in terms of factivity.

In this paper, which is part of a larger project on the semantic and argument-structural differences between *know* and *believe* verbs, I defend the Hintikka analysis of *believe*, in (1) (for a comprehensive discussion and analysis of *know* vs. *believe*-verbs, see Djärv 2021). From examining the morpho-syntax of *believe DP* sentences in English and German (in §2.1), I show that in terms of their argument structure, *believe* combines with clauses and Content DPs as direct objects of the verb, whereas Source DPs behave like (optional) indirect objects, similarly to the indirect object in sentences like *Lisa baked Mary a cake*. This is consistent with the semantic analysis of Content DPs from Uegaki (2016), whereby *believe* selects for propositions and combine with Content DPs via a content-retrieval type-shifter, which extracts the propositional content, of type $\langle st \rangle$, from Content DPs, thereby saturating their p-argument slot. In §2.2–2.3, I further examine the nature of the source-inference in (4a), showing that Source DPs share key aspects of their meaning with assertion reports (cf. Anand & Hacquard 2009). However, rather than being part of the truth-conditional meaning of the sentence, Source DPs are interpreted as part of the sentence's not-*at issue* content. In §3, I present my proposal for the semantic composition of *believe DP* sentences.

2. New data: Source vs. Content DPs

2.1. Source vs. Content DPs: argument structural differences

As observed by Djärv (2019), in English, Source and Content DPs cannot co-occur:

- (5) Djärv (2019: 235)
*I believe you the claim that Mary is a genius.

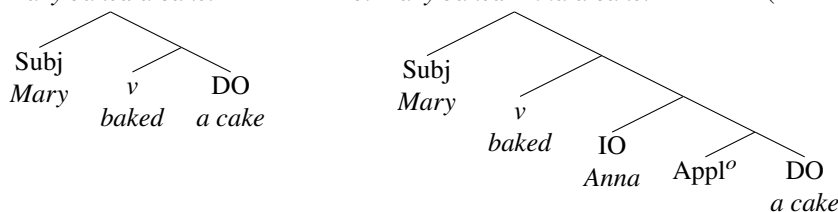
This might lead us to think that the two DPs saturate, and therefore compete for the same argument slot of *believe* (as proposed by Roberts 2020), and that their interpretation depends on other factors. However, Djärv (2019) shows based on German data that this cannot be correct, at least as a general analysis: in German, the two types of DPs *can* co-occur:

- (6) German (Djärv 2019: 235)
Ich glaube ihr die Behauptung, dass Maria ein Genie war.
I believe her.DAT the.ACC claim that Maria a genius was

I believe the claim, that she told me, that Maria was a genius.

One possibility, in view of this contrast, is to suggest that Source DP sentences in German and English are derived in different ways (as suggested by Djärv 2019). However, as we shall see below, there is good evidence in favour of a uniform approach to Source and Content DPs in German and English, both in terms of their interpretation and argument structure. Moreover, Source DPs and Content DPs in both languages behave differently from one another in terms of their morpho-syntactic properties. This shows us that the two DPs do not occupy the same argument slot. Here, I will show that the argument structure of *believe*, in both languages, is parallel to that of optionally ditransitive verbs like *bake*, as shown in (7).

- (7) a. *Mary baked a cake.* b. *Mary baked Anna a cake.* (after Pylkkänen 2008)



Specifically, I will show that in both languages, Source DPs pattern like *indirect objects* of *believe*, whereas Content DPs and CPs both pattern like *direct objects*. Thus, the data speaks strongly *against* a uniform

analysis of Source DPs and Content DPs, and also strongly *in favour* of a uniform treatment of English and German *believe CP/DP* sentences (up to a degree; which I argue is case-licensing; see discussion in §2.4). The proposed LFs for *believe CP/DP* sentences is given in (8). (§3 spells out a semantics for *Asst^o*.)

- (8) a. Content DPs & clauses
-
- b. Source DPs
-

Here, I discuss two types of evidence for this proposal: case and extraction possibilities (for data showing that German behaves like English with respect to the generalizations in (3)–(4), see Djärv 2021).

Case. As we saw in (6), German Source DPs are Dative, and Content DPs Accusative. This is true also in cases where they do not co-occur (9a,b) and when the proposition is contextually provided (9c):

- (9) Djärv (2019: 235)
- Ich glaube ihr/*sie, dass Maria ein Genie war.
I believe her.DAT/ACC that Maria a genius was
I believe her that Maria was a genius.
 - Ich glaube die/#der Behauptung, dass Maria ein Genie war.
I believe the.ACC/DAT claim that Maria a genius was
*I believe the claim that Maria was a genius.*²
 - Ich glaube ihr/*sie.
I believe her.DAT/ACC
I believe her.

Importantly, this is unlike DP-complements of other types of attitude verbs, like *discover*, *notice*, etc., which are Accusative (see Djärv 2021 for discussion and analysis).

- (10) Ich habe sie/*ihr bemerkt/entdeckt.
I have her.ACC/DAT noticed/discovered.
I noticed/discovered her.

The pattern we observe with *believe DP* sentences is the same as what we find with optionally ditransitive verbs like *bake* and *steal*. Here, indirect objects, like Source DPs, are Dative, and direct objects, like Content DPs, are Accusative. (German, unlike English, has Source Applicatives; see §2.4.)

- (11) a. Ich habe ihr einen Kuchen gebacken.
I.NOM have her.DAT a.ACC cake baked
I baked her a cake./I baked a cake for her. ✓Goal Applicative
- b. Ich stahl ihr den Schlüssel.
I.NOM stole her.DAT the.ACC key
I stole the key from her. ✓Source Applicative

² Note that in (9a), the Accusative form is marked *, whereas in (9b), the Dative form is marked #. This represents the fact that certain kinds of inanimate DPs may also function as Source argument, namely so-called Repository-of-Information nominals like *report* (see Anand & Hacquard 2009). I return to this point in §2.2.

Thus, with respect to case, Source DPs pattern like indirect objects and Content DPs like direct objects. As English doesn't mark Dative vs. Accusative, we can't use this test in English. However, looking at extraction possibilities in passives, we find that Source DPs in *both* German and English behave like indirect objects, whereas Content DPs and clauses behave like direct objects.

Extraction possibilities. In German, it is possible to promote direct objects, but not indirect objects:

- (12) a. Sie stahl ihm den Schlüssel.
she.NOM stole him.DAT the.ACC key
She stole the key from him.
- b. Der Schlüssel wurde ihm gestohlen.
the.NOM key was him.DAT stolen
The key was stolen from him. ✓Promote direct object
- c. *Er wurde den Schlüssel gestohlen.
he.NOM was the.ACC key stolen
He had the key stolen from him. ✗Promote indirect object

In *believe DP* sentences, Content DP and clauses (13a) pattern with direct objects (12b) in terms of extraction, whereas Source DPs (13b) pattern with indirect objects (12c).

- (13) a. (Die Behauptung,) dass Maria ein Genie war, wurde ihm geglaubt.
(The.NOM claim,) that Maria a genius was, was him.DAT believed
(The claim that he made,) that Maria was a genius, was believed. ✓Promote Content DP
- b. *Er wurde geglaubt (die Behauptung), dass Maria ein Genie war.
he.NOM was believed (the.ACC claim), that Maria a genius was
He was believed when he claimed that Maria was a genius. ✗Promote Source DP

As shown in (14), many varieties of English show the opposite pattern for double object constructions. Here, the *indirect*, but not the *direct* object can be promoted.

- (14) a. I baked him a cake.
b. *A cake was baked him. ✗Promote direct object
c. He was baked a cake. ✓Promote indirect object

As we have seen, English does not allow Source DPs and Content DPs to co-occur. However, in a sentence with a Source DP and a clause, the clause cannot be promoted (15a), like direct objects (14b). The Source DP, however, *can* be promoted, as shown in (15b), like indirect objects (14c).

- (15) a. *That Maria is a genius was (generally/widely) believed him. ✗Promote CP
b. He was generally believed that Maria was a genius. ✓Promote Source DP

Crucially, without a Source DP, both clauses and Content DPs can be promoted in passives, showing us that the restriction in (15a) is not due to a general restriction on moving clauses or objects of *believe*.

- (16) a. That Maria is a genius was (generally/widely) believed. ✓Promote CP
b. The claim that Maria is a genius was (generally/widely) believed. ✓Promote Content DP

The same holds for direct objects of verbs like *bake*, in their transitive uses (17), cf. (14b).

- (17) A cake was baked. ✓Promote direct object (transitive use)

Thus, we find that *believe* behaves like an optionally ditransitive verb, in both German and English: Source DPs pattern like indirect objects, and clauses and Content DPs like direct objects.

Taken together, these observations would be difficult to account for on an account whereby Source and Content DPs in English saturate the same type *e* argument slot of *believe*. Rather, both the German

and English data discussed here follow immediately if we assume that clauses and Content DPs are direct objects of *believe*, whereas Source DPs are indirect objects. On the current view (e.g. Pyllkkänen 2008, a.o), this implies that they are introduced by an external head, rather than a core argument of the verb, as shown in (7). In §2.4, I return to the co-occurrence contrast between English (5) and German (6). In the following two sub-sections, I examine the interpretation of Source DP sentences. §2.2 looks at the semantics and §2.3 at the discourse status of these sentences.

2.2. Semantics: Source DP sentences refer to an assertion event

Here, I examine in more detail the meaning of Source DPs, asking what it means to be a ‘source of information’ in the context of these sentences. To this end, I consider two *prima facie* plausible alternatives:

- (18) a. **Hypothesis 1:** y caused x to believe p. **(to be rejected)**
 b. **Hypothesis 2:** there was an assertion event s.t. x proposed to make p common ground.

To tease apart these two hypotheses, I rely on two diagnostics from Anand & Hacquard (2009) [A&H]: the interpretation of epistemic modals and restrictions on inanimate DPs.

Interpretation of epistemic modals. The first diagnostic relies on Tancredi’s (2007) modified version of von Stechow & Iatridou’s (2003) Epistemic Containment Principle [ECP]. In its original form, the principle states that quantifiers cannot bind their traces across an epistemic modal. In the modified version, the generalization is that quantifiers cannot bind their traces across a *subjectively interpreted* epistemic modal. Objectively interpreted epistemic modals obviate the ECP. This is illustrated in (19).

- (19) Runner & Moulton (2017: 15); based on Anand & Hacquard (2009: ex. (15)–(16))
- a. #(Subjectively speaking), every guest might be the murderer. *might > every*
 #It is possible that all guests are the murderer. **every > might*
 *For each guest x, it is possible that x is the murderer.
- b. Objectively speaking, every guest might be the murderer. *might > every*
 # It is possible that all guests are the murderer. *every > might*
 For each guest x, it is possible that x is the murderer.

The idea is that the sentence with the subjectively interpreted modal (19a) is degraded, because the only interpretation available is the not very plausible one that ‘it is possible that all guests are the murderer’ (*might > every*). The sentence with the objectively interpreted modal (19b), meanwhile, is fine, because the more plausible interpretation that ‘for each guest x, it is possible that x is the murderer’ (*every > might*) is available. Importantly for our purposes, A&H observe that there is a contrast between doxastic attitudes and assertion-reports with respect to the ECP, as shown in (20).

- (20) Runner & Moulton (2017: 15); based on Anand & Hacquard (2009: ex. (17))
- a. #Holmes believed that every guest might be the murderer. *might > every / *every > might*
 b. Holmes claimed that every guest might be the murderer. *might > every / every > might*

A&H account for this by proposing that for doxastic attitudes, p (and thus the modal) is evaluated with respect to the attitude holder’s subjective belief state. For assertion reports, on the other hand, p is evaluated with respect to a projected common ground, where p is part of the general consensus, thus yielding an objective stance. An informal version of their proposal for belief vs. assertion reports is given in (21).

- (21) Anand & Hacquard (2009: ex. (28), (30))
- a. John believes that it might be raining.
There is a belief state of John s.t. [it is raining] is compatible with his doxastic alternatives.
- b. John claimed that the Earth is flat.
There was a claiming event e by John proposing to make [the Earth is flat] common ground.

Crucially, for current purposes, Runner & Moulton (2017: 15) observe that sentences with Source DPs, like assertion reports, obviate the ECP.

- (22) They believed Holmes that every guest might be the murderer. (Runner & Moulton 2017: 15)
- a. #believed H's' claim that it is possible that all guests are the murderer. *might > every*
 - b. believed H's claim that for each guest x, it is possible that x is the murderer. *every > might*

Runner & Moulton (2017) (who are primarily concerned with *believe* in the context of non-finite complements) suggest that in these sentences, *believe* is interpreted assertively. I would like to suggest, however, that the obviation effect observed in (22) is not due to *believe* itself being interpreted assertively, but rather follows from the fact that Source DP sentences, besides making a statement about the attitude holder's private subjective beliefs, additionally state that there was an assertion event such that x proposed to make p common ground, as on Hypothesis 2 (18b). The objective stance arises from this additional dimension of meaning, whereby p is evaluated with respect to a projected common ground; the conversational goal of the assertion-event introduced by the Source DP. Some support for this comes from the fact that my consultants find the judgement in (22) to be less sharp than those in (19) and (20). On the hypothesis entertained here, this is not surprising, given that this sentence simultaneously describes a private doxastic state (*they believed p*) and an assertion event (*Holmes has asserted p*).³

In sum, the observation in (22) from Runner & Moulton (2017) shows us that Source DP sentences behave in a way that is characteristic of reported assertions; in line with Hypothesis 2. To further tease apart Hypothesis 1 and Hypothesis 2 in (18), I will use a second diagnostic from A&H, concerning restrictions on the type of inanimate DPs that are available as Source DPs.

Restrictions on inanimate DPs. As I mentioned in fn. 2, certain types of inanimate DPs, like *the report*, may sometimes function as Source DPs. A&H refers to such inanimate subjects as Repository-of-Information (RoI) subjects. They observe that RoI subjects are only available with certain kinds of clause-embedding predicates. Specifically, RoI subjects are available with predicates that describe an assertion event (e.g. *argue*, *claim*, *imply*, and *suggest*), but not with verbs that describe a private belief state (e.g. *believe*, *think*, or *know*). This contrast is illustrated in (23).

- (23) Anand & Hacquard (2009: ex. (21))
- a. #The book {believes, thinks} that the Earth might be flat.
 - b. The book {argues, implies} that the Earth might be flat.

According to A&H, this follows from the same semantic contrast between *claim* and *believe*-verbs that is responsible for the contrast with epistemic modals. Whereas a book or a report can be understood as the agent of an assertion event, doxastic attitudes require a sentient subject, capable of subjective beliefs.

Crucially for us, A&H further note that so-called non-discourse participants like *the timing* are possible only with a subset of verbs that describe an assertion event: while they are generally available with verbs like *imply*, they are not possible with verbs like *argue*.

- (24) Anand & Hacquard (2009: ex. (24))
- a. #The time of death argues that the butler is the murderer.
 - b. The time of death implies that the butler is the murderer.

A&H suggest that sentences like (24b) are not in fact interpreted assertively, but rather as involving a causative doxastic meaning with an implicit generically quantified over experiencer:

³ Among the five German (linguist and non-linguist) native speakers I consulted, only one of them agreed with the judgements in the 'basic' cases (19) and (20), and additionally preferred the *might > every* reading in (22). Given that the judgement for (22) is already subtle in English, together with the fact that the *basic* scope-judgements appear to not be clear in German, I'll leave it for future research to further investigate the nature of the German ECP-facts.

- (25) Based on Anand & Hacquard (2009: ex. (26))
 The time of death implies that the butler is the murderer.
 $\approx \text{GEN}_x$ time of death causes x to believe that the butler is the murderer ($\approx \text{H2 (18a)}$)

A&H propose that predicates like *imply* are ambiguous between a doxastic predicate with an implicit attitude holder and an assertive predicate, and that non discourse participant subjects like *the timing* bring out or activate the doxastic meaning.

This observation allows us to tease apart Hypotheses 1 and 2 in (18). If Source DP sentences are interpreted as causative doxastics (as on Hypothesis 1; ‘y caused x to believe p’), then we’d expect that inanimate DPs like *the timing/the time of death* should be available as Source DPs. If, on the other hand, Source DP sentences are interpreted on par with reported assertions (as on Hypothesis 2; ‘there was an assertion event s.t. x proposed to make p common ground’), then we’d expect that inanimate DPs like *the timing* should *not* be available as Source DPs.

As shown in (26)–(27), Source DPs are subject to the same restrictions on inanimate DPs as subjects of assertion predicates like *argue*. Whereas DPs like *the report* or *the article* can (at least with sufficient context) function as a sources of information, DPs like *the timing* are completely unavailable.

- (26) a. I (definitely) believe this article (that Voice and *v* are different heads).
 b. #I (definitely) believe the time of the death (that the butler did it). English
- (27) a. Ich glaube dem Bericht (schon), dass der Butler der Mörder ist.
 I believe the.DAT report PART, that the butler the killer is
I believe the report that the butler is the killer.
 b. #Ich glaube dem Timing/Zeitpunkt (schon), dass der Butler der Mörder ist.
 I believe the.DAT timing/point-in-time PART, that the butler the killer is
I believe the timing that the butler is the killer. German

In this section, I have shown that Source DPs behave similarly to subjects of verbs like *argue* and *claim*, i.e. verbs which describe assertion reports, as expected on Hypothesis 2 in (18), but not on Hypothesis 1. That is, Source DPs describe an assertion event, and not a ‘cause to believe’ event. Additionally, as we have seen, Source DP sentences also give rise to the inference that the attitude holder believes p. In the following section, I look at the status of these two dimensions of meaning.

2.3. Discourse Status: Source DPs are not at-issue

In this section, I show briefly that the two components of meaning associated with Source DP sentences differ at the level of discourse status. As shown in (28), whereas the inference that the attitude holder believes p gets cancelled under negation, these sentences still take it for granted that ‘you’ (the Source DP) are the source of the p-inference. That is, the source-inference *projects*, a behaviour typical of presuppositions (for data on projection in other embedded environments, see Djärv 2021).

- (28) a. I don’t believe you that Mary is a genius.
 b. Ich glaube dir nicht, dass Maria ein Genie ist.
 I.NOM believe you.DAT not, that Maria a genius is
I don’t believe you that Maria is a genius. \rightsquigarrow I believe that Maria is a genius.
 \rightsquigarrow you have asserted that Maria is a genius

As shown in (29), projection of the indirect object relation is not a general property of double object constructions, including German Source Applicatives; thus casting doubt on the idea, proposed in Djärv (2019), that Source DPs in German are introduced by a generic Source Applicative:

source-arguments in the language, will be Dative. In languages like English, on the other hand, there is no evidence in the child’s input that would lead the child to infer that source-arguments should be Dative.

Hence, in German, the two DPs may co-occur, as there are two case-licensing heads present in the syntax. In English, on the other hand, Source and Content DPs compete for Accusative case-licensing from the head associated with *believe*. On this view, Source DPs are linked to the presence of Source Applicatives, even though the head introducing the Source DP is not in fact itself a Source Applicative head. Crucially, on this view, the co-occurrence contrast follows from syntactic, rather than semantic facts.

3. Proposal

Above I have examined the argument-structure and interpretation of DP-arguments of *believe* in English and German. I have shown that in terms of their argument structure, Source DPs are (optional) indirect objects, licensed by a type of attitudinal applicative. This is unlike Content DPs, which, like clauses, combine with *believe* as direct objects. In terms of their interpretation, we saw in §1 (following previous work) that *believe* + *Content DP* sentences entail the corresponding *believe CP* sentence, and that DPs like *Anna* are interpreted as sources of information. Here, I have examined the interpretation of Source DP sentences in more detail, showing that they share key aspects of their meaning with assertion reports (cf. Anand & Hacquard 2009). However, rather than being part of the truth-conditional meaning of the sentence, Source DPs are interpreted as part of the sentence’s not-*at issue* content, as shown in (33).

- (33) Core components of meaning of Source DP sentences:
- a. Truth-condition: The attitude holder believes *p*
 - b. Presupposes: There was an assertion event s.t. x_{source} proposed to make *p* common ground.

To account for the argument-structure and interpretation of Source DPs given here, I propose that Source DPs are licensed by a head $Asst^o$, given in (34).

$$(34) \quad \left[\left[Asst^o \right]^w = [\lambda p_{\langle st \rangle} . [\lambda x_e . [\lambda f_{\langle st, et \rangle} . f(p)]]] \right. \\ \left. \left\{ \begin{array}{l} \text{defined if } \exists e[\text{assert}(e) \ \& \ \text{agent}(e)(x) \ \& \ \text{goal}(e) = p \cap c] \\ \# \text{ otherwise} \end{array} \right\} \right.$$

In terms of its argument structure, $Asst^o$ is similar to other applicative heads, as we saw in (7). Crucially, it preserves the semantic relation between the verb (*believe*) and the direct object or internal argument of the verb: the proposition introduced by the clause, or (as is possible in German and Spanish) a Content DP (see (38)). Thus, *I believe Anna that Lisa won* will entail that I believe that Lisa won, just like *I baked Anna a cake* will entail that I baked a cake. Additionally, it increases the n-arity of the predicate by introducing the indirect object, the Source DP. Unlike regular applicatives, however, which describe relations between individuals, and are defined for transitive verbs like *bake* and *steal*, $Asst^o$ describes a relation between individuals and propositions, and is defined for proposition-selecting verbs like *believe* (1). This, as argued in detail in Djärv (2021) (building on Uegaki’s 2016 analysis of *know* vs. *believe* with Content DPs (3)), captures the fact that verbs like *know* are incompatible with Source DPs (4).⁵

As shown in (35), a Source DP sentence will be true iff the attitude holder believes *p*, and takes for granted that there exists in the conversational common ground an assertion event *e*, the agent of which is the Source DP, and the goal of which is to make *p* common ground; i.e. that the Source DP has asserted *p*.

$$(35) \quad \left[\left[\text{Mary believes Anna that Lisa won} \right]^w = 1 \text{ in } w \text{ iff } DOX_{mary}^w \subseteq \{w' : \text{Lisa won in } w'\} \right. \\ \left. \left\{ \begin{array}{l} \text{defined if } \exists e[\text{assert}(e) \ \& \ \text{agent}(e)(anna) \ \& \ \text{goal}(e) = \{w' : \text{Lisa won in } w'\} \cap c] \\ \# \text{ otherwise} \end{array} \right\} \right.$$

⁵ For Uegaki (2016) and Djärv (2021), the contrast between *know* and *believe* with respect to DPs (see (3)–(4)) is explained in terms of question-embedding. Djärv (2021) additionally links the contrast between the two types of verbs to factivity, arguing that *know*-verbs (unlike *believe*) combine with individuals at the level of argument structure.

As in Anand & Hacquard (2009) (and Farkas & Bruce 2010, a.o.), the goal of an assertion event is identified as a ‘projected common ground’, a future conversational state in which p is common ground. In (34), this is captured by the condition $[\text{goal}(e) = p \cap c]$, where c is the *context set*, the set of worlds which is the intersection of all of the propositions in the common ground. Unlike with predicates like *claim* and *assert*, this assertion-event is part of the presuppositional, and not the truth-conditional content. The derivation of the VP in (35) is given in (36). (For cases like *I believe Anna*, I assume the same derivation, but with the $\langle \text{st} \rangle$ argument provided by a contextually provided proposition p_C ; see Djärv 2021 for details.)

$$(36) \quad \begin{aligned} \llbracket \text{believe Anna that Lisa won} \rrbracket^w &= \llbracket \text{Asst}^o \rrbracket^w (\llbracket \text{that Lisa won} \rrbracket^w) (\llbracket \text{Anna} \rrbracket^w) (\llbracket \text{believe} \rrbracket^w) \\ &= [\lambda p_{\langle \text{st} \rangle} . \lambda x_e . [\lambda f_{\langle \text{st}, \text{et} \rangle} . f(p)]] (\{w' : \text{Lisa won in } w'\}) (\text{anna}) ([\lambda p_{\langle \text{st} \rangle} . \lambda x_e . \text{DOX}_x^w \subseteq p]) \\ &= [\lambda x_e . \text{DOX}_x^w \subseteq \{w' : \text{Lisa won in } w'\}] \\ &\quad \left\{ \begin{array}{l} \text{defined if } \exists e [\text{assert}(e) \ \& \ \text{agent}(e)(\text{anna}) \ \& \ \text{goal}(e) = \{w' : \text{Lisa won in } w'\} \cap c] \\ \# \text{ otherwise} \end{array} \right\} \end{aligned}$$

In terms of Content DPs, the results from §2.1 about the argument structure of *believe* are straightforwardly compatible with Uegaki’s (2016) proposal for how *believe* combines with clauses and Content DPs. According to Uegaki, *believe* selects for propositions, as on the Hintikkan approach in (1). On Uegaki’s analysis, Content DPs combine with *believe* in the same way as propositions; via the content-retrieval type-shifter in (37), which takes as its input a content DP like *the claim that p* and returns its propositional content p (see Moulton 2009 for discussion of the content function).

$$(37) \quad \text{Uegaki (2016: 634)} \quad \llbracket \text{CONT} \rrbracket^w (x) = \lambda w' . w' \in \text{CONT}_{w'}(x) \quad \left\{ \begin{array}{l} \text{defined if } \text{CONT}_w(x) = \text{CONT}_{w'}(x) \\ \# \text{ otherwise} \end{array} \right\}$$

This captures the entailment in (3) and also fits the results from §2.1. Combining the current proposal for Source DPs and Uegaki’s proposal for Content DPs, we also straightforwardly account for German sentences like (6), which are interpreted, truth-conditionally, like their English counterparts. The derivation of such sentences involves both *Asst*^o (34) and *CONT* (37), as shown in (38) (presuppositions omitted; see Djärv 2021 for a full derivation and Uegaki 2016: 635 for discussion of the presupposition of *CONT*):⁶

$$(38) \quad \begin{aligned} \llbracket \text{believe Anna the claim that Lisa won} \rrbracket^w & \\ &= \llbracket \text{Asst}^o \rrbracket^w (\llbracket \text{CONT} \rrbracket^w (\llbracket \text{the claim that Lisa won} \rrbracket^w)) (\llbracket \text{Anna} \rrbracket^w) (\llbracket \text{believe} \rrbracket^w) \\ &= [\lambda p_{\langle \text{st} \rangle} . \lambda x_e . [\lambda f_{\langle \text{st}, \text{et} \rangle} . f(p)]] (\{w' : \text{Lisa won in } w'\}) (\text{anna}) (\lambda p_{\langle \text{st} \rangle} . \lambda x_e . \text{DOX}_x^w \subseteq p) \\ &= [\lambda x_e . \text{DOX}_x^w \subseteq \{w' : \text{Lisa won in } w'\}] \end{aligned}$$

4. Summary

In this paper, I have argued for an analysis of *believe* as an optionally ditransitive Hintikkan attitude, with clauses and Content DPs combining as direct objects and Source DPs combining as indirect objects. I have shown that Source DPs presuppose an assertion event. Based on this data, I offered a novel analysis of Source DPs (from Djärv 2021), which, combined with Uegaki’s (2016) analysis of Content DPs neatly captures the semantics of *believe DP/CP* sentences in English and German.

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⁶ Using our (technically ungrammatical) running example from English for clarity of exposition.

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