1   The Puzzle

One category of attitude verbs are *factives* (Kiparsky and Kiparsky, 1968; Karttunen, 1977). A verb is factive if the truth of the complement not only is entailed but also projects out of entailment canceling operators—e.g. negation, possibility modal, interrogative (1). This can be contrasted with verbs which do not have this property— (2).

(1)   a.   Dinah *regrets/ knows* that it snowed.
           $\vDash$ It snowed.

(2)   a.   Dinah *believes/ hopes* that it snowed.
           $\nvDash$ It snowed.

(1)   b.   Dinah didn't regret that it snowed.
           Did Dinah regret that it snowed?
           $\vDash$ It snowed.

(2)   b.   Dinah didn't regret that it snowed.
           Did Dinah regret that it snowed?
           $\nvDash$ It snowed.

(3)   a. Vp is *factive*, iff, $Vp \vDash p$ and $O[Vp] \vDash p$

(3)   b. Vp is *non-factive*, iff, $Vp \nvDash p$ or $O[Vp] \nvDash p$

The Question: Are there verbs which presuppose or entail the negation of their complement?

(4) Vp is *anti-factive*, iff, $Vp \vDash \neg p$ and $O[Vp] \vDash \neg p$

The Extremely Puzzling Result: No.

- An English-language corpus search in the MegaAttitudes database came up empty (White and Rawlins, 2017).

- Speakers in Mandarin, Japanese, Lithuanian, German, Slovenian, Serbian, French, Albanian, Greek, and Uyghur do not attest there being any verbs like (4).

- *This is intriguing since there is no in principle reason why there couldn't be a verb with a denotation that looks like (5b)*

  (5)   a. $[[\text{know}]]^{w,g} = \lambda w_s. \lambda p_{\langle s,t \rangle}. \lambda x_e \lambda w : p$ is true in *w. x* believes *p* in *w*
        b. $[[\text{false-B}]]^{w,g} = \lambda w_s. \lambda p_{\langle s,t \rangle}. \lambda x_e \lambda w : \neg p$ is true in *w. x* believes *p* in *w*

- **The Plan:**

  i   Look at one explanation for why there are no anti-factive (Holton, 2017). It isn't a good one (at least I don't think).

  ii Look at a fairly popular account of factivity Simons et al. (2017).

  iii Give my own explanation. Basically, I am going to argue that, assuming factives and anti-factives would have a somewhat similar pragmatic profile, the use of anti-factives would require us to perform a contradictory discourse move. That's why they don't exist.

1.1   A Brief Word On Hallucinate That p

You might think that there is an anti-factive: *hallucinate*. Speakers often attest that *hallucinate that p* produces something like a presupposition that $\neg p$. But there are good reasons to think that it isn't an anti-factive.

- Reason 1: Doesn't project how we'd expect.

  (6) Sam hallucinated that it was snowing.
       $\vDash$ It wasn't snowing.

  (7) Did Sam hallucinate that it was snowing?
       $\vDash$ It wasn't snowing.

  (8) Sam didn't hallucinate that it was snowing.
       $\nvDash$ It wasn't snowing.

- Reason 2: Presupposition is cancelable.

  (9) Dinah hallucinated that it was snowing, and it was.

  (10) #Dinah knew that it was snowing and it wasn't.

- Reason 3: *Hallucinate* allows for *wh*-extraction and argument fronting. Factives don't allow either (Adams, 1985; Abrusán, 2011; Kastner, 2015).

  (11) a. Dinah hallucinated that Sam was dancing.
        b. Who did Dinah hallucinate that was dancing?
  (12) a. Dinah regrets that Sam was dancing.
        b. * Who did Dinah regret that was dancing?
  (13) a. Dinah hallucinated that Mary read this book.
        b. Dinah hallucinated that this book, Mary read.
  (14) a. Dinah regretted that Mary read this book.
        b. * Dinah regretted that this book, Mary read.

2   Holton's Explanation For Why There Are No Anti-Factives

Holton's argument builds on a pretty popular account of factivity. The basic idea is a factive verb like know, takes a fact and not a proposition as an argument (Kiparsky and Kiparsky, 1968; Kastner, 2015). Here's his argument (Holton, 2017):

> . . . if there were any contra-factive [anti-factives] the referent of their complement clauses would have to be of the same type as the referent of the complement clauses of factives. That means that they would have to be things like facts, only false. . . But so far as I know, no one has seriously suggested that there are such things. The whole point about facts is that they are asymmetric in this respect. . . So the reason that there aren't any contra-factives is that there aren't any contra-facts to be their referents. (pp. 5)

So, here's my reconstruction of the argument.

- We can observe that many instances of factives allow for the insertion of 'the fact that...' without change in meaning.

  (15) a. Sam discovered the fact that it was snowing.
        b. Jane regretted the fact that Mary left.
        c. Sam knows the fact that Ottawa is the capital of Canada.

- The data in (15) gives us independent reason to think that factives select for definite DPs in their complements, where *the fact that p* refers to a particular entity. Furthermore, let us posit that in instances of factives with out an overt definiteness operator *the fact that...* there is an unpronounced definiteness operator Δ (Kastner, 2015).

  (16) Dinah believed [$_{CP}$ that it was snowing.]
  (17) Dinah knew [$_{DP}$ Δ[$_{CP}$ that it was snowing.]]

- While non-factives select for a proposition (16), factives select for a DP (17). So, anti-factives, if they existed would presumably select for a DP too. But this means they would refer to a negative fact. Which, ontologically speaking, don't exist.

But this argument doesn't look so good when you start thinking about what Holton's account predicts.

- Problem: Cross-Sentential Anaphora

  (18) I always believed [that you were a good friend]^{i}, now I know it$_{i}$. (Williamson, 2000)

- In (21), Holton argues that *believes* actually selects for a fact instead of a proposition, and this gives us the right interpretation. So this seems a little *ad hoc*. But let's assume he's right. If he is, then we should see other instances of cross-sentential anaphora that are licensed by factives. For example, definite DPs (22). But as we can see this produces ungrammaticality (23).

  (19) Dinah knows the president^{i}. He$_{i}$ is crazy.
  (20) * Dinah believes the president^{i}. He$_{i}$ is crazy.

3   A Different Explanation: QUD

- There is a tradition originating with Stalnaker (1973) which understands presupposition as a broadly pragmatic phenomenon. In this tradition the fundamental concept is the *Question-Under-Discussion* or QUD. Where a proposition is relevant to the QUD or 'at-issue' if it partially answers it, and is backgrounded or 'not at-issue' otherwise (Simons et al., 2010; Beaver et al., 2017; Simons et al., 2017).

(21)   a.   What surprised you most about the first graders?
       They didn't know that you could eat raw vegetables. (Simons et al., 2010)

   b.   AI: *They didn't know that p*.
       NAI: *You can eat raw vegetables*.

       i.   No, they did.

       ii. # No, you can't.

(22)   a.   Where does the bus stop?
       Jane thinks that bus stops at Bloor and Keele.

   b.   AI: *The bus stops at B and K*.
       NAI: *Jane think that p*.

       i.   # No, she doesn't.

       ii. No, it doesn't.

- I realized this morning that (22) is a little-iff so to illustrate it better try it in an appositive relative clause:

   a.   The bus stops, Jane thinks, at Bloor and Keele.
       # No, she doesn't.
       No, it doesn't.

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(23)   a.   An assertion p is relevant to the QUD: $?q$, if and only if, p entails a complete or partial answer to $?q$.

   b. p entails a complete or partial answer to $?q$, if it makes at least one answer to $?q$ false.

   c.   **p is at-issue relative to the QUD, if and only if, $?p$ is relevant to the QUD.**

   d.   **p projects, if $?p$ is not at-issue.**

3.1   Explaining Factivity

- Factivity is explained in terms of being a special kind of projection. In the unmarked case, the entire complement clause under a factive projects—i.e. NAI:

(24)   Dinah didn't discover that it was snowing.
       AI: *Dinah didn't discover that p*
       NAI: *It was snowing*.

- Simons et al. (2017) posit, discourse participants select as the default QUD what would (24) most relevant answer.

(25)   ?[Dinah discovered it is snowing]= {*Dinah discovered that p, Dinah didn't discover p*}.

- But there is only one answer in (25) that requires the complement to be true. Dinah could fail to discover that p because $\neg p$. What explains why we exclude this kind of answer is that speakers interpret (24) as a discourse move that aims to answer (25) directly. As opposed to being a move that opens up a sub-question.

(26)   • ?[Dinah discovered that it is snowing]

   – ANS: Dinah didn't discover that it is snowing.

(27)   • ?[Dinah discovered that it is snowing]

   – ?[It is snowing].

   ∗ ANS: Dinah didn't discover that it is snowing.

- *Conjecture:* Factives always have NAI their complement, and AI the embedding verb.

3.2   Explaining Anti-Factivity

- So let's look at what an anti-factive should be on this picture.

   (28)   a. Dinah *falsely-believes* that it is snowing.
        b. AI: Dinah falsely believe that p.
        c. NAI: $\neg$[it is snowing]

   (29)   QUD: *Whether Dinah falsely-believes that it is snowing?= {Dinah falsely-believes that it is snow, Dinah Does not falsely-believe that it is snowing.}*

- *Conjecture:* If there is a conflict between a discourse relevant subjects belief that p and the speaker's belief that p, then: *whether p?* becomes at-issue.

- If my conjecture is right, then we should not see anti-factives. We shouldn't because *whether Dinah falsely-believes that p?* is AI, only if $\neg p$ NAI. But if $\neg p$ is AI, then *Whether Dinah falsely-believes p* should be NAI.

- So, here's some data to back up my conjecture.

   (30)   Dinah believes that it is snowing but I don't think it is.

- What we see in (30) the most natural way to interpret it is as a move to partially resolve the question: *Is it snowing?*. Note this is the only question a continuation like this can resolve. You for example, can't dispute the mental state of Dinah (31):

   (31)   Does Dinah believe that it is snowing?
          ?? Dinah believes that it is snowing but I don't think she is.

- We see a similar effect with communication reports:

   (32)   What's the weather?
          Dinah said it was snowing but I don't think it is.

(33)   What did Dinah do?
         ?? Dinah said it was snowing but I don't think she did.

- But crucially, we do not see this effect with factives:

(34)   ?? Dinah found out it was snowing but I don't think it is.

- This is unsurprising since factives only can make the state itself AI. We might think that following my conjecture, the reason for this is that the speaker must believe the embedded clause as well.

- But now let's think about the anti-factive case. By uttering (28), the speaker is both committed to *Dinah falsely-believes that it is snowing* and *It is not snowing.* Additionally, assuming that anti-factives have the same discourse role as factives, then they can only be used to resolve the question: *Whether Dinah falsely-believes that it is snowing.* But if my conjecture is correcting, holding these two beliefs should trigger the question *Whether it is snowing?*. But if it is unresolved if it is snowing or not, then by hypothesis, there should be a presupposition failure for *Sam falsely-believes that it is snowing*.

- In short: we do not observe anti-factives because there is no situation where one could be used as a discourse move.

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