Cognitive vs. emotive factives: An experimental differentiation[1]

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Abstract. A central question in current presupposition theory is what (sub-)classes of triggers there are and how they differ from one another (Abusch 2002; Sudo 2012; Tonhauser et al. 2013; Romoli 2012; Abrusán 2016). Factives have traditionally been thought to presuppose the truth of their complements, but the potential need for further differentiation was present from the start, beginning with the distinction between semi-factives (e.g. *discover*) and 'full' factives (e.g. *regret*) by Karttunen (1971). However, the precise nature of the differences involved has remained elusive in theoretical terms, and key empirical properties have been difficult to pin down experimentally (e.g. Jayez et al. 2015). We present new experimental evidence confirming specific differences between emotive factives (*be happy*, *appreciate*) and cognitive factives (*be aware*, *realize*) using a yes/no-continuation acceptability rating task (Cummins et al., 2013). We spell out an analysis of the demonstrated contrast in terms of a distinction between triggers based on whether or not their presupposed content is encoded as part of the conventionally entailed content (Sudo, 2012; Klinedinst, 2010), and also discuss the broader theoretical implications of our experimental results.

Keywords: semantics, experimental pragmatics, presupposition, factivity, entailment.

1. Introduction

1.1. Theoretical background

A central question in current presupposition theory concerns whether and how expressions that trigger presuppositions can be classified in different categories according to their semantic and pragmatic properties (cf. Abusch 2002; Simons 2007; Simons et al. 2010; Sudo 2012; Tonhauser et al. 2013; Romoli 2012; Abrusán 2016). We investigate this question with regards to *factive* presupposition triggers, i.e. expressions that presuppose the the truth of their complement clause. (1)-(2) illustrate that the truth of the embedded clause – that the proposal offended them – remains part of what is conveyed even under negation.

(1)   a. I had discovered that the proposal offended them.
        b. I had not discovered that the proposal offended them.

(2)   a. I regretted that the proposal offended them.
        b. I did not regret that the proposal offended them.

We present new experimental data pertaining to the difference between two types of factives: cognitive factives like *discover* and *find out* on the one hand, which convey a relation between a

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proposition and states or events relating to the subject's doxastic state, and emotive factives like *regret* and *be happy* on the other hand, which communicate a relation between a proposition and the subject's emotive affect towards it.

1.1.1. Empirical contrasts between cognitive and emotive factives

It was already noted by Karttunen (1971) that what he called "semi-factives" (such as *discover* and *find out*) can easily lose their presuppositional status. For example, they do not necessarily project from the antecedents of conditionals, in contrast to other factives such as *regret*, as illustrated in (3).

(3)   a.   If I discover later that the proposal offended them, I will apologize.
           does NOT presuppose   the proposal offended them.
      b.   If I regret later that the proposal offended them, I will apologize.
           presupposes   the proposal offended them.

(3a) conveys no commitment on part of the speaker to the proposition 'the proposal offended them', despite the fact that *discover* typically conveys the truth of its complement at a global level. Furthermore, cognitive factives can be used 'parenthetically' (e.g. Hooper and Thompson 1973; Simons 2007) by having the embedded clause answer a question, as shown in (4) from Simons (2007: p. 1035), whereas emotive factives typically cannot be used this way (5).

(4)   A: Where was Harriet yesterday?
      B: Henry discovered that **she had a job interview at Princeton**.

(5)   A: Where was Harriet yesterday?
      B: ?? Henry is happy that **she had a job interview at Princeton**.

In (4), B introduces *she had a job interview at Princeton* as the embedded clause of the cognitive factive *discovered* and uses it to introduce new, non-presupposed information to answer the question, which can certainly not be taken for granted. By contrast, in (5) it is introduced as the embedded clause of the emotive factive *is happy*, and here it seems to retain its presuppositional status: B's response is intuitively inappropriate, presumably because information that has the status of a presupposition is not suitable for addressing A's inquiry for new information about Harriet.

1.1.2. Theoretical approaches to the contrast

While the contrasts illustrated above go back to the beginnings of the linguistic literature on presuppositions, extensive discussion of explicit theoretical proposals for differentiating types of triggers only began in the early 2000's. One prominent proposal by Dorit Abusch (2002; 2010) distinguishes between 'soft' and 'hard' triggers, and assigns cognitives to the former category and emotives like *regret* to the latter.[2] The contrast above can then be seen as an

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[2]Abusch never employs the terms *cognitive* and *emovitve*, but mentions Karttunen's discussion of *discover* as a case of soft trigger.

instance of a more general pattern, as the presuppositions of soft, but not hard triggers, are thought to be easily suspendable. For example, it is seen as parallel to the contrast between the soft trigger *win* and the hard trigger *too* illustrated in (6), from Jayez et al. (2015: p. 174; but note that these authors propose their own terminology and distinction in terms of 'strong' vs. 'weak' triggers).

(6)   a.   I don't know whether Paul participated in the race, but if he **won**, he must be very proud.
      b.   ?? I don't know whether Paul participated in the race, but if Mary participated **too**, they probably had a drink together just after.

The context in both cases establishes that the speaker is agnostic about Paul's participation in the race. In (6a), this does not seem to create a critical conflict with the notion of participation conveyed by *win*, which typically projects (from antecedents of conditionals and other standard projection environments) and is thus taken to be a presupposition. In contrast, in (6b), the agnostic preface seems to clash with the projecting presupposition that someone else (salient in the context, with Paul as the only feasible candidate) participated in the race.

Generally speaking, Abusch's analysis follows influential work by Stalnaker (1974) in assuming that (at least) certain presuppositions can be derived pragmatically, i.e., as a general conversational inference that is not conventionally encoded at the level of lexical meaning. In particular, Abusch puts forth an account based on lexical alternatives. Under this view, soft triggers are associated with a set of lexical alternatives (e.g. *win* is associated with the alternative *lose*). In addition, a context-sensitive pragmatic principle imposes that one member from the set of sentences where the alternatives are substituted in fact holds. In the case of soft triggers, the idea is that all the alternatives share an entailment (e.g., *win* and *lose* both entail participation), which results in the entailment being true regardless of which alternative turns out to be true. The suspendability of the presuppositions of soft triggers is then explained by the context-sensitivity of this pragmatic principle: given that the content that traditionally is seen as presupposed starts off as a simple conventional entailment of the trigger, the effect of the pragmatic principle can effectively lose its force, e.g., when this entailment is locally relevant. This is what happens in (6a) where Abusch's analysis represents the meaning of the conditional as *if Paul both participated and won*, and the effect of considering alternatives in the provided context does not give rise to a global notion that Paul participated.

In addition to Abusch, there are several other proposals taking a conversational approach to deriving presuppositions which differ in the details. For example, Romoli (2012) proposes an alternative-based pragmatic account of presuppositions, where soft presupposition triggers are assimilated to indirect scalar implicatures. A different type of pragmatic account has grown out of work by Mandy Simons and colleagues (Simons, 2007; Simons et al., 2010; Tonhauser et al., 2013). For these authors, the presuppositional status of a trigger depends crucially on the Question Under Discussion (QUD). I.e., whether or not part of the content introduced by an expression is treated as presupposed or backgrounded is determined relative to the conversational goals and issues at stake. Like Abusch and Romoli, they assume that factives entail the truth of their complement clause. For example, if the QUD is 'What happened?', then the content of

the matrix clause (*Henry discovered that p*) constitutes the 'at-issue' part of the utterance, and *Harriet had a job interview at Princeton* is backgrounded and treated as part of the common ground, i.e., presupposed. If the QUD is 'Where was Harriet yesterday?', as in (4) and (5), then the content of the embedded clause *Harriet had a job interview at Princeton* is treated as new, at-issue information, which updates the common ground, i.e., it is not presupposed. The contrast between the cognitive and the emotive factives with respect to their ability to suspend their presupposition on this account then, would presumably need to be linked to a difference in their abilities to function parenthetically (see (4) and (5)).[3]

Taking a more general perspective, what's crucial for current purposes is that all of these pragmatic approaches involve the assumption that presupposition triggers lexically entail the content that eventually gets projected as a presupposition (that the embedded clause is true), for both cognitive and emotive factives. In contrast, we argue that the experimental data presented below suggests that this only holds for cognitive factives, and that the presupposition of emotive factives is not part of what is conventionally entailed. Such a distinction between triggers has been advanced by previous authors for other triggers, in particular Sudo (2012); Dahlman (2016).

1.2. Experimental background

While experimental work on presuppositions has only recently become a research area with significant growth, the aim of substantiating differences between different types of triggers has been a key driving force in it. For reasons of space, we will not attempt anything close to comprehensive coverage of this literature, but merely highlight a couple of especially relevant examples of prior research (for a recent review of experimental work on presuppositions more generally, see Schwarz 2016).

One of the early studies finding differences between triggers is Tiemann et al. (2011), who detect variation in acceptability judgments in contexts that do not explicitly support the trigger's presupposition, but are consistent with it. Similarly, Domaneschi et al. (2014) find that while some presupposition triggers leave a lasting impact – suggesting their presupposition is accommodated – others essentially seem to be ignored: after reading short texts containing various triggers followed by a distractor task, subjects are more likely to answer questions based on the contribution of triggers like *stop*, compared to a greater likelihood of failing to consider the presupposition such as that of the prefix *re-* (as in *reintroduce*). Tiemann (2014) and Tiemann et al. (2015) report a similar lack of consideration of the presupposition of *again* when answering questions, even without a delay in the task.

The just mentioned studies confirm some of the differences between triggers, in that the patterns of variation across triggers at least roughly match one of the theoretical divisions between types of triggers. But other studies that are more narrowly targeted at comparisons between specific triggers falling on opposite sides of a given proposal for a theoretical divide have failed to

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[3]Note that while the QUD-based account certainly leaves room for differentiating triggers, it is not obvious what precisely it would say about the contrast between different types of factives.

yield clear confirmation of expected contrasts. For example, Schwarz (2014) compares the presumed 'soft' trigger *stop* with the 'hard' trigger *again* in terms of their processing time course. The results from visual world eye tracking suggest that both soft and hard triggers are processed rapidly, contrary to what might be expected based on (one line of) results on processing conversational implicatures, which can be presumed to share crucial features with soft triggers on certain pragmatic accounts. Furthermore, various attempts at comparing soft triggers to implicatures suggest that they differ in their processing profile, providing evidence against analyses that assimilate them (Chemla and Bott, 2013; Kennedy et al., 2015: among others). Yet another attempt at assessing a key part of the empirical claim with regards to the distinction between hard and soft triggers illustrated in (6) was made by Jayez et al. (2015). Their acceptability judgment study focusing on the hard triggers *too* and *regret* suggests that these, too, can fail to project from antecedents of conditionals in contexts that globally establish ignorance with respect to the truth of the presupposition, at least with sufficient contextual support.

Most relatedly to the experiments reported below, Cummins et al. (2013) and Amaral and Cummins (2015) investigate various triggers in English and Spanish and test the acceptability of *Yes, although* and *No, because* continuations, as illustrated for *again* and *stop* below:[4]

(7)   Q: Did Brian lose his wallet again?
       A: Yes, although he never lost it before.
       A': No, because he never lost it before.

(8)   Q: Did John stop smoking?
       A: Yes, although he never smoked before.[5]
       A': No, because he never smoked before.

Across all triggers that they looked at, both *yes* and *no* responses of this sort are degraded relative to controls, suggesting that contradicting the presupposition comes with a cost no matter what. But interestingly, the triggers in their results seem to be grouped into two classes with regards to the extent to which *yes,. . .* and *no,. . .* responses differ from one another: for expressions such as *stop* and *still*, there is a fairly substantial, statistically significant difference in acceptability between the response options, with higher ratings for *no* than for *yes*. In contrast, expressions such as *again* and *too* yield comparable acceptability ratings for both continuations.[6] Cummins et al. (2013) relate their results to the distinction between lexical and resolution triggers (Zeevat, 1992), but they broadly align with the soft-hard distinction as well. And in line with common claims about this distinction, the interpretation offered by these authors is indeed that the first set of triggers more easily allows for 'local accommodation' (Heim, 1983: i.e., an interpretation where presupposed content acts as if it were run-of-the-

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[4]Similar tasks involving the selection of the best answer from a set of options had previously been used to investigate clefts and focus (Onea and Beaver, 2011; Velleman et al., 2012; Destruel et al., 2015).

[5]Note that Cummins et al. (2013) do not explicitly provide the continuations they used for *stop*, so this is our best guess at what they looked like for this question, which is listed in the materials in their appendix.

[6]Note that they also found *regret* to pattern with the first set of triggers, exhibiting a significant difference between continuations. This is directly relevant to our findings below, and at first sight may seem incompatible with them; see footnote 12 for our take on this.

mill entailed content), leading to relatively greater acceptability of the *no*-responses for these triggers. But there is a potential additional dimension to the variation as well, which can be related to Zeevat's notion of lexical triggers, which constitute cases where the presupposition is a requirement that comes with the asserted component of the trigger. As Amaral and Cummins (2015: p. 169) put it, in these cases 'the responses in condition [A; *yes*-continuation] appear self-contradictory, if we assume that the presupposition is a logical prerequisite for the at-issue content of the trigger.' In other words, the content introduced in the question cannot be affirmed independently of the presupposition. Our experiments below build on essentially this notion, though we couch it in a slightly different theoretical context.[7]

2. Experiments

The starting point for our investitagion is the hypothesis that we find different relationships between different subcomponents of meaning for emotive and cognitive factives. Generally speaking, both types of factives contribute (at least) two meaning components, that of the AT-TITUDE involved (which relates the matrix subject's mental state to the embedded proposition), and that of the (EMBEDDED) proposition P (conveying that P is true). We propose that these two components stand in a different relationship to each other for the two types of factives, such that for emotive factives, P can be disentangled from the subject's ATTITUDE in a way that it cannot for cognitive factives. The basic intuition is that it is quite easy to imagine that one is *happy* about a certain state of affairs, but is simultaneously wrong about it. It is harder to see how one can *discover* something which is not true. Relatedly, (9a) is a coherent statement, whereas (9b) gives rise to contradiction:[8]

(9)   a.   John was happy that his parents are coming to town, although it turned out that he was in fact mistaken/although it turned out that they had to cancel.
       b.   ?? John discovered that his parents are coming to town, although it turned out that he was in fact mistaken/although it turned out that they had to cancel.

More specifically, we build on the proposal by Sudo (2012) that certain triggers (e.g., change of state verbs like *stop*) have their presupposition represented as part of the entailment at the lexical level, whereas others (such as gender features on pronoun or the additive presupposition of *also*) do not. Adapting this general approach, we hypothesize that cognitive and emotive factives differ in terms of their entailment properties — specifically, that P, while generally surfacing as projective content for both types of factives, is also part of the conventionally entailed content of cognitive factives, whereas it is not for emotive factives (Table 1).

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[7]Note that a further directly related notion, that of certain triggers exhibiting 'Obligatory Local Effects,' has been introduced in recent work by Tonhauser et al. (2013).

[8]On this point, Egré (2008: p. 103) also observes that the emotive *regret* behaves differently from the cognitive *know* in false-belief environments.

Factive Type	COGNITIVE that P	EMOTIVE that P
Conventional Entailment	P & ATTITUDE	ATTITUDE

Table 1: Our hypothesis. Cognitives, but not factives, conventionally encode their embedded proposition P as part of their entailment.

We test this hypothesis using a yes/no-continuation task, similar to the above-mentioned one employed by Cummins et al. (2013) to explore differences between a range of triggers such as *stop* and *again*. The task pairs a factive question with a response of the form *yes, although...* or *no, because...*, followed by a denial of the content of the embedded proposition, as illustrated in (10).

(10)   Q.   Is Anna **aware/happy** that $[_p$ Ryan is coming to the wedding]? /
            Does Anna **realize/appreciate** that $[_p$ Ryan is coming to the wedding]?
       A1. Yes, although he isn't.
       A2. No, because he isn't.

While the overall approach taken here is quite similar to that of Cummins et al., our hypothesis provides a slightly different angle on the expected outcomes by focusing on whether or not an affirmative answer is possible when the presupposition is explicitly denied at the same time. Our basic assumption is that a *yes*-response necessarily commits the speaker to the entailed content introduced by the question. However, it may in principle be possible to deny a presupposition, to the extent that it is introduced entirely at a separate level and not part of the conventionally entailed content. This leads to diverging predictions based on our hypothesis: if the content of the embedded proposition is entailed, as we propose is the case for the cognitive factives, saying *yes* and then denying the content of the embedded proposition should be contradictory, and thus only *no* will be a viable response. But for the emotive factives, where we hypothesize that the content of the embedded proposition is not part of what is entailed, it should in principle be possible to just endorse the (emotive) ATTITUDE by responding *yes*, even if qualifying immediately by noting that the embedded proposition is false – i.e. singling out one aspect of the meaning (the entailed content: ATTITUDE) while contesting another aspect (P). Note that homing in on one particular aspect of meaning in your affirmation may still come at a cost, i.e., it is indeed plausible that the default impact of an affirmation involves endorsing both entailed and presupposed content, wholesale, as it were. What's crucial for our approach is that in principle it may be possible that non-entailed presuppositions can be denied along with a *yes*-response, while entailed ones cannot. If so, that leads to a prediction for our hypothesized difference between cognitive and emotive factives, namely that the latter should yield a greater acceptance of *yes*-responses than the former. Note that the hypothesis makes no specific prediction for the relative acceptability of denials of presupposed content with *no*-continuations, which require targeting the presupposed content with negation (commonly analyzed as involving local accommodation). It's possible that the different relationship between presuppositions and entailments has a reflex here, too, but this does not necessarily follow from our hypothesis. In the following, we report on two experiments to test these predictions: Experiment 1, where the participants were asked to chose which of the *yes* vs. *no* answer-options they preferred, and

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Experiment 2, which uses acceptability ratings to home in on the acceptability of *yes*-responses more directly.

2.1. Experiment 1

2.1.1. Design

In Experiment 1, participants were presented with questions containing a cognitive or an emotive factives and had to indicate their preference with resepct to *yes* and *no*-answer options. There were additional response options to express that 'Both options are equally good.' or 'Both options are equally bad.'

(11)   Q.   {Did Mark **find out**/Was Mark **surprised**} that [$_{PS}$ his parents are visiting]?
       A1.   Yes, although they had to cancel because of the weather.
       A2.   No, because they had to cancel because of the weather.
       A3.   Both options are equally good.
       A4.   Both options are equally bad.

If, as hypothesized, cognitives but not emotives entail the content of the proposition they embed, we expect that the *yes*-responses should be more readily available for the questions with an emotive facctive, compared to those with a cognitive one. That is, for the emotive factives, we expect both the *yes* and the *no*-responses to be in principle available. Assuming more or less comparable availability of the *yes* and *no*-responses, the *both good* and *both bad* responses should be chosen more frequently for emotive factives (depending on how the potential cost of local accommodation (for *no*) or targeting only one aspect of meaning (for *yes*) affects acceptability judgments). For the cognitive factives on the other hand, we expect these to allow only the *no*-responses, as these should be clearly better than *yes*-resonses (even if involving some cost for local accommodation). Hence, *both good* should be impossible with the cognitive factives, given the unacceptability of the *yes*-response. The *both bad* option might get chosen for the cognitive factives, if subjects dislike both local accommodation and cancellation/suspension. However, this is likely to be the dispreferred choice, assuming that local accommodation does make *no*-responses available.

2.1.2. Participants

Thirty-six native speakers of English participated in the study. The participants were recruited on Prolific.ac, a crowd-sourcing tool for recruiting participants to participate in scientific studies online. Participants were paid at rate of 5.20 GBP per hour for their participation. The task took approximately 10 minutes to complete. No participant was excluded from the analyses.

2.1.3. Materials

All items presented short written dialogues between two speakers. There were two variations of twenty-four experimental items, corresponding to the two predicate types: COGNITIVE (*re-*

alize, *find out*) and EMOTIVE (*be disappointed*, *be surprised*) factives, as illustrated in (11) above. Each subject only saw a given item in one version, with item-condition pairings counterbalanced across subjects. In addition, there were twenty-four filler items where factives were paired with different continuations. Given the prediction for the critical part of the experiment, that the *yes*-responses should be endorsed to a greater extent in the EMOTIVE condition than in the COGNITIVE condition, the fillers were designed to yield the opposite preference. Hence, among the fillers, the emotive factives favoured a *no*-response, and the cognitive factive favoured a *yes*-response, as illustrated in (12) and (13), in order to counteract the potential risk of introducing an overall bias against the *yes*-responses. The *both good* and *both bad* options in (A3) and (A4) were available for the fillers, too.

(12) Emotive filler:
  Q.   Was Mike disappointed that John decided to quit football?
  A1. Yes, although he didn't think John was a very good player.
  A2. No, because he didn't think John was a very good player.

(13) Cognitive filler:
  Q.   Was Mary surprised that Bill got the grant?
  A1. Yes, although she was on the grant committee.
  A2. No, because she was on the grant committee.

The participants were given the following instructions: "In this experiment you will read short questions. You will then be asked to choose which answer you prefer, given a choice of two answers. You also have the opportunity to say that you think that both answers are equally good or equally bad. There is not a right or a wrong answer. Simply choose the answer that you prefer, given the preceding question." In order to control for variability stemming from the two predicate types influencing the answers across conditions, we used a block design. Thus, half of the participants saw the emotive factives in a randomized order first, and the cognitive factives in a randomized order last, and vice versa for the other half of the participants. Each block contained both fillers and critical items. Additionally, the items were divided into two groups, in order for each specific predicate to be evenly distributed across participants, thus creating a two-by-two Latin square design.[9]

2.1.4. Analysis

The results were analyzed as logistic mixed effects regression models in R (version 3.1.2) using the *glmer* function of the *lme*4 package (version 1.1-11) and its *bobyqa* optimizer. Results from maximally complex converging models are reported here (Barr et al., 2013). We ran four types of models regarding the predicted outcomes: models predicting the observation of a *yes*-response (to the exclusion of all the others), of a *no*-response (to the exclusion of all the others), of a *both good*-response (to the exclusion of all the others) and of a *both bad*-response (to the exclusion of all the others). They tested for a fixed effect of predicate type (EMOTIVE, COGNITIVE). For each of these simple-effect models, we also ran a version testing for an

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[9]The experiment is available at: `http://spellout.net/ibexexps/SchwarzLabArchive/YesNoFact/experiment.html`

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effect of block order (EMOTIVE-COGNITIVE, COGNITIVE-EMOTIVE) and its interaction with predicate type. Participants and items were added as random effects, with a random slope for predicate type per participant, and a random slope for predicate type and block order (in the relevant models) per item. Our different baselines exhausted the logical space of effects and interactions. The models did not include data-points for the filler items, and no other data-point was excluded.

2.1.5. Results

The results are summarized in Figure 1. The response patterns for the first block showed a clear contrast between the cognitive and the emotive factives. There was a main effect of predicate type on the observation of *no-* and *both bad*-responses in the first block (resp. $p = 0.00247$, $\beta = 1.2433$, $SE = 0.4107$ and $p = 0.024687$, $\beta = 1.6566$, $SE = 0.7375$), with *no*-responses being more frequent for the cognitive factives and *both bad*-responses being more frequent for the emotive factives. There was also a significant interaction with block order for the *no*-responses ($p = 0.02423$, $\beta = 1.3729$, $SE = 0.6092$) but not for the *both bad*-responses; the significant main effects between the two types of factives disappeared in the second block (predicate type for *no* $p = 0.7260$, $\beta = 0.12959$, $SE = 0.36983$; predicate type for *both bad* $p = 0.678$, $\beta = 0.3225$, $SE = 0.7768$), suggesting that exposure to one type of factive predicate had a strong effect on the participants' responses, potentially through priming one type of interpretation, or through adjusting the participants' standards for evaluation. There was no such significant main effect on the observation of *yes-* and *both good*-responses (all $p > 0.17$, $\beta \leq 0.5$). We observed the same results in simple models, excluding block order as a predictor: *no-* and *both bad*-responses were more frequent with cognitives than with emotives (*no*: $p = 0.0222$, $\beta = 0.5266$, $SE = 0.2303$; *both bad*: $p = 0.0223$, $\beta = 0.7232$, $SE = 0.3165$) but there was no significant effect of predicate type for *yes-* and *both good*-responses (*yes*: $p = 0.737$, $\beta = 0.08468$, $SE = 0.25253$; *both good*: $p = 0.809$, $\beta = 0.07354$, $SE = 0.30382$).
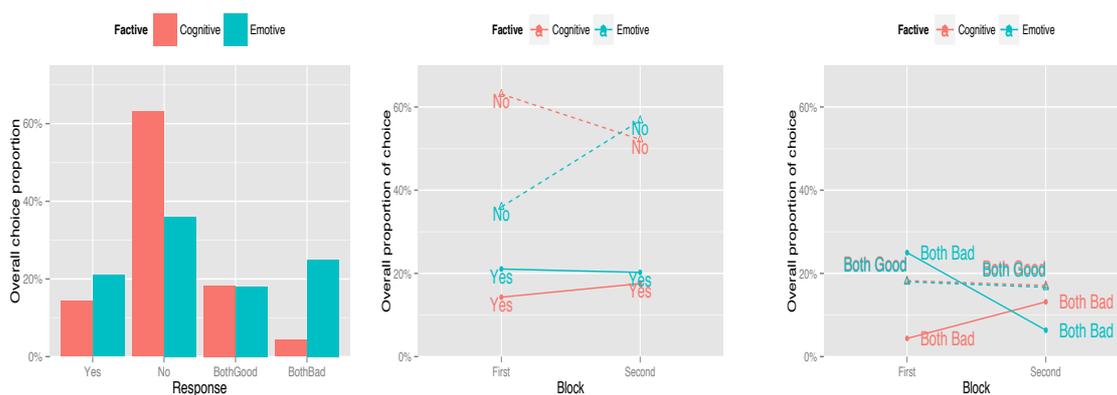
Figure 1: **Left:** proportion of responses for the two types of factives in block 1, where the contrast between the cognitive and the emotive factives is significant for the *no* and the *both bad*-responses. **Center and right:** responses for the four response types (*yes, no, both good, both bad*), by block. The contrast between the two types of factives is neutralized in block 2.

To summarize, even though the contrasts between the two verbs are subtle, and subject to influencing each other across blocks, there is nonetheless a clear contrast between the two types of factives with respect to the availability of *no*-responses. Even though there was no direct, visible contrast in the availability of *yes*-responses and *both good*-responses, the contrast in *both bad*-responses is in line with our hypothesis, according to which the two aspects of meaning identified as part of the semantics of the two types of factives (the ATTITUDE and the (EMBEDDED) P components) contribute to the overall semantic properties in different ways for the emotive and the cognitive factives — specifically in terms of the truth of the embedded clause being part of the conventional entailment in the case of cognitive factives, but not for the emotive factives. Under this view, participants were not sufficiently inclined to consider an interpretation where either negation targeted P directly or where an affirmative response selectively endorsed the conventionally entailed content (for emotive factives). At the same time, participants did display a sensitivity to the contrast in entailment in that they were more amenable to accepting a *no*-response for cognitive factives, because it should be easier to target the embedded proposition P with negation when it is conventionally entailed.

However, there is at least one alternative interpretation of the results which basically attributes the contrast in *no*-responses to varying availability of local accommodation, and does not posit a difference between factives in terms of whether or not P is part of the conventionally entailed content. To spell out a specific version of this alternative, it might be that only emotives are lexically associated with a conventional presupposition that P (which at the same time is part of the entailed content as well). In contrast, the presuppositional status of P would result from a pragmatic derivation in the case of cognitive factives, in line with the proposals by Simons, Romoli and others. Based on these assumptions, *no*-responses for cognitives are expected to be easily acceptable, to the extent that the pragmatic derivation does not (or at least not necessarily) take place under negation.[10] For emotives on the other hand, both a *yes* and a *no*-response would require cancellation of a hard-coded, conventional presupposition, which would lead participants to generally prefer the *both bad* response to indicate a presupposition failure.

In order to disambiguate between these two interpretations of the results, Experiment 2 used an acceptability rating task where subjects were only presented with one answer option at a time. This allowed us to test for a contrast in the acceptability of *yes*-responses between the two types of factives more directly. As discussed above, our hypothesis predicts that *yes*-responses paired with denials of P will be more readily available for emotive factives than for cognitive factives. In contrast, the alternative interpretation we just considered does *not* predict such a contrast in the *yes*-responses, as both types of factives should yield low ratings for *yes*-responses, based on the crucial assumption that factives uniformly include a conventional entailment that P.

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[10]For Romoli in particular, the justification after *no* would block or cancel this derivation, in the same way that the *sometimes* implicature normally associated with *not always* does not arise in *I don't always curse because I never curse*).

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2.2. Experiment 2

2.2.1. Design

Experiment 2 used an acceptability rating task to provide an independent assessment of the acctability of *yes* and *no* continuations. Participants saw only one response at a time (*yes, although...* or *no, because...*), as shown in (14) and (15).

(14) Q. {Is Maria **aware /happy**} that [$_P$ Mike is moving back to Chicago]?
       A1. Yes, although he isn't.

(15) Q. {Is Maria **aware**/Is Maria **happy**} that [$_P$ Mike is moving back to Chicago]?
       A2. No, because he isn't.

Specifically, the participants were asked to rate to what extent the answer sounds natural to them, in light of the question, by choosing a value between 1 ('completely unnatural') to 7 ('completely natural') by clicking the number or pressing the corresponding key. They were instructed that there was no right or wrong answer. If cognitive, but not emotive factives conventionally entail P, then we expect to see a contrast between the cognitive and the emotive factives in the *yes*-responses, such that *yes* is rated significantly lower for the cognitives than for the emotives. Again, no specific predictions were made for the *no*-responses. In addition to the slight change in the nature of the task, the stimuli were refined from Experiment 1 to be more uniform, in particular by consistently using future-oriented progressive forms (e.g., *is moving to Chicago*) in the embedded clause and expressing denial in the response-continuation via VP-ellipsis. This was done to avoid potential other pragmatic strategies of reconciling the denial with the initial affirmative or negative response, which may have given rise to additional variation in response patterns for the original set of materials.

2.2.2. Participants

Sixty-two undergraduate students at the University of Pennsylvania, all native speakers of English, participated in the study for course credit through the Psychology department's subject pool. The experiment took approximately 15 minutes, and was carried out on lab computers.

2.2.3. Materials

As illustrated above, the items consisted of short dialogues between two speakers, as in (14), (15). Versions of the twenty-four critical items were created in four conditions, corresponding to the two predicate types—cognitive and emotive, and the two answer types—*yes, although* and *no, because*. We also included a between item adjective-verb manipulation, such that half of the items contained verbal factives (*appreciate, realize*), and half of them, adjectival factives (*happy, aware*). Forty-eight filler items were also included. These were designed with two purposes in mind: first, to provide a floor and a ceiling baseline for the *yes*- and *no*-responses; and second, to counterbalance the number of good and bad *yes*- and *no*-responses. Half of the fillers were therefore constructed using a non-factive matrix predicate (*think*), where the *no*-

answers would be infelicitous, and the *yes*-answers would be fully acceptable, as in (16). The other half of the fillers involved a question with two conjuncts, as in (17). Here, it would be the *yes*-answers that were infelicitous, while *no* would be an acceptable response.

(16)   Q.   Does Sue think that Bill's parents are going to the wedding?
       A1.   #No, because they are.   ('Bad Control')
       A2.   ✓Yes, although they aren't.   ('Good Control')

(17)   Q.   Is John going to Paris and Rome this summer?
       A1.   ✓No, he's not.   ('Good Control')
       A2.   #Yes, although he isn't going to Rome.   ('Bad Control')

The participants were given the following instructions: "In this experiment you will read short dialogues between two people in the form of a question and an answer. You will then be asked to rate to what extent the answer sounds natural to you in light of the question, by choosing a value between 'completely unnatural' (1) to 'completely natural' (7). There is not a right or a wrong answer. Simply make the choice based on how well you feel the answer works for the preceding question." In contrast to Experiment 1, the factive and emotive items were randomly mixed, but answer type (*yes* vs. *no*) was separated by blocks, with order counter-balanced across groups.[11]

2.2.4. Analysis

The ratings were analyzed using linear mixed effects regression models in R (version 3.1.2), using the *lmer* function of the *lme*4 package (version 1.1-11). All our models included predicate type (EMOTIVE, COGNITIVE) and answer type (YES, NO) as fixed effects. Given that we didn't make predictions regarding syntactic category (ADJECTIVE, VERB) nor block order (YES-NO, NO-YES), we fitted models excluding them both (simple models) and models including either one of them as predictors (models including both of them would not converge). We tested for the maximally complex models, including all possible interactions of predictors and all random slopes for participants and items as random effects, and our different baselines exhausted the logical space of effects and interactions. The models only included the data points of the experimental items.

2.2.5. Results

The results are presented in Figure 2. Responses were similar in the first and second block (main effects $t \leq 1.35$, $\beta \leq 0.45$; two-way interactions $t \leq 0.3$, $\beta \leq 0.15$; three-way interaction $t = 0.302$, $\beta = 0.13988$, $SE = 0.43359$) and for adjectives and verbs (main effects $t \leq 1.5$, $\beta \leq 0.35$; two-way interactions $t \leq 1.63$, $\beta \leq 0.44$; three-way interaction $t = 1.216$, $\beta = 0.37898$, $SE = 0.31167$). As predicted, the response patterns showed the *yes*-ratings to be significantly higher for the emotive than for the cognitive factives (simple model: $t = 4.954$, $\beta = 0.76$, $SE = 0.1534$; $t \geq 3.1$ and $\beta \geq 0.59$ otherwise), with no difference in the *no*-ratings (simple

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[11]The experiment is available at:
`http://spellout.net/ibexexps/SchwarzLabArchive/YesNoRating/experiment.html?Home=true`

model: $t = 0.625$, $\beta = 0,1005$, $SE = 0.1607$; $t \leq 0.785$ and $\beta \leq 0.1683$ otherwise). There was also an interaction between predicate type and answer type (simple model: $t = 4.083$, $\beta = 0.8605$, $SE = 0.2108$; $t \geq 2.61$ and $\beta \geq 0.67$ otherwise).
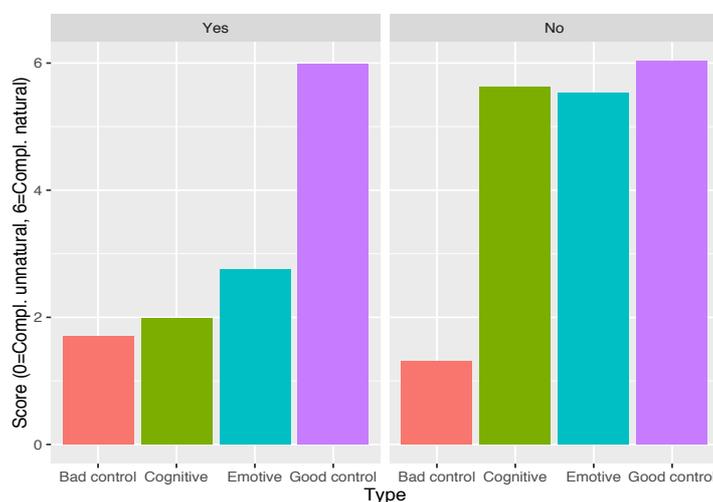
Figure 2: Mean ratings by answer type and predicate type (merged blocks).

With this experiment, we replicated the main conceptual result from Experiment 1, in that we elicited a contrast between emotive and cognitive factives. The contrast no longer consists in participants endorsing *no*-answers more readily as responses to cognitives than to emotives; rather, we now see that participants deem *yes*-answers relatively more natural as responses to emotives than to cognitives.[12] Importantly, the results from Experiment 1 were not only compatible with our hypothesis, but also with an alternative hypothesis based on potential differences in the availability of local accommodation. However, the results from Experiment 2 are not in line with the predictions of such an alternative view: that view assumes that P is conventionally entailed both by cognitive and emotive factives, therefore *yes*-answers should be rated as low for emotive as for cognitive factive questions (under the assumption that *yes* commits the speaker to all the entailed content). On the other hand, our hypothesis in well in line with the results: participants were able to understand the affirmative reply as singling out the entailed content to the exclusion of the embedded proposition P to some extent for emotives. This led to an increase in acceptability of *yes*-continuations, in contrast to cognitives, which were visibly as low as the baseline controls in this regard. This is consistent with the idea that emotives do not, but cognitives do, conventionally entail P, given the assumption that it is in principle possible to selectively affirm the conventionally entailed content with a *yes*-response.

3. Discussion

Taken together, the results from Experiment 1 and Experiment 2 support the hypothesis we advance, that cognitive and emotive factives differ in terms of whether the truth of the embedded

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[12]Cummins et al. (2013) report results for *regret*, which look similar to other triggers that we would see as candidates for entailing their presupposition. However, there is no direct point of comparison to other types of factives, and furthermore, their materials seem pragmatically skewed by using embedded clauses that the matrix subject is virtually guaranteed to be an informed authority on, such as *Did Fiona regret buying the house?*.

clause is part of what is conventionally entailed (in addition to being presupposed). While the first experiment did not support that notion directly, the results were perfectly consistent with this notion, but they also could be explained by an alternative hypothesis that locates the difference entirely in terms of the interaction of negation (and more generally, *no*-answers) with different triggers. Experiment 2 sought to get a more direct comparison of the acceptability of *yes*-responses paired with a denial of the presupposition, and found a significant difference (and corresponding interactions) between the two types of factives. This showed that an explanation of the contrast has to extend beyond negation, which our hypothesis does but the alternative one does not provide. That said, there are various aspects of the results as well as the broader theoretical discussion that merit further consideration.

The first issue to raise here is the absence of a contrast in ratings for the *no*-answers in Experiment 2, which contrasts with what we observed in Experiment 1. We suggested that *no*-responses were more likely to be selected with the cognitive factives because it is easier for negation to target the embedded proposition P when it is part of the conventionally entailed content. In the case of the emotives, this requires allowing negation to target purely presuppositional content, which may come with some cost (e.g., through local accommodation). But based on this interpretation, it may seem a bit surprising that we did not find parallel results for Experiment 2, where no difference in acceptability between *no*-answers for emotive and cognitive factives emerged. While we can't offer a full-fledged explanation for this, there are a number of tentative points to offer that suggests that this need not undermine our proposal. To begin with, the two experiments differed not only in the explicit task, but also in several other details of implementation. While the choice of an appropriate response in Experiment 1 could be seen as closer to a production situation, the acceptability rating task in Experiment 2 primarily involved comprehension (plus assessment of an observed dialogue). It is at least possible that this introduces an asymmetry in terms of how likely people are to call upon a mechanism such as local accommodation: in Experiment 1, it was easy to avoid such a move by choosing a different response choice, whereas in Experiment 2, it may have offered itself as the last resort for taking the presented dialogue to be plausible. Furthermore, the block manipulations in the two experiments were different: Experiment 1 separated the two types of factives into separate blocks, whereas Experiment two had different blocks for *yes* and *no*-continuations, with factive types mixed with blocks. Thus the lack of an effect for negation in the latter may simply parallel the block order effect in Experiment 1, where no differences emerged between factive types in the second block. Finally, it is worth noting that the issue we're addressing effectively is based on a null effect, and the absence of evidence in this regard should not be mistaken as evidence against our hypothesis. The core of our line of argument is that there is a difference between emotive and cognitive factives in terms of conventional entailment, and that we can find *positive* evidence for *non-entailment*, which we did.

We should also address why no difference between types of factives in the acceptability of the *yes*-responses emerged in Experiment 1: both *yes* and *both good* choices were equally low there for cognitives and emotives, whereas in Experiment 2, *yes*-answers were judged to be more natural for emotives. As already noted in connection with the preceding point, the two experiments differed in various relevant respects, in particular with regards to choosing an appropriate response vs. providing a graded assessment of the acceptability of a fixed response. While the

contrast between the different types of factives had an impact in both tasks, the persistent global presence of the truth of the embedded proposition for emotives seems to have decreased selection of either response in Experiment 1, suggesting that participants were reluctant to select a response with an unsupported presupposition from an emotive factive. That *no*-responses were much more readily selected and clearly preferred, for cognitives, fits the notion that their presuppositions are less persistent than those of emotives, echoing the claim that presuppositions of soft triggers are more easily suspendable that those of hard triggers (Abusch, 2002). As discussed earlier, expressions that have been claimed to project part of their conventionally entailed content (as we claim is the case for cognitive factives) tend to fall in the category of soft triggers, whereas expressions that have been claimed to trigger a presupposition independent from their conventionally entailed content (as we claim for emotive factives) generally fall in the category of hard triggers. Note that we here have tried to remain neutral as to the source of the projective content of factives, leaving open the possibility that in the case of cognitive factives, it could be derived as a type of implicature *à la* Romoli (2012) or a conversational inference more generally, based on the presence of the relevant proposition at the level of the conventionally entailed content. In contrast, this type of analysis is not available for the emotives, given our interpretation of the data. One obvious remaining option then is to posit that in the case of emotive factives, we are dealing with a conventionally encoded presupposition that is NOT simultaneously present at the level of conventionally entailed content.

However, there is at least one further alternative, which relates to the question of what exactly is involved in the ATTITUDE component, in particular in the case of emotive factives.[13] To spell out this option, let us first step back and return to the possibility of deriving the factive inference for cognitive factives: the original source of this content is in the conventional entailments at the lexical level, on this view. Its special status, leading to projection behavior is derived in one way or another based on the notion that one can distinguish between different pieces of meaning at this level namely i. that the subject believes (or has come to believe, etc.) that P, and ii. that P holds. In contrast, the information conveyed by an emotive factive expression like *be happy that* P seems to ultimately involve at least three pieces: i. that the subject has an emotionally positive attitude towards P, ii. that P holds, and iii. that the subject believes that P holds. So while there clearly is only one ingredient to the ATTITUDE component of cognitives (i), there could be any combination of (i) and (iii) that is lexically encoded to form the ATTITUDE component of emotives. Relating this to our experimental results, note that any of these options would be compatible with our interpretation of the experimental results above, given that none of the considered ATTITUDE components entail P. Once we incorporate all three pieces of information into our considerations, further candidates for a conventionally encoded *presupposition* of emotives enter the picture. In addition to the option noted above that P (ii) be treated as a hard-coded presupposition, one could well imagine that emotives conventionally encode the subject's belief that P (iii) as a presupposition and derive the stronger inference that P in fact holds conversationally, based on assumptions about the well-informedness and authority of the attitude holder. Alternatively, the 'belief-presupposition' (iii) could also be part of what is conventionally entailed, and emotive factives would then entail this presupposition. This would still be consistent with our interpretation of the experimental results, since neither the presuppositional nor the conventionally entailed content of emotive factives would

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[13]Thanks to Valentine Hacquard for discussion leading to our consideration of this possibility.

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then contribute that P holds: this would only emerge as a possibly defeasible inference from the presupposition that the subject believes P. In summary, once we think more broadly about precisely what ingredients there are to the meaning of emotive factives, more options open up, including one where a belief-presupposition of emotives is represented at the level of conventional entailments. While this would make cognitive and emotive factives more similar again on an abstract level, there would still be a substantive difference with regards to the role of the embedded proposition P (which would still be entailed for cognitives but not for emotives on the view under consideration).

Regardless of where one comes down on these more intricate issues, the interpretation of our data is as follows: Our starting point was the long-standing observation that i. the complements of factives in general (i.e., both cognitive and emotive) are typically projected as true or impose restriction on the context of utterance, but ii. they differ in the extent to which they do so. Our proposal is that the content of the proposition that factives embed is also part of what is conventionally entailed in the case of cognitives, but not in the case of emotives. The experimental results we obtained and presented here support this proposal, and even the final alternative analysis we just discussed would wind up embracing it by assuming that emotives neither presuppose nor conventionally entail the truth of the proposition they embed, as it maintains that the truth of the embedded proposition could be derived from other conventionally encoded content. In the end, the various analyses that we discussed share precisely this property, while crucially differing on how the truth of the embedded proposition ends up as part of the conveyed content, with behavior that suggests it is (generally) projective and imposes constraints on the context of utterance, as presuppositions are traditionally thought to do.

4. Conclusion

We presented two experiments investigating the role of the embedded proposition of both cognitive and emotive factives, using a *yes/no*-continuation task. Taken together, the experiments suggest that while the embedded proposition of cognitives inevitably gets embraced by affirmative responses to questions, this is not necessarily so for emotives. We interpret these results in terms of a more general distinction between presupposition triggers, where some – like cognitives – entail their presupposition, whereas others – like emotives – do not. This interpretation rules out certain pragmatic accounts of emotives, but leaves open at least two theoretical paths for introducing their factive presupposition, either in terms of conventionally encoding them at the presuppositional level (and only at the presuppositional level), or by deriving them from other ingredients, such as the belief-component that seems to be involved in emotives as well.

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