# No Hard Feelings
# If Hard Presuppositions Project

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## Introduction and Key Points

> Hard presupposition triggers like *too* pattern differently than soft presupposition triggers like *win* (Abusch 2002) in that the former rarely give rise to non-projection readings: (1a) and (1c)

> We consider the hypothesis that *semi-factive* predicates behave like soft triggers and *emotive factive* predicates like hard triggers (Abbott 2006, Abrusán 2016): (1b) and (1d)

> However, we do find non-projection with hard triggers in mistaken belief contexts: (2)

> Some research questioned the validity of a distinction between semi-factives and robust factives (Egré 2008). Karttunen (2016) claims that most factives, other than those that take clausal subjects (*be odd*), are not real presupposition triggers

> If the distinction between semi-factives and emotive factives is not real, we should find no difference in their projection rate. Instead, our results support a distinction between the two classes of factive predicates, matching the soft-hard hypothesis

> We argue that mistaken belief contexts are special and can affect all presupposition triggers in attitudinal contexts uniformly, contra Karttunen (2016): (3) to (5); *be odd* only resists mistaken-belief contexts if it lacks a syntactically expressed attitude holder

(1)  a.  I don't know whether Eleni participated in a race, but if she **won**, she is drunk now.
    b.  I don't know whether Eleni participated in a race, but if Taro **discovers** that she did, he will be furious.
    c.  # I don't know whether anybody else was ill, but if Eleni was ill **too**, she needed rest.
    d.  # I don't know whether Taro is ill, but if Eleni **regrets** that he is, she will console him.

Non-projection contexts with emotive factives lead Karttunen (2016) a.o. to argue that only predicates like *be odd* presuppose factivity, but others do not (example from Egré 2008: 14; cf. Klein 1975: B12):

(2)  John wrongly believes that Mary got married, and he **regrets** that she is no longer single.
    ↝ Mary is no longer single.

This is a quite stable fact that arises when a presupposition trigger interacts with an attitude predicate:

(3)  a.  # Taro mistakenly believes that Eleni likes soccer and it's awkward that she does.
    b.  Taro mistakenly believes that Eleni likes soccer and he believes it's awkward that she does.

Even *be odd* allows for non-projection when an **attitude holder** is introduced with *to him*:

(4)  a.  # Taro mistakenly believes that Eleni likes linguistics, and it's **odd** that she does.
    b.  Taro mistakenly believes that Eleni likes linguistics, and it's **odd to him** that she does.

The same can be observed with the hard trigger *too* when embedded under *believe*:

(5)  Eleni didn't pass the syntax exam. Aditi, despite having passed, comes out of the department crying for some other reason, and Taro thinks that she got a failing grade.
    a.  # Aditi, too, failed syntax.
    b.  Taro believes that Aditi, too, failed syntax.

Emotive factives are special here because they are both presupposition triggers and attitude predicates.

## The Experiment

We carried out an Acceptability Judgment Task (Likert scale from 1 to 7) to probe into the effects of presupposition violations with a variety of triggers, accessible (in Italian) here: ⬈ https://farm.pcibex.net/r/WWrlKZ/ (Zehr & Schwarz 2022).
40 participants (mean age $21.3\pm3.29$) were tested. The experiment consisted of two parts so that the items in the first sub-experiment occured before the second; with 24 fillers interspersed throughout.

**Sub-experiment 1**       4 × 2 Design, 32 items
> PREDICATE (*too, again* vs. *be angry, be sad* vs. *understand, realize* vs. *think, believe*)
> CONTEXT (▲: $\neg p$ if vs. ●: $\neg B_x(p)$ if)

**Sub-experiment 2**       2 × 2 Design, 16 items
> PREDICATE (*be angry, be sad* vs. *understand, realize*)
> CONTEXT (■: $\neg p$ and vs. ◆: mistaken belief)

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(not acceptable)  1   2   3   4   5   6   7   (completely acceptable)
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**Materials** (slightly adapted to resolve pronoun ambiguities of the English translation)

(6)  **Additive particles**                     *too, again*
> ▲ Taro didn't steal anything from Aditi, but if he stole her hat too, Aditi will rip off his bathing suit.
> ● I don't know whether Taro stole anything from Aditi, but if he stole her hat too, Aditi will rip his bathing suit.

(7)  **True factives**                           *be angry, be sad*
> ▲ Eleni didn't lose the kite, but if Taro is angry that she did, he will hurl her sunglasses into the sea.
> ● I don't know whether Eleni lost the kite, but if Taro is angry that she did, he will hurl her sunglasses into the sea.
> ■ Taro didn't make the roses die, but Eleni is angry that he made them die.
> ◆ Eleni mistakenly believes that Taro made the roses die, and is angry that he made them die.

(8)  **Semi-factives**                           *understand, realize*
> ▲ Aditi didn't manipulate the card deck, but if Taro realizes that she did, he will uninvite her from the next sleepover.
> ● I don't know whether Aditi manipulated the card deck, but if Taro realizes that she did, he will uninvite her from the next sleepover.
> ■ Aditi didn't break the toy train, but Taro, after examining it, realized that she broke it.
> ◆ Aditi didn't break the toy train, but Taro, after examining it, mistakenly realized that she broke it.

(9)  **Non-factives**                           *think, believe*
> ▲ Eleni didn't get the top grade, but if Taro thinks that she did, he will be jealous.
> ● I don't know if Eleni got the top grade, but if Taro thinks that she did, he will be jealous.

**Hypothesis** (the ▲ vs. ● contrast for true factives was found in a pilot and hence is included below)
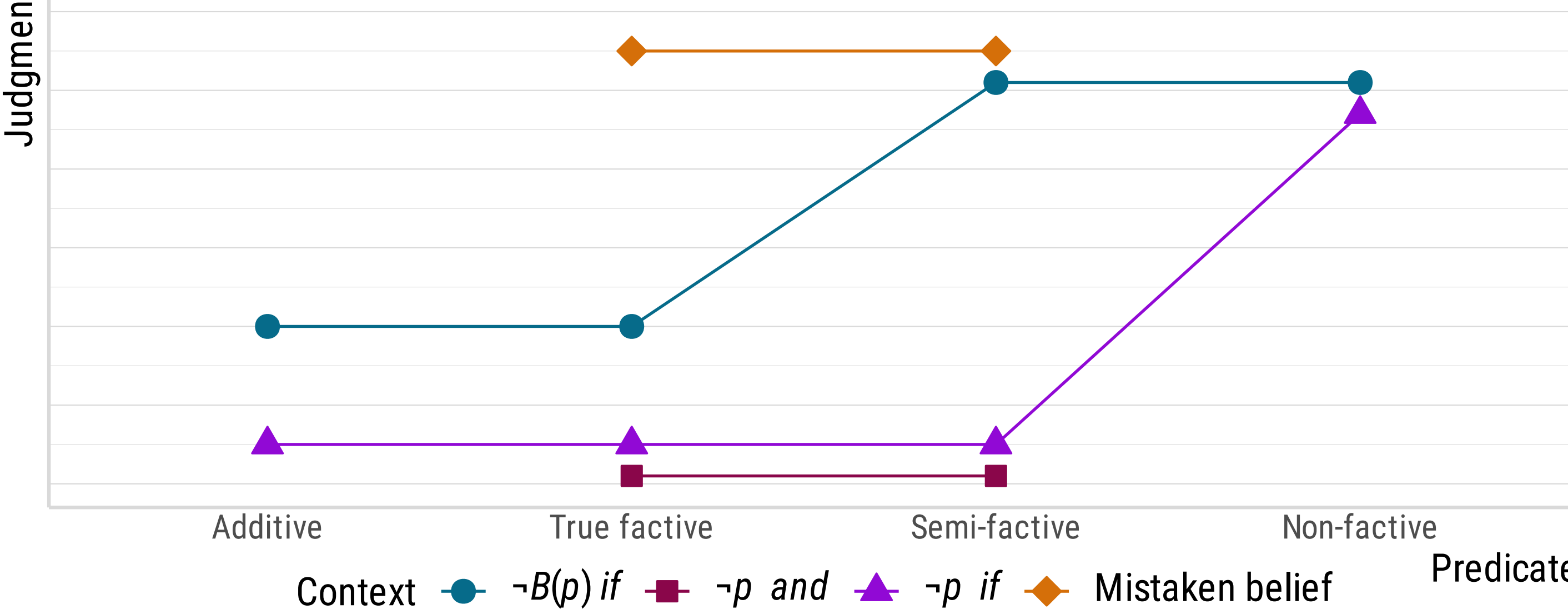


**Results** The shaded areas indicate the raw rating distribution.
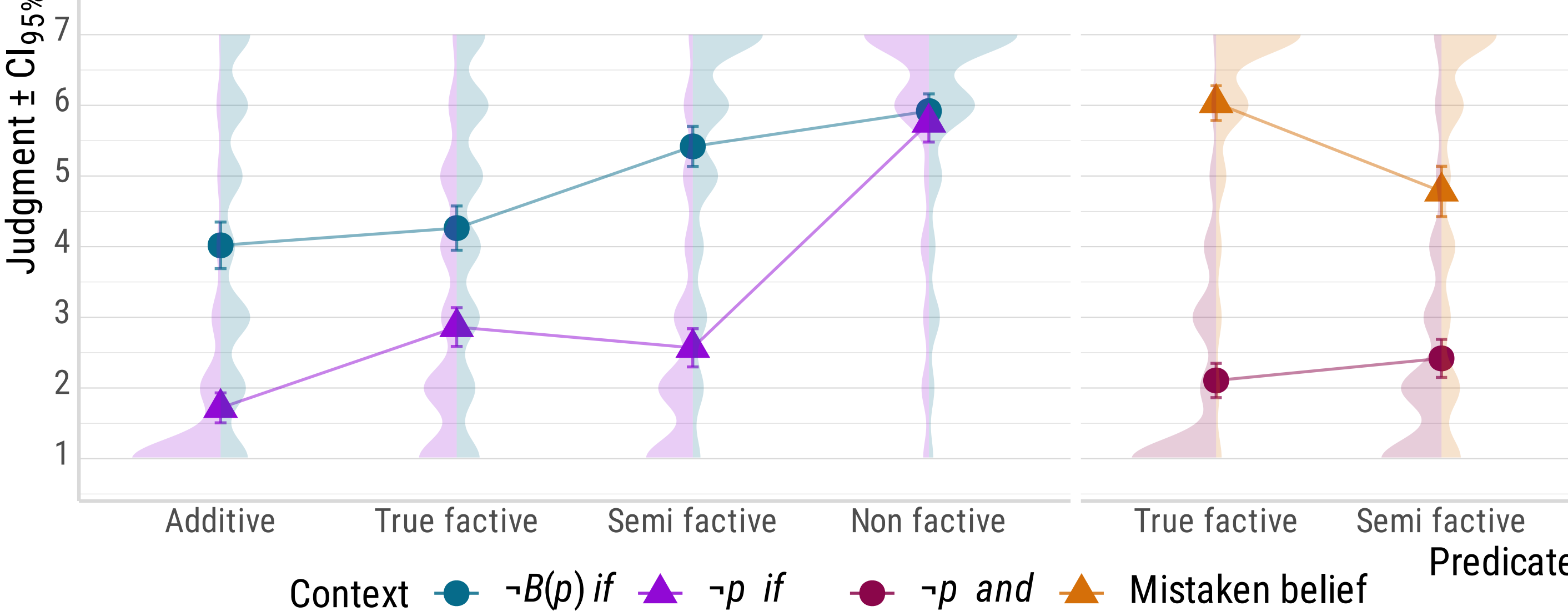


**Statistical Analysis** We fit two Bayesian cumulative probit mixed models, one for each sub-experiment, in R (4.3.2; R Core Team 2023) using *brms* (Bürkner 2021). 40k iterations, $N(0,1)$ slope priors.

$$Y \sim \text{PREDICATE} * \text{CONTEXT} + (1 + \text{PREDICATE} * \text{CONTEXT} \mid \text{ITEM}) + (1 + \text{PREDICATE} * \text{CONTEXT} \mid \text{ID})$$

The estimates and HDIs in the plot below are based on the posterior conditional effects of the models detailed above, calculated using the *emmeans* package (Lenth 2019).
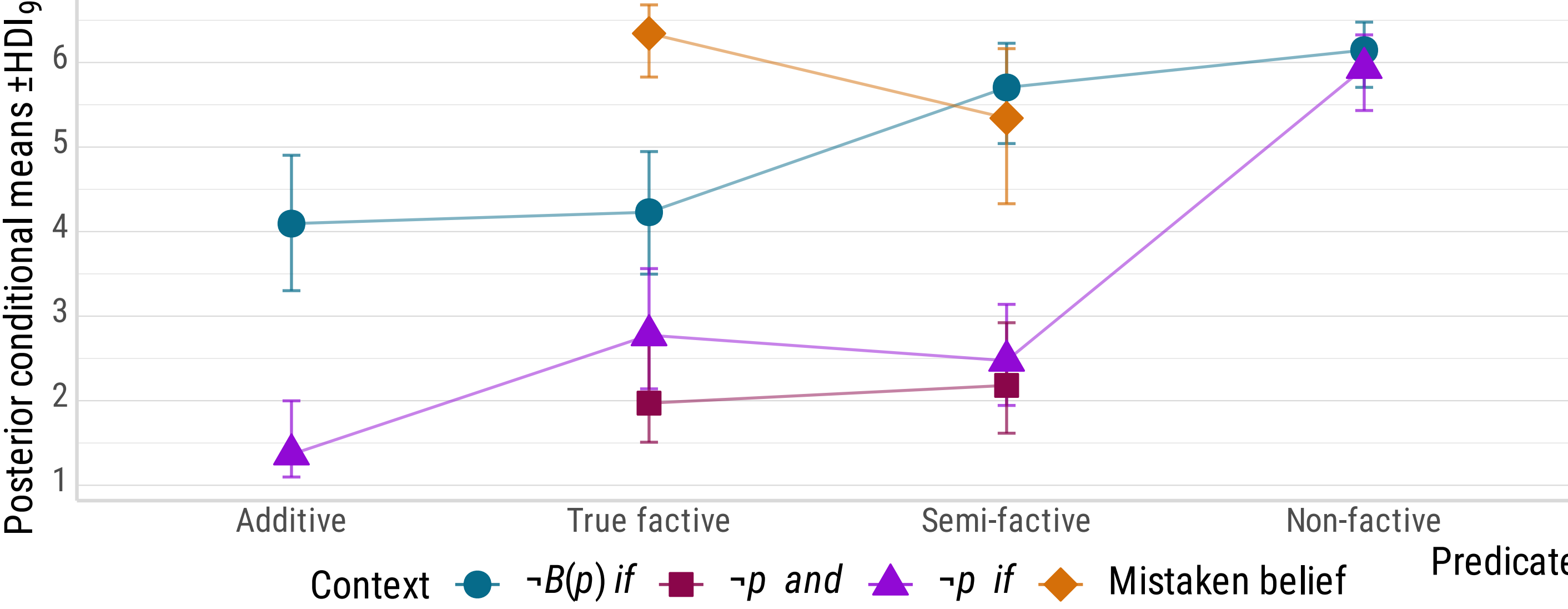


**Bayes Factor analyses** (note that these probably slightly favor the null due to the uninformative priors.) Positive values support difference hypotheses, negative ones support the null.

| Parameter | $\log_{BF}$ | Parameter | $\log_{BF}$ | Parameter | $\log_{BF}$ |
|---|---|---|---|---|---|
| ●: *realize* vs. *be angry* | 4.73 | ▲: *realize* vs. *be angry* | −1.66 | ●: vs. ▲: *be angry* | 4.20 |
| ●: *realize* vs. *too* | 4.66 | ▲: *realize* vs. *too* | 2.35 | ◆: *be angry* vs. *realize* | 2.15 |
| ●: *be angry* vs. *too* | −1.52 | ▲: *be angry* vs. *too* | 2.79 | | |

## Conclusions and Next Steps

> Our experimental results do not seem consistent with the claims by Karttunen (2016)
> > True factives pattern with additive particles wrt. presupposition violations, and contrast with semi-factives and non-factives; they should be classified as hard triggers
> > Non-projection for true factives is only available in ◆ mistaken belief contexts
> > Semi-factives can give rise to non-projection in mistaken belief contexts, too
> The ▲ vs. ● contrast with true factives and additive particles has not been observed before.
> > Local accommodation is normally not available for hard triggers, see (1c) and (1d)
> > The effect cannot be due to the accommodation of a mistaken belief context: cfr. ▲ and ■ where $\neg p$ is asserted (compatible with a mistaken belief)
> How does the interaction between PREDICATE and the ▲ ● conditions come about?
> Why are ◆ mistaken belief contexts worse with semi-factives? State vs. achievement?
> Do presupposition triggers embedded under attitudes, (3) and (5), pattern like emotive factives?

## A Theoretical Puzzle

The presupposition in ◆ mistaken belief contexts is interpreted relative to the belief state of the subject instead of the Context Set. Two preconditions appear to be necessary, see (2) to (5):
> the syntactic realization of an attitude holder (compare *regretful* vs *regret*)
> the mention of a false belief that individual has

Is the factive presupposition of true factives the result of a (hardly defeasible) pragmatic principle?

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