Semantics of Non-Doxastic Attitude Ascriptions from Experimental Perspective

Wojciech Rostworowski, Katarzyna Kuś & Bartosz Maćkiewicz*

Abstract: The paper presents novel experimental data regarding reports of non-doxastic attitudes (expressed by verbs such as "wants", "fear", "is glad", and etc.) As observed by some theorists, non-doxastic attitude ascriptions differ from the ascriptions of doxastic attitudes (e.g., "believes") in that they do not support simple entailments or presuppositions of their complement clause. In particular, an ascription may intuitively change its truth-value if we alter the informational structure of the embedded clause without modifying its truth conditions. We present two experiments whose results support this observation. Experiment 1 shows that the truth-value and acceptability judgements of non-doxastic attitude ascriptions in a context generally depend on the informational structure of the embedded clause. Experiment 2 reveals that the truth-value judgements vary if we manipulate not only the "presupposition-assertion" structure of the embedded clause, but also the components related to the non-presuppositional entailments of the clause. This conclusion suggests that the contents on which attitude verbs operate should be represented as structured entities.

Keywords. attitude ascriptions; entailments; non-doxastic attitudes; presuppositions; semantics; truth-value judgements

1. Introduction. A number of theorists (e.g., Heim 1992, Elbourne 2010, Maier 2015, Rostworowski 2018) have observed that there is a certain asymmetry between reports of doxastic attitudes – like beliefs or knowledge – and reports of the non-doxastic attitudes – like desires, fears, feeling glad, etc. Consider the following pairs of ascriptions:

(1) a. Anne believes that the ghost from the attic is quiet. ⇒
b. Anne believes that there is a (unique) ghost in the attic and it is quiet.
(2) a. Anne is glad that the ghost from the attic is quiet. ⇏
b. Anne is glad that there is a (unique) ghost in the attic and it is quiet. (e.g., Elbourne 2010)

Provided we regard (1a) as being *de dicto* (i.e., we take "the ghost" to be inside the scope of the belief-operator at the level of the sentence logical form), the ascription has the reading which trivially entails (1b). In general, two ascriptions in (1) seem to be equivalent given that their embedded clauses have closely related contents. On the other hand, (2b) is essentially different from (2a) and can be intuitively false in a situation in which (2a) is intuitively true (e.g., when Anne is glad that the ghost is quiet but not happy that the ghost exists at all). So, (2a) and (2b) have different truth conditions. Yet, the difference between the complement clauses in (2) is exactly the same as in (1). We will use the term "hyperintensionality" to refer to the indicated feature of non-doxastic attitude ascriptions.

The paper aims to contribute experimental data regarding the hyperintensionality of non-doxastic attitude ascriptions. First, we seek to verify whether ordinary users of language share the

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intuition that ascriptions of non-doxastic attitudes may have different truth values, even though their complement clauses have the same truth-conditional contents. Second, we want to investigate what kinds of manipulations of the complement clause structure are responsible for the expected difference in the truth-value evaluations. In Section 2, we provide some theoretical considerations about what is potentially responsible for the asymmetry in the truth-value evaluations of ascriptions such as (2a) vs. (2b). In Section 3, we present our experiments. Section 4 offers a discussion of our results and indicates further research directions.

2. Attitude verbs, presuppositions, and entailments. Let us take a closer look at the problem of hyperintensionality. Assuming that attitude verbs operate on the contents of their embedded clauses and nothing else – in line with compositional semantics – the contrast between (2a) and (2b) must be regarded as the output of a difference between the contents of the embedded clauses. One possible explanation of the contrast is that the embedded clauses – i.e., "the ghost from the attic is quiet" and "there is a (unique) ghost in the attic and it is quiet" – have different informational structures in the sense that the first one presupposes the existence of a ghost, while the second explicitly *asserts* it. In other terms, there is a difference between the sets of presuppositions of the sentences that serve as the complement clauses in (2a) and (2b).[1] There are other examples which confirm the prediction that incorporating the presupposition of the embedded clause as a part of its assertoric content affects the intuitive interpretation of the whole sentence. Consider:

(3) a. John wishes that Anne would quit smoking. ⇏
    b. John wishes that Anne would smoke and quit it.
(4) a. Jane wonders whether it was Jones who murdered Smith. ⇏
    b. Jane wonders whether Smith was murdered and it was Jones who had done it.

On the most natural readings, (a)-ascriptions express different contents from (b)-ascriptions.

The appeal to presuppositions can explain the effect of "hyperintensionality" related to non-doxastic attitude ascriptions. A prominent feature of presuppositions is that they project in various kinds of embeddings, i.e., they continue to arise if the trigger is embedded under certain operators (for example, negation, or the antecedent of a conditional; see Karttunen 1974). When projecting, the presupposition escapes the scope of a given operator at the same time. This phenomenon can be illustrated with a simpler example including negation:

(5) It wasn't Jones who murdered Smith.

A natural reading of the sentence is the one on which it (still) presupposes the existence of Smith's murderer and denies that Jones is the murderer. That is, what is denied is only the fact that Jones murdered Smith – and not the fact that Smith has been murdered at all. The projection behavior of presuppositions whose triggers are embedded under attitude verbs is more complex. Yet, different analyses of this behavior agree with some general observations and predictions, which roughly fit the pattern illustrated by (5). Namely, the ascription such as (2a) – which contains a presuppositional trigger in the complement clause (here, 'the ghost from the attic') – presupposes as a whole that either the local presupposition is simply satisfied, or that the attitude holder *believes*

[1] For this reason, some theorists (e.g., Elbourne 2010, 2013) have argued that the contrast between (2a) and (2b) and the like provides an argument for the presuppositional treatment of definite descriptions and against Russellian analysis on which descriptions are treated as quantifiers. Arguably, Russell's theory is committed to the claim that (2a) (on the *de dicto* interpretation) has the reading exactly equivalent to (2b). (For criticisms of this claim, see Kaplan 2005, Neale 2005, Pupa 2013, Rostworowski 2018).

that it is satisfied (see Karttunen 1974, Heim 1992, Geurts 1998, Maier 2015). In particular, (2a) presupposes that Anne believes that the ghost from the attic exists. The mere presupposition of the ghost's existence is at the same time analyzed as escaping the scope of the non-doxastic attitude verb.[2] So, (2a) does not state, among other things, that Anne is glad that the ghost exists. On the other hand, when the existence of the ghost is a part of the asserted content – like in (2b) – it naturally falls under the scope of the non-doxastic attitude verb on the *de dicto* interpretation. Consequently, (2b) expresses a different attitude than (2a). In short, the presuppositional account can predict that (2a) and (2b) are non-equivalent.

However, some further examples of non-doxastic attitude ascriptions (see Blumberg 2017, Rostworowski 2018) provide evidence for the hypothesis that hyperintensionality does not manifest itself only in the cases of presuppositional differences between the complement clauses in the ascriptions. Consider the following examples:

(6) a. Jessica wants to buy the one-thousand-dollar necklace. $\not\Rightarrow$?
b. Jessica wants to spend one thousand dollars and buy the necklace for this amount.

(7) a. Brad wonders whether the dictator has been assassinated. $\not\Rightarrow$?
b. Brad wonders whether the dictator is dead and has been assassinated. (Rostworowski 2018)

Arguably, (a)-ascriptions express somewhat different attitudes than (b)-ascriptions; in particular, we may imagine a context in which (a)-ascriptions are intuitively correct and (b)-ascriptions are not. At the same time we can observe that the first conjunct of the complement clause in the above (b)-ascriptions should not be regarded as a presupposition of the corresponding complement clause in (a)-ascription – just like it is in the earlier examples (2)-(4). For instance, the statement of "Jessica bought the one-thousand dollar necklace" entails that Jessica *spent* one thousand dollars (and bought the necklace for this amount), but the latter is not presupposed by the former in the technical sense. In particular, this sort of entailment does not exhibit the proper projection behavior, which, according to the earlier consideration, is a typical feature of presuppositions.

To sum up, non-doxastic attitude ascriptions seem to display hyperintensionality if the complement clauses induce structural differences of the non-presuppositional nature, likewise in the case in which the embedded clauses have different presuppositions. That is to say, the intuitive truth-value of a non-doxastic attitude ascription depends on the way how the information in the complement clause is structured, in addition to its truth condition. Hence, two ascriptions where the complement clauses are truth-conditionally equivalent may be evaluated differently in a context.

Finally, hyperintensionality of non-doxastic attitude ascriptions provides a challenge for semantic theory. Roughly speaking, it shows that the semantic content of a sentence – which serves as the input for attitude-verbs operators – is fine-grained to the extent that the sentence informational structure must be included in the content representation. In light of this, the non-structural notions of content – like the ones defining it in terms of *sets* of possible worlds or situations – require substantive revisions in order to handle non-doxastic attitude verbs properly. In particular, it might prove difficult to develop a theory which predicts that, for instance, (7a) is true while (7b) is not in the same context, provided that the state of the dictator's being dead is intuitively a part of any situation in which the dictator has been assassinated. (For some discussions and proposals see, e.g., Roelofsen & Uegaki 2016, Blumberg 2017).

[2] For instance, this prediction is entailed by the analyses of Geurts (1998) and Maier (2015).

3. Experimental Studies. The aim of our experimental studies was to provide empirical evidence for the theoretical claims made above. In Experiment 1, we investigated whether the general informational-structure manipulations of the complement clause affected the truth-value or acceptability judgements of an attitude ascription in a context. Experiment 2 further explored the issue by testing whether the expected difference in evaluations depends on the nature of the manipulation – on whether the manipulated element of the complement clause has a presuppositional nature or is a non-presuppositional entailment.

3.1. EXPERIMENT 1. In this experiment, we compared two kinds of non-doxastic attitude ascriptions: *straight* ascriptions and *complex* ascriptions. The former embedded simple propositions as their complement clauses (cf. 2a, 3a), while the latter a conjunction of two claims (cf. 2b, 3b). In *complex* ascriptions, the attitude ascribed to a protagonist consisted of two parts: the first one explicitly stating a presuppositional or entailed content of the straight ascription, the second being the straight ascription itself. Here are some examples used in our experiment:

(8) a. Linda is glad that her presentation today convinced the client. (*straight* ascription)
b. Linda is glad that she had a presentation today and convinced the client. (*complex* ascription)

(9) a. Linda fears that her presentation will not convince the client to sign the contract. (*straight* ascription)
b. Linda fears that she will have a presentation and she won't convince the client to sign the contract. (*complex* ascription)

Due to the exploratory nature of the study, the non-doxastic attitudes we studied were diverse in nature. Two of them were expressed by a pro-attitude verb ("want" and "glad"), two were con-attitudes ("fear" and "feel sorry"). In addition, our verbs differed grammatically because "want", a basic pro-attitude verb, does not introduce the content of the attitude with a that-clause but needs a verb in the to-infinitive form in the complement. The other verbs we have chosen are complemented by a that-clause, although the verb "glad" can be also followed by a verb in the to-infinitive form. In line with our theoretical considerations, we predicted differences between the evaluations of *straight* and *complex* ascriptions. In particular, people should tend to evaluate straight ascriptions more positively than complex ascriptions in the contexts presented in our questionnaires.

3.1.1. METHODS. We used questionnaires with an acceptability task and a truth-value judgment task. After reading a short fictional story, the respondents evaluated either a *straight* ascription or a *complex* one. They assessed either the truth value of a given ascription or its acceptability. Both types of questions were followed by a confidence level question regarding the given answer. The participants answered on a 100-point visual analogue scale in the form of a slider ranging from -50 ("strongly disagree") to +50 ("strongly agree"). In addition, they were asked a categorical comprehension question which appeared in advance to the critical evaluation question. The exact form of the questions is presented in Table 1.

Questions	Truth-value judgment	Acceptability
Comprehension question	"To whom Linda had to give the presentation?"	("a client" and "an employee")
Main question	"In the light of the story, how would you evaluate the statement *A*?" ("TRUE" and "FALSE")	"In the light of the story, would you accept the statement *A*?" ("YES" and "NO")
Confidence level	(if they answered TRUE) "To what extent do you agree that the sentence *A* is true?"	(if they answered YES) "To what extent do you agree that the sentence *A* is acceptable?"
	(if they answered FASLE) "To what extent do you agree that the sentence *A* is false?"	(if they answered NO) "To what extent do you agree that the sentence *A* is unacceptable?"

Table 1: Example prompts (*A* stands for an attitude ascription)

To sum up, we employed a 2 x 2 x 4 mixed experimental design with two between-subject factors: a type of ascription (*straight* vs. *complex*) and a type of a task (acceptability vs. truth-value judgment), and one within-subject factor (verb: "fear" vs. "want" vs. "feel sorry" vs. "glad").

3.1.2. PARTICIPANTS. For Experiment 1, 331 participants were recruited on *Clickworker* to complete an online questionnaire. Non-native English speakers and subjects who failed the attention or comprehension check were excluded. The final sample consisted of 285 subjects (163 females, 120 males, one person who refused to answer and one person who chose "other"; mean age: 39.35).

3.1.3. MATERIALS. We developed four kinds of situations that differ in their setup and plots, and named them after the protagonists: *Linda*, *Anne*, *Mark*, and *John*. The difference across setups was not predicted to be significant and served merely as a robustness check. Each vignette depicted a situation in which non-doxastic attitudes of the protagonist can be accurately/truly described by a *straight* ascription. However, certain beliefs and other attitudes of the protagonist indicated that the first conjunct of the embedded conjunction in the *complex* ascription was not a part of the protagonist's attitude. Table 2 presents a sample of the *Mark* vignette in all four conditions (four non-doxastic verbs) with both *straight* and *complex* ascriptions evaluated by the study participants.

3.1.4. PROCEDURE. The study had the form of an on-line questionnaire in which participants were asked to read a total of eight short fictional stories ("vignettes", 4 targets + 4 fillers) and answer questions about them. Each participant was randomly assigned to two between-subject conditions (questions on a *straight*/*complex* ascription and the truth-value judgment/acceptability rating task) and received four vignettes with different setups, one for each within-subject condition (non-doxastic attitude verbs). Four setups (*Linda, Anne, Mark, John*) were counterbalanced across presentation lists in such a way that no participant received two vignettes with the same setup while each setup was equally likely to occur with any non-doxastic attitude verb. Additionally, four experimental vignettes were interspersed with four vignette-fillers.

Want	*Fear*	*Feel sorry*	*Glad*
Mark is a third-year student of history. He attends a philosophy course which he doesn't enjoy very much. He prefers online meetings over the regular stationary ones. Mark wishes the continuation of the philosophy course next year would be online.	Mark is a third-year student of history. He attends a philosophy course which he enjoys very much and wants to continue next year. But he prefers regular stationary meetings over the current online ones. As the pandemic grows, Marks is afraid that next year the classes will be continued only online.	Mark is a third-year student of history. He attends a philosophy course which he enjoys very much and wants to continue next year. But he does not like the online form of studying and so is not happy that the philosophy classes are conducted on the Internet this year.	Mark is a third-year student of history. He attends a philosophy course which he doesn't enjoy very much. He prefers online studying over the regular stationary meetings, especially when it comes to the philosophy course. This year the university runs all courses online due to the pandemic, which makes Mark happy.
(*Straight* ascription) Mark wants the philosophy course next year to be online.	(*Straight* ascription) Mark fears that the philosophy classes next year will be online.	(*Straight* ascription) Mark feels sorry that the philosophy classes he attended this year are online.	(*Straight* ascription) Mark is glad that the philosophy classes this year are online.
(*Complex* ascription) Mark wants a philosophy course next year and for it to be online.	(*Complex* ascription) Mark fears that there will be philosophy classes next year and they will be online.	(*Complex* ascription) Mark feels sorry that he has attended philosophy classes this year and they have been online.	(*Complex* ascription) Mark is glad to have philosophy classes this year and that they are online.

Table 2: Example stimuli (Experiment 1)

3.1.5. RESULTS. In order to analyze the data, we computed a compound index for each rated ascription in the following way: we took confidence rating and multiplied it by 1 if the answer to the main question was positive (TRUE or YES) and by -1 if it was negative (FALSE or NO). Using a 2 x 2 x 4 ANOVA, we found a statistically significant effect of the ascription type ($F(1, 281) = 116.3$, $p < 0.001$, $\eta^2_g = 0.131$). In line with our predictions, *straight* ascriptions (acceptability rating: $M = 35.1$, $SD = 12.3$; truth-value judgment: $M = 35.9$, $SD = 12.8$) were rated substantially higher compared to the *complex* ones (acceptability rating: $M = 16.3$, $SD = 19.6$; truth-value judgment: $M = 14.2$, $SD = 17.0$). Figure 1 shows the mean evaluations of ascriptions in each condition. Figure 2 shows the means for all attitude verbs jointly. No statistically significant difference between the two types of task was observed ($F(1, 281) = 0.170$, $p = 0.68$). The only statistically significant interaction was between the ascription type and verb factors ($F(3, 834) = 7.147$, $p < 0.001$, $\eta^2_g = 0.016$). A closer examination of the data revealed that for each verb, the difference between *straight* and *complex* ascriptions was statistically significant ($p < 0.01$), but for "fear" and "glad" the difference was less pronounced compared to "glad" and "feel sorry".

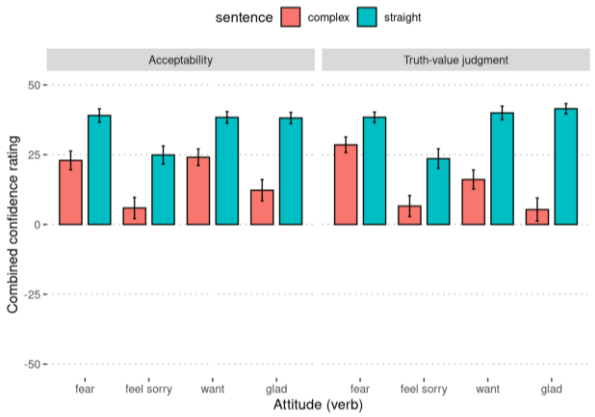

Figure 1: Experiment 1 means by condition

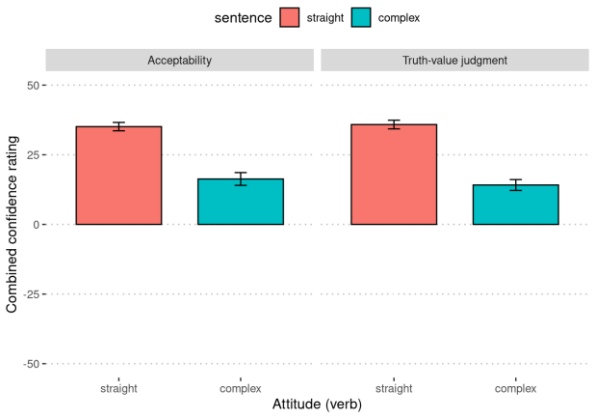

Figure 2: Experiment 1 means by condition for all verbs collapsed

3.2. EXPERIMENT 2. The second experiment aimed to verify whether the difference in evaluations between *straight* and *complex* ascriptions persists both in the case in which the clause embedded in the complex ascription explicitly formulates its presupposition, as well as a non-presuppositional entailment. We hypothesized that *straight* ascriptions are evaluated more positively than the *complex* ones in both cases.

3.2.1. METHODS. Due to the lack of differences in the type of task in the first experiment, we used only the truth-value judgment tasks. This is the only change in methods compared to Experiment 1.

We employed a 2 x 2 x 2 mixed experimental design with one between-subject factor, i.e., a type of ascription (*straight* vs. *complex*) and two within-subject factors: a type of information-structure manipulation (*presupposition* vs. *entailment*) and attitude verb ("want" vs. "glad").

3.2.2. PARTICIPANTS. In total, 352 participants recruited on *Clickworker* took part in the study. After excluding those who failed the attention check at the beginning of the survey, 292 participants remained. Then those who failed at least one comprehension check concerning target stories were also excluded. 290 subjects remained in our sample (196 females, 89 males, five persons who chose "other"; mean age: 36.23).

3.2.3. MATERIALS. Again, we developed four kinds of setups that differ in their plots and were named after the protagonists: *Andrew, Tanja, Arthur* and *Jessica.* The idea behind the stories was the same as in Experiment 1: while the protagonist's attitude could be accurately described with a *straight* ascription, it was questionable whether it could be described with a corresponding *complex* ascription. For each setup, we proposed two types of *complex* ascriptions: the first conjunct was either a presupposition, or a non-presupposed entailment of the second conjunct (i.e., the *presupposition* and *entailment* conditions). Table 3 presents a sample of the *Andrew* vignette in all four conditions with both *straight* and *complex* ascriptions evaluated by the study participants.

3.2.4. PROCEDURE. Again, the participants were presented with an on-line questionnaire and asked to read a total of four target vignettes interspersed with four filler items. Each participant was randomly assigned to one of two between-subject conditions (*straight* or *complex* ascription) and received four vignettes with different setups, one for each within-subject condition ("want" vs. "glad") and one for each type of the information-structure manipulation (*presupposition* vs. *entailment*). Four setups were counterbalanced across presentation lists.

Want		*Glad*	
Presupposition	*Entailment*	*Presupposition*	*Entailment*
Andrew owns a big old house. Unfortunately, it has been seriously damaged by a huge flood. As costs of keeping the house have started to go up, Andrew would rather not have to deal with this or any other house. He believes it would be better for him to sell the house and move to a smaller apartment. But before putting his house on the market, Andrew decides to make some repairs and spruce his home up a little.	Andrew owns an old beautiful cottage. Unfortunately, he will have to sell it because of high costs of running and keeping it in good condition. Andrew generally does not want to sell the house because he really likes it. If he is to sell it to anyone, it would be to his cousin Jennifer, an interior designer, since he believes that she will take good care of the cottage.	Andrew owns a big old house. Unfortunately, it has been seriously damaged by a huge flood. Andrew decides to make some repairs. However, afterwards, he feels uneasy living there because he is scared that something like that would happen again. He then decides to sell this house and move to a small apartment that will not be as troublesome as a house. When putting his house on the market, he realizes that the improvements he has made after the flood have significantly increased the value of his property, which makes him really happy.	Andrew owned an old beautiful cottage. Unfortunately, he had to sell it because of high costs of running and keeping it in good condition. Andrew is generally not happy about selling the house because he really liked it. However, at the same time he feels pleased that he has sold it to his cousin Jennifer, an interior designer, since he knows that she will take good care of the cottage.
(*Straight* ascription) Andrew wants to renovate his house.	(*Straight* ascription) Andrew wants to sell his house to Jennifer.	(*Straight* ascription) Andrew is glad that he has renovated his house.	(*Straight* ascription) Andrew is glad that he has sold his house to Jennifer.
(*Complex* ascription) Andrew wants to own a house and to renovate it.	(*Complex* ascription) Andrew wants to sell his house and sell it to Jennifer.	(*Complex* ascription) Andrew is glad that he owned a house and renovated it.	(*Complex* ascription) Andrew is glad that he has sold his house and that he has sold it to Jennifer.

Table 3: Example stimuli (Experiment 2)

3.2.5. RESULTS. The preparation of the data was the same as in Experiment 1. The results are presented in Figure 3 which shows means by condition in Experiment 2. The main finding of the first study was replicated. The participants rated *straight* ascriptions (*presupposition*: M = 35.94, SD = 16.00; *entailment*: M = 22.73, SD = 20.80) significantly higher than *complex* ones (*presupposition*: M = -12.60, SD = 26.50; *entailment*: M = -0.35, SD = 25.10; $F(1, 576) = 373.1$, $p < 0.001$, $\eta^2_g = 0.26$). We also found a statistically significant effect of the verb ($F(1, 576) = 78.84$, $p < 0.001$, $\eta^2_g = 0.06$). Two interactions were statistically significant. The first one was a two-way interaction between the type of information-structure manipulation and type of ascription (F(1,

576) = 47.15, $p < 0.001$, $\eta^2_g = 0.04$). The effect of the ascription type was more pronounced in the *presupposition* condition compared to the *entailment*. As can be seen in Figure 4, the difference between *straight* and *complex* ascriptions is larger in the presupposition condition. The second significant interaction was a three-way interaction between the information-structure manipulation, a type of ascription and a verb ($F(1, 576) = 7.384$, $p = 0.007$; $\eta^2_g = 0.006$). More detailed inspection of the data shows that the interaction effect is present due to the fact that in the *presupposition* condition, the difference between *straight* and *complex* ascriptions for "want" is larger than for "glad".

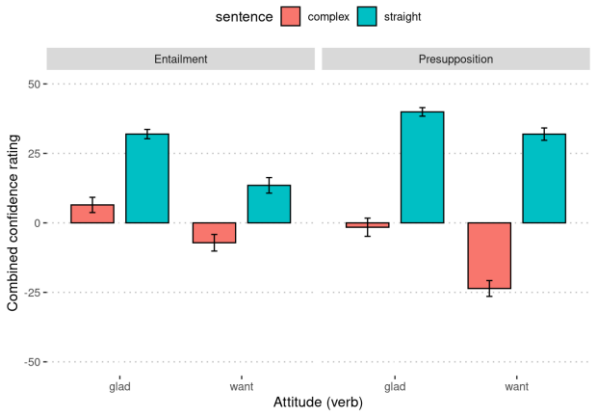

Figure 3. Experiment 2 means by condition

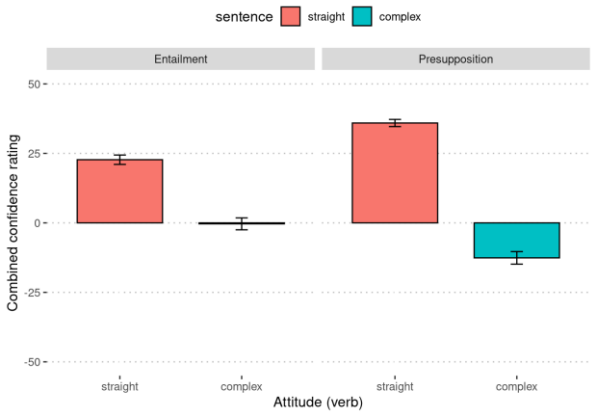

Figure 4. Experiment 2 means by condition for all verbs collapsed

4. Discussion and Conclusions. The results of both experiments have confirmed our theoretical predictions. Experiment 1 has shown that evaluations of the non-doxastic attitude ascriptions generally depend on the informational structure of the embedded clause. In particular, people tend to agree that *straight* ascriptions are "true" or accept them to a much greater degree than *complex* ascriptions in the contexts presented in our study. Experiment 2 has provided a more specific insight into the phenomenon at issue. A subject *S* may hold an attitude towards *q* and not towards *p* (where *p* is a presupposition of *q*) and, in such a case, people tend to evaluate the ascription saying that *S* holds the given attitude towards the conjunction of *p* and *q* as false rather than true. It shows that presuppositions indeed escape the scope of attitude-verbs operators in the sentences like *straight* ascriptions. This observation is in line with predictions of the theoretical analyses of presupposition projection. However, Experiment 2 also has demonstrated that a similar effect (though somewhat weaker) arises with non-presuppositional entailments. That is to say, according to the study participants, *S* may hold an attitude towards *q* but not towards the conjunction of *p* and *q*, even if *p* is entailed by *q*, so *q* and "*p* and *q*" are genuinely equivalent. This result indicates that non-doxastic attitude ascriptions are indeed sensitive to the way in which the content of the complement clause is structured, which means that non-doxastic attitude verbs operate on structured contents (rather than, e.g., sets of possible worlds).

As we have observed, the difference between evaluations of *straight* and *complex* ascriptions was more pronounced in the *presupposition* condition than in the *entailment* one. In particular, people tended to evaluate *complex* ascriptions as closer to "false" rather than "true" in the *presupposition* condition, while they expressed genuinely ambivalent judgments in the *entailment* condition (rate of acceptance close to 0). Our hypothesis is that this difference is due to pragmatics.

An entailment being not presuppositional is practically something that follows from the assertoric part of a statement, thereby it is related to the statement main content in a more direct way than a presupposition. In a sense, such an entailment indicates a *consequence* of a given action, state, etc. expressed in the statement. Presumably, when evaluating a sentence "*S* is glad that *p* and *q*", or "*S* wants *p* and *q*", some of the study participants felt that *S* had nonetheless accepted *p* as a consequence of the desirable *q*, although *p* itself was not desirable for *S*. Consequently, these participants tended to agree that the *complex* ascriptions were true to a certain degree.

To sum up, we have argued that non-doxastic attitude verbs are sensitive to the informational structure of the embedded clause. In the first part of the paper, we have presented theoretical observations in support of this claim. We have also argued that the phenomenon under discussion can be (only) partially explained by the theory of presuppositions and their projection. In the second part of the paper, we have provided novel experimental evidence that supports our theoretical observations. The results have shown that the informational structure of the embedded clause is relevant to the truth-value evaluation of a non-doxastic attitude ascription and confirmed the prediction that presuppositions project out of the scope of attitude verbs.

There are further questions which arise with regards to our experimental findings. Firstly, none of the conditions in which people evaluated *complex* ascriptions prompted them to give definitely negative answers. This raises the question of whether the rejection of *complex* ascriptions reflects a genuine semantic judgment, i.e., the ascriptions are indeed false according to people. If yes, then the respondents must have refused to express such a judgment in a definite way for some reasons (for instance, they observed that the second conjunct in the embedded clause correctly described the given attitude, so they wanted to deliver a less harsh verdict). The alternative is that the rejection is based on purely pragmatic grounds – that is, people regarded *complex* ascriptions as misleading but not literally false in the presented contexts. The second question is what kinds of entailments are actually supported by non-doxastic attitude verbs. The obtained results showing that *straight* ascriptions do not validate *complex* ascriptions indicate that at the same time Conjunction Elimination may work "under" an attitude verb (i.e., "*S V*es that *p* and *q*" ⇒ "*S* Ves that *p*" is valid). The reason why people reject complex ascriptions is likely because the first conjunct in the embedded clause incorrectly describes an attitude of a subject. If so, people evaluate the whole ascription "S Ves that p and q" based on their evaluation of "S Ves that p", which indicates that they implicitly perform Conjunction Elimination. Both issues require further experimental research.

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