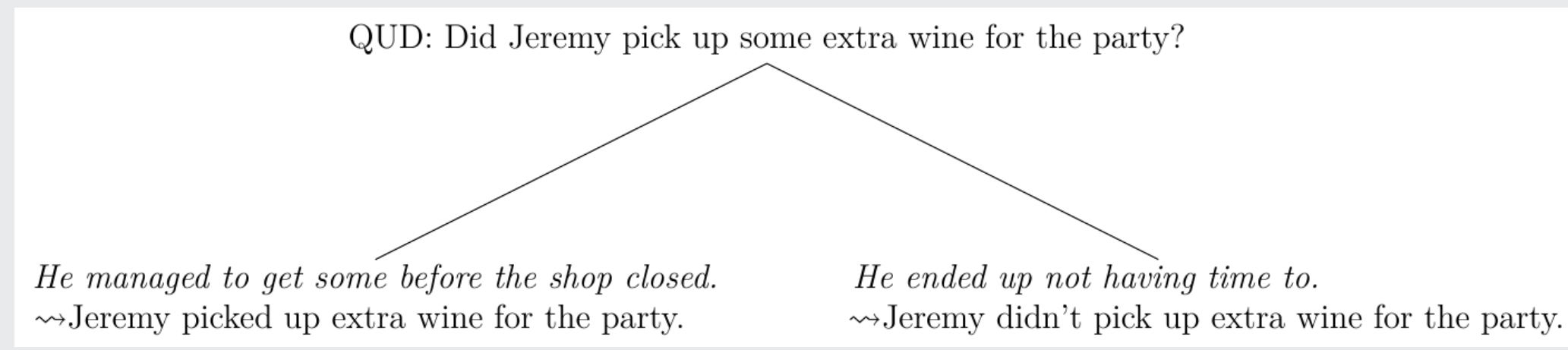


Background

**Non-actuality implicatures** (NAIs; Grant, Clifton & Frazier 2012) highlight the contrast between a described state of affairs and the actual world. NAIs are triggered by future oriented predicates like *want*, *is eager to*, non-epistemic modal *should*, *is supposed to* (1)-(2):

- (1) Alice **should've** gone to the conference. (2) Jeremy had **intended to** pick up some extra wine for the party.
- Alice didn't go to the conference. → Jeremy didn't pick up extra wine for the party.

According to Grant et al, NAI triggers like those in (1)-(2) introduce Questions under Discussion (QUD; Roberts 1996) as to whether the described state holds. The expectation that this QUD will be answered leads to the implicature.



- >What aspects of a discourse determine how the implicit QUD is resolved (answered as *yes* or *no*)?
- >Is the likelihood of retaining the implicature affected by the structure of the embedding discourse?
- >Does the **question structure** of the discourse containing a NAI trigger influences how likely the inference is to survive, or alternatively, be cancelled?

Three Mechanical Turk experiments explore the role of discourse-structuring questions in resolving NAIs.

- >**Exp1:** open v. closed question — higher implicature cancellation rates when question structure is open
- >**Exp2:** for open discourse questions, there is a strong effect of the type of evidence the utterances following the NAI trigger on the rate of implicature cancellation.
- >**Exp3:** effect of explicitly introduced embedded *why/why not* questions interacts with question structure

Exp1: Question structure and implicature cancellation

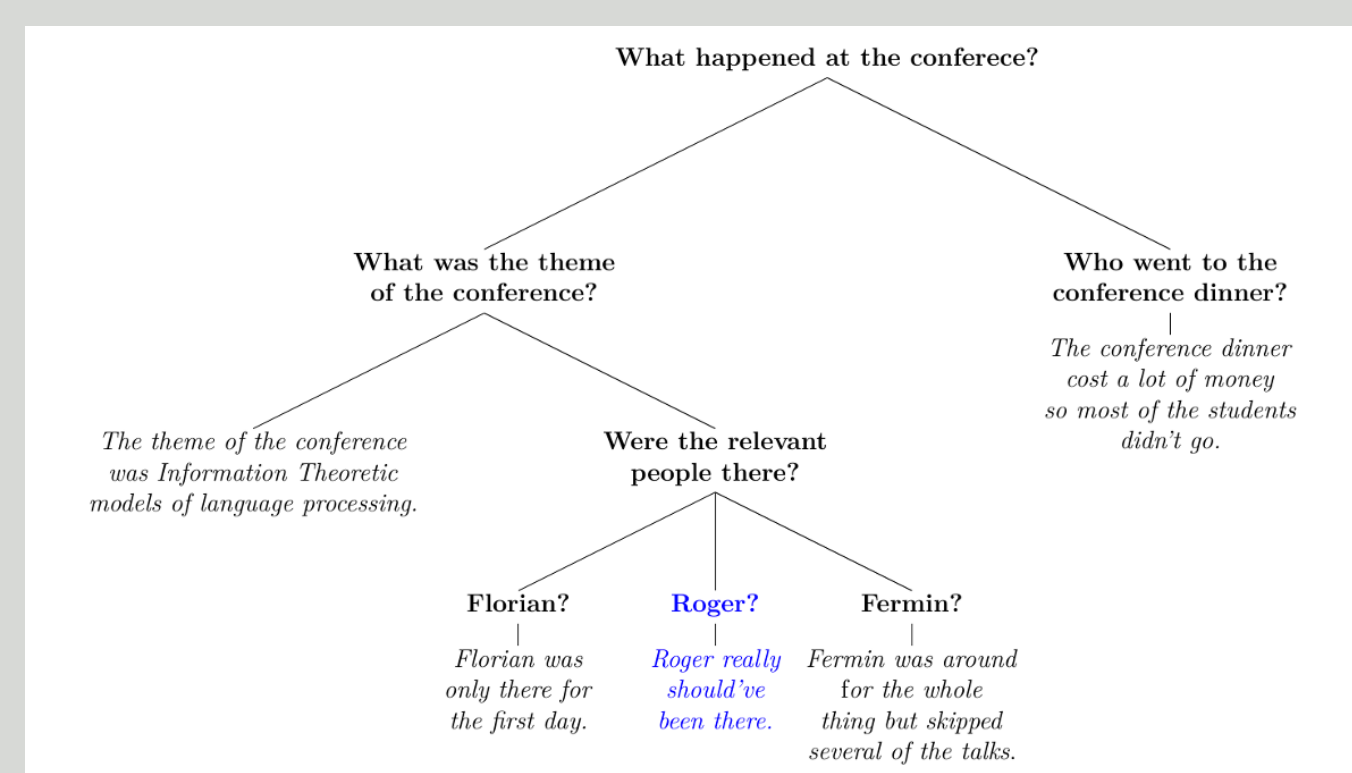
**Question:** >Does the QUD structure of the discourse influence whether NAIs persist or are cancelled?

Participants read 12 5-sentence discourses (n=63) that appeared in one of three structural configurations. (Discourse trees below based on Büring 2003.)

Discourse types:

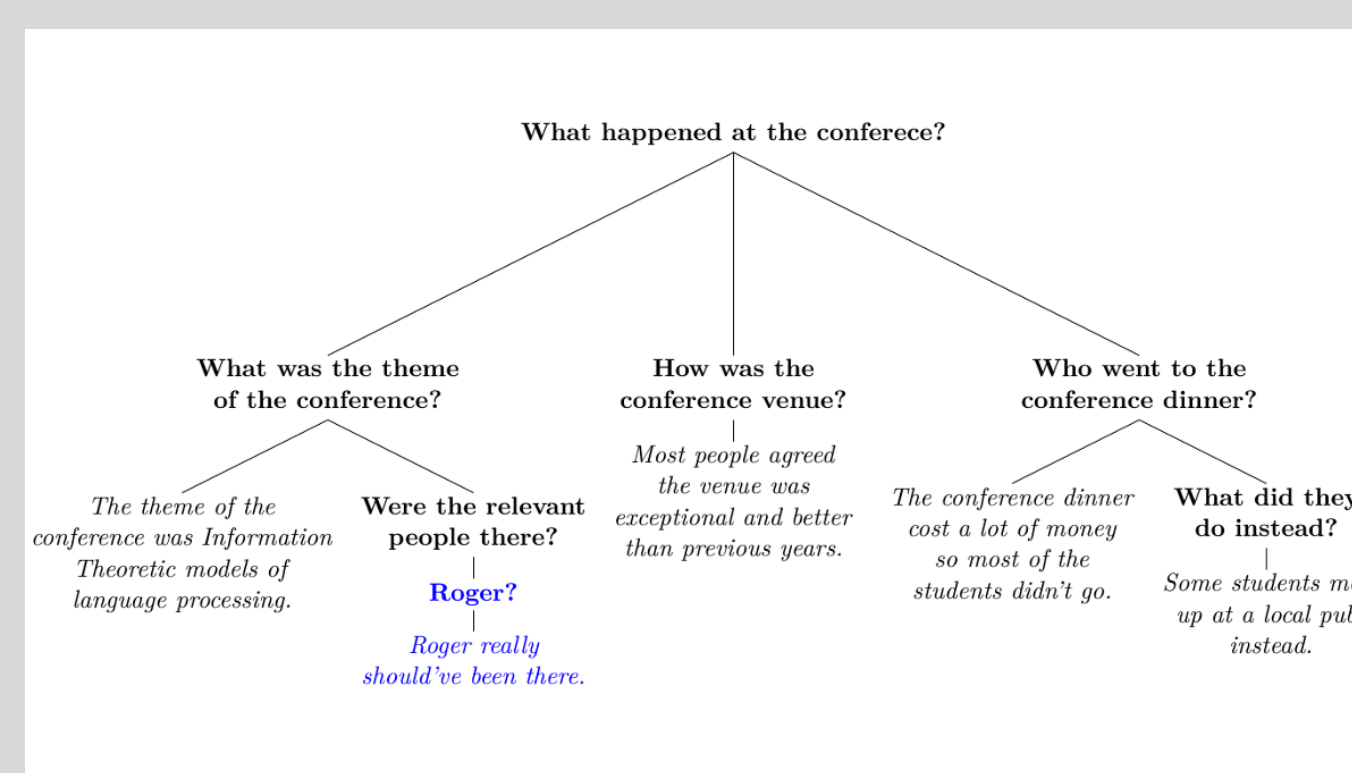
**closed QUD/branching**

- The theme of the conference was Information Theoretic models of language processing.
- Florian was only there for the first day.
- Roger really **should've been there**.
- Fermin was around for the whole thing but skipped several talks.
- The conference dinner cost a lot of money so most of the students didn't go.



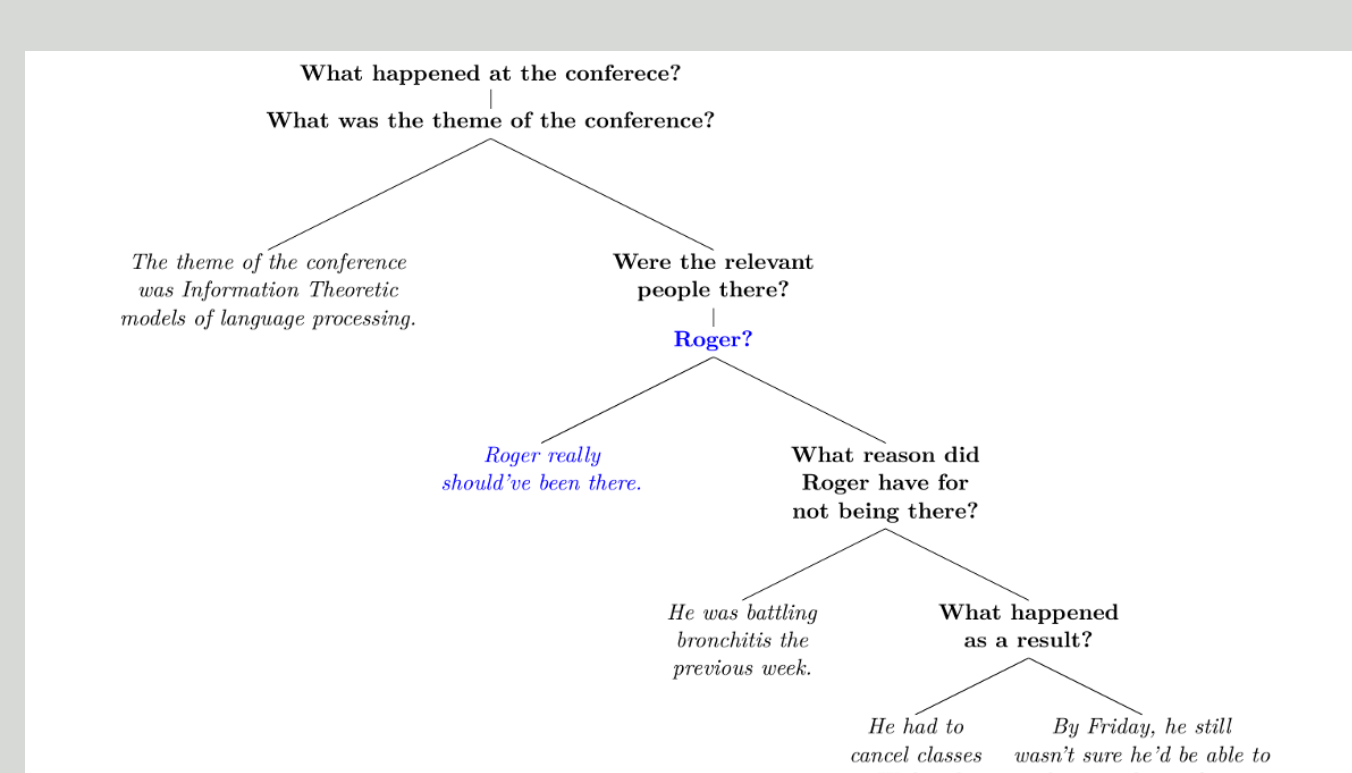
**closed QUD/nonbranching**

- The theme of the conference was Information Theoretic models of language processing.
- Roger really **should've been there**.
- Most people agreed the venue was exceptional and better than previous years.
- The conference dinner cost a lot of money so most of the students didn't go.
- Some students met up at a local pub instead.



**open QUD**

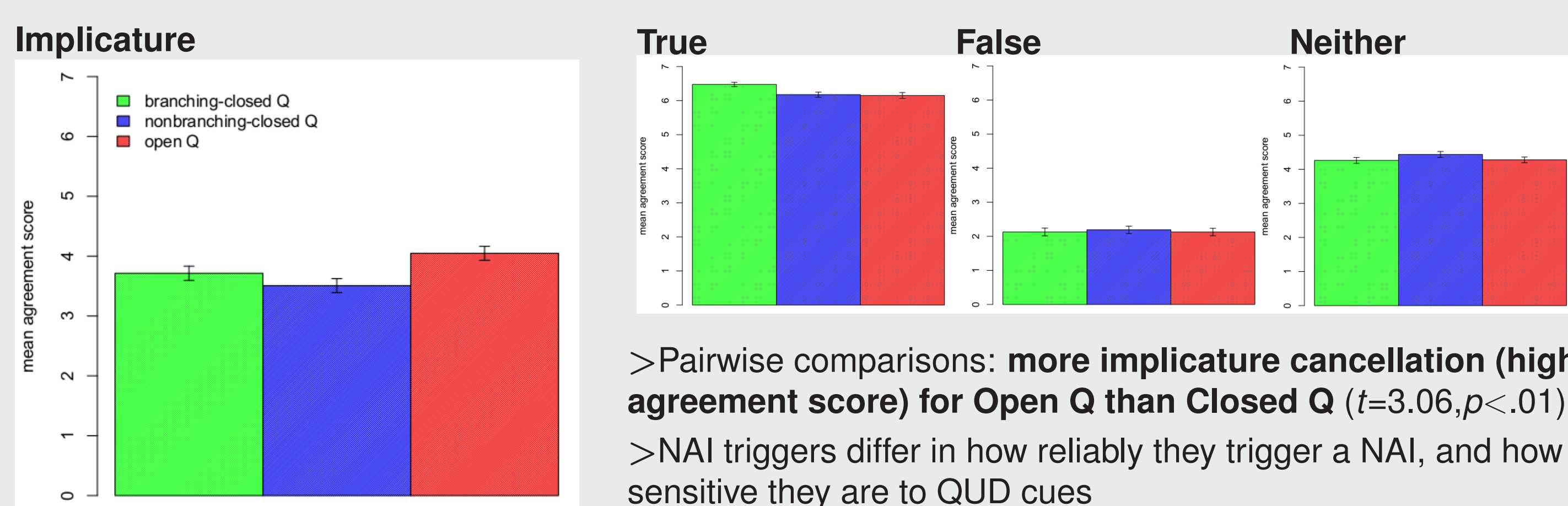
- The theme of the conference was Information Theoretic models of language processing.
- Roger really **should've been there**.
- He was battling bronchitis the previous week.
- He had to cancel classes on Wednesday.
- By Friday, he still wasn't sure he'd be able to make it to the conference.



Each discourse was followed by four statements; participants indicated how much they agreed with the statements on a 1-7 scale (1=strongly disagree).

**Statement types:** True, False, Not answered, Implicature. *The conference dinner was optional. Florian was there the whole time. Most of the people at the conference were students. Roger was at the conference.*

- >Implicatures should be rejected more often when discourse leaves QUD open
- >Implicatures should persist more often when discourse 'closes off' QUD



>Pairwise comparisons: **more implicature cancellation (high agreement score) for Open Q than Closed Q** ( $t=3.06, p<.01$ )  
>NAI triggers differ in how reliably they trigger a NAI, and how sensitive they are to QUD cues

**Experiment 1:**

- >Non-actuality implicatures introduce a question to be resolved by the following discourse.
- >The likelihood of retaining the implicature is sensitive to the structure of the embedding discourse.

Exp2: Evidence about the answer to the QUD

**Question:** >Are implicature cancellation rates affected by whether subsequent material in the discourse provides evidence for a positive or negative answer to the QUD introduced by the NAI trigger?

Participants read 28 5-sentence discourses (n=30) that appeared in one of four configurations. Two corresponded to the Closed-branching, Closed-nonbranching conditions from Exp1. There were two Open QUD conditions:

**open QUD-positive evidence**

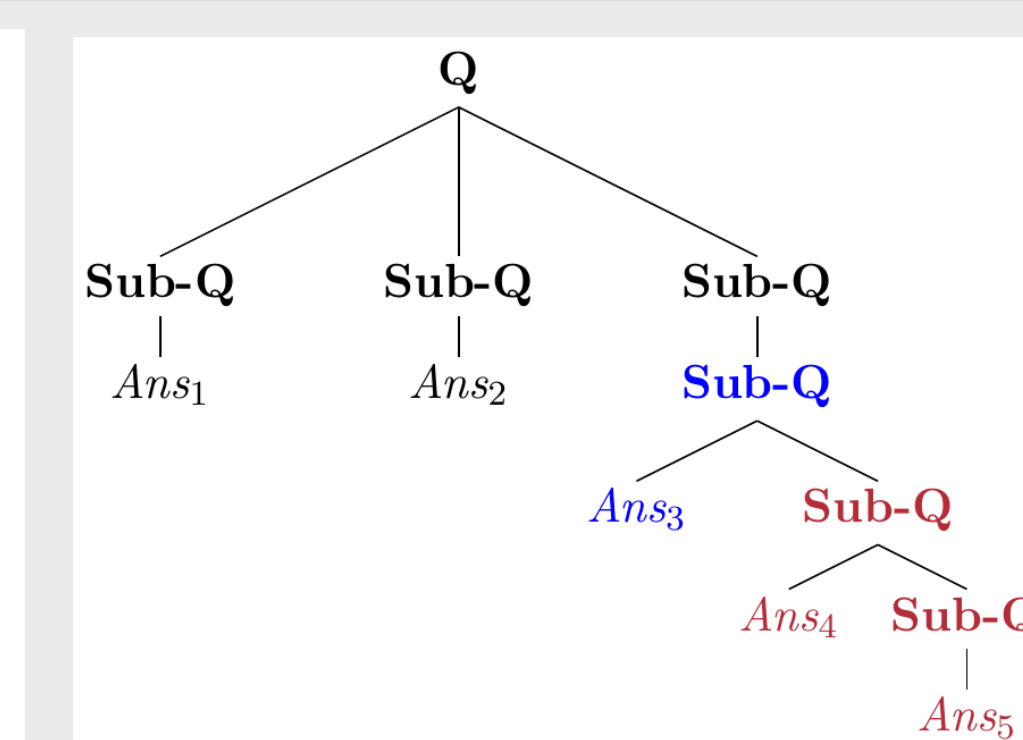
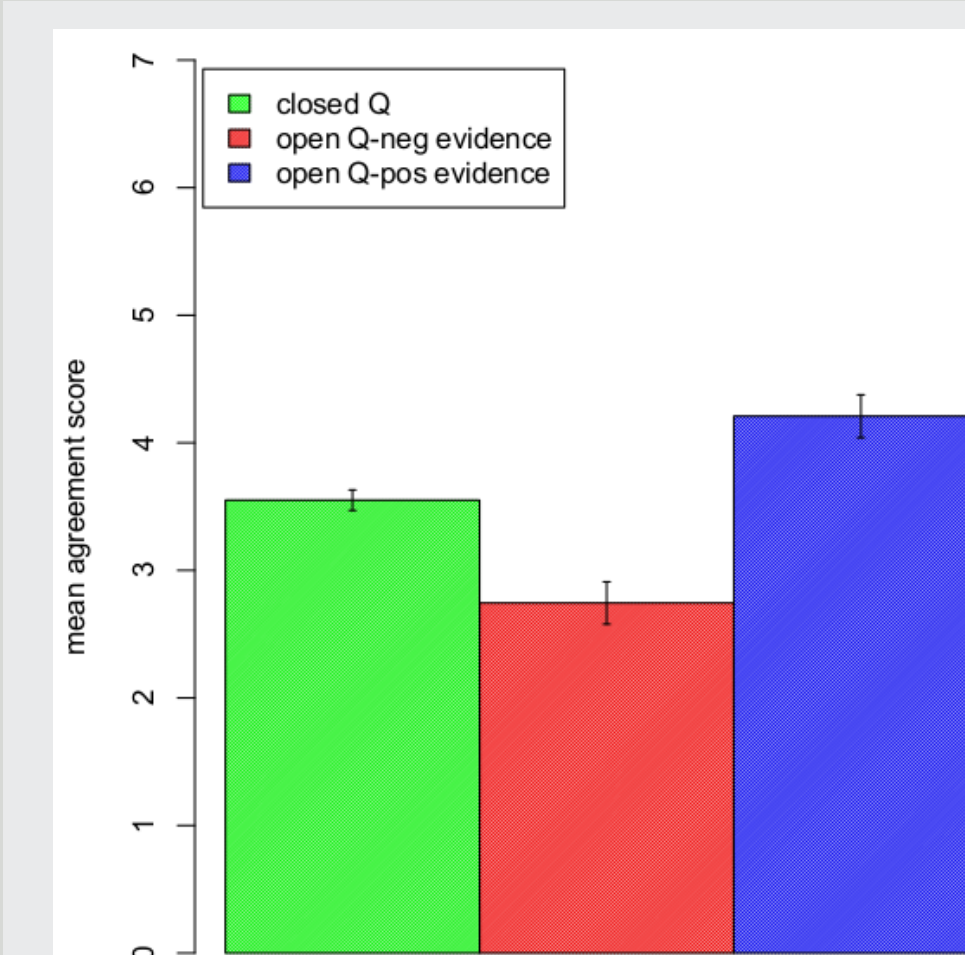
- The interviews at the analytics firm were highly stressful for all the job applicants.
- The firm did all its hiring for the year in one busy week of interviews.
- To prepare for his interview, Bill **had intended** to read every technical report from the past five years.
- He **thought being familiar with the company's previous work would give him an edge**.
- He **got the sense that the company really valued hard work and would be impressed that he was so well-prepared**.

**open QUD-negative evidence**

- The interviews at the analytics firm were highly stressful for all the job applicants.
- The firm did all its hiring for the year in one busy week of interviews.
- To prepare for his interview, Bill **had intended** to read every technical report from the past five years.
- He **knew it was a huge amount of material, and very dense reading**.
- He **spent most of his evenings working through the reports but had many more left to go through**.

Procedure and statement types were as in Exp1-2.

- >Implicatures should be rejected more often when discourse leaves QUD open
- >Within the Open QUD conditions, implicatures should be rejected more often when material following the NAI trigger provides evidence for a positive answer to the QUD.



>Pairwise comparisons: **more implicature cancellation (high agreement score) for Open than Closed Q** ( $t=3.06, p<.01$ )

**Experiment 2:**

- >The likelihood of retaining the implicature is sensitive to the nature of the evidence provided by subsequent discourse material about the answer to the implicit QUD.

Exp3: Explicit questions

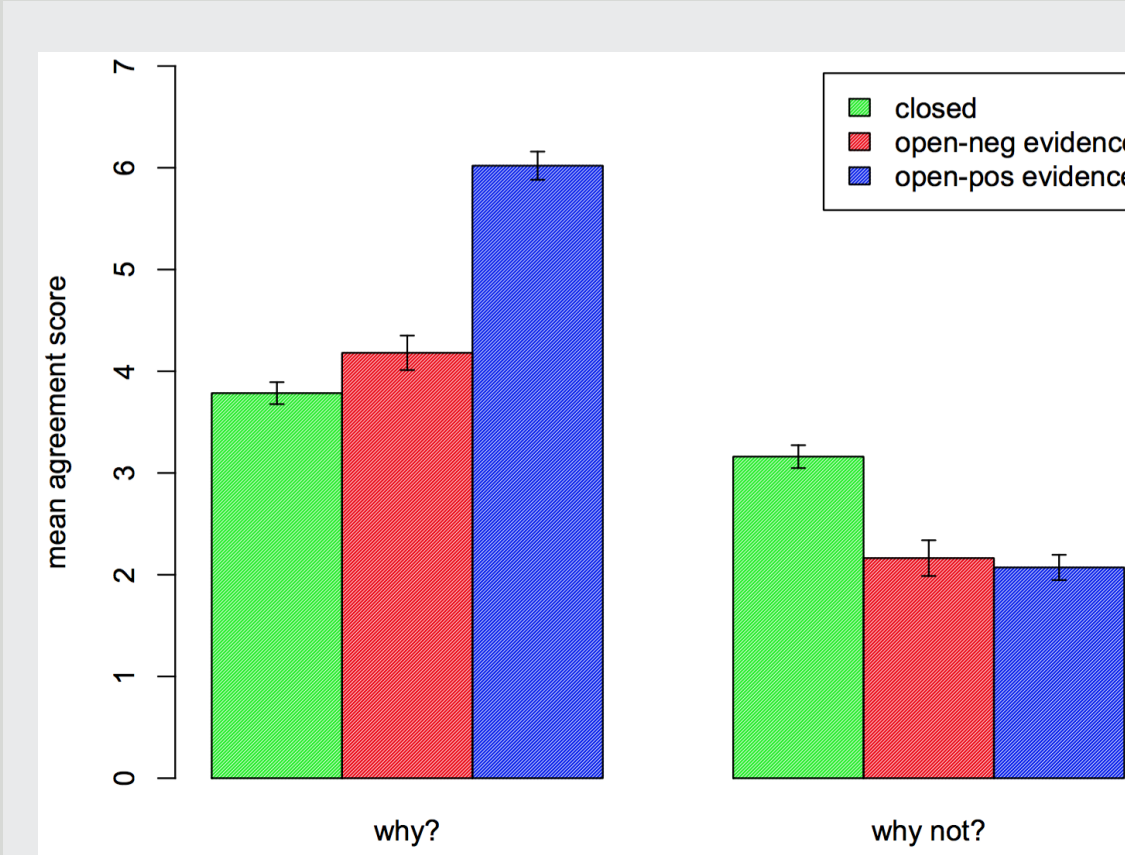
**Question:** >How are implicit cues to question structure (open/closed Q, positive/negative evidence about NAI) affected by explicitly introduced wh-questions that presuppose either the NAI or cancellation reading?

Participants read 28 6-sentence discourses (n=30) that appeared in one of the four configurations from Exp1. An additional sentence was included immediately following the sentence containing the NAI trigger, which introduced an embedded *why* or *why not* question. For the Exp2 example above:

*To prepare for his interview, Bill had intended to read every technical report from the past five years.*  
**why?** It was obvious why he did.  
**why not?** It was unclear why he didn't.

Procedure and statement types were as in Exp1-2.

- >The polarity (*why/why not*) of the embedded Q should strongly influence whether the NAI persists or is cancelled, since the embedded Q introduces a presupposition that the state of affairs holds/does not.
- >In the presence of explicit evidence (the presupposition introduced by the wh- Q) about the status of the NAI, do the implicit question structure of the embedding discourse (Exp1-2) or the implicit positive/negative evidence about the resolution of the NAI (Exp2) still influence implicature cancellation rates?



>Lmm model with openQUD, WhQ polarity, interaction as FEs: **positive WhQ polarity** (*why*) strongly predictive of agreement/NAI cancellation ( $\beta = 1.34, SE = .11, p < .0001$ ).  
>**WhQ polarity-open/closed QUD interaction:** greater impact of WhQ polarity when QUD open ( $\beta = .13, SE = .05, p < .01$ ).  
>Within open QUD subset: Both **positive NAI evidence** ( $\beta = .44, SE = .18, p < .05$ ), **WhQ polarity** ( $\beta = 1.49, SE = .13, p < .0001$ ) predict agreement/NAI cancellation.  
>**Positive evidence interacts with WhQ polarity** ( $\beta = .48, SE = .12, p < .001$ ): stronger WhQ polarity effect when discourse following NAI trigger provides positive evidence about how the NAI should be resolved.

**Experiment 3:**

- >Presuppositions introduced by explicit embedded wh- questions strongly influence whether NAIs persist (*why*) or are cancelled (*why not*).
- >Implicit cues to the question structure of the discourse (whether the question containing the NAI trigger is open/closed, whether discourse material following the NAI trigger provides positive/negative evidence about how the NAI should be resolved) still influence NAI cancellation rates in the presence of explicitly introduced wh- questions.

Conclusions

- Using NAIs as a case study, these results contribute to our understanding of discourse-structuring questions, and the cues used to infer them.
- >Whether the current discourse unit is perceived to remain open or be closed off influences whether NAIs persist or are cancelled
- >For NAIs in open Q discourses, subsequent discourse material that provides positive or negative evidence about the resolution of the NAI (cancellation v. NAI reading) influences implicature rates.
- >The effect of explicitly introduced embedded *why/why not* questions, which introduce presuppositions supporting either the NAI or cancellation reading, interacts with implicit cues to question structure.