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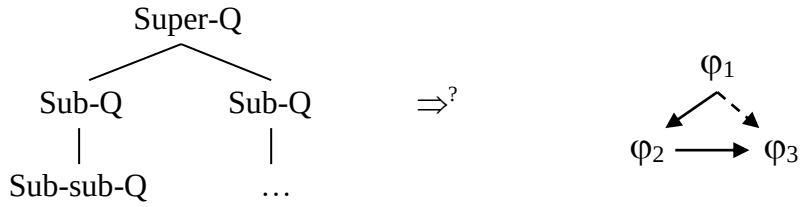
Exploring the Connection between QUDs and Discourse Structure

Introduction

Starting point:
While both QUD-based approaches (Roberts 1996/2012, Beaver et al. 2017) and relational approaches (Kehler 2002, Asher & Lascarides 2003) have proven successful in improving our understanding of discourse coherence, it is an open question how they could be unified (but see Kehler & Rohde 2017, as well as Jasinskaja's work).

Focus of today's talk:
I want to focus on the *hierarchical* aspects of discourse structure (see Hunter & Abrusán 2017), exploring the possible relationship between QUDs and the difference between subordinating and coordinating discourse moves.



Background

- one central aspect of a theory of discourse structure concerns how it motivates the accessibility of individual discourse segments given the structure, as captured by the distinction between subordinating and coordinating relations in interaction with the Right Frontier Constraint (Polanyi 1988):

  (1) Right Frontier Constraint (simplified)
  Only discourse segments on the right edge of a discourse structure are available for discourse continuations.

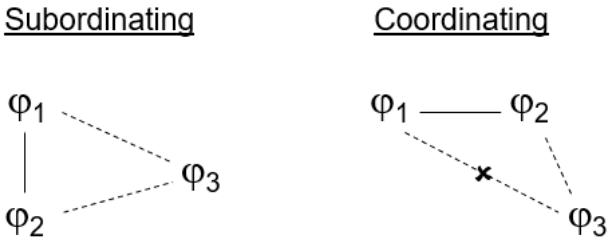


FIGURE 1: ILLUSTRATION OF RIGHT FRONTIER CONSTRAINT

- ↗ however, the distinction between subordinating and coordinating relations is usually made impressionistically by listing individual relations rather than being derived (see Asher & Vieu 2005), thus begging the question what's underlying this difference

- ➢ in the following, I want to pursue an approach inspired by Jasinskaja (2017) and Jasinskaja & Karagjosova (to appear) that adopts the view that the distinction between subordinating and coordinating moves is related to achieving communicative goals

- Jasinskaja (2017) and Jasinskaja & Karagjosova (to appear) argue that ELABORATION constitutes the default relation as derived from the pragmatic principles of Exhaustivity and Topic Continuity, while coordinating relations require explicit marking

  (2) The Principle of Exhaustivity
  By default, an utterance is interpreted exhaustively (wrt. the current discourse topic).

  (3) The Principle of Topic Continuity
  By default, the discourse topic does not change.

- to capture cases of other subordinating relations like EXPLANATION that seem to violate this hypothesis, see (4), Jasinskaja & Karagjosova propose the broader definition in (5)

  (4) John praised Bill. He wrote the best term paper.

  (5) Definition of Subordination
  In a sequence of discourse units $<U_1, U_2>$, U_2 is subordinate to U_1 whenever the communicative goal of U_1 cannot be reached before the communicative goal of U_2 is reached.

- on this approach, subordination is used to address a *grounding problem*, for instance to provide further information to ensure proper comprehension of an utterance:

  (6) This piece begins with an anacrusis,
  [What is 'anacrusis'?]
  an unaccented note which is not part of the first full bar.

- the view I want to take here puts subordination and coordination in relation to the principles in (2) and (3), namely as moves in a game that needs to balance maximizing informativity (≈ *Tell me new things!*) and understanding (≈ *Don't tell me things I don't understand!*)

  - ✦ the guiding intuition here is that there is a pressure to move on in a conversation but that it is bad to leave open questions behind

➢ the aspect of this approach I want to explore here is how to identify what requires grounding and to what extent people are sensitive to it, pursuing the following hypothesis:

  (7) QUD Grounding Hypothesis
  If a discourse unit is associated with an identifiable QUD, the respective QUD needs to be addressed before the discourse can move on but is expected to be continued once it is solved.

↗ in order to pursue this hypothesis, however, I need to make some assumptions about what an identifiable QUD and its corresponding grounding issue is

Transition

- I want to focus on two cases that have been shown to affect processing online and (partially) framed as relating to a particular QUD

Case #1: Implicit Causality

- certain verb types like *admire* or *fascinate* famously give rise to a so-called implicit causality (IC) bias, that is, an ambiguous pronoun in cases like (8) has a bias towards being resolved to the previous stimulus argument (Garvey & Caramazza 1974 etc.)

(8) a. Thuy admires Emma because she is a jibbey. (*she* = Emma)
b. Brandon fascinates Chris because he is a leego. (*he* = Brandon)

- this effect has been investigated within a framework of coherence relations, where it was shown that IC-verbs increase the proportion of EXPLANATION relations after a full stop compared to non IC-verbs (Kehler et al. 2008) and affect online processing (Rohde et al. 2011, Kehler & Rohde 2017)

- Solstad & Bott (2013) argue that this bias towards EXPLANATION relations is due to the presence of a causal argument in IC-verbs that wants to be specified, supported by data showing that both the EXPLANATION bias and the pronoun resolution bias disappears when the causal argument is explicitly specified with a PP like *with his travel descriptions* for (8b)

➢ in light of this research, I assume that IC-verbs give rise to an implicit *Why*-question that is ideally addressed with a following EXPLANATION

Case #2: Non-actuality Implicatures

- Grant et al. (2012) and Clifton & Frazier (2012) provide evidence that modal verbs like *need* or *could* affect the online processing of ellipsis and relate this to a *non-actuality implicature* of these verbs (= the described state of affairs does not hold) that gives rise to a polar QUD of the form *Did it happen?*

(9) This information { needed to be / was } released but Gorbachev didn't.

(10) a. This information { should be / was } released but Gorbachev didn't, according to our sources, notify the appropriate bureau.
b. Jessica { could go / went } to Paris, but she hasn't, according to her sister, been to Rome any time recently.

➢ I will follow these authors in assuming that modals like *could p* give rise to the QUD *Did p happen?* with a following CONTRAST addressing that QUD

↗ notably, CONTRAST is standardly considered a coordinating relation, somewhat detrimental to the idea that grounding problems need to be solved via subordination, but allowing the possibility to investigate the idea for both subordinating and coordinating grounding moves

Experiments

- to test the QUD Grounding Hypothesis, I will present two semi-pilot experiments (a third one can be found in the Appendix)

Experiment 1: sentence pair AJT (N=24)

Research Question: Is there a penalty for not solving QUD?

Items: 16 IC-verbs (½ NP1, ½ NP2), 16 NAI-verbs (½ *could*, ½ *should*), 16 bad fillers

Set 1: IC-verbs

Design: 2x2, PREPOSITIONAL PHRASE (+/-PP) x DISCOURSE RELATION (EXPL vs NARR)

Sample Item:

(11) +/-PP S_1: Frank impressed Mary at the party (with his agility).
EXPL[1]/NARR S_2: (Then) He danced quite remarkably.

Prediction: NARRATION should be worse than EXPLANATION but less so w/ PP

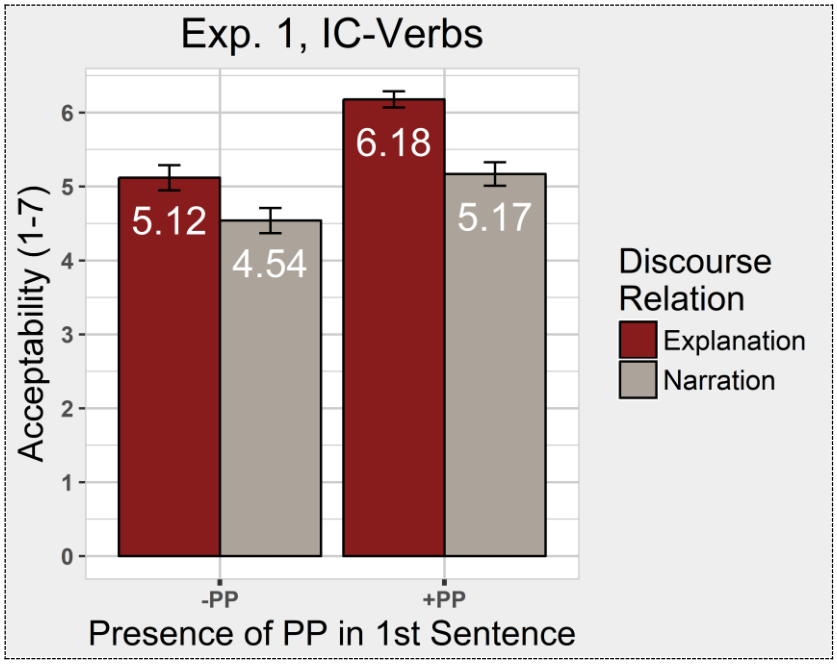
- NARRATION would correspond to moving on w/o solving grounding problem, but if the PP provides the causal argument and thereby solves the grounding problem, moving on should be licensed.

Results
(rep. measures ANOVA)[2]:

- NARRATION significantly worse than EXPLANATION

- PP leads to significant increase

- penalty for NARRATION numerically smaller w/o PP



Discussion:

- penalty for NARRATION as predicted but potential interaction in opposite direction
- preference for +PP might be due to facilitated integration or its own QUD

[1] In the presence of the PP, the EXPLANATION relation might also be considered as ELABORATION.
[2] PP: ($F_1(1, 23) = 22.44$, $p < .001$***, $F_2(1,15) = 7.762$, $p < .05$*); DISCOURSE RELATION: ($F_1(1, 23) = 17.7$, $p < .001$***, $F_2(1,15) = 15.46$, $p < .01$**); INTERACTION: ($F_1(1, 23) = 1.88$, $p = .184$, $F_2(1,15) = 2.653$, $p = .124$).

Set 2: NAI-verbs

Design: 2x2, VERB-TYPE (+/-NAI) x DISCOURSE REL. (CONTRAST vs ELABORATION)

Sample Item:

(12)	+/-NAI	S_1:	Max { could / is going to } write poetry for a living.
	CONT	S_{2a}:	However, all his teachers advised against it.
	ELAB	S_{2b}:	His teacher put him in contact with a renowned publisher

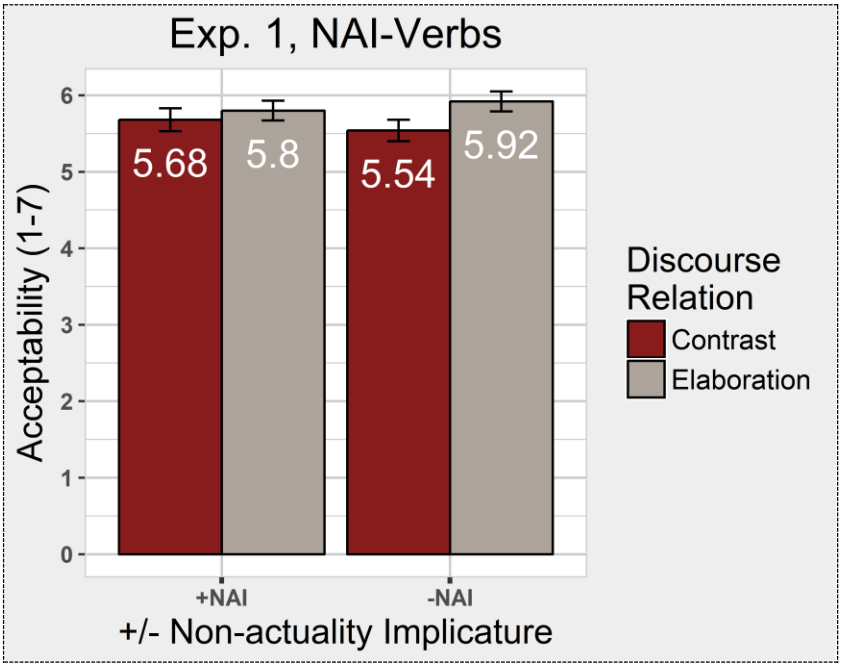
Prediction: ELABORATION should be worse after NAI-verbs compared to non-NAI verbs.

- ELABORATION would not address the grounding problem raised by the NAI, thus leading to a decrease, whereas non-NAI verbs are assumed to be not restricted to a particular continuation

Results (rep. measures ANOVA)[3]*:*

- slight trend towards preference for ELABORATION

- even smaller trend towards interaction seemed to be specific to *could*-items



Discussion:

- interactive trend in the right direction but general preference for ELABORATION unexpected

Interim Summary:

- Set 1 provided support for the idea that moving on w/o addressing a ground problem leads to a penalty, but the assumed absence of a grounding problem still favored a subordinating move, suggesting that (i) either adding a PP still raises a grounding problem, or (ii) the pressure to stay on topic is stronger than to move on

- support for (ii) may come from Set 2, where subordination was slightly preferred despite it not solving the assumed grounding problem

[3] NAI: ($F_1(1, 23) = 0.009$, $p = .926$, $F_2(1,15) = 0.005$, $p = .946$); DISCOURSE RELATION: ($F_1(1, 23) = 2.845$, $p = .105$, $F_2(1,15) = 1.144$, $p = .302$); INTERACTION: ($F_1(1, 23) = 0.582$, $p = .453$, $F_2(1,15) = 0.925$, $p = .352$).

Experiment 2: three sentence AJT (N=24)

Research Question: Is there a penalty for not "moving on" after a QUD was solved?

Items: 16 IC-verbs, 16 NAI-verbs, 16 bad fillers

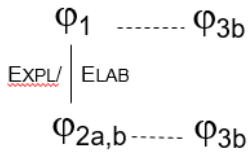
Set 1: IC-verbs

Design: 2x2, DISCOURSE RELATION (EXPL vs ELAB) x ATTACHMENT (SEG1 vs SEG2)

Sample Item:

(13)		S_1:	**Frank** impressed ***Mary*** at the party.
	EXPL	S_{2a}:	**He** was dancing quite remarkably.
	ELAB	S_{2b}:	**He** was standing in the corner of the room.
	SEG1	S_{3a}:	The next morning, ***she*** went for a walk in the park.
	SEG2	S_{3b}:	Then, **he** chugged a bottle of Jack Daniels.

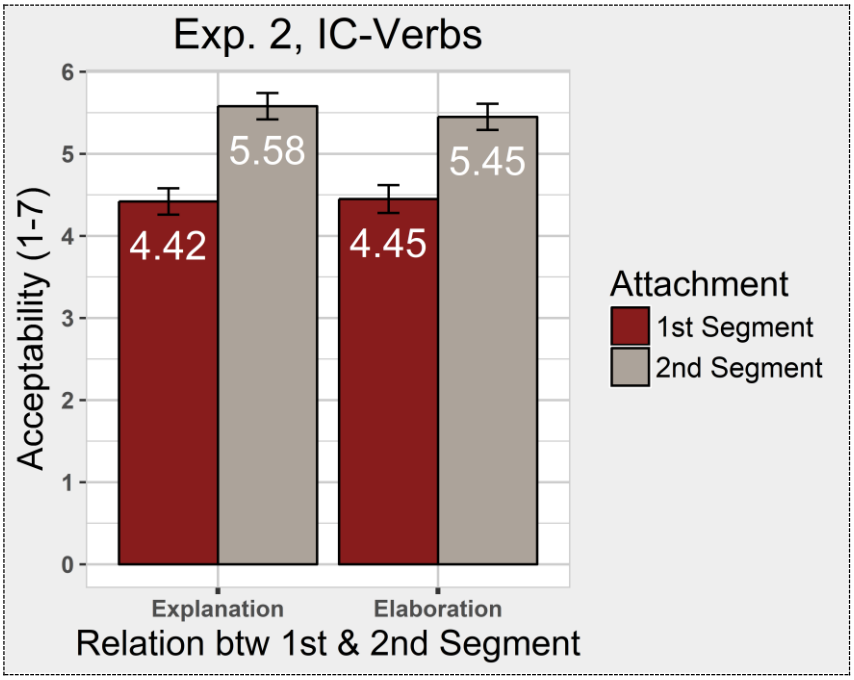
Prediction: Referring back to Segment 1 should be better after an EXPLANATION than after ELABORATION.



- the second segment should solve the grounding problem if it is an EXPLANATION, allowing to move on with Segment 1, whereas an ELABORATION should require more work on the grounding problem

Results (rep. measures ANOVA)[4]*:*

- significant decrease for attaching at Segment 1 independently of DISCOURSE RELATION



Discussion:

- penalty for referring back to Segment 1 expected given that Segment 1 continuations where designed to be rather odd, but lack of influence of DISCOURSE RELATION surprising

[4] DISCOURSE RELATION: ($F_1(1, 23) = 0.14$, $p = .712$, $F_2(1,15) = 0.069$, $p = .796$); ATTACHMENT: ($F_1(1, 23) = 33.24$, $p < .001$***, $F_2(1,15)=23.89$,$p<.001$***);INTERACTION: ($F_1(1,23)=0.355$, $p=.557$, $F_2(1,15)=0.247$,$p=.626$).

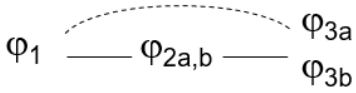
Set 2: NAI-verbs

Design: 2x2, QUD (*solved* vs *open*) x ATTACHMENT (SEG1 vs SEG2)

Sample Item:

(14)		S_1:	**Max** could house-sit a mansion next weekend.
	solved	S_{2a}:	However, ***Rachel*** took care of it.
	open	S_{2b}:	However, ***Rachel*** had to clean the carpets.
	SEG1	S_{3a}:	**He** left the owners his availabilities for the next time.
	SEG2	S_{3b}:	***She*** watched the house while she was cleaning.

Prediction: Referring back to Segment 1 should be better after the grounding problem was solved compared to when it remains open.

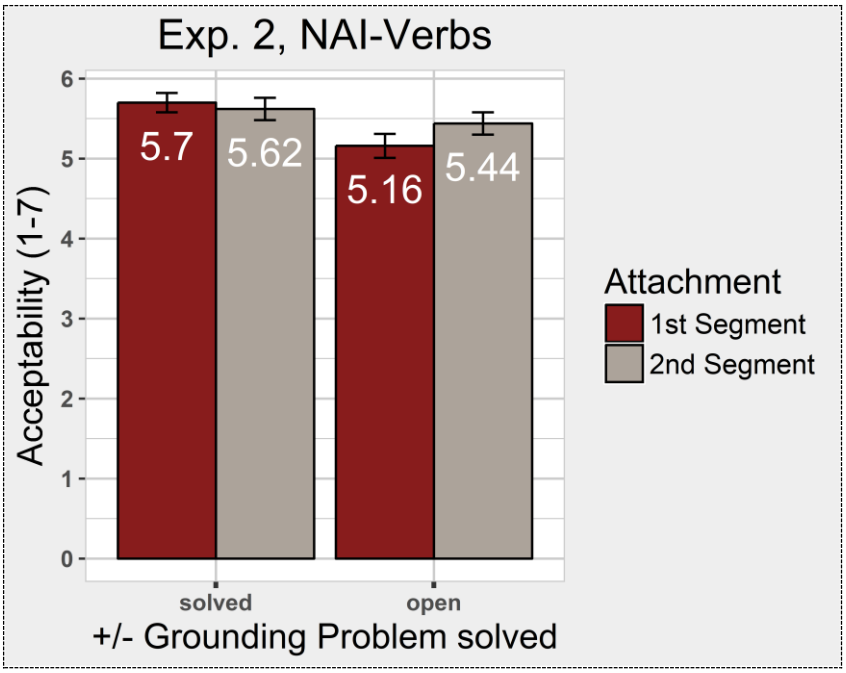


- if the second segment solves the grounding problem, it should be more expected to go back to the first segment than when the grounding problem remains open, basically ameliorating a violation of the Right Frontier Constraint

Results
(rep. measures ANOVA)[5]*:*

- significant decrease if the grounding problem remains open

- slight trend towards stronger penalty for open grounding problem when going back to Segment 1



Discussion:

- lack of general effect for violating RFC surprising, but interactive trend in line with prediction

Interim Summary:

- Set 1 may be viewed as enforcing the idea from Exp1 for a general subordination bias
- Set 2 seemed promising as a case that focuses on coordination

[5] QUD: ($F_1(1,23) = 5.799$, $p < .05$*, $F_2(1,15) = 5.393$, $p < .05$*); ATTACHMENT: ($F_1(1,23) = 0.683$, $p = .417$, $F_2(1,15) = 0.503$, $p = .489$); INTERACTION: ($F_1(1,23) = 2.045$, $p = .166$, $F_2(1,15) = 1.801$, $p = .2$).

General Discussion & Conclusion

- while to be taken with a grain of salt, the experiments could not provide strong evidence – if any – in favor of the QUD Grounding Hypothesis and its underlying view
- rather, it seems that there is a general preference for subordination even when there is no clearly identifiable QUD that may require grounding
- it might be worthwhile to push the boundaries of when the preference for subordination can be waived in favor of an advancement in discourse

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Appendix

Experiment 3: Single sentence acceptability judgment task (AJT) (N=24)

Research Question: Are participants sensitive to the presence of a QUD that requires grounding even with a single sentence?

Items: 16 IC-verbs, 16 NAI-verbs, 16 exploratory fillers, 12 bad fillers

Set 1: IC-verbs

Design: 2x2, VERB-TYPE (+/-IC) x PREPOSITIONAL PHRASE (+/-PP)

Sample Item:

(A1) a. +IC Frank impressed Mary (with his dancing).
b. -IC Frank thanks Mary (for her wonderful company).

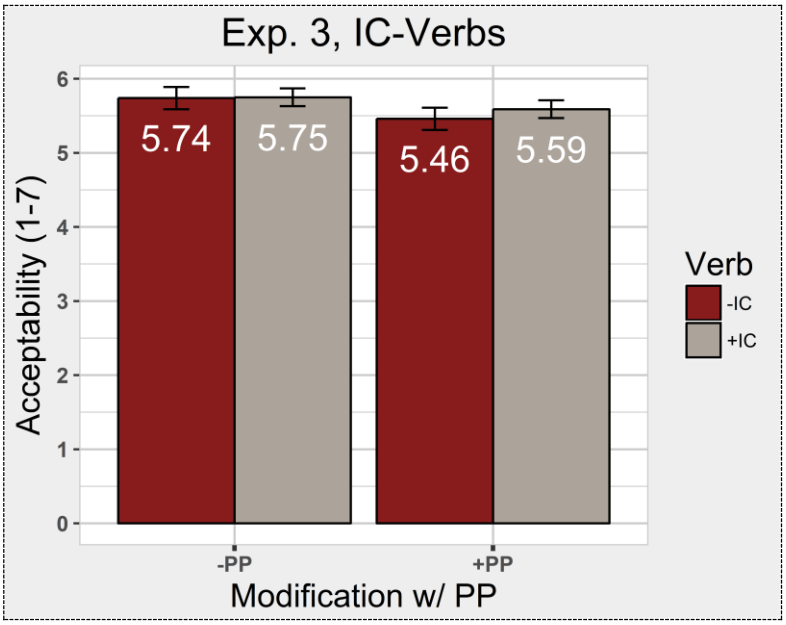
Prediction: IC-verbs w/o PP should be worse than non-IC verbs w/o PP due to open QUD, but equally acceptable w/ a PP since it (=the PP) provides the causal argument

Results (by-subj ANOVA)[6]*:*

- marginal effect of PP: presence of PP decreases ratings

Discussion:

- critically no difference between verb-types w/o PP
- decrease for PPs might be due to some PPs being somewhat marked (e.g. *love s.o. for sth.*) or increased complexity



[6] PP: F(1, 23) = 3.286, p = .083(*); VERB-TYPE: F(1, 23) = 0.305, p = .586; INTERACTION: F(1, 23) = 0.202, p = .657. A by-item analysis was not performed since 'IC' was a between-item factor.

Set 2: NAI-verbs

Design: single 2-level factor, VERB-TYPE (+/-NAI)

Sample Item:

(A2) a. Jessica { could / is going } to Paris next month.
b. A private firm { should / will } be hired by the deputy director.

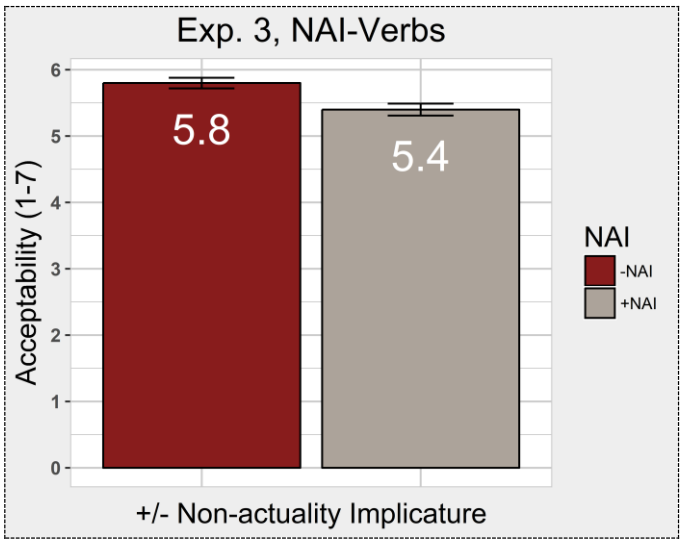
Prediction: NAI-verbs should be worse than non-NAI verbs due to open QUD

Results (repeated measures ANOVA)[7]*:*

- NAI-verbs significantly less acceptable than non-NAI verbs

Discussion:

- prediction borne out but might also be due to some difficulty associated with modal verbs (e.g. complexity, ambiguity)



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[7] $F_1(1,23) = 13.36$, $p < .01$**, $F_2(1,15) = 4.77$, $p < .05$*.

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