Effect of monotonicity on pronoun interpretation in discourse anaphora

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Introduction

Pronouns can co-vary with quantifiers.

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(1) **Binding**

a. Every violinist is wondering when they'll be first chair

b. A violinist lost their chance at being first chair.

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(1) **Binding**

a. Every violinist is wondering when they'll be first chair

b. A violinist lost their chance at being first chair.

c. # They are wondering when every violinist will be first chair.

d. # When every violinist plays, they wonder about that.

Subject to a restriction: the quantifier must c-command the pronoun.

Certain indefinite-pronoun combinations challenge this generalization (*discourse anaphora*).

(2) ✓ Every farmer who owns a donkey pats it. (*donkey*)

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(2) ✓ Every farmer who owns a donkey pats it. (*donkey*)

But also:

(3) a. A donkey was upset and it brayed. (*cross-conjunction*)

b. Either Max doesn't have a donkey or it's in the barn. (*cross-disjunction*)

Discourse anaphora behaves like binding.

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(4) **Crossover effects** [Chierchia, 2009]

a.# It kicked every farmer who owns a donkey.
(Strong Cross-Over)

b. ? Its stubbornness annoys every farmer who owns a donkey.
(Weak Cross-Over)

(5) **Sloppy readings with focus** [Bassi and Longenbaugh, 2018]
Only the farmer who has a GRAY donkey pats it regularly.

Discourse anaphora calls for radical changes in the way we conceive of binding.

- **E-type theories:** pronouns are disguised definite descriptions.
  [Evans, 1980, Heim, 1990, Elbourne, 2005]
- **Dynamic theories:** sentences denote context updates.
  [Groenendijk and Stokhof, 1991, Heim, 1982]

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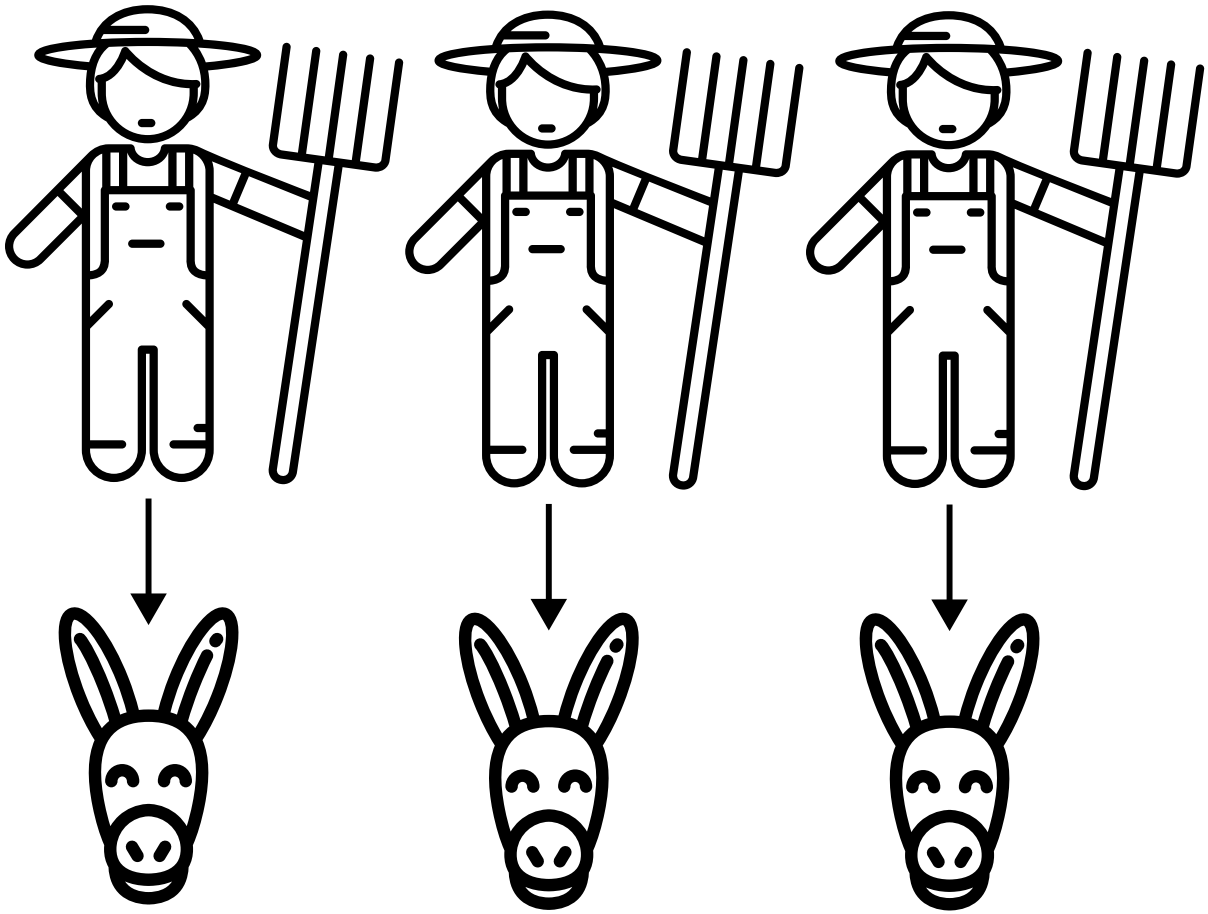
These theories solve the hard question of why such sentences are felicitous…
…but the question of truth-conditions of these sentences is rarely tackled nowadays.
[Elliott, 2020, Mandelkern, 2022, Chatain, 2024]

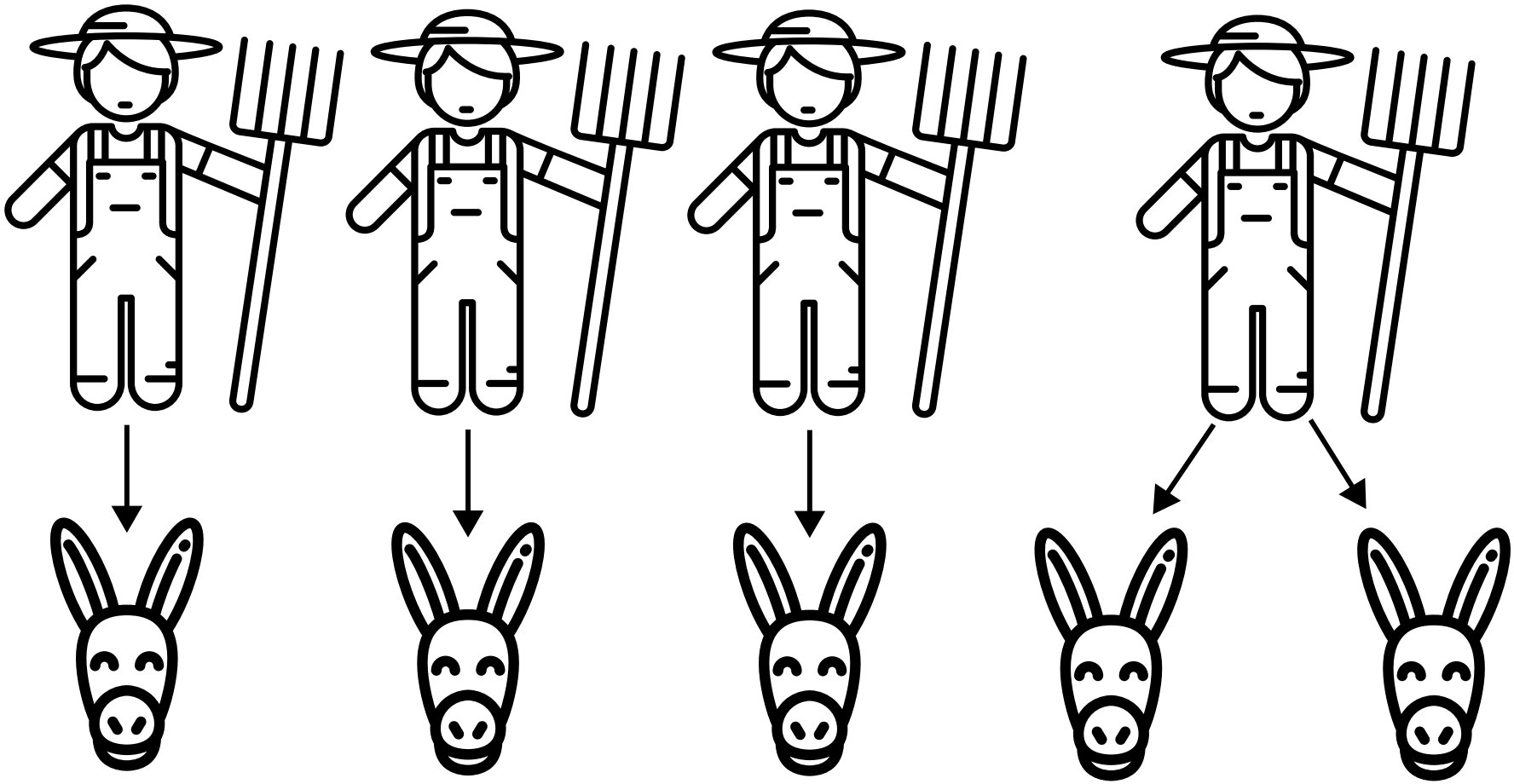
(7) Every farmer who owns a donkey pats it.

It is clear what the sentence implies in such situations:



But what do we infer about "*who pats whom*" if a farmer owns multiple donkeys?

(8) Every farmer who owns a donkey pats it.



Such situations may make one feel *queasy* ; yet, uniqueness does not seem to be *strong* requirement on such sentences
[Heim, 1982]

(9) Our sageplants come in packs of 6. So, of course, every client who bought a sageplant bought five others along with it.

Such situations may make one feel *queasy* ; yet, uniqueness does not seem to be *strong* requirement on such sentences
[Heim, 1982]

(9) Our sageplants come in packs of 6. So, of course, every client who bought a sageplant bought five others along with it.

Compare with:

(10) There are three thieves.
So, of course, the person who stole the jewelry and two other people stole the jewelry.

It is known that donkey sentences may receive both an existential and a universal reading
[Chierchia, 1992, Groenendijk and Stokhof, 1991, a.o.].

(11) Every farmer who owns a donkey

a. …pats some of the donkeys they own (*existential*)

b. …pats all of the donkeys they own (*universal*)

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(11) Every farmer who owns a donkey

a. …pats some of the donkeys they own (*existential*)

b. …pats all of the donkeys they own (*universal*)

c. …pats the donkey they own (*uniqueness*)

Adapted from [Chierchia, 1992]:

(12) *In this town, farmers are stressed ; patting a donkey may be the only way to release the tension.*
A: Well, that's good, every farmer who owns a donkey pats it regularly.
B: # No, that's not true, Josh has two donkeys and only pats one of them.

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(13) *In this town, donkeys are stressed ; patting them may be the only way to release the tension.*
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(14) a. Every farmer who owns a donkey pats it regularly.

b. No farmer who owns a donkey pats it regularly.

c. Some farmer who owns a donkey pats it regularly.

A range of experimental studies show that the type of quantifier dictates certain reading preferences
[Foppolo, 2008, Denić and Sudo, 2022, Sun et al., 2020]:

	existential	*universal*
Every	%	✓
Some	✓	*
No	✓	*

[Kanazawa, 1994]'s generalization

There is a preference for whichever reading is monotonic.

This entailment only follows if one reads (18a) universally:

(15) a. Every farmer who has a donkey pats it.

b. $\Rightarrow$ Every farmer who has a gray donkey pats it.

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(16) **Universal reading**

a. *Every farmer who has a donkey pats every donkey they own*

b. $\Rightarrow$ *Every farmer who has a gray donkey pats every gray donkey they own*

(17) **Existential reading**

a. *Every farmer who has a donkey pats a donkey they own*

b. $\not\Rightarrow$ *Every farmer who has a gray donkey pats a gray donkey they own*

This entailment only follows if one reads (18a) existentially:

(18) a. Some farmer who owns a donkey pats it.

b. $\Leftarrow$ Some farmer who has a gray donkey pats it.

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(19) **Universal reading**

a. *Some farmer who has a donkey pats every donkey they own*

b. $\not\Leftarrow$ *Some farmer who has a gray donkey pats every gray donkey they own*

(20) **Existential reading**

a. *Some farmer who has a donkey pats some donkey they own*

b. $\Leftarrow$ *Some farmer who has a gray donkey pats some gray donkey they own*

	existential	*universal*
Every	%	✓
Some	✓	*
No	✓	*

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- Not discussed in the context of other types of discourse anaphora.

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Every	%	✓
Some	✓	*
No	✓	*

- Kanazawa's generalization is established only on three donkey configurations.
- Not discussed in the context of other types of discourse anaphora.
- Some theories explicitly rely on the presence of the quantifier to generate the ambiguity.
  [Champollion et al., 2019]

Goal

Test whether Kanazawa's generalizations extends to other discourse anaphora such as cross-conjunction and cross-disjunction anaphora.

The question of truth-conditions arise for cross-conjunction:

(21) Max owns a donkey and it's in the barn.

a. …and some donkey he owns is in the barn. (*existential*)

b. …and every donkey he owns is in the barn. (*universal*)

c. …and the donkey he owns is in the barn. (*uniqueness*)

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b. …and every donkey he owns is in the barn. (*universal*)

c. …and the donkey he owns is in the barn. (*uniqueness*)

Judgments from the theoretical literature. [van der Does, 1993, Gotham, 2019, Chatain, 2018, Krahmer and Muskens, 1995, Elliott, 2020, Hofmann, 2022, Lewis, 2021, a.o.]

And cross-disjunction anaphora:

(22) Either Max doesn't own a donkey or it's in the barn.

a. ...or some donkey he owns is in the barn. (*existential*)

b. ...or every donkey he owns is in the barn. (*universal*)

c. ...or the donkey he owns is in the barn. (*uniqueness*)

And cross-disjunction anaphora:

(22) Either Max doesn't own a donkey or it's in the barn.

a. ?...or some donkey he owns is in the barn. (*existential*)

b. ?...or every donkey he owns is in the barn. (*universal*)

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Why an experiment?

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- population-level insights
- scale use reveal fine-grained intuitions

Conclusions

- In Part I of the talk, experiments 1-3 show that Kanazawa's generalization extends to cross- and cross-disjunction environment for simple sentences.

Foreshadowing the conclusions

Conclusions

- In Part I of the talk, experiments 1-3 show that Kanazawa's generalization extends to cross- and cross-disjunction environment for simple sentences.
- In Part II of the talk, experiment 4-5 show that adding negation in the clause that contains the pronoun has unexpected consequences from the perspective of Kanazawa's generalization.

Validating Kanazawa's generalization on conjunction and disjunction

Experiment I: conjunction

(23) There is a circle and it is blue.

a. **existential:** *...and at least one circle is blue*

b. **universal:** *...and every circle is blue*

c. **uniqueness:** *...and the one circle is blue*

uniqueness $\Rightarrow$ universal $\Rightarrow$ existential

Experiment I: conjunction

(23) There is a circle and it is blue.

a. **existential:** *...and at least one circle is blue*

b. **universal:** *...and every circle is blue*

c. **uniqueness:** *...and the one circle is blue*

uniqueness $\Rightarrow$ universal $\Rightarrow$ existential

Q1: which readings are accessed by participants?

Experiment I: conjunction

Methodology

- TVJ task
- A sentence presented along with a picture
- Picture represents geometrical shapes of various colors
- Rate from *completely false* to *completely true*
- 7-point scale

Experiment I: conjunction

Why not just a yes/no answer?
$\rightsquigarrow$ *there is information in people's use of intermediate scale values* [Marty et al., 2015]

Experiment I: conjunction

(24) There is a circle and it is blue.

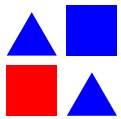
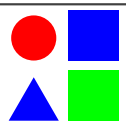
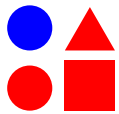
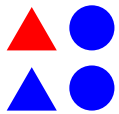
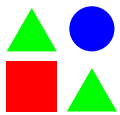
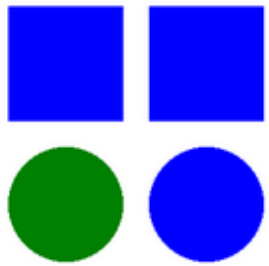
	existential	universal	unique
Pronoun-First-False 	F	F	F
Pronoun-Second-False 	F	F	F
Pronoun-Existential 	T	F	F
Pronoun-Universal 	T	T	F
Pronoun-Unique 	T	T	T

Table: Readings true in each condition

Experiment I: conjunction

There is a triangle and it is red

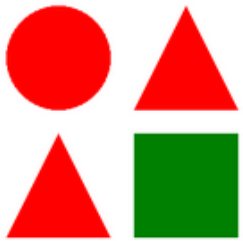


Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

Pronoun-First-False condition

Experiment I: conjunction

There is a square and it is blue

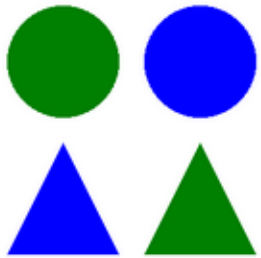


Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

Pronoun-Second-False condition

Experiment I: conjunction

There is a circle and it is green



Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

Pronoun-Exist condition

Experiment I: conjunction

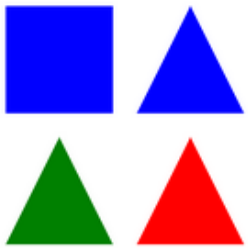
There is a circle and it is red

Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

Pronoun-Universal condition

Experiment I: conjunction

There is a square and it is blue



Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

Pronoun-Unique condition

Experiment I: conjunction

Q2: if a uniqueness reading is observed, is it due to an implicature arising from the indefinite?

(25) There is a person in the classroom.
$\rightsquigarrow$ *there is exactly one person in the classroom*

Experiment I: conjunction

Compare with a no-pronoun baseline:

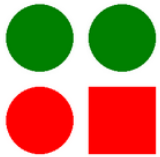
(26) There is a circle and the triangle is green.

		no uniqueness	uniqueness
NoPro-Both-False	▲	F	F
NoPro-First-False	▲	F	F
NoPro-True-Weak	● ● ▲	T	F
NoPro-True-Strong	●▲	T	T

Table: Readings true in each condition

Experiment I: conjunction

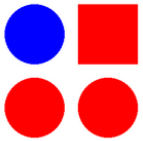
There is a triangle and the square is red



Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

NoPro-First-False

There is a triangle and the square is green



Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

NoPro-Both-False

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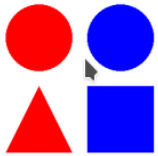
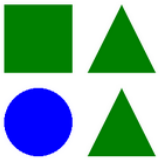


Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

NoPro-True-Weak

There is a square and the circle is blue



Completely false ○ ○ ○ ○ ○ ○ ○ Completely true

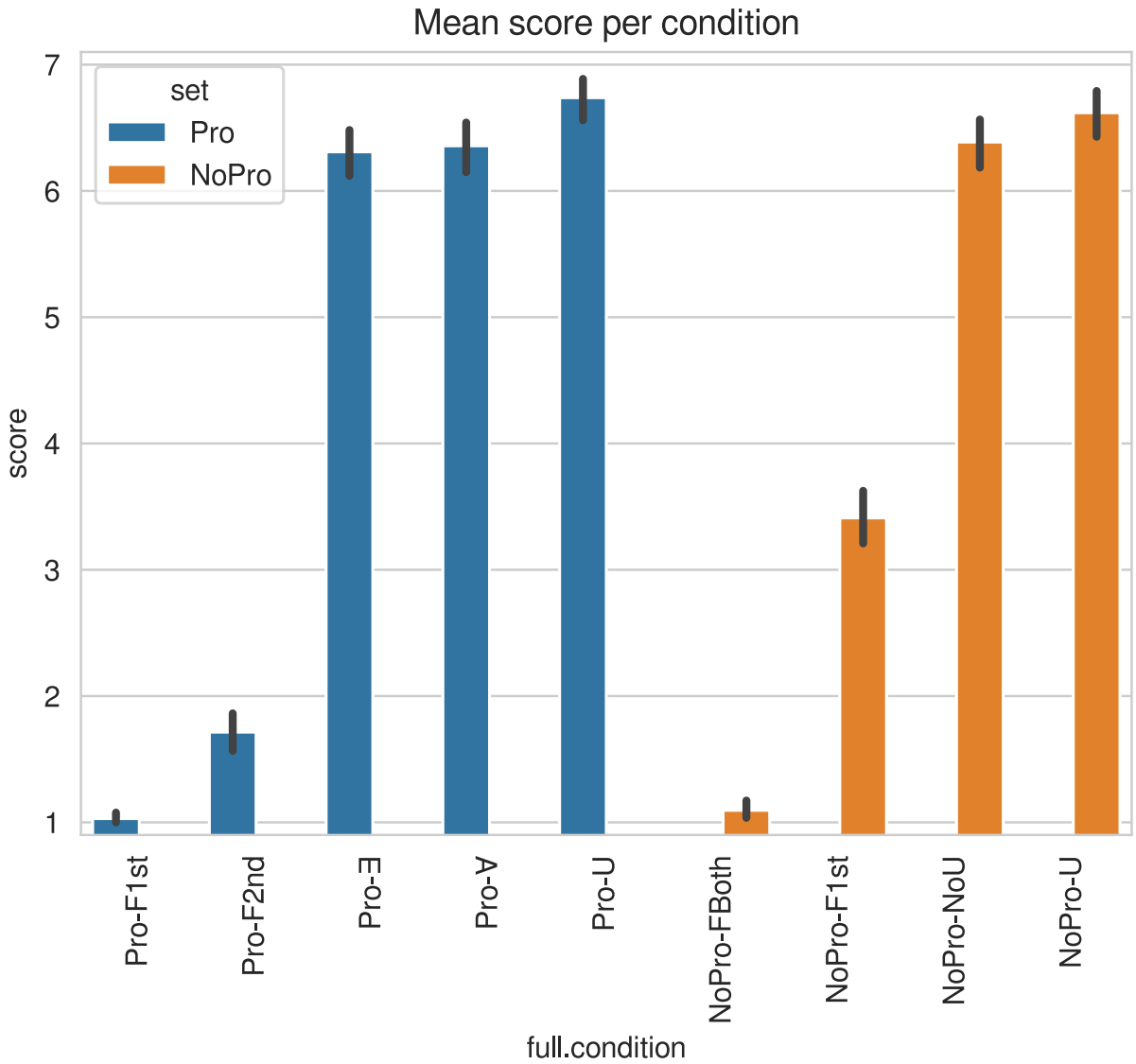
NoPro-True-Strong

Experiment I: conjunction

- Recruited on the Prolific platform
- 60 participants
- 3 trials per condition $\times$ (5 + 4) conditions = 27 trials
- Excluded participants who, on more than one trial, did not give one of the two lowest ratings to the NoPronoun-Both-False and Pronoun-First-False conditions.
- Excluded participants who always answered with one of the two leftmost scale items for all trials.

$\rightsquigarrow$ 4 participants excluded

Experiment I: Results



Experiment I: Results

- Significant difference between Pro-Second-False and Pro-Exists ($t = 28.228$, $df = 108.55$, p-value $< 2.2e^{-16}$)
  $\rightsquigarrow$ *speakers access an existential reading.*

(Stats: t-tests, Holm-Bonferroni corrected, interaction with ANOVA, Holm-Bonferroni)

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- Difference between Pro-Exists and Pro-Universal is not significant ($t = -0.24521$, $df = 105.09$, p-value $= 0.8068$)
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- Difference between Pro-Universal and Pro-Unique is not significant ($t = 2.0146$, $df = 101.85$, p-value $= 0.1397$)
  $\rightsquigarrow$ *No evidence for a uniqueness reading in the pronoun condition.*

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  $\rightsquigarrow$ *No evidence for a uniqueness reading in the pronoun condition.*
- The interaction between Pro/NoPro is not significant ($F(df\ \text{interaction}, df\ \text{within}) = 0.953$, $p = 0.666$)
  $\rightsquigarrow$ *In particular, no evidence of it being due to an implicature.*

(Stats: t-tests, Holm-Bonferroni corrected, interaction with ANOVA, Holm-Bonferroni)

Experiment II: disjunction

(27) Either there isn't a circle or it is green.

a. **existential:** …*or at least one circle is green*

b. **universal:** …*or every circle is green*

c. **uniqueness:** …*or the one circle is green*

Experiment II: disjunction

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a. **existential:** …*or at least one circle is green*

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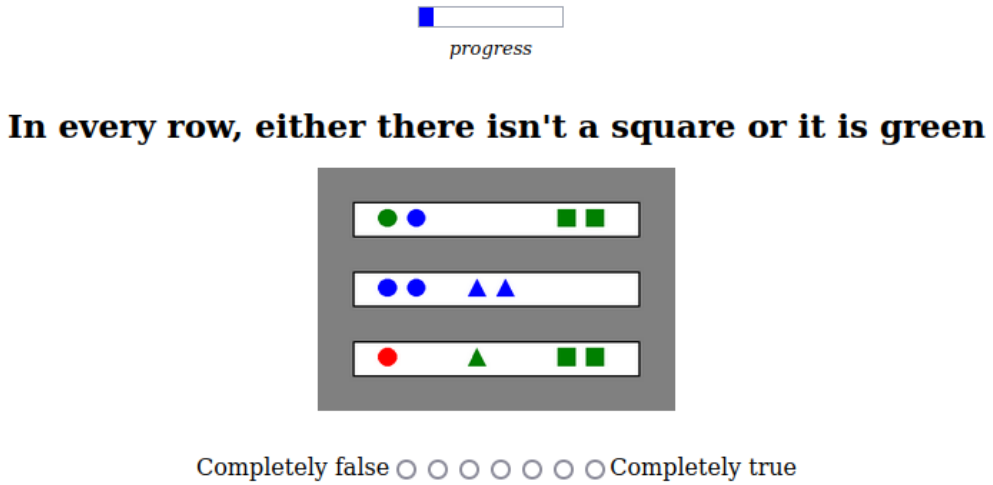
c. **uniqueness:** …*or the one circle is green*

If participants interpret the sentence as providing a description of the picture, they may find it odd.

Experiment II: disjunction



(28) In every row, either there isn't a circle or it is blue.

a. **existential:** *in every row, ... or at least one circle is blue*

b. **universal:** *in every row, ... or every circle is blue*

c. **uniqueness:** *in every row, ... or the one circle is blue*

(28c) $\Rightarrow$ (28b) $\Rightarrow$ (28a)

Experiment II: disjunction

It’s a hard task !

Experiment II: disjunction

(29) In every row, either there isn't a circle or it is blue.

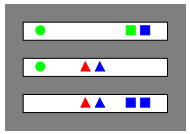
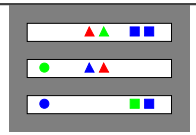
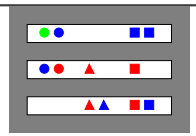
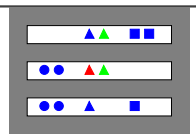
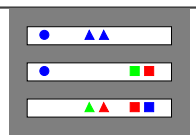
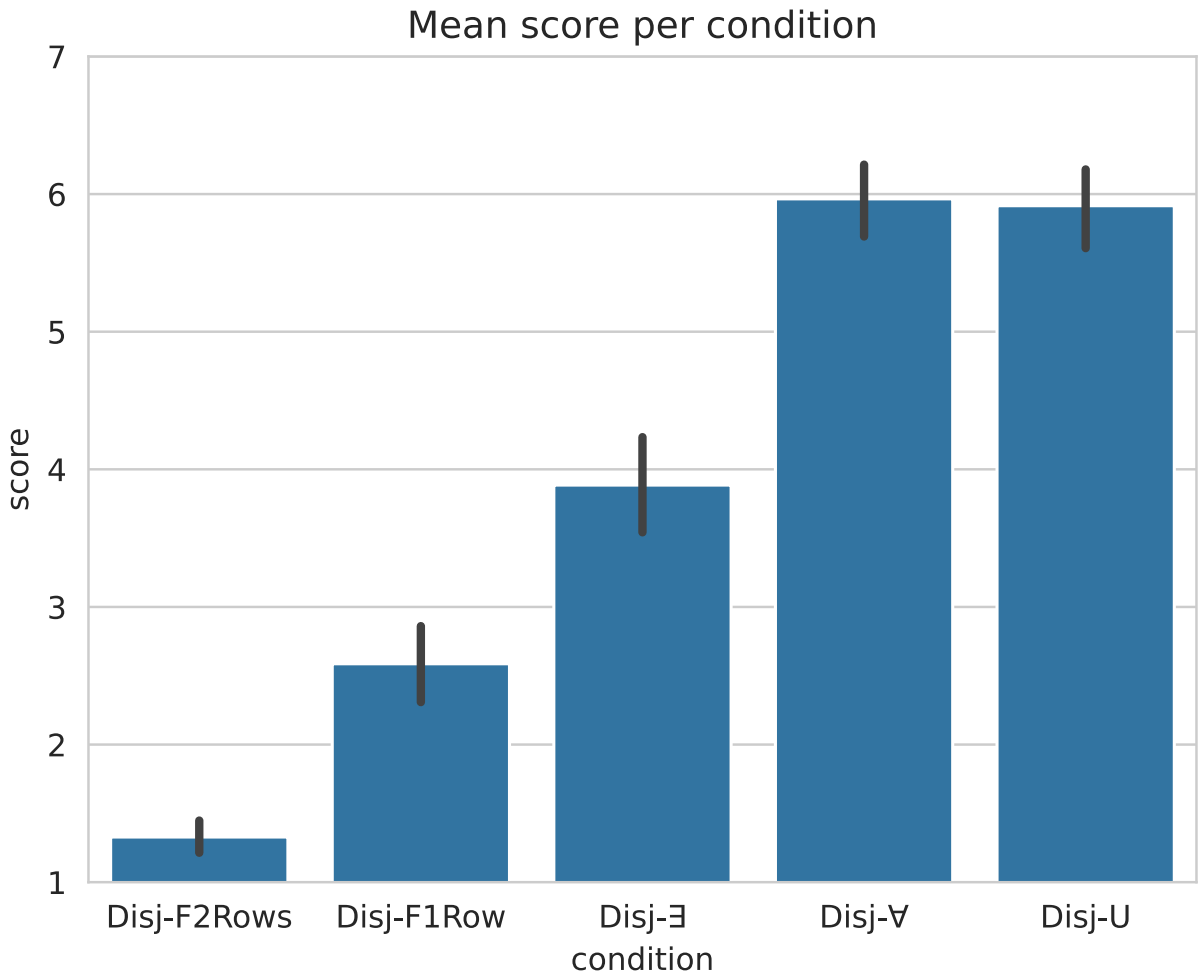
		existential	universal	unique
Disj-F2Rows		F	F	F
Disj-F1Row		F	F	F
Disj-∃		T	F	F
Disj-∀		T	T	F
Disj-U		T	T	T

Table: Readings true in each condition

Experiment II: disjunction

- Recruited on the Prolific platform
- 80 participants
- 3 trials per condition $\times$ 5 conditions = 15 trials
- Excluded participants who, on two trials, didn't give one of the two lowest scores to the Disj-F2Rows condition

Experiment II: results



Experiment II: results

- Significant difference between Disj-F1Row and Disj-$\exists$
  (t $= 28.228$, df $= 108.55$, p-value $< 2.2e^{-16}$)
  $\rightsquigarrow$ *the existential reading exists*

(Stats: t-tests, Holm-Bonferroni corrected)

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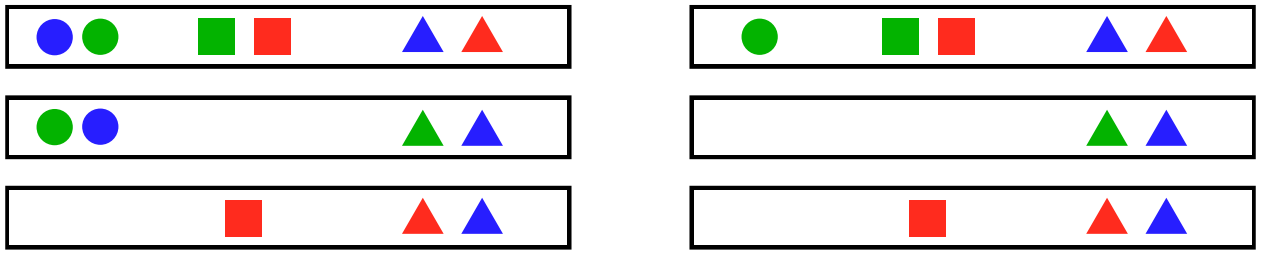
  $\rightsquigarrow$ *the universal reading exists*
- No significant difference between DISJ-$\forall$ and DISJ-U (oops?)
  $\rightsquigarrow$ *no evidence of a uniqueness reading*

(Stats: t-tests, Holm-Bonferroni corrected)

Truth-partiality

Experiment II: results

Counter-hypothesis: there is no existential reading ; the difference between Disj-∃ and Disj-∀ reflects partial-truth responses



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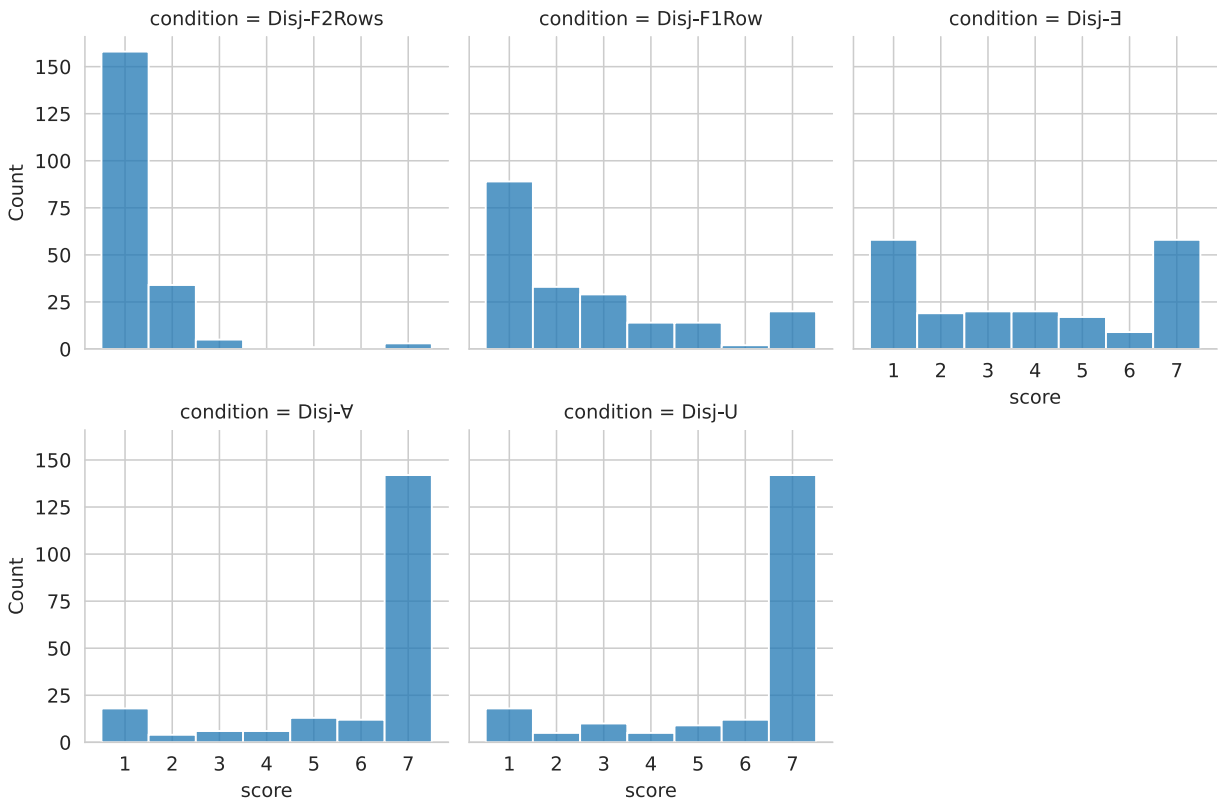

⇝ the distribution of Disj-∃ looks bi-modal

⇝ Disj-F1Row does not

Experiment II: results

Q: could the universal reading be due to the presence of a universal quantifier?
$\rightsquigarrow$ *unselective quantification* [Heim, 1982, Lewis, 1975]

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(30) a. In every $\text{row}^{\text{row, c}}$, either there isn't [a circle]$_c$ or it is blue$_c$.

b. $\forall r, c, \text{row}(r) \rightarrow \neg(\text{circle(c)} \wedge \text{in}(r)(c)) \vee \text{blue}(c)$

Experiment III: conjunction & disjunction

A minimal comparison

(31) a. There is a circle and it is green.

b. Either there isn't a circle or it is green.

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Conj conditions		**Disj conditions**	
Conj-F1st		Disj-False	●
Conj-F2nd	●	Disj-∃	●●
Conj-∃	●●	Disj-∀	●●
Conj-∀	●●	Disj-U	●
Conj-U	●	Disj-T1st	

Experiment III: conjunction & disjunction

- 2 blocks, one for each group, order of blocks randomized
- Recruited on the Prolific platform
- 130 participants
- 3 trials per condition $\times$ (5 + 5) conditions = 30 trials

The exclusion problem

Criteria for exclusion:

- Color-blind
- Non-native speakers of English
- Scored ≥ 3 on at least two of the Conj-F1st condition trials.
- Scored ≤ 5 on at least two of the Disj-True condition trials.

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Excluded 61 participants (e.g. $\sim$ 50% of all)

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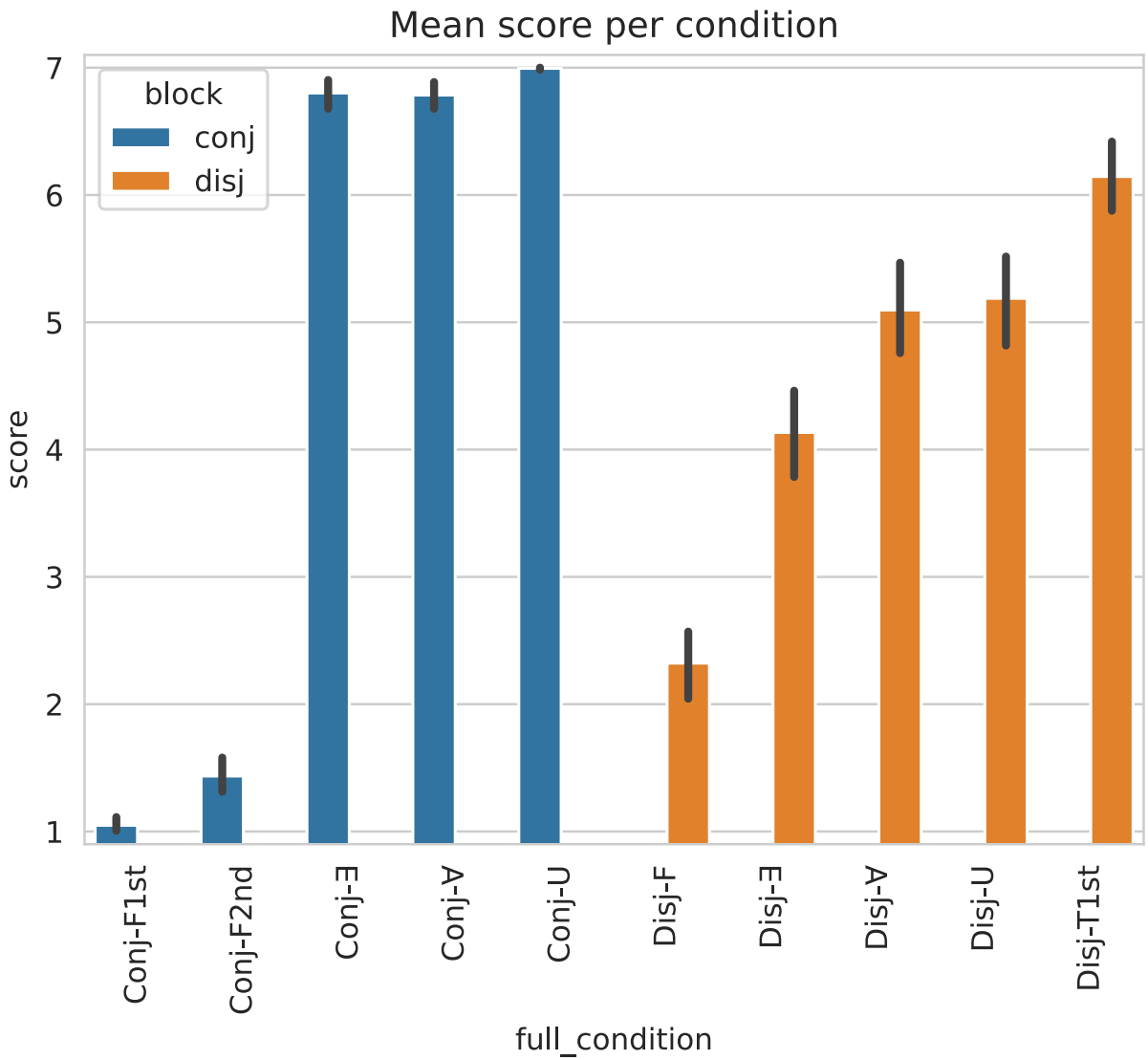
  $\rightsquigarrow$ *excluded 59 participants*

Excluded 61 participants (e.g. $\sim$ 50% of all)
$\rightsquigarrow$ *that's a lot!*
$\rightsquigarrow$ *more on this later*

Experiment III: conjunction & disjunction



Experiment III: conjunction & disjunction

Replicated:

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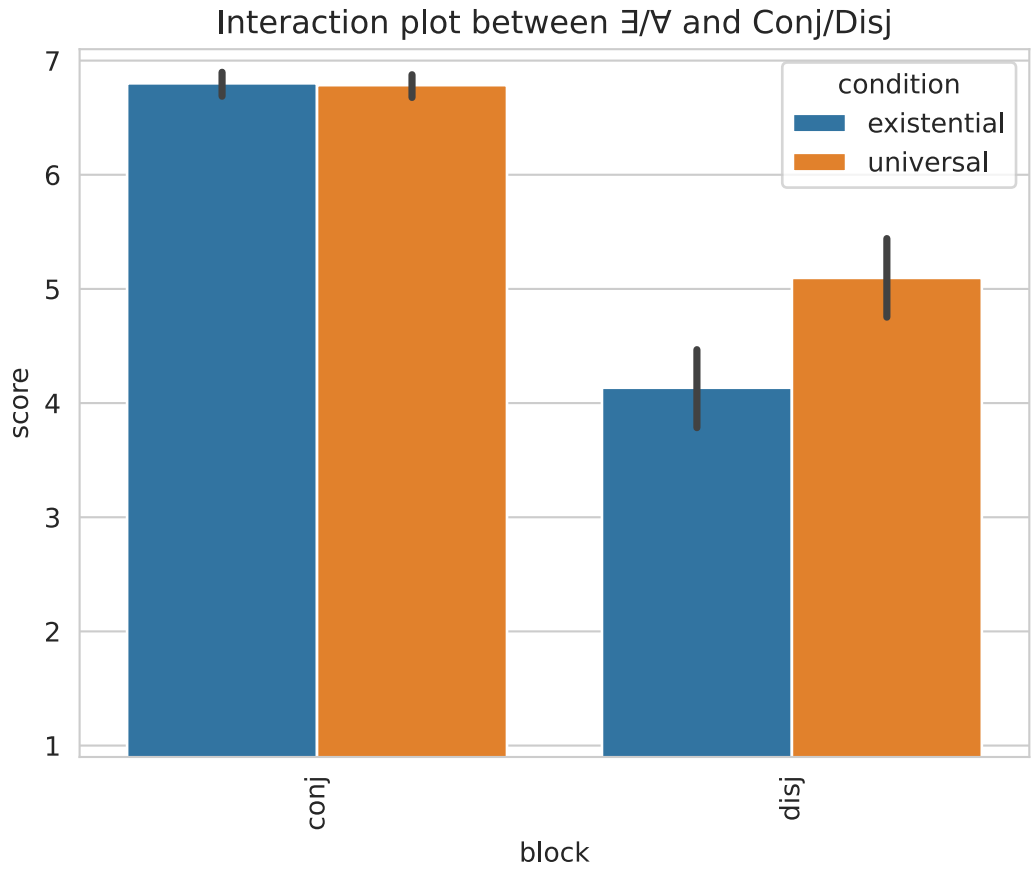
  ($\chi^2(\text{df} = 1) = 0.3841, p = 0.5354$)

(Stats: Cumulative Link Models, Holm-Bonferroni corrected)

Experiment III: conjunction & disjunction

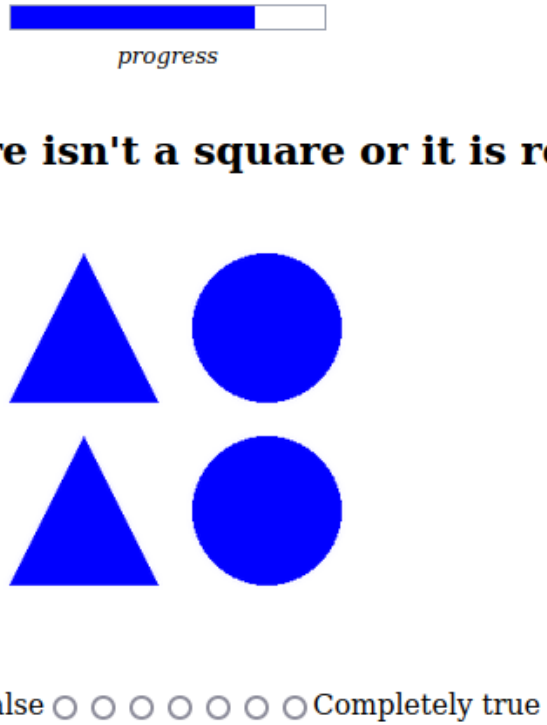


New: significant interaction Disj/Conj and ∃/∀

$(\chi^2(\text{df} = 1) = 9.0431, p = 0.00791)$

Discussion

- But what about the 50% of participants we excluded?
- They assign normatively incorrect truth-values (theory-neutrally)



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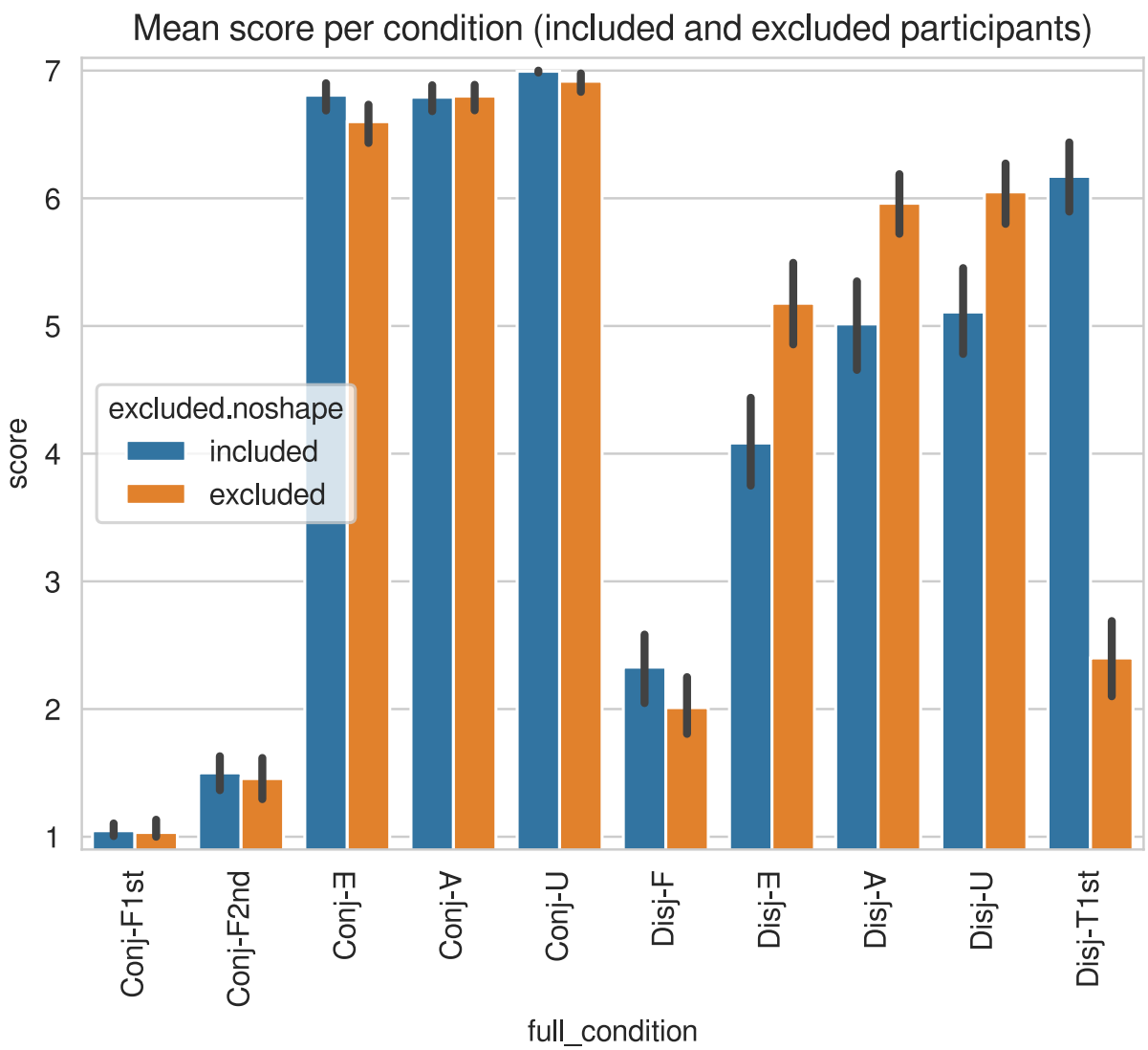
- Non-excluded participants may be doing the same (except less often). Our results might be a reflection of the unexplained behavior, rather than the grammatical behavior we're testing for.
- **Claim:** It does not affect the critical point ; there is a universal reading, independently of the presence of a quantifier.

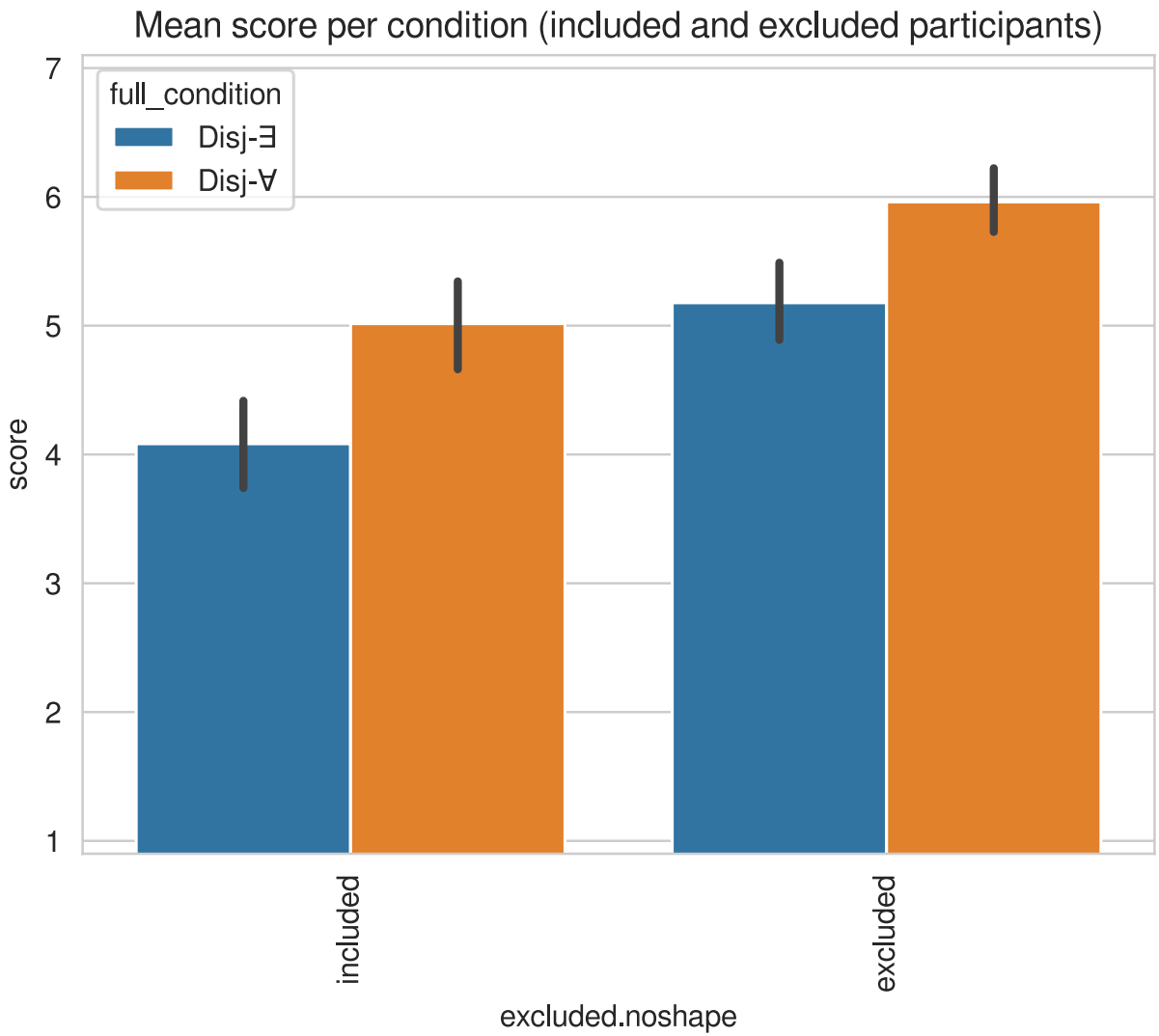
Discussion

Sketch on the board

Discussion


Mean score per condition (included and excluded participants)
score
7
6
5
4
3
2
1
excluded.noshape
included
excluded
Conj-F1st
Conj-F2nd
Conj-∃
Conj-∀
Conj-U
Disj-F
Disj-∃
Disj-∀
Disj-U
Disj-T1st
full_condition

Discussion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full_condition
Disj-∃
Disj-∀
score
7
6
5
4
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included
excluded
excluded.noshape

Discussion

If the unexplained behavior resulted in more universal readings, we would find that the difference between Disj-$\exists$ and Disj-$\forall$ would increase in the excluded participants[1].

[1] Assuming the propensity to have the unexplained behavior on a given trial is *not* independent of the participant.

Discussion

- Experiment II provides evidence of both existential and universal readings.
- But the universal reading might come from the presence of *in every row*.
- Experiment III provides evidence for a universal reading independently of the presence of *in every row*.

$\Rightarrow$ Cross-disjunction anaphora is ambiguous.

Theoretical implications

- Are the results predicted?
- Are they expected?

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  $\rightsquigarrow$ *not by any existing theory*
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- Are the results predicted?
- Are they expected?
  $\rightsquigarrow$ *all results fall within Kanazawa's generalization*

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$\Rightarrow$ *no theory quite predicts the observed pattern*

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Are the results expected?

	∃	∀
[...a donkey ...] and [...it ...]	✓	*
not [...a donkey ...] or [...it ...]	✓	✓

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	∃	∀
[...a donkey ...] and [...it ...]	✓	*
some [...a donkey ...] [...it ...]	✓	*
no [...a donkey ...] [...it ...]	✓	*
every [...a donkey ...] [...it ...]	✓	✓
not [...a donkey ...] or [...it ...]	✓	✓

[Geurts, 2002, Foppolo, 2008, Denić and Sudo, 2022]

Are the results expected?

[Kanazawa, 1994]'s generalization

There is preference for monotonic readings.

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Entailment only in an existential reading:

(32) a. There is a triangle and it is blue.

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Entailement only in a universal reading:

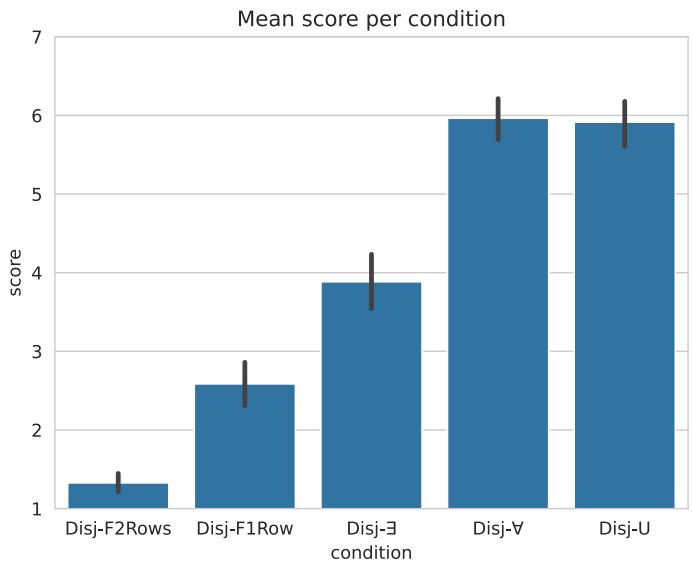
(33) a. Either there isn't a triangle or it is blue.

b. $\Rightarrow$ Either there isn't an equilateral triangle or it is blue.

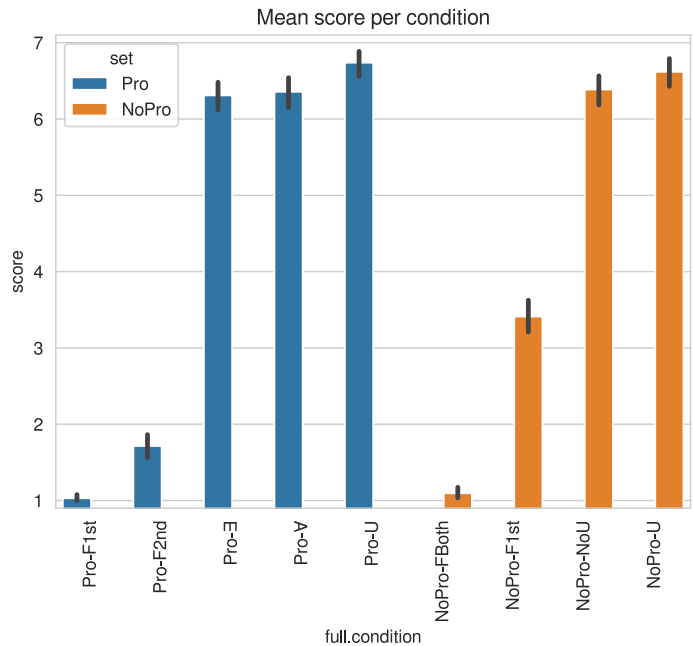
Are the results expected?

But the "*preference*" for a universal reading in the cross-disjunction case isn't so marked as in the cross-conjunction case:

Cross-disjunction



Cross-conjunction



Are the results expected?

No clear preference in experimental studies on *donkey* anaphora

(34) Every farmer who owns a donkey pats it.

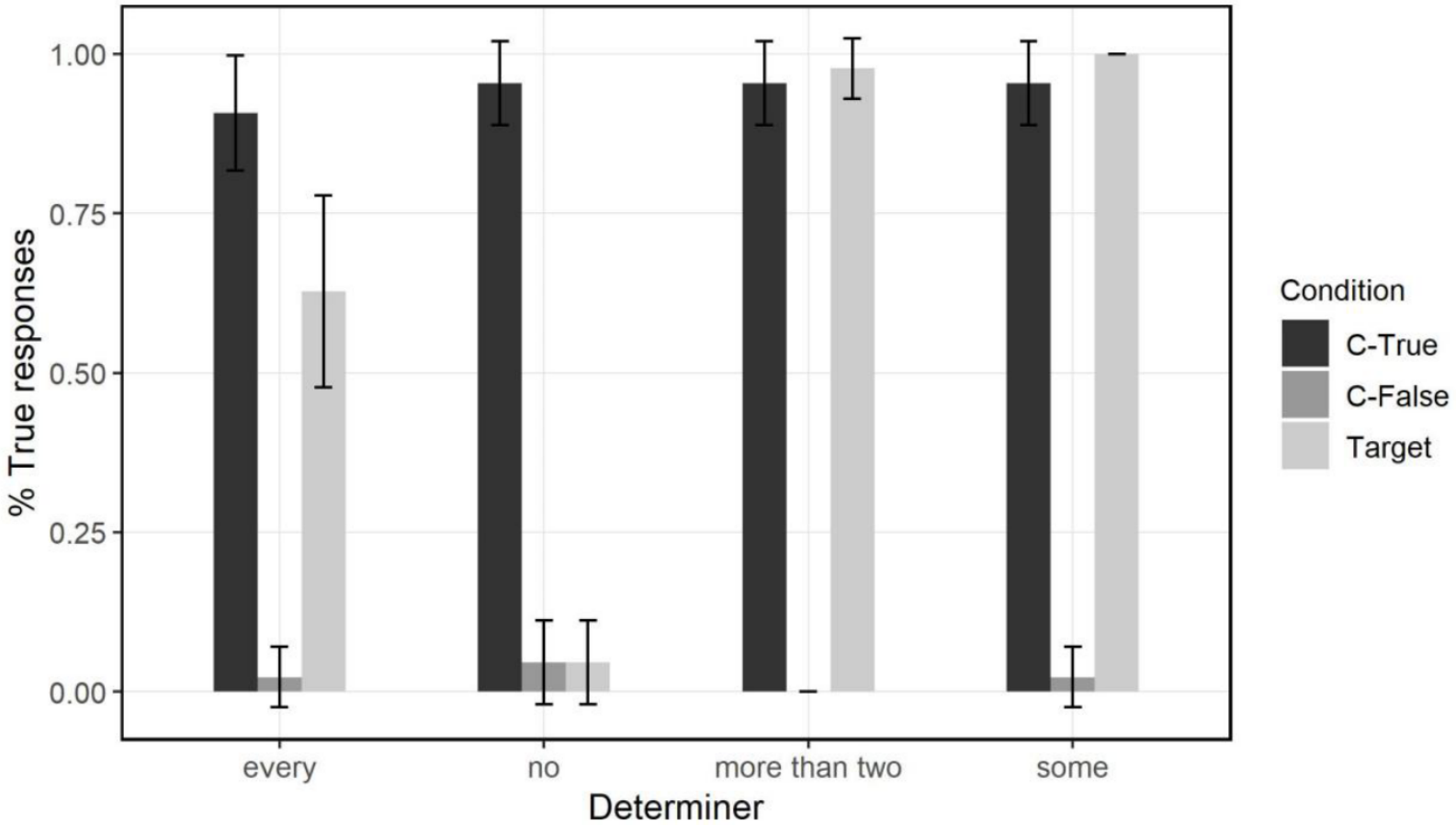
Are the results expected?

[Foppolo, 2008]

TODO1

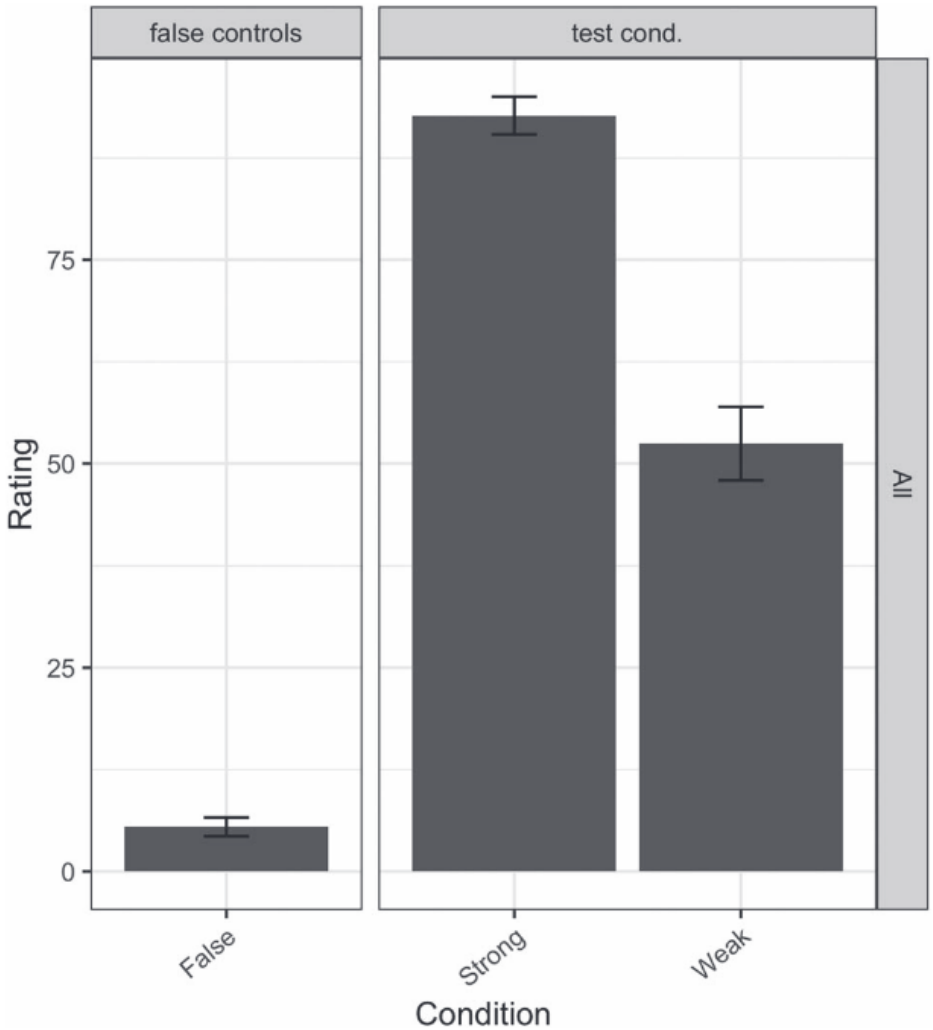
Are the results expected?

[Sun et al., 2020]



Are the results expected?

[Denić and Sudo, 2022]



Are the results expected?

Fits in with (a version of) [Kanazawa, 1994]'s generalization

Kanazawa revisited

In a configuration "*[…a NP] …[…it …]*"

- The existential reading is always available.
- The universal reading is available iff it is monotonic.

Against Kanazawa's generalization: the effect of negation

The theoretical literature has produced examples which seem to obtain the "*unattested*" reading:

(35) a. Some people who have an umbrella left it at home today.

b. No person who had an umbrella left it at home today.

Using the same umbrella biasing items, [Chatain, 2018] argues that universal readings are also available.

(36) I bet you $10 that Max has an umbrella and that they left it at home today.
⇝ *bet lost if they brought one*
⇝ *questionable bet*

Beyond Kanazawa

- Why don't we see these readings in experimental studies?
- Why do we wee ambiguity in universal/bathroom cases in experimental studies?

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$\rightsquigarrow$ we don't use biased examples like the *left-umbrella* example!

Why is the *left-umbrella* case special?

- *left* is negative: *left* = *not take*

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  - although no real evidence for this from usual tests
  - it would not matter for Kanazawa's generalization
- *leave umbrella at home* begs for the question: *will Max get wet?*

(37) ? I left any umbrella at home.

Beyond Kanazawa

Idea: test the effect of negation directly

Beyond Kanazawa

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(38) There a circle and it is not blue.

a. **existential:** *...and some circle is not blue*

b. **universal:** *...and every circle is not blue*

TODO3

Beyond Kanazawa

Idea: test the effect of negation directly

(38) There a circle and it is not blue.

a. **existential:** *...and some circle is not blue*

b. **universal:** *...and every circle is not blue*

TODO4

Kanazawa's generalization does not predict this manipulation to matter.

(39) a. There is a circle and it is not blue.

b. $\Leftarrow$ There is a big circle and it is not blue. (if exist.)

c. $\not\Leftrightarrow$ There is a big circle and it is not blue. (if univ.)

Against Kanazawa's generalization

A standard principle upheld by many modern theories of anaphora:

Scope extension rule ("*Egli's theorem*")

$$[\exists x, p(x)] \wedge q(x) \Leftrightarrow \exists x, [p(x) \wedge q(x)]$$

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(41) a. There is a circle and it is not blue.

b. $\Leftrightarrow$ There is a circle that is not blue.

Against Kanazawa's generalization

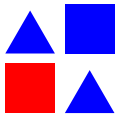
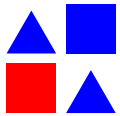
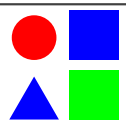
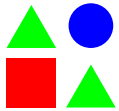
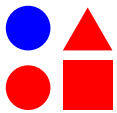
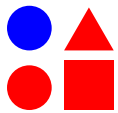
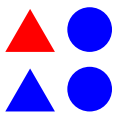
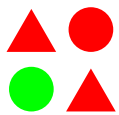
			
There is a circle and it is blue.	*	✓	✓
There is a circle and it is not blue.	✓	✓	*

By Egli's theorem, we don't expect a difference.

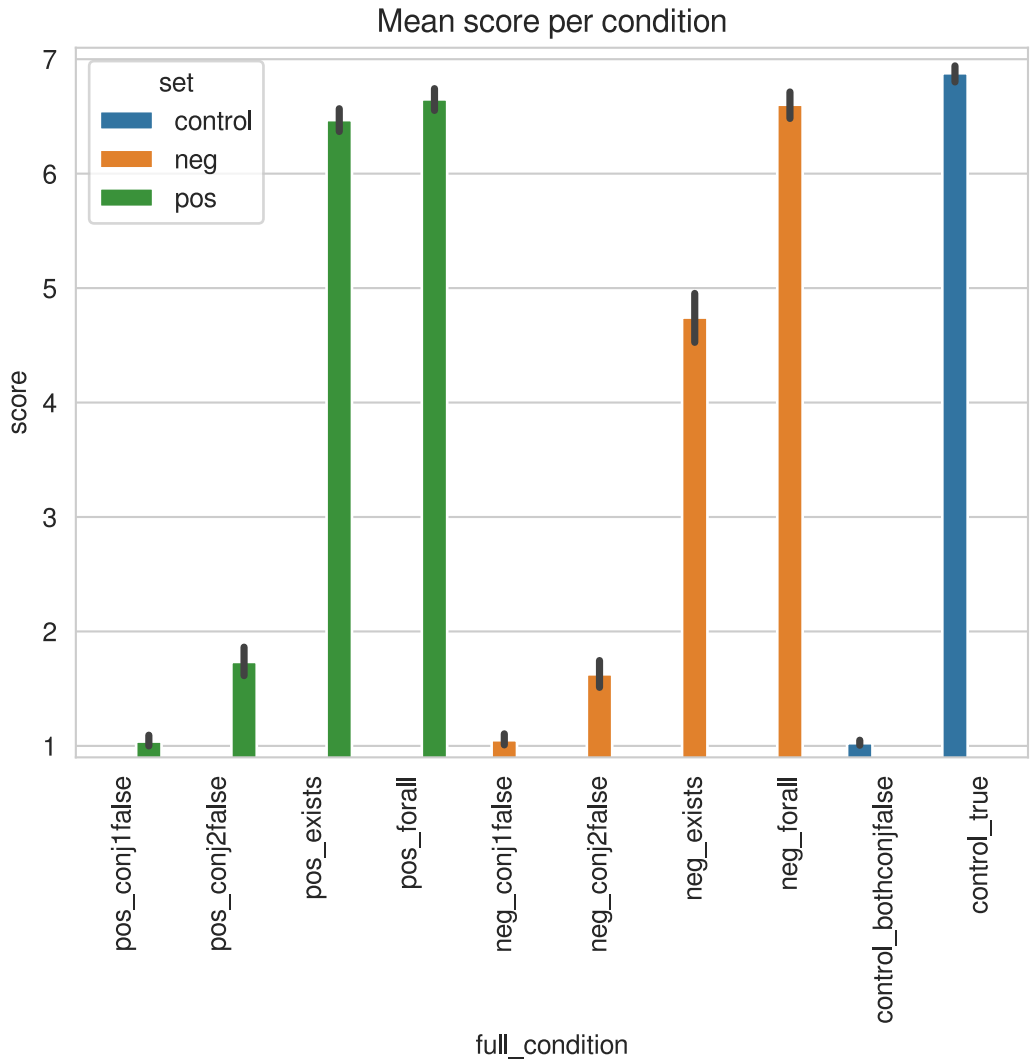
Experiment IV & V: Negation in conjunction

(42) a. There is a circle and and it is blue. (Pos- conditions)

b. There is a circle and and it is not blue. (Neg- conditions)

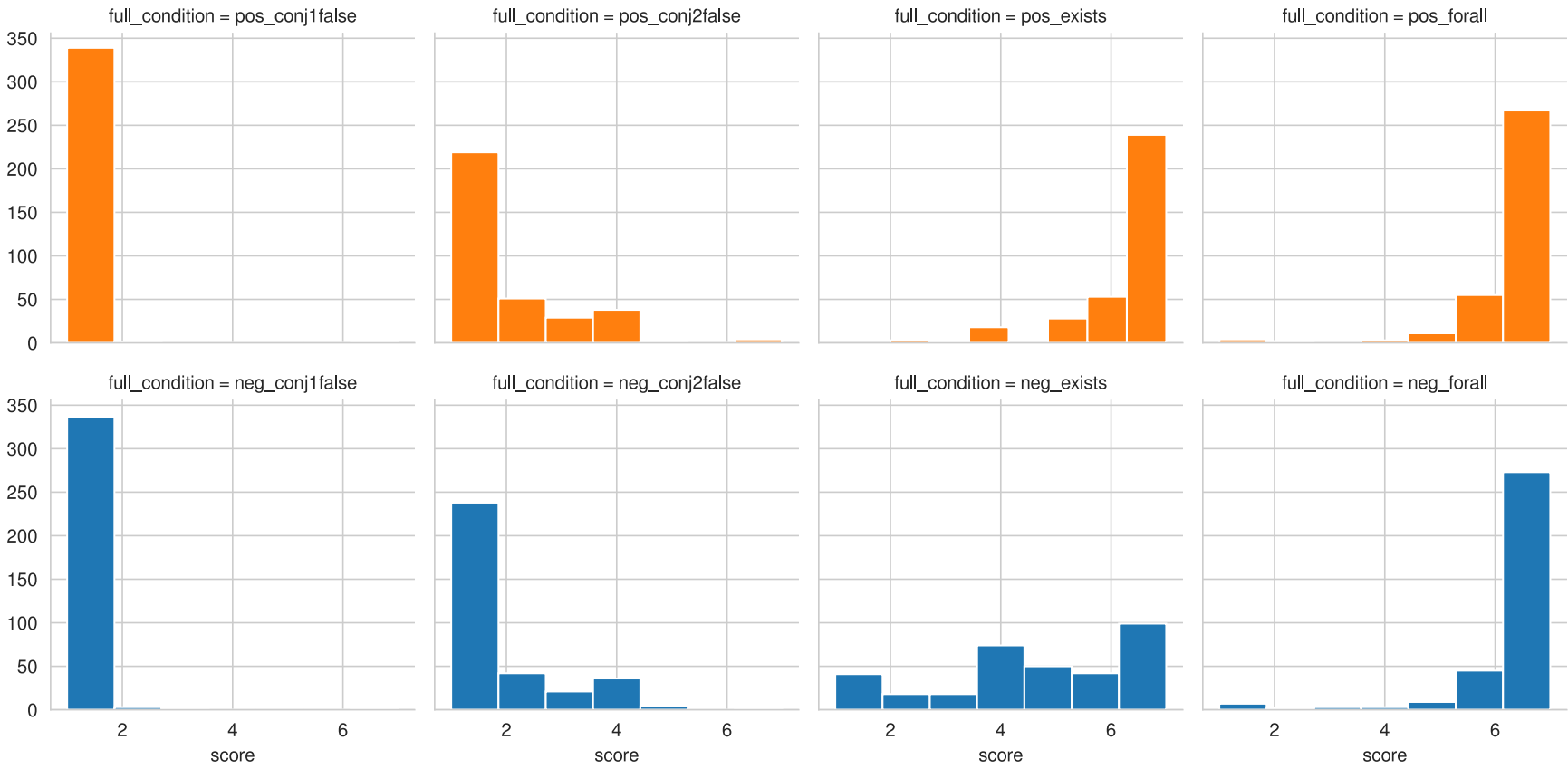
exist.	univ.	picture	sentence	sentence	picture	exist.	univ.
*	*		Pos-F1st	Neg-F1st		*	*
*	*		Pos-F2nd	Neg-F2nd		*	*
✓	*		Pos-∃	Neg-∃		✓	*
✓	✓		Pos-∀	Neg-∀		✓	✓

Experiment IV & V: Negation in conjunction



- Significant diff. between Pos-F2nd and Pos-$\exists$
- Significant diff. between Pos-$\exists$ and Pos-$\forall$
- Significant diff. between Neg-F2nd and Neg-$\exists$
- Significant diff. between Neg-$\exists$ and Neg-$\forall$
- Sig. interaction between Pos/Neg and $\exists$/$\forall$

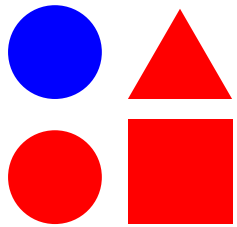
Experiment IV & V: Negation in conjunction



Participants are only variable in (43b).

(43) a. There is a circle and it is blue.

b. There is a circle and it is not blue



Experiment IV & V: Negation in conjunction

Counter-hypothesis: people not so good with this logical puzzles, negation confuses them.

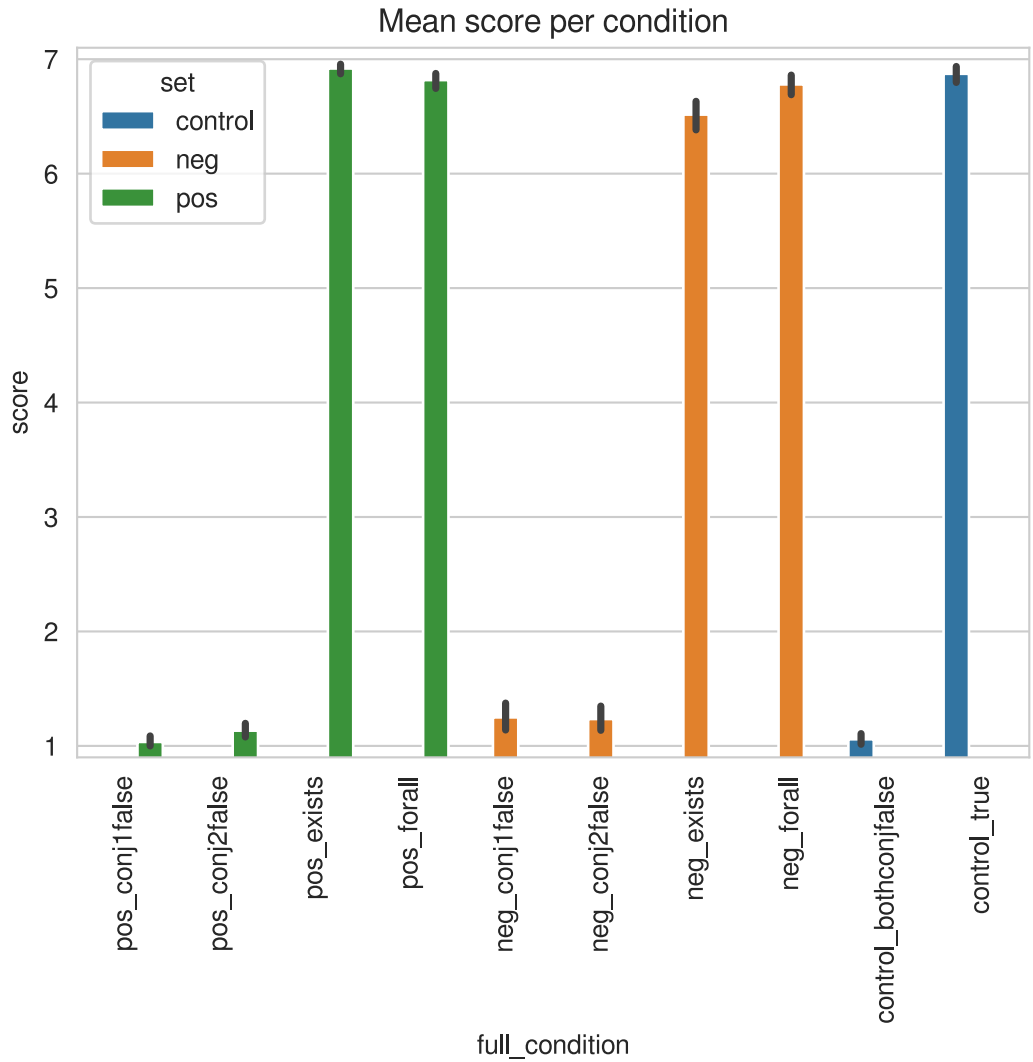
Experiment V : no-pronoun control

We run experiment IV replacing the sentences with:

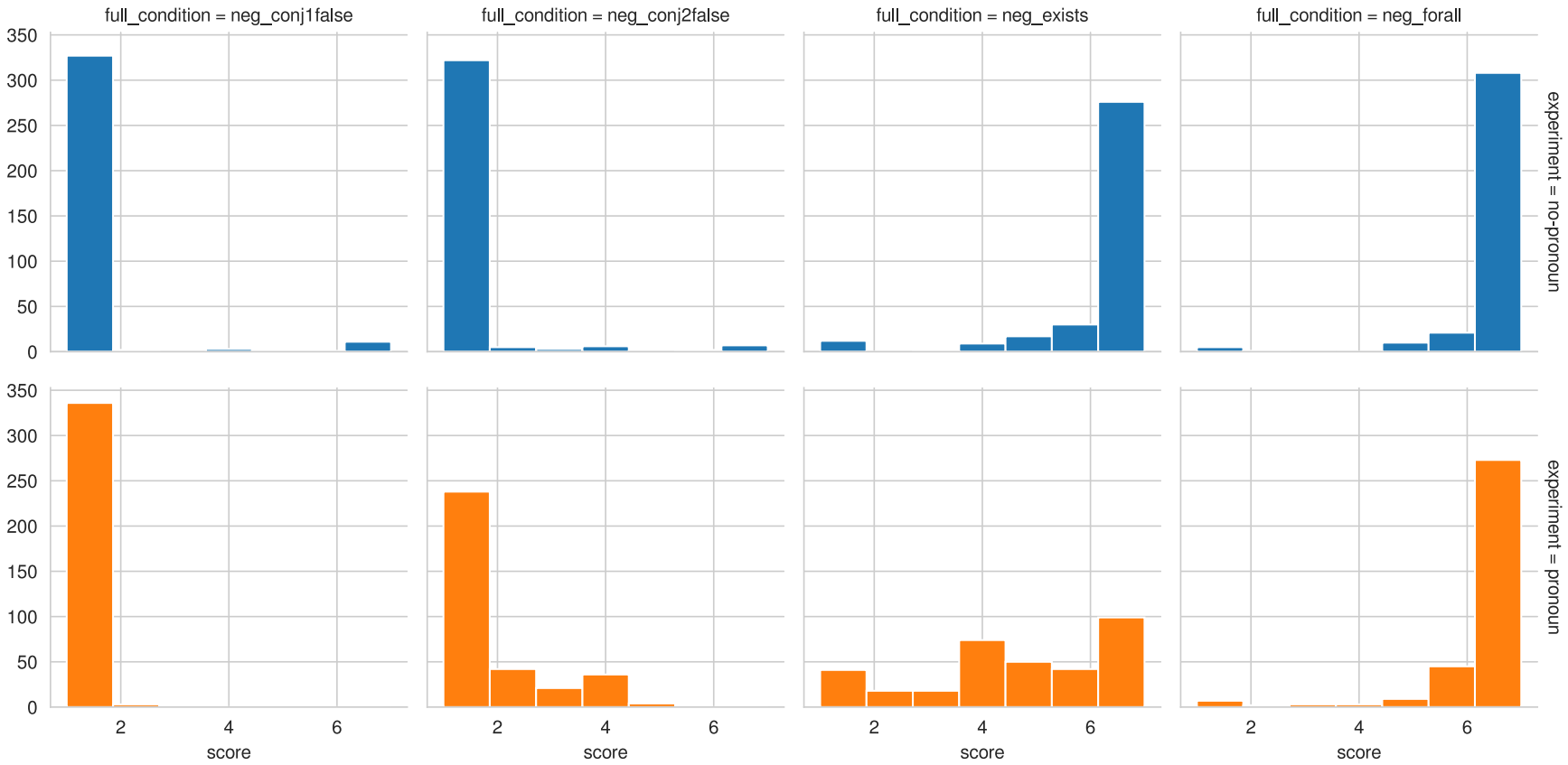
(44) a. There is a circle that is blue.

b. There is a circle that is not blue.

Experiment V : no-pronoun control



Experiment V : no-pronoun control



Discussion

Recap

- **Part I:** As far as positive sentences are concerned, we validate Kanazawa's generalization with connectives
- **Part II:** Negation in the pronoun's clause reveals ambiguity even in the cross-conjunction case.

How might we predict the results?

Two paths forward:

1. **Ambiguity everywhere:** the grammar generates existential and universal reading across the board
   $\rightsquigarrow$ *a pragmatic story is needed*

How might we predict the results?

Two paths forward:

1. **Ambiguity everywhere:** the grammar generates existential and universal reading across the board
   $\rightsquigarrow$ *a pragmatic story is needed*
2. **No ambiguity in conjunction cases** the grammar does not generate universal reading for conjunction and existential quantifiers
   $\rightsquigarrow$ *the biased examples must be confounded*

E-type-like [Chatain, 2018, Chatain, 2024]

(45) Either there isn't a circle or $f_{(et)e}$(circle) is blue

a. super-true if true under all values of f

b. super-false if false under all values of f

c. indeterminate otherwise

(46) There is a circle and $f_{(et)e}$(circle) is blue

a. super-true if true under all values of f

b. super-false if false under all values of f

c. indeterminate otherwise

E-type-like [Chatain, 2018, Chatain, 2024]

(45) Either there isn't a circle or $f_{(et)e}$(circle) is blue

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(46) There is a circle and $f_{(et)e}$(circle) is blue

a. super-true if true under all values of f

b. super-false if false under all values of f

c. indeterminate otherwise

$\rightsquigarrow$ *this is compatible with but does not explain any of the preferences and subtle effects observed.*

The liberal theory

Next steps

- Is the presence of uncertainty due to the unique question that negative clauses raise?
- Or is it due to it creating monotone decreasing context?

Conclusion

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- Our initial evidence supports the fact that Kanazawa's generalization extends beyond donkey cases:

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  - Cross-conjunction anaphora has a universal reading.

Recap

- Our initial evidence supports the fact that Kanazawa's generalization extends beyond donkey cases:
  - Cross-conjunction anaphora only has an existential reading.
  - Cross-disjunction anaphora is ambiguous between an existential and a universal reading.
- Yet that is predicted not predicted by any extant theory.
- Cracks in the picture when looking at negated versions
  - Cross-conjunction anaphora has a universal reading.
  - Yet, it does not have the same signature as the ambiguity found in the cross-conjunction cases.

Thank you!

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