

ABSTRACT

Findings in experimental syntax suggest that acceptability judgments are *gradient*. In the previous literature, there have been two approaches to explaining this: the first approach posits that the grammar itself is gradient; the second approach posits that the grammar is categorical but interacts with other cognitive systems that may be gradient when speakers are generating acceptability judgements. The goal of this project is to precisely quantify the assumptions needed by the latter approach. We do this by looking at gradience in island effects across island types and \bar{A} -dependency types.

OBJECTIVE

To use the methods of experimental syntax to precisely quantify the gradience found in acceptability judgments found across island and extraction types. The variables manipulated in the experiments are:

1. Island type: *whether*-island, Complex NP (CNPC)-Islands, Subject Islands, Adjunct Islands
2. Dependency Type: Bare *wh*-words, D-linked *wh*-words, Relative Clause Heads
3. Embedded and unembedded structures

MATERIALS & METHODS

In this study we leveraged two quantitative tools:

(i) Factorial definition of island effects:

Super-additive interaction of Structure Complexity x Dependency Length.

1. Who thinks that Paul chased the bus?
NON-ISLAND | SHORT
2. Who wonders whether Paul chased the bus?
ISLAND | SHORT
3. What did the officer think that Paul chased?
NON-ISLAND | LONG
4. What did the officer wonder whether Paul chased?
ISLAND | LONG

Sentences with Island violations are less acceptable than sentences matched for structural complexity and dependency length.

(ii) Highly controlled set of filler items

- Allows for direct comparison of distinct island types across multiple experiments.

Island types

- **Whether islands**
What did the officer wonder whether Ben chased?

- **CNPC Islands**

What did you hear the rumor that Sam ate?

- **Subject Islands**

Who does the reporter think the gift from prompted the congressional hearing?

- **Adjunct Islands**

What do you worry if the lawyer forget at the office?

Dependency types

- **Bare *wh*-word**

What did the detective wonder whether Paul stole?

- **D-linked *wh*-word**

Which necklace did the detective wonder whether Paul stole?

- **Relative clause head**

I found the necklace that the detective wondered whether Paul stole.

Embeddedness

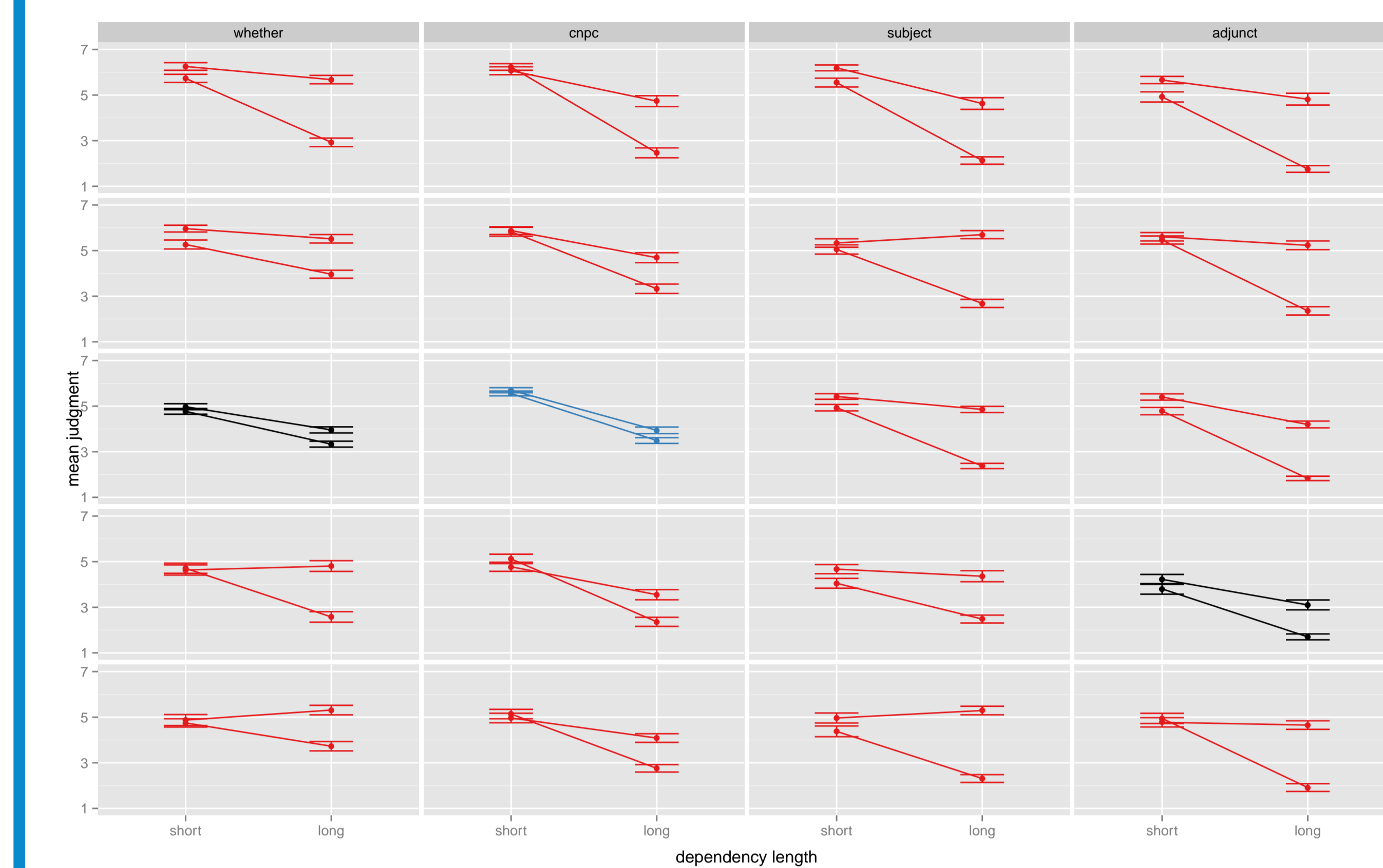
- **Embedded**

I found out what the officer wondered whether Paul chased?

- **Unembedded**

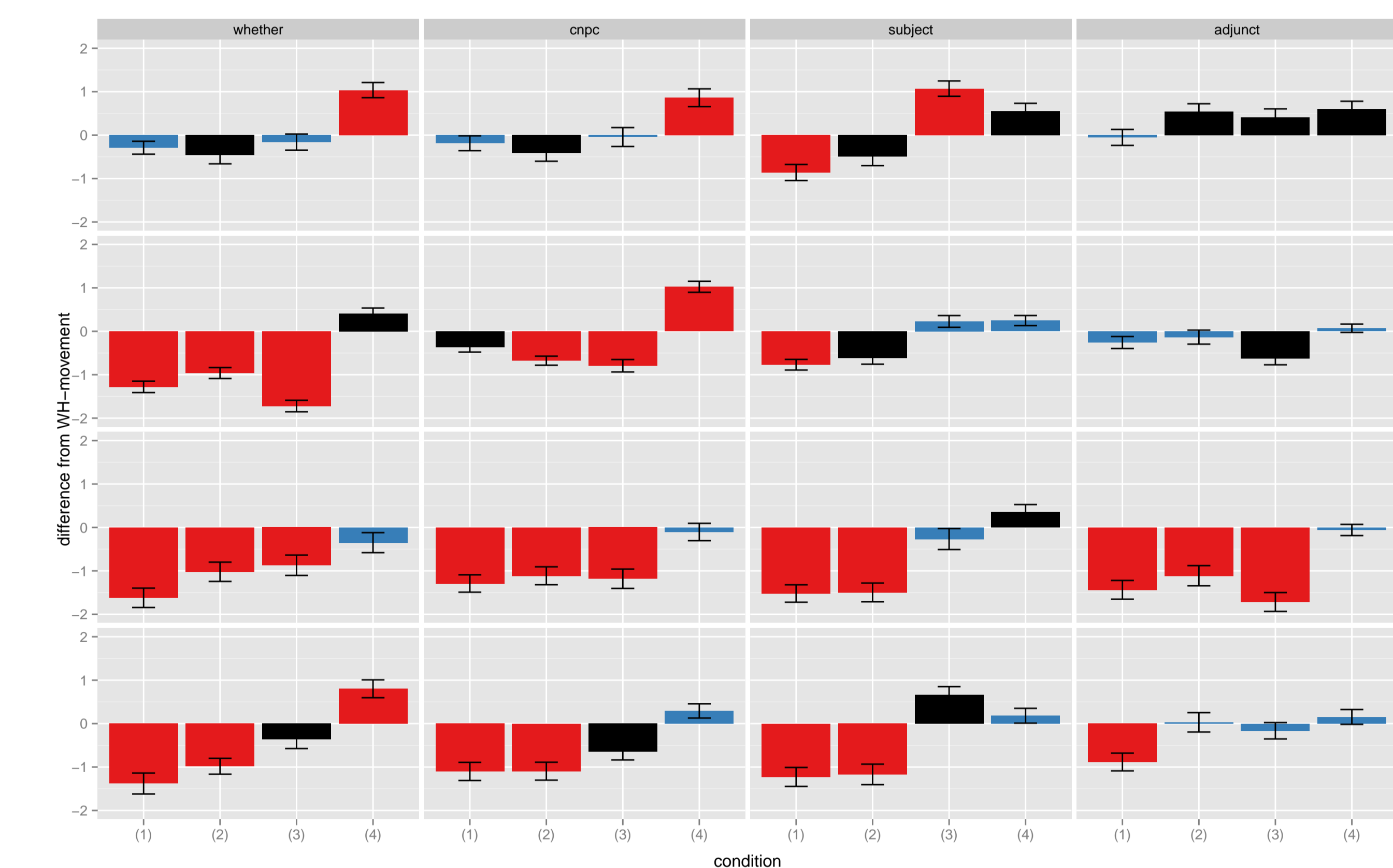
What did the officer wonder whether Paul chased?

RESULTS



The left shows the interaction plots for each of the 20 experiments (32 participants each). The super-additive effect is indicated by the “alligator mouth” pattern. The colors report a Bayes Factor analysis, which quantifies how much the evidence favors one hypothesis over others in the form of odds ratio [1]. Red indicates substantial evidence for an island effect, blue indicates substantial evidence against an island effect and black indicates not enough evidence either way.

The graphs to the right show the differences in acceptability of the embedded and unembedded D-linked, relative clause and embedded bare *wh*-word conditions from unembedded *wh*-phrase conditions which are acting as a baseline. This is again colored by Bayes Factors. Red indicates substantial evidence for a difference in acceptability, blue indicates substantial evidence against a difference in acceptability and black indicates not enough evidence either way.



DISCUSSION

- **Evidence was found for all island types in bare *wh*-word condition.**

Greater acceptability found for *whether* and CNPC-islands, but this is in all conditions.

- **There was an effect of dependency type: D-linking.**

The island violating sentences with D-linked *wh*-words were rated more acceptable than baseline *whether* and CNPC-islands.

Solution: (i) In islands with bare *wh*-words there are two violations and with D-linking there is only one or (ii) deny there is any violation.

- **There was an effect of embedding.**
Embedding decreases the acceptability of all

control conditions while leaving the island violating sentences at the same acceptability.

Solution: Interaction of constraint violations and embedding in sentence processing system [2].

- **There was an effect of dependency type: Relative Clauses**

RCs do not show evidence for *whether* islands and evidence *against* CNPC-islands. This is caused by an increase in the acceptability of the island violating sentences and a decrease in grammatical conditions.

Solution: Combination of the embedding effect on grammatical conditions and D-linking effect on the island violating conditions.

REFERENCES

- [1] Rouder et al. Default Bayes factors for ANOVA designs. *Journal of Mathematical Psychology*, 2012.
- [2] Alexopoulou & Keller. Locality, cyclicity, and resumption. *Language*, 2007.

CONCLUSION

The gradience observed in island effects can be accounted for with a novel grammatical effect of D-linking/ RC heads and a well established processing

effect for embedding. **Gradient effects found in acceptability can be handled by categorical grammars.**