ERP satiation of *whether*-islands impacts scalp distribution, not amplitude

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Syntactic Satiation

– An increase in acceptability for ungrammatical sentences after repeated exposures in a single experiment. (Snyder 2000)

- Snyder reported satiation effects for three types of island violations, including *whether*-islands, but not for four other syntactic violations.
  - These asymmetries may indicate **differences in the source** of the unacceptability effect, with satiation indicating a processing-based source for *whether*-islands.
- **Replication Problem:**
  - Replications and extensions of Snyder's findings in the acceptability domain have yielded **mixed results** (Hiramatsu 2000, Francom 2009, Sprouse 2009, Goodall 2011, Do and Kaiser 2017).
  - One common thread in these results is the possibility that **conscious response strategies** may impact the satiation effect.

Our Aim

In this study:

- We attempt to look for an effect of satiation in a response that is beyond conscious control and potentially closely tied to sentence processing – **event related potentials (ERPs)**.
  - Hahne and Friederici (1999) have shown a satiation-like effect for one ERP component, reporting a decrease in P600 amplitude to phrase-structure violations when **80% of experimental items were violations**.
- Thus, we look for a **satiation-like effect in the ERP responses** that arise for *whether*-islands as a first step toward establishing an ERP-satiation literature to complement the judgment-satiation literature.

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Testing for Satiation of Islands

Kluender and Kutas (1993) recorded ERPs for *if*-islands and *what*-islands, reporting a **central/anterior negativity in the 300-500ms time window at the embedded subject** after "if" and "what" relative to the control condition in (5). Our experiment included five conditions: whether-islands (1), why-islands (2), a grammatical "whether" condition (4) so that we could establish the behavior of a grammatical *whether*-clause for comparison, and the K&K control. (Complex NP-islands (3) were also included.)

	Sentence Type	Example
(1)	whether-islands	*What does the tenant wonder [whether **Mary** read?]
(2)	why-islands	*What does the tenant wonder [why **Mary** read?]
(3)	Complex NP islands	*What did the tenant make [the claim that **Mary** read?]
(4)	whether-grammatical	Why does the tenant wonder [whether **Mary** read the book?]
(5)	Controls	What does the tenant think [that **Mary** read?]

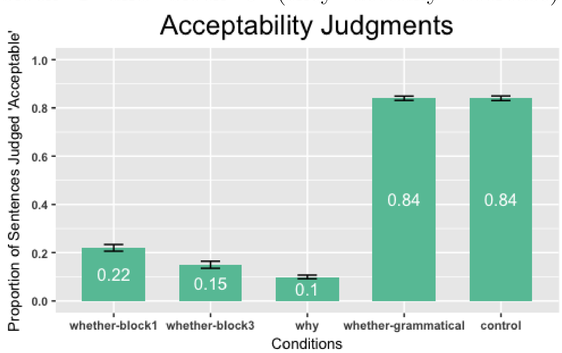
Our design contained 80% unacceptable and 20% acceptable items, evenly divided among 3 logical blocks (see table below). Participants gave an acceptability judgment (yes/no) after every item.

	Time Block 1	Time Block 2	Time Block 3	Total Items
No. of whether-islands	30		30	60
No. of why-islands		120		120
No. of Complex NP islands			30	30
No. of whether-grammatical	4	18	8	30
No. of Controls	4	18	8	30
Total No. of Test Items	38	156	76	270
Ratio of Violations to Control	80%/20%	80%/20%	80%/20%	80%/20%

Results

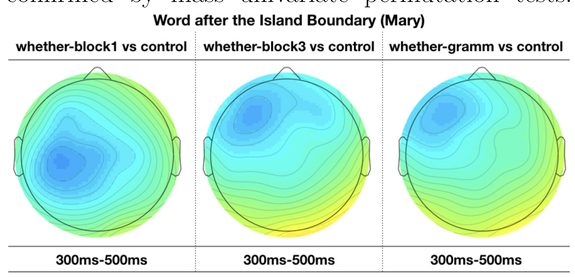
No Satiation in Judgments

There is no evidence of judgment satiation in the acceptability task. The **judgments for *whether*-islands do not increase** between block 1 and block 3 (they actually decrease).



Change in Scalp Distribution

In block 1, *whether*-islands show a **left-central negativity** in the 300-500ms window at the critical word (Mary) compared to the control condition. In block 3, they show a **left-anterior negativity**. These differences in distribution are confirmed by mass univariate permutation tests.



Conclusion

Our results suggest that **satiation impacts the scalp distribution, but not amplitude**, of the ERP response.

- Crucially, **the left-anterior negativity also appears for the *whether*-grammatical condition**, suggesting that *whether*-islands begin to resemble grammatical *whether*-clauses after ERP-satiation.

Though more work is necessary to tie this ERP effect to the processing-vs-grammar debate, it **at least suggests that the satiation literature can be expanded** through the systematic study of ERP satiation and syntactic violations.

Future Work

1. Scalp distribution analysis
2. Dedicated experiment exploring *whether*-islands and *whether*-grammatical clauses

References

Do, M. and E. Kaiser (2017). A closer look: Investigating the mechanisms of syntactic satiation. pp. 187–194. 34th West Coast Conference on Formal Linguistics: Cascadilla Proceedings Project.

Francom, J. C. (2009). Experimental syntax: exploring the effect of repeated exposure to anomalous syntactic structure–evidence from rating and reading tasks.

Goodall, G. (2011). Syntactic satiation and the inversion effect in english and spanish wh-questions. *Syntax 14*(1), 29–47.

Hahne, A. and A. D. Friederici (1999). Electrophysiological evidence for two steps in syntactic analysis: Early automatic and late controlled processes. *Journal of cognitive neuroscience 11*(2), 194–205.

Hiramatsu, K. (2000). *Accessing linguistic competence: Evidence from children's and adults' acceptability judgments.* Ph. D. thesis.

Kluender, R. and M. Kutas (1993). Subjacency as a processing phenomenon. *Language and cognitive processes 8*(4), 573–633.

Snyder, W. (2000). An experimental investigation of syntactic satiation effects. *Linguistic Inquiry 31*(3), 575–582.

Sprouse, J. (2009). Revisiting satiation: Evidence for an equalization response strategy. *Linguistic Inquiry 40*(2), 329–341.