

An experimental investigation of three purported exceptions to island effects in English

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1. Introduction

Three exceptions to island effects that should be ruled out by standard island constraints, but have been reported to be (relatively) acceptable:

- (1) non-finite wh-island: *What do you wonder how to fix __?
 - (2) recursive NP island: *What did you support the end of the enforcement of __?
 - (3) bare participle adjunct island: *What did Amy ruin the crop spraying __?
- (Chomsky 1986, Deane 1991, Truswell 2007)

Three structurally standard island effects (counterparts of (1)-(3)):

- (4) whether-island: *What do you wonder whether Emily fixed __?
- (5) complex NP island: *What did you make the claim that Emily fixed __?
- (6) causal adjunct island: *What did Amy ruin the crop because she sprayed __?

Two main approaches towards these exceptional constructions:

1. **Grammatical theories**: Island effects are consequences of violating syntactic constraints (Chomsky 1986, Ross 1967).
2. **Reductionist theories**: Island effects are consequences of non-grammatical constraints on the human sentence parser, such as limited processing resource capacity (Kluender and Kutas 1993, Keshev and Meltzer-Asscher 2018).

2. The questions to be answered

1. Are there island effects in the exceptional constructions?

Super additivity from the acceptability judgment result is an indicative of island effect and can be defined as extra decrease in acceptability over and above the effect of long distance dependencies and the effect of processing island structures.

Super additivity (Sprouse 2007)



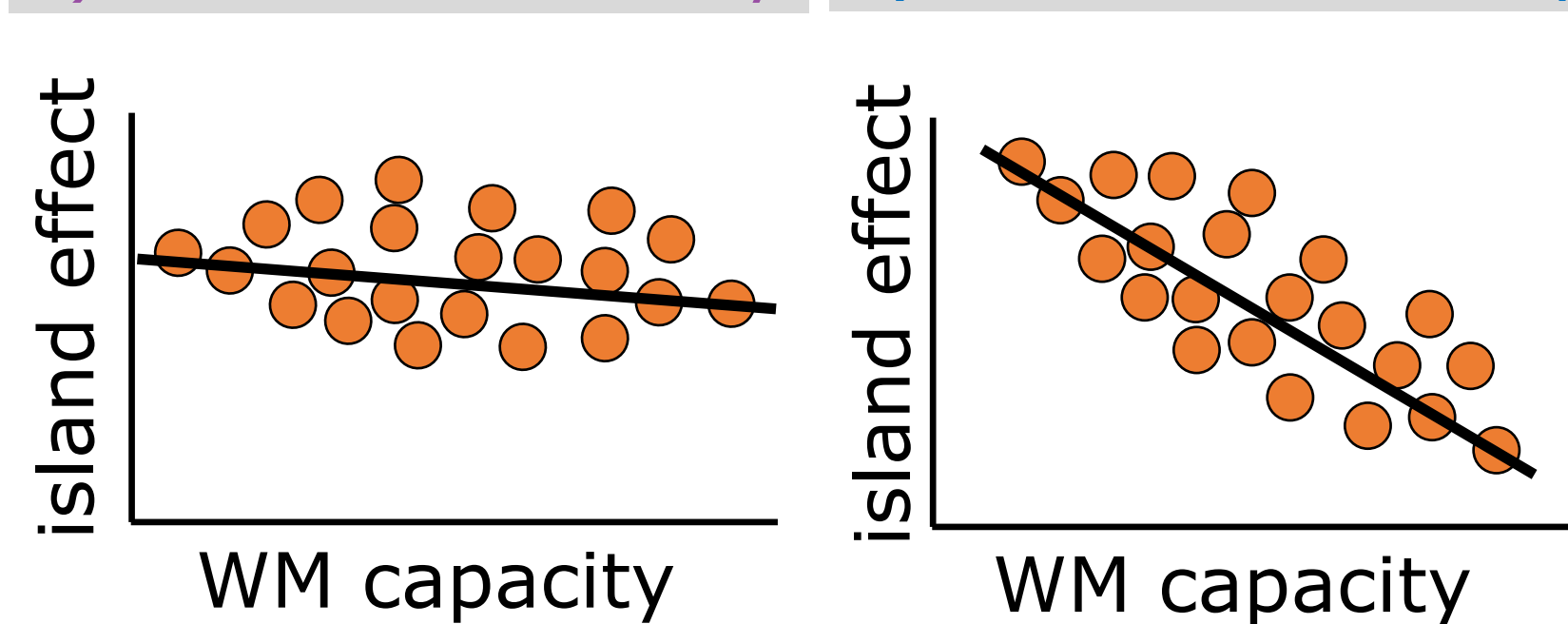
2. Do the effects correlate with working memory capacity?

a) Grammatical theories predict

no correlation between island effects and working memory capacity.

a) Reductionist theory predict **strong correlation** between island effect and working memory (as working memory scores increase, island effect should decrease)

a) Grammatical theory b) Reductionist theory



3. Three experiments (with two parts)

Part 1. Acceptability Judgment task (7-point scale):

Each experiment contained two island types: the exceptional construction and the standard island. The 2x2 design crossed two factors (LENGTH and STRUCTURE). Participants rated 2 tokens of each condition, yielding 16 target items, combined with 32 fillers and 9 practice items for a total of 57 items.

Part 2. Reading Span Task: Participants judge the plausibility of a sentence, then memorize a word. After 2-6 sentence/word pairs, participants were asked to recall the words in any order (10 trials, 2 each of 2 to 6 sentence/word pairs).

STIMULI	TASK
Betsy could never tell a lie	[read and judge plausibility(y/n)]
logic	[memorize]
John filled the pen with milk	[read and judge plausibility(y/n)]
nation	[memorize]
1. _____	2. _____
	[type the memorized words]

Three experiments, 96 participants each on Amazon MTurk.

4. Island effects in both standard vs. exceptional island

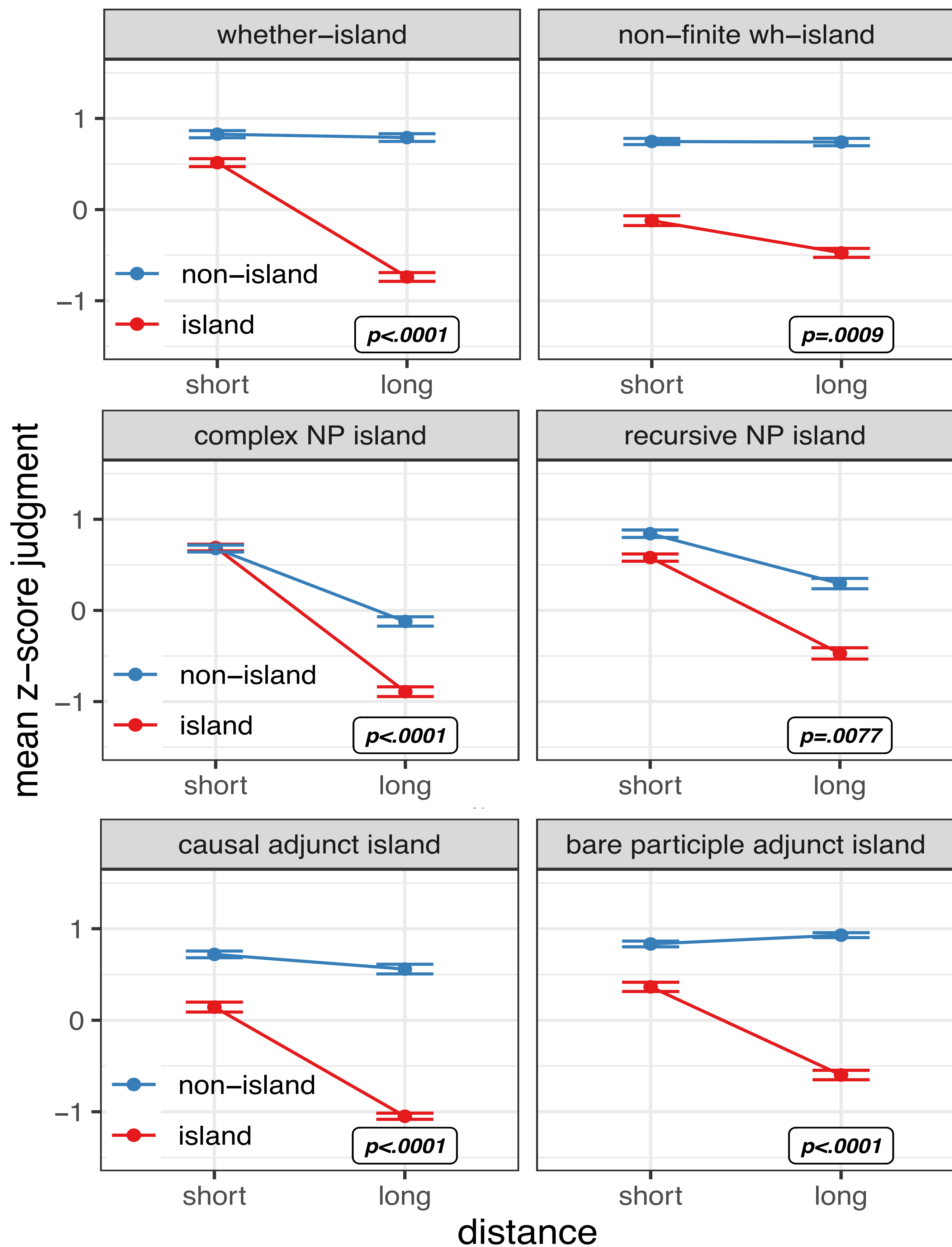


Figure1. Interaction plots with the means and estimated standard errors for each island: standard islands (4)-(6) on the left and purported exceptions (1)-(3) on the right.

An example of the factorial design (non-finite wh-islands)
Who __ thinks John wants to fix the car?[short, non-island]
What do you think John wants to fix __?[long, non-island]
Who __ thinks John wonders how to fix the car?[short, island]
What do you think John wonders how to fix __?[long, non-island]

Result of Acceptability Judgment Task

- We constructed linear mixed-effects models using length and structure as fixed effects, and subjects (intercept and slope) and items (intercept only) as random effects.
- We used the lmerTest package in R to calculate p -values using the Satterthwaite approximation for degrees of freedom. The p -values superimposed on the plots indicate that **all three apparent exceptions show an effect above and beyond the effects of length and structure - an island effect.**
- The island-violating conditions for the exceptions are in the lower half of the range of acceptability, suggesting that all three are true island effects, not exceptions.
- The violation condition in each putative exception is a bit more acceptable than the violation in each standard island, perhaps indicating a reason why these were reported as exceptions.

5. Correlation between island effects and working memory

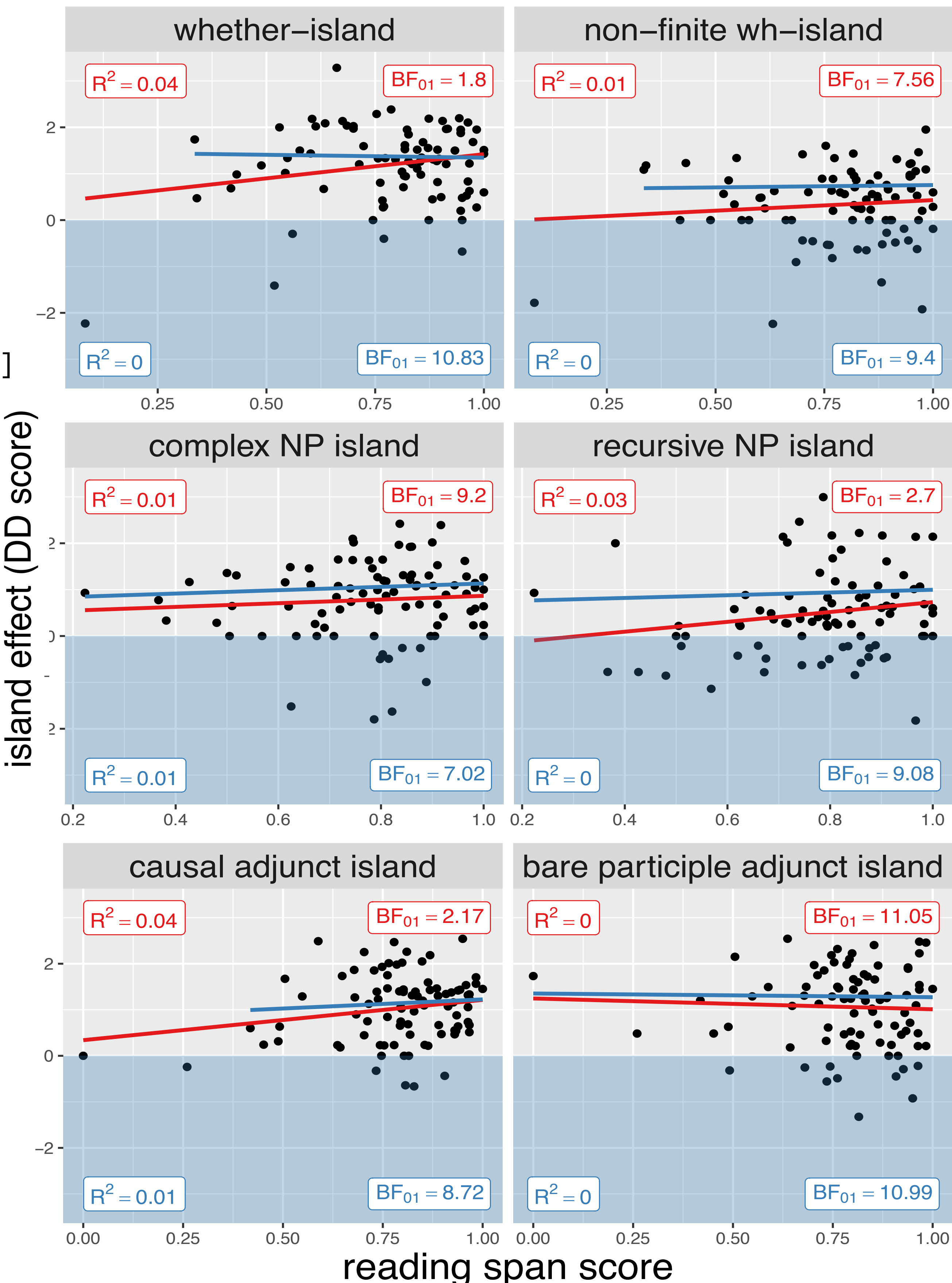


Figure2: Correlation plots between reading span scores (x-axis) with the island effects (as defined as a superadditive interaction term) from island effects for each island(y- axis): the standard island is on the left and the purported exception is on the right

Result of Reading Span Task and the correlation

- The working memory capacity theory predicts a substantial negative correlation: island effects should be smaller for participants with higher working memory capacity (Kluender and Kutas 1993, Sprouse et al. 2012).
- We report partial-credit unit scoring for the reading span task here (Conway et al. 2005), but note that the other three scoring methods yield the same results.
- We report lines of best fit, R^2 , and Bayes Factors (BF_{01}) for the full sample (red), and participants with positive island effects (blue).
- The results are the same in both cases: **there is no (negative) correlation for either the exceptional island effects or the standard island effects.**
- This suggests that the island effects that we found for these exceptions cannot be explained by the working memory capacity theory, and should be more profitably analyzed as similar to the standard island effects in (4)-(6).

Conclusion: We offer new evidence in this debate by using formal acceptability judgments to show that the exceptional constructions do indeed show island effects, contrary to the claims in the literature, and by using working memory tasks to show that these island effects cannot be explained by a basic working memory capacity-based approach.

references: Chomsky (1986), Conway, A. R., Kane, M. J., Bunting, M. F., Hambrick, D. Z., Wilhelm, O., & Engle, R. W. (2005), Deane (1991), Hofmeister, P & Sag, I. A. (2010), Keshev, M., & Meltzer-Asscher, A. (2019), Kluender, R., & Kutas, M. (1993) Sprouse, J., Wagers, M., & Phillips, C. (2012), Truswell (2007)