

Niko Webster¹, Mandy Cartner², Matthew Kogan¹; Matt Wagers¹ & Ivy Sichel¹

¹UCSC, ²TAU

How is grammar structured?

What type of entities serve as its basic building blocks?

Are they "constructions", defined by different combinations of structure, meaning, and function, such as wh-questions, relative clauses, topicalization structures, cleft constructions, passives?

Or are they abstract syntactic representations, such as movement dependencies?

We probe these issues via sensitivity to island locality.

Overview

Road Map

1. Background on islandhood

- Syntactic accounts
- Discourse function accounts

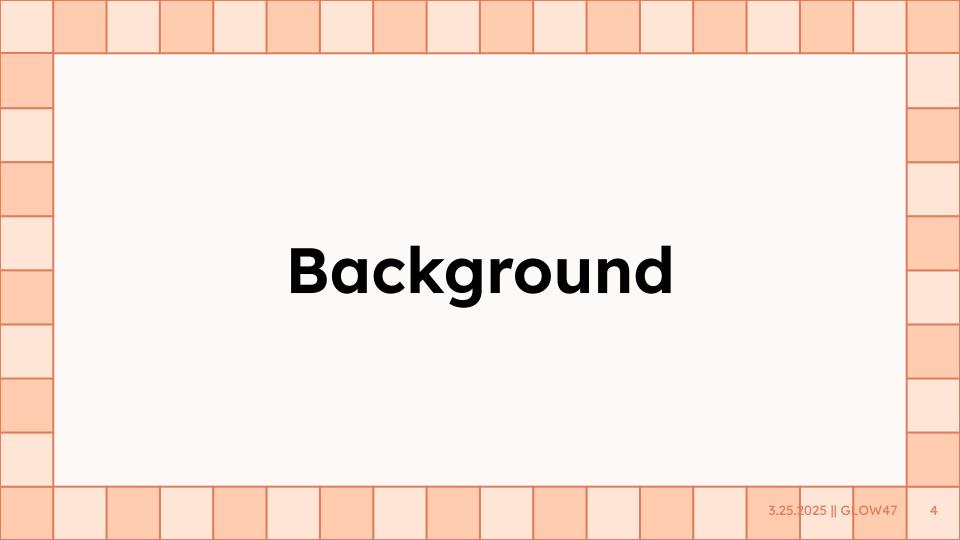
2. Present study

- WHQ (wh-questions)
- RC (relative clauses)
- TOP (topicalization)

3. Comparing constructions

4. Discussion and conclusion





Islands: environments which block extraction. (Ross 1967)

Examples: Subject Islands, Adjunct Islands, Complex NP, etc.

What is the source of island-locality?

- Wh-extraction out of adjuncts
- (1) a. Jaden meditated before meeting Mariella.
 - b. * **Who**, did Jaden meditate [before meeting _,]?

- Wh-extraction out of subjects
- (2) a. A friend of Sue invited Mariella to the party.
 - b. * **Who**; did [a friend of $_{i}$] invite Mariella to the party?
 - c. **Who**; did Sue invite [a friend of $_{i}$] to the party?

- Relativization out ⁽³⁾ of adjuncts
- * Sue knew **the person**; that Jaden meditated [before meeting _;].

- Relativization out ⁽⁴⁾ of subjects
- a. * Sue knew **the person**; that [a friend of _;] had invited Mariella to the party.
- b. Sue knew **the person**; that Mariella had invited [a friend of _;] to the party.

- Topicalization out of adjuncts
- (5) a. Jaden meditated before meeting that person.
 - b. * **That person**;, Jaden meditated [before meeting _;].

- Topicalization out of subjects
- (6) a. A friend of that person invited Sue to the party.
 - b. * **That person**_i, [a friend of $_{-i}$] invited Sue to the party.
 - c. **That person**_i, Sue invited [a friend of $_{-i}$] to the party.

- (2) b. * Who, did [a friend of _,] invite them to the party?
 - c. Who; did Sue invite [a friend of _;] to the party?



- (2) b. * Who, did [a friend of _,] invite them to the party?
 - c. **Who**; did Sue invite [a friend of _;] to the party?

Island effects arise with a wide range of dependency formations, differing in their semantic contribution and discourse function, suggesting a common syntactic underpinning: movement.

(Schütze, Sprouse & Caponigro 2015)

Island effects arise with a wide range of dependency formations, differing in their semantic contribution and discourse function, suggesting a common syntactic underpinning: movement.

(Schütze, Sprouse & Caponigro 2015)

Subject Condition: constituents within a syntactic subject cannot be targeted for sub-extraction.

(Chomsky 1973, Huang 1982, Pesetsky 1982, Privoznov 2021, Ross 1967)

Island effects arise with a wide range of dependency formations, differing in their semantic contribution and discourse function, suggesting a common syntactic underpinning: movement.

(Schütze, Sprouse & Caponigro 2015)

Subject Condition: constituents within a syntactic subject cannot be targeted for sub-extraction.

These accounts differ, but all attempt to derive island effects via constraints on the syntactic representation of movement.

Islands reflect interactions of information-structural categories of backgroundedness, focus, and prominence.

(Abeillé et al. 2020, Ambridge & Goldberg 2008, Cuneo & Goldberg 2023, Erteschik-Shir 1973, Hofmeister & Sag 2010, Kuno 1987)

Thus, the unacceptability of certain instances of (sub-)extraction is not purely syntactic in nature.

Extraction is restricted out of embedded contexts which are not "at-issue" (Erteschik-Shir 1973)

For example, differences in the presuppositionality of verbal complements affects the availability of object extraction

- (7) a. **Who**; did Nora say [that Marcus visited $_{i}$]?
 - b. *Who; did Nora rejoice [that Marcus visited _;]?

A recent incarnation: direct backgroundedness approaches to islandhood (Ambridge & Goldberg, 2008; Goldberg, 2006, 2013; Cuneo & Goldberg, 2023)

Backgrounded Constructions are Islands (BCI):

Constructions are islands to dependency formations to the extent that their content is backgrounded within the relevant extraction domain.

A recent incarnation: direct backgroundedness approaches to islandhood (Ambridge & Goldberg, 2008; Goldberg, 2006, 2013; Cuneo & Goldberg, 2023)

Backgrounded Constructions are Islands (BCI):

Constructions are islands to dependency formations to the extent that their content is backgrounded within the relevant extraction domain.

This is not our target. Instead, we argue against what we call **IS profile theories**, which characterize island effects as an *interaction* between the IS profile of a domain, and the IS profile of a dependency type.

Recent work suggests that the islandhood of subjects is due to their status as backgrounded (not at-issue).

Abeillé et al. (2020), Winckel et. al. (2025)

Abeillé et al. (2020) observed subject island effects with wh-questions, but not relativization, and attribute the contrast to the difference in WHQ and RC information structure profiles

In wh-questions, the extracted element is a focal domain, bearing prominent content.

(Lambrecht 1994)

In relativization, the extracted element is ascribed some property, without a dedicated discourse function.

(Gundel 1988, Kuno 1976, Lambrecht 1994)

The Abeillé et al. (2020) account:

Dependencies which foreground the extracted constituent engender an information-structural clash.

Focus-Background Conflict Constraint (FBC):

A focused element should not be part of a backgrounded constituent (Abeillé et al. 2020)

Focus-Background Conflict Constraint (FBC)

Objects

No extraction baseline

A. The dealer sold a sportscar, and the baseball player loved the color of the sportscar because of its surprising luminance.

PP-extracted dependency

B. The dealer sold a sportscar, **of which**; the baseball player loved [the color _;] because of its surprising luminance.

P-stranded dependency

C. The dealer sold a sportscar, **which**; the baseball player loved [the color of _;] because of its surprising luminance.

Subjects

No extraction baseline

D. The dealer sold a sportscar, and the color of the sportscar delighted the baseball player because of its surprising luminance.

PP-extracted dependency

E. The dealer sold a sportscar, **of which**; [the color _;] delighted the baseball player because of its surprising luminance.

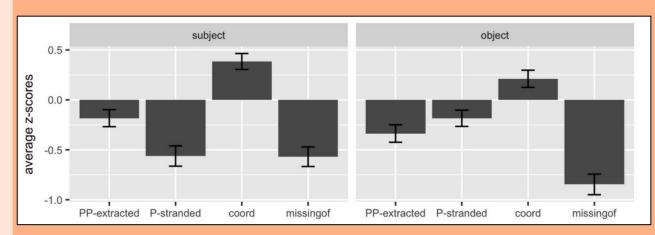
P-stranded dependency

F. The dealer sold a sportscar, **which**; [the color of _;] delighted the baseball player because of its surprising luminance.

Focus-Background Conflict Constraint (FBC)

In their results, they find sub-extraction out of subjects is *better* than out of objects in RCs, as opposed to WHQs.

- The difference they find between WHQs and RCs holds only for pied-piping, or extraction of the entire PP.
- With preposition stranding, there is no difference.



Abeillé et al. (2020) Experiment 2: Condition means and 95% confidence intervals for z-scores of all conditions.

Abeillé et al. (2020) claim that pied-piping alleviates a hypothetical parsing difficulty caused by p-stranding, and therefore ratings collected under pied-piping are more closely tied to grammaticality.

We argue, instead, that p-stranding is the most appropriate environment to test in English, for three reasons.

The claim that p-stranding out of subjects is rare, due to a
processing difficulty, is circular - why is there a difficulty that
arises in these precise cases of subject sub-extraction?

2. Stranded prepositions followed by no complement provide an unambiguous signal for a gap, which is reason to hypothesize that p-stranding should be easier to process. (Radford 2019)

Studies find that p-stranding is generally preferred over pied-piping in RCs, both in their relative distribution, and in acceptability judgement tasks.

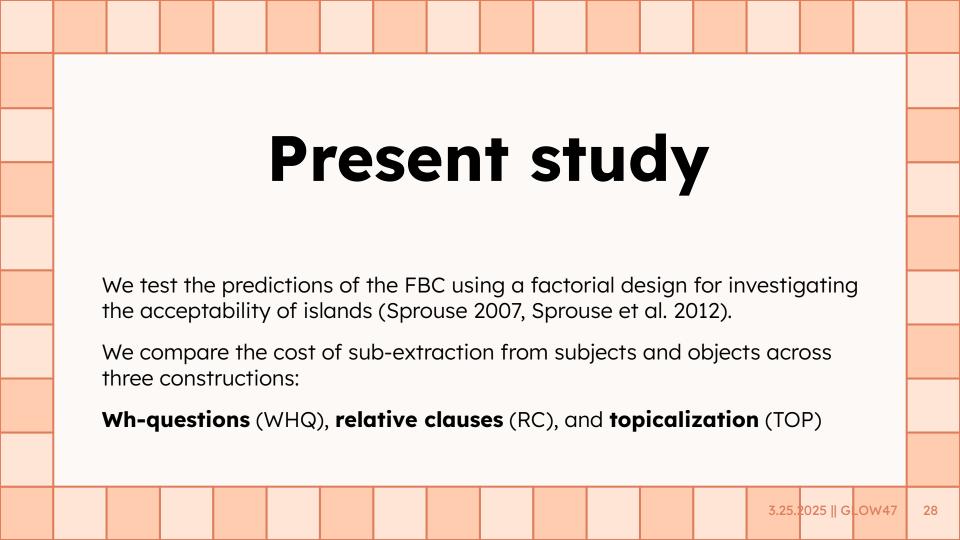
(Hoffmann 2011, Huddleston & Pullum 2003, Trotta 2000)

3. The frequency of p-stranding in English is much more common than pied-piping, and belongs to a colloquial register.

(Gries 2002, Eznina 2013, Günther 2021)

Takeaways leading into the present study

- 1. We test with p-stranding, not pied-piping
- 2. We add topicalization, which should not create a clash according to the FBC
- **3.** We use a design that allows us to isolate independent measures of complexity



Present study

We add topicalization to the set of constructions investigated by Abeillé et al. (2020).

In topicalization, the extracted element is marked as backgrounded, and predicated about in the proposition.

(Lambrecht 1994, Prince 1984)

(8) **This structure**_i, the students are familiar with $_{-i}$.

Present study

In our factorial design, we aim to isolate the components that contribute to the difficulty of processing islands: **complexity**, **extraction**, **islandhood**. (Sprouse 2007, Sprouse et al. 2012)

- With this design, we can estimate the independent costs of complexity and extraction, and whether island configurations exceed these costs, by comparing across conditions.
- Despite surface differences in the particular profiles of each construction's subject and object sub-extractions, this allows us to generalize across the three constructions.

WHQ: WHQ: RC: RC:

TOP:

TOP:

WHQ: island WHQ: RC: island RC: TOP: island TOP:

WHQ: island WHQ: island RC: island RC: TOP: island TOP:

WHQ: island



WHQ: island



RC: island



permeable RC:



TOP: island



TOP: permeable



Present study

Design

Example itemset (subject position) from Exp. 1: WHQs

For each construction (WHQ, RC, TOP), we constructed a $2 \times 2 + 1$ factorial design across subject and object positions

DP Complexity

(Simple, Complex)

Extraction Type

(No Extraction, Full Extraction, Sub-extraction)

No Extraction Stephanie said <u>the investigator</u> Simple a. had already questioned the driver. Stephanie said the investigator of b. Complex the crime had already questioned the driver. **Full Extraction** Which investigator did Stephanie Simple say _ had already questioned the driver?

say _ had already questioned the driver? d. Complex Which investigator of the crime did Stephanie say _ had already questioned the driver?

Sub-Extraction

e.	Complex	*Which crime did Stephanie say
		[the investigator of _] had
		already questioned the driver?



- No extraction
- Full extraction
- Sub-extraction

Design Walkthrough



simple complex



- No extraction
- Full extraction
- Sub-extraction

Complexity Cost

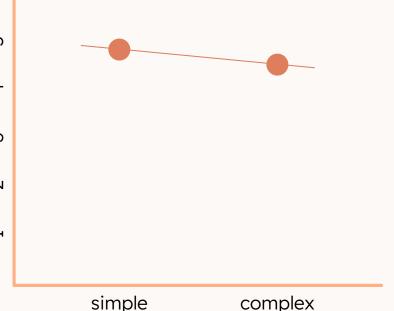
No Extraction, Simple

a. Stephanie said <u>the investigator</u> had already questioned the driver.

No Extraction, Complex

b. Stephanie said <u>the investigator</u> <u>of the crime</u> had already questioned the driver.







- No extraction
- Full extraction
- Sub-extraction

Complexity Cost = a - b

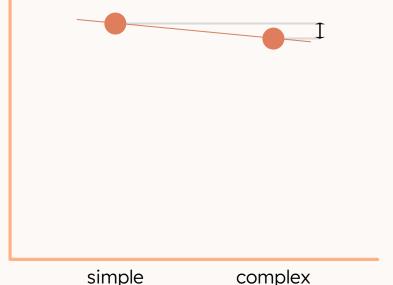
No Extraction, Simple

a. Stephanie said <u>the investigator</u> had already questioned the driver.

No Extraction, Complex

b. Stephanie said <u>the investigator</u> <u>of the crime</u> had already questioned the driver.







- No extraction
- Full extraction
- Sub-extraction

Extraction Cost

No Extraction, Simple

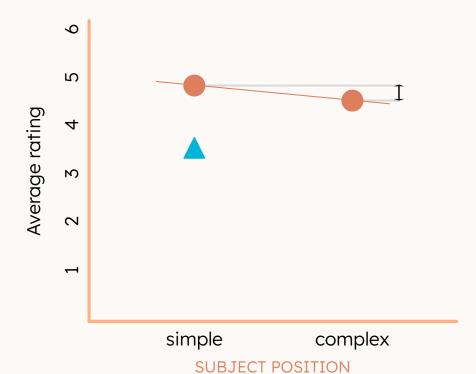
 a. Stephanie said <u>the investigator</u> had already questioned the driver.

No Extraction, Complex

Stephanie said <u>the investigator</u>
 <u>of the crime</u> had already
 questioned the driver.

Full Extraction, Simple

c. <u>Which investigator</u> did Stephanie say _ had already questioned the driver?



- No extraction
- Full extraction
- Sub-extraction

Extraction Cost = a - c

No Extraction, Simple

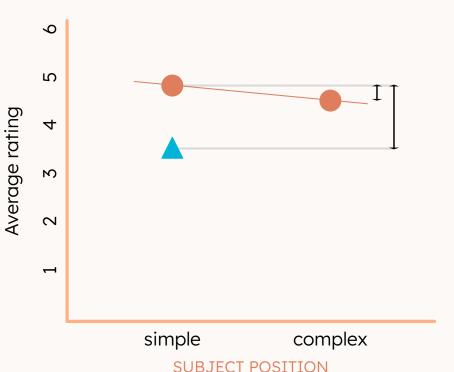
 a. Stephanie said <u>the investigator</u> had already questioned the driver.

No Extraction, Complex

Stephanie said <u>the investigator</u>
 <u>of the crime</u> had already
 questioned the driver.

Full Extraction, Simple

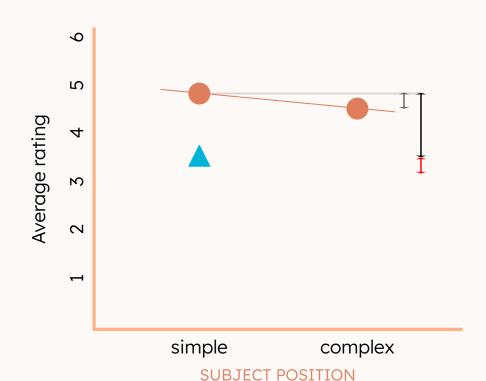
c. <u>Which investigator</u> did Stephanie say _ had already questioned the driver?





- No extraction
- Full extraction
- Sub-extraction

Complexity + Extraction

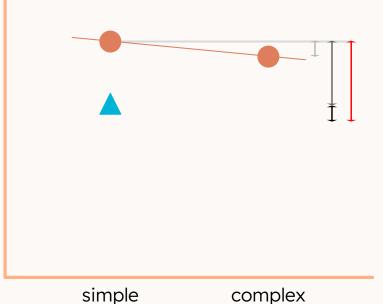


- No extraction
- Full extraction
- Sub-extraction

Complexity + Extraction =

$$[(a-b) + (a-c)]$$





- No extraction
- Full extraction
- Sub-extraction

Complexity + Extraction =

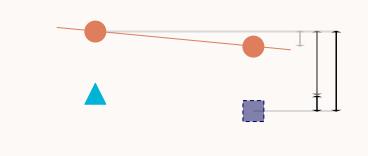
[(a-b) + (a-c)]

Predicted cost of sub-extraction, assuming no islandhood

Sub-extraction, Complex

e. <u>Which crime</u> did Stephanie say [the investigator of _] had already questioned the driver?





simple complex SUBJECT POSITION

Present study: Design

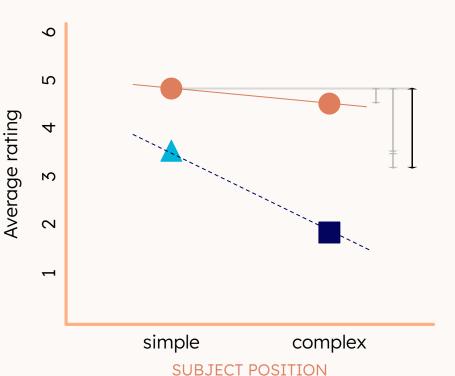


- No extraction
- Full extraction
- Sub-extraction

Actual cost of sub-extraction:

Sub-extraction, Complex

e. <u>Which crime</u> did Stephanie say [the investigator of _] had already questioned the driver?



Present study: Design



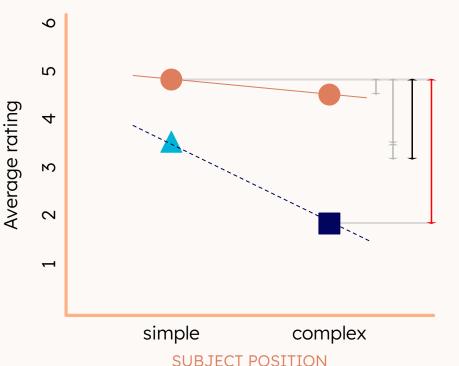
- No extraction
- Full extraction
- Sub-extraction

Actual cost of sub-extraction:

Does it exceed the additive cost of complexity + extraction?

Sub-extraction, Complex

e. <u>Which crime</u> did Stephanie say [the investigator of _] had already questioned the driver?



- No extraction
- Full extraction
- Sub-extraction

'Island' effect: DD score

Sub-extraction cost =

(e) -
$$[(a-b) + (a-c)]$$

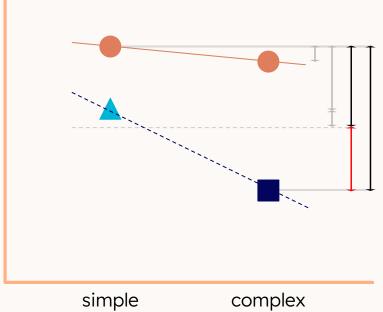
(Difference of Differences, or "DD score")

Sub-extraction, Complex

Which crime did Stephanie say [the investigator of] had already questioned the driver?



Average rating



Present study: Design

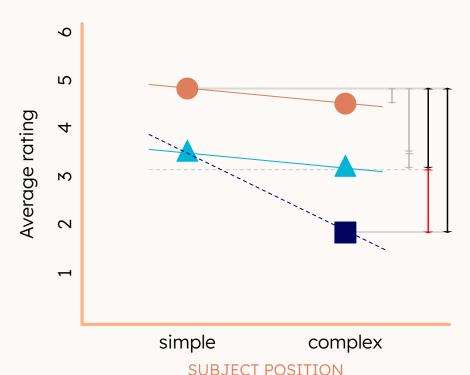


- No extraction
- Full extraction
- Sub-extraction

Full Extraction, Complex

d. Which investigator of the crime did Stephanie say _ had already questioned the driver?

Though not directly part of the island calculation, we anticipate it to roughly line up with the predicted cost of complexity+extraction as well.



47

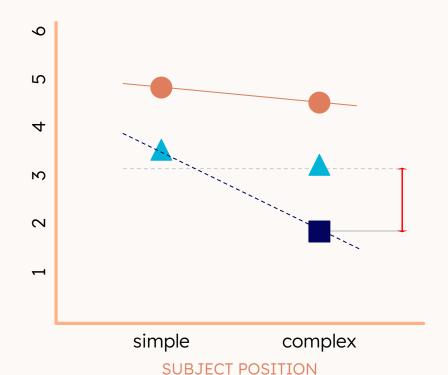
Present study: Design



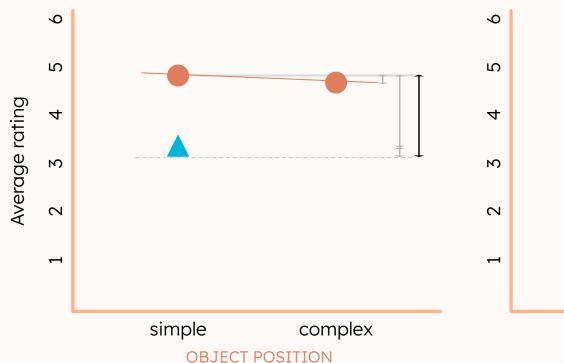
- No extraction
- Full extraction
- Sub-extraction

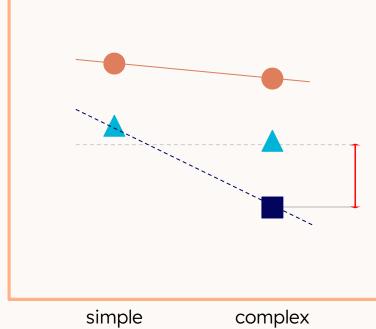
Calculation of the DD score gives us a measure of the cost of sub-extraction out of *any* domain.

But how do we know if we have a Subject Island effect?



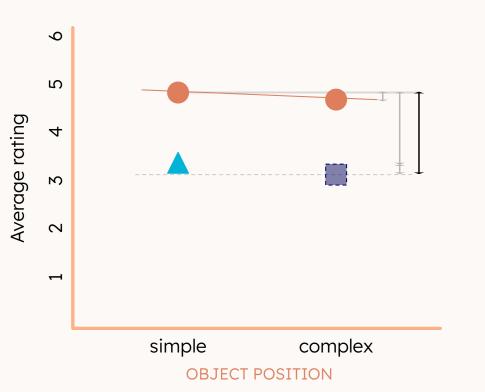
- No extraction
- Full extraction
- Sub-extraction

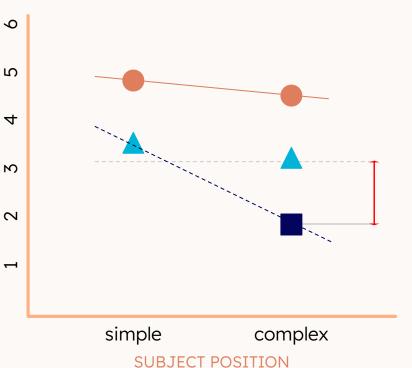




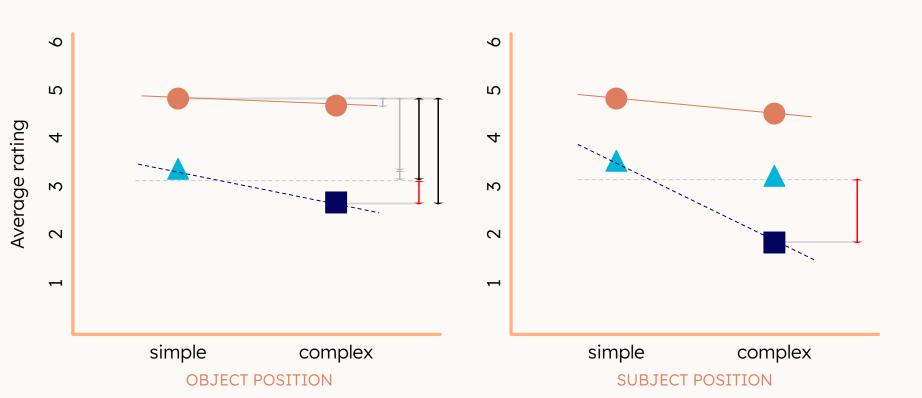
SUBJECT POSITION

- No extraction
- Full extraction
- Sub-extraction

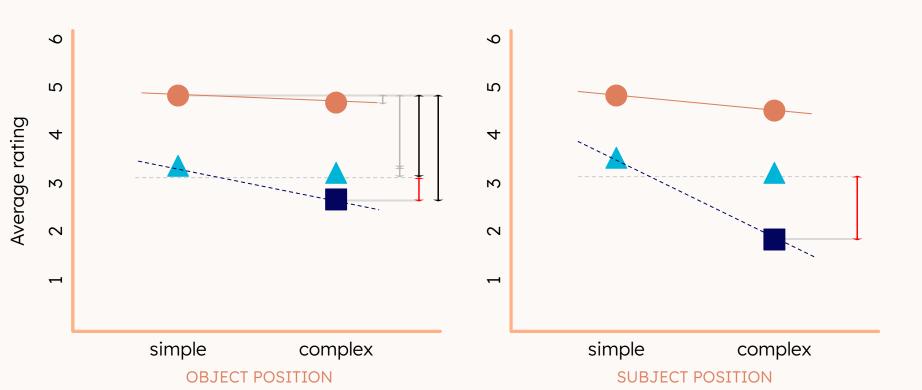




- No extraction
- Full extraction
- Sub-extraction



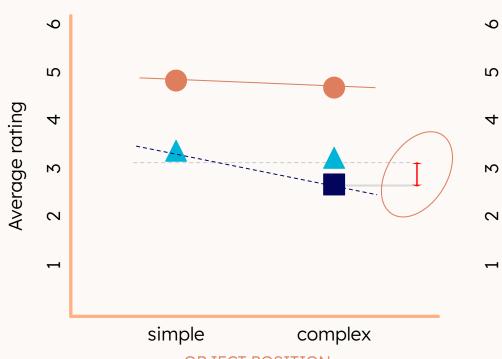
- No extraction
- Full extraction
- Sub-extraction

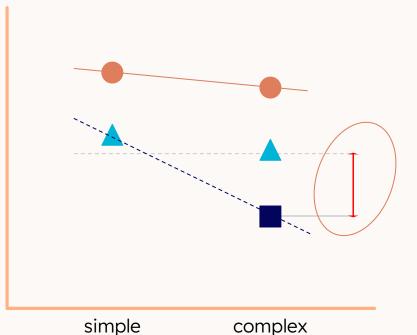


- No extraction
- Full extraction
- Sub-extraction

Subject Island Effect:

Difference between subj. and obj. DD scores





Experiment 2

Relative clauses (RC)

Present study: Design

a.

b.

Complex

Simple

No Extraction

already questioned the driver]. I noticed that [Stephanie explained the investigator of the

crime had already questioned the driver 1.

Full Extraction Simple

d.

already questioned the driver]. I noticed [the investigator of the **<u>crime</u>** that Stephanie explained

had already questioned the driver].

Sub-Extraction

Complex *I noticed [the crime that Stephanie explained [the investigator of 1 had already questioned the driver].

I noticed that [Stephanie

explained the investigator had

I noticed [the investigator that

Stephanie explained had

Present study: Design

Experiment 3

Topicalization (TOP)

No Extraction

1.	,	Stephanie explained <u>the</u> <u>investigator</u> had already questioned the driver.

b.	Complex	Stephanie explained <u>the</u>
		<u>investigator of the crime</u> had
		already questioned the driver.

Full Extraction

c.	Simple	That investigator, Stephanie
		explained _ had already
		questioned the driver.

d.	Complex	That investigator of the crime,
	•	Stephanie explained _ had
		already questioned the driver.

Sub-Extraction

e.	*That crime, Stephanie explained [the investigator of _] had already questioned the driver.

Present study

Methods

We conducted three individual experiments for WHQ, RC and TOP constructions.

36 items, 72 fillers

72 participants recruited via Prolific

Acceptability judgment task: participants rated each sentence on a 6 point scale.

	Results																
														3.25.	2025 G	_OW47	57

No extraction

Full extraction

Sub-extraction

Experiment

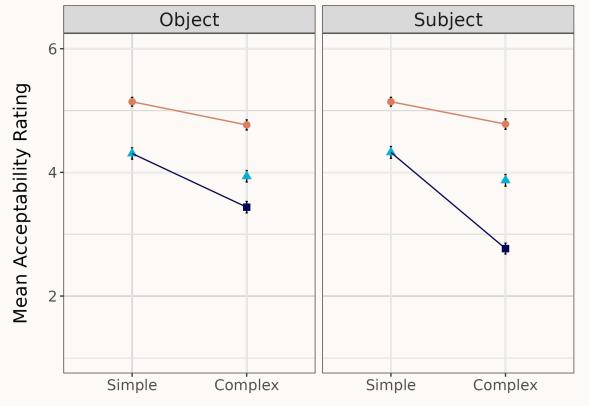
1: WHQ

Subject DD Score: 0.79 (S.E. 0.12)

Object DD Score: 0.32 (S.E. 0.09)

Greater sub-extraction penalty for subjects vs objects

 $(\beta = -0.94, 95\%CrI = (-1.54, -0.32),$ Std.Err. = 0.31, Pr(β < 0) = 99%)



DP Complexity

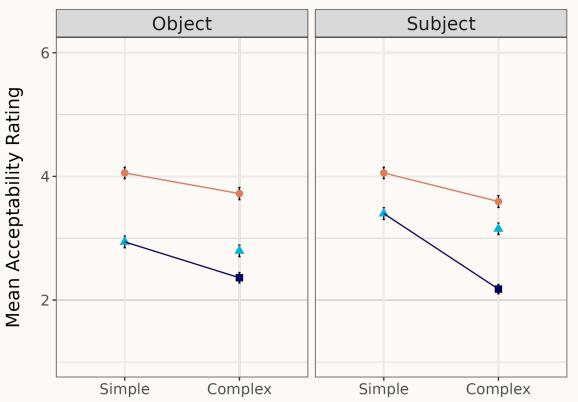
No extraction

Full extraction

Sub-extraction

Experiment

2: RC



Subject DD Score: 0.49 (S.E. 0.12)

Object DD Score: 0.16 (S.E. 0.11)

Greater sub-extraction penalty for subjects vs objects

 $(\beta = -0.58, 95\%CrI = (-1.17, 0),$ Std.Err. = 0.30, Pr(β < 0) = 97%)

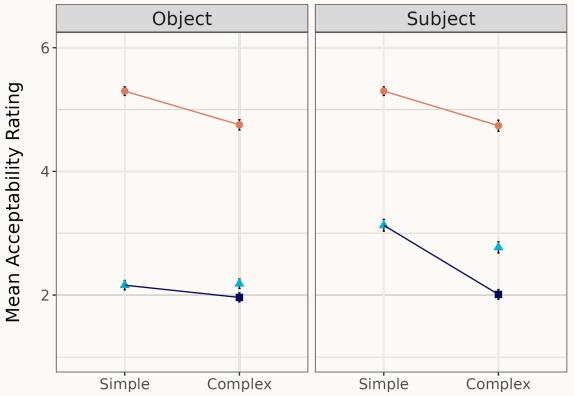
DP Complexity

No extraction

Full extraction

Sub-extraction

Experiment 3: TOP



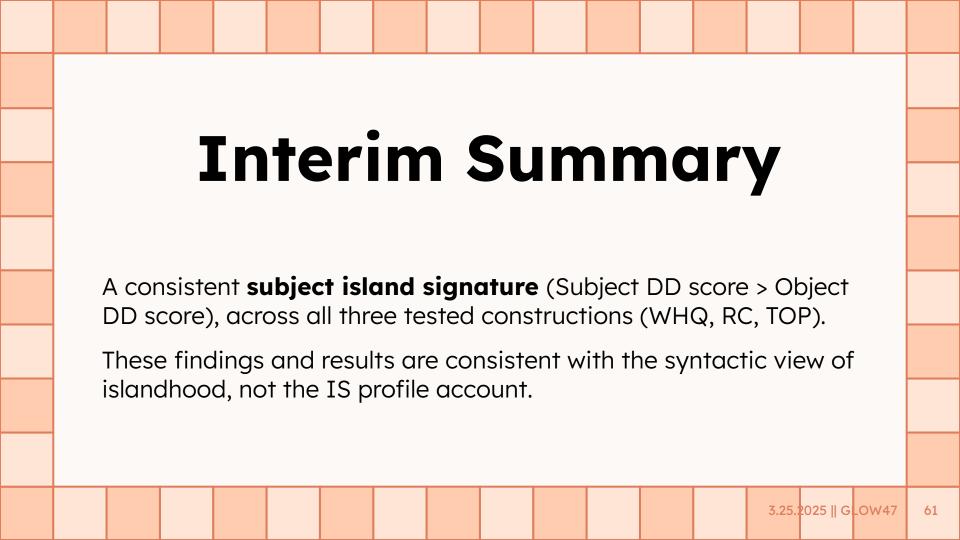
Subject DD Score: 0.29 (S.E. 0.08)

Object DD Score: -0.19 (S.E. 0.09)

Greater sub-extraction penalty for subjects vs objects

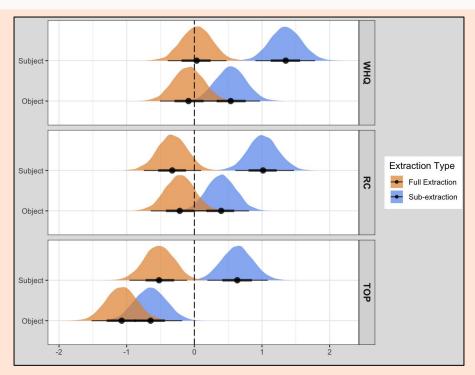
 $(\beta = -1.24, 95\%CrI = (-1.90, -0.59),$ Std.Err. = 0.33, $Pr(\beta < 0) = 100\%)$

DP Complexity



Results

Comparing constructions



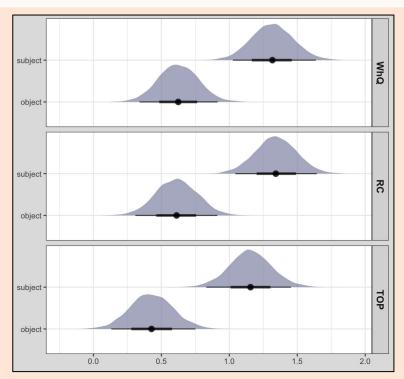
To investigate the variability in sub-extraction penalties, we fit additional models to compare the costs of full extraction & sub-extraction.

We see consistently greater difference in extraction costs for subjects vs objects across WHQ, RC, & TOP

Sampled posterior distributions (with 95% HPDI) of standardized extraction costs by position, faceted by experiment

Results

Comparing constructions



Here we plot the difference between the sub-extraction and full extraction costs for subjects and objects across the three constructions, revealing a stable and invariant pattern across the constructions.

This consistent difference between subject and object DDs across constructions is what we identify as a subject island effect.

Posterior distributions (with 95% HPDI) of difference between standardized fulland sub-extraction costs by position, faceted by experiment



For all three constructions, the degradation in acceptability for sub-extraction from subjects was significantly greater than the combined cost of DP complexity and extraction.

In other words, we observed an additional penalty associated with sub-extraction from subjects that is not predicted by these independent costs.

For all three constructions, the degradation in acceptability for sub-extraction from subjects was significantly greater than the combined cost of DP complexity and extraction.

In other words, we observed an additional penalty associated with sub-extraction from subjects that is not predicted by these independent costs.

Furthermore, for all three constructions, we found that subject DD scores were significantly greater than object DD scores.

For all three constructions, the degradation in acceptability for sub-extraction from subjects was significantly greater than the combined cost of DP complexity and extraction.

In other words, we observed an additional penalty associated with sub-extraction from subjects that is not predicted by these independent costs.

Furthermore, for all three constructions, we found that subject DD scores were significantly greater than object DD scores.

Upshot: Despite differences across the constructions, what *is* consistent is the difference between subjects and objects. This is the signature of the subject island effect.

Our findings are incompatible with the FBC, which predicts that only WHQs give rise to a subject island effect.

We found a stable difference in the extraction costs of subjects vs. objects across constructions, suggesting a single underlying constraint that regulates the grammatical operation of movement.

What is sensitive to locality is not IS profile, but a movement dependency.

More problems for an FBC type of account

- wh in-situ introduces the same focalization as WHQs but sometimes it does NOT show island effects. (Huang, 1982)
- **resumptive pronouns** have been reported to ameliorate the acceptability of island violations, in languages that use them grammatically. (Sells, 1987; McCloskey, 2006; Keshev & Meltzer Asscher, 2017; Tucker et al. 2019)
- parasitic gaps not all cases of p-stranding within a subject are considered ungrammatical. A subject-internal gap parasitic to a gap in the matrix clause has greatly improved acceptability. (Ross 1967, Phillips 2006; Culicover, 2001; Engdahl, 1983)

Conclusion

Subjects are islands across **TOP**, **WHQ**, and **RC** constructions, despite the information structural differences between them.

The ban on sub-extraction out of syntactic subjects cannot be solely attributed to the discourse function specific to individual constructions.





References



Abeillé, A., Hemforth, B., Winckel, E., & Gibson, E. (2020). Extraction from subjects: Differences in acceptability depend on the discourse function of the construction. *Cognition, 204,* 104293.

Ambridge, B., & Goldberg, A. E. (2008). The island status of clausal complements: Evidence in favor of an information structure explanation. *Cognitive Linguistics*, 19(3).

Chomsky, N. (1973). Conditions on transformations. A Festschrift for Morris Halle/Holt, Rinehart, and Winston.

Cuneo, N., & Goldberg, A. E. (2023). The discourse functions of grammatical constructions explain an enduring syntactic puzzle. *Cognition, 240,* 105563.

Enzinna, N. R. (2013). *The Processing of Preposition-Stranding Constructions in English* [Master's thesis, Florida international University].

Erteschik-Shir, N. (1973). On the nature of island constraints [Doctoral dissertation, Massachusetts Institute of Technology].

Goldberg, A.E. (2006). *Constructions at Work: the nature of generalization in language*. Oxford University Press.

Goldberg, A. E. (2013). Backgrounded constituents cannot be "extracted". *Experimental Syntax and Island Effects, 221.*

Gries, S. T. (2002). Preposition stranding in English: Predicting speakers' behaviour. *Proceedings of the Western Conference on Linguistics 12*, 230-241.

Gundel, J. K. (1988). Universals of topic-comment structure. *Studies in syntactic typology.* John Benjamins.

Günther, C. (2021). Preposition stranding vs. pied-piping—The role of cognitive complexity in grammatical variation. *Languages*, *6*(2), 89.

Hoffmann, T. (2011). *Preposition placement in English: A usage-based approach.* Cambridge University Press.

Hofmeister, P., & Sag, I. A. (2010). Cognitive constraints and island effects. *Language*, *86*(2), 366.

Huang, C. J. (1982). Move Wh in a language without Wh movement. *The Linguistic Review, 1,* 369-416.

Huddleston, R., Pullum, G. K. (2002). *The Cambridge Grammar of the English Language*. Cambridge University Press.

Kuno, S. (1976). Subject, theme, and the speaker's empathy. A Re-examination of relativization phenomena in subject and topic. *Subject and topic*, 417-444.

Lambrecht, K. (1994). Information structure and sentence form. *Topic, focus, and the mental representations of discourse referents, 71.* Cambridge University Press.

Pesetsky, D. (1982). Complementizer-trace phenomena and the nominative island condition. *The Linguistic Review, 1(3),* 297-344.

Prince, E. F. (1984). Topicalization and left-dislocation: A functional analysis. *Annals of the New York Academy of Sciences 433(1)*, 213–25.

Privoznov, D. (2021). *A theory of two strong islands* [Doctoral dissertation, Massachusetts Institute of Technology].

Radford, A. (2019). Relative clauses: Structure and variation in everyday English. *Cambridge Studies in Linguistics 161*. Cambridge: Cambridge University Press.

Ross, J. R. (1967). *Constraints on variables in syntax* [Doctoral dissertation, Massachusetts Institute of Technology].

Schütze, C. T., Sprouse, J., & Caponigro, I. (2015). Challenges for a theory of islands: A broader perspective on Ambridge, Pine, and Lieven. *Language*, 91(2), e31-e39. Sprouse, J. (2007). *A program for experimental syntax: Finding the relationship between acceptability and grammatical knowledge* [Doctoral dissertation, University of Maryland, College Park].

Sprouse, J., Wagers, M., & Phillips, C. (2012). A test of the relation between working-memory capacity and syntactic island effects. *Language*, 82-123. Trotta, J. (2000). *Wh-clauses in English: Aspects of theory and description*. Rodopi.