

Real Time Status of Semantic Exceptions to the Adjunct Island Constraint



**MINNESOTA SYNTAX AND
PSYCHOLINGUISTICS LAB**

Annika Kohrt
Trey Sorensen
Dustin A. Chacón
{kohrt008,soren870,dustin}
@umn.edu



Filler-Gap Dependencies

This is **the pie** that the FBI agent ate ____ .

- Filler-gap dependencies are **actively constructed**
(Fodor 1978; Crain & Fodor 1985; Stowe 1986; Traxler & Pickering 1996)

This is **the pie** that the FBI agent wrote a poem about ____ .

- However, active gap formation is suppressed in **syntactic islands**
(Stowe 1986; Kluender & Kutas 1994; Kluender 1998; Traxler & Pickering; Phillips 2006, 2013; Wagers & Phillips 2009; Hofmeister & Sag 2010; Yoshida, Kazanina, Pablos, & Sturt 2014; Chacón 2015)

This is **the pie** that the FBI agent [that wrote a poem] liked ____ .

Filler-Gap Dependencies

- **Hypothesis 1:**

- Islands are **linguistic constraints**

(Ross 1967; Chomsky 1981, 1986, 2001, 2007; Huang 1982; Rizzi 1990, 2015; Boeckx 2013...)

- ... that are rapidly deployed to constrain the parser

(Phillips 2006, 2013; Wagers & Phillips 2009; Yoshida, Kazanina, Pablos, & Sturt 2014; Chacón 2015, in prep.)

- **Hypothesis 2:**

- Active dependency formation recruits working memory resources

(Wanner & Maratsos 1978, Kluender & Kutas 1993; Kluender 1998; Fiebach, Schlesewsky, Friederici 2002; Phillips, Abada, & Kazanina 2005; Wagers & Phillips 2013; Matchin, Sprouse, Hickock 2014; Chacón in prep.)

- Islands are also demanding on working memory resources

(Kluender & Kutas 1993; Kluender 1998; Gibson 1998; Hawkins 1999, Hofmeister & Sag 2010)

- ... and the combination of the two exceeds working memory capacity

Adjunct Islands

- Adjunct clauses are traditionally characterized as islands
(Chomsky 1981; Huang 1982; Cinque 1990; Uriagereka 1999)
- Extraction from adjuncts is perceived to be better depending on the kind of events described by (1) the main clause and (2) the adjunct clause
(Truswell 2007, 2011; for similar facts, see Lakoff 1970, Kehler 1996 ...)

*Which tune did Harry dance [whistling ____]?

Which tune did Harry arrive [whistling ____]?

Which tune did Harry stand around [whistling ____]?

- Adjunct extraction appears to be better if the main verb is an **achievement** or a **stative verb**, but not **activities/accomplishments**

Adjunct Islands

- **Question 1:**
 - Is extraction from adjuncts sensitive to the semantics of the VPs?
- **Question 2:**
 - Do comprehenders use the semantics to anticipate gaps in adjuncts?

Experiment 1: Judgment Study

- **Q1:** Is extraction from adjuncts sensitive to the semantics of the VPs?
- **Design:**
 - $N = 24$; 1–7 Likert judgment task
 - 2×2 Design: ±Wh, ±Extractable; 16 items, 16 fillers (50% bad)
 - **+Extractable:** 8 "true achievement" and 8 stative VPs;
–**Extractable:** activities and accomplishments

Experiment 1: Judgment Study

–Wh, –Extractable:

John wondered whether his best friend **worked** at the office
drinking some coffee late this afternoon

–Wh, +Extractable:

John wondered whether his best friend **arrived** at the office
drinking some coffee late this afternoon

Experiment 1: Judgment Study

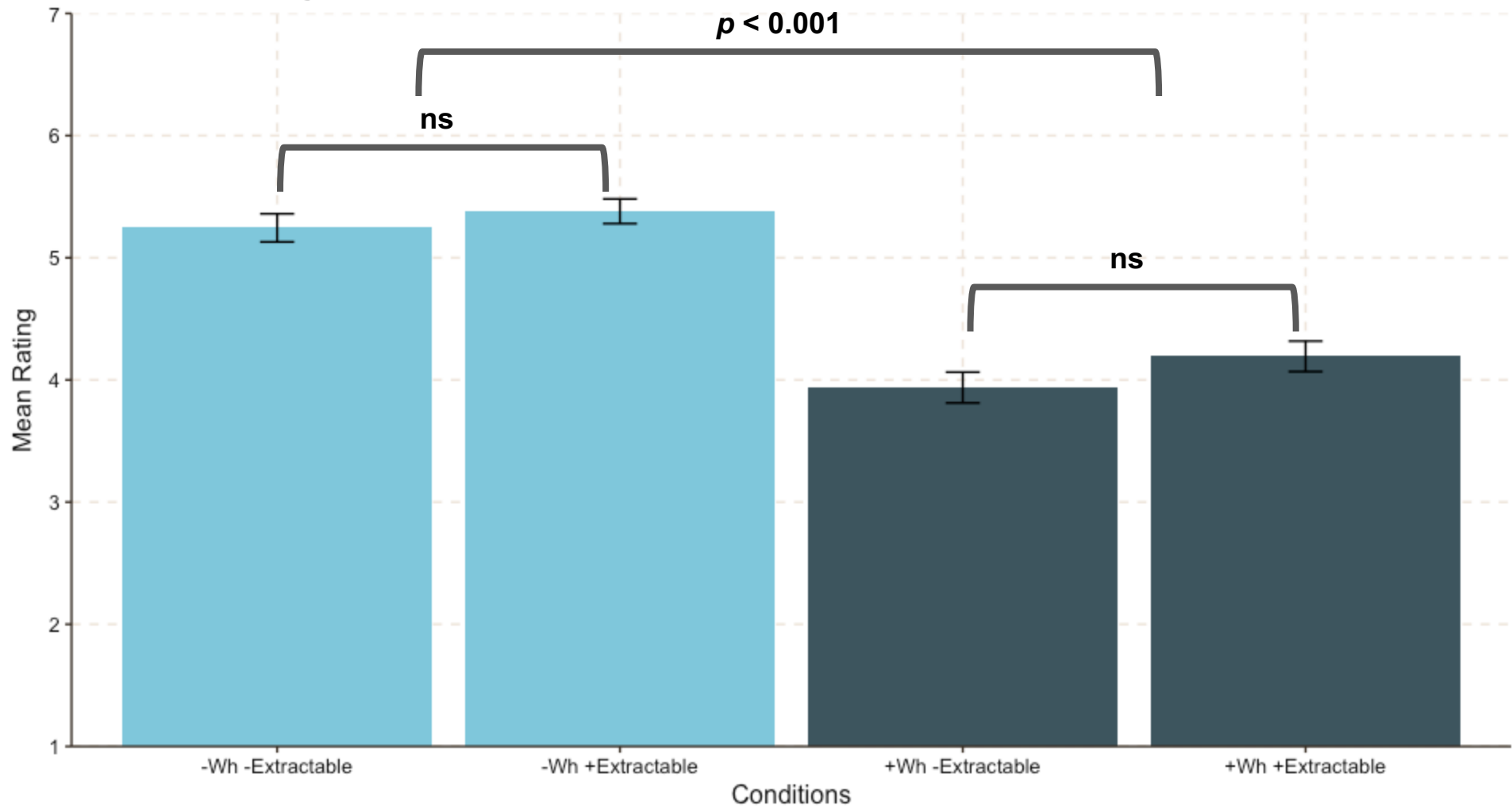
+Wh, –Extractable:

John wondered **which coffee** his best friend **worked** at the office
drinking ___ late this afternoon

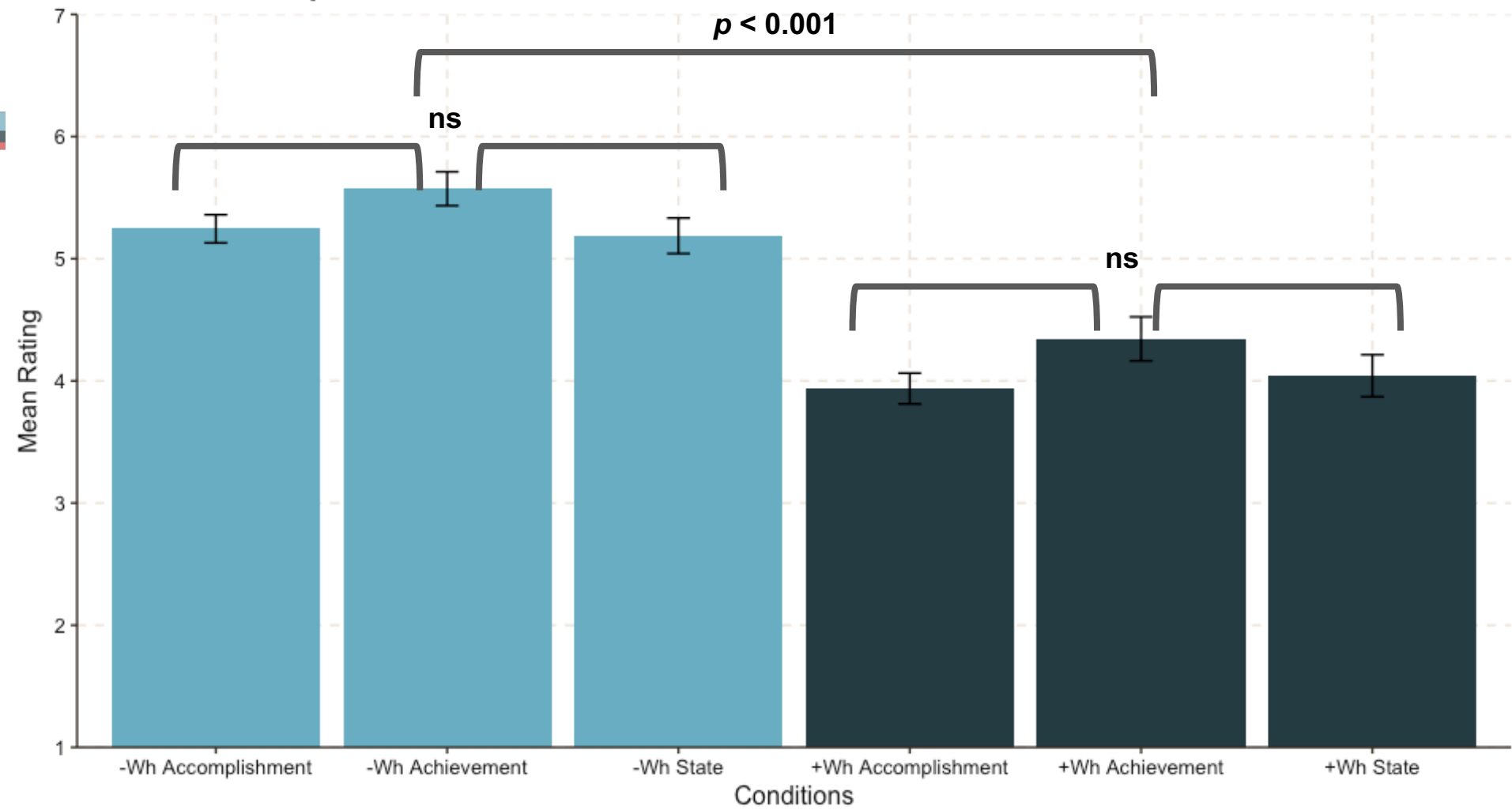
+Wh, +Extractable:

John wondered **which coffee** his best friend **arrived** at the office
drinking ___ late this afternoon

Results from Experiment 1



Results from Experiment 1



Experiment 1: Judgment Study

- **Q1:** Is extraction from adjuncts sensitive to the semantics of the VPs? **No?**
- However, informally, the comparison between these two sentences is noticeable.
Why?
 - John wondered **which coffee** his friend **arrived** at the office [**drinking** ____]?
 - *John wondered **which coffee** his friend **worked** at the office [**drinking** ____]?
- **Proposal:**
 - Extraction from adjunct clauses is **ungrammatical** (Huang 1982, ...)
 - **Achievement** verbs are more easily relatable to adjunct clauses

Experiment 2: Self-Paced Reading Task

- **Q2:** Do comprehenders use the semantics to anticipate gaps in adjuncts?
- **Design:**
 - $N = 48$; Self-Paced Reading Task; Plausibility Mismatch Paradigm (Traxler & Pickering 1996)
 - 2×2 Design: ±Plausible, ±Extractable; 16 items; 74 fillers

Experiment 2: Self-Paced Reading Task

–Extractable, –Plausible:

John wondered **which reports** his best friend **worked** at the office
drinking ___ late this afternoon

–Extractable, +Plausible:

John wondered **which coffee** his best friend **worked** at the office
drinking ___ late this afternoon

Experiment 2: Self-Paced Reading Task

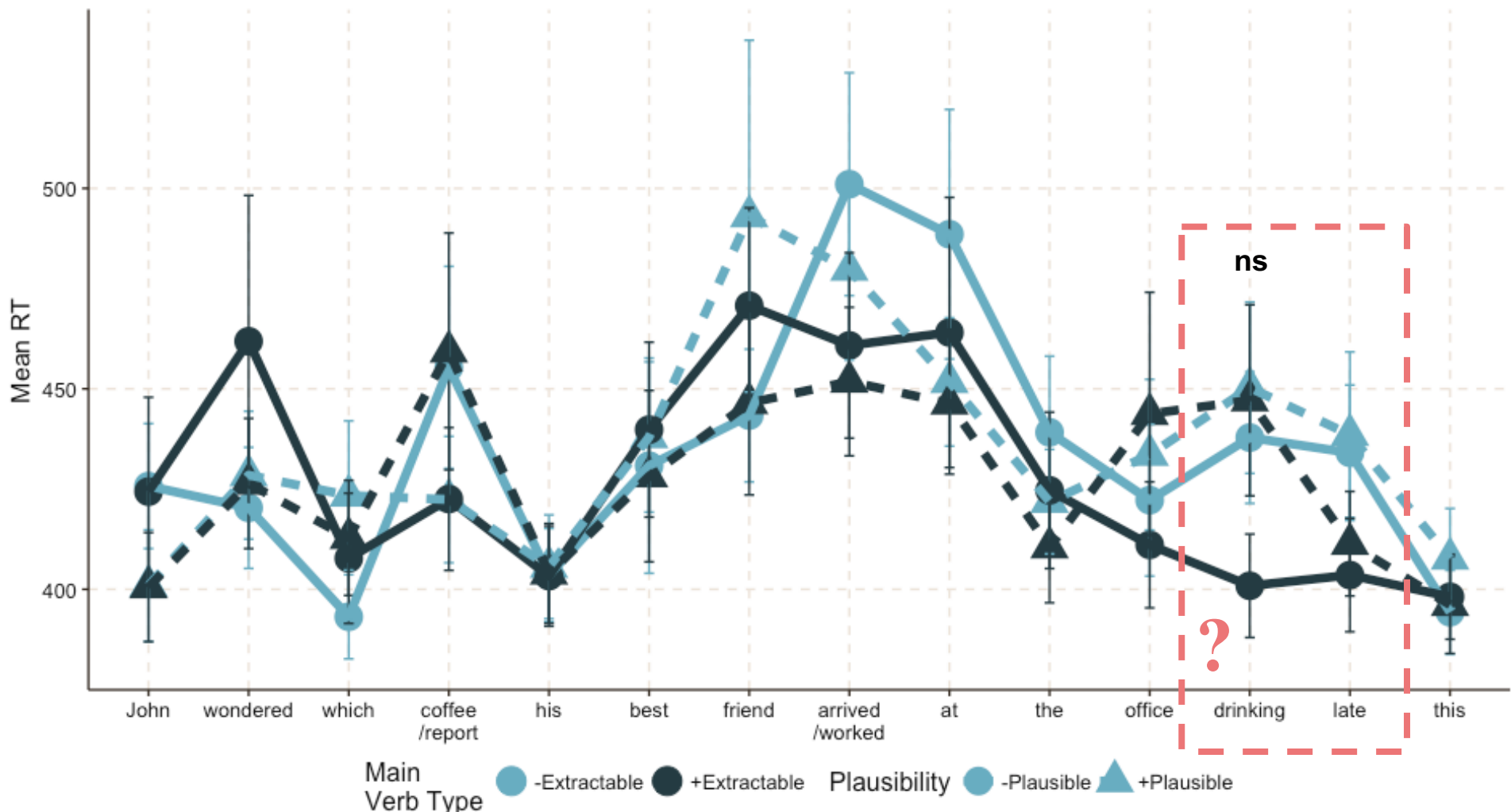
+Extractable, –Plausible:

John wondered **which reports** his best friend **arrived** at the office
drinking ___ late this afternoon

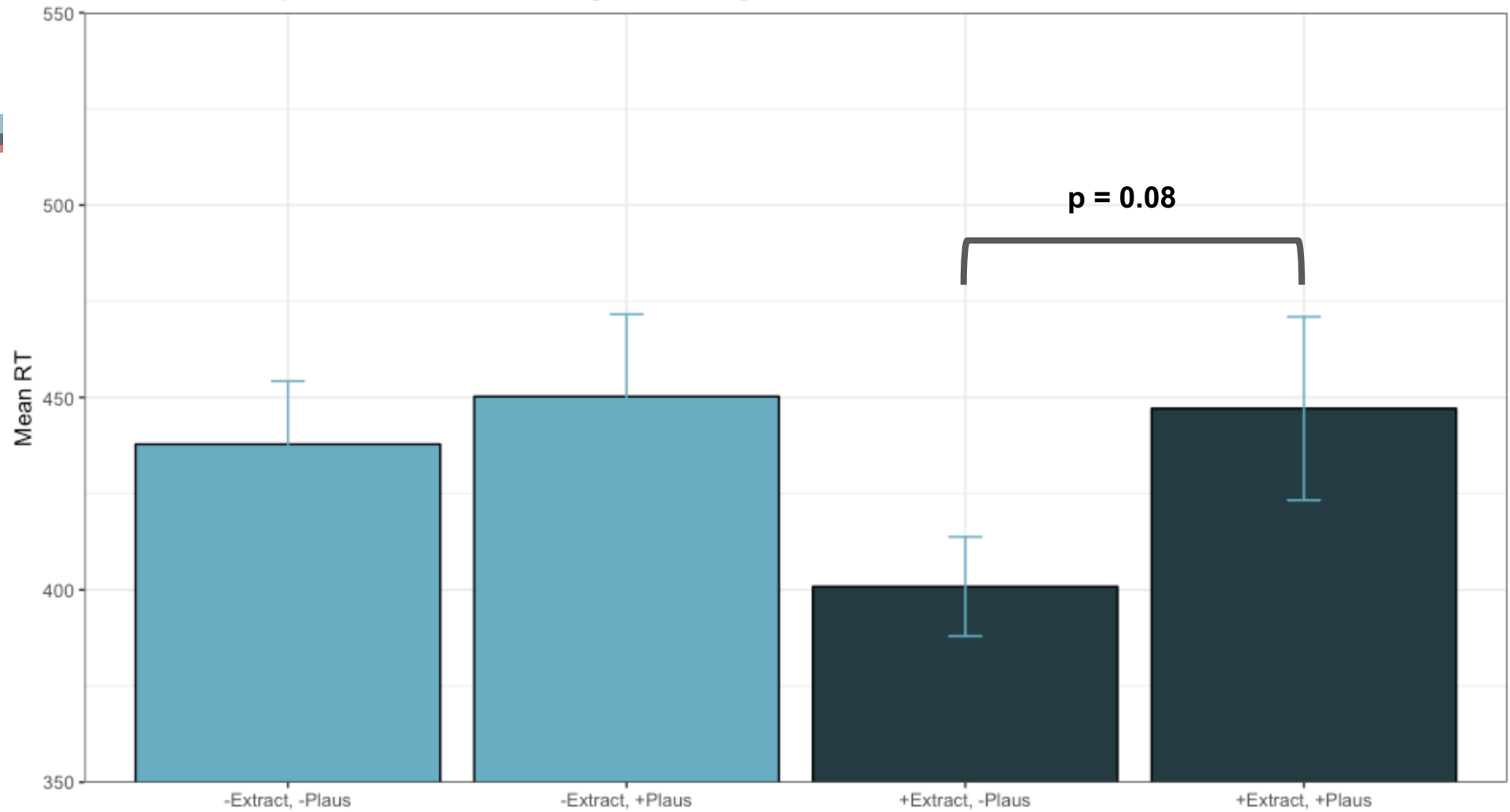
+Extractable, +Plausible:

John wondered **which coffee** his best friend **arrived** at the office
drinking ___ late this afternoon

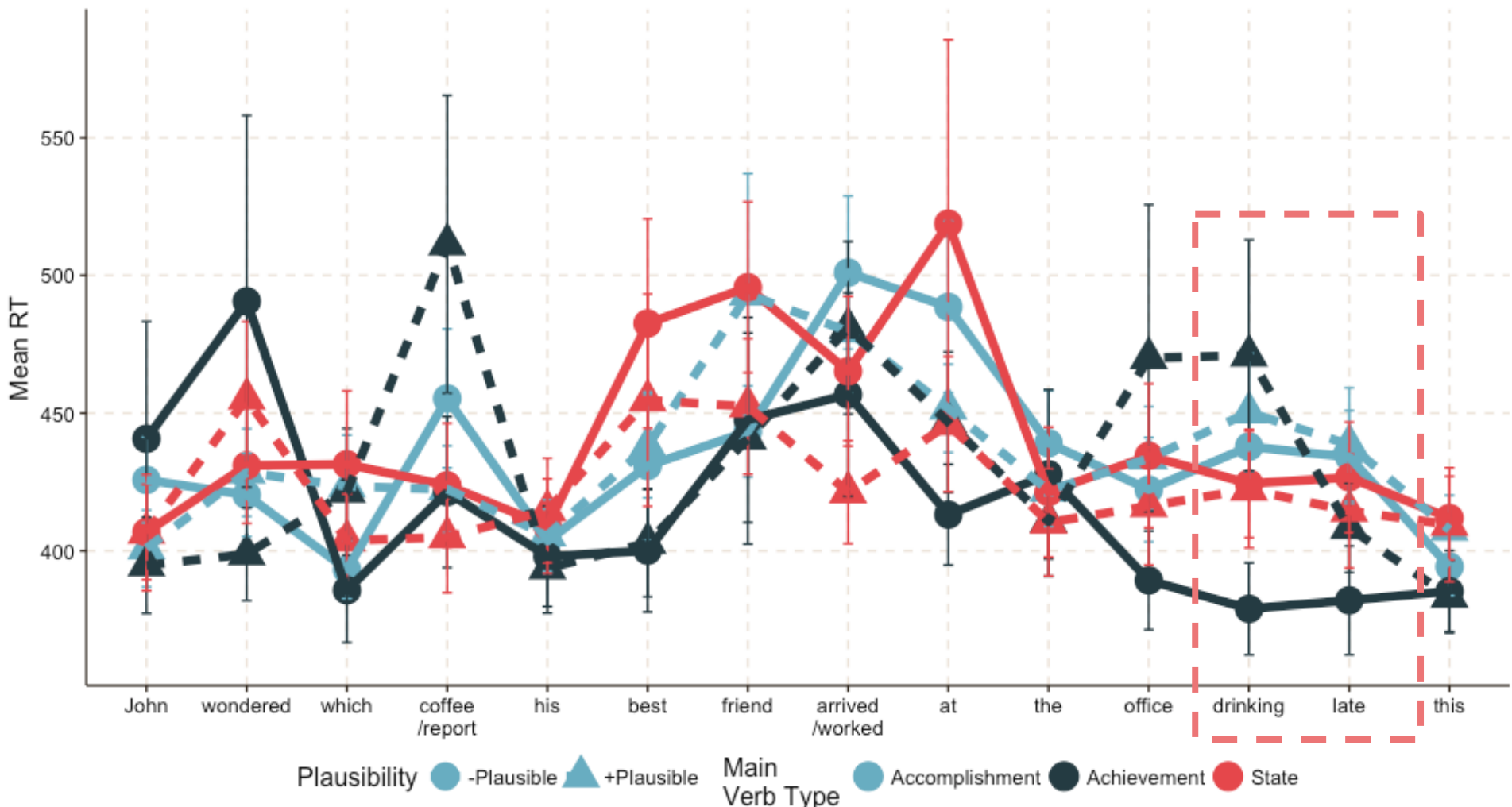
Results from Experiment 2



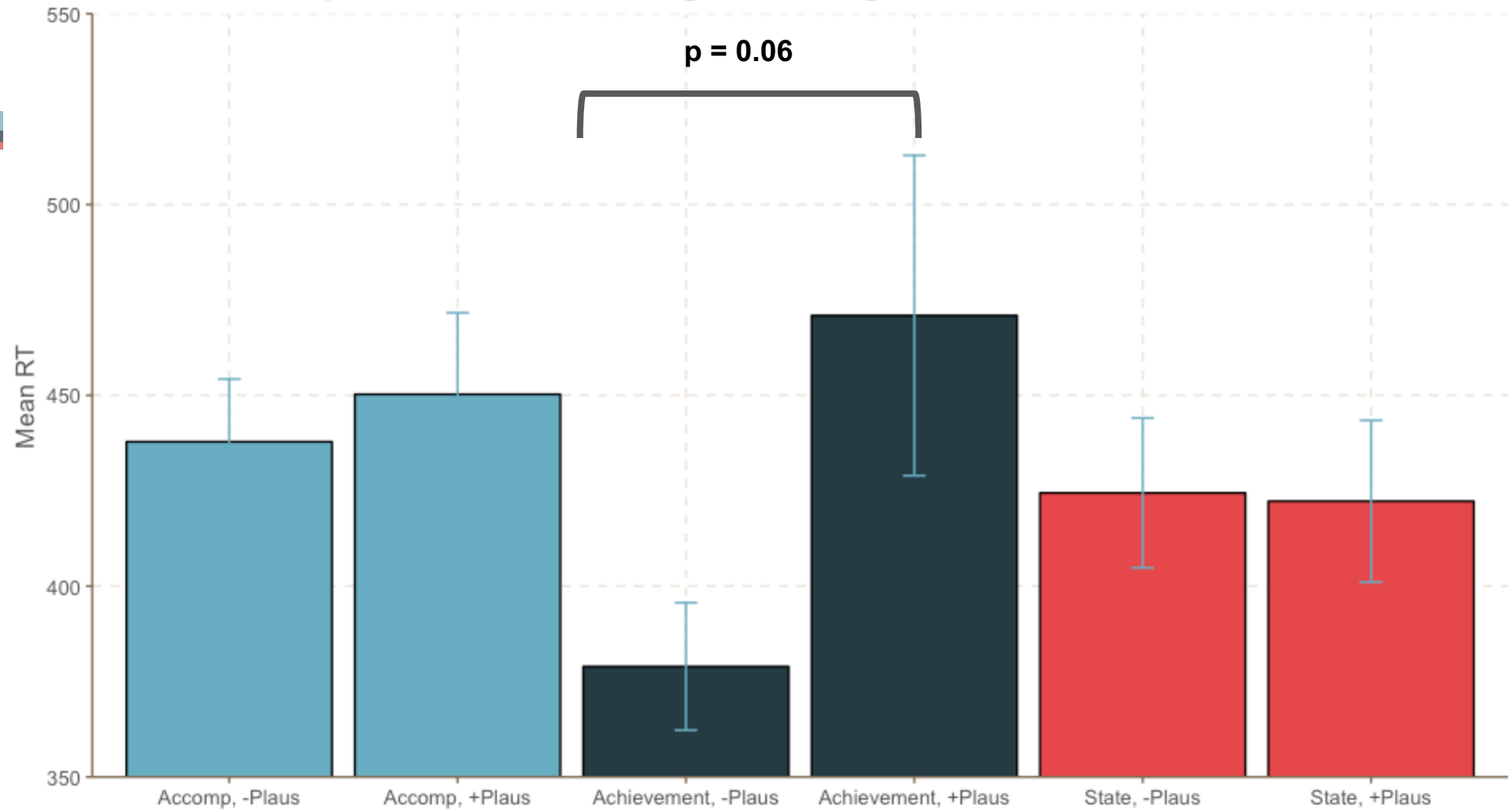
Results from Experiment 2, at Critical Region 'drinking'



Results from Experiment 2



Results from Experiment 2, at Critical Region 'drinking'



Experiment 2: Self-Paced Reading Task

- Q2: Do comprehenders use the semantics to anticipate gaps in adjuncts? Kind of...
- Increased RTs for +Extractable, +Plausible, specifically for achievement verbs
- ... Which are supposed to be the good extractions!

So, what's going on?

- Active gap formation avoids islands + adjuncts are islands (cf. Expt 1) =
Comprehenders do not initially attempt to link filler and verb in adjunct
- Upon encountering a verb in the adjunct clause...
 - ... **if** the main verb is an achievement...
 - ... **and** the adjunct verb can take the filler as a plausible argument...
 - ... **then** the comprehender will execute a **reanalysis** process (\uparrow RTs),
locating a gap in the clause
- Comprehenders will put work into creating a gap **bottom-up**

So, what's going on?

- Achievement verbs have a free event variable for the process before it (Higginbotham 2000)
- **Reanalysis**, gated by lexical association between *coffee* and *drinking*

... **which coffee** his friend **arrived** at the office [**drinking** ____]? **tempting object!**

$\lambda e. \text{arrive}(e) \ \& \ \exists E[E = e' < e]$

$\lambda e. \text{drink}(e')$

easy to identify

So, what's going on?

- Achievement verbs have a free event variable describing the process before it (Higginbotham 2000)
- Truswell (2007; 2011): event identification between *drinking* & *arrived* (↑RTs)
- Ease of composition + no reanalysis = quick RTs

... **which report** his friend **arrived** at the office [**drinking** ___]? **not a good object!**

$\lambda e.\text{arrive}(e) \ \& \ \exists E[E = e' < e]$

$\lambda e.\text{drink}(e')$

easy to identify

So, what's going on?

- Increased RTs at *drinking* because of difficulty in relating events (Coercion?)
- No attempt at linking *coffee* and *drinking*

... **which coffee** his friend **worked** at the office [**drinking** ____]?
sat around



harder to relate

So, what's going on?

- So far, this is a post-hoc explanation
- Future work will more carefully compare statives vs. achievements within the same items
- ERP studies to attempt to identify different components (ease of relating two verbs vs. noticing plausible fillers)

Conclusions

- **Question 1:**
 - Is extraction from adjuncts sensitive to the semantics of the VPs?
 - **No evidence that extraction out of adjuncts is affected by the main VP**
- **Question 2:**
 - Do comprehenders use the semantics to anticipate gaps in adjuncts?
 - **Kind of:**
 - They **are** sensitive to the semantics of the sentence (VPs & plausibility)
 - But this is relevant for building a filler-gap dependency **bottom-up**
 - ... and only when the main VP is an **achievement**

Conclusions

- **The "islands debate":**
 - Extraction from adjunct clauses is uniformly rejected...
 - ... but, comprehenders are capable of construing a gap in an adjunct clause
 - This is hard to explain on 'resource limitation' theories

- **Semantic processing:**
 - Comprehenders rapidly compute semantic information...
 - ...And revise structural commitments based on the interpretation of the structure

The people we concluded the talk [**thanking** ____ .]

- Audience of CUNY 31
- MSPLab
- Syntax Reading Group (SRG)

- Nick Huang
- Jason Overfelt
- Brian Reese
- Peter O'Neill
- Austin Kraft



**MINNESOTA SYNTAX AND
PSYCHOLINGUISTICS LAB**

Conclusions

- **Question 1:**
 - Is extraction from adjuncts sensitive to the semantics of the VPs?
 - **No evidence that extraction out of adjuncts is affected by the main VP**
- **Question 2:**
 - Do comprehenders use the semantics to anticipate gaps in adjuncts?
 - **Kind of:**
 - They **are** sensitive to the semantics of the sentence (VPs & plausibility)
 - But this is relevant for building a filler-gap dependency **bottom-up**
 - ... and only when the main VP is an **achievement**