Cognitive Constraints on Syntactic Islands

Philip Hofmeister and Ivan Sag

LING 229: Islands Seminar

Presented by Matt the Younger
The Basic Idea
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...the acceptability of sentences containing island violations appears to vary systematically with the manipulation of nonstructural factors

Philip Hofmeister (UCSD)

Ivan A. Sag (Stanford)
The Basic Idea

...the acceptability of sentences containing island violations appears to vary systematically with the manipulation of nonstructural factors.

...appeals to constraints on sentence processing may ultimately offer the most elucidating and economical explanation.
The Big-Picture Logic
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- Islands are hard to empirically delimit
  - Many factors improve acceptability in strong island contexts
  - A “panoply of counterexamples from other languages.” (p.9)
The Big-Picture Logic

- Islands are hard to empirically delimit
  - Many factors improve acceptability in strong island contexts
  - A “panoply of counterexamples from other languages.” (p.9)
- The factors which improve island violations are often nonstructural
  - Islands have many properties independently known to cause processing difficulty.
The Big-Picture Logic

- Islands are hard to empirically delimit
  - Many factors improve acceptability in strong island contexts
  - A “panoply of counterexamples from other languages.” (p.9)
- The factors which improve island violations are often nonstructural
  - Islands have many properties independently known to cause processing difficulty.

If we can reduce islands to processing constraints, we can simplify the grammar
Not on The Agenda

- A brief history of generative islands (pp. 4-16)
- Other factors which influence island acceptability not tested by experiment
- The history of processing studies of islands and extraction in general (pp. 16-22)
Narrowing the Focus

Complexity of the *wh*-Phrase  |  Definiteness in extraction path
Narrowing the Focus

Complexity of the wh-Phrase

Which article don’t you remember $[\text{cp who wrote } ____]$?

$\geq$

What don’t you know $[\text{cp who wrote } ____]$?

$\Rightarrow$ complex wh-phrases facilitate extraction

Definiteness in extraction path
Narrowing the Focus

Complexity of the wh-Phrase

Which article don’t you remember \([_{\text{CP}} \text{ who wrote } ____ ]\)?

\[ \geq \]

What don’t you know \([_{\text{CP}} \text{ who wrote } ____ ]\)?

⇒ complex wh-phrases facilitate extraction

Definiteness in extraction path

Who did you see \([_{\text{NP}} \text{ pictures of } ____ ]\)?

\[ \geq \]

Who did you see \([_{\text{DP}} \text{ the picture of } ____ ]\)?

\[ \geq \]

Who did you see \([_{\text{DP}} \text{ John’s picture of } ____ ]\)?

⇒ extraction is harder the more definite the NP
Narrowing the Focus

Complexity of the \textit{wh}-Phrase

Which article don’t you remember $[\text{CP who wrote } \_\_\_]$?
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What don’t you know $[\text{CP who wrote } \_\_\_]$?

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Definiteness in extraction path

Who did you see $[\text{NP pictures of } \_\_\_]$?
$\geq$
Who did you see $[\text{DP the picture of } \_\_\_]$?
$\geq$
Who did you see $[\text{DP John’s picture of } \_\_\_]$?

$\Rightarrow$ extraction is harder the more definite the NP

But there are some questions...

1) How solid are these empirical facts?
2) Do these effects appear in processing?
3) When during processing do these effects appear?
The Experiments
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• EXPERIMENT 1: Complex Noun Phrase Islands
  • Complexity of wh-phrase matters for acceptability.
  • Definiteness matters slightly less.
The Experiments

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  • Complexity of \textit{wh}-phrase matters for acceptability.
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• EXPERIMENT 2: \textit{Wh}-Islands
  • A sufficiently complex \textit{wh}-phrase basically ameliorates islandhood.
The Experiments

• **EXPERIMENT 1: Complex Noun Phrase Islands**
  - Complexity of *wh*-phrase matters for acceptability.
  - Definiteness matters slightly less.

• **EXPERIMENT 2: Wh-Islands**
  - A sufficiently complex *wh*-phrase basically ameliorates islandhood.

• **EXPERIMENT 3: Adjunct Extraction**
  - Complexity also matters when adjuncts are extracted (*contra* Rizzi, Cinque, etc.)
Self-Paced Reading: A Primer

- IDEA: reading time directly reflects processing difficulty
- Present words one at a time in a moving window
- Subjects control the pace, but may not go back
- Computer measures the reading time at each word
In --- -------- ------- -------
--- ------ --- ----------- -- ---
------- --- ------- ---------
-------

Wednesday, March 3, 2010
-- ---- criminal ------- -------
--- ------- --- ----------- -- ---
------- --- ------- ---------
-------

Wednesday, March 3, 2010
-- --- ****** justice -------

--- ******* --- ****** --- ******  --- ****** --- ****** --- ****** ---

-----  --- ******  --- ******  -

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system,
yet
equally
groups.
Are the people represented by one group?
Residual Reading Time: Controlling for Word Length
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• Obviously, longer words take longer to read
  • ...but we don’t want to mistake reading long words for an effect!

• Solution: figure out each subject’s predicted reading time as a function of word length
Residual Reading Time: Controlling for Word Length

- Obviously, longer words take longer to read
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- Solution: figure out each subject’s predicted reading time as a function of word length

![Reading time vs. word length graph]

Reading time

<table>
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<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
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<tr>
<td>0</td>
<td>300</td>
<td>400</td>
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Residual Reading Time: Controlling for Word Length

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Residual Reading Time, II

![Graph showing the relationship between word length and reading time. The graph is a straight line on a Cartesian plane with the x-axis labeled 'Word length' ranging from 0 to 6 and the y-axis labeled 'Reading time' ranging from 0 to 500. The line passes through the points (0, 0) and (5, 500).]
Residual Reading Time, II

![Graph showing the relationship between word length and reading time.](chart.png)
Residual Reading Time, II
Residual Reading Time, II

![Graph showing the relationship between Word length and Reading time.](#)
• Net effect: Standardizing each measurement by the subject’s predicted reading time helps control for word length
Net effect: Standardizing each measurement by the subject’s predicted reading time helps control for word length.

...and of course we trim a bit:

- outlier reading times trimmed (± 2 sd; 2-4% of the data)
- reading times < 200 ms dropped (superhuman speed)
- subjects with accuracy < 67% also dropped
Experiment 1: CNPC

- 36 embedded CNPC violations
- Examined *wh*-complexity and definiteness of the NP comprising the CNP
- 80 fillers
- Negative feedback on incorrect comprehension
- 31 Stanford undergrads, 6 dropped for inaccuracy
Experiment 1: The Stimuli

wh-complexity
definiteness
### Experiment 1: The Stimuli

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(a) I saw **who** Emma doubted [**OP** the report that we had captured ____ in the nationwide FBI manhunt]
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Wednesday, March 3, 2010
Experiment 1: The Stimuli

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At the Complementizer...
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The WHICH condition is read faster than its corresponding BARE condition
At the Complementizer...

The WHICH condition is read faster than its corresponding BARE condition.
At the Complementizer...

The WHICH condition is read faster than its corresponding BARE condition.
At the Complementizer...

The WHICH condition is read faster than its corresponding BARE condition

but what is going on here?

The WHICH condition is read faster than its corresponding BARE condition
At the Complementizer..., II

Mean residual reading time (ms)

Figure 1: Mean residual reading times at complementizer (that) in Experiment 1. Error bars show (+/−) one standard error.

Figure 2: Mean residual reading times at embedded auxiliary and verb in Experiment 1. Error bars show (+/−) one standard error.
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moreover, the WHICH condition nearly equals the baseline!
At the Complementizer..., II

moreover, the WHICH condition nearly equals the baseline!
At the Complementizer..., II

moreover, the WHICH condition nearly equals the baseline!
At the Complementizer..., II

Thus, the WHICH condition nearly ameliorates the island violation altogether

moreover, the WHICH condition nearly equals the baseline!
At the Embedded Tense Layer...

Figure 1: Mean residual reading times at complementizer (that) in Experiment 1. Error bars show (+/− one standard error.}

Figure 2: Mean residual reading times at embedded auxiliary and verb in Experiment 1. Error bars show (+/− one standard error.}
At the Embedded Tense Layer...

Again we see the effect of the WHICH condition relative to each BARE counterpart.
At the Embedded Tense Layer...

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At the Embedded Tense Layer...

...as well as the relative amelioration by the WHICH condition
At the Embedded Tense Layer...

...as well as the relative amelioration by the WHICH condition
Looking at It Another Way

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<th>Region6</th>
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<tbody>
<tr>
<td>Residual RT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>BARE</td>
<td>87.93 (20.69)</td>
<td>48.88 (14.73)</td>
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<td>−64.01 (4.90)</td>
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<td>−57.22 (11.84)</td>
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<td>−22.05 (16.22)</td>
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<td>14.813***</td>
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Table 1: Mean residual and raw reading times for word regions inside embedded clause clause in experiment I (standard errors in parentheses) + analysis of variance results.

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Table 1: Mean residual and raw reading times for word regions inside embedded clause clause in experiment I (standard errors in parentheses) + analysis of variance results.

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<thead>
<tr>
<th>Word</th>
<th>Region₁</th>
<th>Region₂</th>
<th>Region₃</th>
<th>Region₄</th>
<th>Region₅</th>
<th>Region₆</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual RT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BARE</td>
<td>87.93 (20.69)</td>
<td>48.88 (14.73)</td>
<td>−23.65 (8.17)</td>
<td>−41.66 (8.40)</td>
<td>−33.68 (7.22)</td>
<td>−36.91 (6.98)</td>
</tr>
<tr>
<td>WHICH</td>
<td>11.27 (10.54)</td>
<td>−6.34 (9.76)</td>
<td>−59.09 (5.23)</td>
<td>−71.53 (6.96)</td>
<td>−48.44 (5.41)</td>
<td>−64.01 (4.90)</td>
</tr>
<tr>
<td>BASELINE</td>
<td>14.07 (14.83)</td>
<td>−29.10 (11.09)</td>
<td>−57.22 (11.84)</td>
<td>−68.72 (14.34)</td>
<td>−22.05 (16.22)</td>
<td>−52.27 (12.41)</td>
</tr>
<tr>
<td>Raw RT</td>
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<td></td>
</tr>
<tr>
<td>BARE</td>
<td>467.51 (21.75)</td>
<td>420.36 (15.48)</td>
<td>352.42 (8.06)</td>
<td>361.41 (9.02)</td>
<td>349.05 (8.39)</td>
<td>338.74 (7.29)</td>
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<tr>
<td>WHICH</td>
<td>384.02 (10.50)</td>
<td>360.34 (10.26)</td>
<td>318.04 (5.67)</td>
<td>328.64 (6.95)</td>
<td>329.95 (6.39)</td>
<td>309.79 (5.11)</td>
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<tr>
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<td>343.92 (11.36)</td>
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<td>358.22 (17.67)</td>
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<tr>
<td>Complexity</td>
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<tr>
<td>F₁, df = (1,24)</td>
<td>14.813***</td>
<td>5.415*</td>
<td>15.083***</td>
<td>8.044**</td>
<td>3.597 (.)</td>
<td>6.575*</td>
</tr>
<tr>
<td>F₂, df = (1,35)</td>
<td>11.532**</td>
<td>10.386**</td>
<td>11.572**</td>
<td>6.858*</td>
<td>1.913</td>
<td>13.580***</td>
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<td>NP type</td>
<td></td>
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<tr>
<td>F₁, df = (2,48)</td>
<td>6.034**</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>5.173*</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
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<tr>
<td>F₂, df = (2,70)</td>
<td>7.506**</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>3.746*</td>
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<td>&lt; 1</td>
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<td>Complexity × NP type</td>
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<tr>
<td>F₁, df = (2,48)</td>
<td>3.073 (.)</td>
<td>1.093</td>
<td>&lt; 1</td>
<td>3.171 (.)</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
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<tr>
<td>F₂, df = (2,70)</td>
<td>2.420</td>
<td>1.902</td>
<td>&lt; 1</td>
<td>2.555 (.)</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
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</tbody>
</table>

There is a mild main effect of (in)definiteness.  

p-values:  
* = p < 0.05  
** = p < 0.01  
*** = p < 0.001
## Looking at It Another Way

### Table 1: Mean residual and raw reading times for word regions inside embedded clause clause in experiment I (standard errors in parentheses) + analysis of variance results.

<table>
<thead>
<tr>
<th>Word</th>
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<th>Region 3</th>
<th>Region 4</th>
<th>Region 5</th>
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<tr>
<td>Bare</td>
<td>87.93 (20.69)</td>
<td>48.88 (14.73)</td>
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<td>-41.66 (8.40)</td>
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<tr>
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<td>-71.53 (6.96)</td>
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<td>-64.01 (4.90)</td>
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<td>-68.72 (14.34)</td>
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<tr>
<td><strong>Raw RT</strong></td>
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<td>330.66 (12.80)</td>
<td>358.22 (17.67)</td>
<td>329.35 (13.33)</td>
</tr>
</tbody>
</table>

### Complexity
- \( F_1, df = (1, 24) \): 14.813***
- \( F_2, df = (1, 35) \): 11.532**

### NP type
- \( F_1, df = (2, 48) \): 6.034**
- \( F_2, df = (2, 70) \): 7.506**

### Complexity \( \times \) NP type
- \( F_1, df = (2, 48) \): 3.073 (.)
- \( F_2, df = (2, 70) \): 2.420 (.)

* \( p \)-values: * = \( p < 0.05 \)
** \( p \)-values: ** = \( p < 0.01 \)
*** \( p \)-values: *** = \( p < 0.001 \)

---

There is a mild main effect of (in)definiteness in addition to the effect we already saw.
How Does Acceptability Fit In?

Figure 3: Mean judgment ratios of CNPC violations and baseline. Error bars show \( \varepsilon \) one standard error.

Figure 4: Mean residual reading times in Experiment 2, ranging from first word after wh-phrase to three words after the subcategorizing verb. Error bars show \( \varepsilon \) one standard error.
How Does Acceptability Fit In?

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How Does Acceptability Fit In?

Figure 3: Mean judgment ratios of CNPC violations and baseline. Error bars show $\varepsilon_z/w$ one standard error.

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How Does Acceptability Fit In?

Figure 3: Mean judgment ratios of CNPC violations and baseline. Error bars show \( \frac{v_z}{w} \) one standard error.

Figure 4: Mean residual reading times in Experiment 2, ranging from first word after \( \text{wh-phrase} \) to three words after the subcategorizing verb. Error bars show \( \frac{v_z}{w} \) one standard error.
How Does Acceptability Fit In?

We see the main effect of *wh*-complexity again.
How Does Acceptability Fit In?

Gradience is more pronounced in acceptability:
How Does Acceptability Fit In?

Gradience is more pronounced in acceptability:
How Does Acceptability Fit In?

Gradience is more pronounced in acceptability:

3 \geq 2
Gradience is more pronounced in acceptability:
How Does Acceptability Fit In?

Gradience is more pronounced in acceptability:

\[ 3 \geq 2 \geq 1 \]

but notice that definiteness isn’t significant here
Experiment I: Discussion

• Complexity of the wh-phrase can go so far as to ameliorate island violations altogether

• Definiteness plays as role, but not as strong of one as we might have thought

• Offline acceptability may not always directly reflect processing difficulty
Experiment 2: Wh-Islands

- The question remains: to wh-islands show the same sensitivities that CPNC islands do?
- or, can we replicate Experiment 1 in wh-islands?
Experiment 2: The Stimuli

Albert learned that the managers dismissed the employee with poor sales after the annual performance review.
Experiment 2: The Stimuli

Albert learned that the managers dismissed the employee with poor sales after the annual performance review.

BARE  Who did Albert learn [whether they dismissed ___ after the annual performance review]?
Experiment 2: The Stimuli

Albert learned that the managers dismissed the employee with poor sales after the annual performance review.

BARE

Who did Albert learn \([_{CP} \text{ whether they dismissed } ___ \text{ after the annual performance review }]\)?

WHICH

Which employee did Albert learn \([_{CP} \text{ whether they dismissed } ___ \text{ after the annual performance review }]\)?
Experiment 2: The Stimuli

Albert learned that the managers dismissed the employee with poor sales after the annual performance review.

**BARE**
Who did Albert learn \([_{cp}\text{ whether they dismissed }\text{ ___ after the annual performance review }\])?

**WHICH**
Which employee did Albert learn \([_{cp}\text{ whether they dismissed }\text{ ___ after the annual performance review }\])?

**BASELINE**
Who did Albert learn \([_{cp}\text{ that they dismissed }\text{ ___ after the annual performance review }\])?
Experiment 2: The Stimuli

Albert learned that the managers dismissed the employee with poor sales after the annual performance review.

BARE

Who did Albert learn [CP whether they dismissed ___ after the annual performance review ]?

WHICH

Which employee did Albert learn [CP whether they dismissed ___ after the annual performance review ]?

BASELINE

Who did Albert learn [CP that they dismissed ___ after the annual performance review ]?

- 24 experimental items
- 48 fillers (12 of which were islands)
- 20 Stanford students

- balanced for preposition vs direct object
- balanced for wh-word
After the verb, the BARE condition causes a slowdown in reading time
After the verb, the BARE condition causes a slowdown in reading time.
In Tabular Form...

<table>
<thead>
<tr>
<th>Word</th>
<th>Region$_1$</th>
<th>Region$_2$</th>
<th>Region$_3$</th>
<th>Region$_4$</th>
<th>Region$_5$</th>
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<tbody>
<tr>
<td></td>
<td>they</td>
<td>dismissed</td>
<td>after</td>
<td>the</td>
<td>annual</td>
</tr>
<tr>
<td><strong>Residual RT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BARE</td>
<td>$-46.88$ (3.80)</td>
<td>$-66.62$ (5.24)</td>
<td>$-31.21$ (4.37)</td>
<td>$-35.80$ (4.92)</td>
<td>$-45.86$ (5.28)</td>
</tr>
<tr>
<td>WHICH</td>
<td>$-56.10$ (4.15)</td>
<td>$-77.96$ (5.06)</td>
<td>$-47.99$ (4.81)</td>
<td>$-57.91$ (4.77)</td>
<td>$-65.70$ (4.50)</td>
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<tr>
<td>BASELINE</td>
<td>$-65.24$ (5.81)</td>
<td>$-87.54$ (8.27)</td>
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<td>$-64.18$ (6.87)</td>
<td>$-50.49$ (7.17)</td>
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<tr>
<td><strong>Raw RT</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BARE</td>
<td>$252.45$ (5.10)</td>
<td>$255.96$ (5.68)</td>
<td>$265.27$ (5.41)</td>
<td>$261.48$ (5.75)</td>
<td>$261.31$ (4.94)</td>
</tr>
<tr>
<td>WHICH</td>
<td>$245.03$ (4.84)</td>
<td>$243.74$ (4.67)</td>
<td>$250.52$ (5.26)</td>
<td>$244.44$ (4.97)</td>
<td>$239.44$ (4.35)</td>
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<tr>
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<td>$231.79$ (6.78)</td>
<td>$247.54$ (7.94)</td>
<td>$239.17$ (6.17)</td>
<td>$255.40$ (8.16)</td>
</tr>
</tbody>
</table>

| $t_1(19)$ | 1.299 | 1.283 | 2.346* | 3.180** | 4.101*** |
| $t_2(23)$ | 1.528 | 1.441 | 2.459* | 3.053** | 3.190** |
In Tabular Form...

<table>
<thead>
<tr>
<th>Word</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
<th>Region 4</th>
<th>Region 5</th>
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<tbody>
<tr>
<td>BARE</td>
<td>−46.88 (3.80)</td>
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<th>Region 1</th>
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<th>Region 3</th>
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<th>Region 5</th>
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<td>252.45 (5.10)</td>
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<td>255.40 (8.16)</td>
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<th>Region 4</th>
<th>Region 5</th>
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<td>1.299</td>
<td>1.283</td>
<td>2.346*</td>
<td>3.180**</td>
<td>4.101***</td>
</tr>
<tr>
<td>t_2(23)</td>
<td>1.528</td>
<td>1.441</td>
<td>2.459*</td>
<td>3.053**</td>
<td>3.190**</td>
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end of FGD
### Table 2: Mean residual and raw reading times for word regions inside embedded clause in experiment II

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<td>they</td>
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<td>3.053**</td>
<td>4.101***</td>
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Here’s the main effect

end of FGD
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<tr>
<td>bare</td>
<td>252.45 (5.10)</td>
<td>255.96 (5.68)</td>
<td>265.27 (5.41)</td>
<td>261.48 (5.75)</td>
<td>261.31 (4.94)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>which</td>
<td>245.03 (4.84)</td>
<td>243.74 (4.67)</td>
<td>250.52 (5.26)</td>
<td>244.44 (4.97)</td>
<td>239.44 (4.35)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline</td>
<td>238.95 (6.23)</td>
<td>231.79 (6.78)</td>
<td>247.54 (7.94)</td>
<td>239.17 (6.17)</td>
<td>255.40 (8.16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| t₁(19) | 1.299 | 1.283 | 2.346* | 3.180** | 4.101*** |
| t₂(23) | 1.528 | 1.441 | 2.459* | 3.053** | 3.190** |

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**Question:**
In Experiment I this effect showed up before the resolution of the FGD -- why?

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Wednesday, March 3, 2010
What About Acceptability? II

Figure 5: Mean judgment ratios of embedded Wh-island violations: bare = bare wh-phrase; which = which-N phrase. Error bars show (+/-) one standard error.

Figure 6: Mean residual reading times from matrix verb to embedded verb in Experiment 3. Error bars show (+/-) one standard error.
Again, we see complex *wh*-elements are rated significantly more acceptable than the bare *wh*-counterparts.
Experiment 2: Discussion
Experiment 2: Discussion

- When the \textit{wh}-phrase encodes more information, \textit{wh}-islands are ameliorated
  - So much so that especially \textit{d}-linked \textit{wh}-phrases do not show any difference from the baseline
Experiment 2: Discussion

• When the wh-phrase encodes more information, wh-islands are ameliorated
  • So much so that especially d-linked wh-phrases do not show any difference from the baseline

• These results echo the CNPC results
  • We might think that this means these factors are independent of structural islandhood
  • and therefore conclude that processing is playing a role in the unacceptability of wh-islands
  • but because nonstructural factors affect this, we might more parsimoniously state this outside the grammar
Experiment 3: Adjunct Extraction

Luigi Rizzi
Experiment 3: Adjunct Extraction

Luigi Rizzi

...differential acceptability in island contexts [is] a function of referentiality - adjunct extraction is illicit because of adjuncts’ nonreferential character.
Experiment 3: Adjunct Extraction

...differential acceptability in island contexts [is] a function of referentiality - adjunct extraction is illicit because of adjuncts’ nonreferential character.

...[then] nonreferential adjuncts that differ in syntactic and semantic complexity should not produce the same effects...

Luigi Rizzi
Julie discerned that the survivor had managed to stay alive for eight days after the crash in the harsh conditions.
Julie discerned that the survivor had managed to stay alive for eight days after the crash in the harsh conditions.

How long did Julie observe \([\text{CP whether the passenger had survived }}\] in the unbelievably harsh conditions ]?
Experiment 3: The Stimuli

Julie discerned that the survivor had managed to stay alive for eight days after the crash in the harsh conditions.

**BARE**

How long did Julie observe \([CP \text{ whether the passenger had survived } ___ \text{ in the unbelievably harsh conditions }]\)?

**LONG**

For what period of time after the crash did Julie observe \([CP \text{ whether the passenger had survived } ___ \text{ in the unbelievably harsh conditions }]\)?
Experiment 3: The Stimuli

Julie discerned that the survivor had managed to stay alive for eight days after the crash in the harsh conditions.

BARE

How long did Julie observe [CP whether the passenger had survived ___ in the unbelievably harsh conditions ]?

LONG

For what period of time after the crash did Julie observe [CP whether the passenger had survived ___ in the unbelievably harsh conditions ]?

BASELINE

How long did Julie observe [CP that the passenger had survived ___ in the unbelievably harsh conditions ]?
Julie discerned that the survivor had managed to stay alive for eight days after the crash in the harsh conditions.

How long did Julie observe [CP whether the passenger had survived ___ in the unbelievably harsh conditions ]?

For what period of time after the crash did Julie observe [CP whether the passenger had survived ___ in the unbelievably harsh conditions ]?

How long did Julie observe [CP that the passenger had survived ___ in the unbelievably harsh conditions ]?

- 24 experimental items
- 28 Stanford students
Experiment 3: Results

![Graph showing mean residual reading times in Experiment 2, ranging from first word after "wh"-phrase to three words after the subcategorizing verb. Error bars show ± one standard error.]
the embedded subject shows an effect for BARE
Experiment 3: Results

The embedded subject shows an effect for BARE as well as the spillover region for the verb.
Experiment 3: Results

**Figure 3:** Mean judgment ratios of CNPC violations and baseline. Error bars show $\sigma_{\text{vz}}/w$ one standard error.

**Figure 4:** Mean residual reading times in Experiment 2, ranging from first word after wh-phrase to three words after the subcategorizing verb. Error bars show $\sigma_{\text{vz}}/w$ one standard error.

but there’s no effect at the verb in this experiment
Experiment 3: Discussion
Experiment 3: Discussion

- We see similar patterning for *complexity* in adjunct extraction as we saw for CNPC/wh-islands
  - “The effect of complexity operates independently of referentiality” (p. 33)
  - adjuncts are subject to the same processing as arguments
Experiment 3: Discussion

• We see similar patterning for complexity in adjunct extraction as we saw for CNPC/wh-islands
  • “The effect of complexity operates independently of referentiality” (p. 33)
  • adjuncts are subject to the same processing as arguments

• But they did not show why wh-islands might be sensitive (in acceptability judgments) to referentiality:
  1. adjuncts can’t be cued by a surface-invalid subcat frame
  2. verbs can’t express morphological/other markers of a displaced adjunct
  3. adjuncts can modify things on the extraction path; this could hinder processing
General Conclusions

• Processing difficulty indirectly correlates with acceptability.

• Processing can eliminate the impression of ungrammaticality in islands.

• These effects can relate islands to non-island contexts (center-embeddings, simple interrogatives, etc.).

• We might need to revisit our old generalizations in the empirical domain of islandhood.
Some Questions
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I. What about the CSC?
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1. What about the CSC?

2. Why does the affectiveness of nonstructural factors automatically mean that islands have {no, a very tiny} structural component?
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4. Why is the time-course of the processing of islands so different in the three reported experiments?
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3. Do the results here *necessarily* force a larger revision other than that complexity and definiteness must be built into the theory of islandhood?

4. Why is the time-course of the processing of islands so different in the three reported experiments?

5. Why is the magnitude of effect so different based on the kind of island?
Fin