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## Background

Nested structures (e.g. Relative Clauses) are known to trigger garden-path effects when an alternative analysis is available and in the absence of a supporting context (see [1, 2], among many others).

Recent work has shown that nested garden paths are prosodically disambiguated [3–5].

We focus on the previously understudied ambiguity between Relative Clauses (RCs, 1a) and Connected Clauses (CCs, 1b).

- (1a) **Relative Clause – Nesting:**
- Who did you call?
  - [It was [the humorist [that was leaving the scene]] [that I called]].
- (1b) **Connected Clause – Sisterhood:**
- Who was leaving the scene?
  - [It was [the humorist] [that was leaving the scene]].

## Experiments 1: Speeded Acceptability Judgement

The local ambiguity between Connected Clauses and Relative Clauses can be resolved using Tense. Specific Tense-Matching restrictions apply to Clefts but not to Relative Clauses. The combination of *Matrix Past* and *Embedded Future* disallows a Connected Clause reading (*Tense Harmony*, see [6] among many others).

**Goal** Test parsing preferences for Connected Clauses vs. Relative Clauses in the environment of Clefts.

**Design** 2 Matrix Tense (Past vs. Present) \* 2 Embedded Tense (Matched vs. Mismatched)

**Materials** 40 items

**Participants** 99 native speakers of English (age range=20-to-51, mean=35.6, SD=7.5).

**Procedure** Participants read sentences automatically presented in the RSVP paradigm, each followed by speeded acceptability judgement.

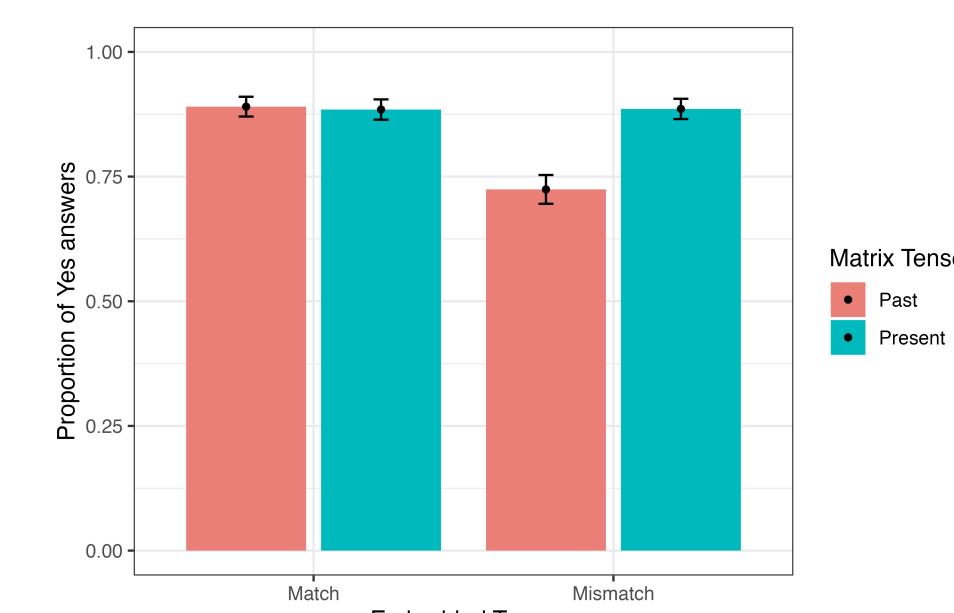
Structure	Matrix-T	Embedded-T	Example
CC/RC	Past	Match	It was the humorist that was leaving the scene.
<b>RC-only</b>	Past	Mismatch	It was the humorist that will leave the scene.
CC/RC	Present	Match	It is the humorist that is leaving the scene.
CC/RC	Present	Mismatch	It is the humorist that will leave the scene.

## Key Findings

- Relative Clauses trigger garden-path effects in the environment of Clefts (**Experiment 1**).
- Speakers use prosody (including pitch and duration) to disambiguate between string-identical Relative Clauses and Connected Clauses (**Experiment 2**).
- Listeners are sensitive to these prosodic differences: Garden-path effect greatly reduced by target prosody (**Experiment 3**).

## Experiments 1 Results

Lower acceptability score for the RC-only condition.



Proportion of ‘Yes’ answers across conditions

Variable	Est.	SE	z-value	p-value
Matrix-T	-0.32	0.05	-6.04	<.001
Embedded-T	0.35	0.08	4.39	<.001
Interaction	0.37	0.05	6.92	<.001

## Experiment 2: Planned Production

**Design** Single factor: 2 Structures (RCs vs. CCs)

**Goal** To test whether RCs and CCs are prosodically different

**Materials** 24 items, each preceded by a prompting question.

(2a) **Cleft/Connected Clause – Sisterhood:**

- Who was leaving the scene?
- It was [the humorist] [that was leaving the scene].

(2b) **Relative Clause – Nesting:**

- Which one of them was identified?
- It was [the humorist [that was leaving the scene]] [that was identified].

**Participants** Seven native speakers of British English (age range=24-to-36, mean=31.3, SD=4.4).

**Procedure** Two recording sessions for each participant, with a one-week gap between sessions.

## Experiments 3: Auditory Acceptability Judgement

**Design** 2 Context (RC vs. CC) \* 2 Prosody (Match vs. Mismatch)

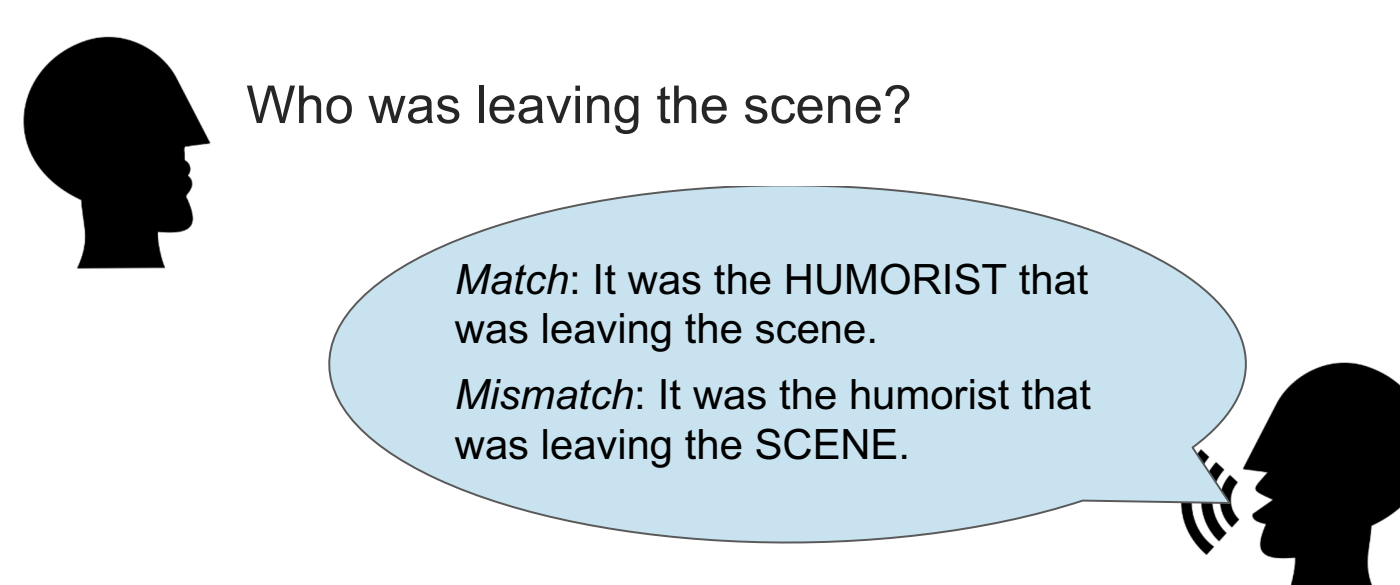
**Goal** To test whether listeners are sensitive to the prosodic differences between the two structures

**Materials** 24 auditory stimuli, each preceded by a written context

**Participants** 64 native speakers of English (age range=20-to-50, mean=33.8, SD=8.1).

**Procedure** Participants read a preceding context and question and then hear the target sentence, followed by acceptability judgement (Yes/No + 3-pt confidence rating)

You were watching a musical with your friend. There was a commotion in the seats around you that distracted you as one of the performers was escorted off stage, so you asked your friend:



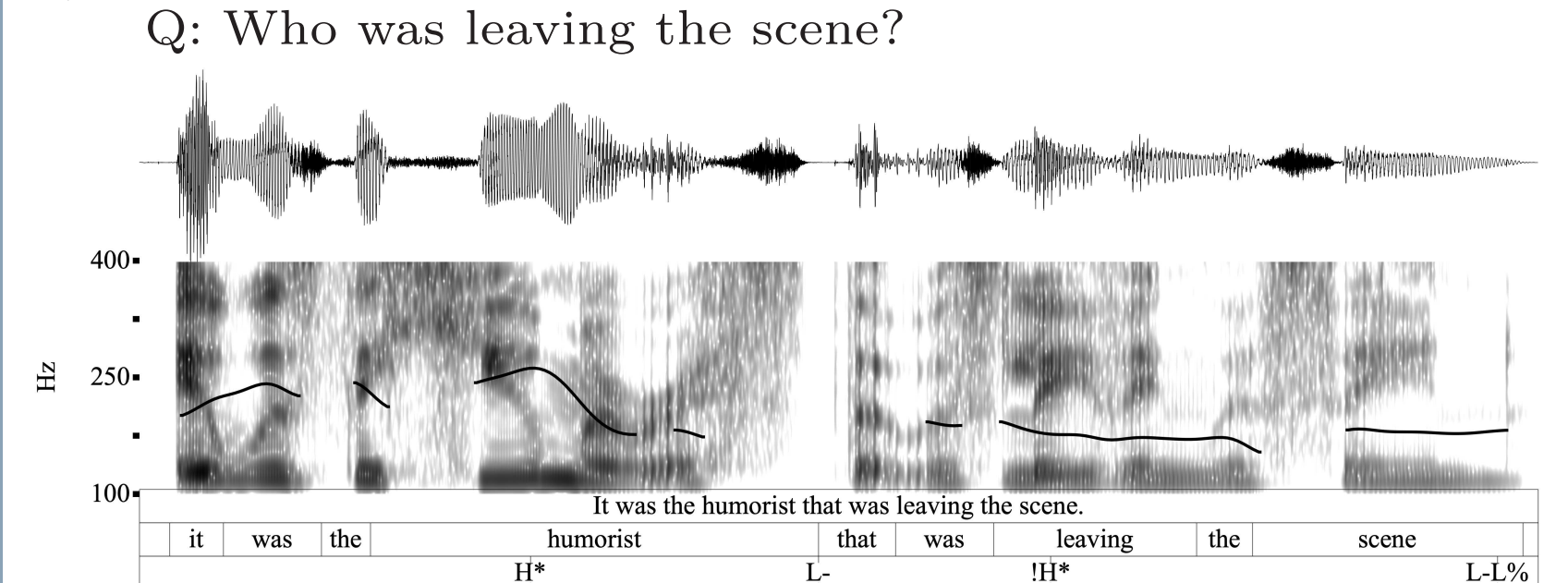
Example stimuli in the **CC-Context** condition

## Experiment 2 Results

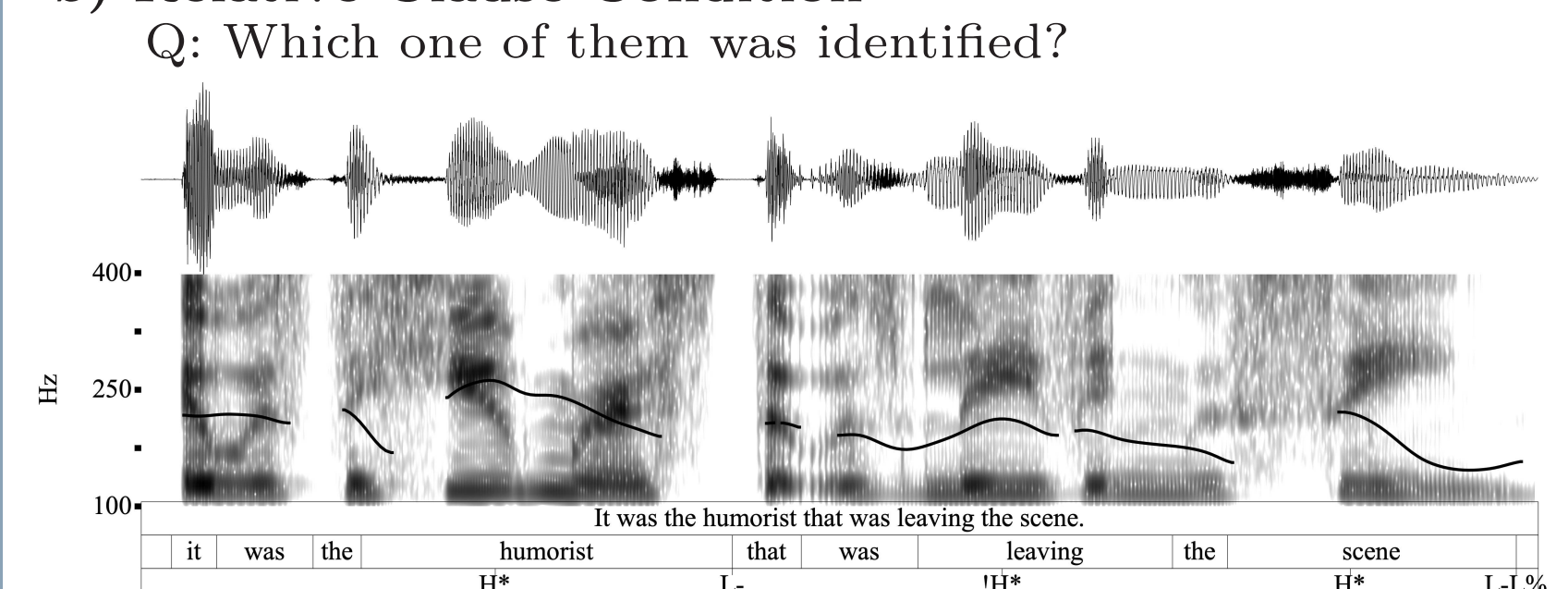
CCs and RCs show Tonal and durational differences.

### Pitch

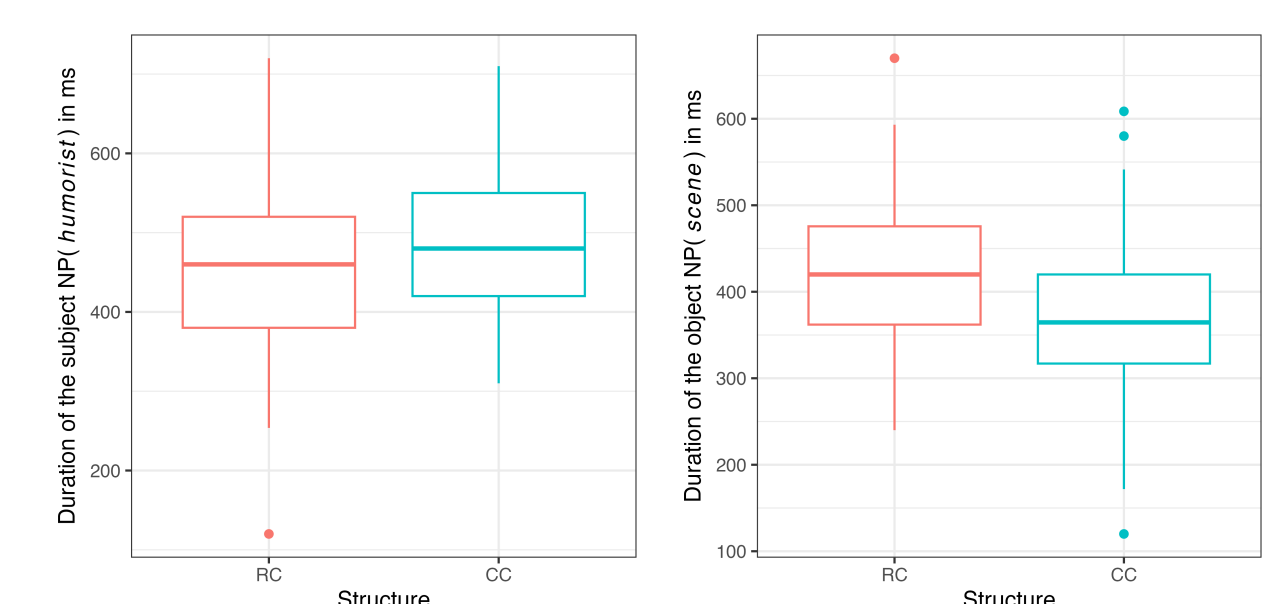
a) **Connected Clause Condition**



b) **Relative Clause Condition**



### Duration



## Discussion and Conclusions

### 1. Garden Path

- Exp.1 and Exp.3 show that RCs trigger garden-path effects in the environment of Clefts.
- An ongoing eye-tracking while reading experiment to test the incremental processing of this type of ambiguity.

### 2. Prosody

- Speakers and listeners make use of both tonal and durational cues to disambiguate Connected

Clauses and Relative Clauses

- Further phonetic analyses are being carried out (intensity, F0, vowel quality).
- More work is needed to disentangle the relative contribution of Information Structure and Constituent Structure in shaping prosody of CCs/RCs
- This work is part of a large scale effort to study the prosodic disambiguation of nesting vs. sisterhood [3, 4, 7]

## References

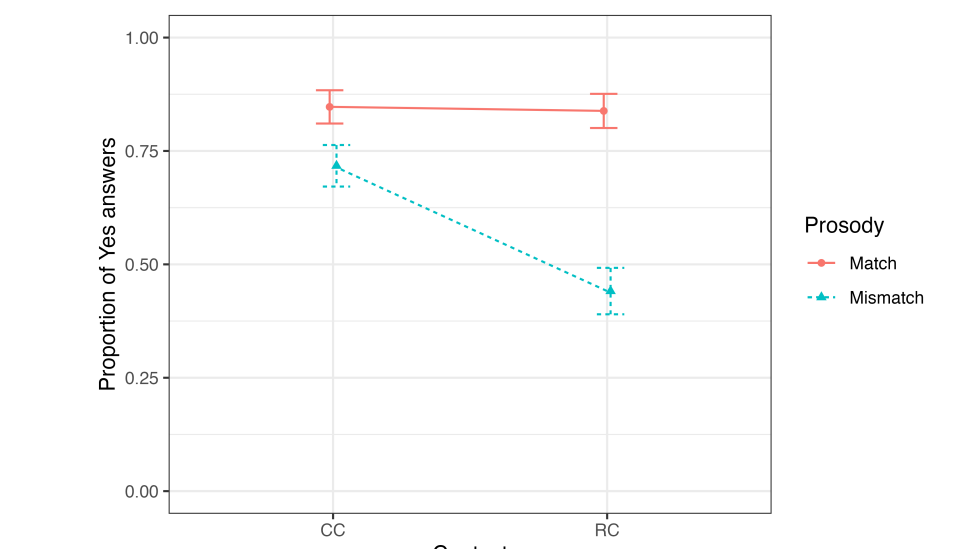
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## Acknowledgement

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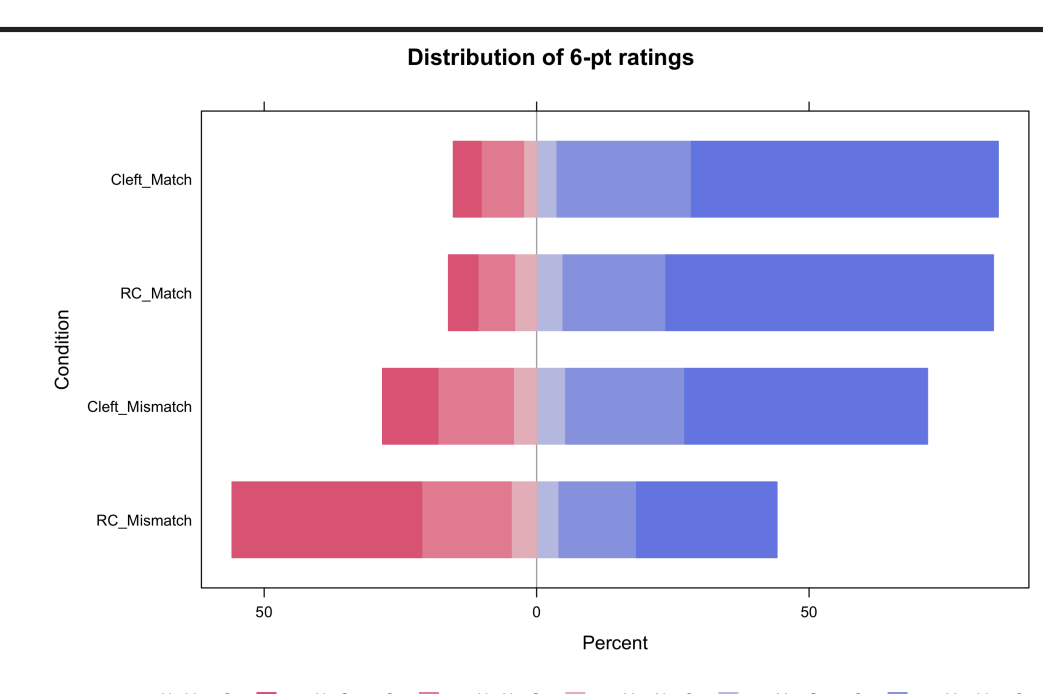
## Experiments 3 Results

Interaction of Context\*Prosody: Stronger effect of mismatched prosody for RCs than CCs.



Proportion of ‘Yes’ answers across conditions

Variable	Est.	SE	z-value	p-value
Context	-0.31	0.41	-0.75	0.45
Prosody	-1.13	0.30	-3.80	<.001
Interaction	-1.37	0.35	-3.90	<.001



Distribution of combined 6-pt ratings across conditions