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Prosody Disambiguates String-Identical Connected Clauses and Relative Clauses

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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.
RC-only	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.

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

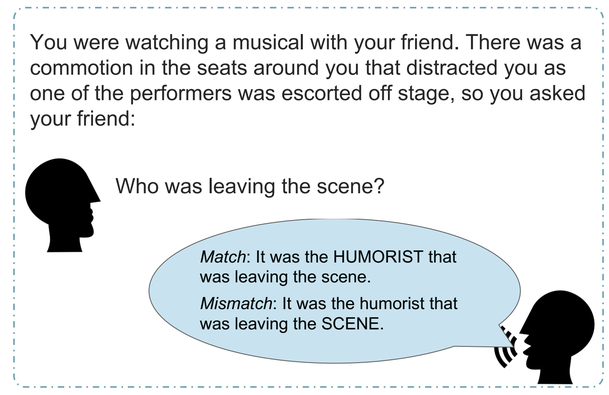
Design 2 Context (RC vs. CC) * 2 Prosody (Match vs. Mismatch)

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)



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

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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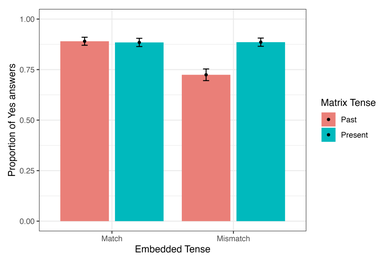
Key Findings

- 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

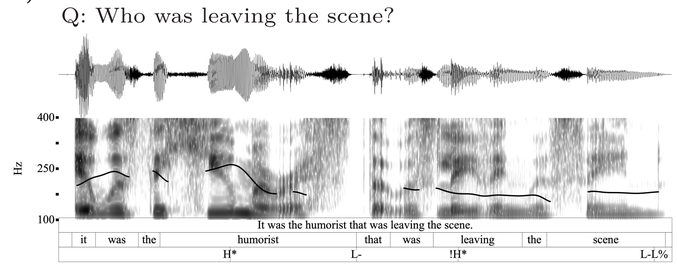
Variable	Est.	SE	z-value	p-value
Matrix-T	-0.32	0.05	-6.04	<.001
Embedded-T	0.35	0.08	4.39	<.001
Interaction	0.37	0.05	6.92	<.001

Experiment 2 Results

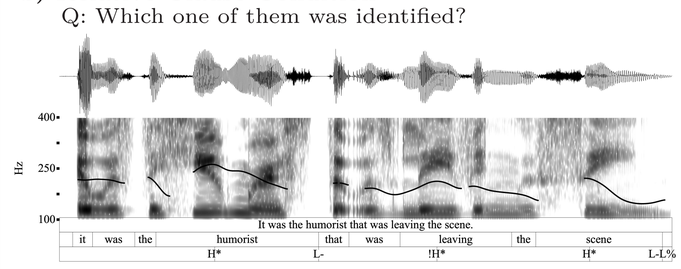
CCs and RCs show Tonal and durational differences.

Pitch

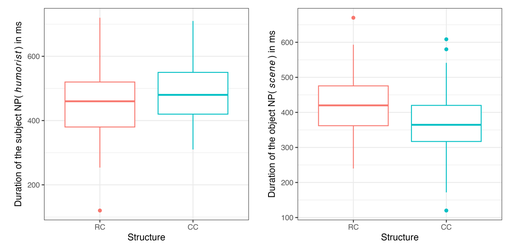
a) Connected Clause Condition
Q: Who was leaving the scene?



b) Relative Clause Condition
Q: Which one of them was identified?

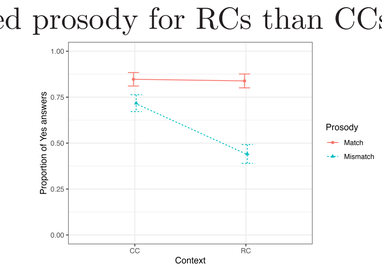


Duration



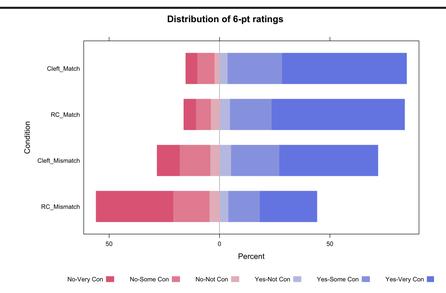
Experiments 3 Results

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