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The role of the P-center in cortical tracking of speech

Vincent Aubanel

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Vincent Aubanel

University of Grenoble Alpes, CNRS,
GIPSA-lab, Grenoble, France

vincent.aubanel@gipsa-lab.fr



Introduction

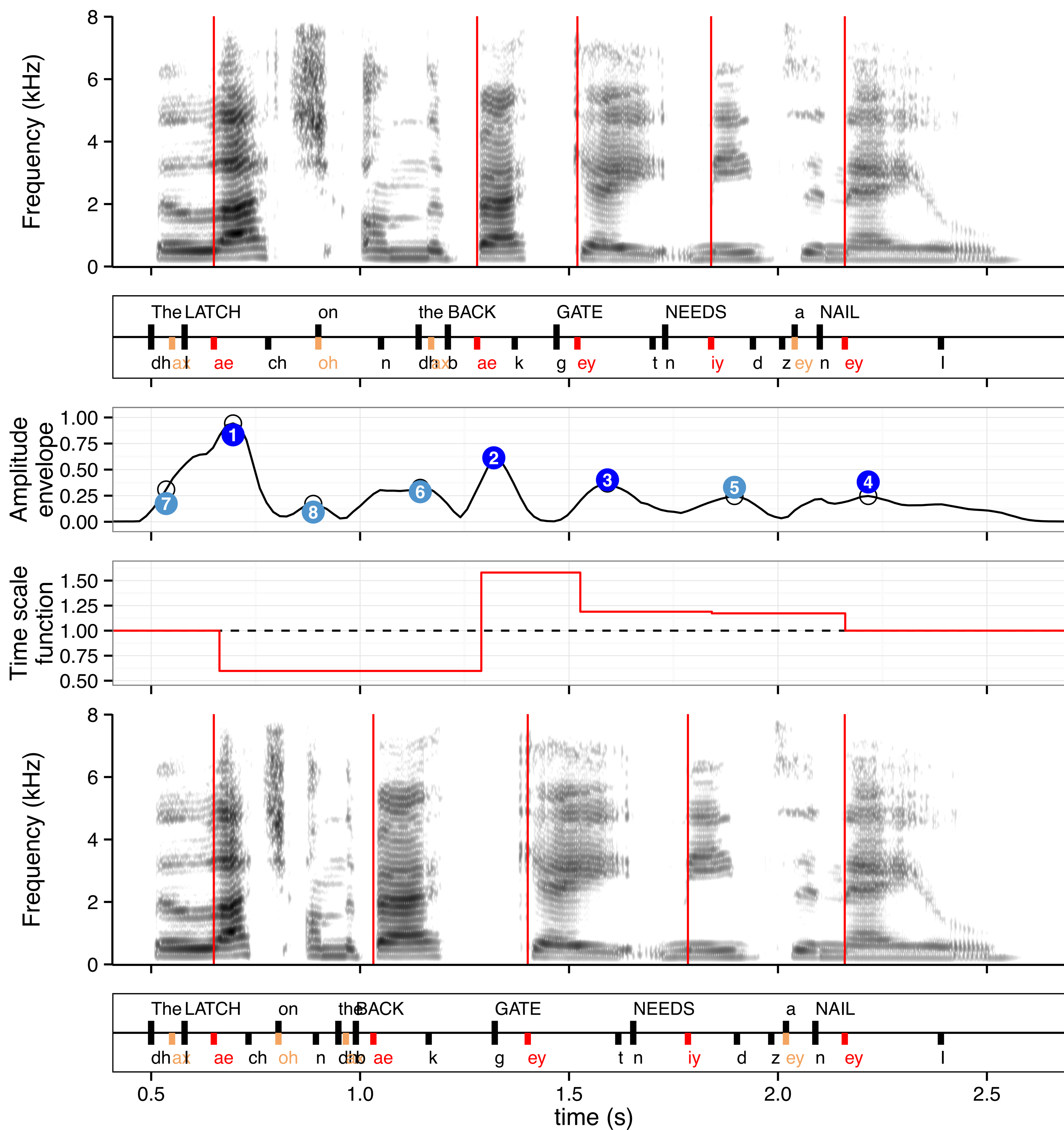
- Cortical oscillations track speech [1]
- Phase-resetting mechanisms at play
- Cortical tracking is maintained in noise [2]
- Speech is quasi-periodic

Q1: which temporal cue is most relevant for driving cortical tracking ?

- Amplitude envelope
- P-center

Q2: Does more regular speech help in noisy conditions?

- naturally timed
- isochronous
- anisochronous



Naturally timed speech (p-centers in red)

Anchor points:

- stressed syllables
- unstressed syllables

- primary peaks
- secondary peaks

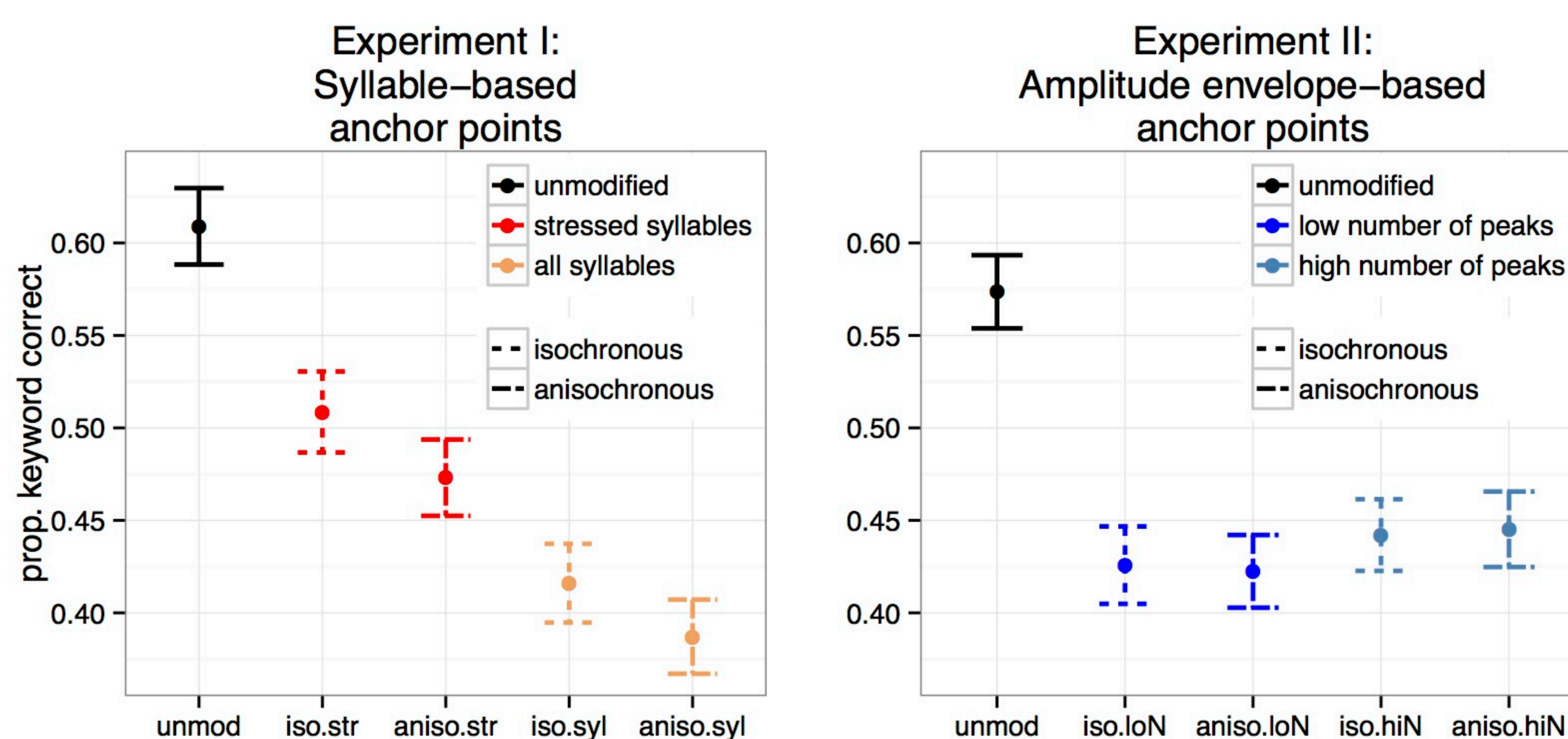
WSOLA
time transformation

Isochronously retimed speech (anchored to p-centers)

Methods

- **55 participants** (Exp. I:26, Exp.II: 29)
- **Material:** 180 Harvard sentences mixed with speech-shaped noise at -3dB SNR
- **Task:** Speech intelligibility in noise
- 5 keyword scored per sentence
- Timescale function applied to speech with WSOLA
- Anisochronous condition obtained by reversing isochronous timescale function
- Same-duration transformation

Listeners' performance



Discussion

- Natural timing is best
- Intelligibility predicted by temporal distortion
- Isochronous better than anisochronous, at least in noisy conditions
- P-center better candidate than amplitude envelope peaks for cortical tracking
- Isochronous advantage: oscillatory-based tracking, or explicitly predictable structure?

References

- All figures from: Aubanel et al. (2016) Front. Human Neurosci. 10:430
- [1] Ding et al. (2016). Nature Neurosci. 19:158
- [2] Fuglsang et al. (2017) Neuroimage 156:435

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Sentences distortion

