

Effects of intermittent changes in speech intelligibility on the neural dynamics of speech tracking

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1 Questions

Do intermittent vs. continuous changes in speech intelligibility differently affect the neural dynamics associated with speech tracking?

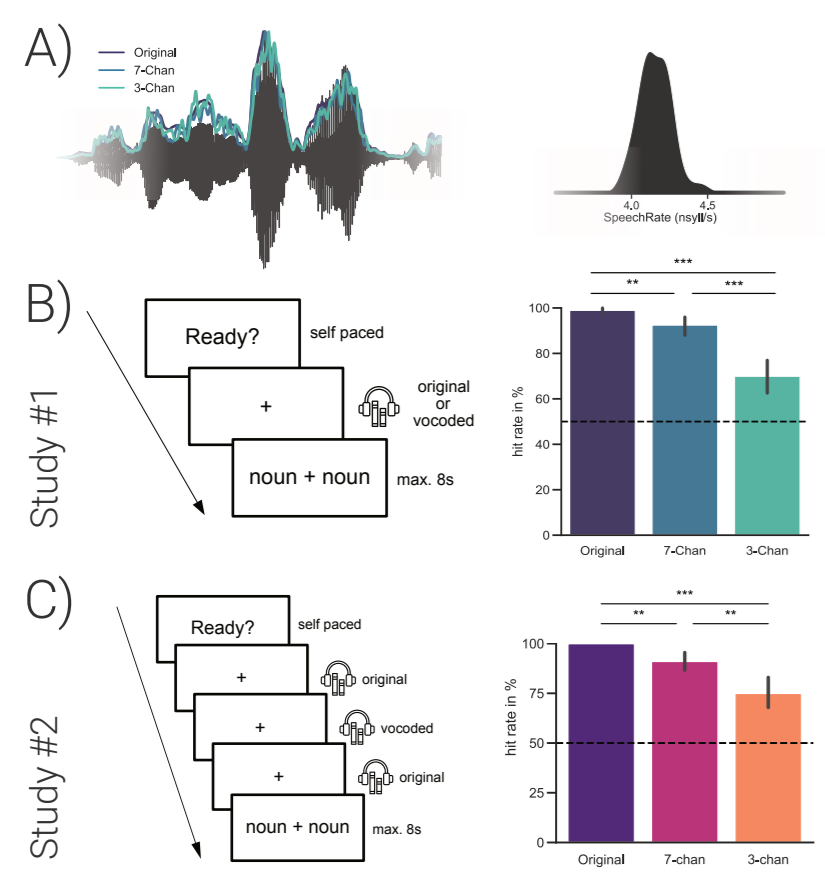
At what stage along the auditory hierarchy can we dissociate between clear and vocoded speech?

2 Method & Procedure

Subjects ($N=52$; split across 2 studies -> B & C) listened to an audiobook narrated by a female speaker whilst seated in the MEG.

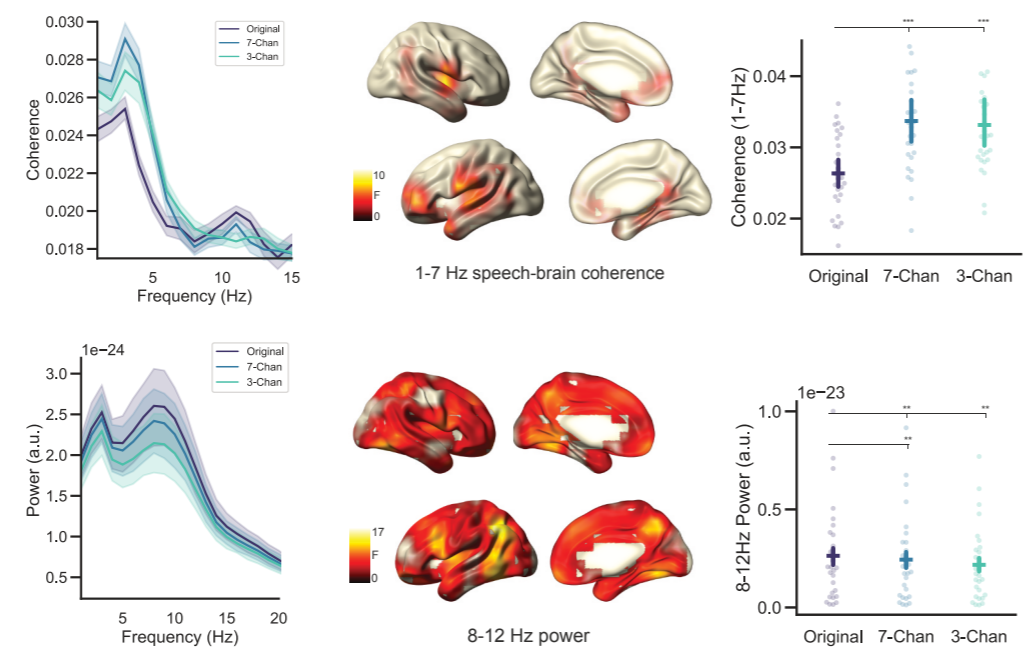
Parts of the audiobook were vocoded (A; 7-Chan, 3-Chan).

Vocoding levels were either kept continuous throughout a block (B) or changed intermittently within a block (C)



3 Intermittent and continuous degradation differently affect the neural dynamics of speech tracking

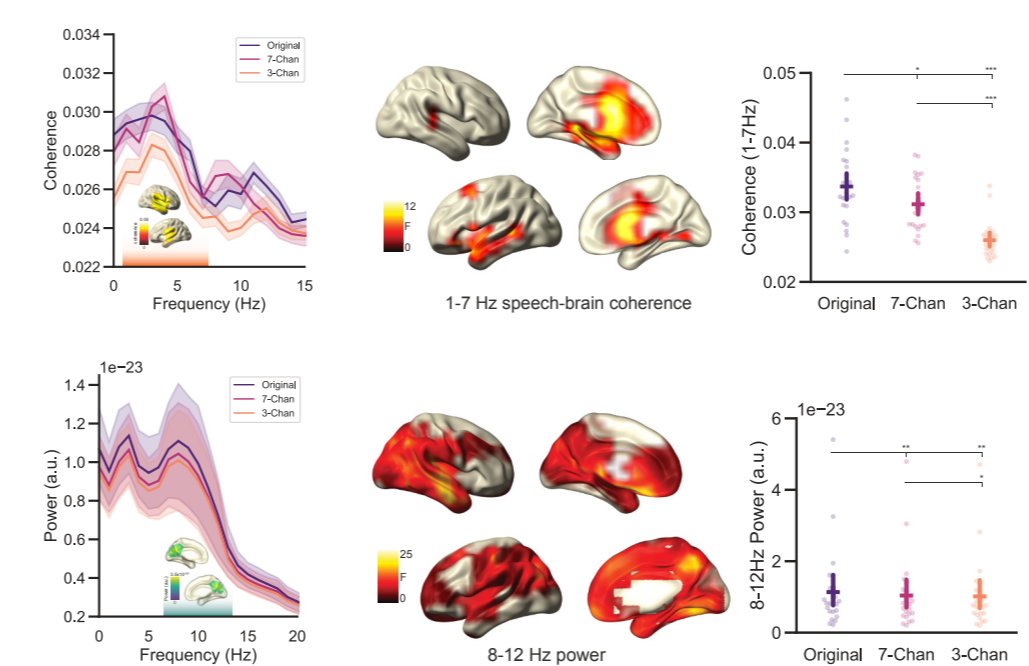
In a continuous setting...



- an increase in speech degradation causes an increase in speech tracking

- while alpha power decreases

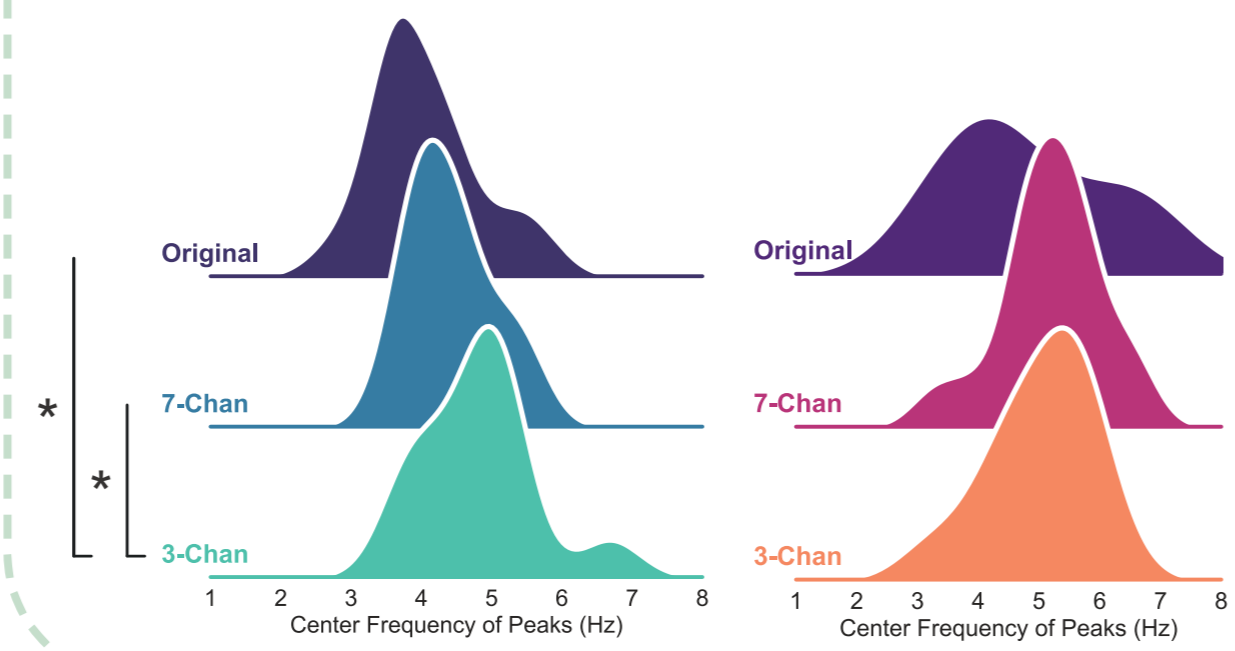
In an intermittent setting...



- an increase in speech degradation causes a decrease in speech tracking

- while alpha power decreases

4 A decrease in speech intelligibility shifts the center frequencies of the coherence spectra away from the syllabic rate of speech

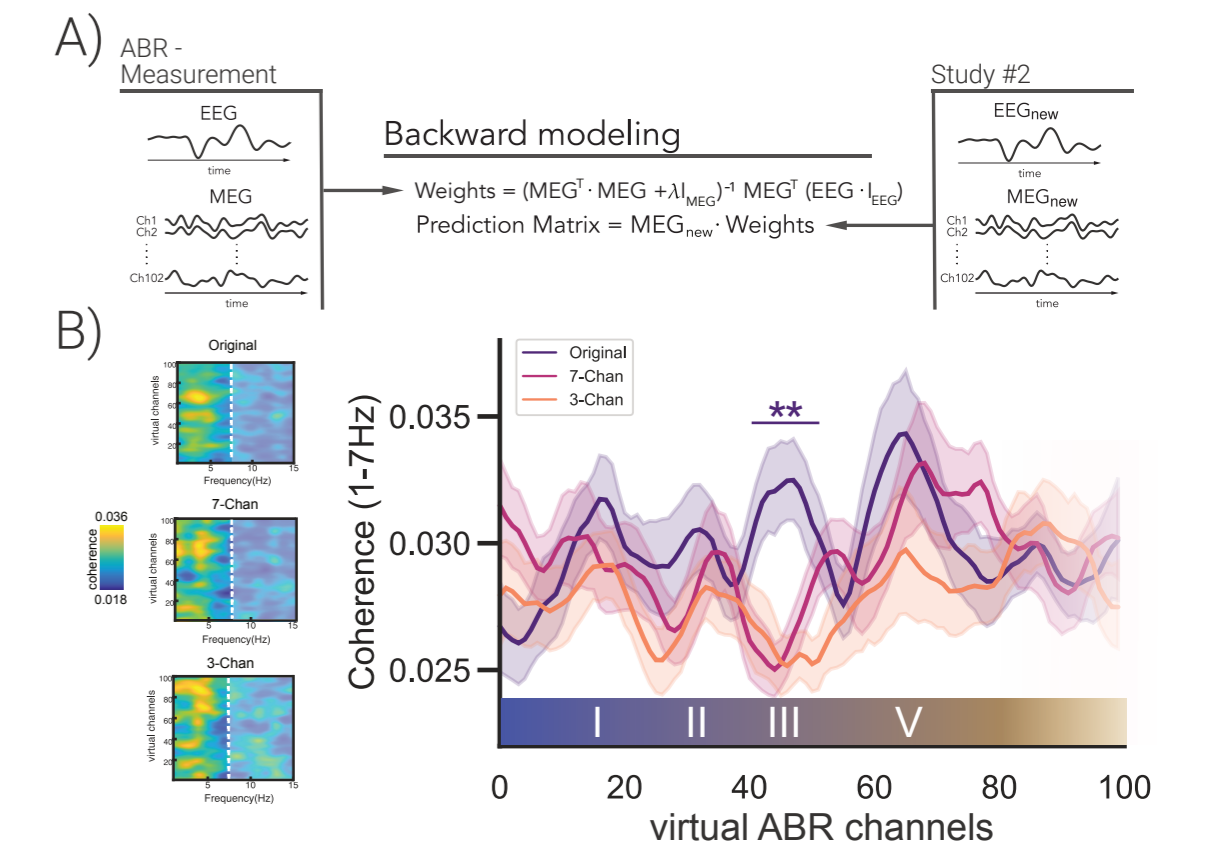


Parametrization of coherence spectra shows that..

- a decrease in speech intelligibility can be associated with an increase in center peak frequency

- As speech becomes less intelligible speech tracking shifts away from the syllabic rate (~4Hz; see Methods & Procedure)

5 Differences in speech tracking between clear and vocoded speech emerge at early auditory processing stages



Using a backward modeling approach (A) we reconstructed auditory brainstem activity related to Study#2

Coherence differences between the speech envelope and clear and vocoded speech already arise at subcortical processing stages (B)

6 Conclusion

- Early differences in speech tracking between clear and vocoded speech arise at subcortical levels

- Intermittent and continuous speech degradation differently affect the neural dynamics of speech tracking