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# Speech synthesis from neural decoding of spoken sentences

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## Abstract

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**Reviewer information**

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### Contributions

### Corresponding author

## Ethics declarations

### Competing interests

## Additional information

### Publisher’s note:

# Extended data figures and tables

## Extended Data Fig. 1 Median original and decoded spectrograms.

**a b**

**a** **b** $n$

$n$ $n$ $n$

$r$

$P$

## Extended Data Fig. 2 Transcription WER for individual trials.

**a b**

**a** **b**

## Extended Data Fig. 3 Electrode array locations for participants.

## Extended Data Fig. 4 Decoding performance of kinematic and spectral features.

**a**

$n$ $x$ $y$

**b**

$n$

**Extended Data Fig. 5 Comparison of cumulative variance explained in kinematic and acoustic state–spaces.**

**Extended Data Fig. 6 Decoded phoneme acoustic similarity matrix.**

**Extended Data Fig. 7 Ground-truth acoustic similarity matrix.**

**Extended Data Fig. 8 Comparison between decoding novel and repeated sentences.**

**a b**

**a**

**b**

*P* **a**

*P* **b** *n*

*P*

**Extended Data Fig. 9 Kinematic state–space trajectories for phoneme-specific vowel–consonant transitions.**

**a** *n*

**b**

*n*

**c** *n*

**d**

*n*

## Supplementary information

**41586_2019_1119_MOESM3_ESM.mp4**

## Supplementary Information

## Reporting Summary

## Supplemental Video 1: Examples of decoded kinematics and synthesized speech production

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## About this article

### Cite this article

*Nature* **568,**

**Subjects** Brain–machine interface • Sensorimotor processing

## Further reading

- **Speech-related dorsal motor cortex activity does not interfere with iBCI cursor control**
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- **Revisiting the Functional Anatomy of the Human Brain: Toward a Meta-Networking Theory of Cerebral Functions**
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- **Decoding Imagined and Spoken Phrases From Non-invasive Neural (MEG) Signals**
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- **Classification of Vowels from Imagined Speech with Convolutional Neural Networks**
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## Comments