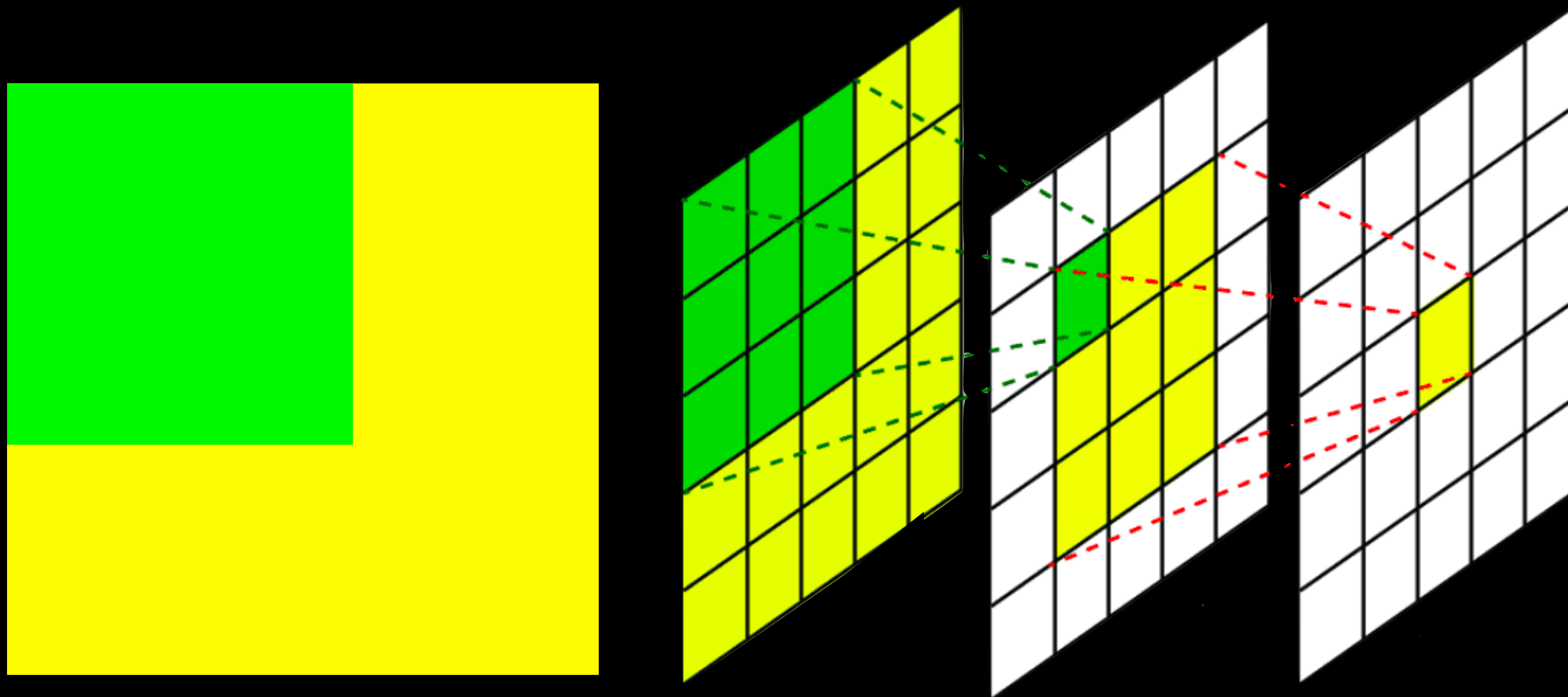


Cog Lunch: Temporal Receptive Windows in the Language Network

Hope Kean 2021.12.14

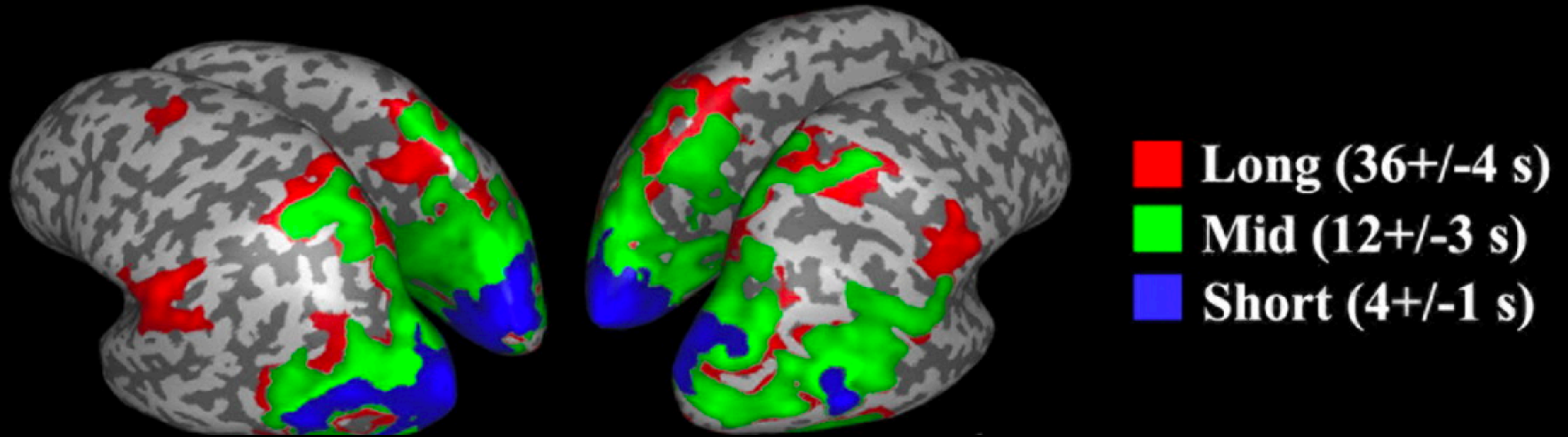
Spatial Receptive Windows

Hubbel & Wiesel 1998



Temporal Receptive Windows

Hasson et al. 2008 (JoN)



In the **Language Network**...

short

acoustics into
phonemes

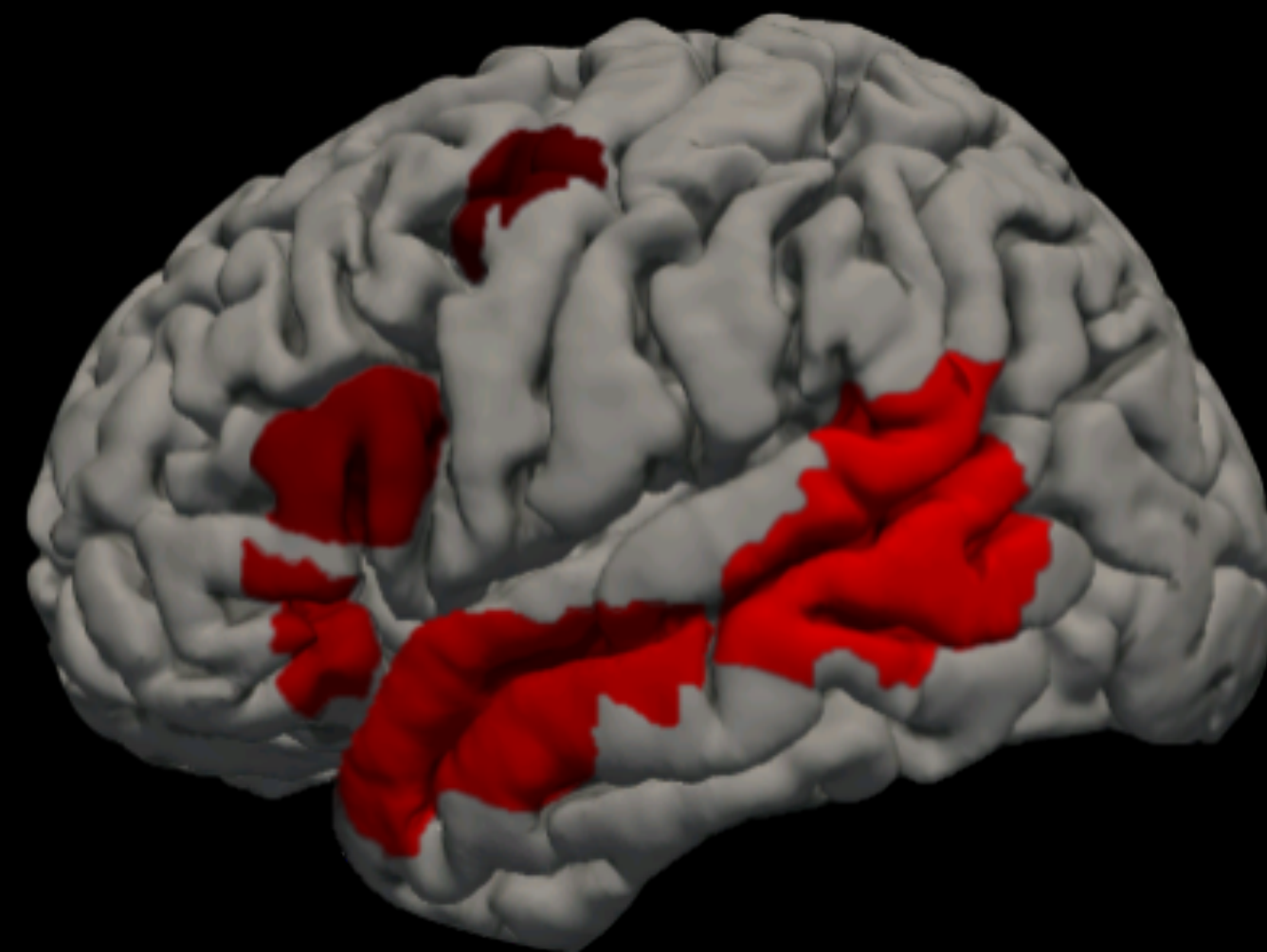
phonemes into
words

words into
phrases

phrases into
sentences

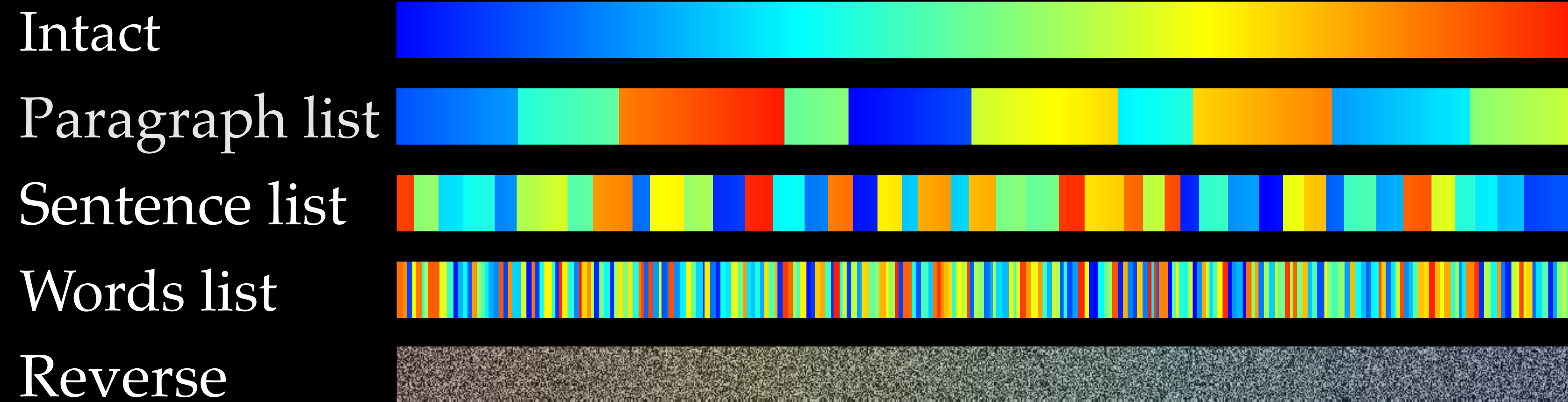
very long

sentences into
paragraphs



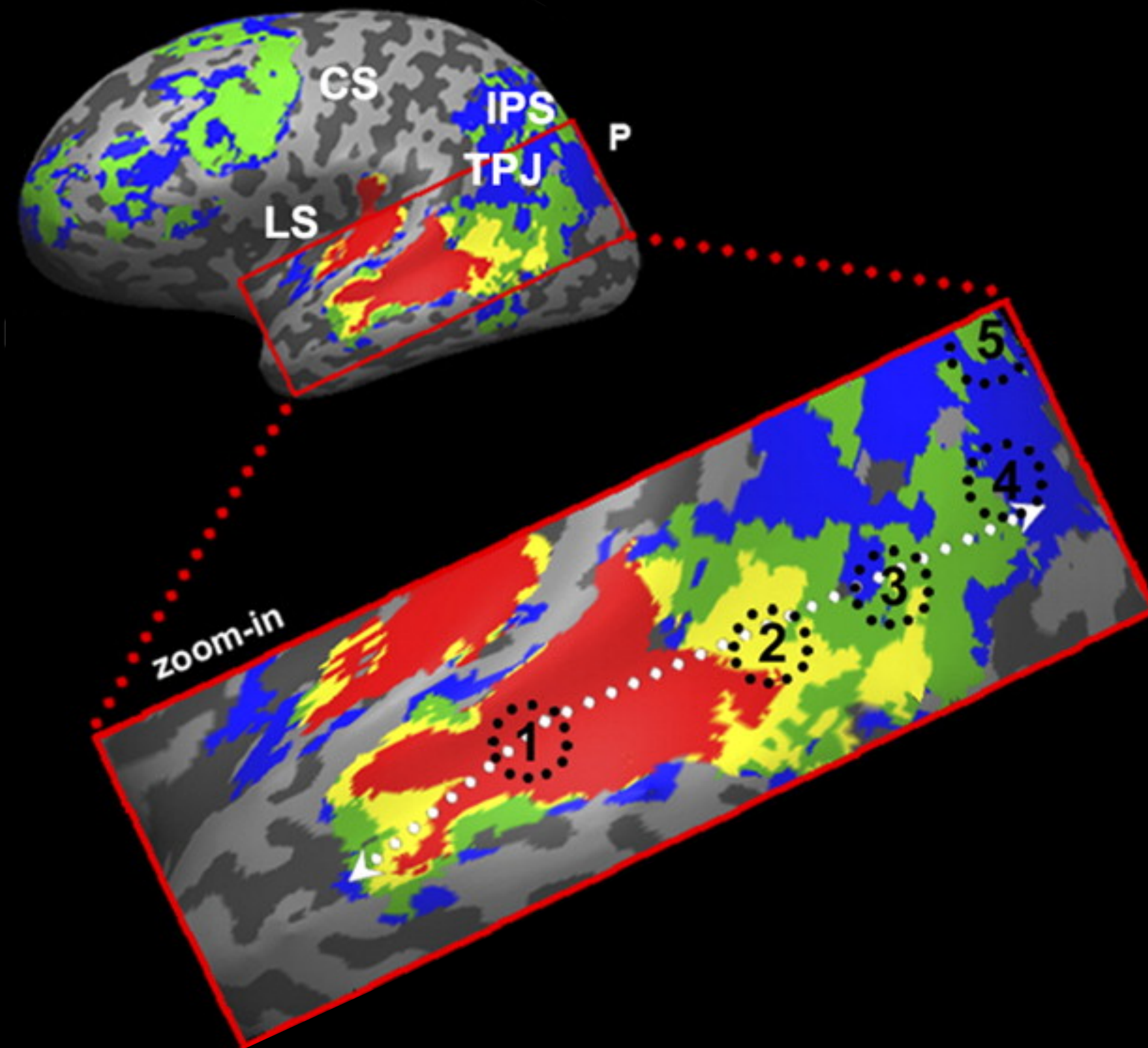
Methods: Inferring Integration Timescales

Five versions of a story:



Language & Auditory Regions

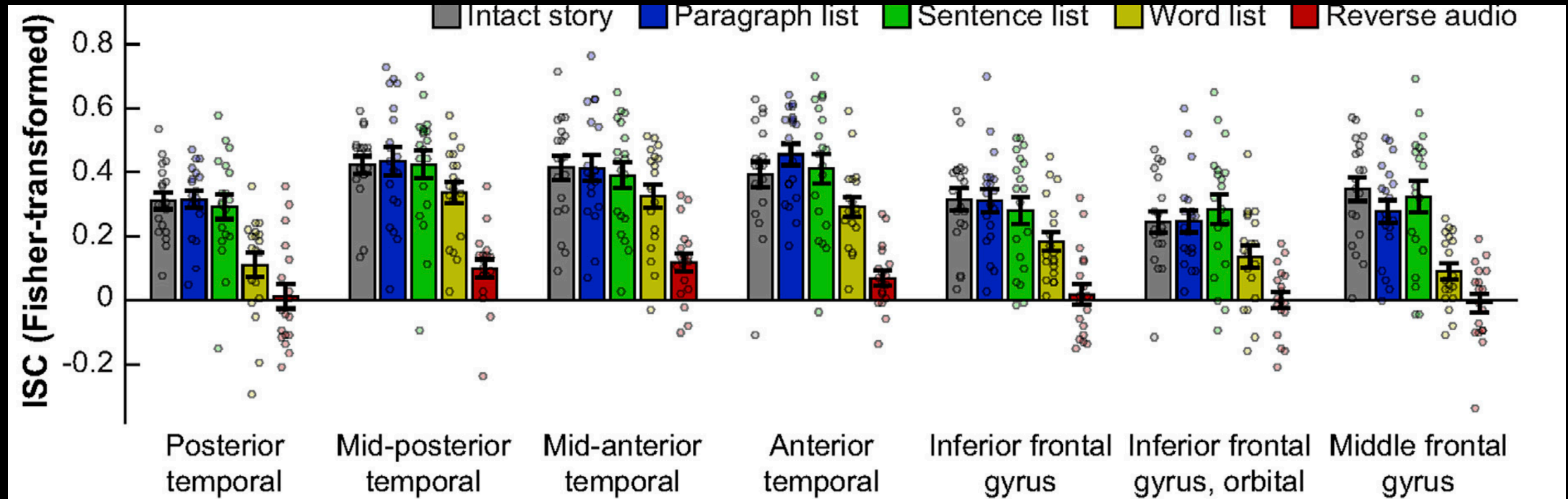
Lerner et al. 2011 (JNeurosci)



Paragraphs
Sentences
Words
Reverse

No Differences in Language-selective Cortex

Blank & Fedorenko 2020 (NeuroImage)



Intact story Paragraph list Sentence list Word list Reverse audio

Open Questions:

1. What is the **TRW** of the language system?
2. Do **language regions differ** in the size of their TRWs?
3. Is the TRW of the language system similar across **typologically diverse languages**?

A Different Approach

Shain et al. 2020 & Pallier et al. 2011

C12	IN	THE	STUDY	SURROUNDED	BY	BOOKS	AND	PAPERS	HER	MOM	WAS	WORKING
C06	BECAME	VERY	RED	IN	THE	FACE	AGREE	TO	PERFORM	IN	THE	SHOW
C04	BRIGHTER	THAN	THE	DAY	HIGHER	AND	HIGHER	PRICES	TWELVE	ACRES	OF	LAND
C03	CLEAR	AND	JOYOUS	HARD	TO	FIND	DID	NOT	ANSWER	ON	THE	WALL
C02	EASILY	CONFUSED	OF	POWER	ARE	INVOLUNTARY	LOOKED	CLEAR	A	FEE	ANY	KNOWLEDGE
C01	AFRAID	ONTO	BELONGED	VOICE	WHY	APPEARED	NOTORIETY	ADULTHOOD	QUICKLY	HIMSELF	AWAY	BURST

Experimental Design

- **Sub-experiment 1**

- 24 word long sequences

- 1
- 2
- 3
- 4
- ~
- 6
- ~
- 8

- 12 word long strings

- **Sub-experiment 2**

- 30 word long sequences

- 1
- 2
- 3
- ~
- 5
- 6
- ~
- ~

- 10 word long strings

Sample Items

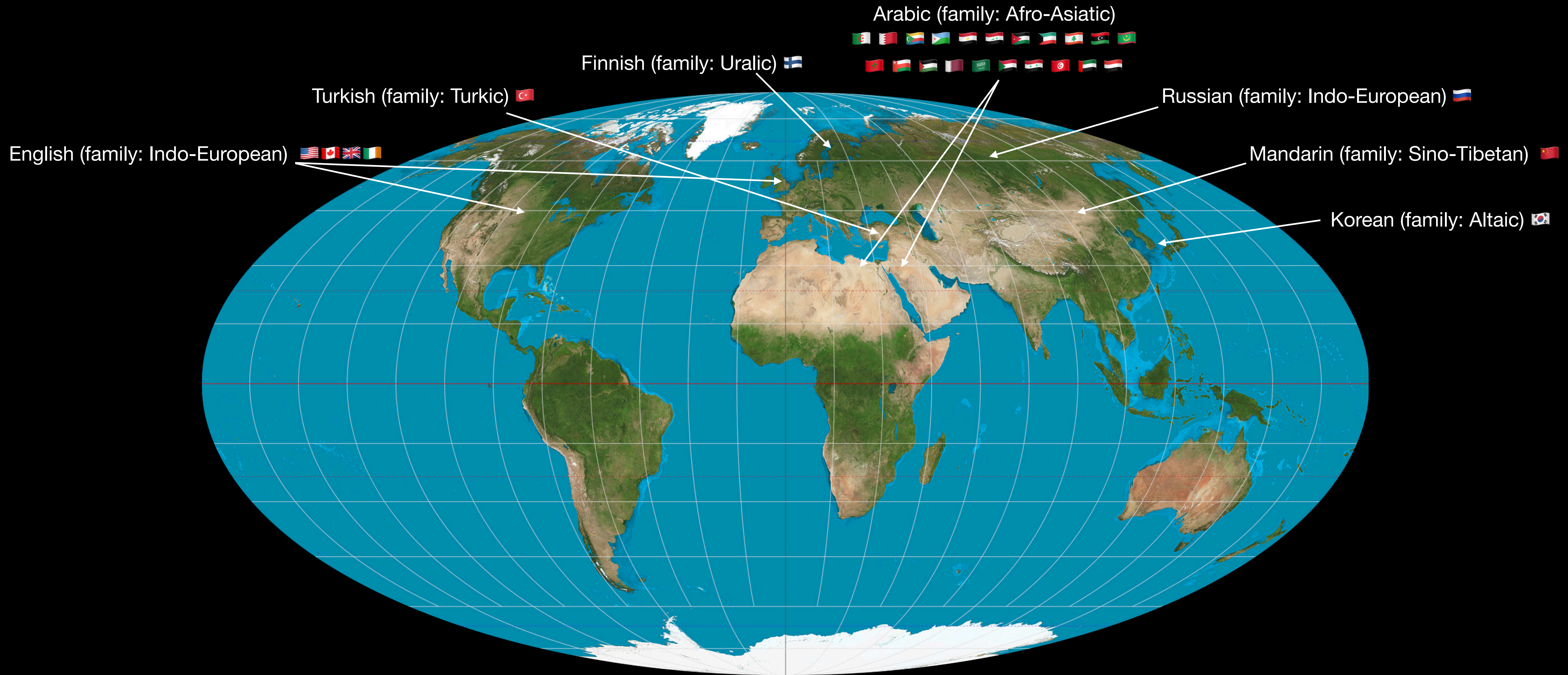
12 words condition

PANES WERE SO DIRTY THAT THEY NEEDED A SPECIALIST TO COME AND ARE COPIES OF THE SETTLEMENT DOCUMENTS THAT WERE FILED TODAY IN THE

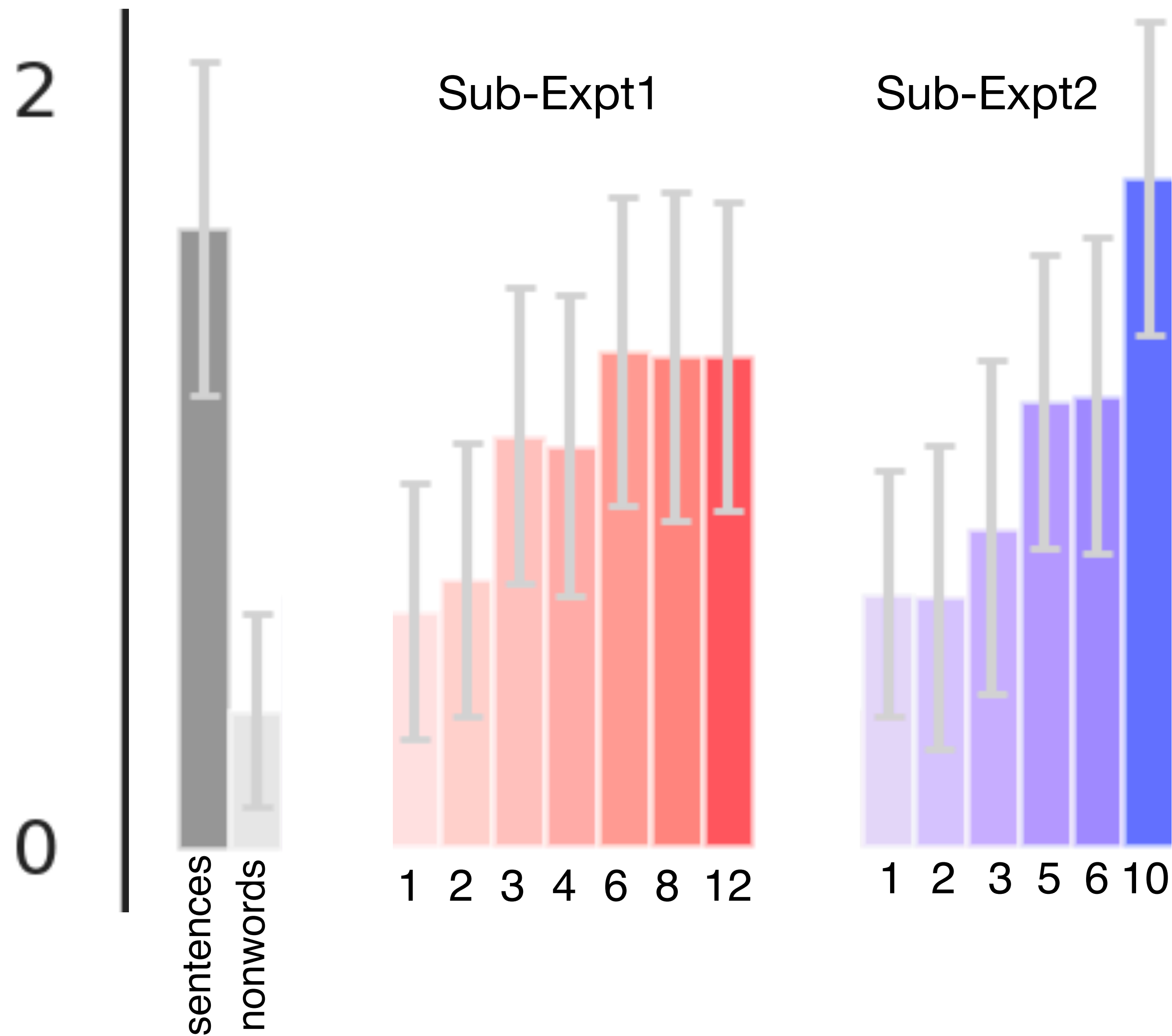
3 words condition

THE ADHERENT OF	CAN I CHANGE	HE ALSO INSPECTED	MAKE SURE YOU	THE TRANSACTION SHALL	THEY WOULD NEVER	THE ATTACHED IS	HE COULD DO
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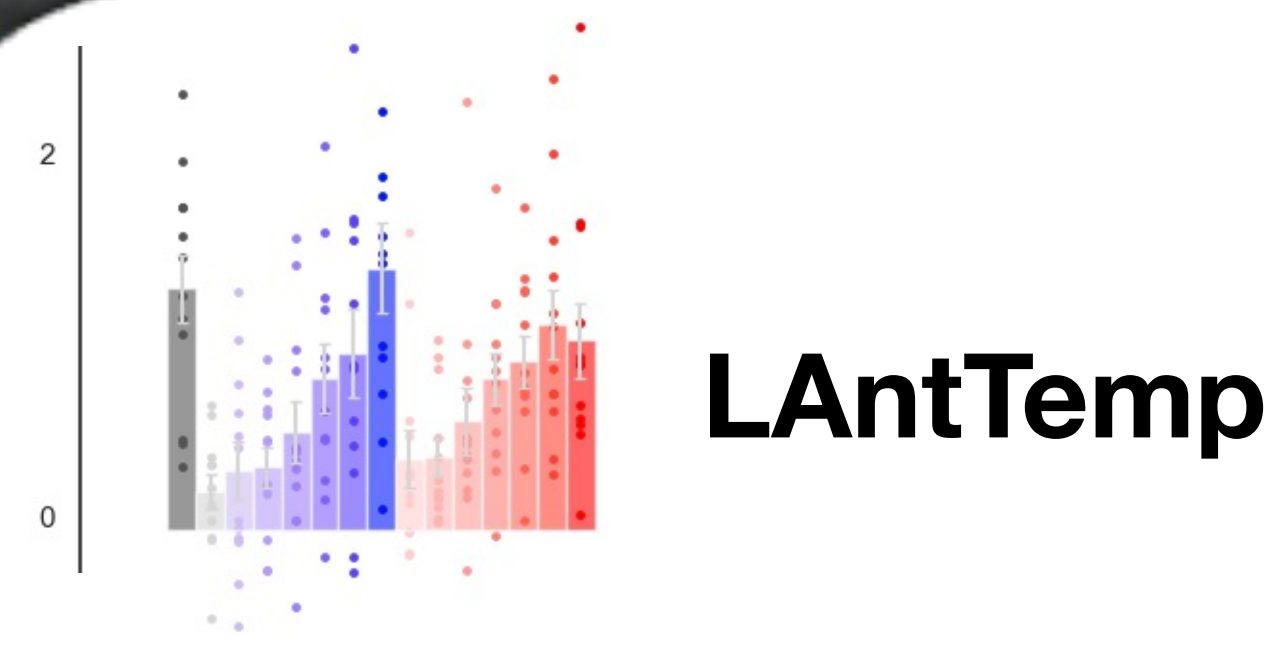
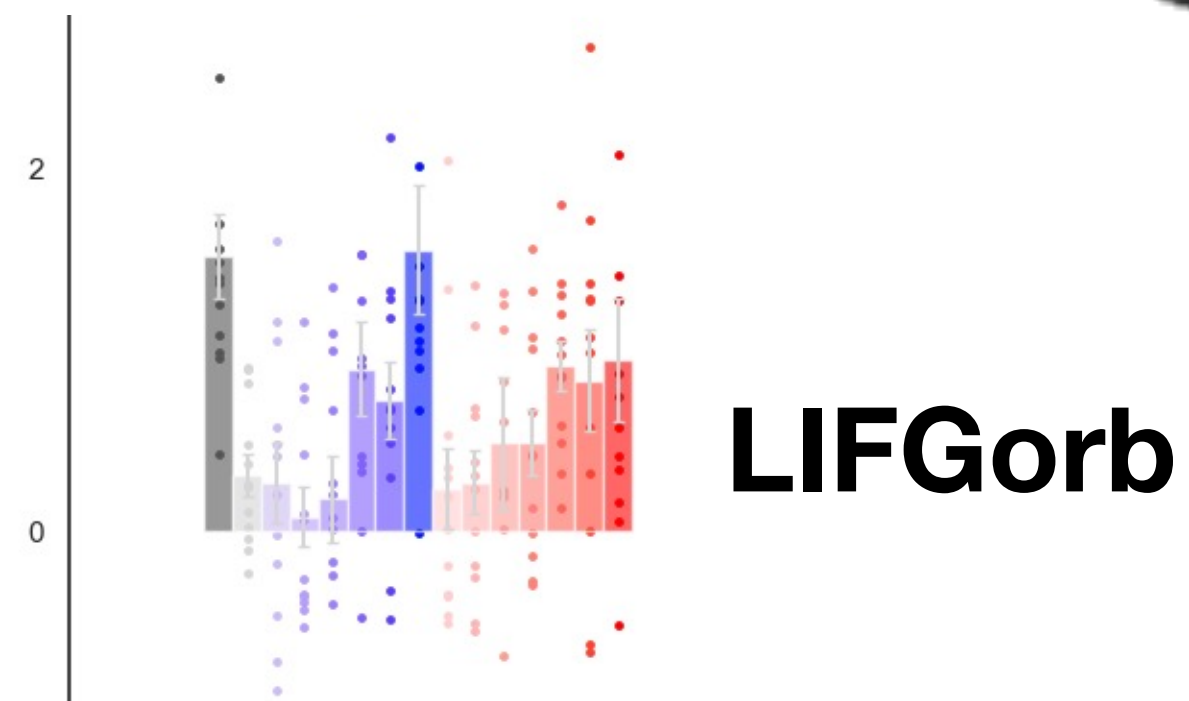
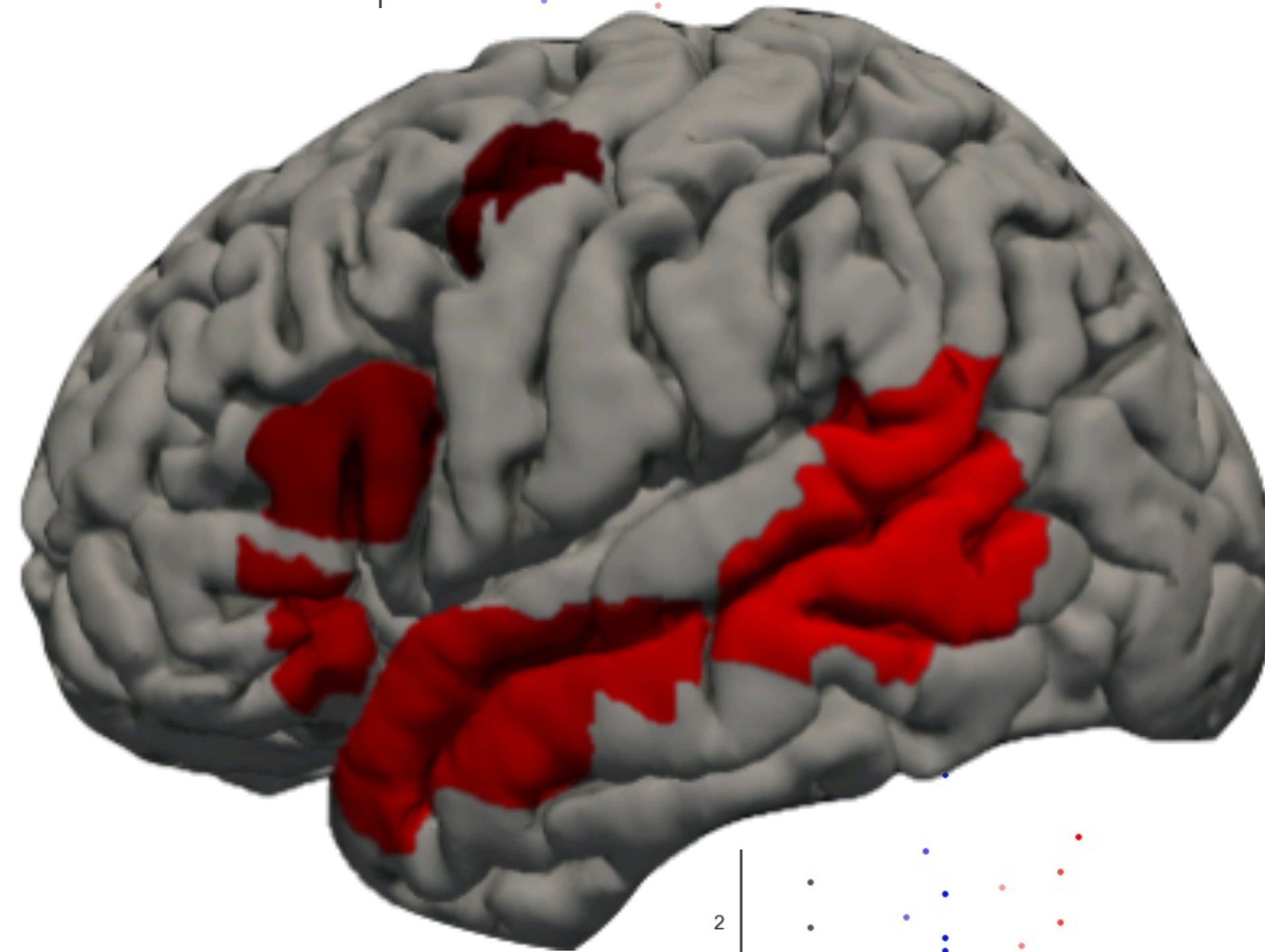
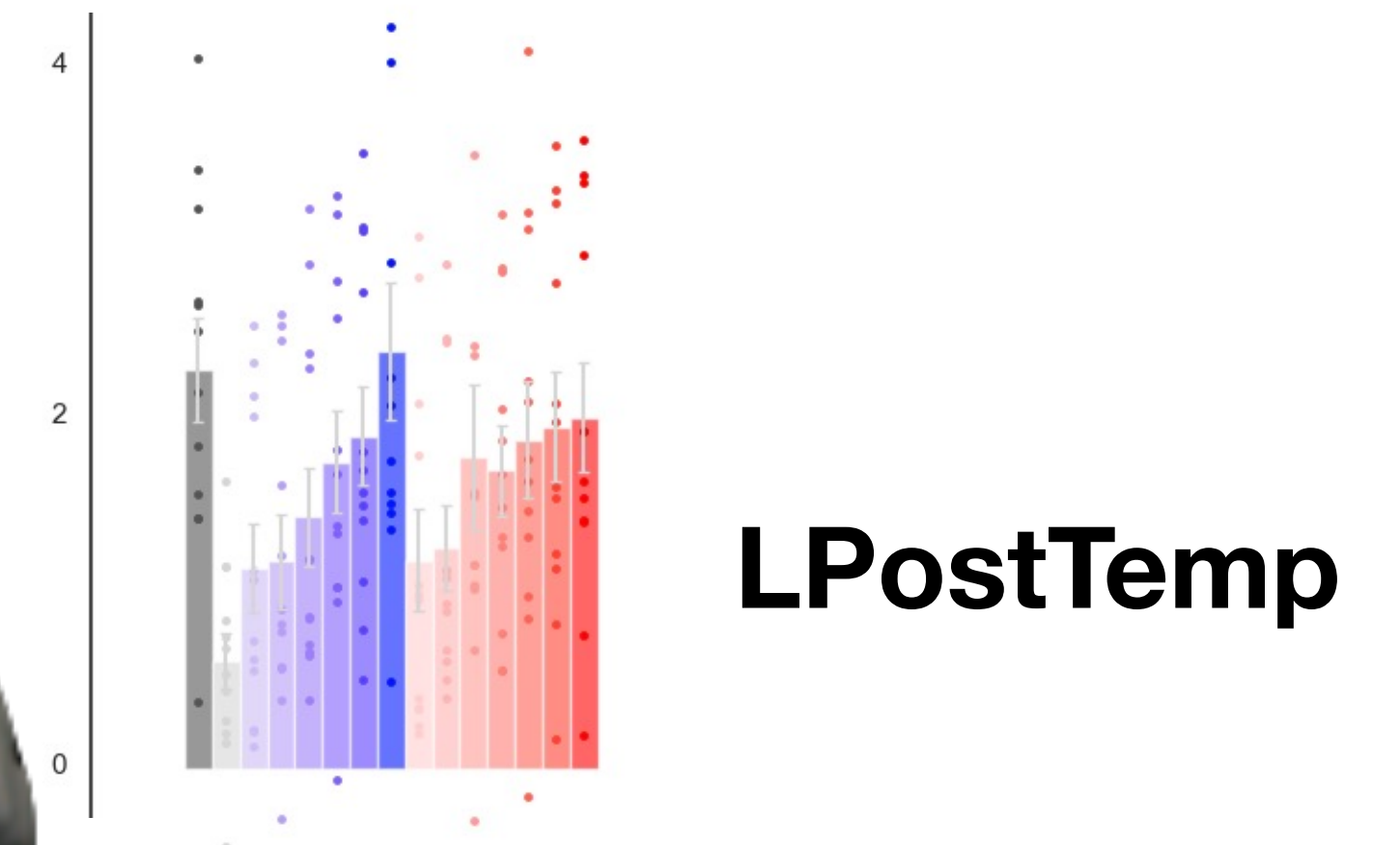
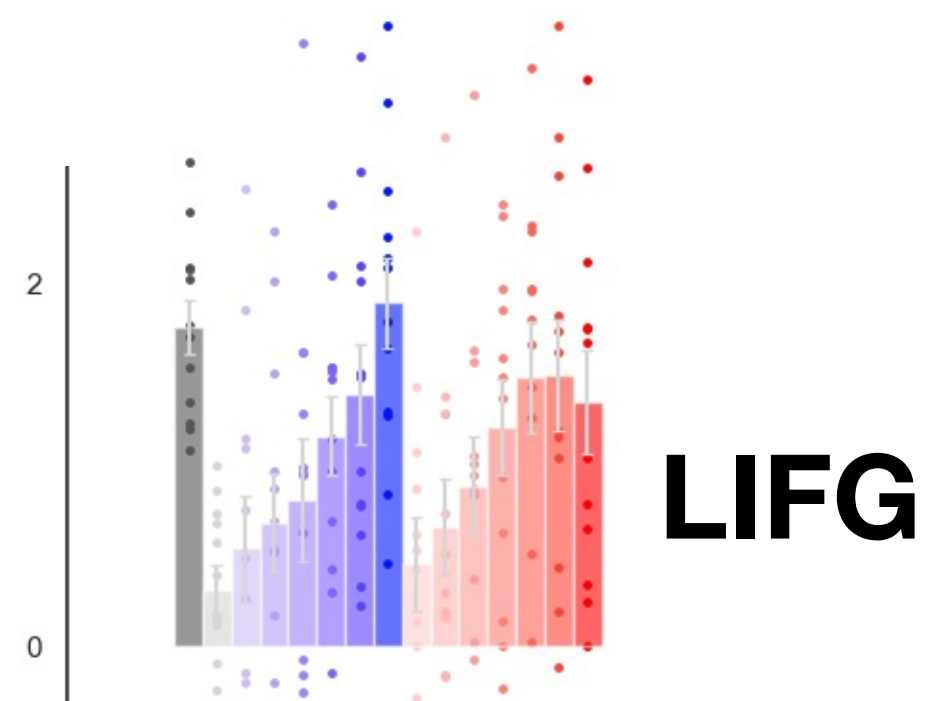
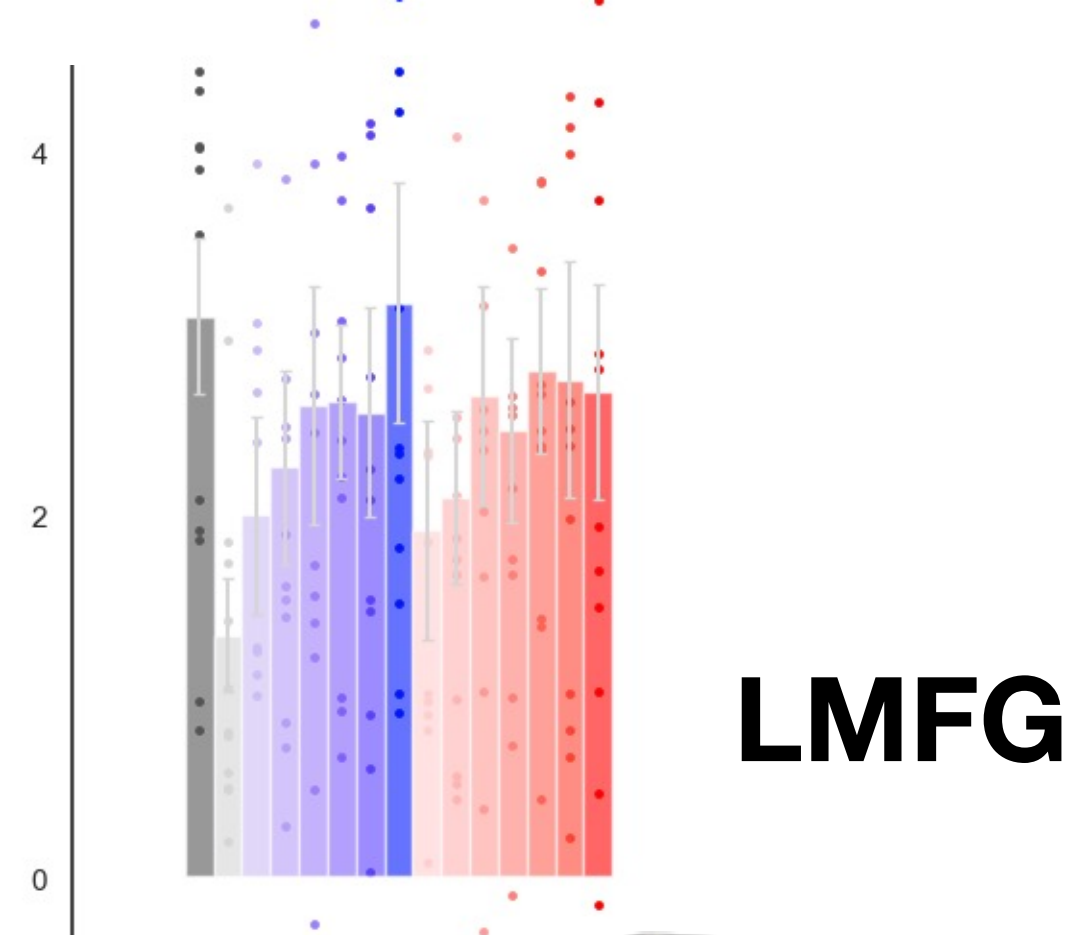
7 typologically diverse languages



Language network responses



Language fROIs



Open Questions:

1. What is the TRW of the language system?

~6-10 words

2. Do language regions differ in the size of their TRWs?

No.

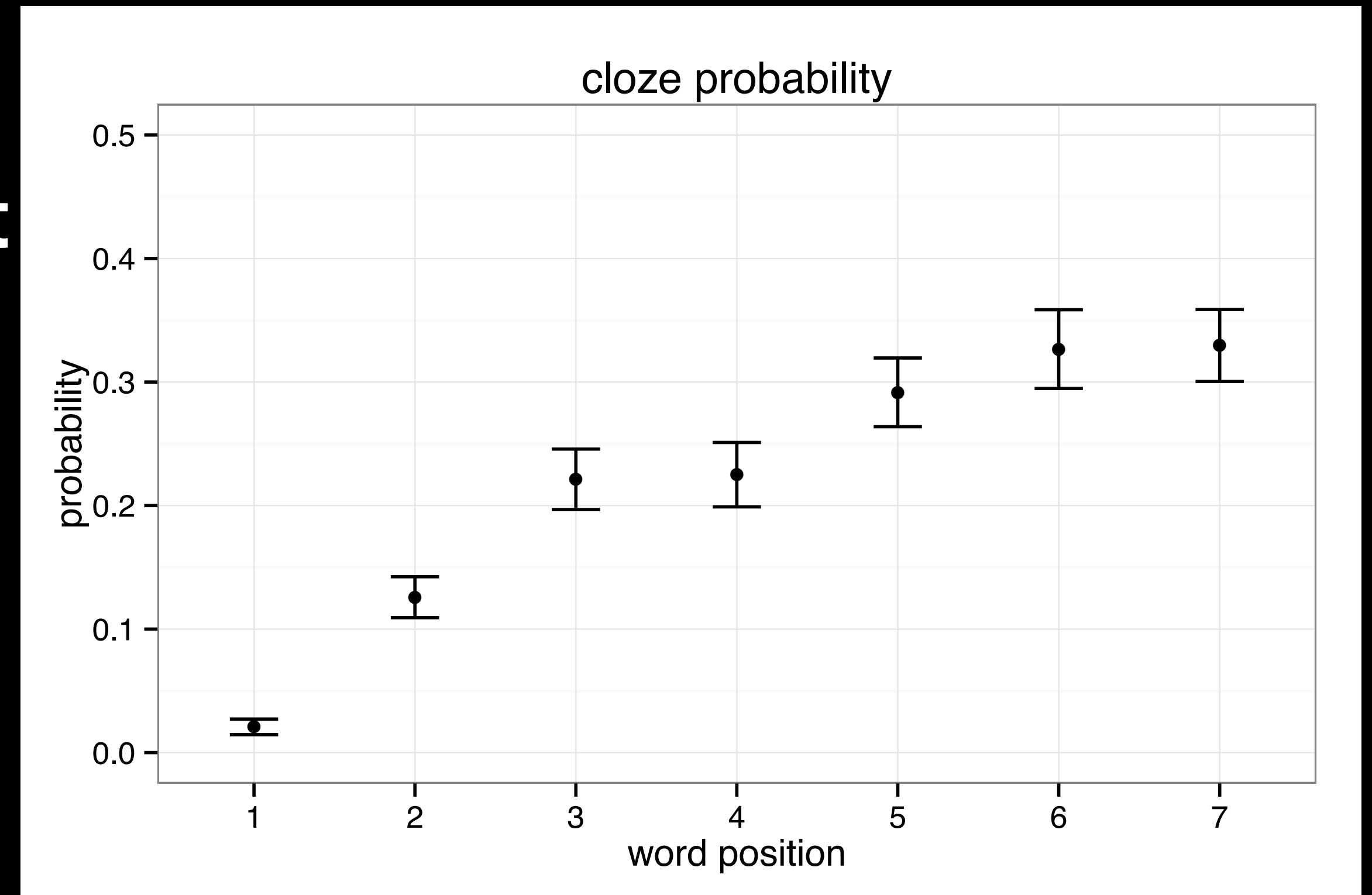
3. Is the TRW of the language system similar across **typologically diverse languages**?

to be continued...

TRW Hypotheses

The TRW is defined by the amount of language that is needed ...

- to successfully predict the next word



The	...					
The	dog	...				
The	dog	chased	...			
The	dog	chased	the	...		
The	dog	chased	the	cat	...	
The	dog	chased	the	cat	in	...

TRW Hypotheses

The TRW is defined by the amount of language that is needed ...

- to successfully predict the next word
- in prosodic units to make up a breath
- to communicate a single event meaning

Thank you for listening!



Ev



Cory Shain



Colton Casto



Ben Lipkin

Thank you to EvLab!

Thank you for coming to
Cog Lunch this Fall 🍂 !!! :)))

**Have very Happy Holidays!
And we'll see you in the Spring!**

