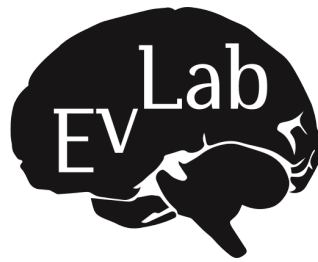


# From Words to Stories: Engagement of language-specific and domain-general neural mechanisms in native and second language comprehension

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## INTRODUCTION

There are well-documented differences in how a native (L1) and a second language (L2) are processed in the brain [1]. These differences are associated with:

- increased cognitive control demands in L2 compared to L1 (e.g., [2])
- differences in L1 and L2 representations in the brain [3,4]

These differences have been attributed to language-specific or domain-general mechanisms, however, limited number of studies used precision fMRI to disentangle domain-general and language specific contributions

**? How is the native and non-native language processing reflected in language and domain-general networks?**

**? Are there regions outside of language and domain-general networks that respond differently to L1 and L2?**

Previously, L2 > L1 differences were mostly studies using single-word stimuli

**? Are differences between languages similar in single words and more complex utterances?**

## METHODS: design

### 31 Polish-English bilinguals

Reading task:

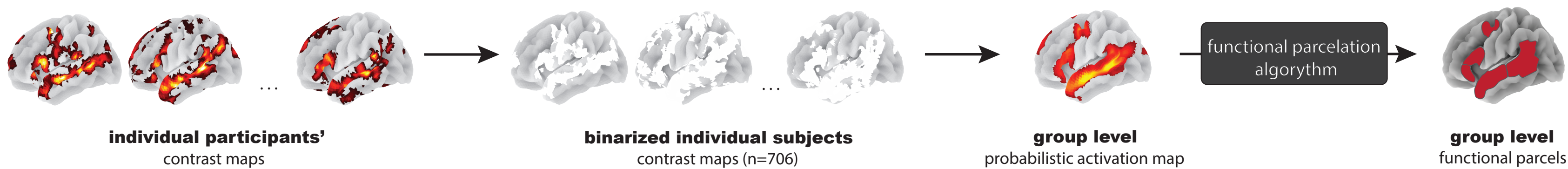
- L1 and L2 passive reading
- word lists, sentences, stories

Task desing:

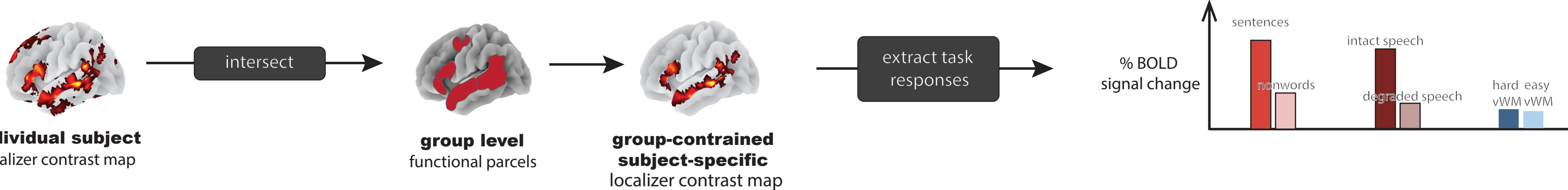
- 30s-long blocks
- 2 repetitions per condition per run
- 4 runs - 8 repetitions per condition in total

## METHODS: analysis

### Creating group-level functional parcels [5]

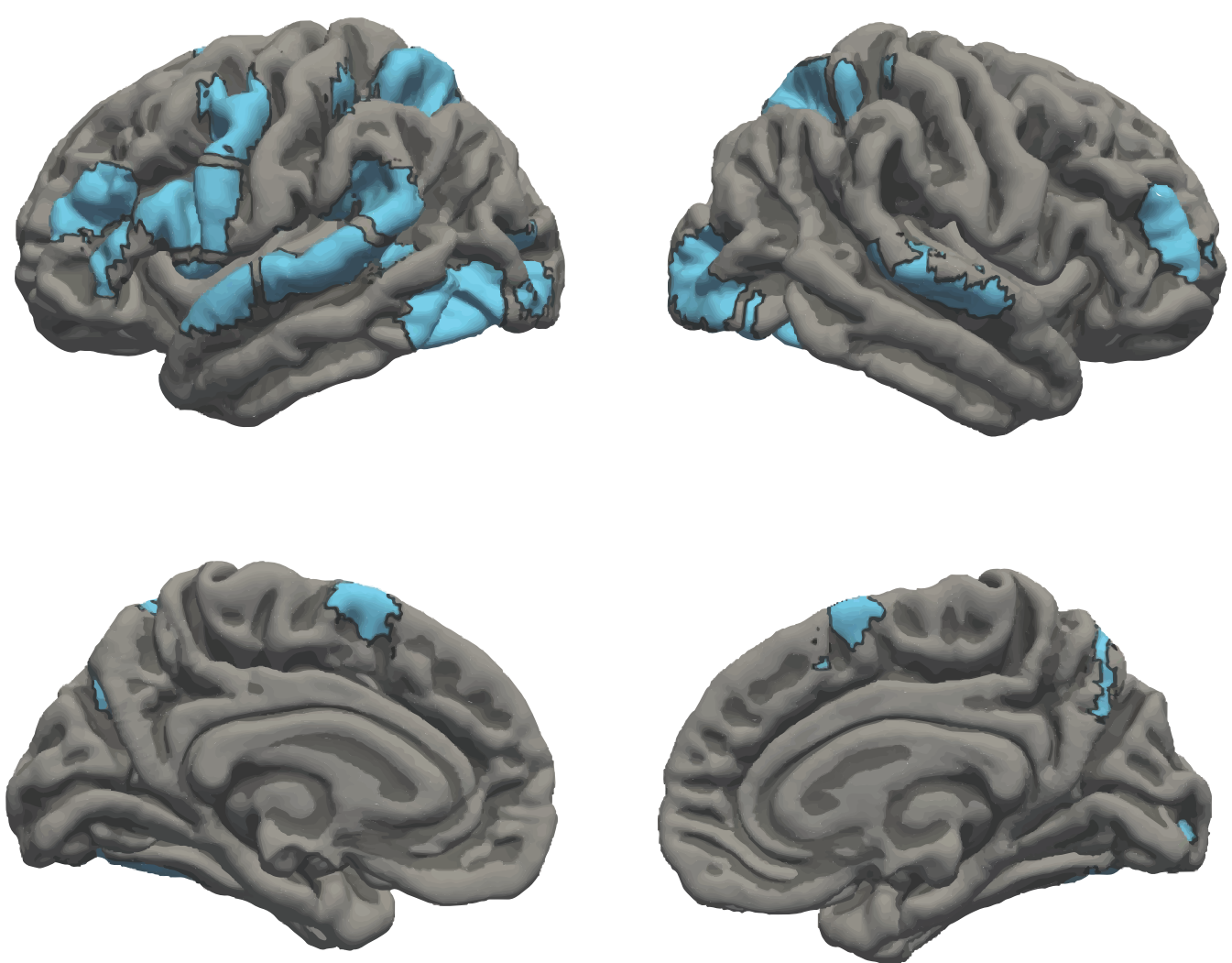


### Creating individual-level functional ROIs



## RESULTS

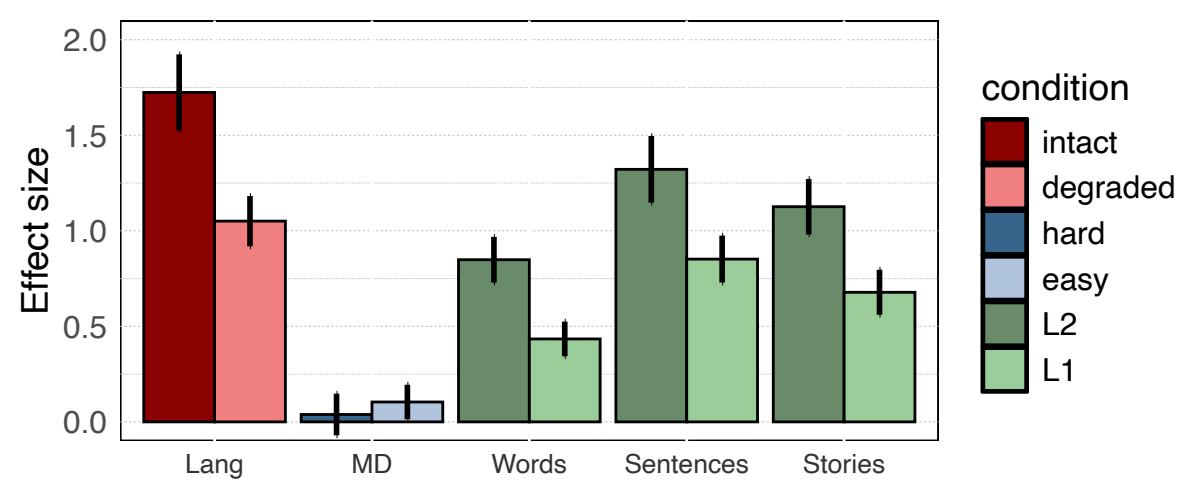
Regions that show a stronger response to L2 over L1



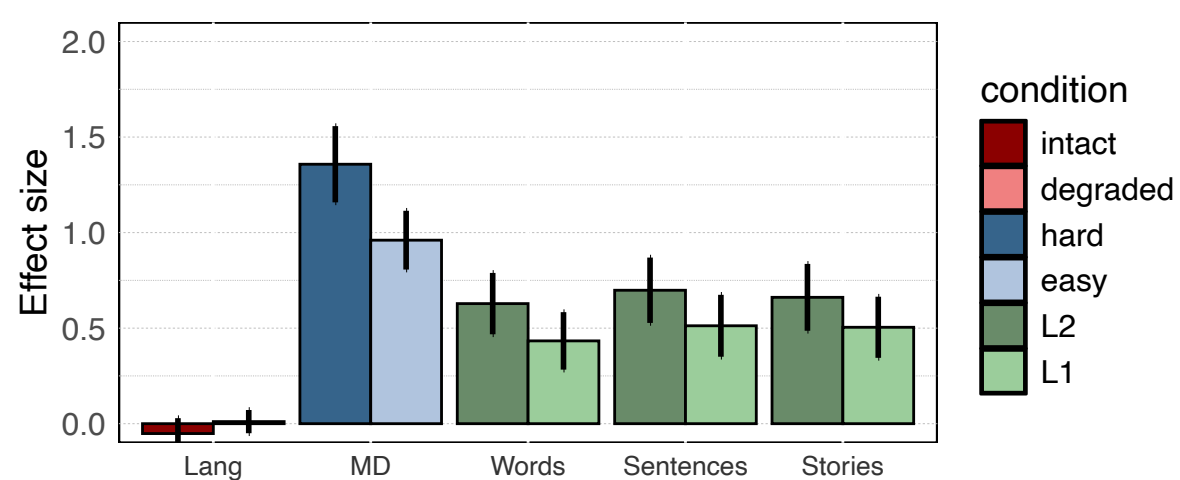
- Collapsed over words, sentences, and stories
- Data-driven parcellation
- Parcels show 3 different functional profiles

3 classes of regions showing different functional profiles:

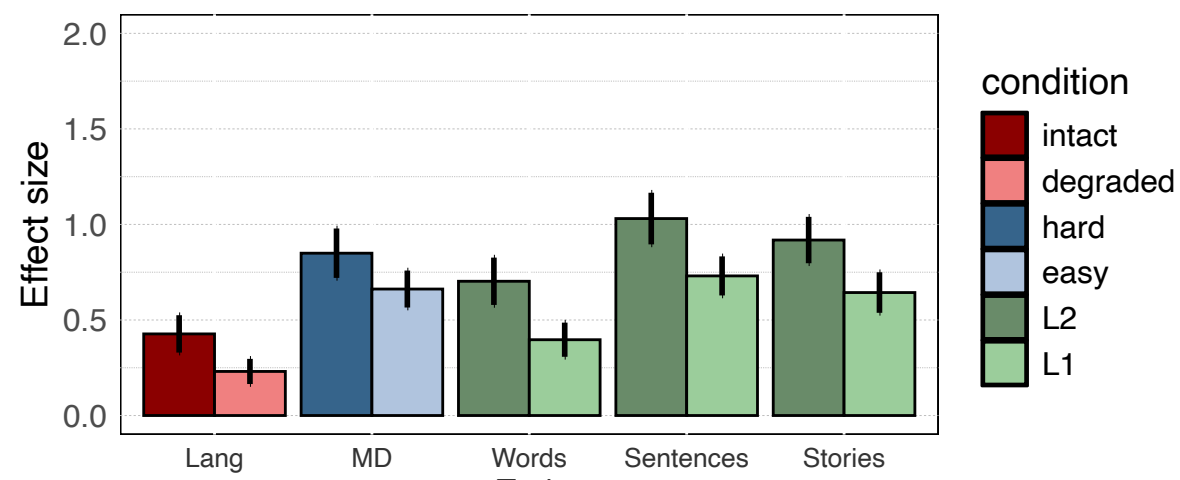
### Language-responsive parcels



### Domain-general parcels



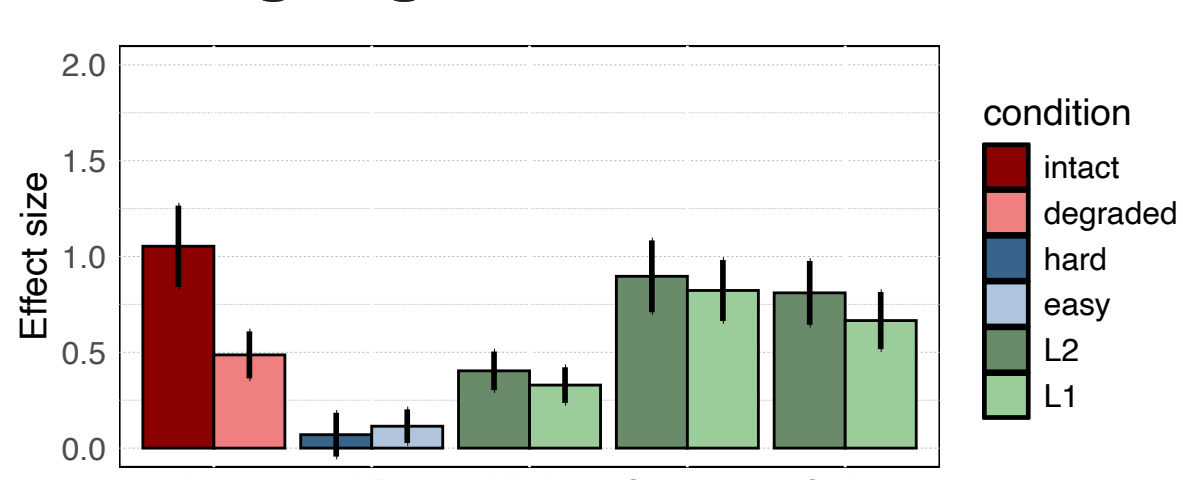
### Mixed-selectivity parcels



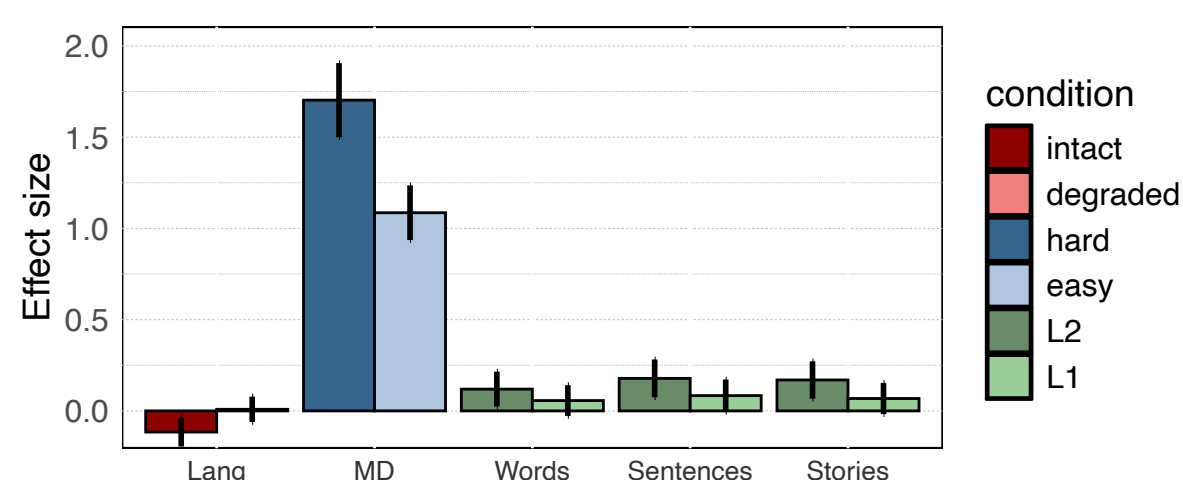
Replication:

auditory [6]  
language dataset (n=101)  
standard  
language and MD parcels

### Language network [5]

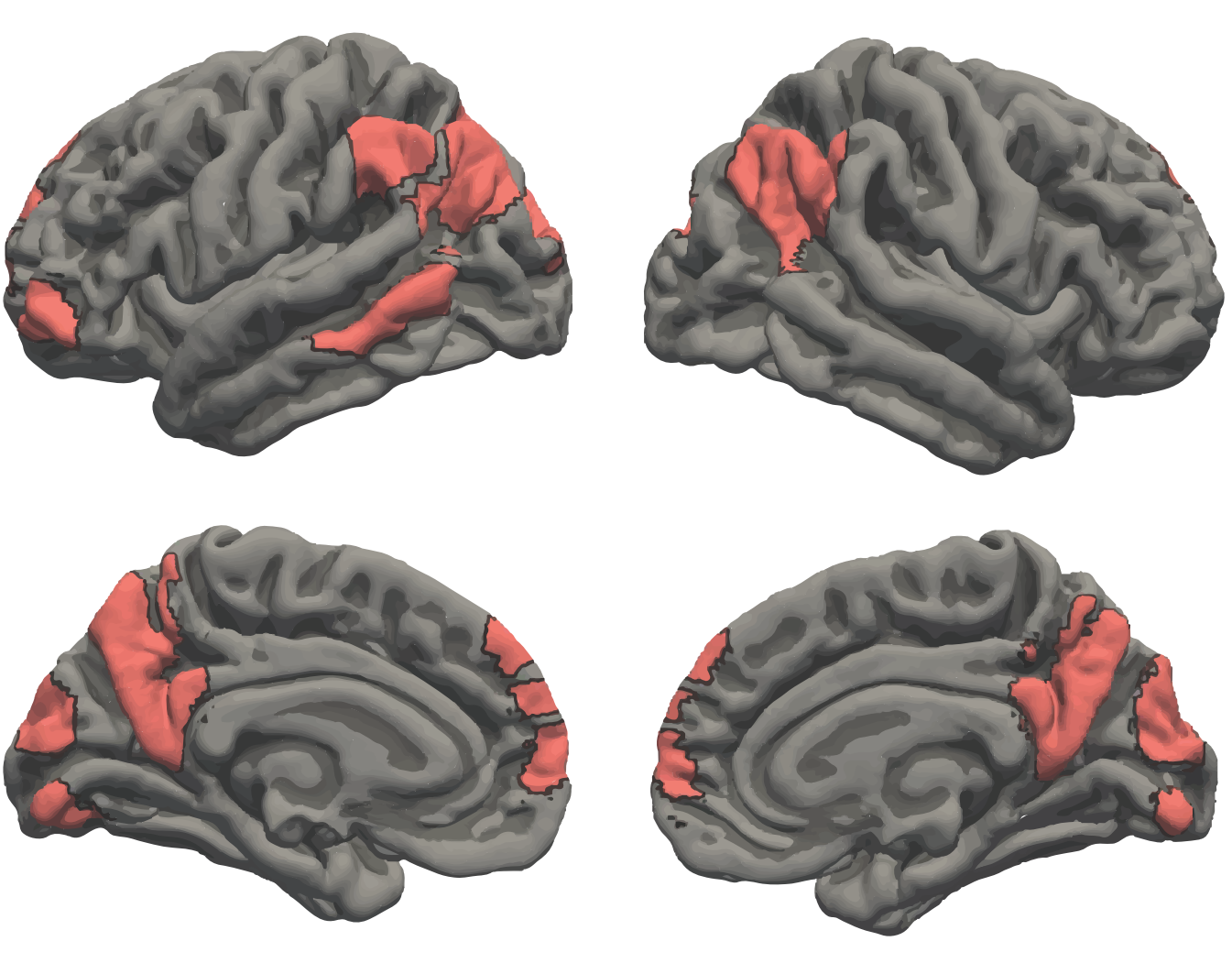


### Domain-general MD network [7]



## Exploratory analysis

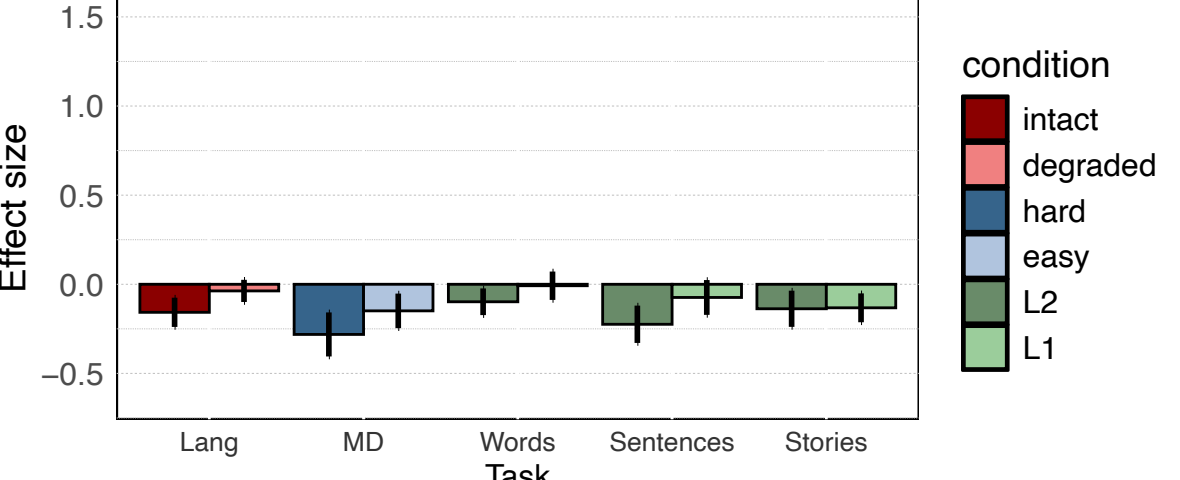
Regions that show a stronger response to L1 over L2



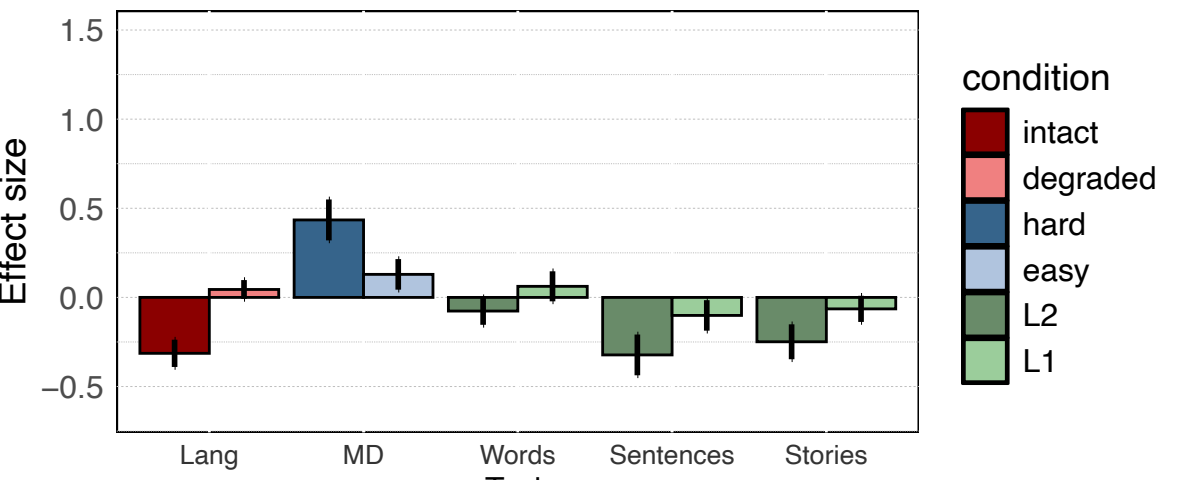
- Collapsed over words, sentences, and stories
- Data-driven parcellation
- Parcels show 3 different functional profiles

3 classes of regions showing different functional profiles:

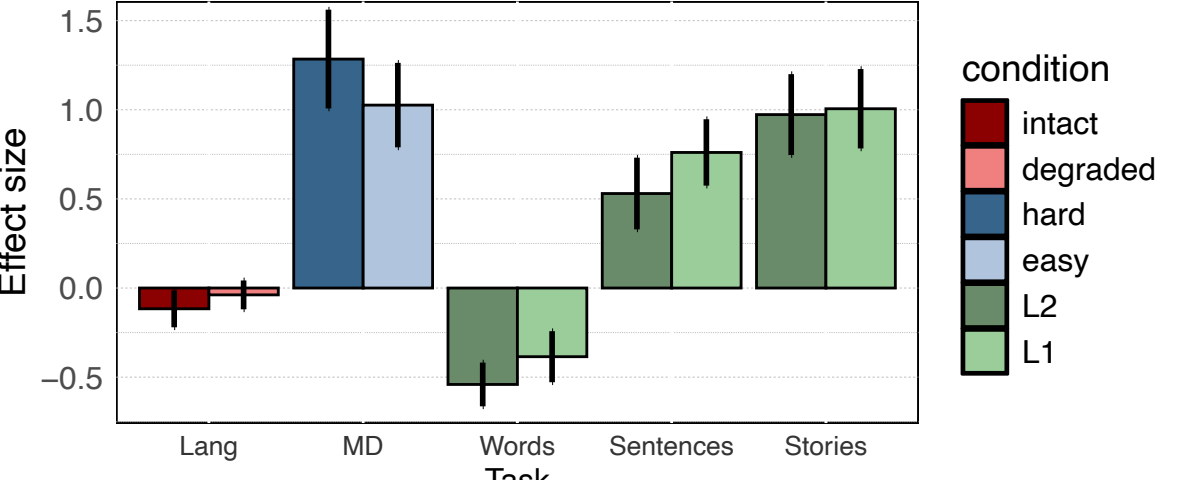
### Default Mode Network parcels



### Domain-general parcels



### Visual cortex parcels



## CONCLUSIONS

Both L1 and L2 processing engage language-specific and domain-general resources.

Within the language system, sentences and stories are linked to stronger responses than wordlists, but stories do not engage language system more than sentences.

### L2 > L1

Processing of L2 engages additional resources in both systems in both reading and auditory comprehension

This effect is **not modulated** by utterance complexity

### L2 > L1

L1 seems to engage **DMN regions** more than L2:

- ? deeper processing of native language**
- ? smaller demands on control mechanisms**