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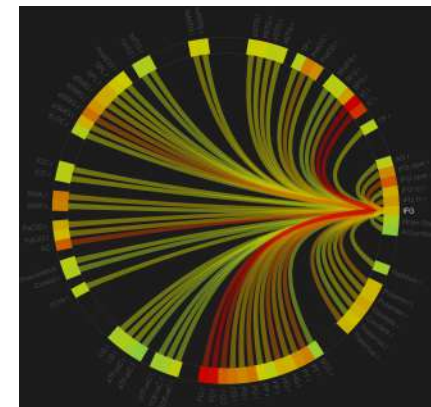
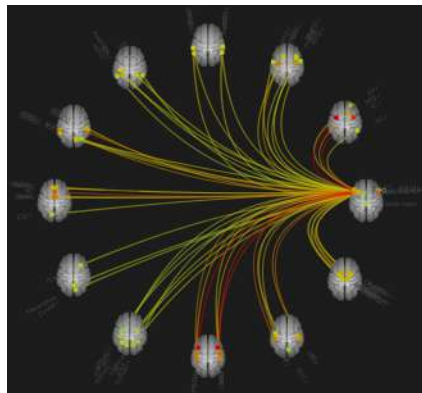
RESTING-STATE BRAIN CONNECTIVITY IN INDIVIDUALS WITH DYSLLEXIA

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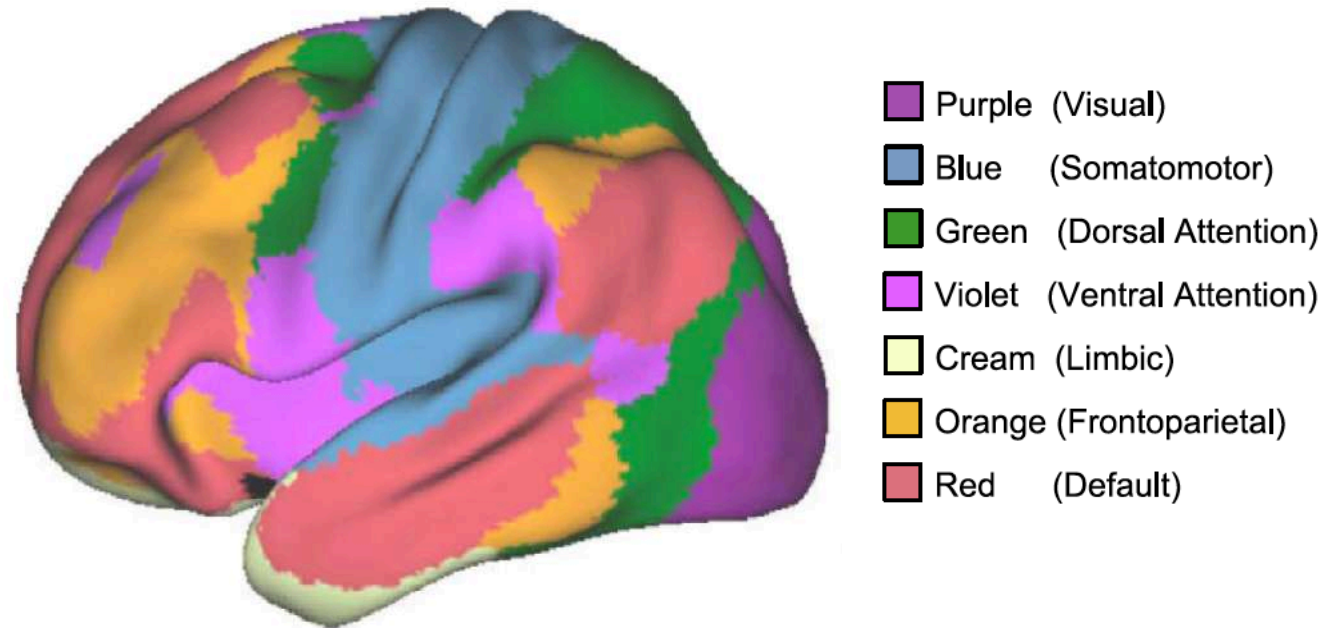
RESTING-STATE CONNECTIVITY

Temporal correlations in spontaneous low frequency (<0.1 Hz) fluctuations in brain signal in the absence of task

Significance

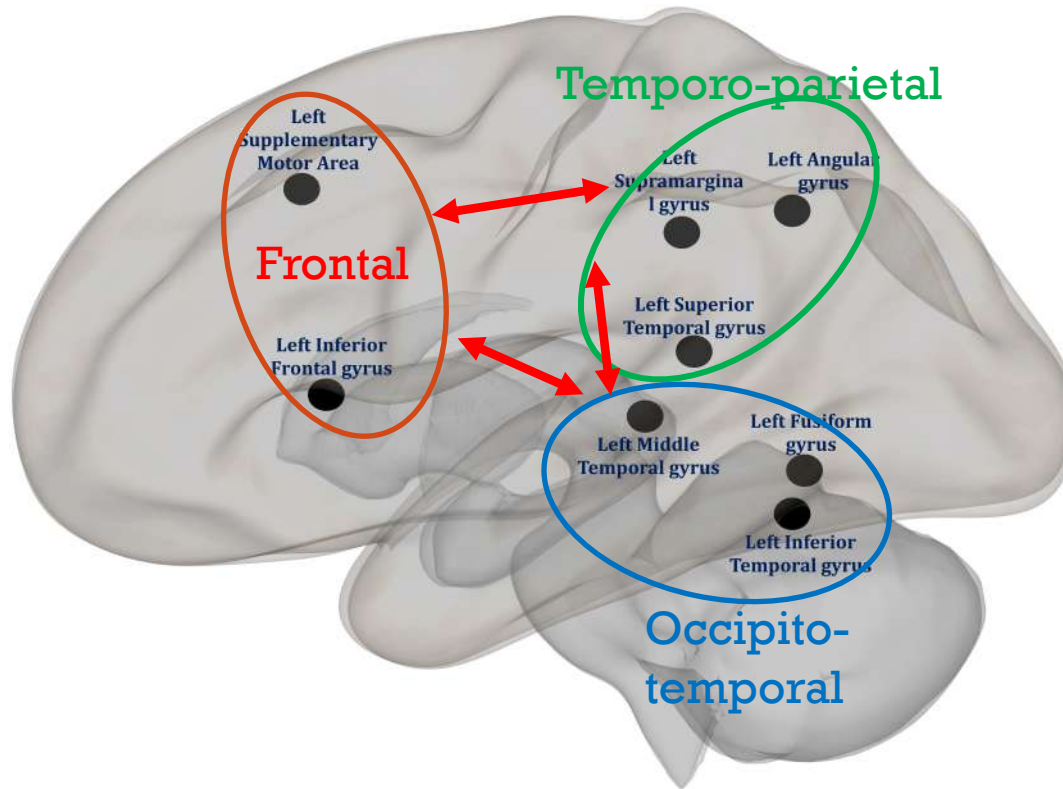
- ✓ Intrinsic organization of brain
- ✓ Removes task-related confounds
- ✓ Sensitive to intervention

Domain-general Resting-state networks



Yeo et al., 2011

READING AT RESTING-STATE

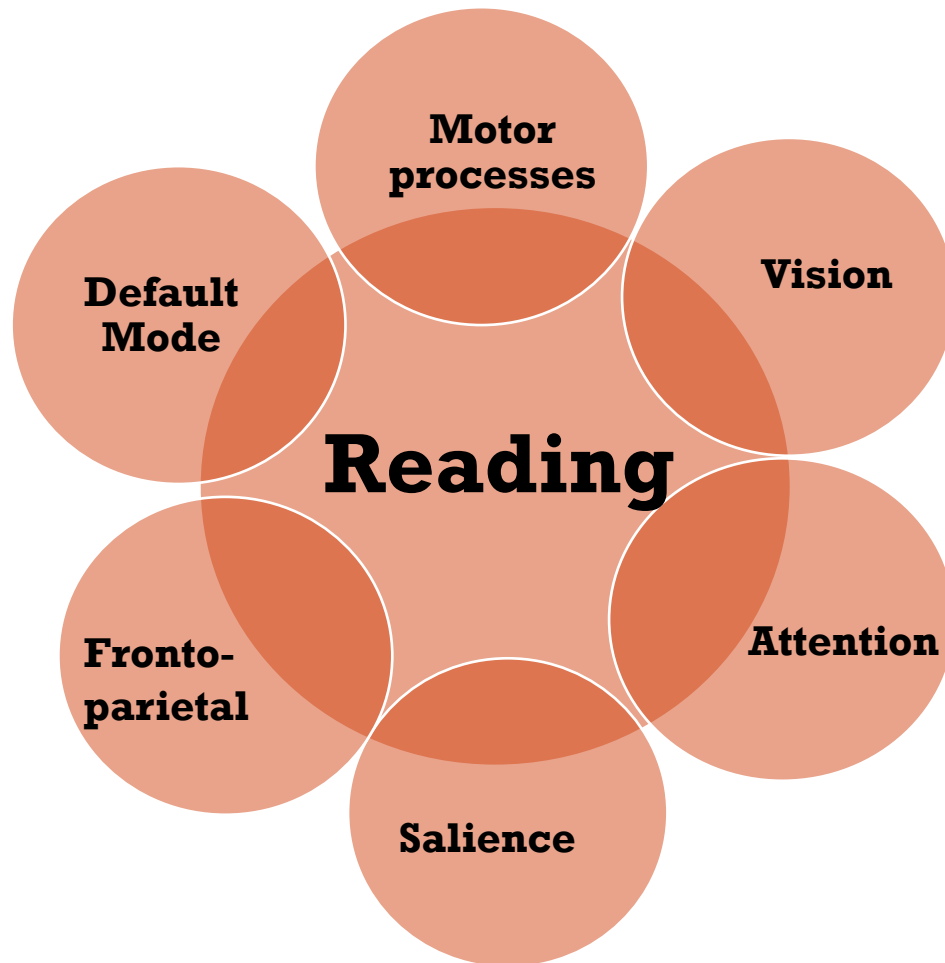


No discernible reading network at rest identified

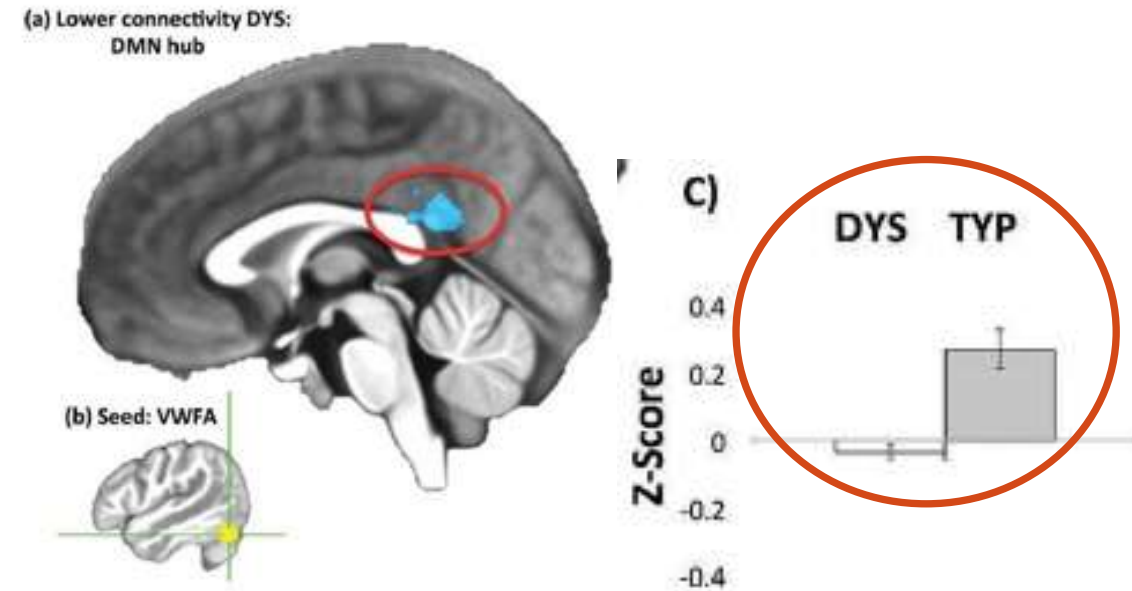
Limited evidence on brain-behaviour relationship

Reading network (RdN)

READING AND RESTING-STATE NETWORKS



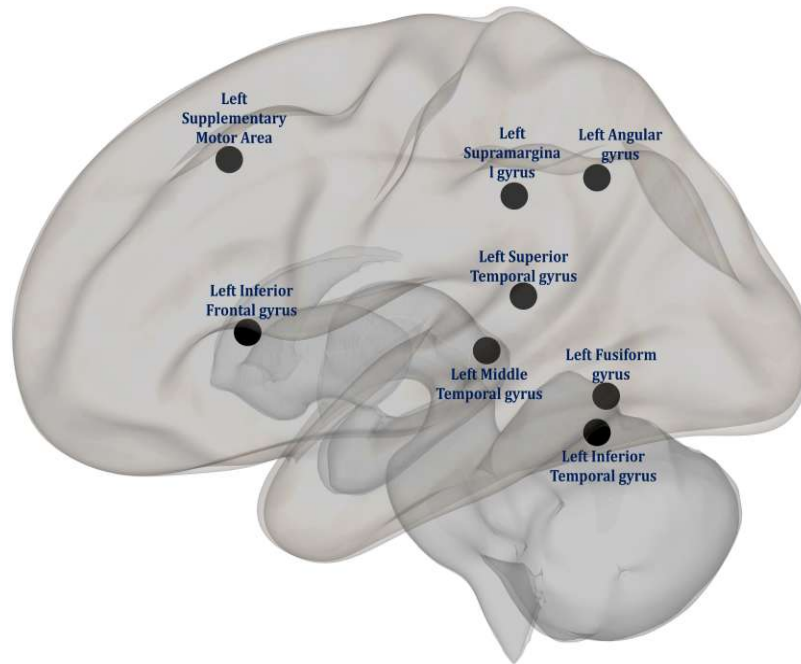
Based on results from Bailey et al., 2018



Buchweitz et al., 2019

RESEARCH QUESTIONS

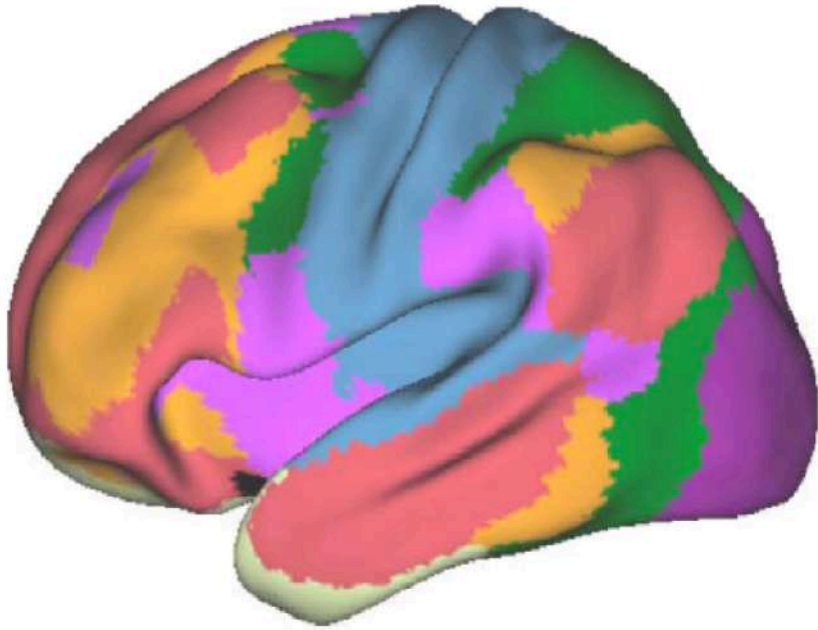
Reading Network (RdN)



Q1: Intrinsic connectivity of RdN at rest in people with and without dyslexia

Q2: Relationship between intrinsic connectivity of RdN and reading behaviour in people with and without dyslexia

Reading and Resting-state Networks (RSNs)



Q3: Relationship between reading-related regions and RSNs in people with and without dyslexia

Q4: Relationship between intrinsic connectivity of RSNs and reading behavior in people with and without dyslexia

METHODS

- N=19 skilled adults (CTRL; 10 males; mean age = 23.9 years) and N=15 adults with dyslexia (DYS; (8 males; mean age = 22.0 years)
- Behavioural: Tests of Word Reading Efficiency (TOWRE)- Real word and Non-word (fluency tasks)
- fMRI: Resting-state sequence

Connectivity analysis

CONN toolbox for preprocessing, first-level (individual-level analyses) and second-level (group-level analyses) (Whitfield-Gabrieli & Nieto-Castanon, 2012)

READING NETWORK

CAT

Orthographic processing



Phonological processing



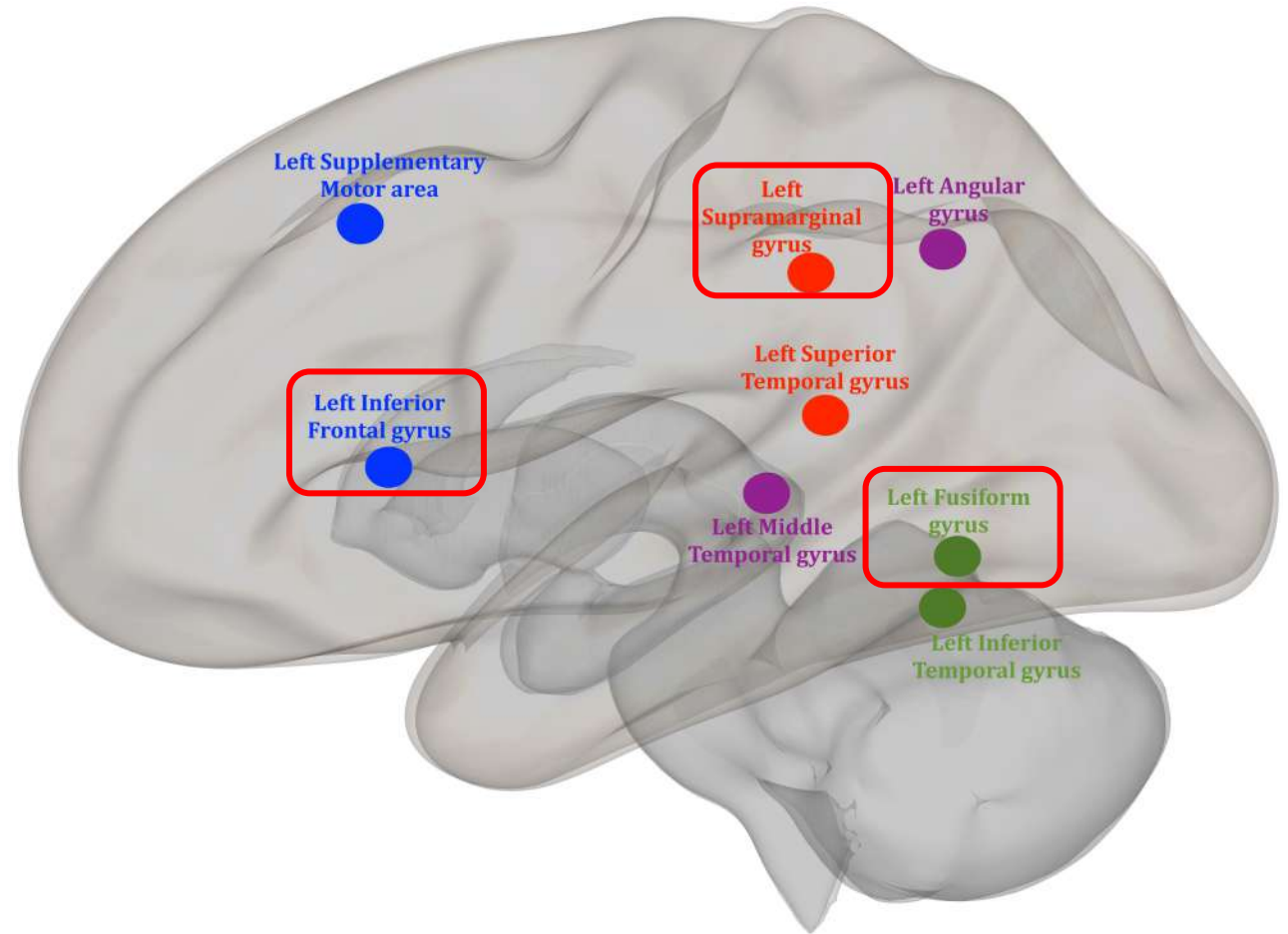
Semantic processing



Articulatory processing



Seed regions



RESTING STATE NETWORKS

Default Mode Network (DMN)

MPFC: Medial prefrontal cortex

LP: Lateral Parietal

PCC: Posterior cingulate cortex

Dorsal Attention Networks (DAN)

FEF: Frontal eye field

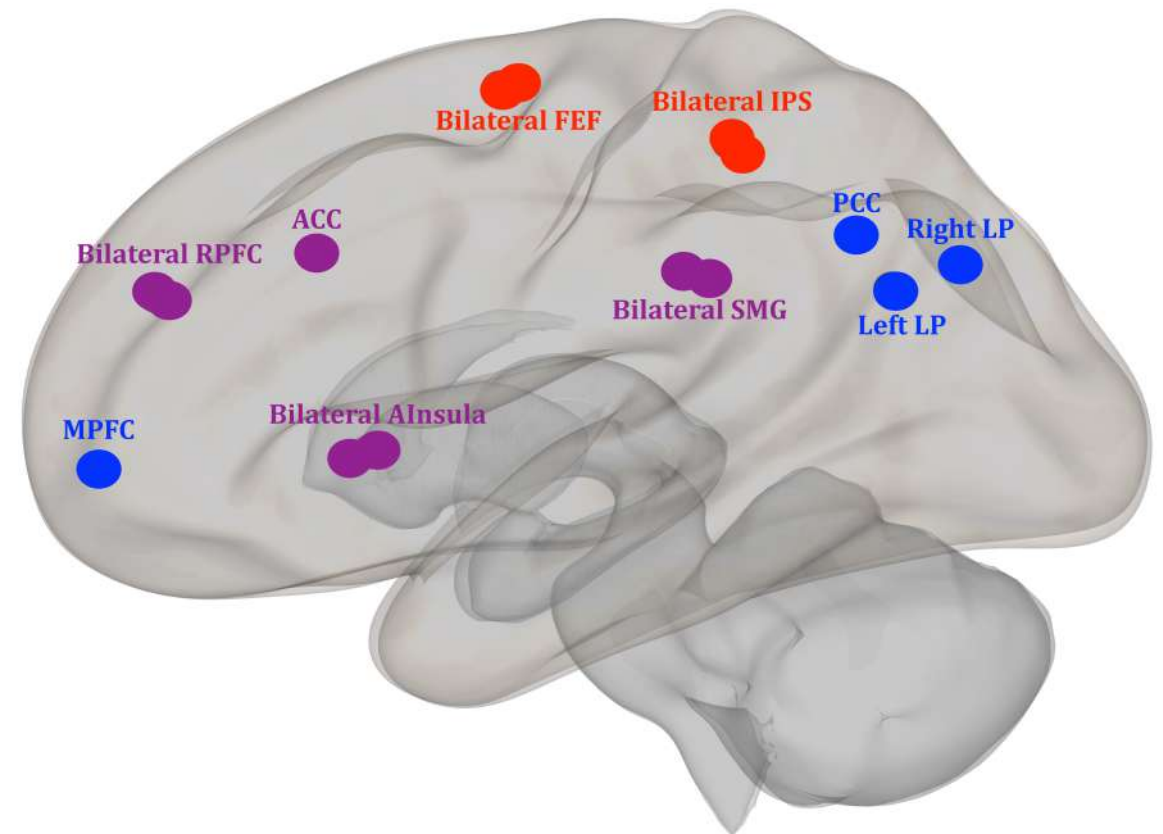
IPS: Inferior Parietal Sulcus

Salience Networks

RPFC: Rostral Prefrontal cortex

ACC: Anterior Cingulate cortex

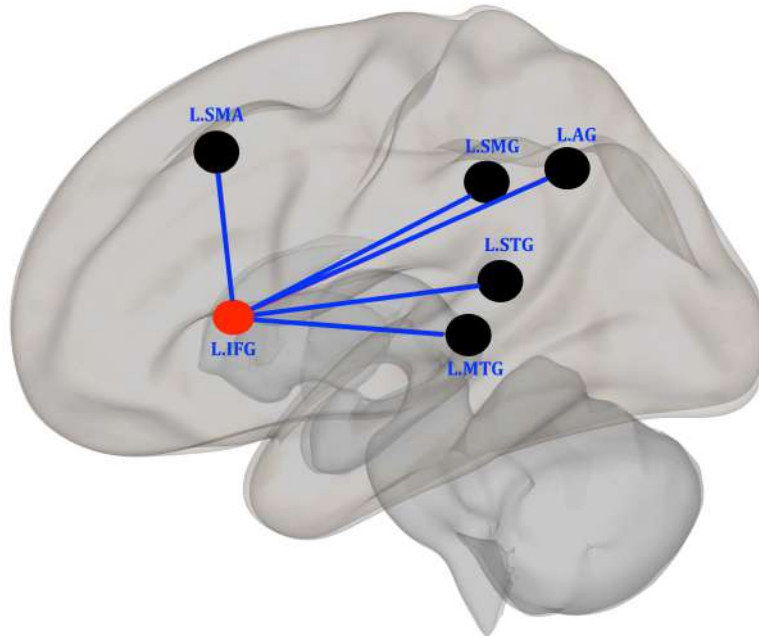
SMG: Supramarginal gyrus



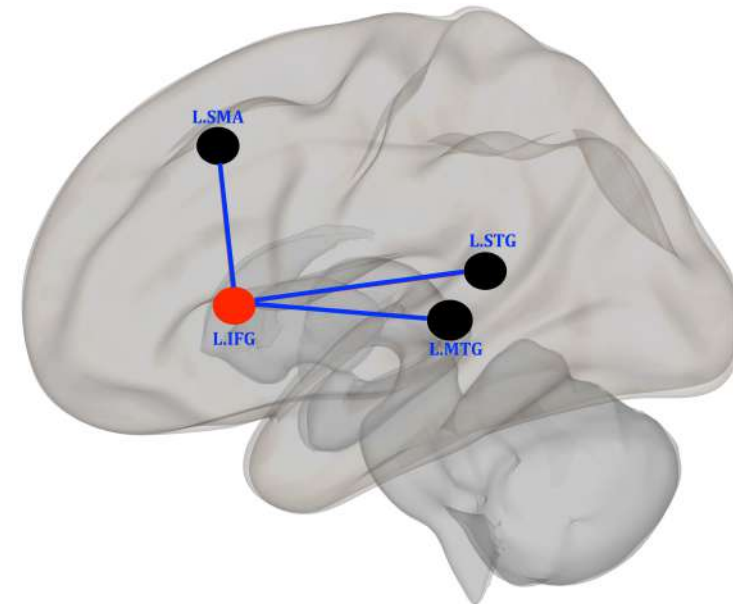
RESULTS

Q1(a): RdN connectivity- Inferior Frontal gyrus (IFG) as seed region

CTRL

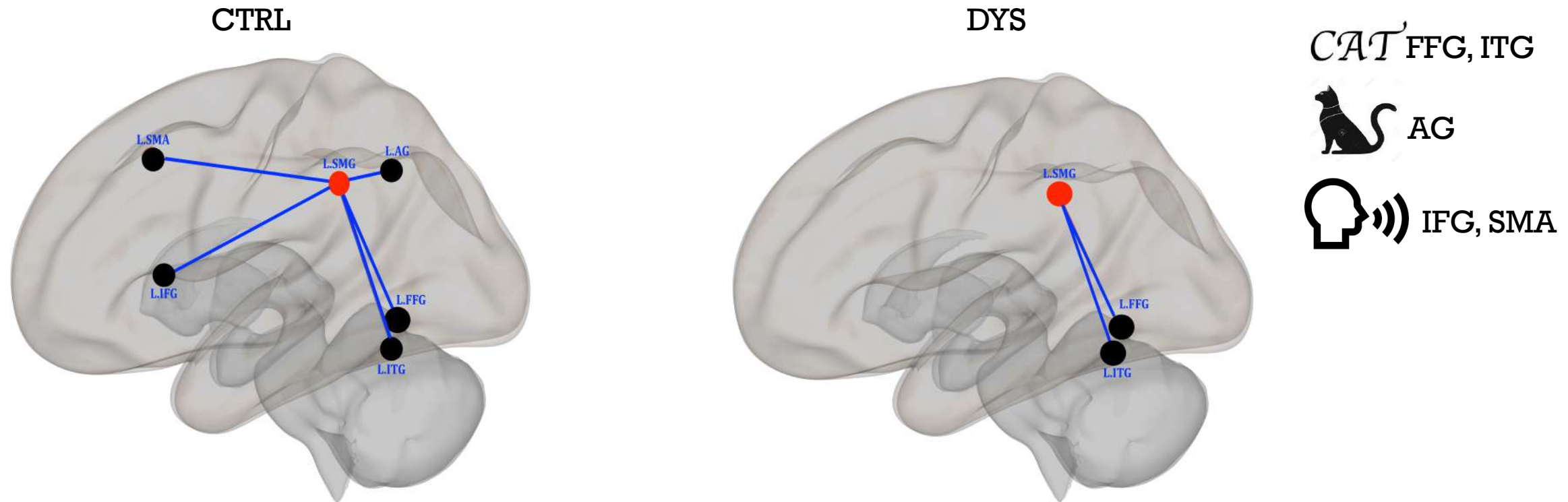


DYS



● - Seed region

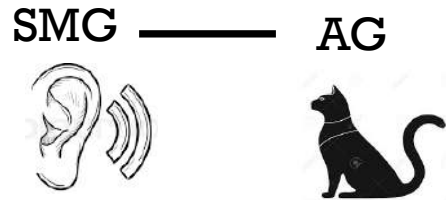
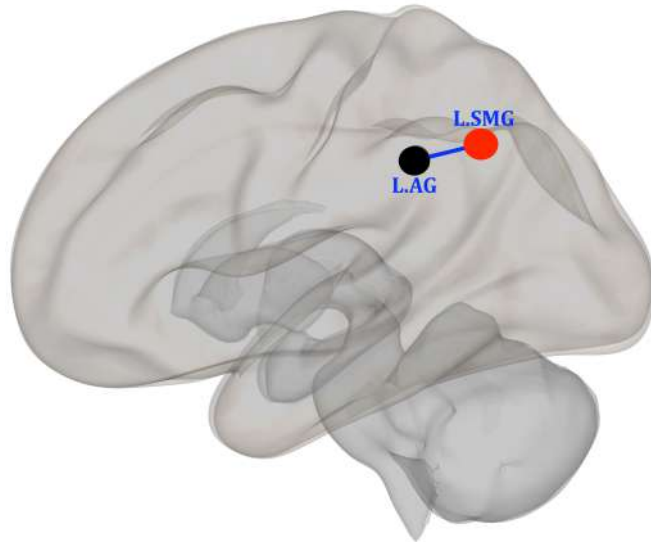
Q1(b): Supramarginal gyrus (SMG) as seed region



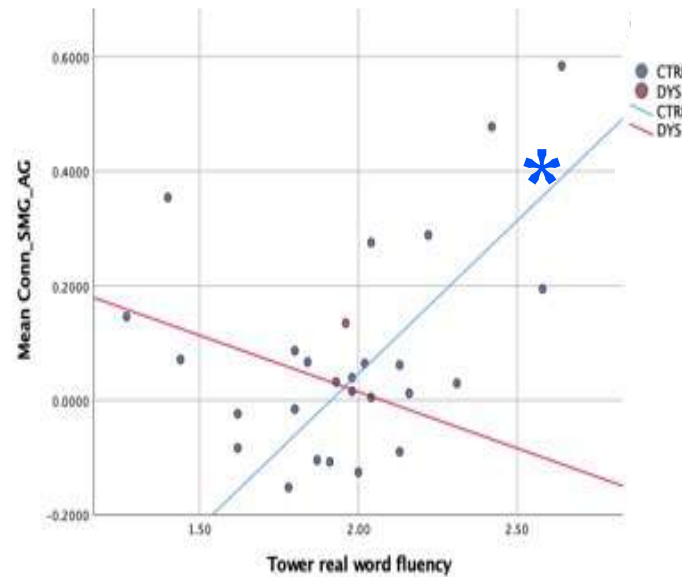
Less integration between regions involved in phonological, orthographic, articulatory and semantic processing in people with dyslexia

Q2: Relationship between intrinsic connectivity of RdN and reading behavior

Between-group difference

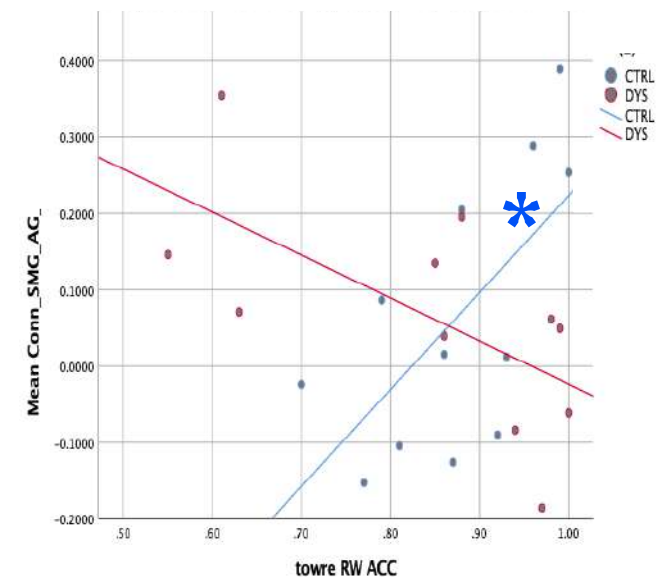


TOWRE RW fluency

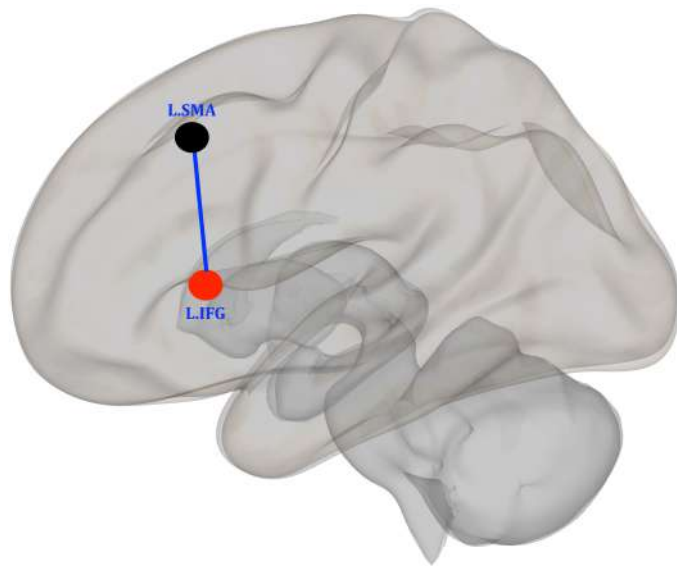


Blue: CTRL * - significant
Red: DYS

TOWRE RW Accuracy



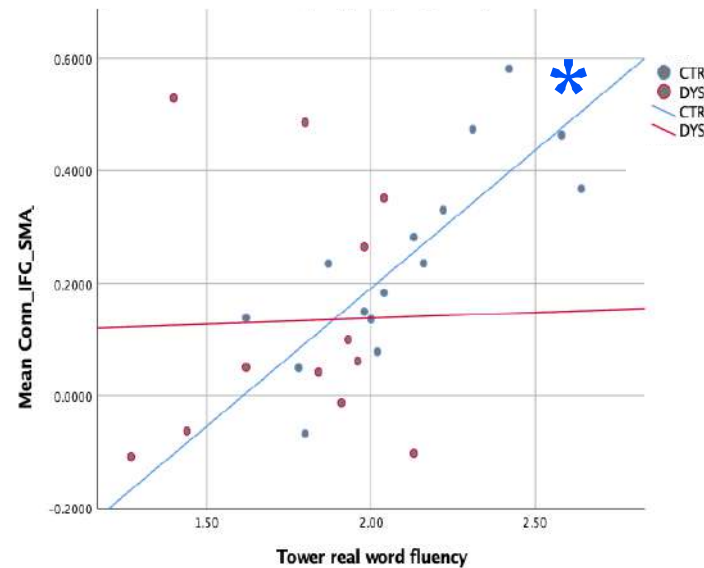
Within-group relationship in CTRLs



IFG — SMA

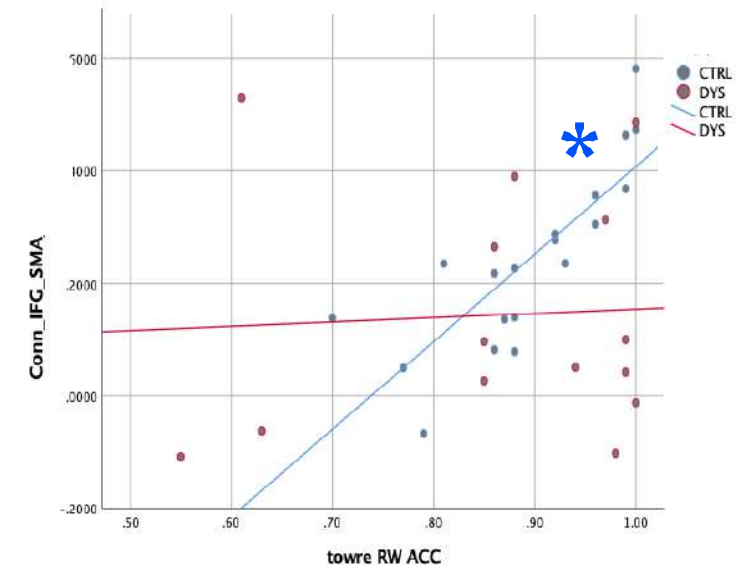


TOWRE RW Fluency



Blue: CTRL
Red: DYS

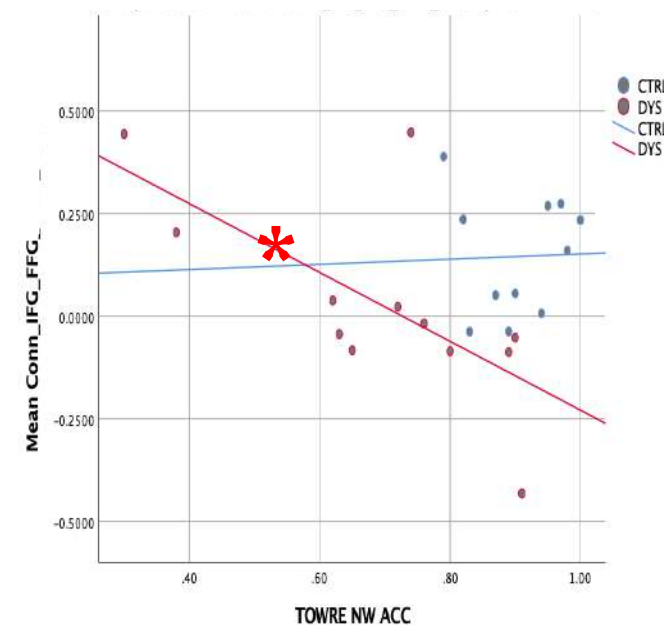
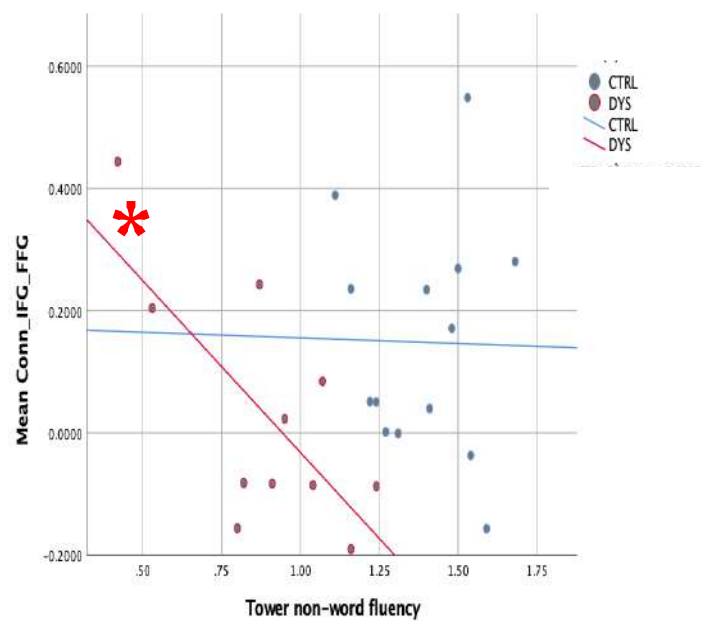
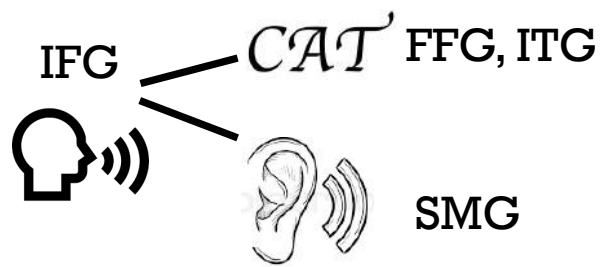
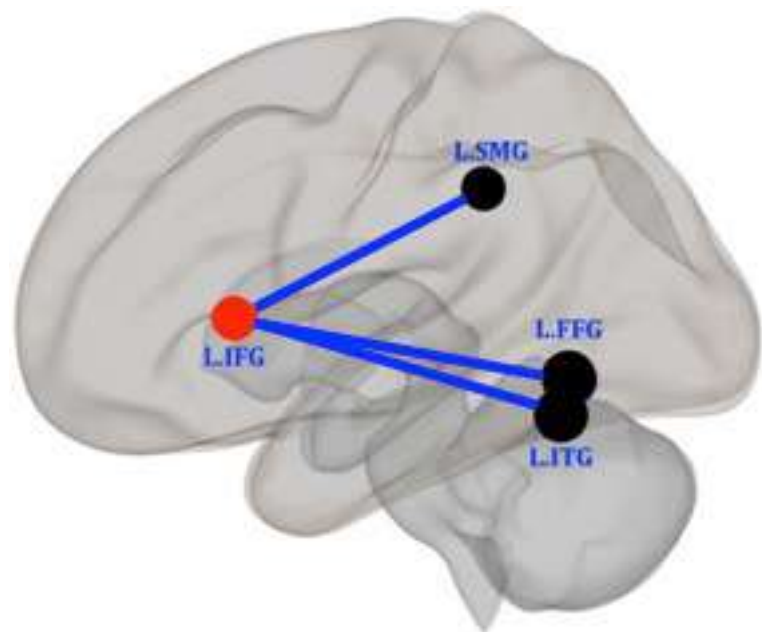
TOWRE RW Accuracy



Within-group relationship in DYS







TOWRE NW Fluency

TOWRE NW Accuracy



Blue: CTRL
Red: DYS

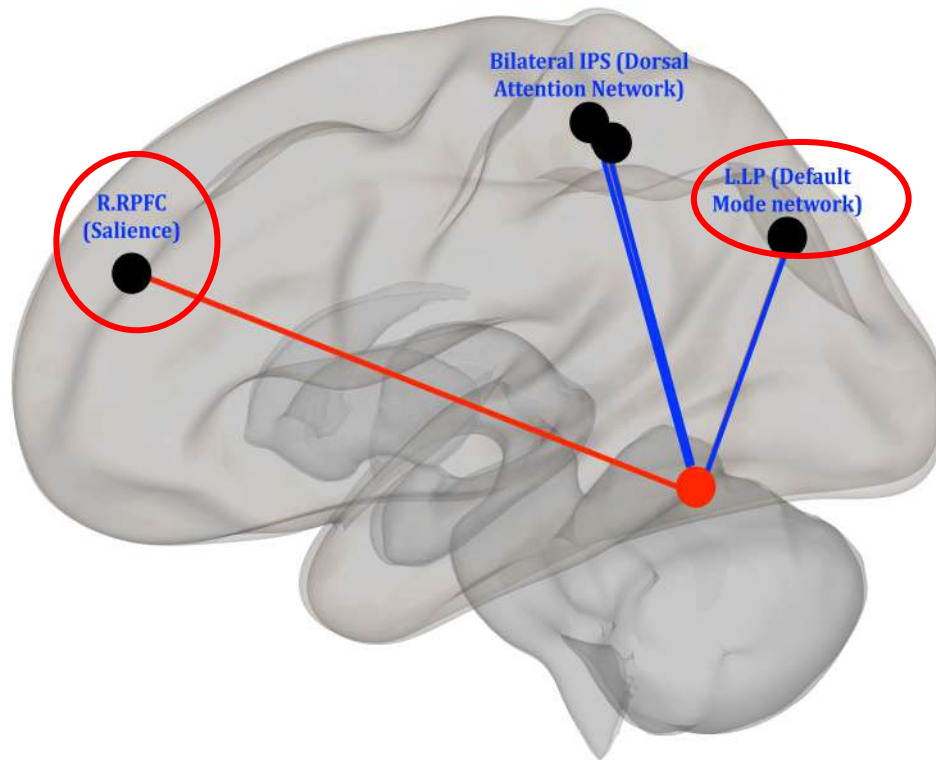
Inferior Frontal gyrus Connectivity

	TOWRE Real-Word	TOWRE Non-Word
CTRL	<p>  IFG-SMA =  Reaction time for real words  Accuracy of real words SLOWER AND MORE ACCURATE </p>	<p>X</p>
DYS	<p>X</p>	<p>  IFG-FFG & ITG =  Reaction time  Accuracy of non-words FASTER AND LESS ACCURATE </p>

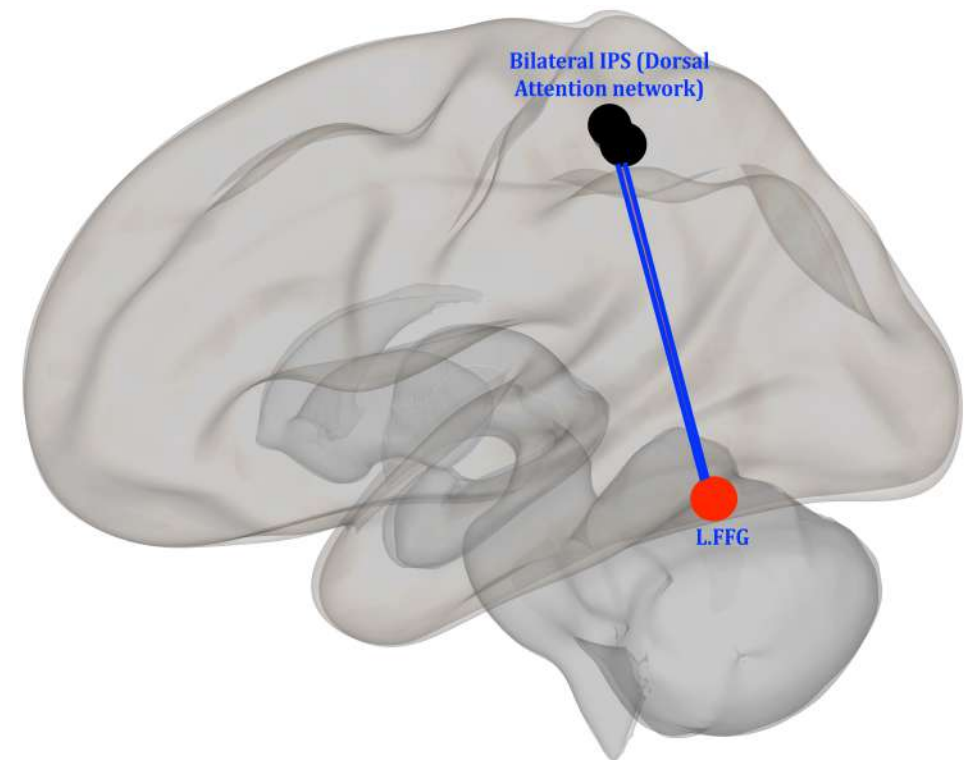
Q3: RdN and resting-state networks (RSNs)

Fusiform gyrus as seed region

CTRL

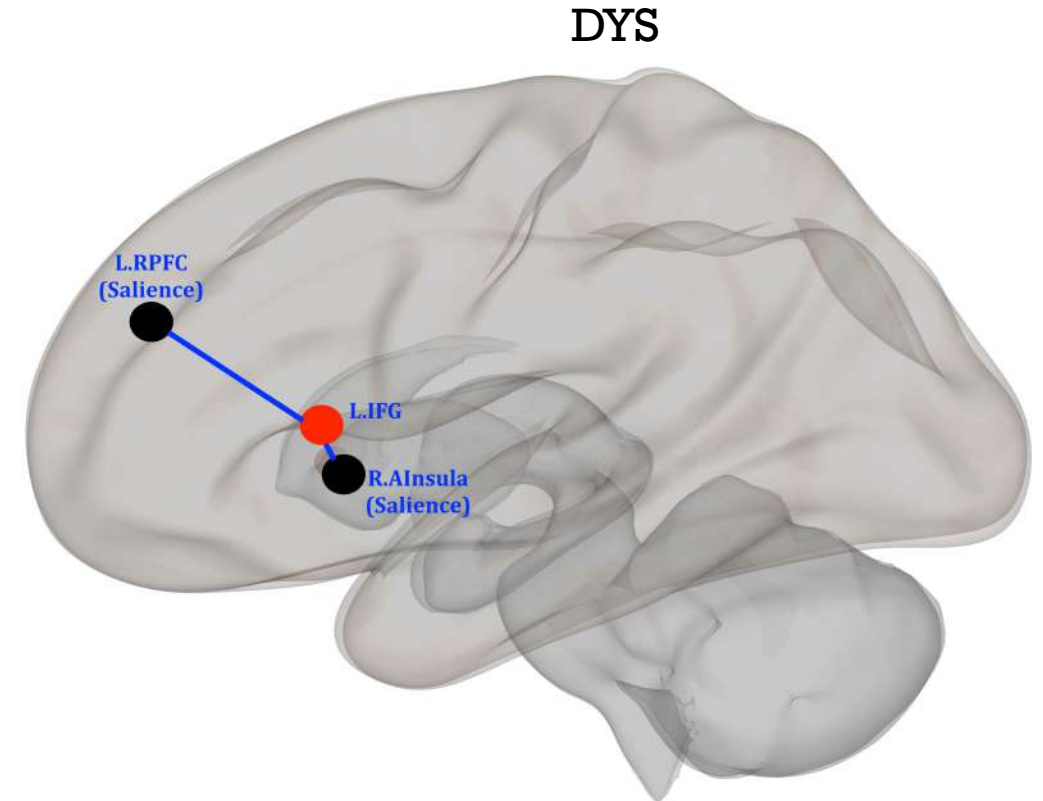
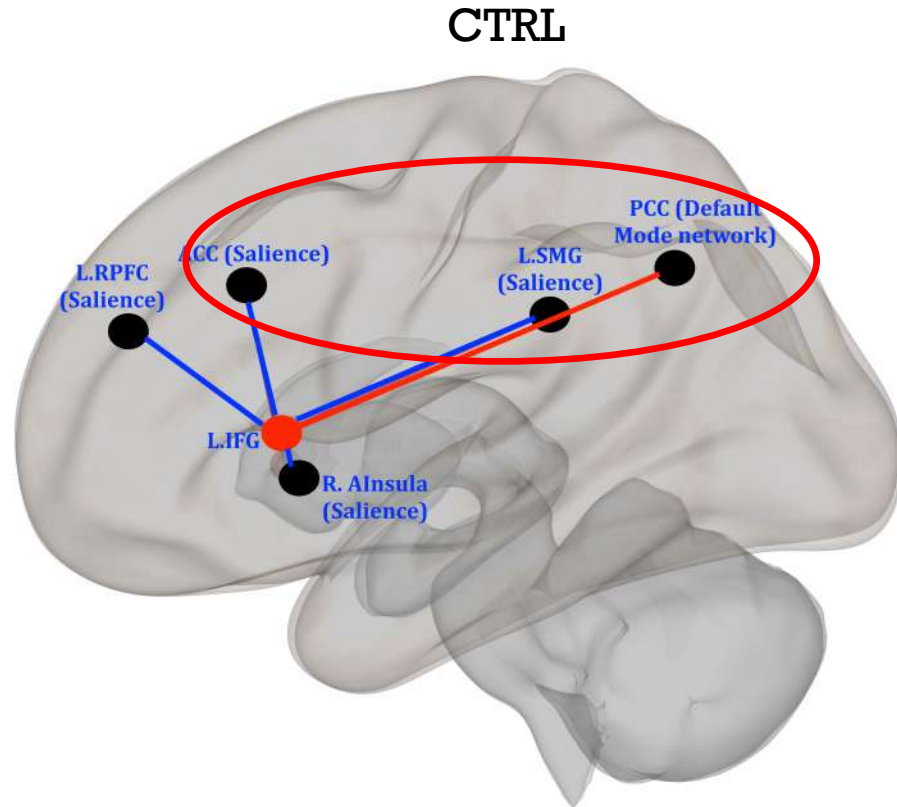


DYS



Blue: Positive connections
Red: Negative connections

Inferior frontal gyrus as seed



Blue: Positive connections
Red: Negative connections

Q4: No correlation between behavior and RSN connectivity was found

CONCLUSION

- Reading network and resting-state networks are distinctively connected at rest in adults with dyslexia
- Differential relationship between the intrinsic connectivity of reading network and reading behavior in adults with dyslexia
 - Connectivity of Inferior Frontal gyrus distinctively related to reading fluency behavior
- Less interaction between reading-related regions and Default Mode and Salience networks in adults with dyslexia
- Future studies
 - Replicate these findings in children and adult populations
 - Study other RSNs in relation to reading performance
 - Influence of intervention on the intrinsic and task-based connectivity

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Inferior Frontal gyrus Connectivity

	TOWRE Real-Word	TOWRE Non-Word
CTRL	<p>  IFG-SMA =  ACC for reading real words connectivity </p>	<p>X</p>
DYS	<p>X</p>	<p>  IFG- FFG, SMG =  ACC for reading & ITG connectivity non-words </p>

Inferior Frontal gyrus Connectivity

	TOWRE Real-Word	TOWRE Non-Word
SKILLED	<p>↑ IFG-SMA connectivity ↑ ACC for reading real words</p>	<p>X</p>
IMPAIRED	<p>X</p>	<p>↑ IFG-FFG,SMG & ITG connectivity = ↓ ACC for reading non-words</p>