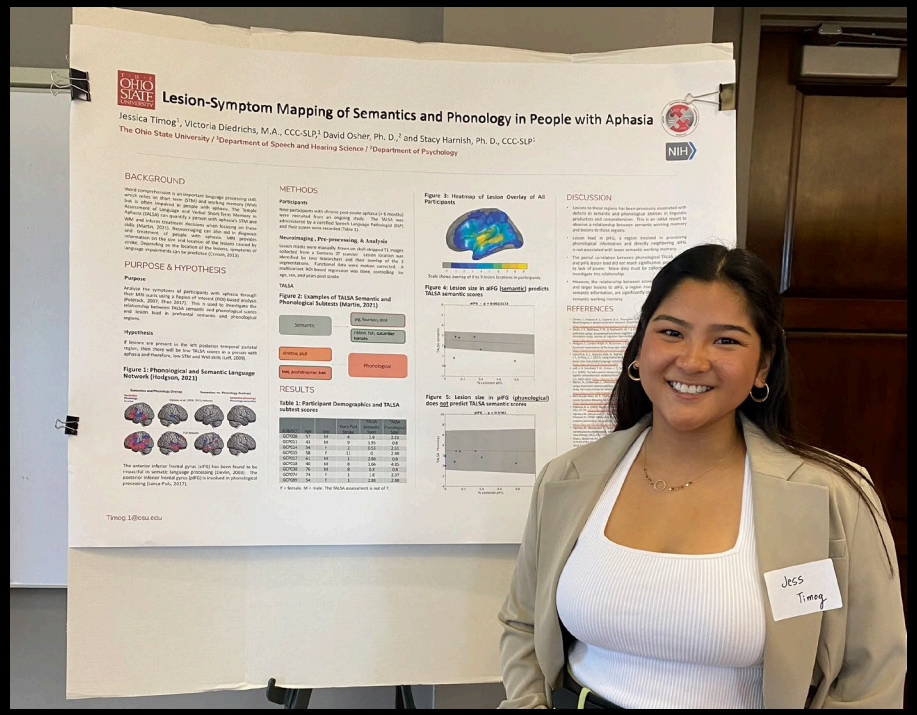
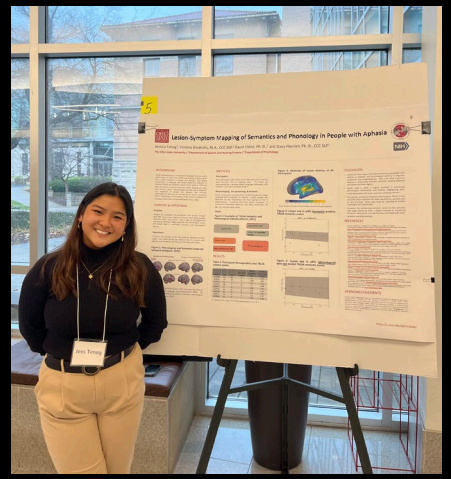
Advancing Diversity in NeuroImaging Research Program:
Jessica Timog


Lesion-Symptom Mapping of Semantics and Phonology in People with Aphasia
Jessica Timog[1], Victoria Diedrichs, M.A., CCC-SLP,[1] David Osher, Ph. D.,[2] and Stacy Harnish, Ph. D., CCC-SLP[1]
The Ohio State University / [1]Department of Speech and Hearing Science / [2]Department of Psychology
BACKGROUND
METHODS
PURPOSE & HYPOTHESIS
RESULTS
DISCUSSION
REFERENCES
Jess Timog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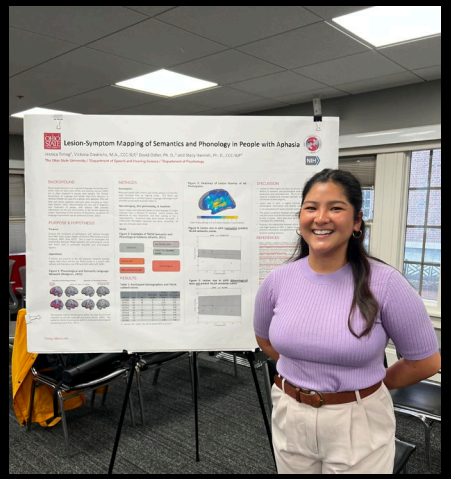
Lesion-Symptom Mapping of Semantics and Phonology in People with Aphasia


The Ohio State University
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Comparing Brain Networks Involved in Phonological and Semantic Processing using Voxel-based Lesion-Symptom Mapping

JESSICA L. TIMOG

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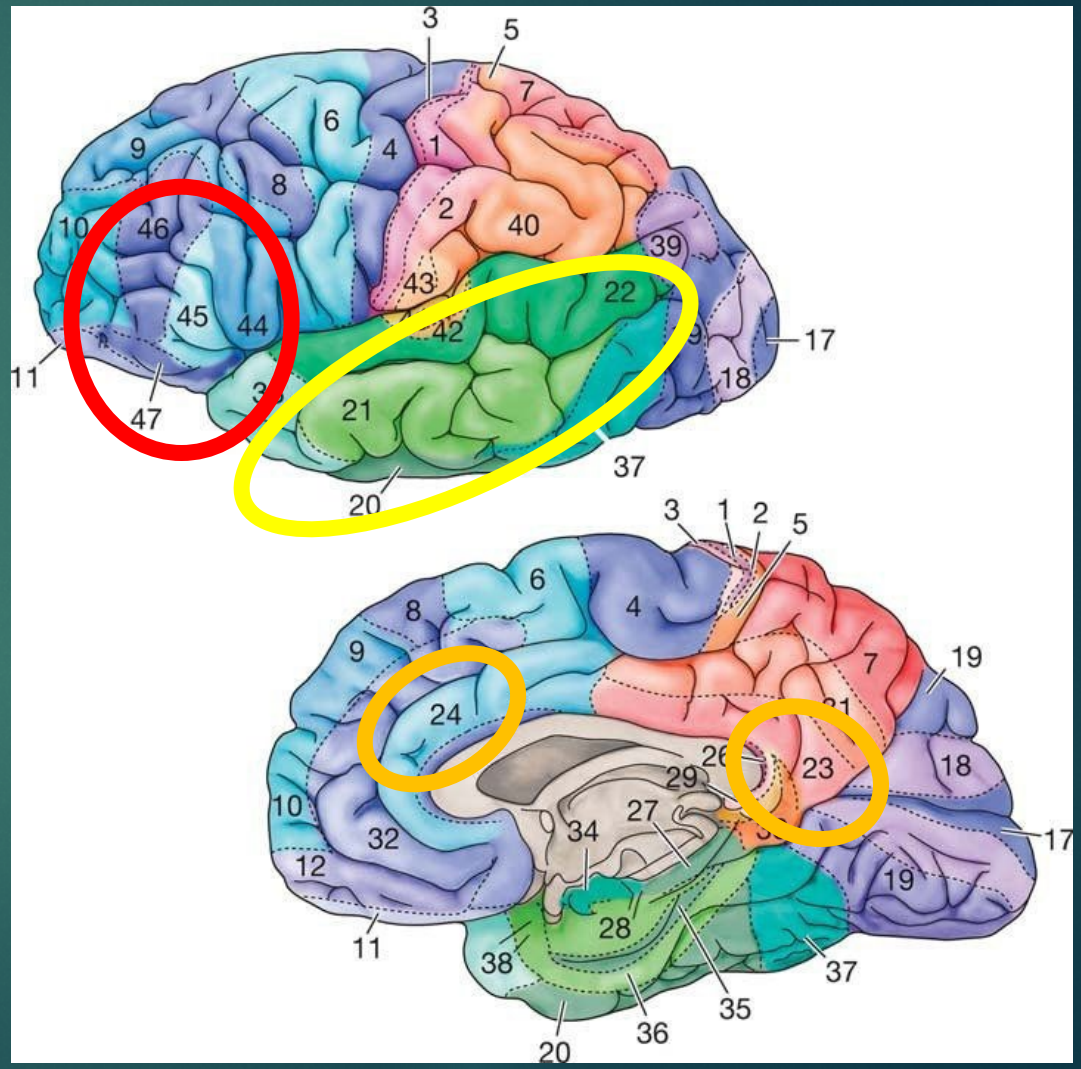
Introduction

Table 1. Hypothesized Areas of the Brain Associated with Completion of the CAT Verbal Fluency Categorical Span

Skillset	Brodmann's Area	Location
Language comprehension[34]	20	Inferior temporal, Fusiform and Para hippocampal gyri
Semantics[13]	21	Middle temporal gyrus
Complex sounds[33]	22	Superior Temporal Gyrus
Recall[24]	23	Posterior cingulate gyrus
Initiation and Suppression[43]	24	Anterior cingulate gyrus

Table 2. Hypothesized Areas of the Brain Associated with Completion of the CAT Verbal Fluency Letter Span

Skillset	Brodmann's Area	Location
Phonology [46, 47]	41/42	Primary and secondary auditory cortex
Attending to speech and phonemes[16, 17, 21, 31]	44/45	Inferior frontal gyrus
Memory Recognition[36]	46	Medial frontal gyrus
Retrieving categories[27]	47	Inferior frontal gyrus - Pars orbitalis



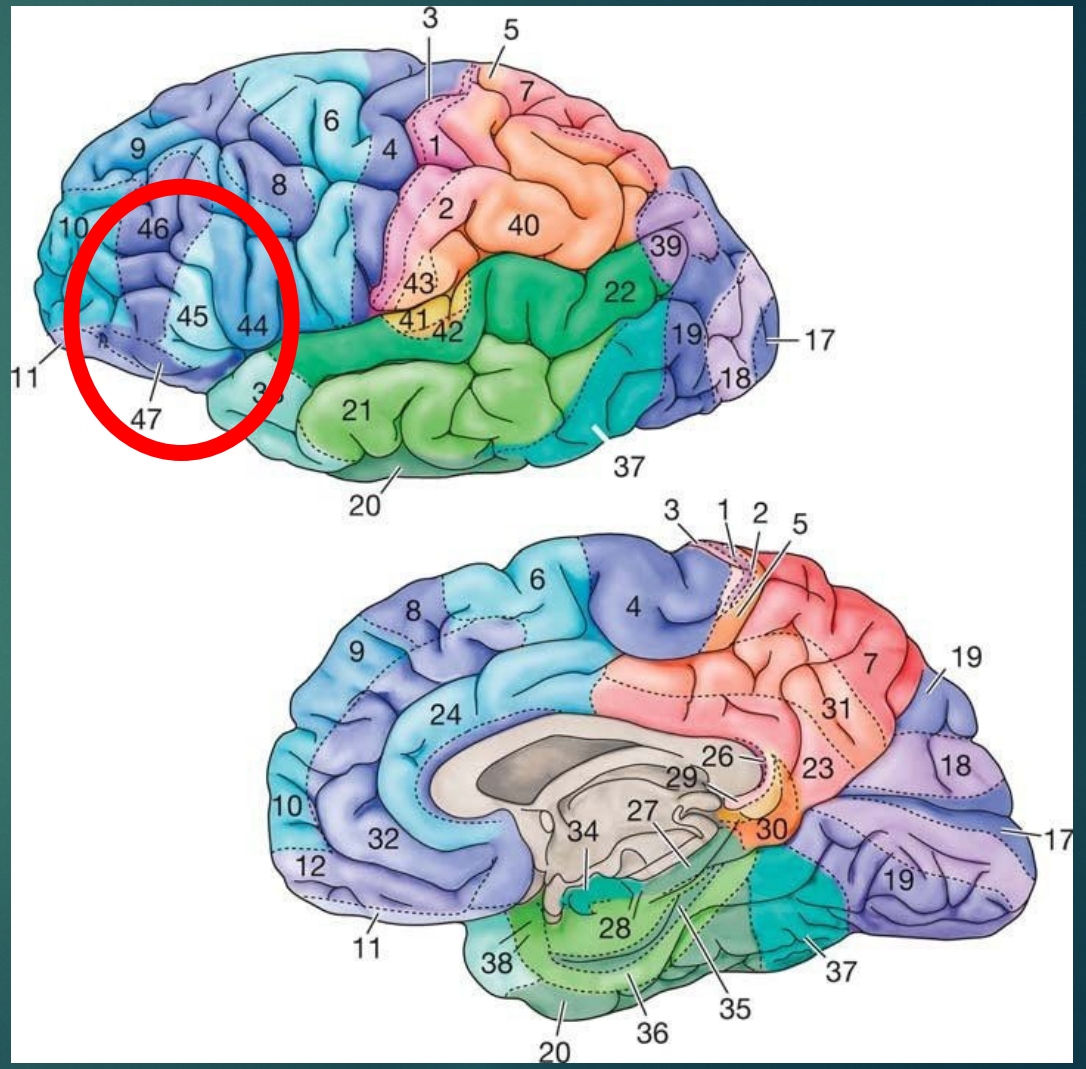
Thompson & Thompson (2015)

Table 3. Hypothesized Areas of the Brain Associated with Completion of the TALSA semantic

Skillset	Brodmann's Area	Location
Memory Recognition[36]	46	Medial frontal gyrus
Retrieving categories[27]	47	Inferior frontal gyrus - Pars orbitalis

Table 4. Hypothesized Areas of the Brain Associated with Completion of the TALSA phonological

Skillset	Brodmann's Area	Location
Attending to speech and phonemes[16, 17, 21, 31]	44/45	Inferior frontal gyrus
Memory Recognition[36]	46	Medial frontal gyrus



Thompson & Thompson (2015)

Methods & Results

Comprehensive Aphasia Test (CAT)

Categorical

Animals

Letter

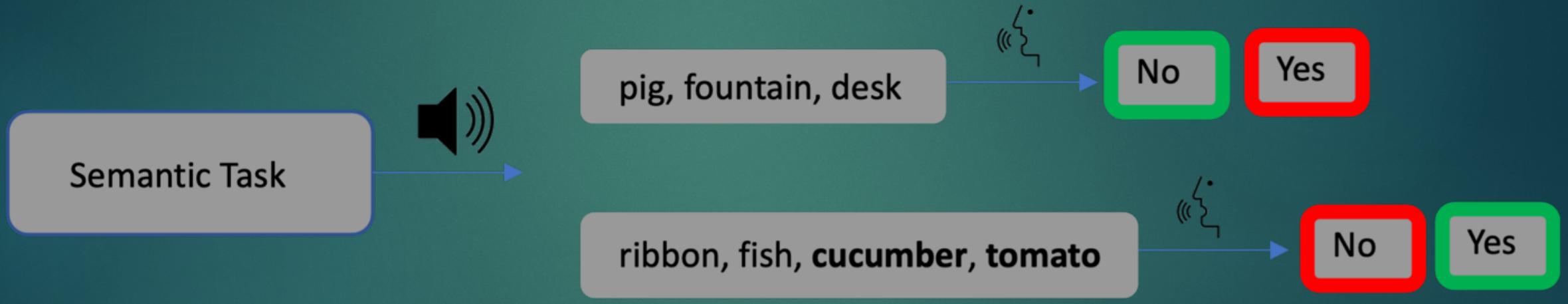
“S_____”

Comprehensive Aphasia Test (CAT)

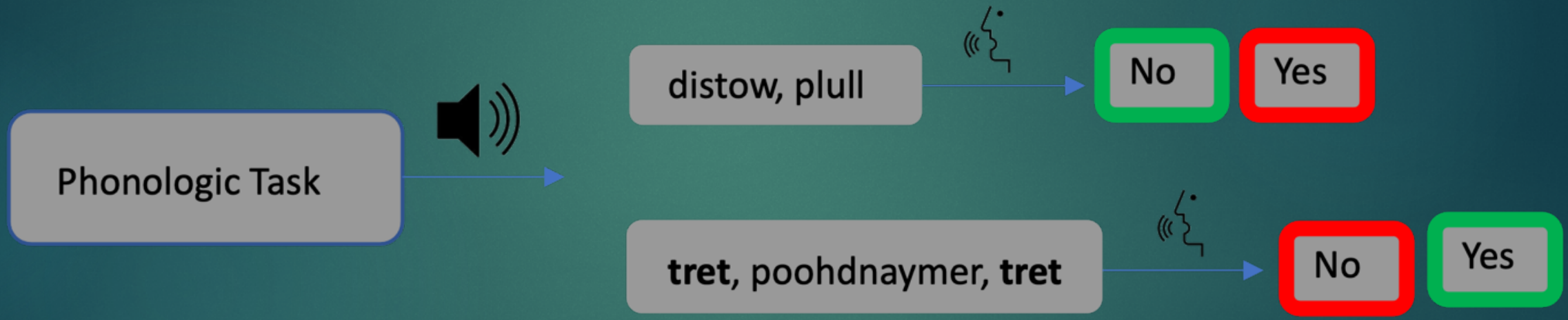
Table 6. Participant Test Scores

SUBJECT	CAT Word Verbal Fluency Categorical Span	CAT Word Verbal Fluency Letter Span
P8	6	3
P11	12	2
P14	2	2
P15	3	0
P17	1	3
P18	3	1
P38	2	1
P74	1	7
P89	2	2
P96	9	2

Temple Assessment of Language and Short-Term Memory in Aphasia (TALSA)



Temple Assessment of Language and Short-Term Memory in Aphasia (TALSA)

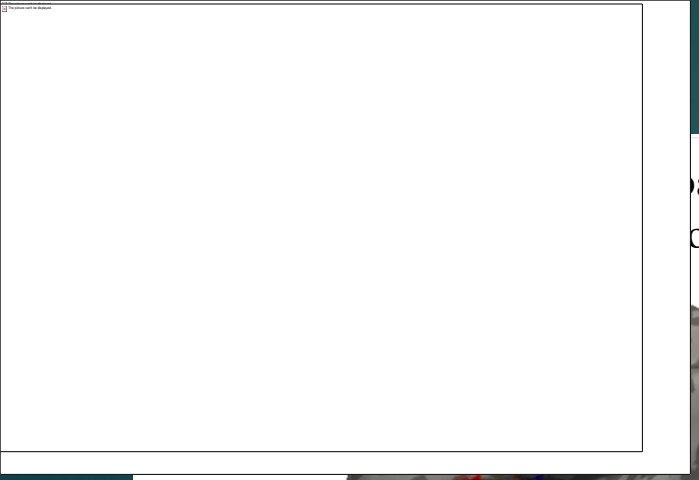


Temple Assessment of Language and Short-Term Memory in Aphasia (TALSA)

Table 6. Participant Test Scores

SUBJECT	TALSA Semantic Span	TALSA Phonological Span
P8	2.8	2.23
P11	1.93	0.8
P14	0.53	2.61
P15	0	2.88
P17	2.88	0.8
P18	1.66	4.85
P38	0.8	0.8
P74	1.8	2.97
P89	2.88	2.88
P96	0.79	0.79

Voxel-Based Lesion Symptom Mapping (VLSM)



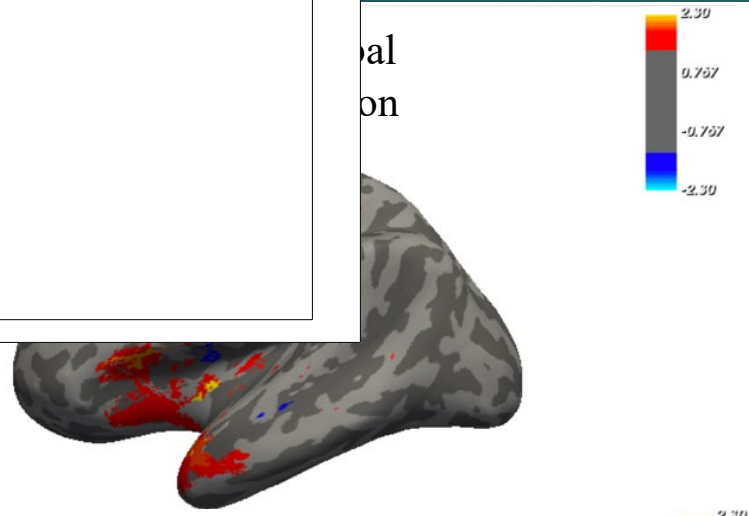
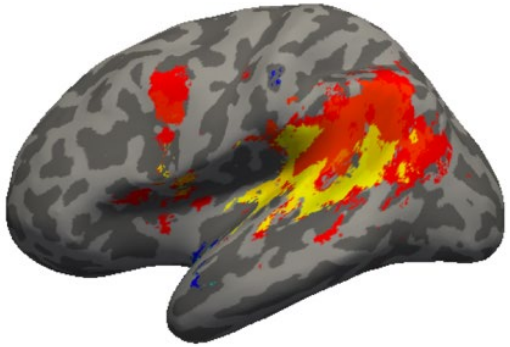


Figure 4. VLSM and CAT Verbal Fluency Letter Span Lesion Load T-Values



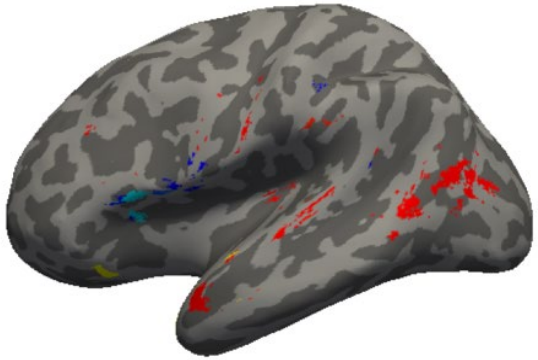


Figure 5. VLSM and TALSA Semantic Lesion Load T-Values

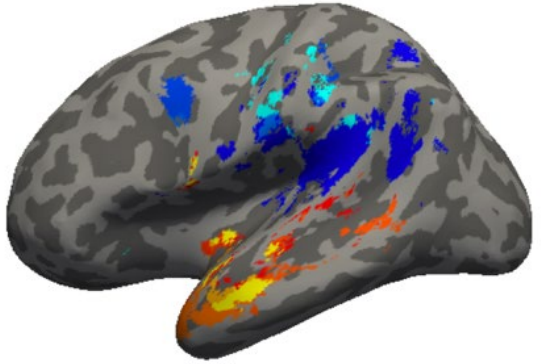


Figure 6. VLSM and TALSA Phonological Lesion Load T-Values

Figure 7. VLSM and CAT Verbal Fluency Categorical Span Lesion Load P-Values

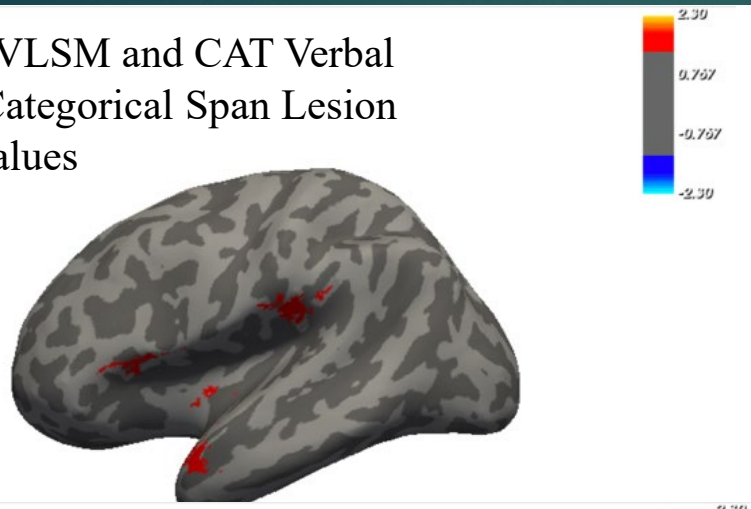


Figure 8. VLSM and CAT Verbal Fluency Letter Span Lesion Load P-Values

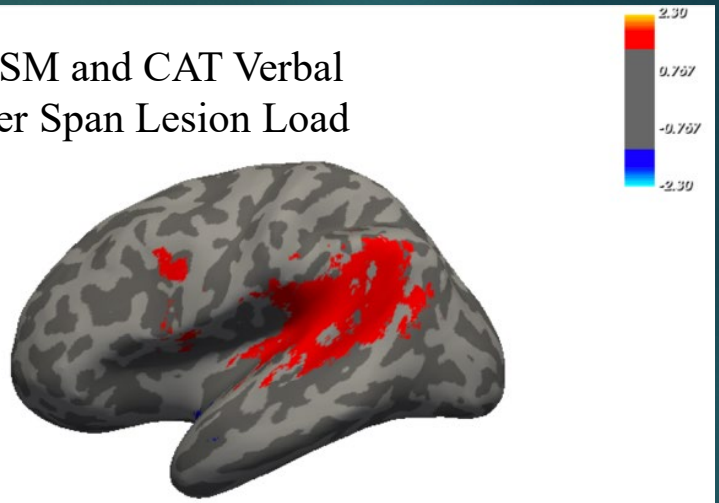


Figure 9. VLSM and TALSA Semantic Lesion Load P-Values

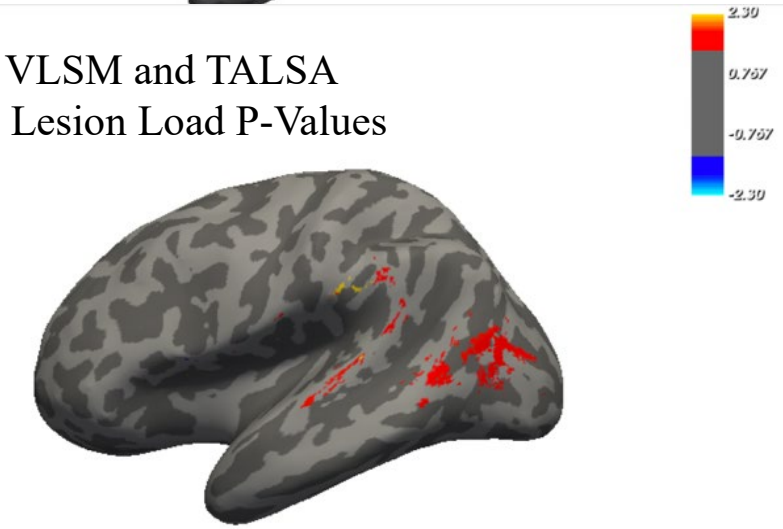
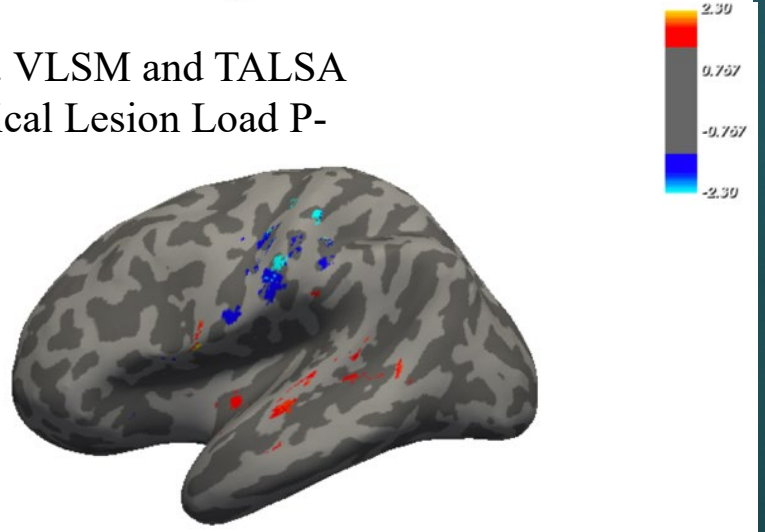


Figure 10. VLSM and TALSA Phonological Lesion Load P-Values



Discussion

Areas of Significance for CAT

Table 7. Areas of the Brain in significance in CAT Verbal Fluency Categorical Span after VLSM analysis

Area in Brain reaching significance (p-values between .05 - .01)	Brodmann's Area	Skillset
Parietal inferior supramarginal gyrus*	40 [8, 31, 37]	Categorization, different-same discrimination, decision making
Superior lateral temporal gyrus***	22[33]	Auditory language, deductive reasoning
Insula*****	13[5, 11, 15]	Phonemes, verbal memory, categorization
Anterior lateral******	44[16, 17, 21, 31]	Word generation, working memory, linguistic fluency

Table 8. Areas of the Brain in significance in CAT Verbal Fluency Letter Span after VLSM analysis

Area in Brain reaching significance (p-values between .05 - .01)	Brodmann's Area	Skillset
Superior temporal sulcus/gyrus**	41[46, 47]	Auditory working memory, auditory priming
Inferior supramarginal parietal*	40 [8, 31, 37]	Categorization, different-same discrimination, decision making
Insula*****	13[5, 11, 15]	Phonemes, verbal memory, categorization
Superior lateral temporal gyrus***	22[33]	Auditory language, deductive reasoning
Posterior lateral******	44[16, 17, 21, 31]	Word generation, working memory, linguistic fluency
Inferior angular parietal gyrus	39[4]	Verbal creativity

Areas of Significance for TALSA

Table 9. Areas of the Brain in significance in TALSA Semantic after VLSM analysis

Area in Brain reaching significance (p-values between .05 - .01)	Brodmann's Area	Skillset
Parietal Inferior supramarginal gyrus*	40 [8, 31, 37]	Categorization, different-same discrimination, decision making
Superior temporal sulcus**	41 [46, 47]	Auditory working memory, auditory priming
Superior temporal lateral gyrus***	22 [33]	Auditory language, deductive reasoning
Temporal middle gyrus****	21 [13]	Categorization, complex sounds

Table 10. Areas of the Brain in significance in TALSA Phonological after VLSM analysis

Area in Brain reaching significance (p-values between .05 - .01)	Brodmann's Area	Skillset
Superior temporal sulcus**	41 [46, 47]	Auditory working memory, auditory priming
Middle temporal gyrus/ sulcus****	21 [13]	Categorization, complex sounds
Insula*****	13 [5, 11, 15]	Phonemes, verbal memory, categorization
Inferior temporal sulcus	37 [1, 16, 31]	Initiation and Suppression

Table 7. Areas of the Brain in significance in CAT Verbal Fluency Categorical Span after VLSM analysis

Area in Brain reaching significance (p-values between .05 - .01)	Brodmann's Area	Skillset
Parietal inferior supramarginal gyrus*	40 [8, 31, 37]	Categorization, different-same discrimination, decision making
Superior lateral temporal gyrus***	22[33]	Auditory language, deductive reasoning
Insula*****	13[5, 11, 15]	Phonemes, verbal memory, categorization
Anterior lateral******	44[16, 17, 21, 31]	Word generation, working memory, linguistic fluency

Table 8. Areas of the Brain in significance in CAT Verbal Fluency Letter Span after VLSM analysis

Area in Brain reaching significance (p-values between .05 - .01)	Brodmann's Area	Skillset
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Inferior supramarginal parietal*	40 [8, 31, 37]	Categorization, different-same discrimination, decision making
Insula*****	13[5, 11, 15]	Phonemes, verbal memory, categorization
Superior lateral temporal gyrus***	22 [33]	Auditory language, deductive reasoning
Posterior lateral******	44[16, 17, 21, 31]	Word generation, working memory, linguistic fluency
Inferior angular parietal gyrus	39[4]	Verbal creativity

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Inferior temporal sulcus	37[1, 16, 31]	Initiation and Suppression

Conclusions

Acknowledgements

- The participants, family members, and caregivers of this study
- The NIH
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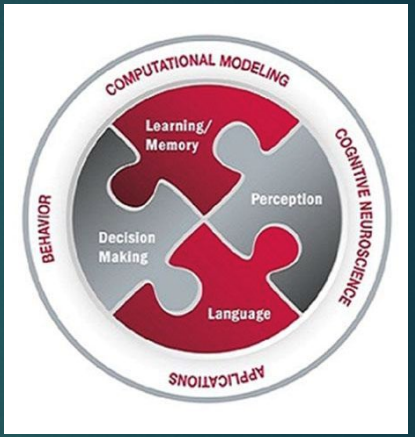
  - TL1TR002735
- The CCBBI
- The Department of Speech and Hearing and the Psychology Department
- All my mentors, advisors, and supporters



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Thank you!