Responsiveness to Cues as a Measure of Emerging Language Ability in Aphasia

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Relevant Background

- Aphasia is an acquired communication impairment affecting receptive and/or expressive language skills
- Initial aphasia severity, lesion location, and lesion size are the most robust predictors of recovery[1-9]
- Predicting individual recovery is more difficult given the multiple factors that impact gains[5,6]
- What **clinically-accessible** information can be obtained to better predict language outcomes on an individual level?

Stimulability

- Articulation literature: A sound that is stimulable improves[10]
- Motor: When TMS evokes a motor response, people make improvements later[11,12]

How do we assess stimulability in aphasia?

Research → Practice

Naming Deficits

- Common to all types of aphasia[13]
- Involve a breakdown at either or both the semantic stage or the phonological stages of lexical processing
- In routine clinical practice, cues of various types are offered when there is a breakdown in naming[14-23]

Assess **naming stimulability** to determine whether there is a relationship between the **type of cues** that facilitate naming and the underlying language system.

Cue Type	Description	Item	Sample Cues
Sentence Cue	Contextual cue containing feature information in the context of a carrier-phrase		"You cut paper with _____"
Feature Cue	Feature cue containing semantic information about the item		"It is used to cut paper"
Phonemic Cue	Verbal phonemic cue with the initial sound (consonant + vowel) of the word		"Begins with /SI/"

Research Aims

- **Aim 1a:** Determine the extent to which **naming stimulability** at one timepoint (T1, T2, T3) predicts **naming accuracy** at the subsequent evaluation (T2, T3, T4)
- **Aim 1b:** Evaluate the hypothesis that naming stimulability at T1 will be associated with improved word retrieval in connected speech at T4.
- **Aim 2:** Determine whether there is a relationship between the type of cue that leads to improved naming (feature, sentence, phoneme) at T1 and corresponding measures of receptive language processing

T1 (6 Weeks)	T2 (3 Months)	T3 (6 Months)	T4 (12 Months)
Naming Battery	Naming Battery	Naming Battery	Naming Battery
Comprehensive Assessment			Comprehensive Assessment

Participants

- N=7 (3 participants completed all timepoints, 4 ongoing)
- Mean age = 45.6, SD = 22.8, 3 Females, 4 Males
- All status-post first-ever Left MCA stroke, English-speakers

Naming Battery

- 175-item Philadelphia Naming Test + 25 items from Boston Naming Test
- Structured sentence cues developed for all items and presented to 40 healthy controls without an accompanying picture using Amazon MTurk
- Above 70% agreement for each item, Average 92.3%

amazon mechanical turk

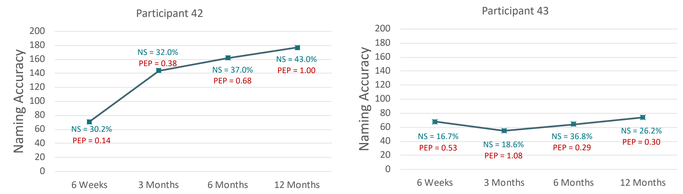
Assessment

Receptive Semantic Processing	Receptive Morphosyntactic Processing	Receptive Phonological Processing
• Pyramids & Palm Trees Test • CAT Subtest 2: Semantic Memory	• BDAE Syntactic Processing • BDAE Reversible Possessives • CAT Subtest 9: Spoken Sentences	• PALPA 2: Same-Different Discrimination • PALPA 4: Minimal Pair Discrimination • PALPA 15: Word-Rhyme Judgement

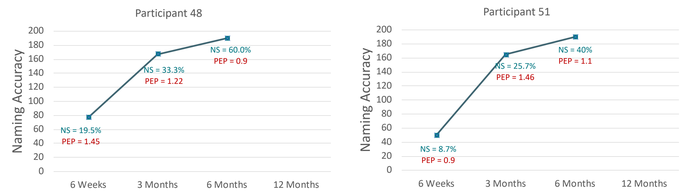
Comprehensive Assessment	Comprehensive Aphasia Test (CAT)
Motor Speech Skills	Diadochokinetic rates, Spontaneous speech sample
Cognitive Skills	Non-linguistic subtests of CLQT
Communication Functioning	Aphasia Communication Outcome Measure (ACOM)
Communication Confidence	Communication Confidence Rating Scale for Aphasia (CCRSA)

Results: Aim 1a

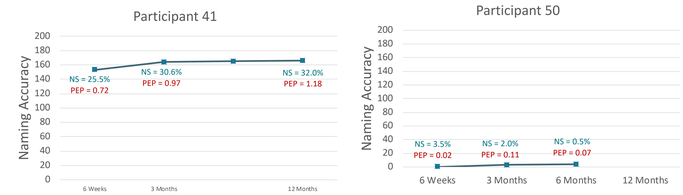
NS = Naming Stimulability
PEP = Proportion Errors Produced



- Similar naming accuracy at T1, but different patterns of naming stimulability (High NS vs Low NS) -> different recovery patterns

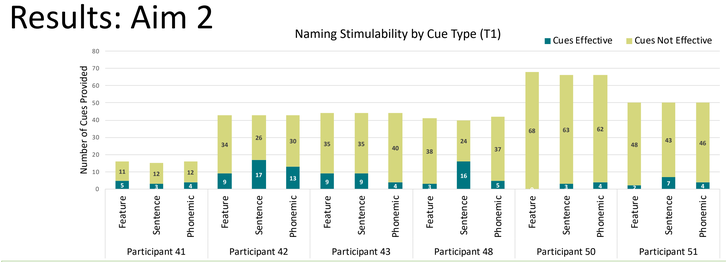


- Proportion errors produced (PEP) provide potentially valuable information. High PEP (compared to no response) -> future improvement



- Fewer attempts at naming (Low PEP) -> minimal change

Results: Aim 2



	Participant 41	Participant 42	Participant 43	Participant 48	Participant 50	Participant 51
Semantic Composite	74%	74%	69%	94%	65%	92%
Morphosyntactic Composite	74%	78%	54%	65%	41%	80%
Phonological Composite	93%	93%	70%	97%	43%	93%

Impressions & Next Steps

- Preliminary data support hypothesis that naming stimulability may provide an insights into future naming ability
- Error productions have surfaced as important additional sources of clinically-relevant information
- Ongoing analyses will examine naming stimulability and error patterns as they relate to composite receptive scores
- Additional analyses will examine performance as it relates to connected speech

References