Auditory Selective Attention Deficits In Mild-Moderate Aphasia: Relation To Formally-Tested And Self-Reported Auditory Comprehension Impairments

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INTRODUCTION

People with aphasia (PWA) often have concomitant deficits in attention.[1] It has even been suggested that aphasic language deficits are rooted in impairments of attention, which could account for the variability seen both within and across PWA.[2] Attention deficits in PWA are generally shown to be contingent on task complexity, with higher-order types of attention more frequently impaired. Comparing controls to a sample of PWA with a range of severities, Villard & Kiran[3] documented increased intra-individual variability across testing sessions in complex attention tasks. They noted that the amount of intra-individual variability showed a substantial range *across* PWA, and suggested this factor might play a role in responsiveness to treatment.

The present study addressed the relationship between attention and auditory comprehension (AC) in a sample of PWA with mild to moderate comprehension deficits.

We address the following research questions:

1. Is auditory selective attention impaired in PWA with mild to moderate AC impairment when compared to controls?
2. Are there differences between PWA and controls in the amount of intra-individual variability in auditory selective attention?
3. In PWA, how are auditory selective attention, formally tested AC, and self-reports of AC related?

METHODS

Participants

Variable	PWA (n=7)	Control (n=6)
Sex		
Male	4	3
Female	3	3
Age (years)		
Mean (SD)	46 (13.2)	53 (15.5)
Min/Max	30/60	26/70
Education (years)		
Mean (SD)	15.1 (3.4)	15.8 (1.8)
Raven's Coloured Progressive Matrices[4] (raw)		
Mean (SD)	32.14 (4.53)	34.00 (1.26)

Inclusion Criteria

PWA:

- Time post-onset ≥ 6 months
- Self-reported functional AC impairment, measured by a Functional AC Questionnaire (FACQ); Limited formal AC impairment (*Boston Diagnostic Aphasia Examination BDAE-3,* Basic Word Discrimination, Commands, and Complex Ideational Material subtests averaging ≥ 60th percentile.)

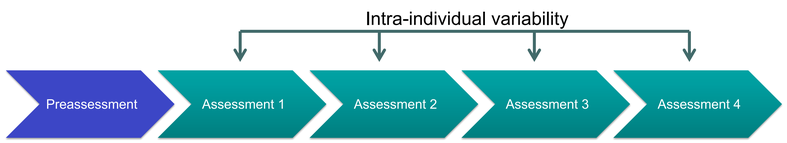
Controls:

- No signs of dementia as determined using the *Mini-Cog* screening tool.[5]

PWA and controls passed hearing and vision screenings.

Procedure

Each participant completed pre-assessment tasks & 4 repeated assessment sessions



Instruments

Pre-assessment

- *Test of Everyday Attention* (*TEA*),[6] a norm-referenced test of various types of attention

Subtest	Type of Attention
Map Search (MS1 & 2)	Visual search and selective attention
Elevator Counting (EC)	Auditory sustained attention
Elevator Counting with Distraction (ECD)	Auditory selective attention
Visual Elevator (VE)	Cognitive flexibility, working memory
Elevator Counting with Reversal (ECR)	Cognitive flexibility, working memory
Telephone Search (TS)	Visual selective attention
Telephone Search while Counting (TSC)	Divided attention

- Additional pre-assessment for PWA:
  - *BDAE-3* (Simple Social Responses, Free Conversation, Picture Description, Automatized Sequences, Repetition, Responsive Naming, Boston Naming Test, Screening of Special Categories)
  - *BDAE-3* Syntactic Processing extended subtests (Touching A with B, Reversible Possessives, and Embedded Sentences)
  - Functional AC Questionnaire (FACQ): items taken from the *ASHA Functional Assessment of Communication Skills for Adults* (*ASHA FACS*)[7] and the *Communicative Effectiveness Index*.[8]

Repeated assessment

- Sustained attention: TEA Elevator Counting (EC)
- Selective attention: TEA Elevator Counting with Distraction (ECD)

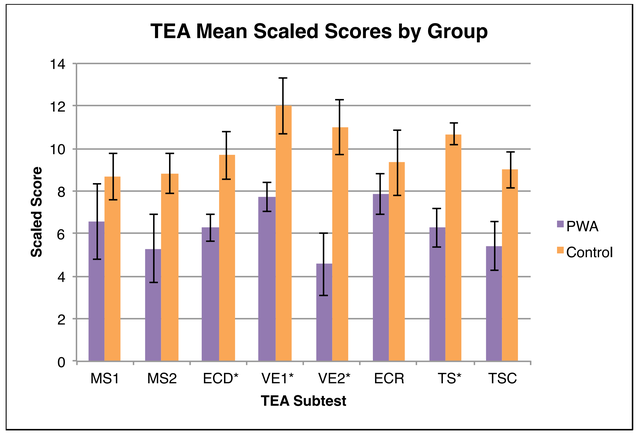
Data Analysis

Due to the small sample sizes, nonparametric statistics were used for all comparisons (Mann Whitney *U* tests) and correlations (Spearman's rho).

RESULTS

Between-group differences on measures of attention

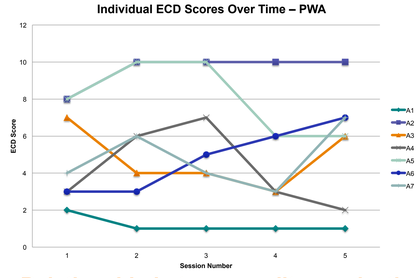
Comparing raw scores of the *TEA* subtests at initial administration, PWA had significantly lower scores than controls on 4 of the 7 subtests: ECD (p=.04), Visual Elevator 1 & 2 (p=.04 and p=.02, respectively), and Telephone Search (p=.01). Differences in Telephone Search while Counting approached significance (p=.07).

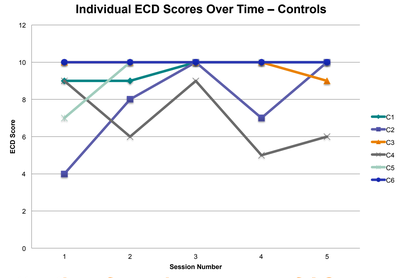


TEA mean scaled scored by group. Scaled score *M*=10, *SD*=3. Error bars represent 1 SEM.
*= significance at the *p*<.05 level.

Intra-individual variability

Intra-individual variability for the repeated auditory attention measures (EC and ECD) was assessed by computing the coefficient of variation (COV) for each participant. The PWA had significantly greater COVs on the selective attention task, ECD (p=.02), but not the sustained attention task, EC (p=.73).





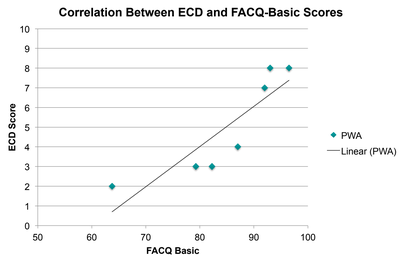
Relationship between auditory selective attention, formal measures of AC, and self-reported measures of AC

Subscores derived from FACQ for analysis

FACQ Subscores	Subscore components
FACQ Average	Average of all 15 items
FACQ Basic	Average of 4 items about basic AC
FACQ Attention	Average of 2 items about AC in attention-taxing situations

Spearman Rank Correlations Between Selective Attention and AC for PWA

Measures	ECD
FACQ	
Average	.26
Basic	.98***
Attention	.07
BDAE-3 AC	
Basic Word Discrimination	.24
Commands	-.30
Complex Ideational Material	.68*
Touching A with B	.71*
Reversible Possessives	.42
Embedded Sentences	.77*



*=Significance at the 0.05 level (1-tailed); **=Significance at the 0.01 level (1-tailed); ***=Significance at the 0.001 level (1-tailed)

DISCUSSION

PWA with mild-moderate AC deficits appear to have worse attention skills overall when compared with age- and education-matched controls, and have greater intra-individual variability during selective attention but not sustained attention tasks. Selective attention had the strongest correlation with self-reports from PWA of their basic functional AC as well as with AC tasks that place higher demands on syntax and working memory.

These findings suggest that for some PWA with mild-moderate AC deficits, impaired selective attention may be perceived as, or exacerbate, underlying AC deficits. This study supports the clinical practice of comprehensive assessments of cognitive-linguistic skills in PWA and highlights the need for further research with larger sample sizes to describe attention skills in PWA as well as efficacy of targeting attention skills to improve communication skills in PWA.

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