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Story Reading Speed, Recognition, and Comprehension in Aging and Dementia

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from the Alzheimer's Association.



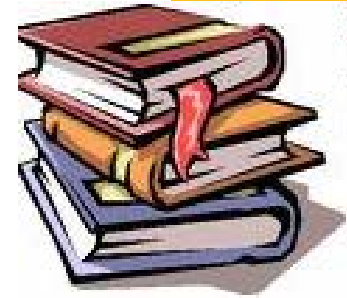
Purpose of this Study

The purpose of this study was to compare the performance of healthy older adults (HOA) and persons with dementia (PWD) on the following measures:

- Time taken to read a short story
- Comprehension of content read, and
- Ability to generate a title for a short story



Importance of studying reading ability in aging and dementia



- Reading is a foundational cognitive-linguistic skill; the need to read and comprehend what is read is pervasive in our daily lives.
- Reading is dependent on multiple cognitive abilities known to be affected by dementia (e.g., attention, working memory, semantic memory, language comprehension).
- Contradictory results have been reported about reading abilities in PWD and it is unclear whether reading is preserved in dementia or not (Bourgeois, 2001).
- Large number of studies on reading in PWD focus on single-word or single-sentence reading; very few studies on reading of narratives.

Research Questions



While silently reading a short story:

Question 1: Do PWD and HOA differ in the time taken to read a short story?

Question 2: Do PWD and HOA differ in their comprehension of a short story, as measured by performance on answering multiple choice questions?

Question 3: Do PWD and HOA differ in their ability to generate a title for a short story?

Method



- Informed consent was obtained from participants or caregivers.
- Medical history obtained; medical records/charts reviewed.
- Participants were administered:
 - **Mini-Mental State Exam** (Folstein, Folstein, & McHugh, 1975)
 - **Geriatric Depression Scale-Short Form** (Sheikh & Yesavage, 1986)
 - **Vision screening** (Adapted from the *Arizona Battery for Communication Disorders of Dementia* - Bayles & Tomoeda, 1993): Screening for literacy, visual scanning, and visual agnosia.
 - **Hearing screening:** Otoscopy, pure tone audiometric screening at frequencies from 500 Hz to 6000 Hz, and face-to-face word recognition testing.

Study Participants

	HOA	PWD
Sample	33 (6 M, 27 F)	33 (11 M, 22 F)
Age	Mean: 80.3 Range: 64-95	Mean:84.8 Range: 70-96
Ethnicity	Caucasian: 28 African-American: 3 Latino = 1 Asian = 1	Caucasian: 31 African American: 1 Biracial: 1 (Hispanic/Caucasian)
Years of Education	Mean:13.8 Range: 12-18	Mean: 12.5 Range: 8-18
MMSE scores (30)	Mean: 28.2 Range: 26-30	Mean: 20.7 Range:11-29
GDS-SF Scores (15)	Mean: 2.5 Range: 0-11	Mean: 2.6 Range:0-8
MMSE - silent reading comprehension item	Pass: 33, Fail: 0	Pass: 32, Fail: 1

Participants with Dementia: Type and Severity of Dementia

	CLASSIFICATION (Severity and Dementia Type)	
Severity of Dementia (Based on MMSE and Global Det. Scale)	Mild: 27	Moderate: 6
Hachinski Scores	Score \leq 4: 26	Score \geq 7: 7
Number of residents with specific type of Dementia	Probable AD: 22 Dementia NOS = 4	Vascular Dementia: 7

Task Instructions



■ BEFORE BEING ASKED TO READ THE STORY

"I am going to give you a short story to read. I want you to read it one time silently to yourself. I will tell you when to start. As soon as you are done reading the story, please say -- *I'm done.*"

■ AFTER READING THE STORY: Title generation

"I would like you to come up with a title for the story that you just read."

■ AFTER GENERATING THE TITLE: Reading Comprehension

"Now I am going to ask you some questions about the story that you just read. I will read out the questions while you follow along. Then you will review the four choices for each question and pick the best answer."

Reading Measures



□ Story Reading Speed

Number of seconds taken to silently read a 106-word story from the *Gray Oral Reading Test-4th Edition* (Wiederholt & Bryant, 2001).

□ Story Comprehension

Number of multiple choice questions about the story, correctly answered (targeting verbatim recall or inferential processing).

□ Story Title Generation

Type of story title generated by participants.

The Blue Jay Story (GORT-IV)

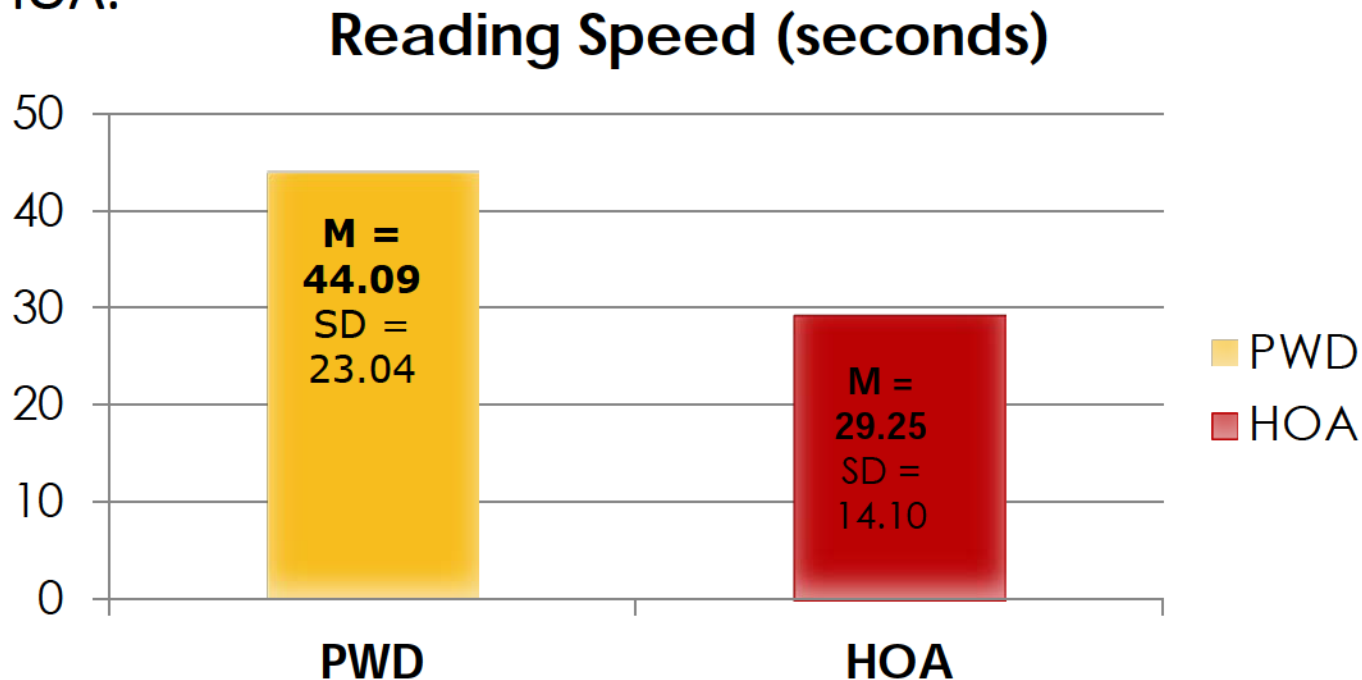


Story presented in 24-point, black font, on white paper to maximize visual contrast

Results: Reading Speed

Between group differences in reading speed were analyzed statistically using the nonparametric Wilcoxon 2-sample t-test.

There were significant between-group differences in reading speed (**p = 0.0038**) with PWD taking longer to read a story than HOA.



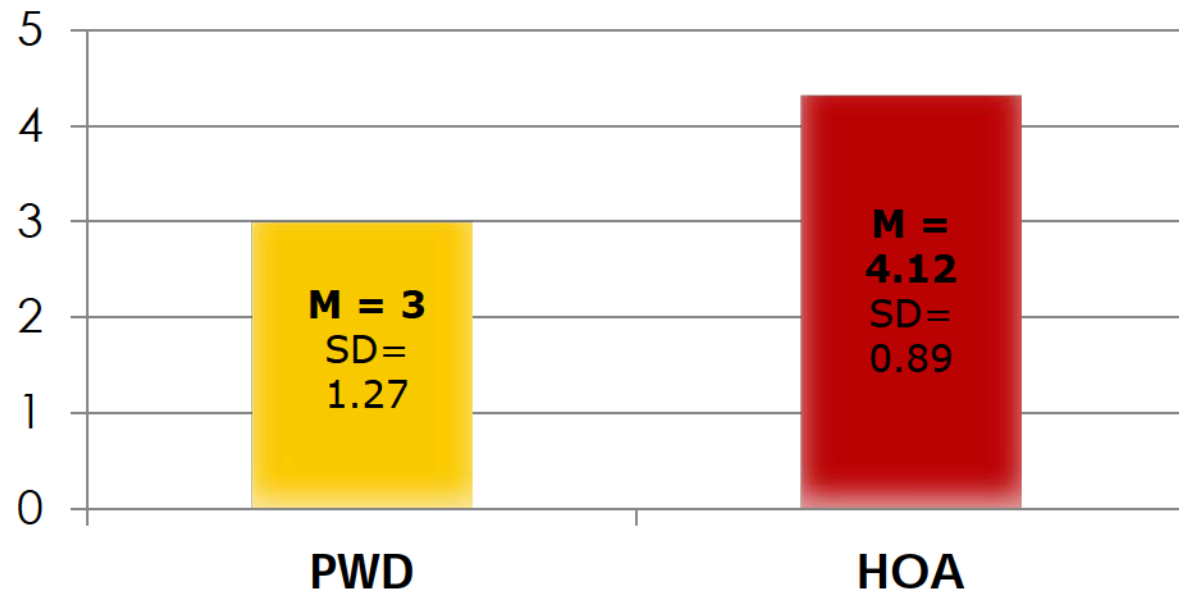
Results: Reading Comprehension

Between group differences were analyzed statistically using the nonparametric Wilcoxon 2-sample t-test.

There were significant between-group differences in reading comprehension with ($p = 0.0006$) with PWD having poorer comprehension than HOA.

Reading Comprehension Score
(out of 5)

	HOA	PWD
Score of 4-5	26	14
Score of 2-3	7	15
Score < 2	0	4



Story Title Rating Scale

Numerical score	Description
0	No response (e.g., <i>I don't know</i>).
1	Incomplete or reference to a minor inferential/literal detail. E.g. <i>Things Happen</i>
2	Title containing only literal OR only inferential information. E.g. <i>The Blue Jay, Solving a Puzzle</i>
3	Title containing both literal AND inferential information. E.g. <i>The Clever Blue Jay</i>

Results – Title Generation

Sample HOA titles

- The Bird And Her Water
- The Thirsty Blue Jay
- Blue Jay With an Innovative Mind
- How The Blue Jay Got Its Water
- A Blue Jay Trying To Get A Drink
- Solving a Puzzle
- There Is Always Hope
- Never Give Up Hope
- Use Your Brains
- If At First You Don't Succeed, Try Again

Sample PWD Titles

- The Thirsty Jay
- The Blue Jay
- The Hope Of The Jay
- Adventures of Jay
- The Bright Jay Bird
- The Bird Is Trying to Find something to drink
- Resourceful
- Life stories
- Worried



Results: Title Generation



- More *No Responses* in PWD (n = 4); none in HOA.
- More vague or incomplete titles (e.g. *Resourceful, Don't give up the ship*) by PWD (n=3) ; none in HOA.
- More nonspecific titles (e.g. *The blue jay*) by PWD (n = 3); none in HOA.
- The majority of PWD, however, were able to provide a title (rated 2 or 3) demonstrating some degree of inferential comprehension and gist processing. This is a striking finding, given that PWD comprehension scores were markedly poorer than HOA.

Conclusions



- Study findings add to the literature on text reading speed and reading comprehension in healthy older adults and persons with dementia. Our key findings are that:
 - 1. Persons with dementia take more time to read a narrative, than HOA.**
 - 2. Reading comprehension of a short story in persons with mild to moderate dementia is notably poorer than HOA, despite PWD taking longer to read the short story, and provision of written multiple-choice answers.**
 - 3. The ability to generate a title for a story was somewhat preserved in the majority of our PWD sample, indicating some spared inferential comprehension and gist processing.**

Clinical Implications



- Importance of studying written language processing, and assessing it in persons with dementia.
- Testing reading ability is directly relevant to the use/design of written cues, low-tech AAC devices, and memory wallets and books.
- Significance of providing more time for written information processing by persons with dementia, and assessing comprehension via multiple indices.

Unanswered Questions



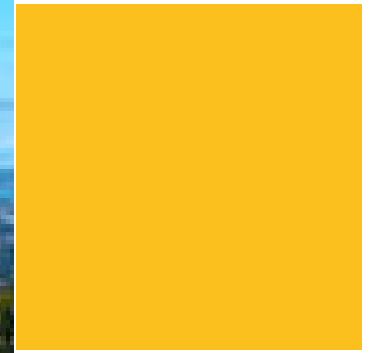
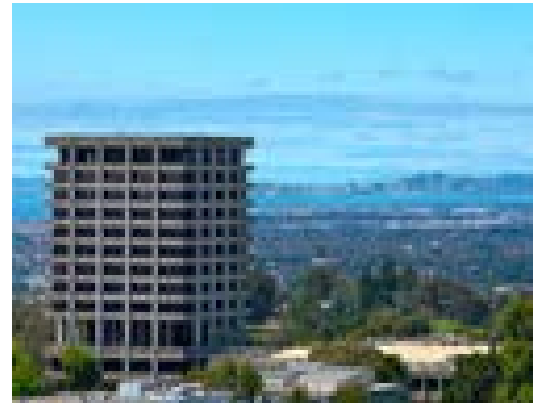
- How might length of a narrative influence reading speed and comprehension?
- How does the type of narrative (e.g., story vs. everyday text like letters, forms, documents) influence reading speed and comprehension?
- How do specific task instructions influence reading speed, comprehension, and title generation?

Future Directions



- Investigating the best predictor of reading comprehension in dementia – mental status, education level, memory deficit, or language deficit.
- Developing interventions for facilitating reading comprehension in HOA, persons with mild cognitive impairment, and dementia.
 - **Montessori-based Interventions – *Question Asking Reading* (Camp and colleagues, 2001; Mahendra et al., 2006)**
 - **Book Club type Life Participation Interventions (e.g. Whitehouse and colleagues, 2009; Elman & Bernstein-Ellis, 2006)**

Acknowledgments



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