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

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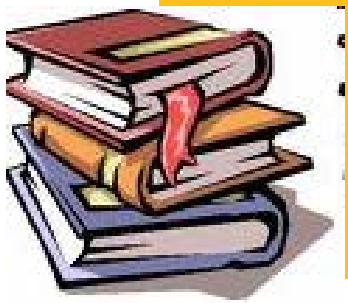
Purpose of this Study

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.

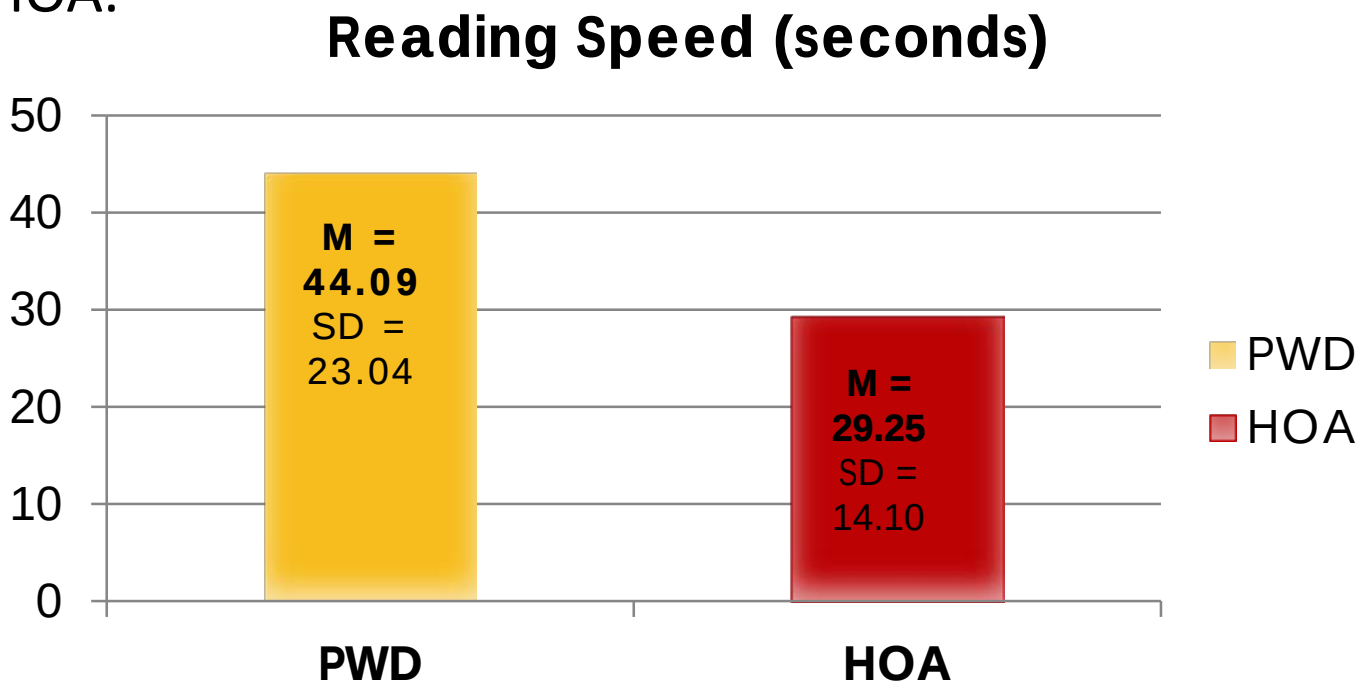
The Blue Jay Story (GORT-IV)

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.

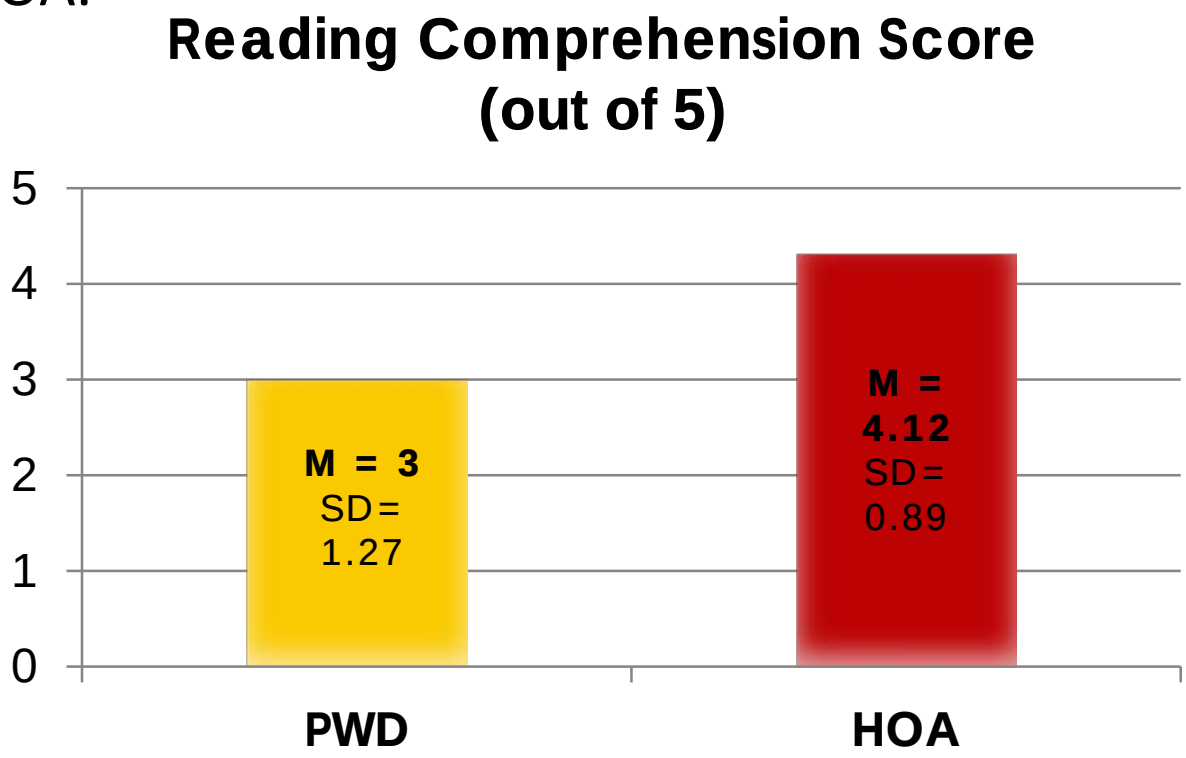


Results: Reading Comprehension

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.

	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 don't know*).
1	Incomplete or reference to a minor inferential/literal detail. E.g. ***Things Happen***
2	Title containing only literal OR only inferential information. E.g. ***The Blue Jay, Solving a Puzzle***
3	Title containing both literal AND inferential information. E.g. ***The Clever Blue Jay***

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)

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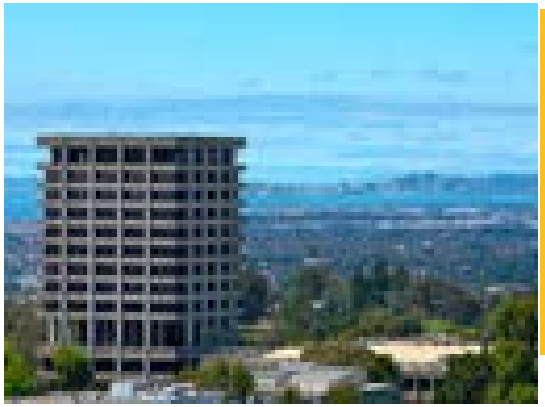

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