

Establishing the DementiaBank Protocol: Using Big Data to Understand Language Changes in Dementia



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Introduction

- By 2050, it is expected that 12.7 million Americans over 65 years will be living with Alzheimer's disease and related dementias (ADRDs).¹
- To support this public health crisis, research has prioritized **prevention and early detection** at the **mild cognitive impairment (MCI) stage**.²
- Although AD is primarily characterized by impairment in episodic memory,³ **language abilities are often impaired and may precede the decline of other cognitive abilities**.⁴
- **Spoken language measurement** may help researchers better understand the progression of AD and to detect early decline.^{5,6}
- To study the progression of language, **open access databases** are needed. **TalkBank** is an open access database for transcribed multimedia data from spoken language interactions.⁷
- Our goal is to expand DementiaBank a clinical bank within TalkBank.

The overall goal of this work is to:

- (1) Describe the new DementiaBank protocol
- (2) Describe the Delaware Corpus data
- (3) Illustrate types of analyses using CLAN and additional resources in DementiaBank/TalkBank

DementiaBank Protocol

Discourse Protocol

Picture Description: Cookie Theft⁸

Story Narrative: Cat Rescue,⁹ "Going & Coming,"¹⁰ Cinderella¹¹

Procedural Discourse: PB&J

Personal Narrative: Hometown

Cognitive-Linguistic Battery

Boston Naming Test–Short Form¹²

Hopkins Verbal Learning Test - Revised¹³

Wechsler Memory Scale–Revised: Logical Memory Subtests¹⁴

Montreal Cognitive Assessment¹⁵

All discourse protocol scripts and materials can be accessed from the DementiaBank website

Transcription

- Audio files are transcribed into CHAT format to be analyzed using various CLAN commands.
- CHAT transcription can be completed using one of two methods: (1) manual transcription or (2) Automatic speech recognition (ASR) transcription

Delaware Corpus

- To date, participants (n=53) were recruited from previous studies at the University of Delaware.
 - **20 neurotypical participants**
 - **33 MCI participants**
- Participants completed **one session** lasting ~90 minutes **via Zoom**.
- **Participants were classified** based on the National Institute of Aging-Alzheimer's Association criteria¹⁶ as determined by a neuropsychologist.
- To be classified as MCI, participants had to **meet all four criteria** specified below:
 1. Concern regarding change in cognition
 2. Impairment in 1+ cognitive domains through objective assessment
 3. Preservation of independence in functional abilities
 4. Not demented
- To be classified as neurotypical, participants had to meet criteria 3 & 4, and produce scores within normal limits on cognitive assessments.



Figure 1. Norman Rockwell "Going and Coming" print¹⁰

Table 1. Delaware Corpus Demographics

	Neurotypical (n=20)	MCI (n=33)
Mean Age (SD; Range)	69.6 (5.9, 62-82)	74.8 (8.8, 61-91)
Sex		
Male	5	16
Female	15	17
Race		
Black/African American	0	3
White	20	30
Education		
High School/Equivalent	1	1
Some College	2	2
Associates/Technical	1	3
Bachelors or Higher	16	27

Example Analyses

- **Cinderella Story: Core Lexicon (CoreLex)**
 - CoreLex is a measure used to determine specific lexical items used to tell a story and can also be compared to norms.¹⁷
- Below, we use the CoreLex analysis to:
 - Compare MCI and neurotypical group performance from the Delaware corpus
 - Compare Delaware corpus groups to a larger group of neurotypical adults established by Dalton et al., 2020¹⁸

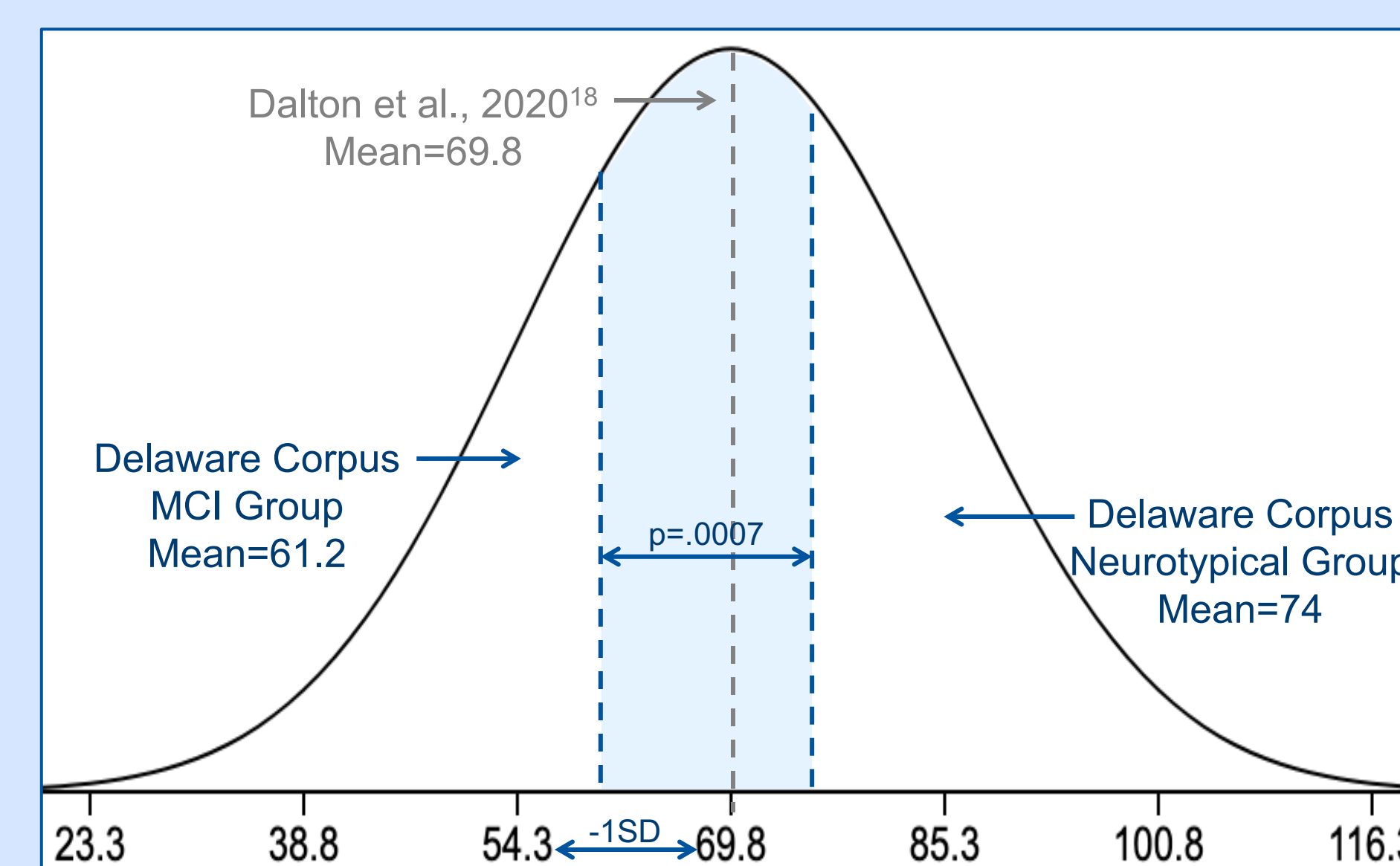


Figure 2. Illustration of CoreLex analysis between Delaware corpus groups and using Dalton et al., 2020¹⁸ norms

Educational Resources

- Manuals, tutorial screencasts, browsable database, collaborative commentary, and more!



Figure 3. Images of DementiaBank/TalkBank educational resources

Next Steps

- **Expand** the database to include **diverse** populations
- Develop **more educational resources**
 - Develop "Grand Rounds" tutorial to provide in-depth illustrative examples of communication challenges
 - Prepare "Classroom Activities" for students to practice language sample analysis, plan treatment goals, and compare discourse across disorders
- **Refine analyses techniques** to help better understand the progression of spoken language across of continuum (neurotypical, MCI, and dementia)

How Can YOU Get Involved?

- **Join the TalkBank consortium** (scan the QR code)
- **Learn how to use the CLAN and CHAT tools** for computer-based transcription, coding, and automated analyses
- **Analyze data** from the Delaware corpus and other DementiaBank corpora
- **Contribute your own data**
 - Using the DementiaBank protocol
 - Non-protocol language samples from adults across ADRDs



NIH National Institute on Aging

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