

Revisiting the Cookie Theft Picture for Cognitive Impairment: Assessing Its Relevance for Discourse Analysis After Four Decades

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BACKGROUND

- The Cookie Theft Picture Description Task (CTPDT) [1] is a standard tool for assessing discourse in cognitive impairment. Linguistic measures can be used to evaluate discourse output
- The original image is criticized as outdated, culturally biased, and limited in relevance for diverse modern populations [2–4]

OBJECTIVE

- Compare discourse measures in participants with Mild Cognitive Impairment (MCI) and Healthy Controls (HCs) from two cohorts, 40 years apart (1980s vs. 2020s)

METHODS

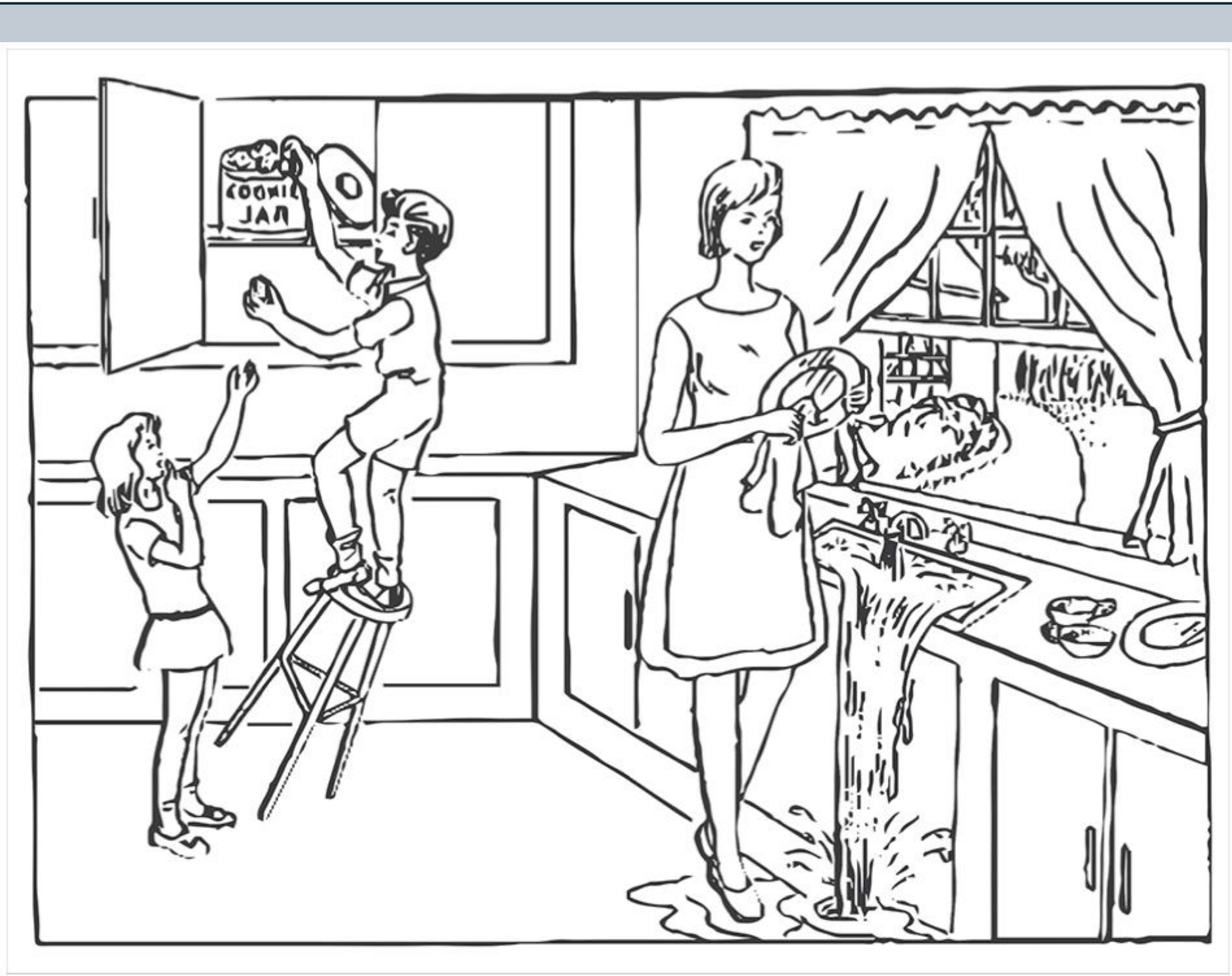


Figure 1. The Cookie Theft picture from the Boston Diagnostic Aphasia Examination (BDAE) [1]

Cohorts and Participants

- 1980s:** 17 MCI, 36 HCs: from the Pitt Corpus within *DementiaBank* [5]
- 2020s:** 11 MCI, 15 HCs: collected as part of a larger multimodal project on early detection of cognitive impairment using automatic speech analysis and eye-tracking biomarkers

Information Units (IUs) Analysis

IUs are distinct pieces of information to be conveyed in a picture description, such as key details about subjects (like a “boy” or “girl”), locations (such as a “kitchen”), and actions (e.g., “taking cookies”) [6].

Information Density (ID) is calculated as

ID= Number of Information Units (IUs) / Total Number of Words

Unique IUs: How many of the 22 IUs are mentioned

Unique ID= Number of Unique IUs Mentioned / Total Number of Words

RESULTS

Group	Mean Age	Male / Female	Mean Education	Mean Score
1980s HC	62.0	15 / 21	14.1	MMSE: 29.2
1980s MCI	66.4	10 / 7	15.3	MMSE: 27.8
2020s HC	71.6	5 / 10	16.4	MoCA: 27.2
2020s MCI	76.8	9 / 2	16.9	MoCA: 21.9

Figure 2. Descriptive Statistics of Age, Gender, Education, and Cognitive Scores

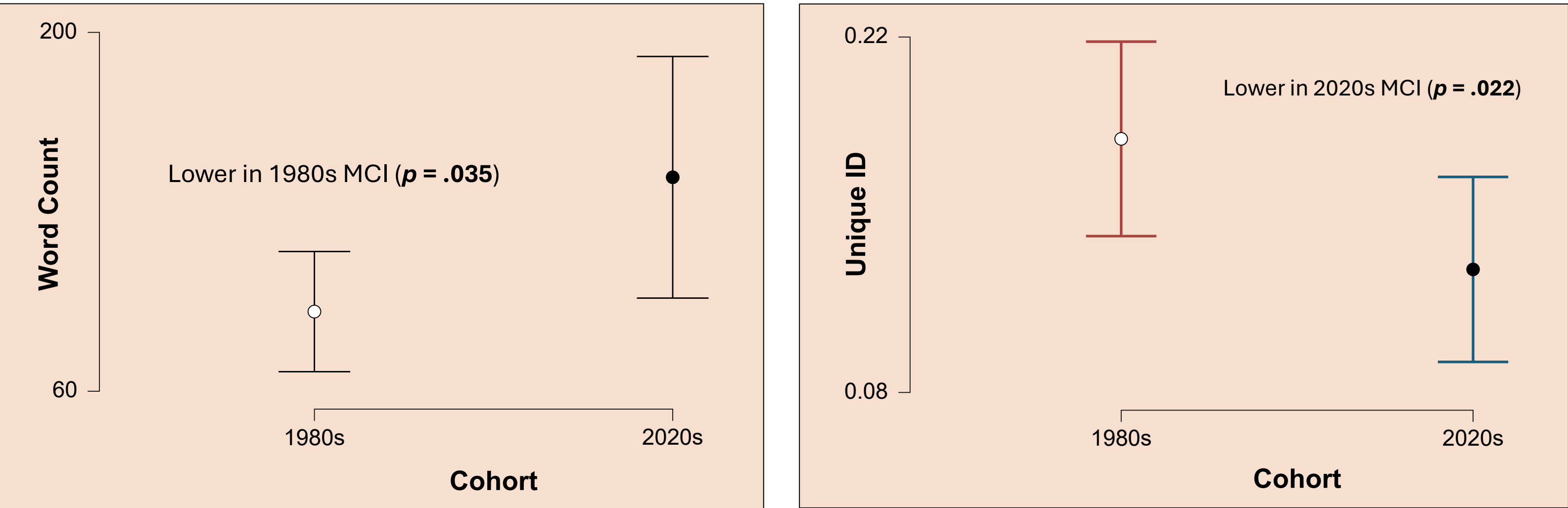


Figure 4. Discourse Measure Differences in MCI groups: 1980s vs. 2020s

CONCLUSION

Most discourse measures, including total IUs and ID, showed no significant differences across cohorts. However, Unique IUs differed in Healthy Controls, and Unique ID differed in MCI participants. The higher Unique IUs in 2020s HCs may reflect higher education, enabling richer lexical access. Conversely, the lower Unique ID in 2020s MCI might indicate more advanced cognitive decline, reducing verbal efficiency. These findings suggest the CTPDT remains applicable, but results from older datasets should be interpreted with caution.

REFERENCES

[1] Goodglass, H. & Kaplan, E. (1972). Boston diagnostic aphasia examination. Philadelphia, PA: Lea & Febiger
[2] Bérubé, S. et al. (2019). *American Journal of Speech-Language Pathology*, 28(1S), 321–329.
[3] Cummings, L. (2019). *Pragmatics and Society*, 10(2), 153–176.
[4] Favaro, A. et al. (2024). *Odyssey: Speaker and Language Recognition Workshop*, 201–208.
[5] Becker, J. T., Boller, F., Lopez, O. L., Saxton, J., & McGonigle, K. L. (1994). The natural history of Alzheimer's disease: description of study cohort and accuracy of diagnosis. *Archives of Neurology*, 51(6), 585–594.
[6] Croisile, B. et al. (1996). *Brain and Language*.

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