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Cognitive disorders as sources of variation in dialogues

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INTRODUCTION

Multiple Sclerosis (MS)
• Neurodegenerative disorder including physiological, motor, cognitive and psychological impairments [1]

Cognitive impairment (CI) in up to 65% patients with MS: deficits in planning and decision making, working memory, attention and speed of processing [2]

- Planning strategy: more time needed to plan the upcoming speech material
- Articulation rate slower with low working memory capacity and slower processing speed
- Interlocutors: similar prosodic adaptation by interlocutors

Research questions
(1) Is turn-taking timing differently adjusted in MS patients with/without cognitive deficits?
(2) Is prosodic adaptation related to cognitive deficits in MS?

METHODS

Neurocognitive tests [3,4]
• Working memory: Letters and number sequencing task; SDMT
• Speed of processing: PASAT-3s
• Phonemic and Semantic fluency tests

Linguistic task
• Shipwreck scenario game [8]
• Dyads: MS vs. C / C vs. I (see table)
• Labeling of Interpools Units and gaps in Q-A pairs (PRAAT)
• Adaptation by interlocutors

Statistics: Mixed models (p < .05)

RESULTS & DISCUSSION

Speakers’ Gaps

Interlocutors’ adaptation

• Strategies in interpersonal coordination depend on cognitive abilities: MS-CI vs. MS-NCI \( \beta = 0.85, SD = 0.23, t = 3.6 \); MS-NCI = C
• Longer gaps in Q-A -> more time preparation for MS-CI
• Wh-questions slower than polar questions -> greater cognitive complexity of response involved [9]
• Interlocutors adapt their gaps to MS-CI \( \beta = 0.38, SD = 0.13, t = 2.8 \)

CONCLUSION

• Cognitive constraints as source of variability in dialogues -> speech planning as flexible [10]
• Speech-based technologies to complement CI screening and monitoring + training therapists
• Future work: finer-grained analysis of different question types.

PARTICIPANTS

N | MS-CI* | MS-NCI* | Controls (C)** | Interlocutors (I)**
---|--------|--------|--------------|---------------------
6 | 6 | 12 | 12

| Age | 50.6 (6.3) | 44 (11.4) | 36.9 (16.1) | 23.4 (3.4) |
| Gender | 5F/1M | 5F/1M | 10F/2M | 10F/2M |
| EDSS | 5 (1.18) | 3.2 (1.25) | -- | -- |

* Relapsing remitting form; Exclusion criteria: therapy with antidepressant; dyslexia; dysthria; history of alcohol or drug abuse; history of psychiatric disorder; hearing disorders; ** Matched in gender and education level with MS; *** Speech therapists or neuropsychologists;

Participants demographics

Neurocognitive scores

• Comparative analysis of healthy vs MS populations to get insight into cognitive constraints on speech planning
• Reading speech and CI:
  - Planning strategy: -> longer time needed to plan the upcoming speech material

• Read speech and CI:
  - Articulation rate slower with low working memory capacity and slower processing speed
  - Planning strategy: -> more time needed to plan the upcoming speech material

• Prosodic adaptation: similar prosodic adaptation by interlocutors

References