Discourse in Memory Deficits in Cantonese Speakers with Dementia

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Background Information & Rationale

Dementia & Memory

- High prevalence of dementia in Hong Kong (7.2%) (Wu et al., 2018)
- **Memory**: Major impairments in people with dementia (PWD) and clinical hallmarks for Alzheimer's Disease (AD) (Arlt, 2013; Economou et al., 2016)
- Impaired **episodic memory (EM)** and **verbal short-term memory (vSTM)** were widely reported (Caramelli et al., 1998; Greene et al., 1996)

Memory & Discourse

- Discourse analysis becomes more popular for studies in dementia
  - **Cost-efficient** and quick (Filiou et al., 2019)
  - Multi-dimensional evaluation of various linguistic levels
- Both EM and vSTM are vital in discourse production
  - Close relationship between memory and discourse production in PWD

Current Study Aims

To investigate the relationship between memory and discourse production in Cantonese-speaking PWD, with the following research questions:

1). Is episodic memory correlated with global coherence of personal narrative in Cantonese-speaking PWD?

2) Is vSTM correlated with informativeness of discourse production in Cantonese-speaking PWD?

a. Specifically, is vSTM correlated with indices of Main Concept Analysis (MCA) in picture description?

b. Is vSTM correlated with empty speech in personal narrative and picture description?

3). Which discourse measure(s) best predict(s) memory deficits in Cantonese-speaking PWD?

Previous Literature & Research Gap

Speakers with traumatic brain injury (TBI)

- Working memory (WM) +ve correlated with syntactic complexities
- vSTM –ve correlated with informativeness and global coherence

People with aphasia (PWA)

- WM +ve correlated with global coherence in story retell
- WM X correlated with global coherence in personal narrative

- **Contradictory results, but why?**
  - Use of different neuropsychological tests
  - Use of different discourse tasks

(Cahana-Amitay & Jenkins, 2018 ; Galetto et al., 2013; Rogalski et al., 2010; Youse & Coelho, 2005)

English Speakers with mild cognitive impairment/ dementia

- EM +ve correlated with global coherence
- WM -ve correlated with use of pronouns

Cantonese speakers with neurogenic conditions

- Lacking in research targeting PWD
- TBI speakers: +ve correlations between attention, executive functions and syntactic complexities

- **Research Gap**
  - Contradictory results in Western literatures
  - Lack of research in the Hong Kong (Chinese) context

(Almor et al., 1999; Kong et al., 2020; Lau et al., 2021; March et al., 2009; Seixas-Limas et al., 2020)

Methodology

Participants

- 119 in total
- Recruited from existing project (BrainLive)
- Diagnosed with **mild or moderate dementia**/ Receiving dementia services
- With no severe visual or hearing impairment

萬友智力 BRAINLIVE

Project: Connecting Families Living with Dementia In Pandemic Situations and Beyond
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Discourse Samples

- 70 narratives & 104 picture description samples collected
- Picture description: **Main Concept Analysis** (MCA) Picture Set 3 - Buying ice-cream (Kong, 2016)
- Personal narrative: most **important life events**
- Samples that were less than 40 words were excluded

Memory & Discourse Measures

Memory measures

- **Episodic memory**
  - Following Seixas-Lima et al. (2020)
  - Calculate the number of episodic details among all T-units (i.e., an independent clause with or without a subordinate clause)
- **Verbal short-term memory**
  - **MoCA** (immediate recall & delayed recall)
  - **OCS** (delayed recall & recognition recall)

Discourse measures

- **Global coherence** (4-point scale rating)
- **Informativeness**:
  - Main Concept Analysis (MCA)
  - Cantonese Aphasia Battery Information Rating
- **Empty Speech** (indices)
  - Percentage of pronouns
  - Pronouns without antecedents
  - Deictic terms
  - Repetitions
  - Empty phrases
  - Comments

***All scorings were analyzed with inter- and intra-rater reliability, with mostly very high agreement**

Statistical Analysis

Correlation

- Non-parametric tests were used as data was not normally distributed
- **Spearman's Rank Correlation**
- Between memory measures and discourse measures

Regression

- 7 memory measures in MoCA and OCS → converted into a composite score for overall vSTM performance
- **Stepwise method** in linear regression was used
- **Independent** variable: discourse measures
- **Dependent** variable: memory measures

Main Results

Picture Descriptions (correlation)

(1) Global coherence & EM: r = **-.478*****
(2) Global coherence & vSTM
- MoCA cued recall: r = **.366*****
- MoCA total recall: r = **.306****
- OCS delayed recall: r = **.281*****
- OCS delayed recall: r = **.382*****

(3) Pronouns without antecedents & EM: r = **-.253***
(4) Comments & EM: r = **-.356****
(5) Empty phrase & vSTM
- MoCA immediate recall: r = **-.208***
- MoCA cued recall: r = **-.285****
- MoCA total recall: r = **-.262****

(6) Information rating & EM: r = **0.501****
(7) Information rating & vSTM
- MoCA delayed recall: r = **.197***
- MoCA cued recall: r = **.437*****
- MoCA total recall: r = **.393*****
- OCS delayed recall: r = **.293****
- OCS recognition recall: r = **.259****
- OCS total recall: r = **.358*****

(8) MCA indices (AC, AI, MC Score) & EM, vSTM: **+ve cor.**
(9) MCA index (AB) & EM, vSTM: **-ve cor.**

- Most correlations between empty speech & memory were weak (r<.30)
- AB and MC Score yielded highest correlations with memory among all MCA indices

Personal Narratives (correlation)

(1) Global coherence & EM: r = **.772*****
(2) Global coherence & vSTM
- MoCA cued recall: r = **.363*****
- MoCA total recall: r = **.282***
- OCS delayed recall: r = **.239***
- OCS delayed recall: r = **.237***

(3) Empty speech:
- Use of rep & MoCA immediate recall: r = **-.296***
- Empty phrase & OCS recognition recall: r = **-.254***

		MCA AC	MCA AI	MCA IN	MCA AB	MC Score	AC per Minute
Episodic memory		.493***	.201	.041	-.421***	.454***	.476***
MOCA	Immediate recall	.063	.034	.074	-.133	.125	.070
	Delayed recall	.097	.078	.070	-.197*	.152	.047
	Cued delayed recall	.335***	.249*	.110	-.408***	.416***	.275**
	Total recall	.258**	.209*	.130	-.355***	.348***	.206*
	Total score	.319***	.314***	.152	-.446***	.443***	.275**
OCS	Delayed recall	.380***	.251**	-.075	-.318***	.337***	.270**
	Recog. recall	.089	.227*	.034	-.214*	.218*	.170
	Total recall	.256**	.338***	.009	-.341***	.352***	.228*

Regression analysis

- **Model of episodic memory**: global coherence in personal narrative was the strongest predictor, accounting for a total 68.5% of variance, [F (4,64) = 38.045, p<.001]
- **Model of vSTM composite score**: information rating of CAB as the ONLY discourse predictor, accounting for 20.5% of variance, [F (1,67) = 18.490, p<.001]

*p<.05, **p<.01, ***p<.001

Discussion

1st research question: SUPPORTED
- Global coherence positively correlated with EM
  - EM is mainly responsible for recalling specific time, location and thoughts, which are all essential to a coherent personal narrative
- It also positively correlated with vSTM measures

2nd research question: SUPPORTED
- MCA indices positively correlated with vSTM measures in picture description tasks
- MCA indices also positively correlated with EM in picture description tasks
- Some empty speech indexes (deictic terms, repetitions & empty phrases) negatively correlated with vSTM measures
  - However, correlations were relatively weak
- Information rating of CAB sig. correlated with episodic memory and vSTM

3rd research question: SUPPORTED
- Global coherence is the **best predictor** of EM
- Information rating of CAB is the best and only predictor of vSTM composite scores
  - it is an overall scoring of relevant content, including any naming & descriptions.
  - it has a broader scoring criteria than other content-based measures, such as MCA, which might explain why it might be more sensitive to predict vSTM

Clinical Implications & Limitations of the paper

Clinical Implications

- Enhanced understanding between memory and discourse in Cantonese-speaking PWD
- Clinical insights for PWD management
  - SLPs can focus on two discourse measures to predict PWD's memory status for more **cost-efficient** assessment

Limitations & Future directions

- Length of narrative samples were relatively short (70-80 Chinese characters)
- Lack of **representativeness** of participants (lack of those with moderate to severe dementia)
- Correlations between WM and discourse production could be explored

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