

Speak more or understand more: a preliminary study on the age-related changes in association between language and memory abilities

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BACKGROUND

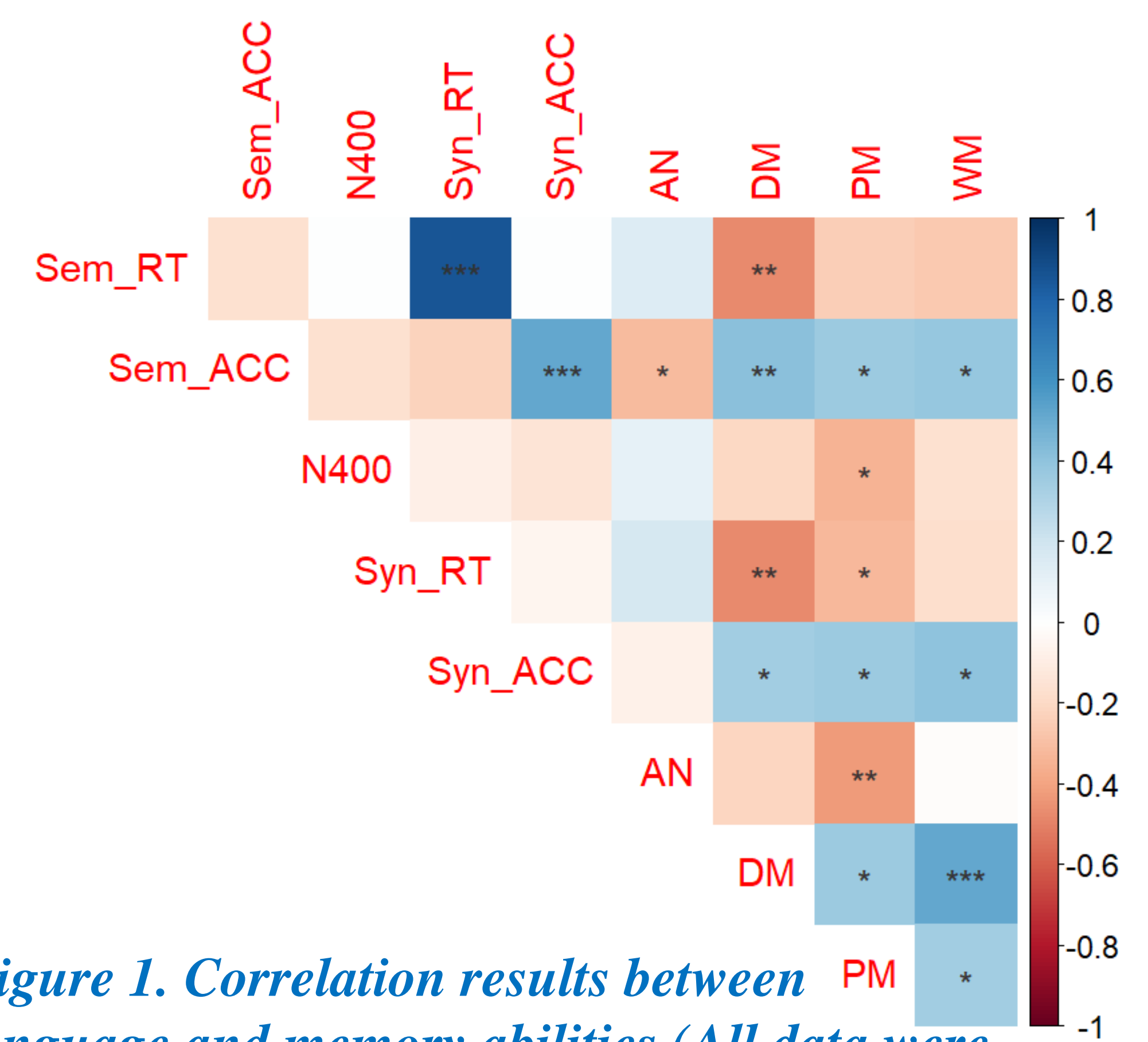
- A clear understanding of aging is crucial to addressing aging-related problems. This study aimed to extend and deepen our understanding of aging mechanisms by investigating the relationship between language and memory abilities in younger and older individuals. The study examined semantic and syntactic abilities, working memory, as well as declarative and procedural memory. Since little research has been conducted on the relationship between memory ability and both production and comprehension during aging, both modalities were considered (Giglio et al., 2022).
- In line with previous studies, we hypothesized that older adults would perform worse on language and memory tasks. Language and memory performance would also be correlated. Memory capacities are predicted to be unequally correlated with language abilities in expressive and receptive modalities.

METHODS

- 21 younger (24.3 ± 2.9 years old, 12 F) and 19 older Chinese adults (68.1 ± 2.6 years old, 9 F) were recruited. All older adults were cognitively healthy based on the Montreal Cognitive Assessment (27.3 ± 1.2). The tests used in this study are shown in Table 1. During comprehension tasks, EEG signals were collected simultaneously.

Table 1. Tests and Performance

Tasks	Abilities	Parameters (abbreviations in Fig. 1)	Performance		p
			Y	O	
Constrained Production test	Expressive semantic ability	Planning time (Sem_RT)	12.4	22.2	.003
	Expressive syntactic ability	Planning time (Syn_RT)	13.2	23	.01
Correctness Judgment test	Receptive semantic ability	Accuracy (Sem_ACC)	91.2	86	.004
		N400 effect (N400)	-2.32	-1.64	.35
	Receptive syntactic ability	Accuracy (Syn_ACC)	97.6	93.5	.032
Declern test	Declarative memory	AN effect (AN)	-2.32	-0.69	.02
Serial Reaction Time test	Procedural memory	D-prime (DM)	1.48	0.9	<.0001
Corsi Blocks test	Working memory	Reaction time (PM)	0.45	0.1	<.0001
		Span (WM)	11.93	9.5	<.0001



RESULTS

- Older adults performed significantly worse than younger adults in both syntactic and semantic tasks for both production and comprehension ($ps < .05$), as shown in Table 1.
- As shown in figure 1, there was a significant relationship between semantic and syntactic abilities in production as well as comprehension. However, semantic and syntactic abilities were not equally associated with memory capabilities in production and comprehension.
- Neither semantic nor syntactic abilities show any significant correlation between production and comprehension.

DISCUSSION

- In this study, evidence from the Chinese population contradicted the notion that language is unitary (MacKay & Abrams, 1996).
- Language is an integrated system of interconnected modules and modalities, including semantics, syntax, and production and comprehension. Therefore, different change trajectories occur for different modules and modalities during aging, and they are differentially related to different memory capacities. This provides an opportunity to recycle the relatively preserved modules/modalities to compensate for the declined modules/modalities.

LIMITATIONS

- Considering the small sample size and technical difficulties, we did not explore the neural mechanisms behind the performance of all modules and modalities, and their association with memory abilities. Future studies should examine the compensatory role of different modules/modalities.