

Effects of Aging, Sex and Forgetfulness on Mental Rotation Performance



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Introduction

Declining visuospatial ability may be associated with prodromal Alzheimer's Disease (AD) or Mild Cognitive Impairment (MCI)[1-4]. Here we set out to establish how healthy older adults performed over time on a remotely administered mental rotation task. Specifically, we investigated: 1) the effects of age, gender and education on mental rotation performance and 2) whether concurrent working memory measures were predictive of mental rotation performance.

Participants

282 healthy adults (age 56-89)

	n	Mean Age	Mean Education
Males	170	72.3 (57-89)	16.12
Females	112	68.8 (56-84)	17.45

Method

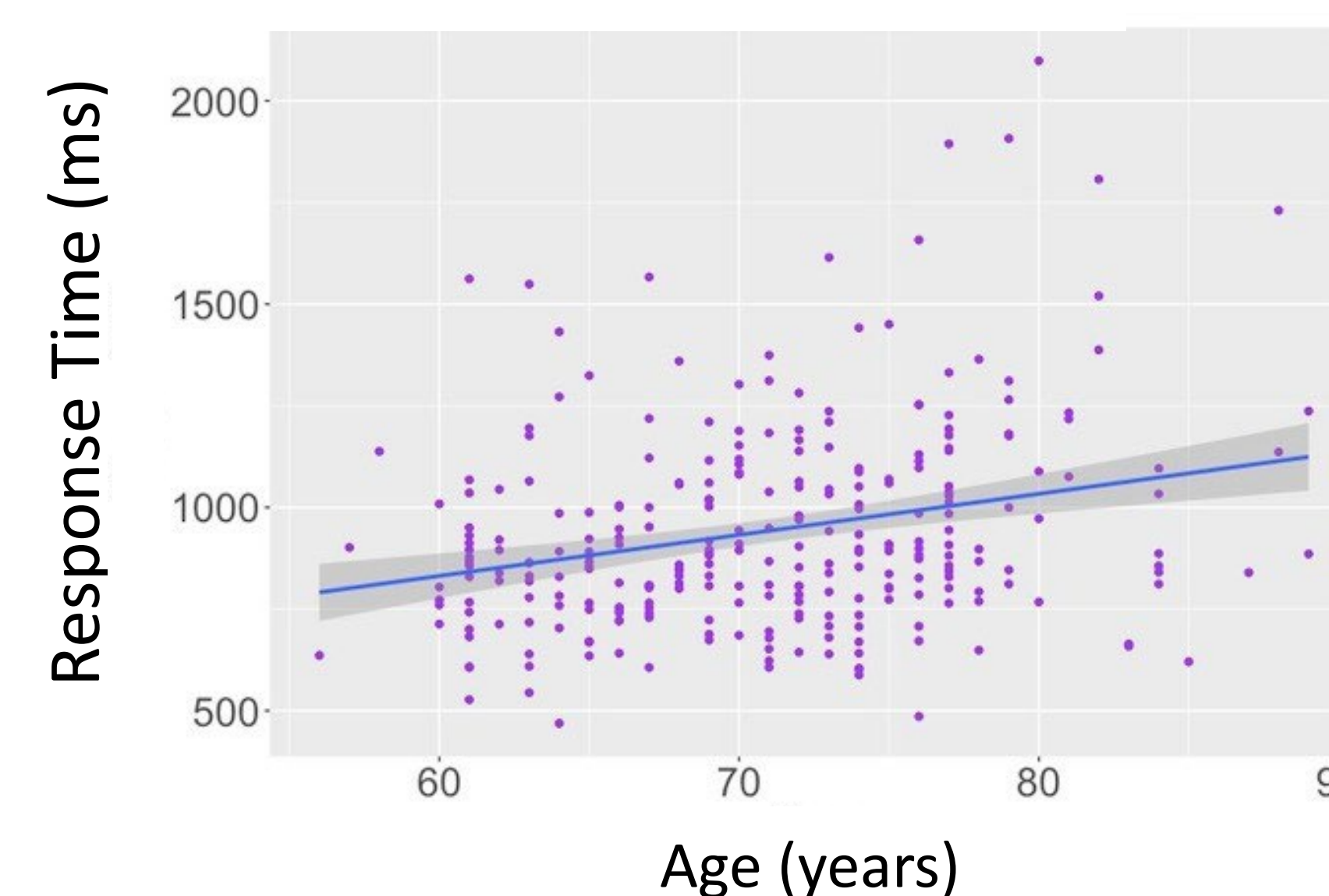
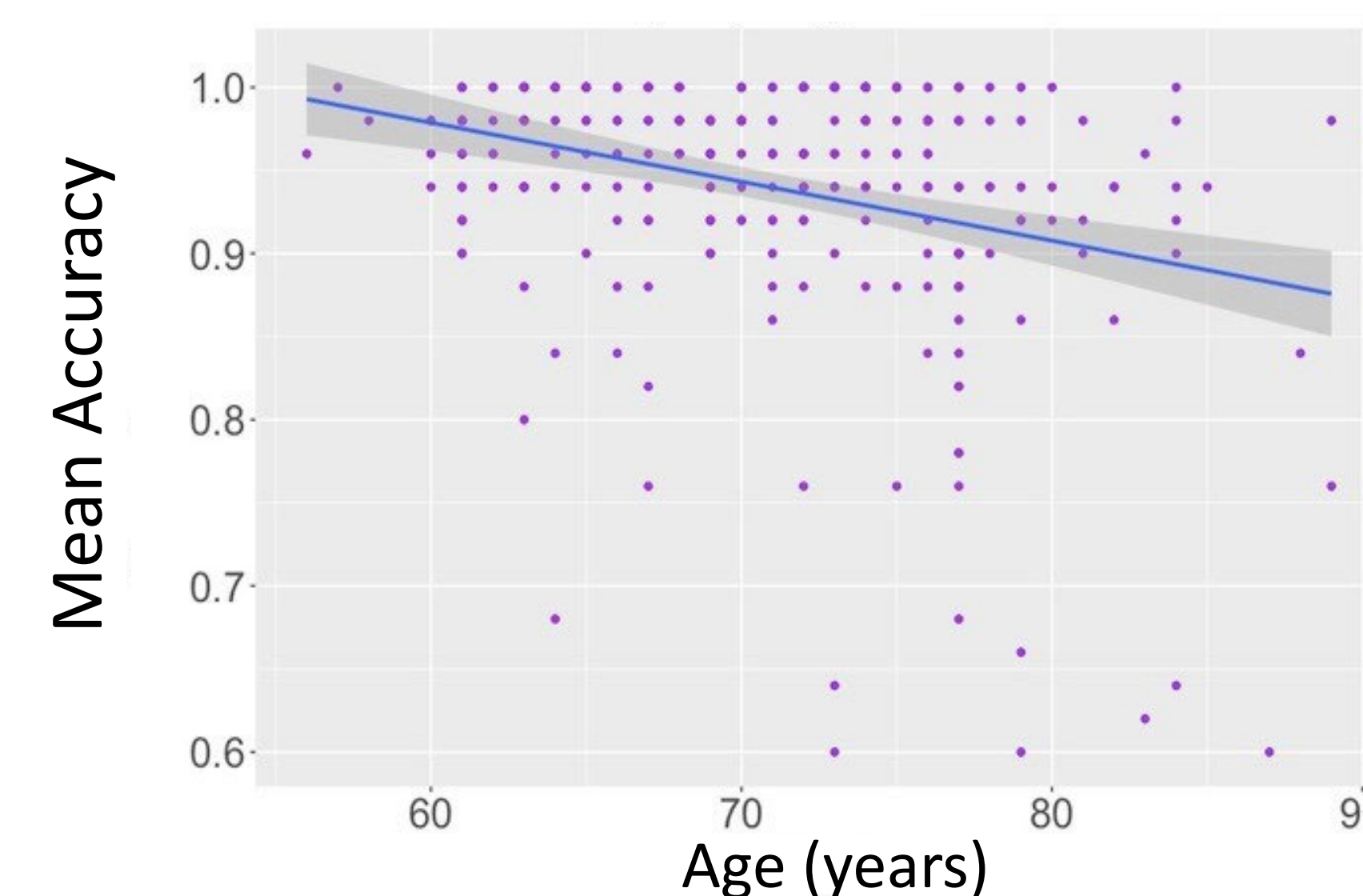


- Participants decide as quickly as possible whether the letter is in its **typical** (R) or **mirror-reversed** (Я) orientation.
 - Response: **left** or **right** mouse click
- Rotation Angle: 0°, +/-60°, or +/-120° of rotation
 - This task was remotely **administered in the participant's home** as part of a larger California Cognitive Assessment Battery (CCAB) developed by

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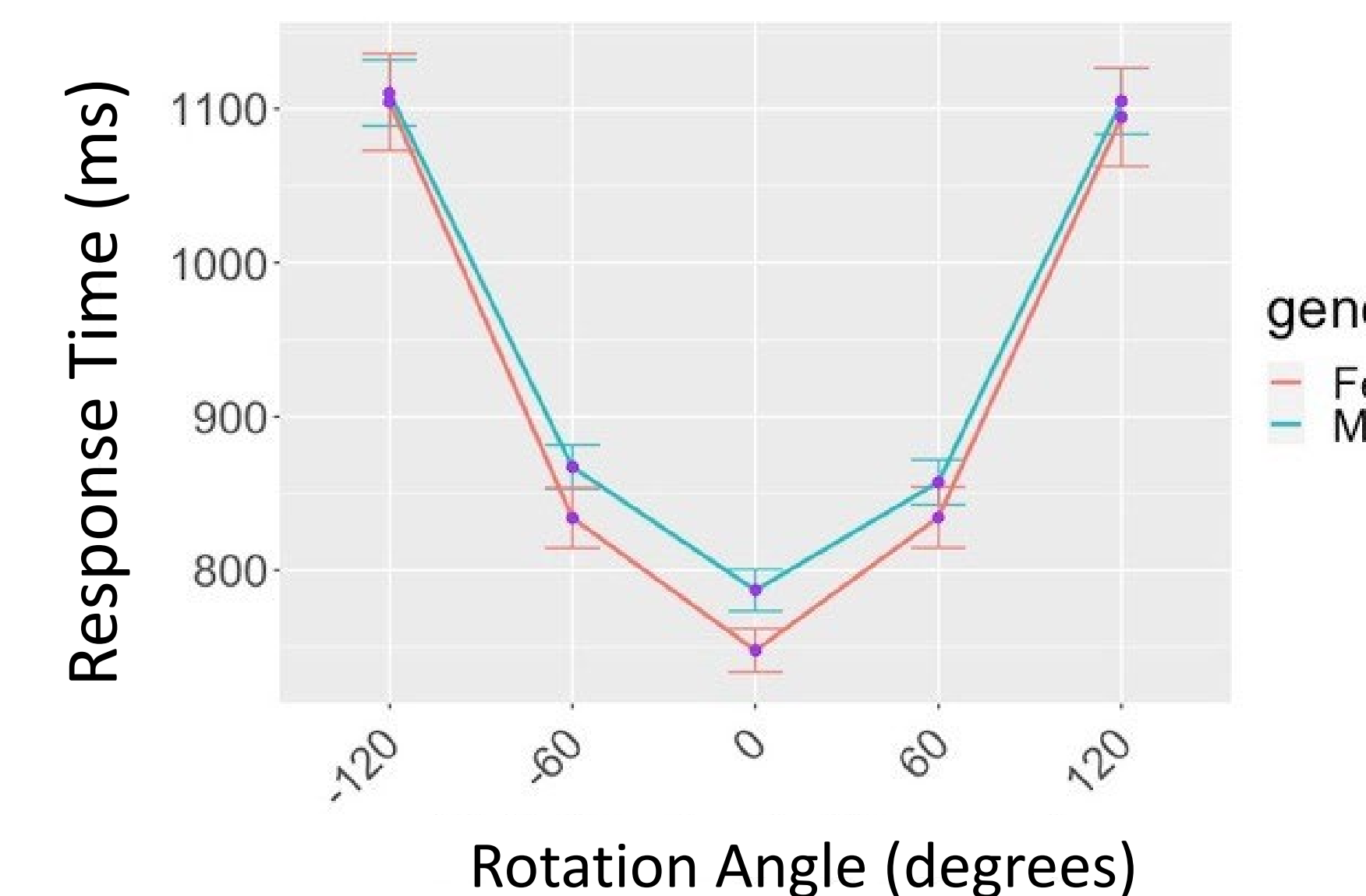
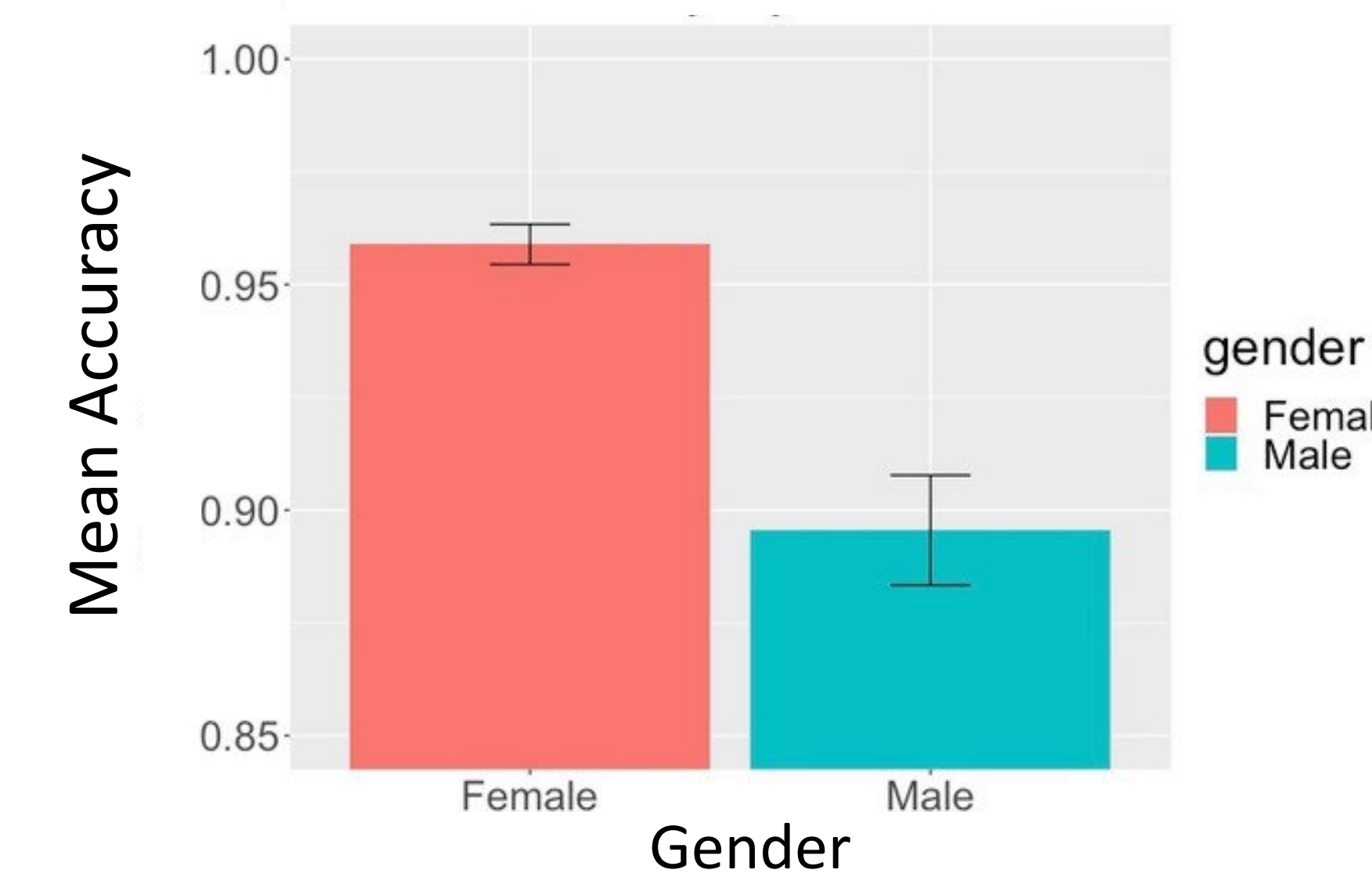
Results

AGE



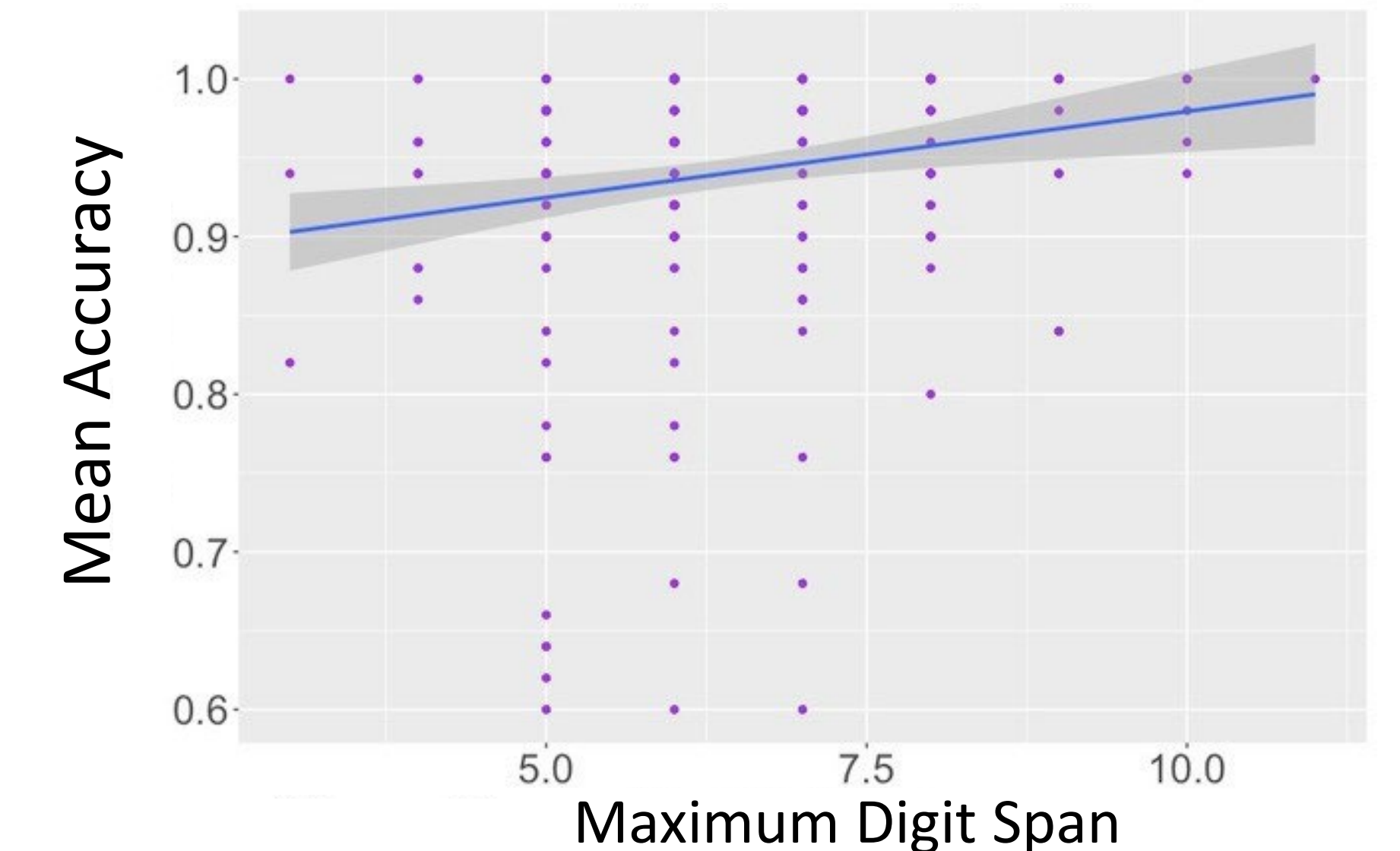
❖ Increasing Age was associated with less accuracy and slower response times.

GENDER



❖ Rotation Angle was predictive of RTs, as expected, but did not interact with Gender.

MEMORY



❖ Higher digit span scores suggest greater memory capacity while higher CFQ scores indicate less capacity.

Accuracy	Model					
Variable	B	SE	95% CI for B		β	p
			LL	UL		
Gender**	0.04	0.02	0.01	0.08	0.16	0.007**
Education	0.008	0.004	-0.0005	0.02	0.11	0.064
Age**	-0.003	0.001	-0.006	-0.001	-0.18	0.003**
CFQ Forgetting	-0.0004	0.002	-0.004	0.003	-0.01	0.803
DS Max*	0.013	0.006	0.001	0.024	0.13	0.027*

RT Mean	Model					
Variable	B	SE	95% CI for B		β	p
			LL	UL		
Gender	9.23	31.1	-52.01	70.46	0.02	0.767
Education	-11.48	8.27	-27.75	4.8	-0.08	0.167
Age**	8.86	2.25	4.42	13.29	0.24	<.001**
CFQ Forgetting*	6.71	3.26	0.29	13.13	0.12	0.041*
Digit Span Max	-17.04	10.73	-38.15	4.08	-0.09	0.113

RT Cost (0°-120°)	Model					
Variable	<i>B</i>	<i>SE</i>	95% CI for <i>B</i>		β	<i>p</i>
			LL	UL		
<i>Gender**</i>	134.44	35.2	65.16	203.54	0.24	<.001**
<i>Education**</i>	-32.65	9.98	-52.29	-13.01	-0.2	0.001**
<i>Age**</i>	8.36	2.49	3.46	13.27	0.2	<.001**
<i>CFQ Forgetting</i>	6.81	3.82	-0.71	14.33	0.1	0.076
<i>Digit Span Max</i>	-6.65	11.54	-22.37	16.07	-0.03	0.565

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Discussion

- Lower accuracy on this mental rotation task was associated with increased age and lower digit span scores.
- Slower response times (RTs) on this task were associated with increased age and higher forgetfulness scores on the Cognitive Failures Questionnaire (CFQ).
- Poorer performance on this mental rotation task may be related to decreased memory capacity.**
- Increased age, lower education, and female gender were all associated with greater RT Cost (a steeper increase in RT with increasing rotation angle).
- Test re-test reliability was good (Accuracy: 0.68 and RT: 0.79).

References

- [1] Suzuki et al. (2018) DOI: 10.3233/JAD-170801
- [2] Lineweaver et al. (2005). DOI:10.1017/S1355617705050034
- [3] Johnson et al. (2009) DOI:10.1001/archneurol.2009.158
- [4] Morris et al. Arch Neurol. 2001;58(3):397-405.

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