Individual Differences in Memory Self-Efficacy and Learning Ability

Amy Chen, Ashley L. Miller, & Nash Unsworth

Department of Psychology, University of Oregon

Background

- Memory self-efficacy (MSE) is defined as one's perception and evaluation of their memory abilities[1,2].
  - Global MSE: Perceived memory ability *in general* (across different memory domains)
  - Concurrent MSE: Perceived *current* memory ability for a *given* task/domain–often referred to as task-specific self-confidence[3]
- Previous research indicates that concurrent measures more strongly relate to memory performance than do global measures. The relation between MSE and recall performance also appears to be stronger when task demands are high (i.e., when tasks require more controlled processing).
- However, most of this research has focused on explaining age-related declines in memory (especially the case for global MSE); hence it remains unclear whether similar individual differences in MSE exist within an age group and whether this explains learning ability.
  - The present study sought to examine whether individual differences in MSE explain learning and memory ability on a delayed free recall (DFR) task.
  - If such a relationship exists, we sought to further understand this relationship by examining how MSE relates to other crucial variables important for learning and memory [e.g., working memory capacity (WMC), long-term memory (LTM) abilities, motivation, and effective strategy use].

Methods

- In all experiments, participants were undergrad students at the University of Oregon who completed three measures of **WMC** before the DFR task. Upon completion of the **DFR** task, participants were asked to indicate how **motivated** they were to perform well on the DFR task. Finally, two measures of **LTM** ability were administered[4].
- Exp 1 and Exp 3 also included questionnaires assessing strategy knowledge[5] and encoding strategy use[6] on the DFR task.

Exp 1 (*N* = 157):

- Assessed global MSE with the **Personal Beliefs about Memory Instrument (PBMI): Specific Memory Ability Scale**[7]

Exp 2 (*N* = 146):

- Assessed concurrent MSE with **performance predictions** before each list of the DFR task. Participants were asked: "If presented with a list of 10 words, how many words do you think you'll remember?"

Exp 3 (*N* = 174):

- Used a similar method to Exp 2 but also administered an adapted version of the **Memory Self-Efficacy Questionnaire** (MSEQ)[2]
- An MSE factor score was created by entering scores from the MSEQ and memory predictions into a factor analysis using principal axis factoring. The two methods were highly correlated when assessed before (*r*'s = .50 to .64) and after (*r*'s = .45 to .69) completing DFR.

Results

Experiment 1: Global MSE

Table 1. *Relations between global MSE, DFR accuracy (DFRacc), WMC, LTM, motivation (Motiv), ineffective strategy use (IneffectUse), effective strategy use (EffectiveUse), and strategy knowledge (StratKnow)*

	DFR acc	WMC	LTM	Global MSE	Motiv	Strat Know	Ineffect Use	Effective Use
DFRaccuracy	1							
WMC	.344***	1						
LTM	.593***	.288**	1					
Global MSE	.040	.032	.055	1				
Motivation	.361***	.056	.335***	-.014	1			
StratKnowledge	.234**	-.053	.172*	.111	.200*	1		
IneffectiveUse	-.160	.018	.038	-.016	.099	-.164	1	
EffectiveUse	.343***	.075	.314***	.125	.321***	.259**	.043	1

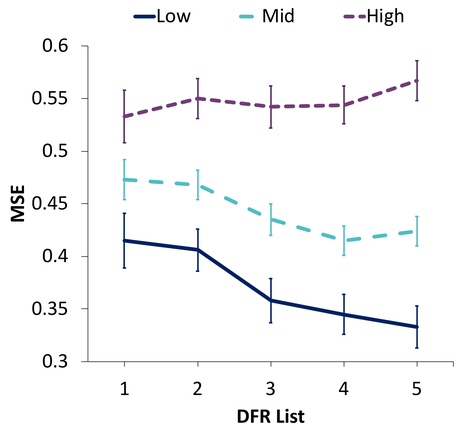
* p < .05
** p < .01
*** p < .001

Experiment 2: Concurrent MSE

Table 2. *Relations between concurrent MSE before list 1 on DFR (MSE B4L1), mean concurrent MSE across lists (Mean MSE), DFR accuracy, WMC, LTM, and motivation*

	DFR acc	WMC	LTM	MSE B4L1	Mean MSE	Motiv
DFR accuracy	1					
WMC	.344***	1				
LTM	.558***	.305***	1			
MSE B4L1	.267**	.294**	.188*	1		
Mean MSE	.653***	.356***	.348***	.733***	1	
Motivation	.411***	.214*	.212*	.163	.347***	1

Figure 1. Concurrent MSE across lists as a function of learning ability.



Experiment 3: Concurrent MSE + Strategy Use

Table 3. *Relations between concurrent MSE, DFR accuracy, WMC, LTM, mean motivation, ineffective strategy use, effective strategy use, and strategy knowledge*

	DFR acc	WMC	LTM	MSE	Mean Motiv	Ineffect Use	Effective Use	Strat Know
DFRaccuracy	1							
WMC	.414***	1						
LTM	.452***	.204**	1					
MSE	.451***	.361***	.297***	1				
Mean Motivation	.225**	.140	.318***	.213**	1			
IneffectiveUse	-.067	.067	-.072	.006	.004	1		
EffectiveUse	.204**	.137	.254**	.353***	.265***	.099	1	
StratKnow	.035	.099	.251**	.132	.054	-.171*	.361***	1

Results (continued)

Table 4. *Simultaneous Regression Predicting DFR accuracy in Experiment 3*

Variable	*β*	*t*	sr^2	R^2	*F*
MSE	.26	3.64***	.051		
MeanMotiv	.04	.55	.001		
EffectiveUse	-.01	-.20	.000		
WMC	.25	3.72***	.054		
LTM	.31	4.56***	.081	.37	18.94***

Conclusions

- While global MSE is related to recall performance among older adults[7](albeit weakly), global MSE does not seem to be a crucial factor in explaining learning ability under conditions of DFR within healthy young-adults (see Table 1).
- However, concurrent (task-specific) MSE is consistently related to enhanced learning abilities within this population.
  - MSE-related differences in learning ability get larger as a function of task experience. People with high learning ability maintain high MSE throughout task duration, whereas those with low learning ability show a steep decline in MSE (see Figure 1).
  - Higher concurrent MSE is also associated with greater WMC, greater LTM ability, increased motivation to perform well in conditions of DFR, and effective strategy use (see Tables 2 and 3).
  - There was no significant difference between low MSE and high MSE individuals with their understanding and knowledge of which strategies are most effective.
- Critically, concurrent MSE explains unique differences in DFR accuracy even when accounting for other important variables (WMC, LTM, motivation, and effective strategy use; see Table 4).
- Collectively, these results suggest that the perception and evaluation of one's specific memory abilities is an important determinant of successful learning.

References

1. Beaudoin, M., & Desrichard, O. (2011). Are memory self-efficacy and memory performance related? A meta-analysis. *Psychological Bulletin, 137*(2), 211-241.
2. Berry, J.M. (1999) Memory self-efficacy in its social cognitive context. *Richmond School of Arts & Sciences,* 69-96.
3. Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. Journal of Social and Clinical psychology, 4(3), 359-373.
4. Miller, A. L., & Unsworth, N. (In Press). Variation in attention at encoding: Insights from pupillometry and eye gaze fixations. *Journal of Experimental Psychology: Learning, Memory, and Cognition*.
5. Hertzog, C., & Dunlosky, J. (2004). Aging, metacognition, and cognitive control. *The Psychology of Learning and Motivation: Advances in Research and Theory, 45*, 215-251.
6. Unsworth, N. (2016). Working memory capacity and recall from long-term memory: Examining the influences of encoding strategies, study time allocation, search efficiency, and monitoring abilities. Journal of Experimental Psychology: Learning, Memory, and Cognition, 42, 50-61.
7. Lineweaver, T.T. & Hertzog, C. (2010). Adults' efficacy and control beliefs regarding memory and aging: Separating general from personal beliefs. *Aging, Neuropsychology, and Cognition, 5*(4), 264-296.