Cognitive Specialization of Memory:
Early life stress enhances working memory in the face of economic uncertainty.

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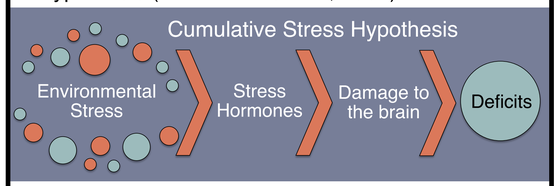
Background

Early Life Stress

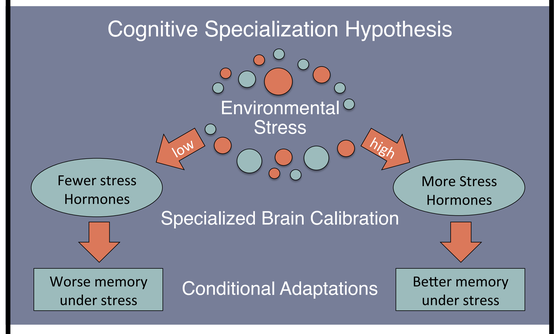
- Early life stress causes cognitive deficits.
- This notion is highlighted by the Cumulative Stress Hypothesis (McEwen & Stellar, 1993).



- This view can be misleading because it highlights the costs of early life stress without considering the benefits it might have.

Cognitive Specialization Hypothesis

- An alternative hypothesis is that stressful early life experiences may specialize cognitive abilities to perform better under specific conditions.
- The Cognitive Specialization Hypothesis suggests that exposure to early life stress specializes the mind to cope with stressful conditions (Frankenhuis & de Weerth, 2013).
- Instead of impairing the mind, early stress may direct and guide it to match the environment.



- In this sense, early life stress may not always lead to cognitive deficits. Instead, it may specialize the mind to cope with stressful circumstances (Ellis & Del Giudice, 2014).

Working Memory & Uncertainty

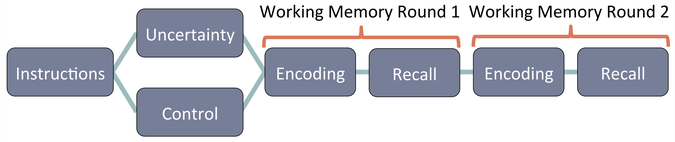
- Working memory is a central component of many cognitive abilities, including the ability to flexibly hold, use, and rapidly update information.
- We propose that early life stress might enhance working memory performance in order to cope with constantly changing environments.

Methods

Experiments

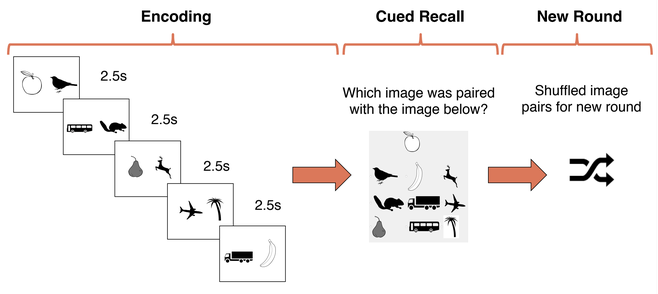
- We conducted three experiments (n=134, n = 107, n = 90) to test whether self-reported childhood stress might enhance working memory performance.
- In each experiment, half of the participants read a New York Times article depicting the uncertain nature of the economy. This article was designed to induce a threat of resource scarcity and economic uncertainty. The other half read a control story.
- After the prime, each participant completed a visual working memory task (study 1), a verbal working memory task (study 2), and a nonsense verbal memory task (study 3).
- Finally, all participants answered questions about their childhood environment and demographics.

General Study Design



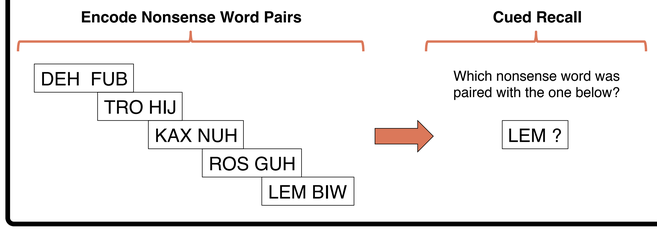
Working Memory Tasks

Study 1: Visual Working Memory



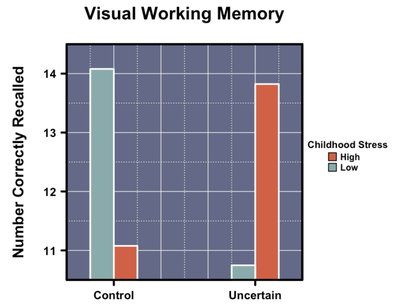
Study 2: Verbal Working Memory

Study 3: Nonsense Word Pairs Working Memory



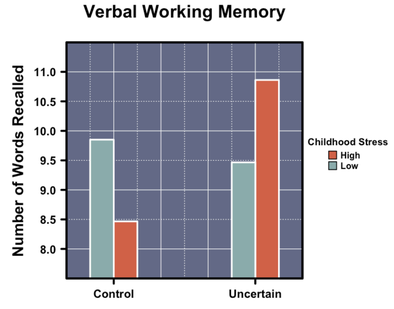
Results

Study 1



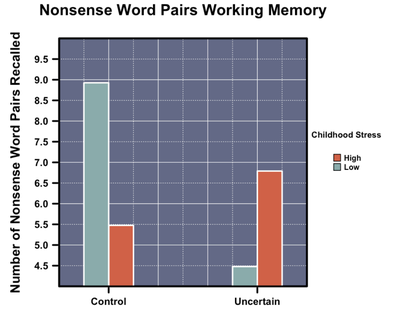
	Estimate	Standard Error	*t*-value	Beta	*p*-value
Intercept	12.58392	0.6271	20.06691	-	0.0000
Condition	-0.27701	0.86839	-0.319	-0.0271	0.75024
Childhood stress	-1.18425	0.44059	-2.68785	-0.3051	0.00813
Interaction	2.3043	0.66333	3.47382	0.3919	0.0007

Study 2



	Estimate	Standard Error	*t*-value	Beta	*p*-value
Intercept	9.13322	0.42421	21.52977	-	0.000
Condition	1.21458	0.62846	1.93263	0.1863	0.056
Childhood stress	-0.64563	0.43832	-1.47296	-0.1862	0.1438
Interaction	1.49005	0.67295	2.21419	0.276	0.029

Study 3



	Estimate	Standard Error	*t*-value	Beta	*p*-value
Intercept	6.93818	0.87416	7.937	-	0.0000
Condition	-1.04975	1.20996	-0.86758	-0.0916	0.38804
Childhood stress	-2.1448	0.96287	-2.22752	-0.3223	0.02852
Interaction	3.33311	1.38493	2.4067	0.3532	0.01824

Discussion

Summary of Findings

- Three experiments tested the idea that early life stress may actually enhance, instead of impair, working memory performance.
- Across these experiments, we consistently found an interaction between the stress-inducing experimental condition and self-reported early life stress.
- Individuals who reported experiencing more early life stress showed *enhanced* working memory performance in the uncertain condition compared to the control condition.

Limitations & Future Directions

- These findings suggest that early life experience may enhance working memory under stressful conditions. However, our early life stress measure was retrospective.
- Future research will need to use prospective, longitudinal assessments of early life stress to better understand how early life stress influences memory.

Conclusion

- The mainstream Cumulative Stress Hypothesis suggests that early life stress impairs the mind and causes cognitive deficits.
- In contrast, the Cognitive Specialization Hypothesis suggests that early life stress is a guiding, rather than impairing force.
- Thus, early life stress might actually lead to enhanced cognitive performance, but only under specific conditions.

References

- Frankenhuis, W. E., & de Weerth, C. (2013). Does early-life exposure to stress shape, or impair, cognition? Current Directions in Psychological Science, 22, 407–412.
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