



Who retains irrelevant information?

Exploring individual differences in memory for distractors

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Introduction

- Selective attention is the ability to direct attention to a target stimulus while ignoring a salient distractor stimulus¹
- Most studies measure memory for target information, but not for distracting information participants are asked to ignore
- Evidence suggests that certain experiences can enhance people's abilities to attend to distracting information *in addition* to target information²
- Children from low-SES homes show greater neural response to distractors than high-SES children, with no differences in memory for target information³

Hypothesis & Aims

- Childhood environment shapes the attentional system
- Test whether SES-related variables contribute to indiv. diffs. in memory for targets *and distractors*

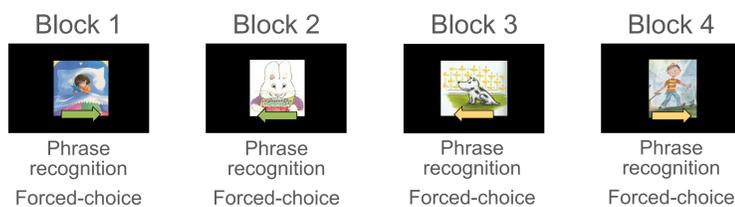
Participants

71 UC Berkeley students, recruited based on their parents' years of education (a proxy for SES)

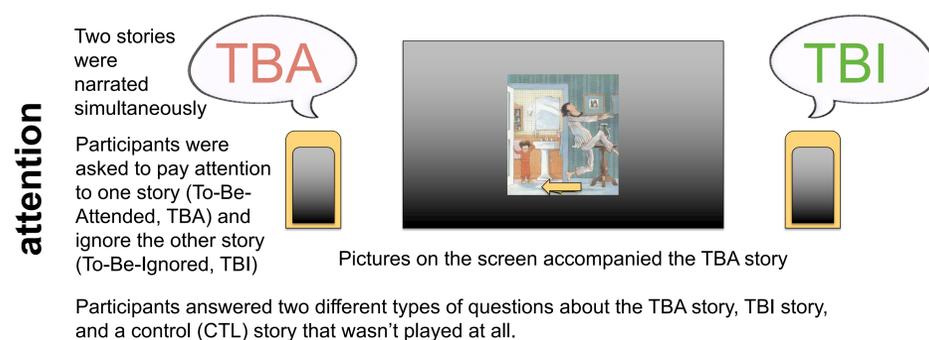
| | Low-SES (n=36) | High-SES (n=35) | |
|-----------------------------|----------------|-----------------|-----------|
| Age | 21.74 (3.70) | 20.79 (1.88) | $p=0.18$ |
| Gender | | | $p=0.468$ |
| female | 26 (72%) | 24 (69%) | |
| male | 8 (22%) | 11 (31%) | |
| other | 2 (6%) | 0 (0%) | |
| Parents' years of education | 11.83 (0.91) | 18.54 (1.52) | $p<0.001$ |
| Childhood income | 11.83 (0.91) | 18.54 (1.52) | $p<0.001$ |
| Childhood noise | 10.17 (2.89) | 7.46 (2.85) | $p<0.001$ |
| Childhood neglect | 18.23 (7.28) | 14.03 (3.22) | $p=0.003$ |

Methods

Participants listened to four sets of stories and answered a series of questions about them. We explored variation in learning from the stories.



Measures



Phrase Recognition

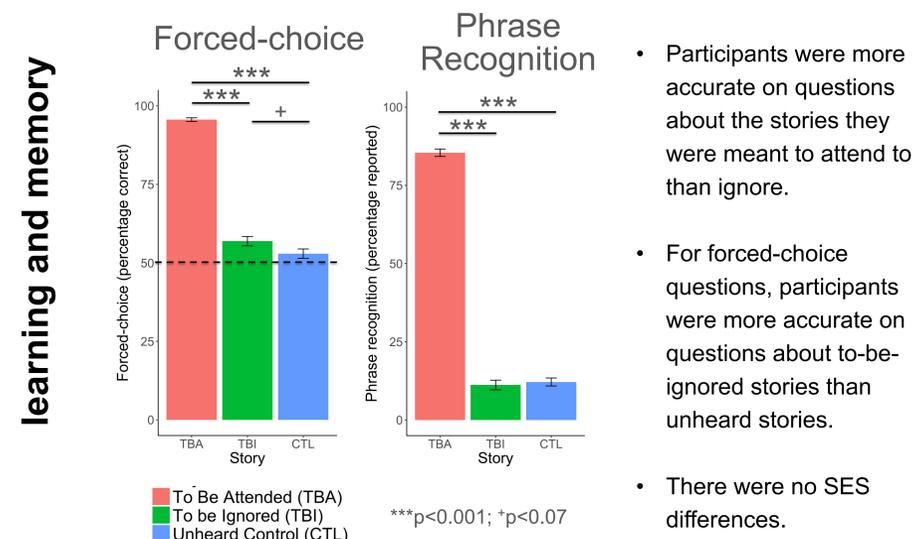
| QUESTION | PHRASE | ANSWER |
|----------|--------------------------|----------|
| 1 | Put her pajamas on | NO ? YES |
| 2 | So they left him alone | NO ? YES |
| 3 | The telephone rang | NO ? YES |
| 4 | Hopped across the carpet | NO ? YES |
| 5 | Got the next call | NO ? YES |
| 6 | Stroked his blue ears | NO ? YES |

Forced-choice

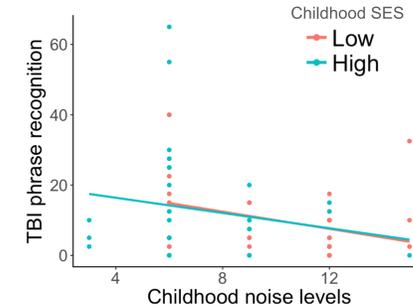
- What did Harry get on his birthday?
 - A silly brown scarf the children had made
 - A wool sweater as a present from grandma
- What did Louise bring when she came over?
 - Her bizarre science gear
 - Her deluxe beauty kit
- What did Lily's mother's friend Florence give to Lily?
 - A yellow cotton rabbit
 - A small stuffed fox

childhood environment: Parents' education, Noise at home, Early neglect

Results



influence of early environment



Participants who grew up in noisier homes learned less from the TBI stories ($t(69)=-2.40$, $b=-2.77$, $p=0.019$), regardless of their childhood SES.

Conclusion

- Participants remembered content from the TBI story when presented with an option between two choices, but not when presented with specific phrases and asked to indicate whether they heard them
- Participants who grew up in noisier households learned less from the TBI stories, suggesting that they were better able to filter out distractors
- Early experiences may influence breadth of attention and memory for distracting information

Future directions

- Explore pupillary dilation as a physiological measure of attention
- Examine how individual differences in attention develop over childhood in different contexts, utilizing naturalistic samples of children's home environments

References

- Amso, D. & Scerif, G. The attentive brain: insights from developmental cognitive neuroscience. *Nat. Publ. Gr.* 16, 606–619 (2015).
- Green, S. & Bevalier, D. Action Video Game Modifies Visual Selective Attention. *Nature* 423, 534–537 (2003).
- Stevens, C., Lauinger, B. & Neville, H. Differences in the neural mechanisms of selective attention in children from different socioeconomic backgrounds: An event-related brain potential study. *Dev. Sci.* 12, 634–646 (2009).
- Stevens, C., Paulsen, D., Yasen, A. & Neville, H. Atypical auditory refractory periods in children from lower socio-economic status backgrounds: ERP evidence for a role of selective attention. *Int. J. Psychophysiol.* 95, 156–166 (2015).

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