Prevalence-induced Concept Change in Older Adults

Sean Devine [1], Cassandra Neumann [1], David Levari [2], Bob Wilson [3], Ben Eppinger [1, 4]

1. Department of Psychology, Concordia University, Montreal
2. Department of Psychology, Harvard University
3. Department of Cognitive Science, University of Arizona
4. PERFORM Center, Concordia University, Montreal

Introduction

Our population is ageing and older adults are slated to have more decision-making power than ever before [1]. Therefore, it is important to understand ageing-related changes in judgments and decision-making.

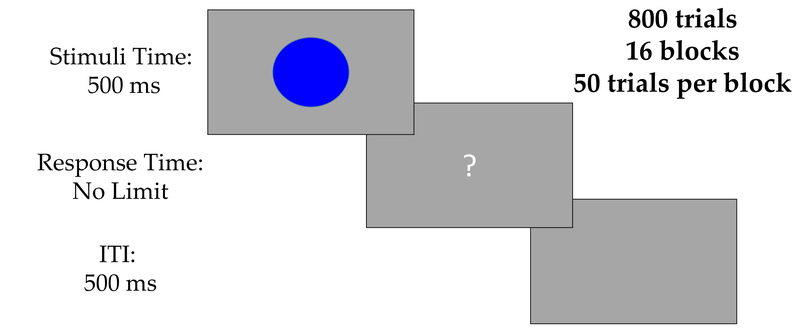
In this study, we focus on one such mechanism: concept formation. Specifically, we build on Levari et al. [2] recent work regarding **prevalence-induced concept change**, demonstrating that our definition of a concept can shift as the prevalence of exemplars of that concept changes.

In this study, we argue that there is good reason to believe that older adults are either **less** or **more** affected by prevalence-induced concept change than younger adults. On the one hand, increased perseverative behaviour might drive prevalence-induced concept change down [3]; on the other, a tendency to outsource control may increase it [4]. To tease these hypotheses apart, we explore behavioural results in an age-comparison sample, as well as use a recent computational model [5].

Method

$N = 120$
60 YA and 60 OA; 30 per condition

A



B

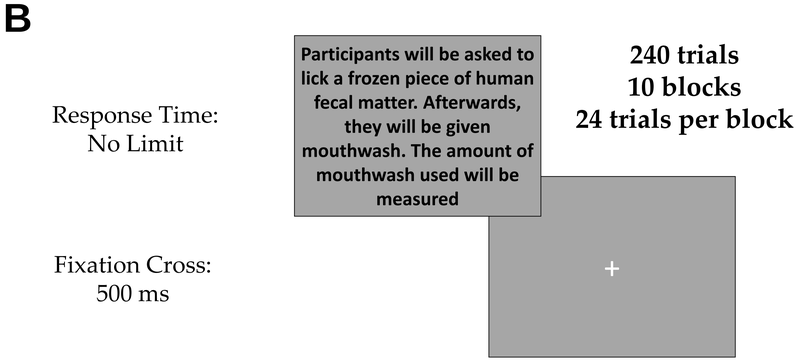


Figure 1. Task flow for (A) the Dots Task and (B) the Ethics Task.

Computational Model [5]

$$p_t = \frac{1}{1 + \exp(\beta_0 + \beta_f f_t + \boldsymbol{\beta_F} F_t + \boldsymbol{\beta_c} C_t)} \quad (1)$$

$$F_{t+1} = \lambda_F F_t + f_t \quad (2)$$

$$C_{t+1} = \lambda_C C_t + c_t \quad (3)$$

β_F = Effect of past stimuli
β_C = Effect of past response

Older adults have **more stable concepts** than **younger adults,** when faced with a changing world.

Take a picture to download a summary paper, the raw data, preliminary code, and more!

Results

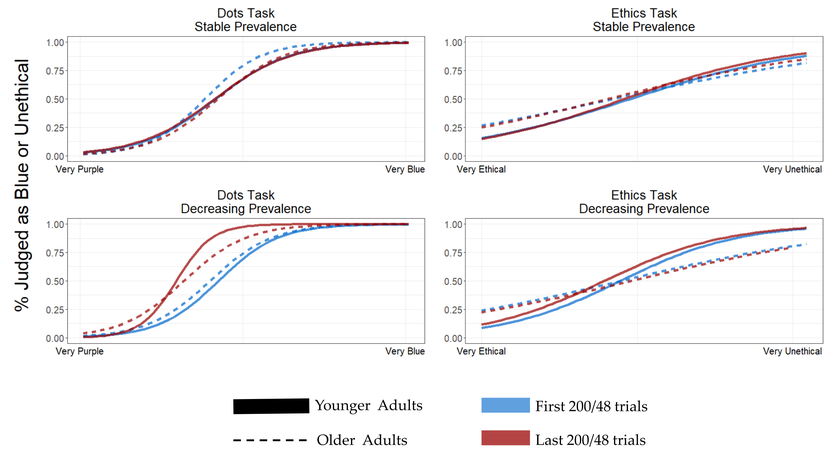


Figure 2. Concept judgements in the Dots Task and the Ethics Task show that older adults are less affected by prevalence-induced concept change in both domains

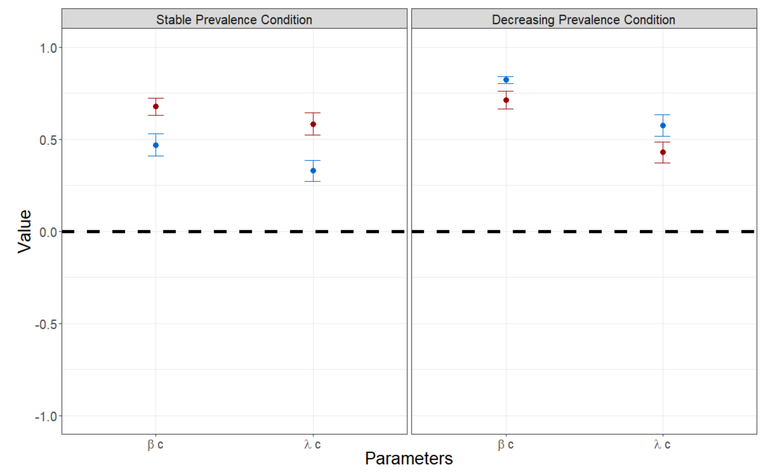


Figure 3. Significant model weights demonstrating that older adults are on average more influenced by past response than younger adults in the Dots Task.

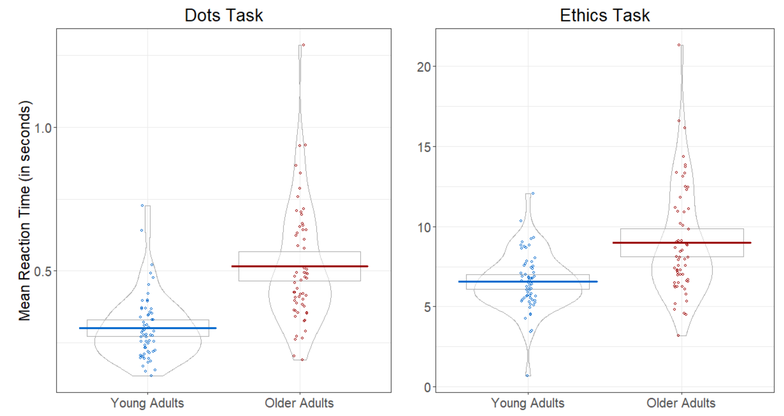


Figure 4. Response times in each age group in each task, demonstrating that older adults respond more slowly than younger adults.

Discussion

Our results suggest that older adults have more stable perceptual and ethical concepts than younger adults when faced with a changing world. The computational modeling analysis reveals that this might in part be due to a more rigid response pattern on the part of older adults. Overall, our results can be nicely summed up as "the more things change, the more they stay the same".

In future work, we will examine whether differences in response times affect sensitivity to prevalence-induced concept change.

References
[1] Stats. Can. (2019).
[2] Levari et al. (2018) *Science*.
[3] Nassar et al. (2016). *Nature Comms*.
[4] Lindenberger et al. (2014). *TICS*
[5] Wilson. (2018). *PsyArXiv*

Concordia University
SSHRC CRSH
Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada

seandamiandevine@gmail.com