Healthy Ageing and Binding in Visual Working Memory: Mixed Versus Blocked Designs.

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Introduction

Healthy ageing is accompanied by an associative deficit: older adults are more likely to miss changes to pairings between items, even following brief delays [1].

Age-effect on temporary feature binding within objects is less clear. For surface features (e.g. colour-shape) most report no specific binding deficit [e.g., 2, 3]. But binding features to location may be a specific problem for older adults [e.g., 4].

Cowan et al. [5] found older adults more likely to miss colour-location changes when mixed with changes to colour only. When trials were blocked there was no clear age-related binding deficit.

However, non-probed items in test array may have guided responses. Using a single probe item avoids this. Two experiments reassess the effect of mixing feature/binding changes.

Method

Experiment 1: Colour-Shape – 48 younger (M age = 20.9, SD = 2.7) and 49 older adults (70.7, 4.9). Experiment 2: Colour-Location – 48 younger (20.9, 2.1) and 49 older adults (70.7, 4.7). Participants split between mixed and blocked conditions.

Results & Discussion

Large effect of age on change detection accuracy (Exp 1: 0.120 95% HDI [0.081, 0.159]; Exp 2: 0.085 [0.053, 0.120]) that was not modulated by the type of change (Contrast of feature vs. binding between age-groups Exp 1: -0.024 [-0.065, 0.015]; Exp 2: -0.031 [-0.062, 0.001]). Mixing feature and conjunction changes did not differentially modulate older adults’ sensitivity to changes (Three way contrast Exp 1: 0.043 [-0.039, 0.120]; Exp 2: -0.051 [-0.114, 0.014]).

In original study [5] the presence of non-probed items may have helped younger adults when the possible change was known (blocked) leading to a different pattern of results to the mixed condition. Avoiding this here, we find no role for mixing versus blocking trials.

Exp 1 adds to growing evidence against a specific effect of age on colour-shape binding [e.g, 2,3,6] in contrast to a clear deficit in early Alzheimer’s [7]. Older adults’ ability to bind to location in VWM is less clear [4,6]. Exp 2 found no specific deficit (we have replicated this finding in a follow-up study not presented here) in line with recent findings [6]. Studies that report deficits tend to use nameable stimuli [e.g, 4] possibly making the task ‘relational’ in nature. The role of stimulus factors, in particular nameability, should form the basis of future investigation.

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References