Age-Related Patterns of Object-Based Inhibition of Return Depend on Task

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Abstract

Young and older adults were tested on separate static and dynamic inhibition of return (IOR) tasks. In each task, we measured location- and object-based IOR. Our findings suggest a pattern of preserved location- and object-based inhibition in a static condition, with object-impaired inhibition of older adults in a dynamic task.

Introduction

Inhibitory processes have been identified as susceptible to age-related decline.[1] Recent research shows that this decline in inhibitory processing is not a general impairment but may depend on the neural resources required for the task.[2]

The inhibition of return (IOR) mechanism can be used to guide attention by delaying attention to previously inspected locations and objects. In Posner's spatial cueing task[3], IOR is associated with locations. However, in real life events, such as driving, many of the objects in our environment do not remain stationary. Two modifications to the traditional spatial cueing task have used static[4] and dynamic[5] stimuli to test whether the IOR mechanism has qualities that respond differently to objects.

Variations of these tasks tested on young and older adults have shown robust location-based IOR effects in both age groups and object-based IOR in young adults only.[6,7] A limitation of these tasks is testing object and location conditions in separate tasks. Additionally, manipulations of the time course may have not adequately captured the temporal parameters best suited for older adult development of object-based IOR.

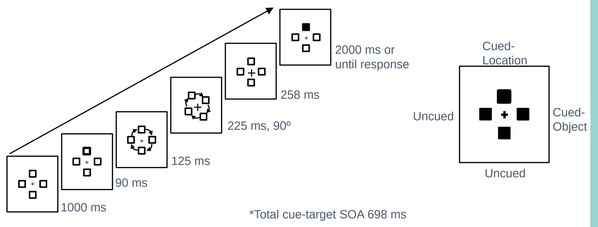
The objective of the current studies was to evaluate age differences on location- and object-based IOR in a dynamic and static environment. I predicted that age patterns would show preserved location-based IOR and impaired object-based IOR.

Methodology

Experiment 1
35 young adults (*M* = 18.7 years; 14 M/21 F)
35 older adults (*M* = 72.5 years; 12 M/23 F)

Participants completed a dynamic double-cue detection task.

Location-based IOR = Cued-Location RT – Uncued RT
Object-based IOR = Cued-Object RT – Uncued RT

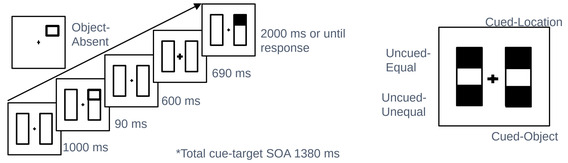


*Total cue-target SOA 698 ms

Experiment 2
24 young adults (*M* = 18.8 years; 7 M/17 F)
24 older adults (*M* = 71.5 years; 7 M/17 F)

Participants completed a static double-cue detection task with two conditions: object present (below) and object absent.

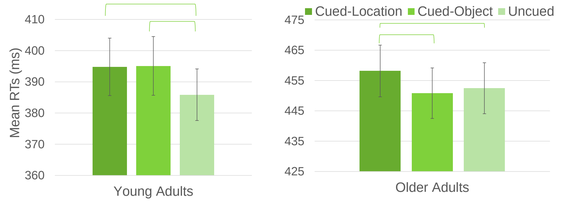
Location-based IOR =
Cued-Location RT – (Cued-Object RT + Uncued-Equal RT)/2
Object-based IOR = Cued-Object RT – Uncued-Equal RT

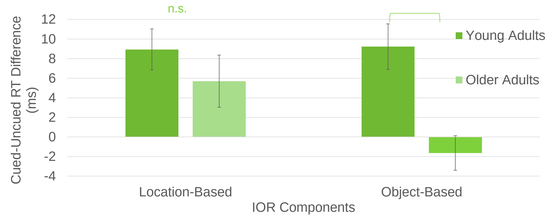


*Total cue-target SOA 1380 ms

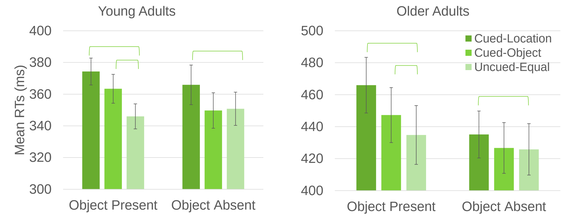
Results

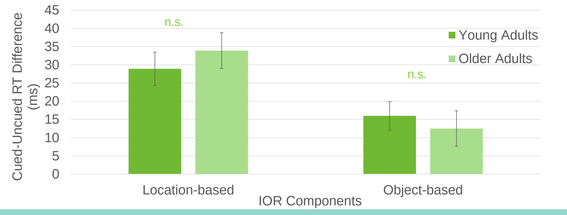
Experiment 1





Experiment 2





Conclusion

On both tasks, young and older adults showed location-based IOR that does not differ in magnitude. On a dynamic task (Exp. 1), young adults but not older adults showed object-based IOR. On a static task (Exp. 2), both age groups showed object-based IOR.

These findings support my predictions that location-based IOR is preserved into old age, across both static and dynamic tasks. The current findings also support age-related changes in object-based IOR. The findings related to object-based IOR suggest that age differences may be influenced by the moving nature of the stimuli or a more sensitive development of inhibition of objects.

Previous research has not found object-based IOR in older adults using a static task[6], however both the paradigm and cue-target SOA differed from the current task. The object-based IOR observed in older adults (Exp. 2) may have been due to the longer cue-cue and cue-target SOAs. The latter SOA has been found to be critical for the development of object-based IOR in young adults.[8] The additional time between salient events may have provided sufficient time to disengage and shift attention, facilitating the development of inhibition in older adults.

With consideration that older adults show well-preserved location-based IOR, the current findings do not suggest that there is an age-related deficit to this inhibitory process. While object-based inhibition may be more susceptible to change, these studies suggest that further investigation is necessary to evaluate age patterns across different measures of object-based processing and attention.

References

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