

Contextual Guidance of Attention in Younger and Older Adults

Matthew S. Peterson, Arthur F. Kramer, Angela Colcombe

Beckman Institute and Department of Psychology
University of Illinois at Urbana-Champaign



ABSTRACT

Contextual cuing is a memory-based phenomenon in which previously encountered spatial information can implicitly guide attention to the likely location of a target. Previous research from our lab has demonstrated that contextual cueing is able to partially override the ability of abrupt onsets to capture attention. We explored the ability for memory-based attentional guidance to prevent onset capture in younger and older adults. Although younger adults demonstrated onset capture when viewing randomly generated displays, they were relatively immune to onset capture when viewing the repeated displays. In contrast, older adults showed evidence of onset capture when viewing both the repeated and the novel displays.

INTRODUCTION

PARADIGM

In Contextual Cuing, Participants search new or repeated displays for the presence of 1 or 2 targets:

- **Repeated** or **New** display: Each subject viewed 12 repeated displays, and 1 instance of each appeared in each block of trials. Item locations, but not identities, were identical in each instance. New displays were randomly generated for each trial.

- **Epochs** - subjects took part in 3 days of testing, with each day consisting of 4 epochs (20 blocks).

- **Onsets** - Onsets were introduced on the second day of testing and appeared during the 2nd and 3rd epochs of days 2 and 3 (Epochs 6, 7, 10, & 11).

- **Memory Test** - After the end of the third session, participants were presented with new (random) and repeated displays and asked to judge their familiarity on a scale from 1 to 5.

GOALS

1. Can older adults use contextual information to override onset capture?

Older adults generally show deficits in inhibiting automatic responses. e.g. Juola et al. (2000) have shown that older and younger adults showed similar attention switching benefits for symbolic and onsets cues, yet the older adults were unable to use the symbolic cues to override onset capture when the onsets were irrelevant.

Chun and Jiang (1998) have suggested that contextual cuing is an automatic process guided by an implicit memory representation. Kramer & Peterson (2001, in press) have demonstrated that contextual information can be used by younger adults to override capture by irrelevant onsets.

If contextual cuing is an automatic process, then older adults might be able to use contextual information to override capture by irrelevant onsets.

2. Chun and Jiang have suggested that contextual cuing is an automatic process guided by implicit memory.

To provide a more thorough test of implicit memory, we used the same 12 repeated display configurations for all subjects. At the end of the 3rd session, subjects were asked to rate the familiarity of the 12 repeated displays along with 12 new (randomly generated) displays.

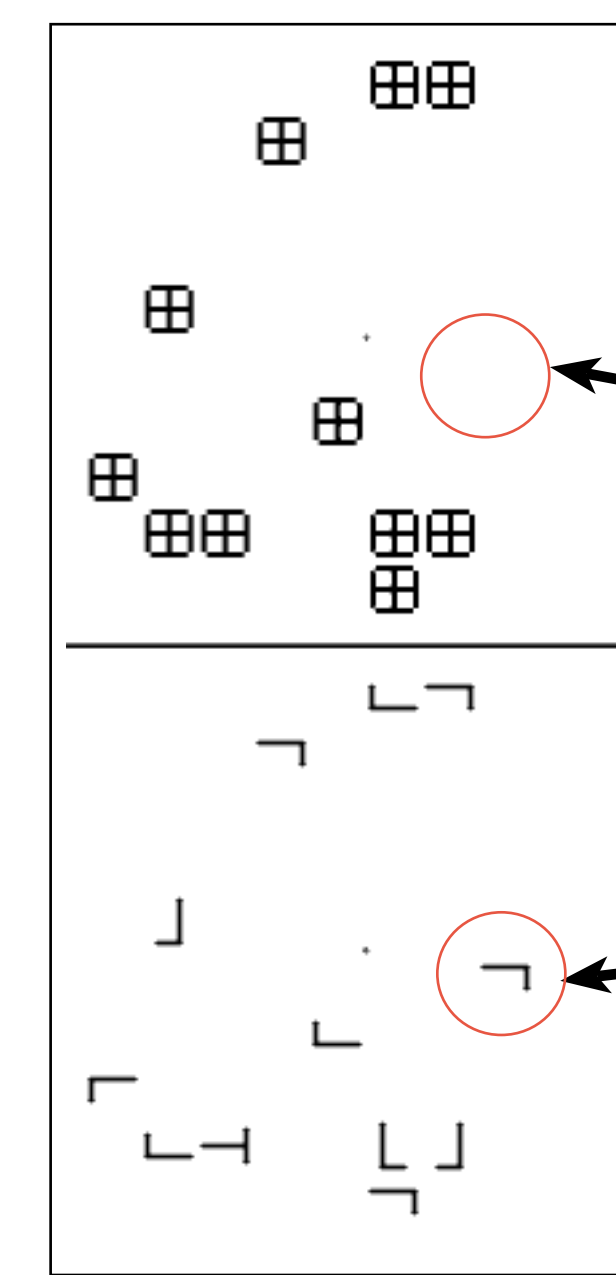
For each subject, the familiarity ratings for each configuration were compared to the contextual benefit (new - repeated) for that configuration.

METHOD

PARTICIPANTS

12 young adults (ages 18 — 30)
12 old adults (ages 65 — 80)

Premask Display
(1000 msec)



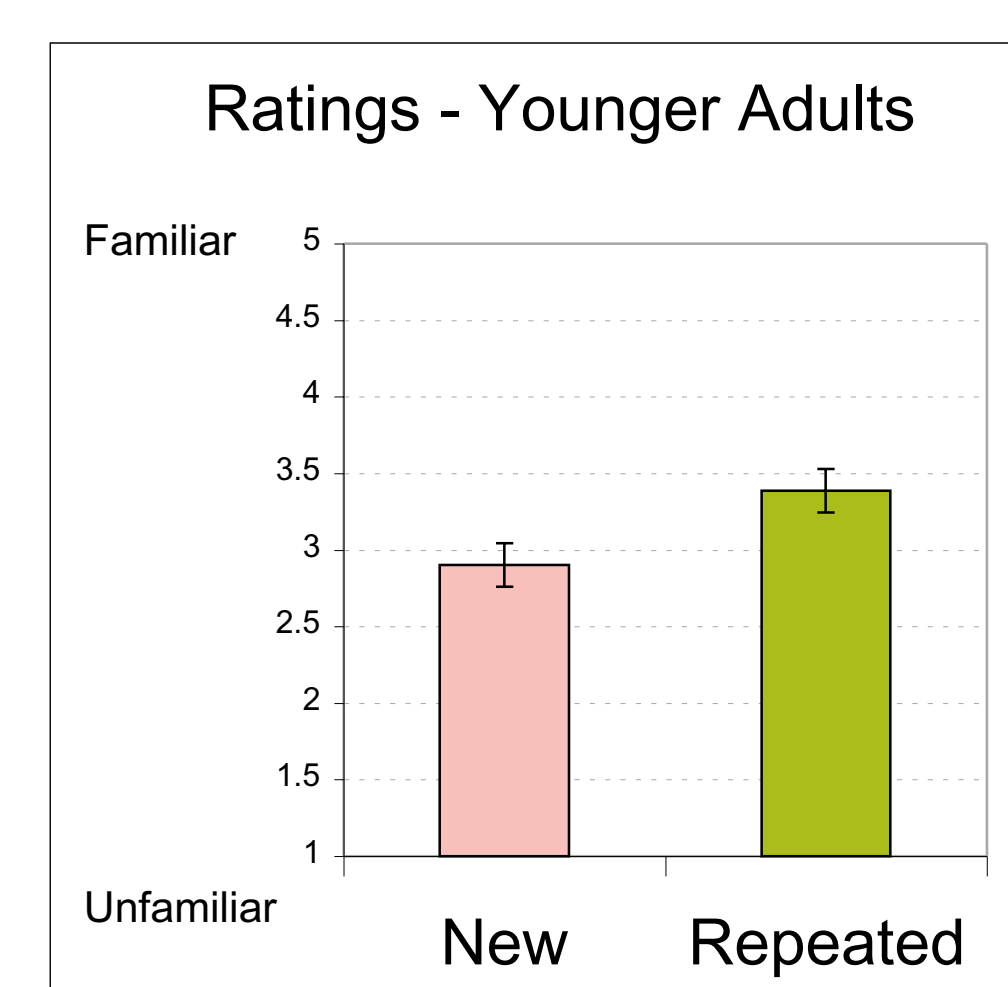
On Onset trials, one premask was omitted.

Search Display

Onset item

Memory Results

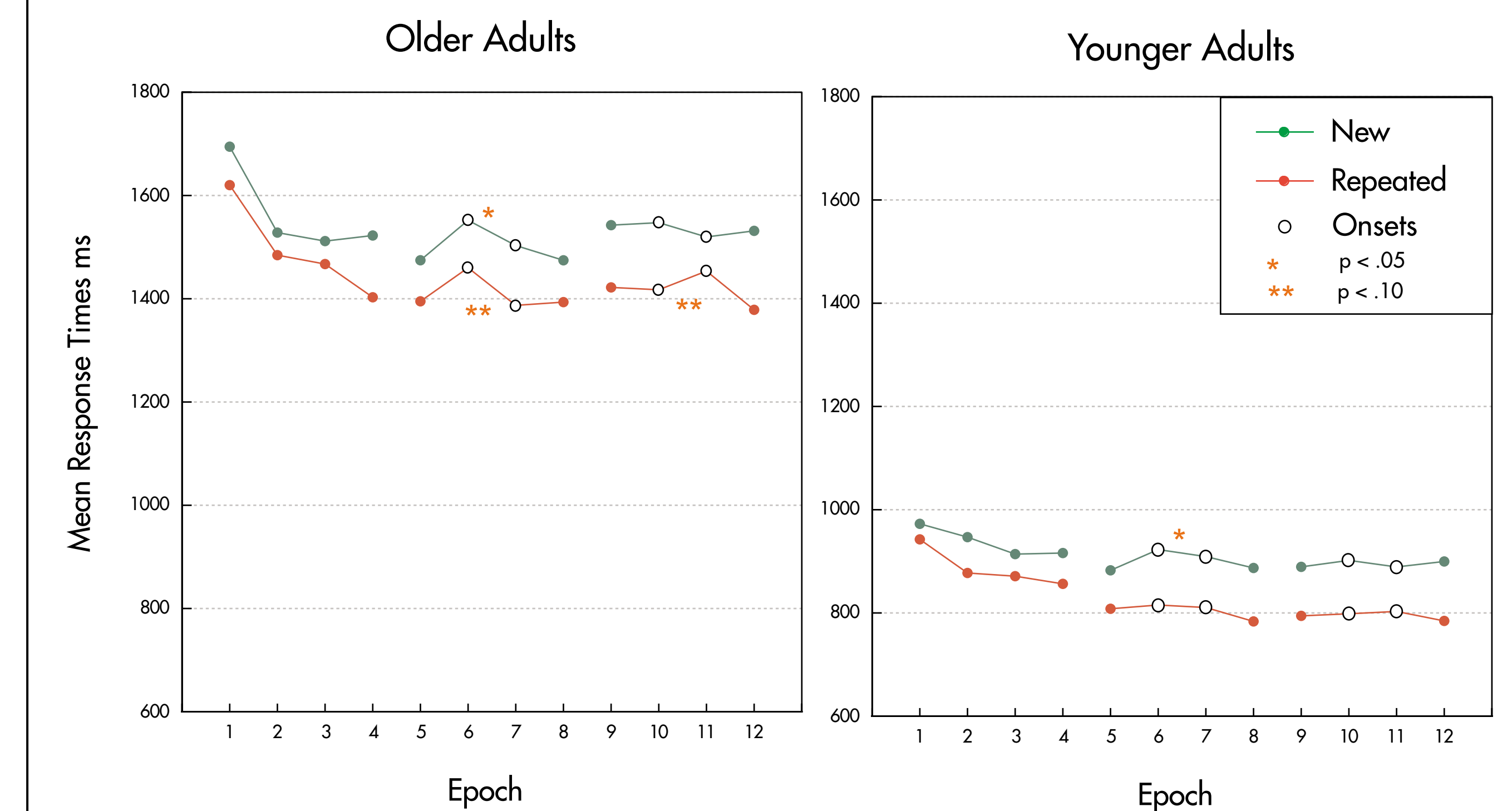
- Older and Younger adults showed similar degrees of explicit recognition.



- Yet the degree of explicit recognition was completely uncorrelated with the degree of contextual cuing ($R^2 = .02$ and $.04$ for older and younger adults, respectively).

- Suggests that contextual cuing is guided by an implicit memory representation.

Search Results



- **Age** - Older adults were slower than Younger Adults

- **Configuration** - Targets were found more quickly in **repeated** displays than in **new** displays.

- **Epoch** - Responses became faster as subjects gained more experience.

- **Config x Epoch** - Contextual cuing increased as exposure to repeated displays increased.

NO AGE INTERACTIONS - suggests that younger and older adults show the same degree of contextual cuing.

- **Onsets - New Displays**: For both age groups, onsets affected responses on only the 2nd day.

- **Repeated Displays**: Older adults were marginally affected by onsets on both days.

Conclusions

1. Contextual cuing is unaffected by age.
2. Younger adults can use contextual information to override onset capture.
3. Older adults show marginal effects of onset capture when viewing repeated displays.
4. Suggests that the top-down guidance of contextual cuing develops more slowly as we age and is unable to beat out irrelevant onsets for control of attention.

References

- Peterson, M. S., & Kramer, A. F. (2001) Attentional guidance of the eyes by contextual information and abrupt onsets. *Perception and Psychophysics*, 63, 1239-1249.
- Peterson, M. S., Kramer, A. F. (2001). Contextual cueing reduces interference from task-irrelevant onset distractors. *Visual Cognition*, 8, 843-859.
- Juola, J. F., Koshino, H., Warner, C. B., McMickell, M., & Peterson, M.S. (2000) Automatic and voluntary control of attention in young and elderly adults. *The American Journal of Psychology*, 113, 159-178.