

Effects of aging on task- and stimulus-related attention during a short-term memory task

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Introduction

Age-related declines in measures of short-term memory¹, attention² and processing speed³ have often been reported in the literature. However, few studies were interested to explore the effects of age-related differences on task- and stimulus-related attention during different short-term memory load conditions. In young people, a recent study has shown a trade-off between stimulus-related and task-related attention during a verbal short-term memory task⁴ confirming previous similar findings in the visual domain⁵. Indeed, in the former study, a slowing effect of a distractor stimulus (DS) was observed on response times but only in low-load memory conditions. By focusing on attention, the question arises whether the same trade-off as in young people is also observed in elderly people, given the age-related changes of many cognitive processes.

Objective

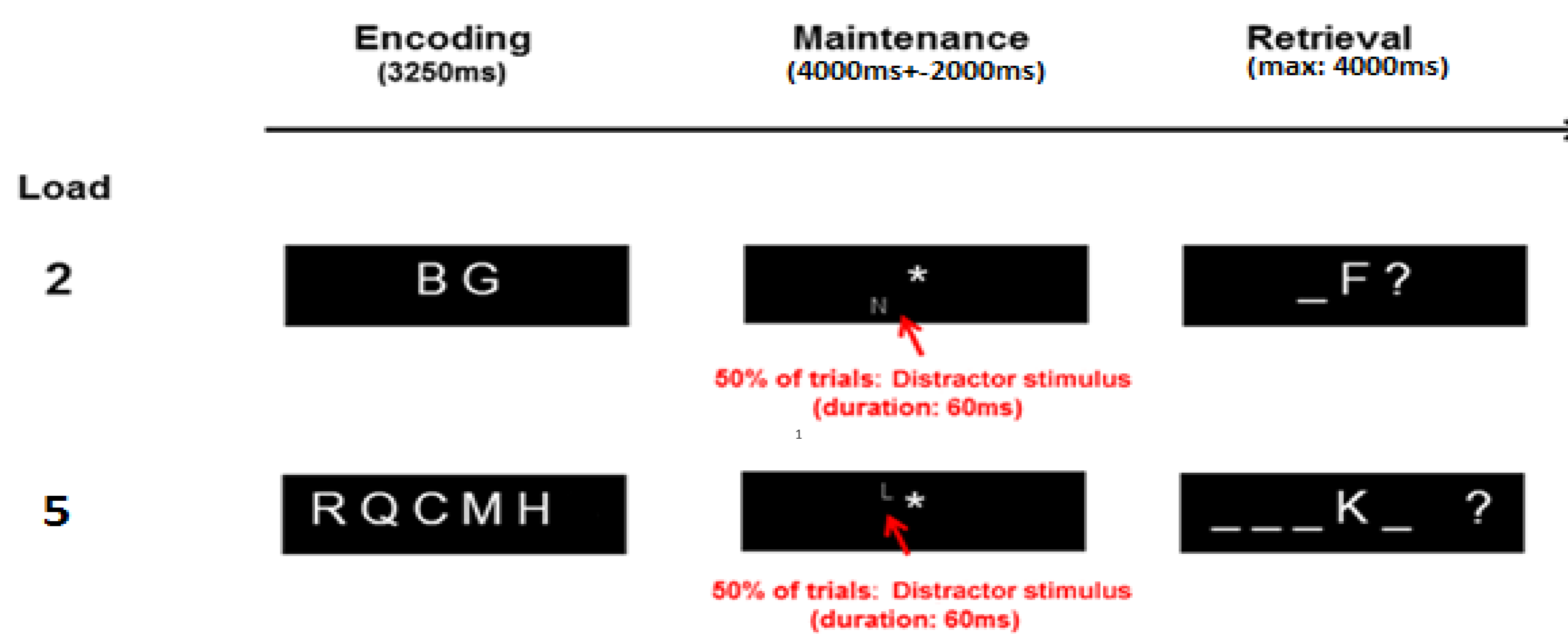
The aim of our study was to compare the allocation of attention resources between young and older people during a short-term memory task, varying with memory load.

Participants

Participants	Young	Older
Number	20	20
Age	24.6 (2.39)	72.7 (6.96)
Years of education	15.5 (2.09)	16 (3.11)
MMSE	-	29.7 (0.46)

Materials and procedure

We adapted a task used by the group of Majerus et al. (2012) in young people to an elderly population. 26 Trials are presented in each memory load condition (2 and 5) with and without distractor stimulus (DS) during maintenance.



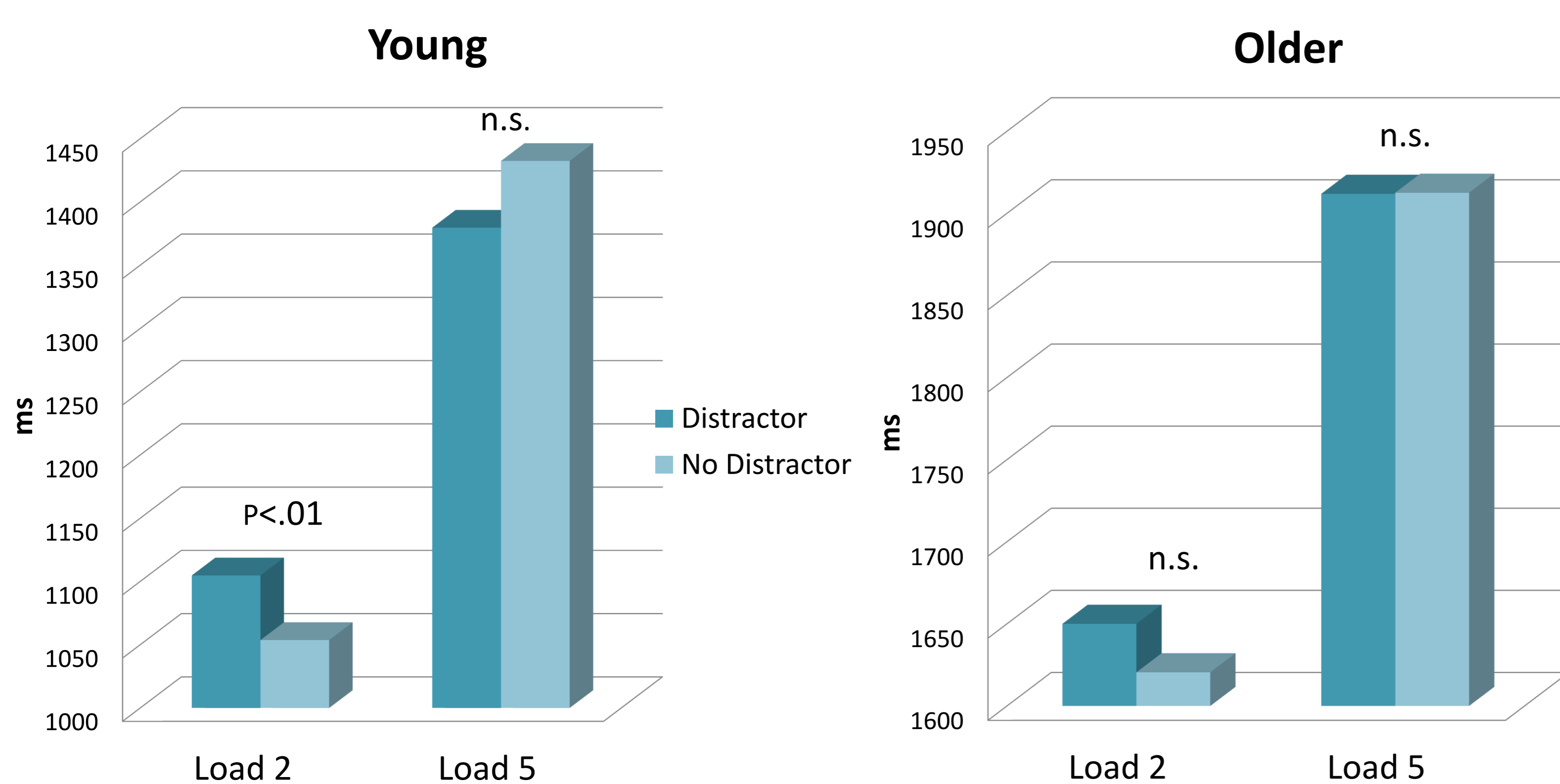
Results

Correct response rate (%)

	2 DS	2 No DS	5 DS	5 No DS
Young	99 (1.80)	99 (1.71)	97 (4.68)	97 (3.08)
Older	95 (6.59)	97 (5.13)	94 (6.42)	94 (6.42)

Correct response rate: Significant main effect of group, $F(1,38) = 9.06, p < .01$

Response Times (ms)



Response times: Significant main effect of group, $F(1,38) = 42.07, p < .01$.

Significant main effect of memory load, $F(1,38) = 279.81, p < .01$.

Significant memory load X distractor stimulus (DS) interaction, $F(1,19) = 8.79, p < .01$ in young people, n.s. in older people.

Discussion

Young participants performed better and faster than older participants, an observation which is consistent with the often reported age-related declines of span size and processing speed.

The increase in response times and decrease in correct response rates as short term memory load increases are also consistent with previous findings.

Furthermore, the interaction observed between memory load and presence of a distractor stimulus in young participants replicates the results of the recent study of Majerus et al. (2012) showing a slowing effect of the distractor stimulus, but only in low load memory conditions. In young people this confirms the existence of a trade-off between task- and stimulus-related attention in the adapted version of this task.

The absence of such an interaction in the elderly group suggests that task-related attentional resources of elderly people are already fully engaged during the low load memory condition, leaving no resources available for the processing of distractor information. Alternatively, the emphasis on task-related attention could compensate for the sometimes reported age-related loss of efficiency in stimulus-related attention⁶. Data concerning cerebral activations (fMRI) underlying this task are ongoing.

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