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# Three year old boys treasure pirate memories

## Gender and episodic memory in preschoolers

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### Introduction

According to Tulving (2005), an important feature of the episodic memory system is mental time travel. This refers to the capacity for both reliving past personal experiences and imagining oneself in future situations. Tulving (2005) also hypothesized that this episodic memory system is not operational before the age of 4. Indeed, Scarf, Gross, Colombo and Hayne (2013) found that 3-year olds performed at chance level on a task that involved using the memory of an earlier episode in order to prepare for a future act. Of the 4-year olds, 75% succeeded. Furthermore, Scarf et al.'s (2013) results suggested that 3-year olds form episodic memories, but do not retain them for longer than 15 minutes. The present study aimed at replicating these findings using Scarf et al.'s method.

### Hypothesis

We predicted that more 4-year olds than 3-year olds would choose a key in order to open a locked pirate's chest that they found during an earlier episode of treasure-hunting in a different location (i.e., sandbox).

### Materials and methods

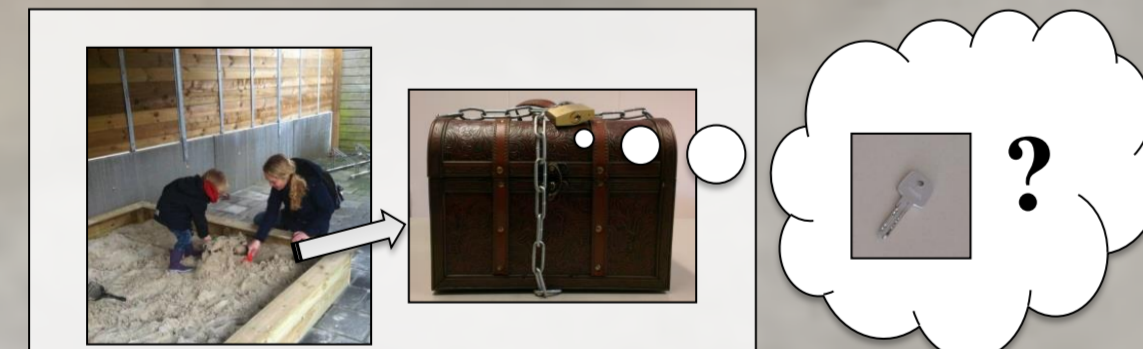
#### Participants

N = 23 three-year olds (12 boys, 11 girls)

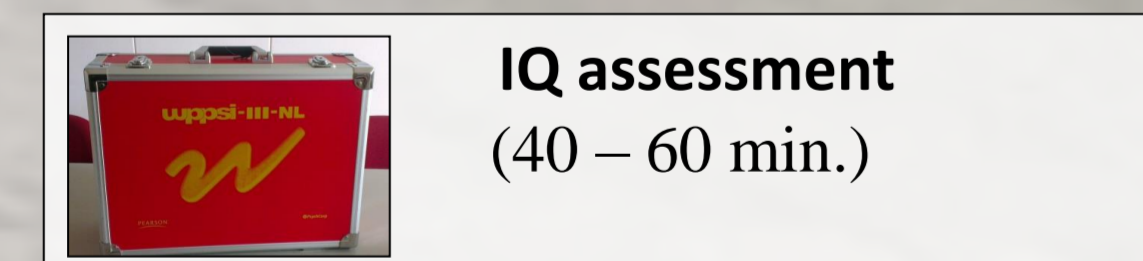
N = 23 four-year olds (14 boys, 9 girls)

#### Procedure

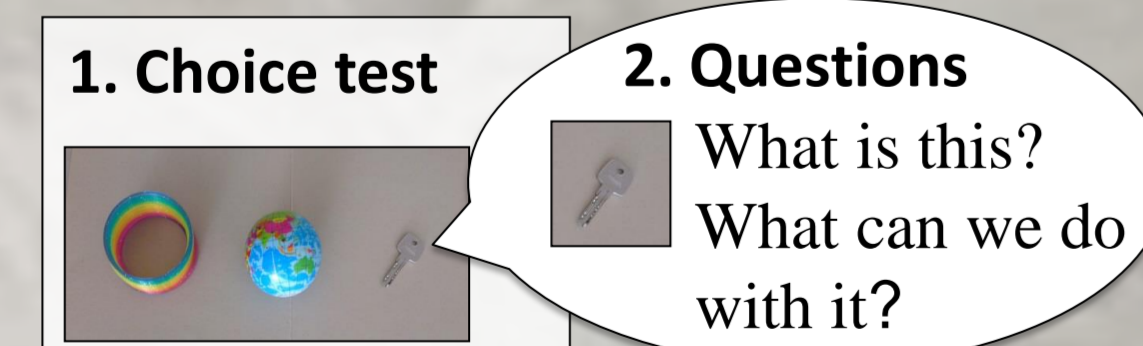
Encoding  
(sandbox)



Delay  
(test room)



Retrieval  
(test room)



### Results

#### Test of main hypothesis

- All children were familiar with the concept of "key".
- Next to comparing the percentages of 3- and 4-year olds who selected the key immediately in the choice test (1), we looked at the percentages of children who made verbal reference to the pirate's chest during the follow-up questions (2). In addition, children were allowed to reconsider their choice and we compared the percentages of children who selected the key at any point during the retrieval phase.

#### How many 3 and 4-year olds chose the key or referred to the treasure?

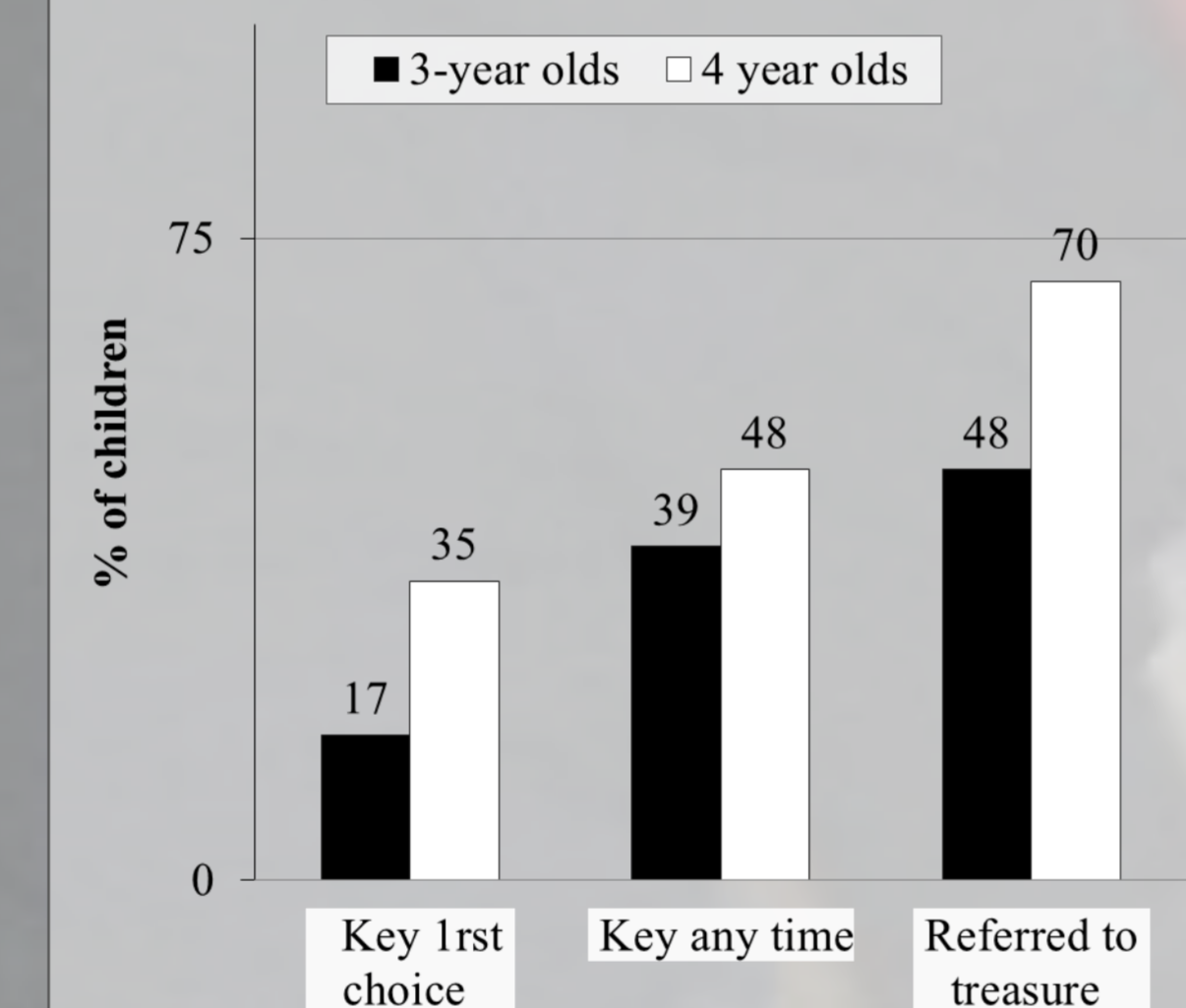
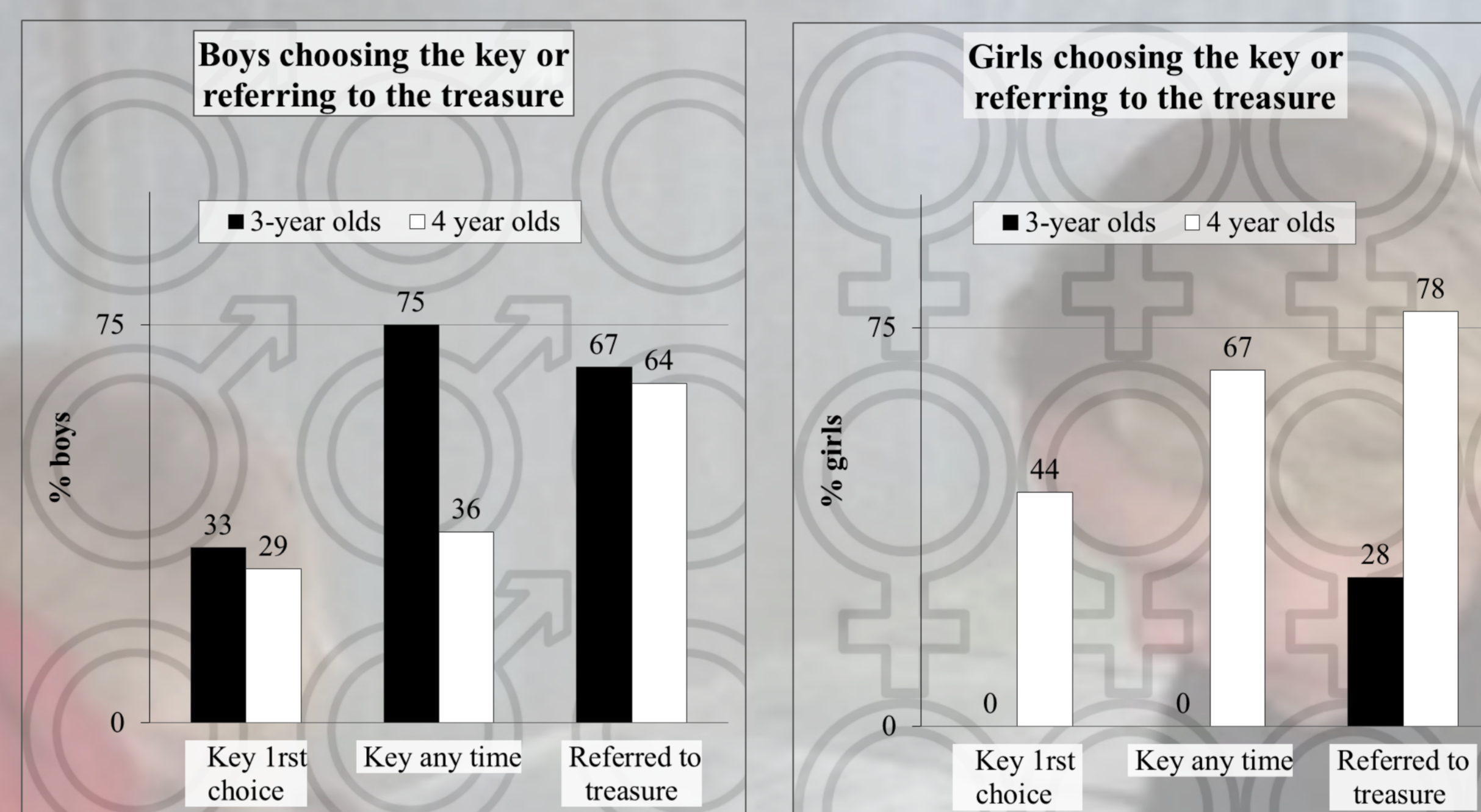


Figure 1.

- Although fewer 3-year olds than 4-year olds selected the key or made verbal reference to the treasure chest, the groups did not statistically differ, all  $X^2(1) < 2.24, p's > .13$ .
- The gridline at 75% represents the percentage of 4-year olds in Scarf et al. (2013, experiment 1).

#### Exploratory analyses

Next, we explored the role of gender, IQ and knowledge about pirates.

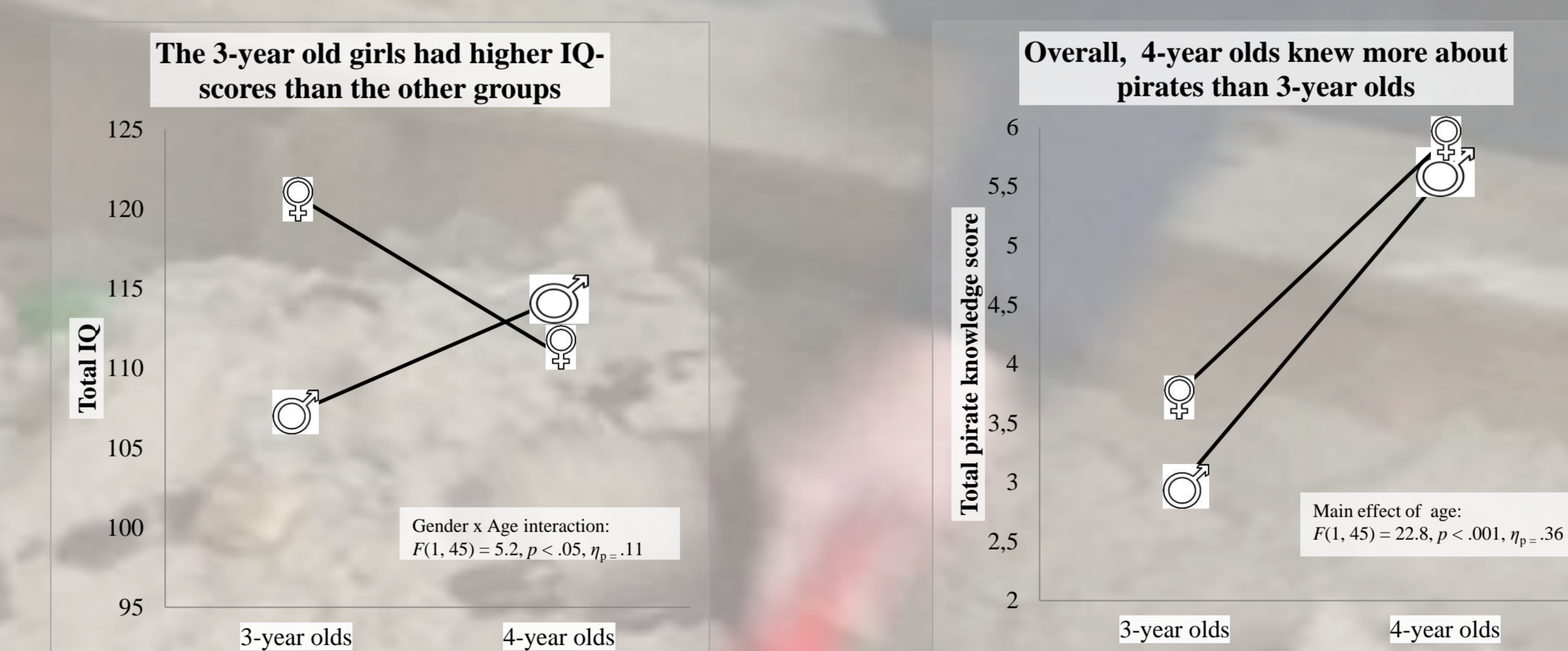


Figures 2a and 2b (above).

Boys and girls showed different retrieval patterns. More 3-year old boys than 4-year old boys selected the key at any point during test. For girls, more 4-year olds than 3-year olds selected the key or made verbal reference to the treasure chest, all  $p's < .05$ .

Figures 3a and 3b (below)

The retrieval advantage for 3-year old boys was not due to higher IQ scores or more knowledge about pirates.



### Literature cited

Scarf, D., Gross, J., Colombo, M., & Hayne, H. (2013). To have and to hold: Episodic memory in 3- and 4-year-old children. *Developmental Psychology, 55*(2), 125-132. doi:10.1002/dev.21004

Tulving, E. (2005). Episodic memory and autoeosis: Uniquely human? In: H. S. Terrace & J. Metcalfe (Ed.), *The missing link in cognition: Origins of self-reflective consciousness* (pp.3-56). New York, Oxford University Press.

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### Conclusions

Contrary to predictions, in general 4-year olds did not select the key more often than 3-year olds. However, exploring gender differences revealed that 3-year old boys outperformed 3-year old girls. They even outperformed 4-year old boys in that more 3-year old boys picked the key at any time during the retrieval phase. These differences were not due to 3-year old boys having more knowledge about pirates or performing better on the intelligence test. If anything, the 3-year old girls had higher total IQ scores.

The present results do not confirm Scarf et al.'s (2013) findings that 4-year olds generally perform better in this particular episodic memory paradigm. It should be noted that the overall percentage of 4-year olds selecting the key as their first choice (35%) was much lower than the 75% reported by Scarf et al (2013). Procedural differences may account for this difference. For example, one of the distracter toys (the colourful ball or toy spring) may have been particularly attractive, to the disadvantage of selecting the key. A pilot study without a sandbox episode suggested that the ball and spring were selected equally often (42 %) and more frequently than the key (16 %). Future studies may employ less attractive distracters to see whether the overall percentage of key-selectors increases.

As for gender differences, there is no obvious reason to assume that boys display better episodic memory than girls in general. The superior performance of the 3-year old boys may be due to being more interested in pirates than girls. Although there were no differences in knowledge about pirates between 3-year old girls and boys, it might be that boys simply find pirates more appealing. They may thus have encoded the sandbox episode more strongly or benefitted more from self-generated retrieval cues. If so, episodes that are more in line with 3-year old girls' interests should boost their episodic memory performance. Future studies, *a priori* selecting larger groups of boys and girls, may shed further light on this.

All in all, the superior performance in the group of 3-year old boys challenges Scarf et al.'s (2013) conclusion that in general, 3-year olds more rapidly forget episodic information than 4-year olds.

### Further information

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