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# From two to many: The role of executive functions in young children's generalization of novel object names in a comparison design

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## INTRODUCTION

Learning novel words and the associated concepts is facilitated by comparison situations (Graham et al. 2010). More precisely, it requires to figure out which properties are central for the target category. To do so, children have to inhibit salient irrelevant dimensions, flexibly find new relevant dimensions, and update their representation of conceptually relevant or irrelevant dimensions in working memory (see Richland, Morrison, & Holyoak, 2006 for discussions). However, the link between executive function and categorization as never been directly investigated.

## METHOD

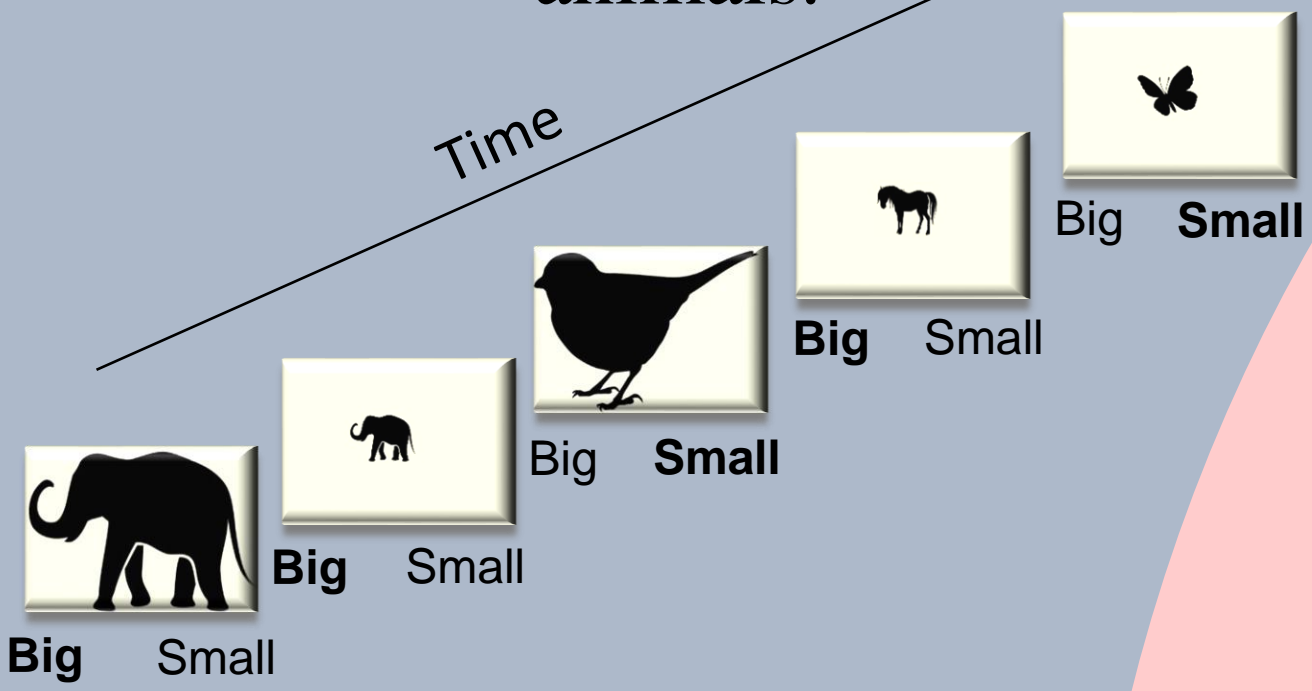
With correlational analysis, we explored the links between executive functions, vocabulary and categorization task. The three executive functions evaluated were :

- Working memory (NIH Toolbox Battery)
- Inhibition (Real Animal Size Test)
- Cognitive flexibility (Dimensional Change Card Sort)

We also tested vocabulary knowledge with the EVIP (French adaptation of PPVT).

### Real Animal Size Test (RAST)

Children were presented with animals pictures and were asked to press one button for big animals (and not big pictures) and another button for small animals.



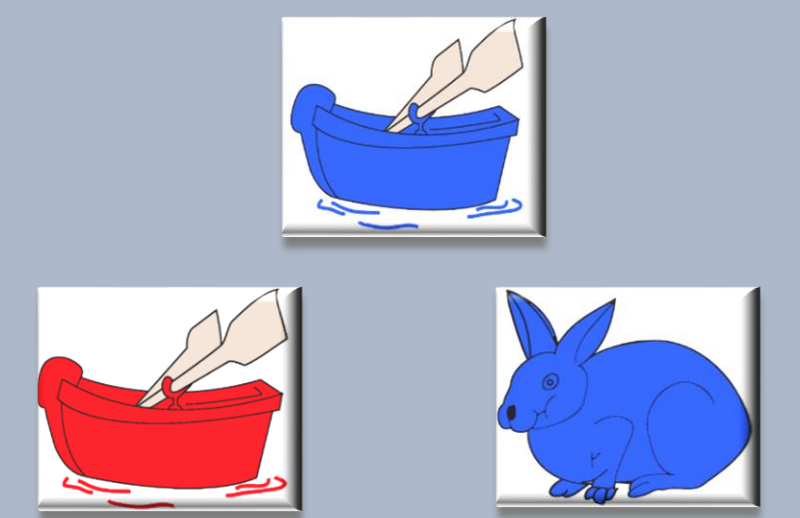
**Inhibition**

### POPULATION

76 children (39 female, mean age = 54.45m +/- 3.73, range: 46-60m)

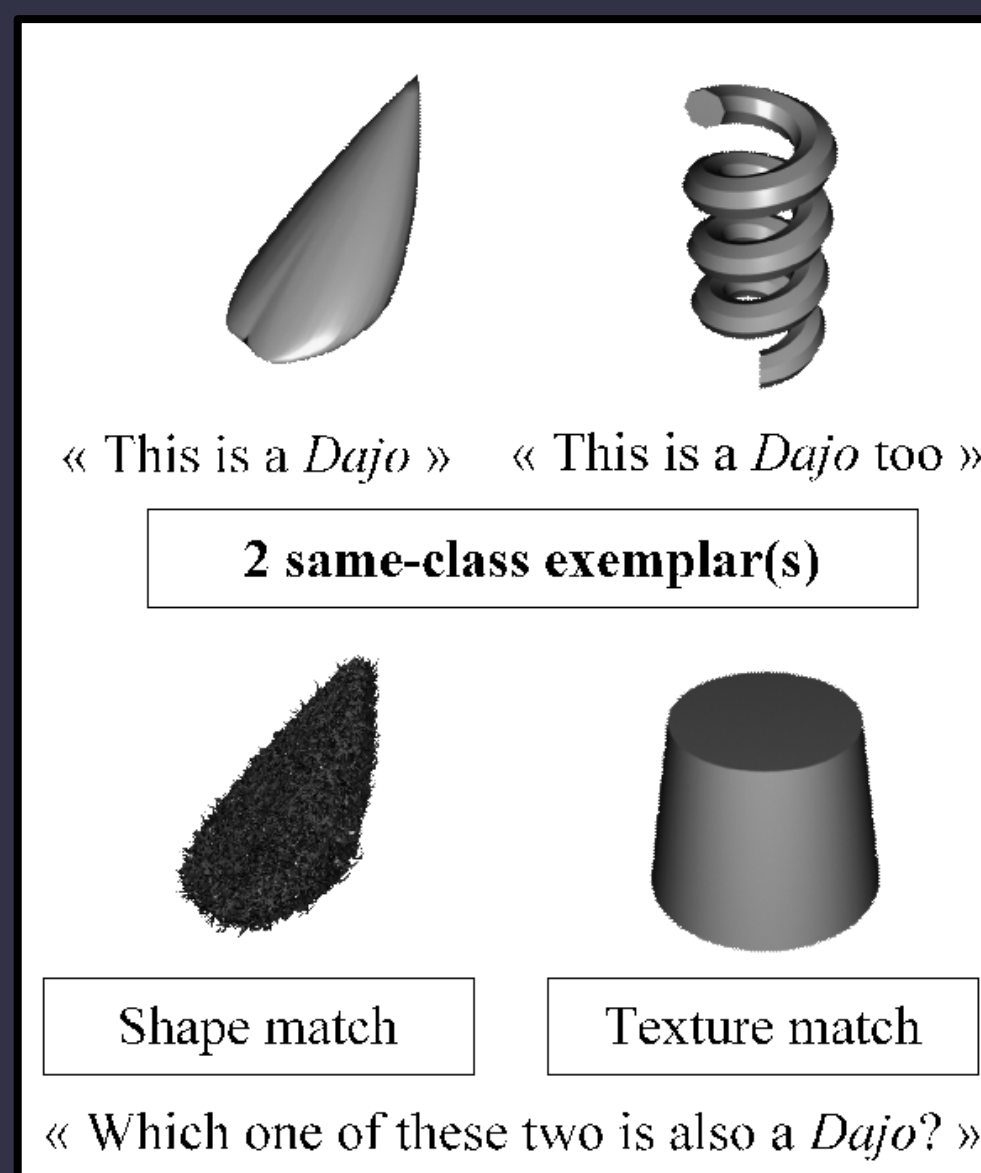
### Dimensional Change Card Sort (DCCS)

In this task, children were shown two target cards and asked to follow a rule : choose the one with the same color (or shape) as the example. After several trials, the rule was reversed and they were asked to select the one with the same shape (or



**Flexibility**

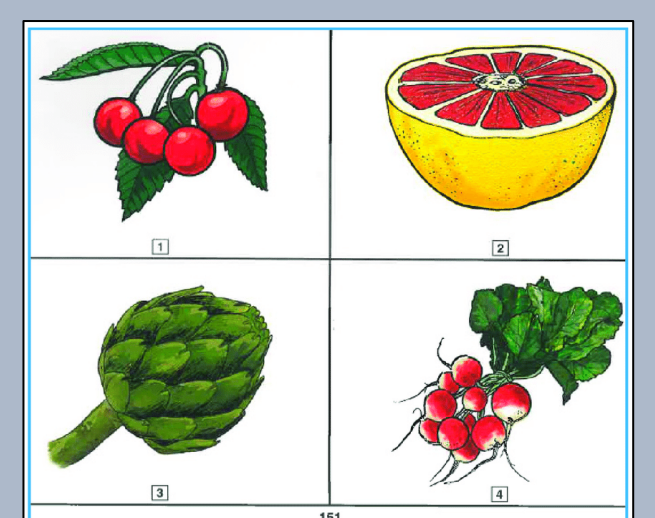
### Categorization task



**Vocabulary**

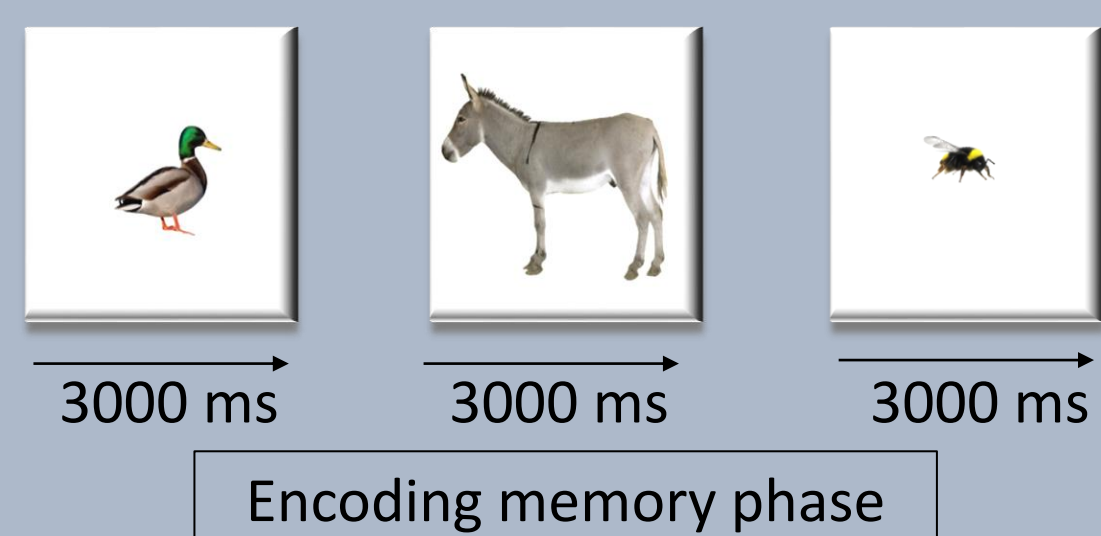
### EVIP (PPVT)

In this test, children had to select the one out of four-images associated with a noun given by the experimenter. Responses were recorded on a paper sheet and a standard score was computed according to the age.



### List Sorting

In this task, children were presented with pictures of animals and they had to recall them from smaller to bigger.



**Working memory**

Bee...Duck...Donkey !

Ranked recall memory phase

	Categorization score	Age	Working memory score	Flexibility score (DCCS)	Inhibition score (DCCS)	Vocabulary score (EVIP)
<b>Categorization score</b>		$r = .285$ $p = .006$	$r = .013$ $p = .457$	$r = .190$ $p = .051$	$r = .108$ $p = .176$	$r = -.070$ $p = .725$
<b>Age</b>	$r = .285$ $p = .006$		$r = .280$ $p = .007$	$r = .054$ $p = .322$	$r = .386$ $p < .001$	$r = -.044$ $p = .649$
<b>Working memory score</b>	$r = .013$ $p = .457$	$r = .280$ $p = .007$		$r = .067$ $p = .284$	$r = .196$ $p = .045$	$r = .279$ $p = .007$
<b>Flexibility score (DCCS)</b>	$r = .190$ $p = .051$	$r = .054$ $p = .322$	$r = .067$ $p = .284$		$r = .090$ $p = .220$	$r = .059$ $p = .306$
<b>Inhibition score (Stroop)</b>	$r = .108$ $p = .176$	$r = .386$ $p < .001$	$r = .196$ $p = .045$	$r = .090$ $p = .220$		$r = .184$ $p = .056$
<b>Vocabulary score (EVIP)</b>	$r = -.070$ $p = .725$	$r = -.044$ $p = .649$	$r = .279$ $p = .007$	$r = .059$ $p = .306$	$r = .184$ $p = .056$	

## CONCLUSION

Results revealed a correlation between flexibility and concept generalization performance, and no correlation with inhibition and working memory or vocabulary. It suggests that executive control play a major role in comparison situations and more precisely that performance differences are associated with the necessity to rerepresent the stimuli when it is necessary.

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