Working Memory in Children: A Time-Constrained Functioning Similar to Adults

The Time-Based Resource-Sharing Model

- Focus of attention can be allocated to only one activity at a time, thus when attention is devoted to processing component, it is not available for maintenance.
- But when attention is switch away from memory traces, their activation decays with time.
- Thus, some refreshing by attentional focusing is needed through a rapid switching of attention between processing and maintenance.
- Working memory performance depends on the proportion of time during which processing captures attention, thus impeding memory refreshing.

Model tested in adults (Barrouillet, Bernardin, & Camos, 2004; Barrouillet, Bernardin, Portrat, Vergauwe, & Camos, 2007; Barrouillet, & Camos, 2007)

> Provided that processing activities are attentional demanding, the longer is the processing time, the shorter are the possibilities for maintenance activities and thus the higher is the forgetting of information.

WHAT ABOUT CHILDREN?

General Method

Maintaining letters while judging the position of successive squares

Comparison of two experimental conditions of a spatial judgment task in each experiment

- One condition is supposed to involved higher reaction time than the second one
- Within-subject design and random mixed conditions
- 3 series of 1 to 5 consonants to be remembered in each condition
- Position of 8 successive squares to be judged by pressing keys between two consonants

Experiment 1

Position Discriminability

5 mm vs. 68 mm between the two positions

- 24 French fifth graders
- Mean age 10.5 years (SD = 5 months)

<table>
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<tr>
<th>Close</th>
<th>or</th>
<th>Distance</th>
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Recall

When the positions of successive squares are close children take longer to achieve the spatial judgment and their span performances are weaker.

Experiment 2

Contrast Discriminability

1% vs. 50% of luminosity level between squares and background

- 28 French fifth graders
- Mean age 10.8 years (SD = 3 months)

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<tr>
<th>Normal</th>
<th>or</th>
<th>Degraded</th>
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Recall

When the contrast between background and successive squares is narrow children take longer to achieve the spatial judgment and their span performances are weaker.

Conclusion

A Working Memory functioning similar to adults

Factors that affect working memory functioning in adults have a similar impact in children.

As in adults, even small increases in the duration of response selections had a disruptive effect in concurrent maintenance and resulted in poorer recall performance. These facts suggest that, at least from the age 10 onwards, working memory has the same time-constrained functioning in children as in adults.

According to TBRS account, processing and maintenance share a common supply in a time-based competition. When attention is occupied by processing episodes, it is no longer available to refresh memory traces that inescapably decay through time. Their maintenance requires to switch attention from processing to storage.

The present results show that this rapid switching mechanism is functional since 10 years of age.