

Lecture 10

early memory development

reading

Schacter et al. (2011): core text: Chapter 5; pp. **197-198**;
Chapter 11; pp. **435-437**;

Goswami, U. (2008). *Cognitive Development: The Learning Brain*. Psychology Press. Chapter 8. The development of memory.

plus pdf article on blackboard if you are interested:

Gathercole, S.E. (1998). The development of memory. *J. Child. Psychology & Psychiatry*, 39, 3-27.

memory

the ability to store, retain, recall information about experienced events

key questions

- how do we measure children's memory?
- how do children construct reliable memories of events

recognition; identify the presence of 'x' from an event

yes /no response – guessing?

recall; describe or retrieve from experience of event

declarative (autobiographical) & working memory

mobile task (2-7mths)

conjugate reinforcement

e.g. *Rovee-Collier et al. 1980, also 1997*

conditioned response = kick

learning = contingency between

big/fast kick → dingly-dangly mobile

retention depends on training



Learning from 2mths; 6mths learn faster; more durable

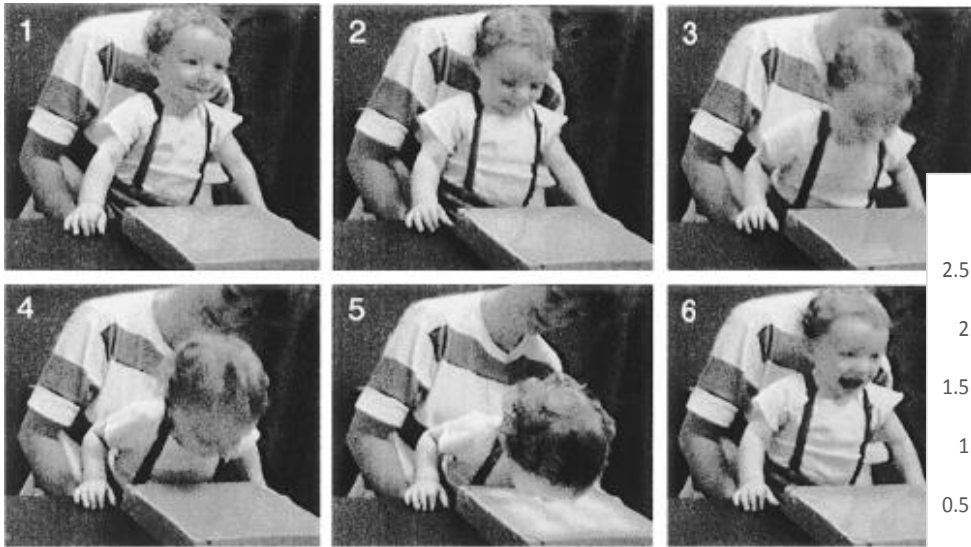
Specificity to event (after 24h delay), as per Tulving (1983)

By 9 mths; able to respond **flexibly** to test on different trains

(Hartshorn & Rovee-Collier, 1997)

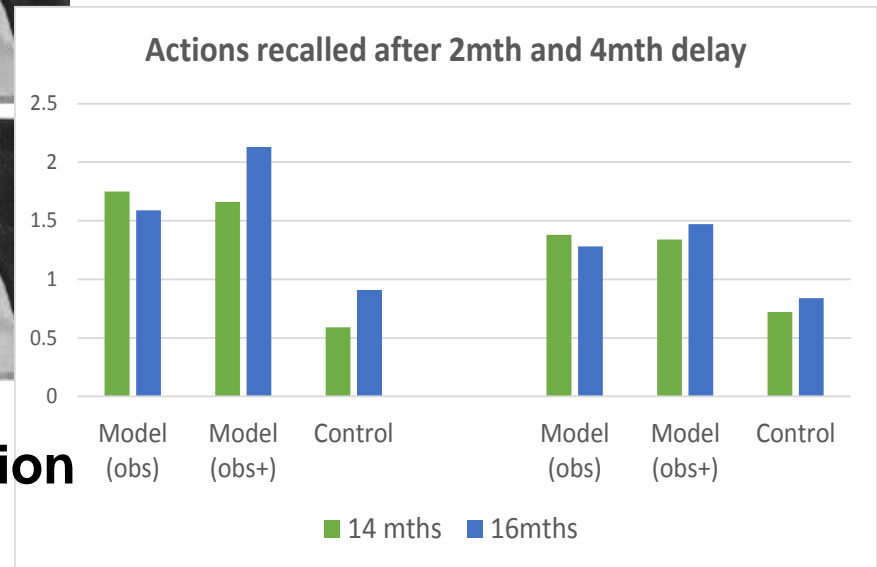
do toddlers 'remember'?

14/16 mths shown demonstrated act = lean forwards and touch forehead on panel → activate light (orange) panel



20 sec demo + 3*repetitions

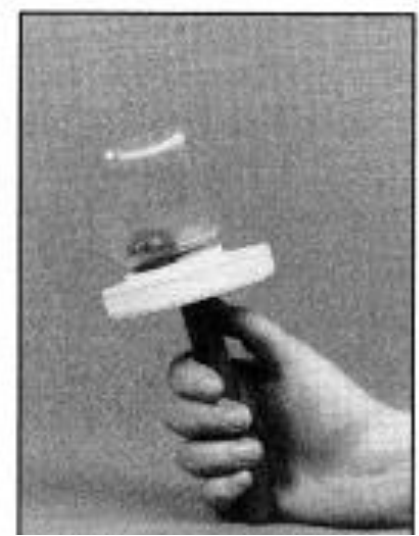
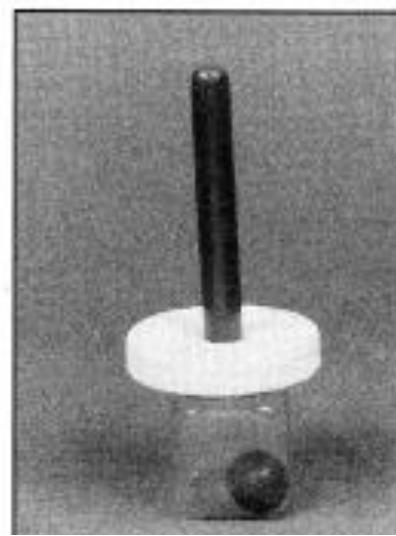
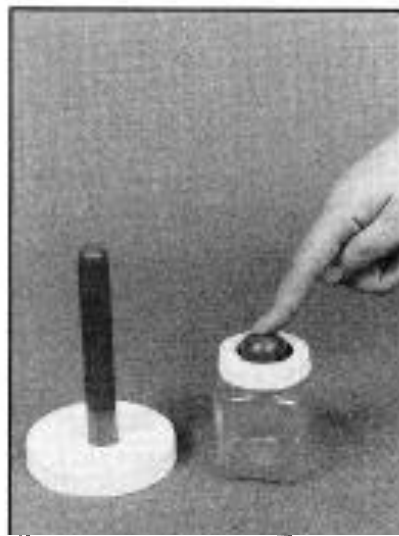
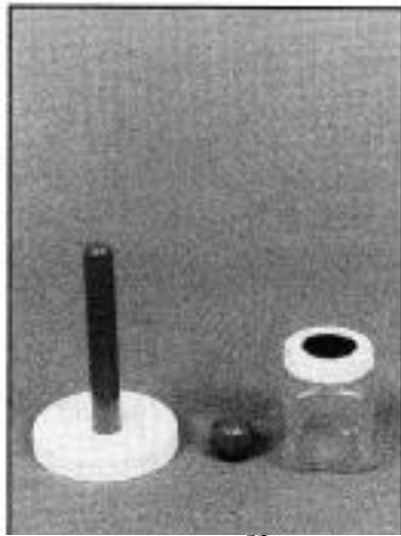
e.g. Meltzoff (1995): deferred imitation



Memory for actions, but older toddlers benefit more from **retrieval opportunity**

memory for actions? Or just objects

e.g. 18-24 mths: Herbert & Hayne, 2000



Stimulus set

Step 1

Step 2

Step 3

Green rattle

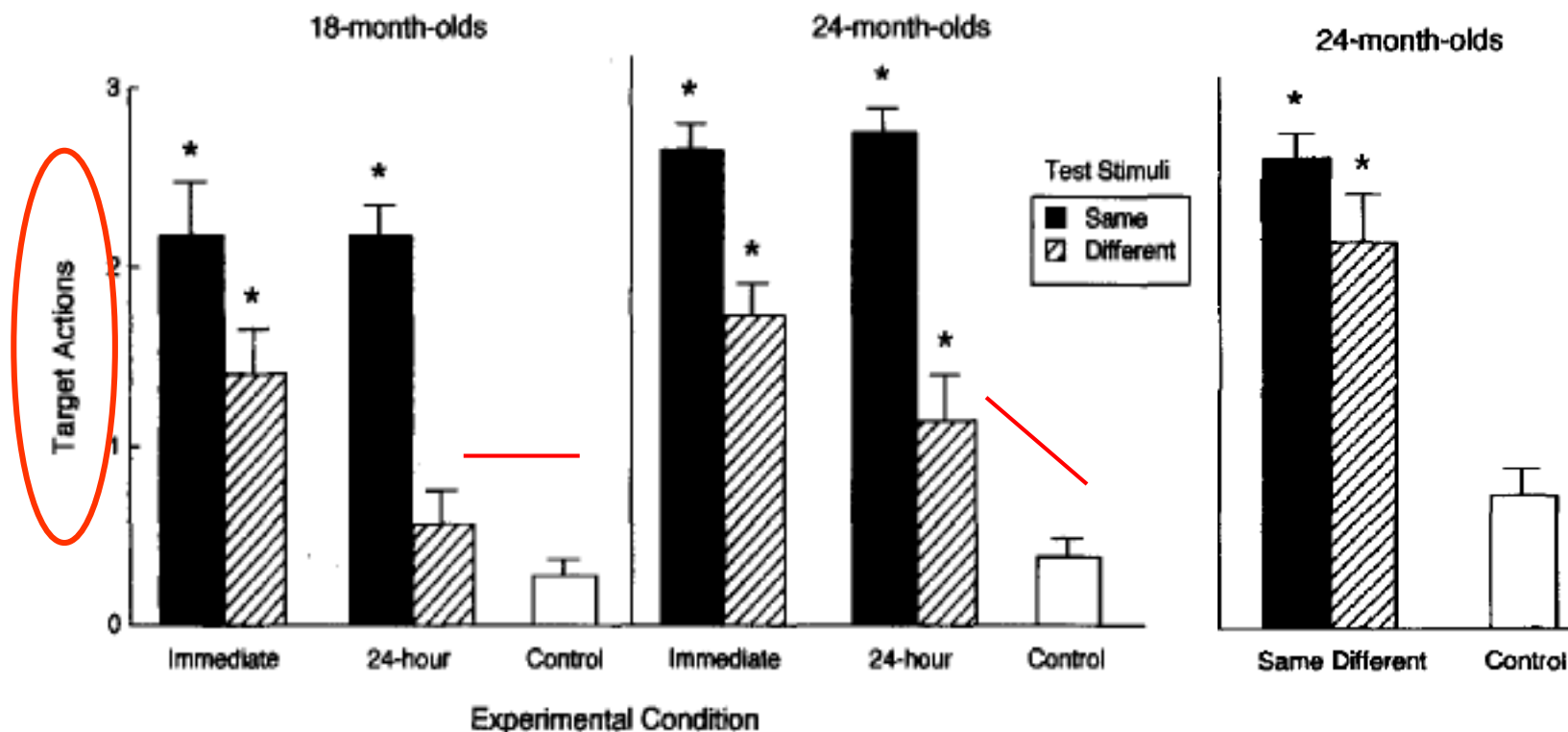
Push ball through
diaphragm into
cup

Put stick on jar,
attaching with
Velcro

Shake stick to make
noise

enduring and flexible memories

data from Herbert & Hayne, 2000 (1A & 2)



Why? Older children better exploit retrieval cues;
verbal coding utilised to facilitate encoding too

recall sequences, not single actions



declarative memory test; analagous to verbal recall?

- predicts later memory (*Bauer et al. 2006*)
- verbally accessible (*Bauer et al. 2002*)
- amnesics fail (*McDonough et al. 1995*)

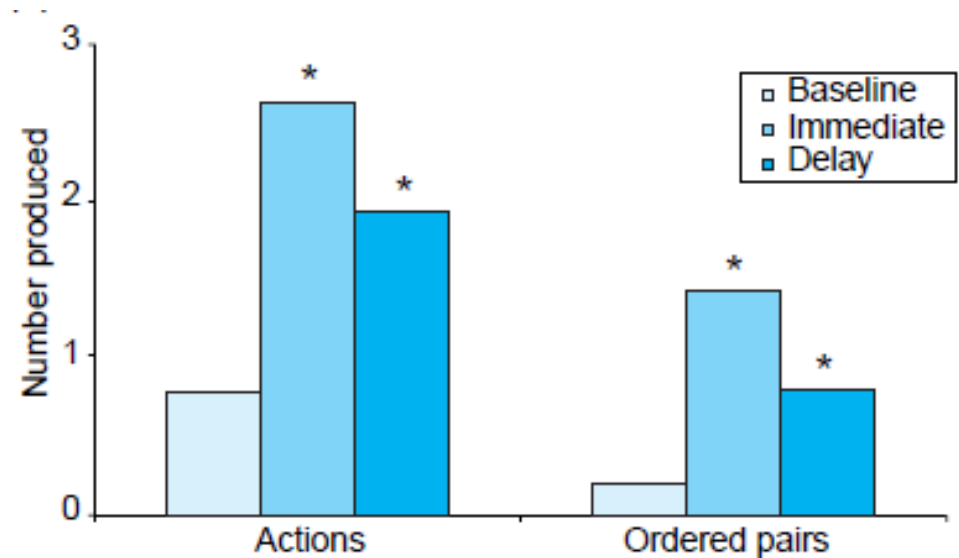
elicited imitation; key transitions

stability of recall improves with age

- at 6mo; 25% recall action pairs (24hr delay)
- at 11mo; 50% recall action pairs (1mth delay)
- at 24mo; 100% recall action pairs (1mth delay)

persistence too

- at 6mo; 24hr delay
- at 9mo; 1mo (not 3)
- at 20mo; >12 months



From pre-verbal to verbal memory

- **access verbal encoding** of memory
- **organise knowledge** (scripts, Nelson '88)
- strategic encoding: if objects in semantic sets (e.g., fruit, animals), younger children less likely to arrange the pictures if allowed (*Bjorklund & Douglas, 1997*)
- utilise predictable script knowledge for:
 - encoding – what to expect
 - storage – sub-events may be chunked
 - retrieval – the script provides a prompt

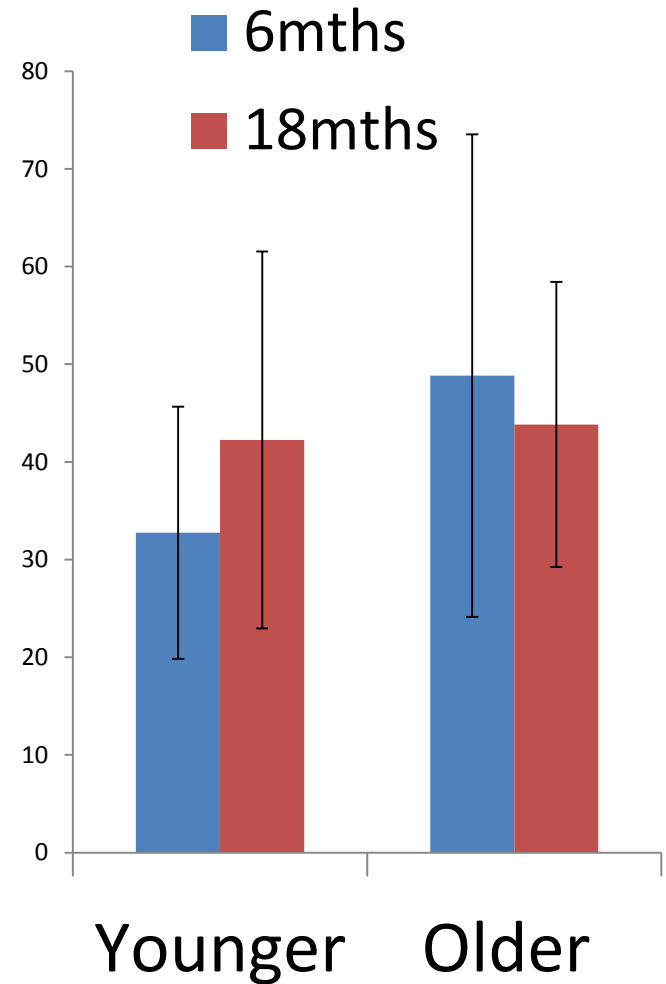


verbal events (preschool)

Older children (3y6mo - 4yrs)
later recalled same amount
with age, more spontaneous
with age, more detailed
recall enhanced if discussed



From Hamond & Fivush '91



verbal events *over time*

Salient events from preschoolers
7 years later – older children
recalled with **novel information**



Number of propositions recalled

Events originally recalled at:	At the original interview	At 8-year interview: total	At 8-year interview: before cue	Proportion new information
40 months of age	10.61 (8.39)	9.57 (4.22)	7.93 (3.63)	0.87 (0.18)
46 months of age	11.08 (4.91)	11.78 (6.14)	8.00 (5.07)	0.83 (0.14)
58 months of age	9.67 (5.04)	9.40 (4.78)	7.40 (5.91)	0.79 (0.24)
70 months of age	18.52 (16.02)	16.80 (11.85)	13.85 (12.50)	0.70 (0.20)

“ . . . they poured some water on Wilson” @58mths

“ . . . water was gettin' gettin' poured on Wilson's head” @ 8yrs

From Fivush & Schwarzmuller '98

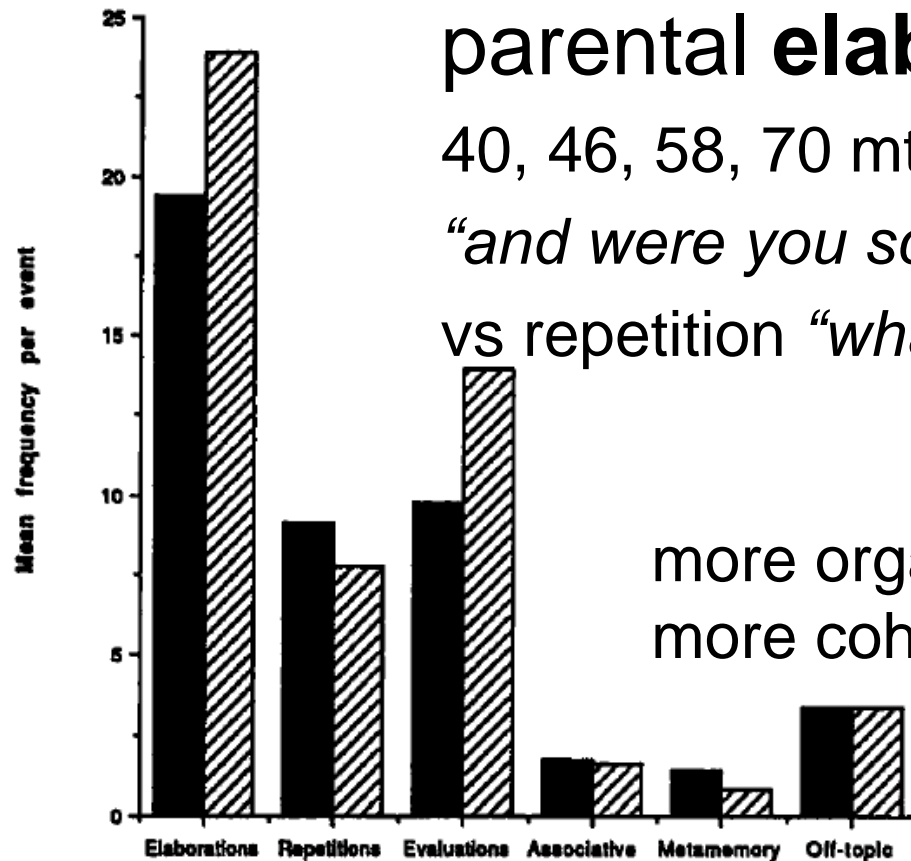
constructing 'autobiography'

parental **elaborative style**

40, 46, 58, 70 mths – salient shared event

“and were you scared of the croc?”

vs repetition *“what else?”* or switch of topic



more organized & detailed memories
more coherent self-perspective

From Reece, Haden, Fivush, 1993

talking long-lasting memories

If you want your child to remember it well – talk about it?

- Constructing child-centred narrative generates a more autonomous sense of self (Wang, 2007)
- But, memory not simply due to opportunity to refresh linguistic skill @ encoding predicts later elicited imitation (*Bauer & Wewerka, 1997*)
- Preschoolers recall of a salient event, much better if verbally reported at the time (*Pillemer et al. 1994*)

But how much do young children recall in short-term?

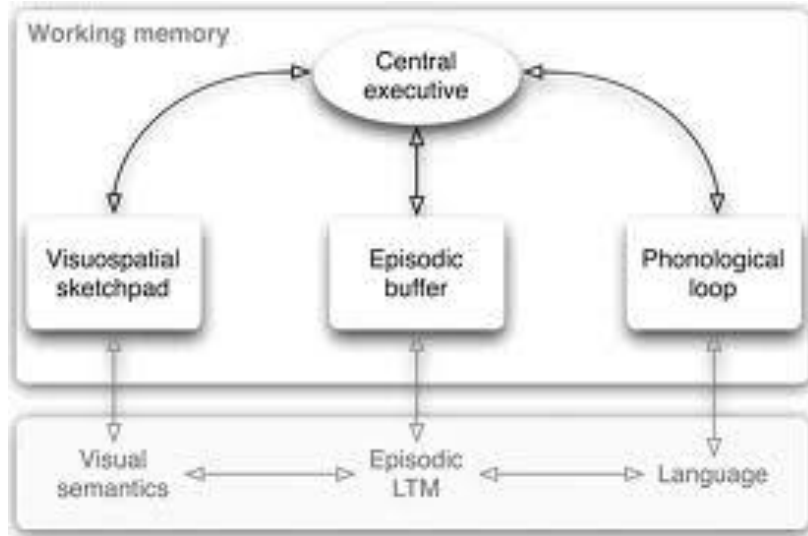
→ *Working memory (Gathercole, Cowan, Jarrold)*

working memory

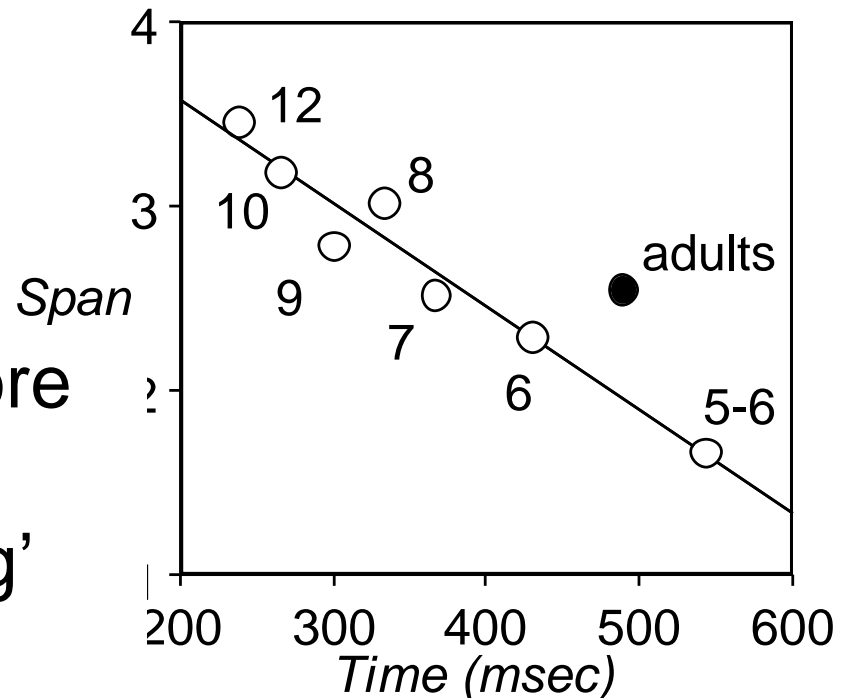
‘mental workspace’
(*Baddeley & Hitch, '74*)

time-limited decay

memory span - how much?



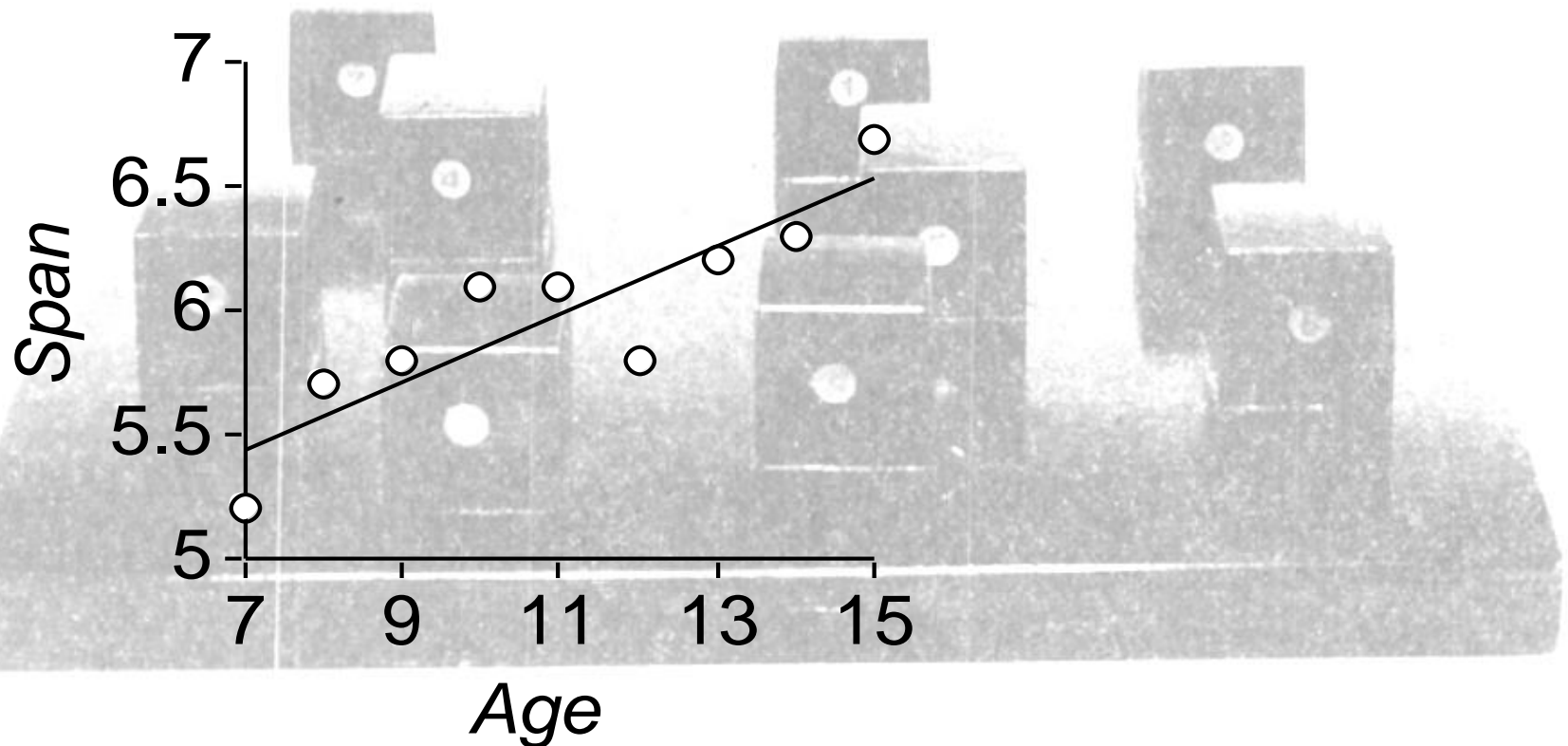
As children remember more
(larger memory span) –
linear relation to ‘how long’
a limited capacity



not just memory for 'words'

Isaacs & Vargha-Khadem (1989)

more *abstract* tasks – less 'linguistic' load

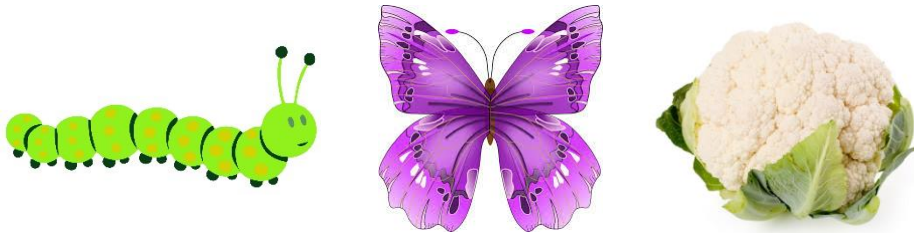


phonological coding

Baddeley & Hitch → phonological loop

- recode information to **phonological code**
- **storage** in memory + covert **rehearsal**

@3-5 yrs show *phonological similarity effect*
(duck, luck, muck) so store phonological codes
& *word length effect* (butterfly, tadpole) so rehearse



But not for pictures, unless
child is ~ 7yrs or older
(Hitch et al., 1989)

pre-rehearsal?

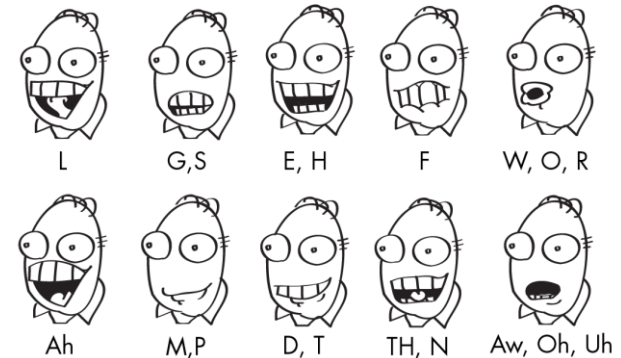
- “lip movements” benefit recall
(*Flavell, Beach, Chinsky ‘66*)
- correlation between **speech rate** and span?
(constant on spoken tasks 4-10; *Hulme et al., ‘84*)
(only 10yr+ on picture tasks; *Hitch*)

a key transition in the **phonological loop**?

No – young children discover ‘naming’ (Henry, 1991) and struggle with overt speech output

With age, opt for rehearsal as a **strategy**

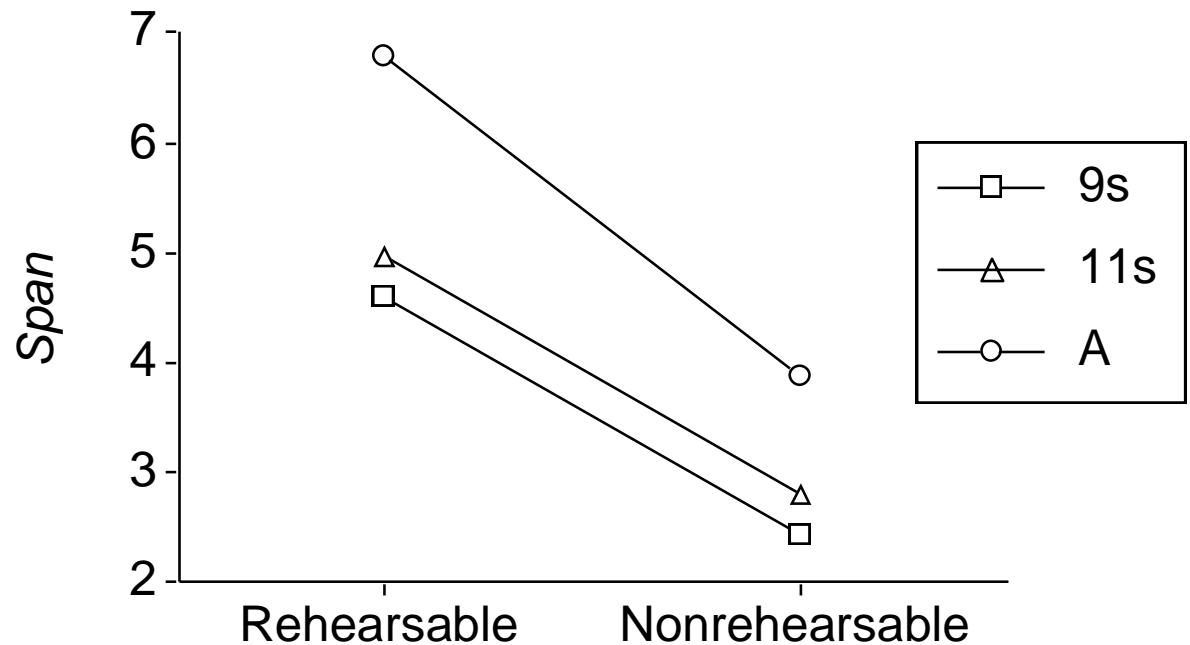
The MOUTH-ABET



memory capacity?

9s, 11s, & adults recalling digit lists in two conditions:
standard digit span – allows strategy use (rehearsal)
running memory span – don't know when list will end,

Cowan et al. (2005)



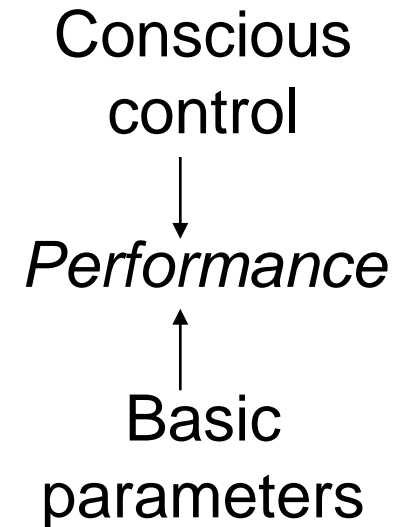
rehearsal helps, but age differs in both measures

conclusions

Declarative memory develops early and relies on organising principles:

- temporal and causal structure
- language aptitude & elaboration

Working memory development reflects a mix of basic (bottom-up) and high level (top-down) factors



Summary

- From early infancy, memory seen in familiar /recognition tasks; largely 'implicit, automatic, non-conscious'
- End of first year, deferred and elicited imitations of actions and sequences; 'explicit, controlled, declarative' memories
- End of second year, transitions in flexibility and duration of nonverbal memories (and onset of verbal coding)
- Verbal memories benefit from organisation and elaboration – parenting style can facilitate a sense of autobiography & self
- Immediate memory is time-limited, span increases with age; changes in strategies used (like rehearsal) – and maybe storage/ efficiency of memory (hard to separate which?)