Effects of internal state on infant learning and memory

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BACKGROUND

- Rapid changes in internal state, and accompanying behavioral changes, are a trademark of infancy (Clifton & Nelson, 1976)
- In adults, being in the same state at memory and encoding and retrieval facilitates recall (state-dependent memory, Bower, 1981)
- Infants require a close match between external cues present at encoding and retrieval to access a particular memory (Hayne, 2004)
- Given the profound reliance on matching *external* cues, infant memory might be highly susceptible to variations in *internal* state

METHOD

Participants and Design : N = 96 infants aged 9 months

Play period	Same state condition (n = 32)		Different state condition (<i>n</i> = 32)		Baseline condition (<i>n</i> = 32)	
	Animated/ animated (<i>n</i> = 16)	Calm/ calm (<i>n</i> = 16)	Animated/ calm (<i>n</i> = 16)	Calm/ animated (<i>n</i> = 16)	Animated $(n = 16)$	Calm (<i>n</i> = 16)
Play before demonstration	Animated	Calm	Animated	Calm	-	-
Play before test	Animated	Calm	Calm	Animated	Animated	Calm

Set-up





Set-up of the laboratory. Demonstration and test sessions occurred in the smaller part of the room behind the dividing wall (left photo), out of view of the stimuli used during the play periods. The right photo shows a set of materials used for inducing animated play.





RESULTS

Manipulation check

Calm versus animated play with a parent led to

- differences in body movement (actigraphy)
- differences in observed activity levels (video ratings)
- no differences in heart rate

Imitation scores



Condition	Mean numbe
Same state	1.47 (1.19)
Different state	0.59 (0.95)
Baseline control	0.47 (0.84)

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- calm/animated
- calm/calm

Baseline



CONCLUSIONS

- The average imitation score in the same state condition was almost three times higher than in the different state condition. • Variations in internal state made recently formed memories
- inaccessible to infants
- Using internal cues could be adaptive early in life when memory networks are in development
- Rapid state changes in infancy might be a contributor to the phenomenon infantile amnesia

NEXT STEPS

- Internal state might influence memory processing in different ways and at different stages
- Current experiment (on hold): State-congruent learning in 9-monthold infants
- similar paradigm as in experiment on state-dependent memory • induction of animated vs. calm state and then animated or calm
- demonstration
- Test after a 10-min delay
- first data suggest mood congruent learning might occur
 but further data collection necessary

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