

The influence of Action Production System on Action Understanding in 12 month old infants (Cannon N., Woodward A., 2011)

Abhijit Sharang
IIT Kanpur

Motivation

- Perceptual processes aid in understanding and anticipating others' actions
- Anticipation of others' actions is more robust than non-social event anticipation in both adults and infants
- Common link between action production and action anticipation
- Is the same mechanism functional in infants?
- If yes, then developments occurring in action control system should correspond to development in action anticipation

Experiment

- Assessment of 12 month old infants' anticipation of and engagement in containment action
- Two tasks: observation and behaviour
- Behavioural task: hands on involvement in containment action. *Containment latency*, *overall activity* and *containment activity* were measured
- Observation task: short clip of person involved in containment task was shown. *Gaze latency* in anticipating the goal was measured
- Two groups: one group involved in behaviour first and the other involved in observation first

Results

- Behaviour

Table 1 Means (and standard deviations) of behavioral measures for each task order

	Task order	
	Behavior first <i>M (SD)</i>	Observation first <i>M (SD)</i>
Number of instances:		
Containment activity	6.51 (3.86)	6.99 (3.55)
Experimenter prompts	1.18 (1.25)	0.92 (.89)
Amount of time:		
Containment latency (seconds)	37 (40)	33 (26)
Overall activity (seconds)	71 (28)	82 (17)

Note: $n = 15$ in each group.

- Observation

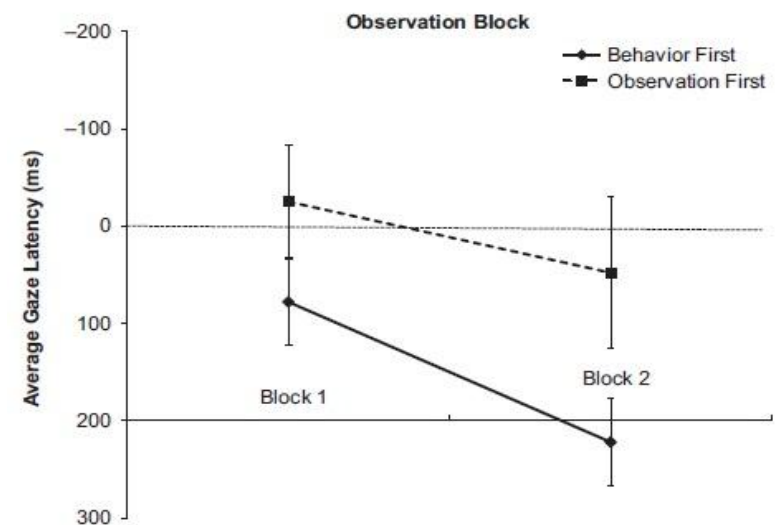


Figure 2 Average gaze latencies based on task order group (behavior first and observation first) and observation block (trials 1–5 and trials 6–9). The median gaze latency score for events in block 1 and block 2 was calculated for each infant, and averaged across the group. Points displayed above the zero line indicate gaze arrival before the ball arrival, and above 200 ms account for saccades launched prior to the ball arrival.

[Cannon et al, 2011]

Results(cont..)

- Relations between actions and observation

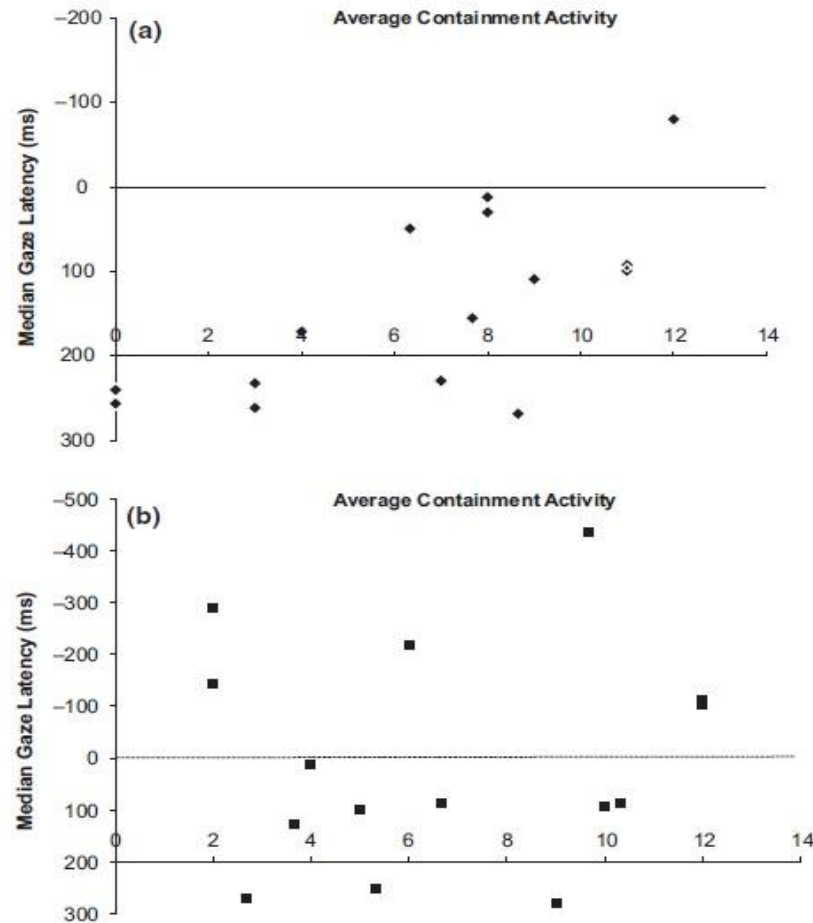


Figure 3 Individuals' median gaze latency as a function of containment activity for each task order, (a) behavior task first, $r = .68$, and (b) observation task first. $r = .10$.

[Cannon *et al*, 2011]

Results(cont..)

- Strong relationship between gaze latency and containment activity in the behaviour first group
- However, the relation was not strongly evident in observation first group
- Moreover, overall activity was not reliably correlated with gaze latency for either group, ruling out the possibility of prior exposure of toys responsible for the result
- Also, no significant correlation was found between containment activity and overall attention during observation

Conclusion

- Findings reveal that the relation between infants' production of actions and their anticipation of the same prospective actions is independent of general activities and overall attention
- However, the converse was not validated as evident from the absence of correlation in the observation first group.
- The two results seem to validate the hypothesis that motor control system is influential in action anticipation in infants as well.

References

- Cannon, Erin N., et al. "Action production influences 12-month-old infants' attention to others' actions." *Developmental science* 15.1 (2011): 35-42.
- Falck-Ytter, Terje, Gustaf Gredebäck, and Claes von Hofsten. "Infants predict other people's action goals." *Nature neuroscience* 9.7 (2006): 878-879.
- Flanagan, J. Randall, and Roland S. Johansson. "Action plans used in action observation." *Nature* 424.6950 (2003): 769-771.