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Background

- Studies of social learning have compared whether individuals choose the same object, the same actions, or produce the same outcome as a demonstrator (Call, Carpenter & Tomasello, 2005; Nielsen, 2006).
- By 7 months, infants copy a model by choosing the same object (Hamlin, Hallinan & Woodward, 2008).
- Around 12 months, infants begin to copy specific actions. In the second year, imitation becomes goal-directed, with infants copying a subset of demonstrated actions (Carpenter, Call & Tomasello, 2005).

Aims

- **Q.1:** Which aspects of behavior do infants copy first: objects or actions?
- **Q.2:** Are these two phenomena related?

Method

Participants: 38 infants tested longitudinally at 6, 11 and 13 months at three different tasks.

Aspects of Imitation measure: An adaptation of Barr, Dowden & Hayne's (1996) three-step hand-puppet paradigm at 6 & 11 months: Two objects, two action and two end locations



Goal-directed Imitation measure: At 13 months, an adaptation of Carpenter, Call and Tomasello's Mouse-House paradigm (2005) was used to assess whether infants selectively copied the experimenter's intention



Cognitive Control measure: The A not B task (Diamond, 1985) was administered at 11 months to assess the alternative explanation that the observed relation might be due to general cognitive development rather than development of imitation alone.



Coding

Aspects of Imitation measure: Coded for same/other object, same/other action and same/other end location.

- **Non-imitators (object or action):** Infants who never choose the same object/same action or decreased over time (i.e. unstable).
- **Imitators (object or action):** Infants who increased in imitation (same object / same action) or remained stable imitators over time.

Goal-Directed Imitation measure: Coded for motion matches (i.e. hopping) and for location matches, (i.e. putting the toy in the end location).

• **Goal-directed imitation:** Frequency of motion matches in no-end location condition + Frequency of location matches in end location conditions

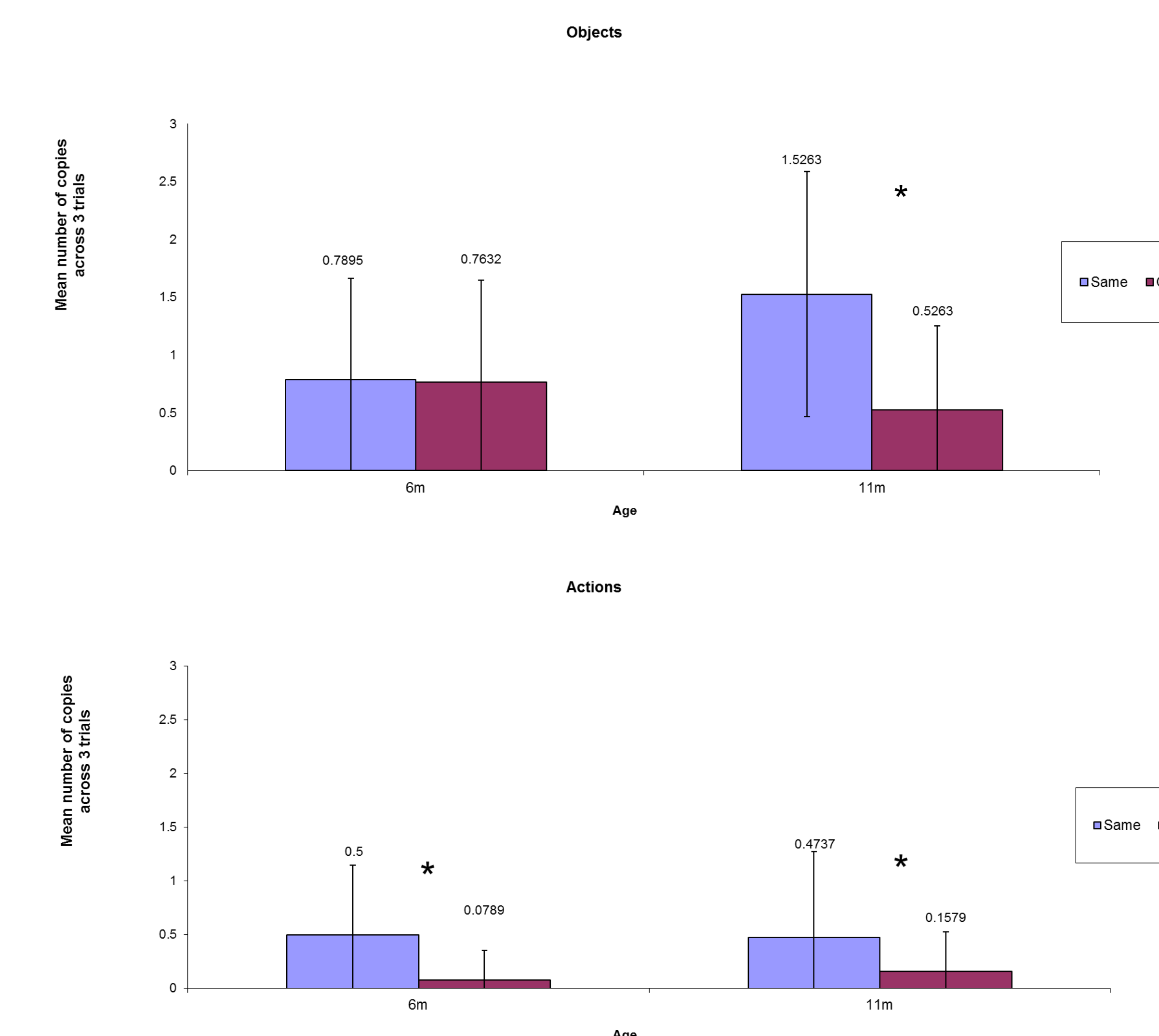
Cognitive Control measure: Coded for passing or failing the task.

- **Passing:** Infants search/gaze at the right location.
- **Failing:** Infants did not search/gaze in the right location.



Results

Object and action imitation in the 1st year:



Relation between types of goal-directed imitation:

- Correlation between object-imitation and goal-directed imitation:
 $r_b = .43$ $p = 0.05$
- No relation with cognitive control measure:
 $\chi^2(1) = 2.40$, $p > .05$
- No relation between action-imitation and goal-directed imitation or cognitive control measure:
 $r_b = -.17$, $p > .05$, $\chi^2(1) = .01$, $p > .05$

Conclusions

- This is the first study demonstrating that choosing the same object as another person during the first year of life is related to copying the goals and intentions of another person during the second year.
- We conclude that copying objects provides an important pathway to imitation.

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