Sensitivity to sensorimotor contingencies in infants: a paradigm for robotic/psychology collaboration

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Introduction

--- BACKGROUND ---

- **Sensitivity to the effects of actions**, i.e. sensorimotor contingencies (SMCs) could be a basic mechanism at the origin of **learning** [1].
- **Intrinsic motivation** (IM) may be a strategy that allows infants to efficiently explore their **open-ended environment** [2].

--- OUR STUDY ---

- We investigated a paradigm where we can show that **young infants are sensitive to SMCs**.
- As a test we used the paradigm to study whether infants can learn to **specifically move one arm** that generates a contingent stimulation [3].

--- THE FUTURE ---

- Use the paradigm to study:

- **parameters** of sensitivity to SMCs;
- infants' **exploration strategy** in open-ended environments (IM);
- **transfer of learning** from one contingency to another.

- We hope that data obtained with this paradigm will be **useful to roboticist** in testing of their models.

Methods

--- EXPERIMENTAL DESIGN & SUBJECTS ---

- Variant of a classic contingency paradigm [4]: bracelets that detect an infant's arm movements, and that can generate **a visual and auditory stimulus contingent on the activity of <u>one</u> arm**.

- Nineteen 6 month-old infants, separated in two groups:
  - ***Contingent group***: infants saw a visual stimulus accompanied by a sound, whose speed of movement followed the speed of one of their arm's movement.
  - ***Non-contingent (control) group***: there was no contingency between the infant's movements and the display. Instead the infant experienced the stimulation that a typical baby of the contingent group experienced.

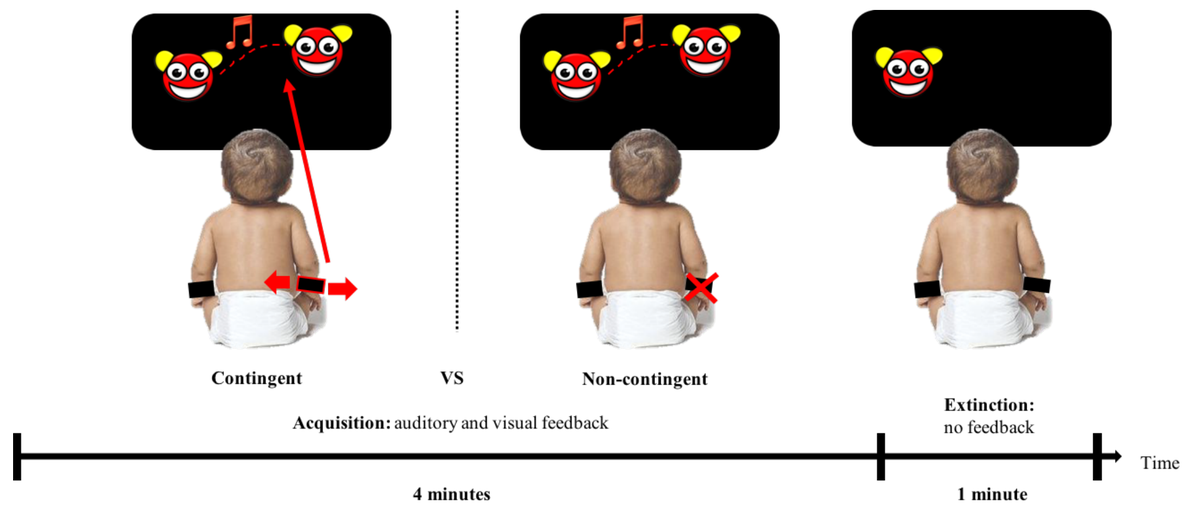


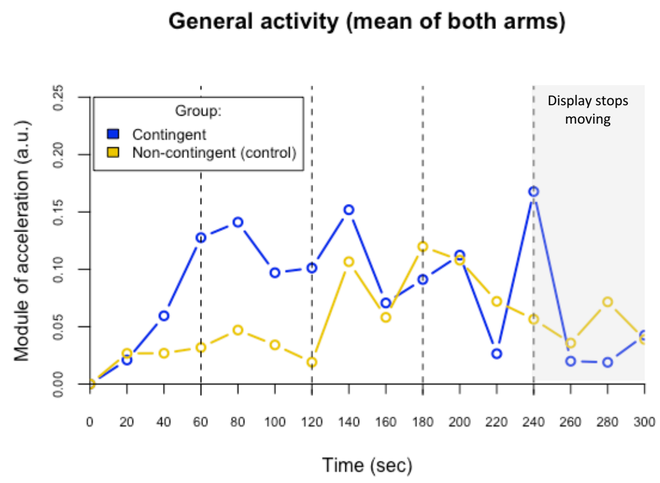
Figure 1 – Setup: the infant wears a bracelet on each wrist that records the activity of the arm.
- Acquisition phase (4 minutes): the infant experienced the contingent or non-contingent stimulus;
- Extinction phase (1 minute): the infant is exposed to a static stimulus.

--- MEASUREMENTS ---

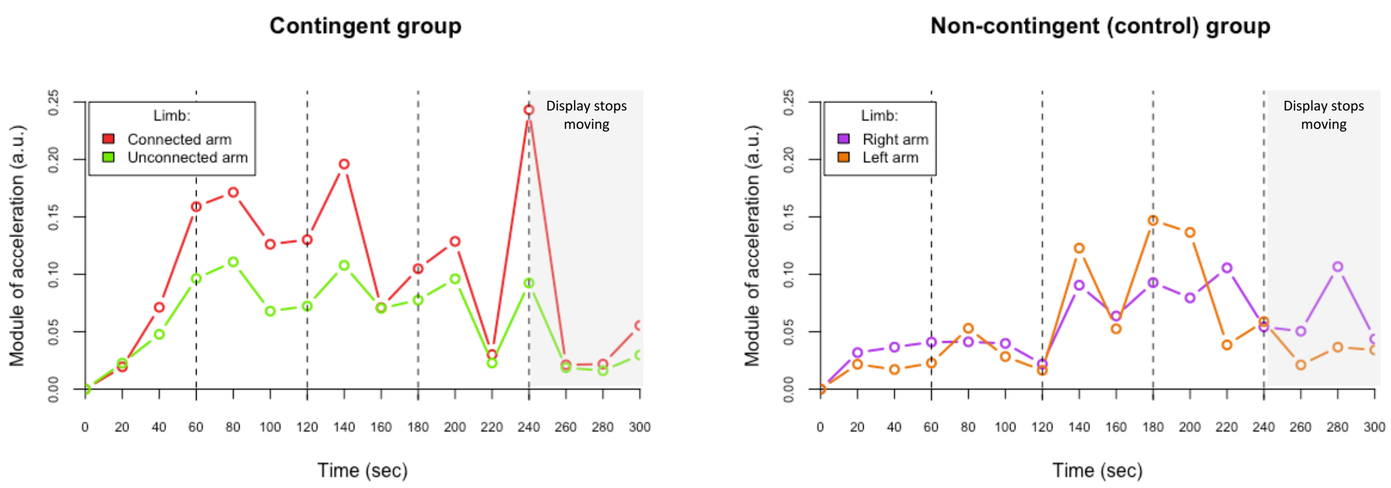
- We measured the **activity of each arm**.
- A **qualitative analysis** of the infant behavior is ongoing (results not presented here).

Results

--- GENERAL ACTIVITY: BETWEEN GROUPS COMPARISON ---



--- LIMB ACTIVITY: BETWEEN ARMS COMPARISON ---



Conclusion & Perspectives

--- CONCLUSION ---

- This paradigm allows infants to **show their learning** of a new contingency.
- 6-month-old infants are able to **specifically move one limb** to generate a contingent stimulus.

--- PERSPECTIVES ---

- Our next step is to study the **parameters** of sensitivity to SMCs, infant's **exploration strategies** (IM), and **transfer of learning** from one contingency to another.
- We are **seeking collaboration with roboticists** who would like to model these behaviors [5,6].

References

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