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Positive Emotional Reactions and Arousal enhance Infants' Learning.

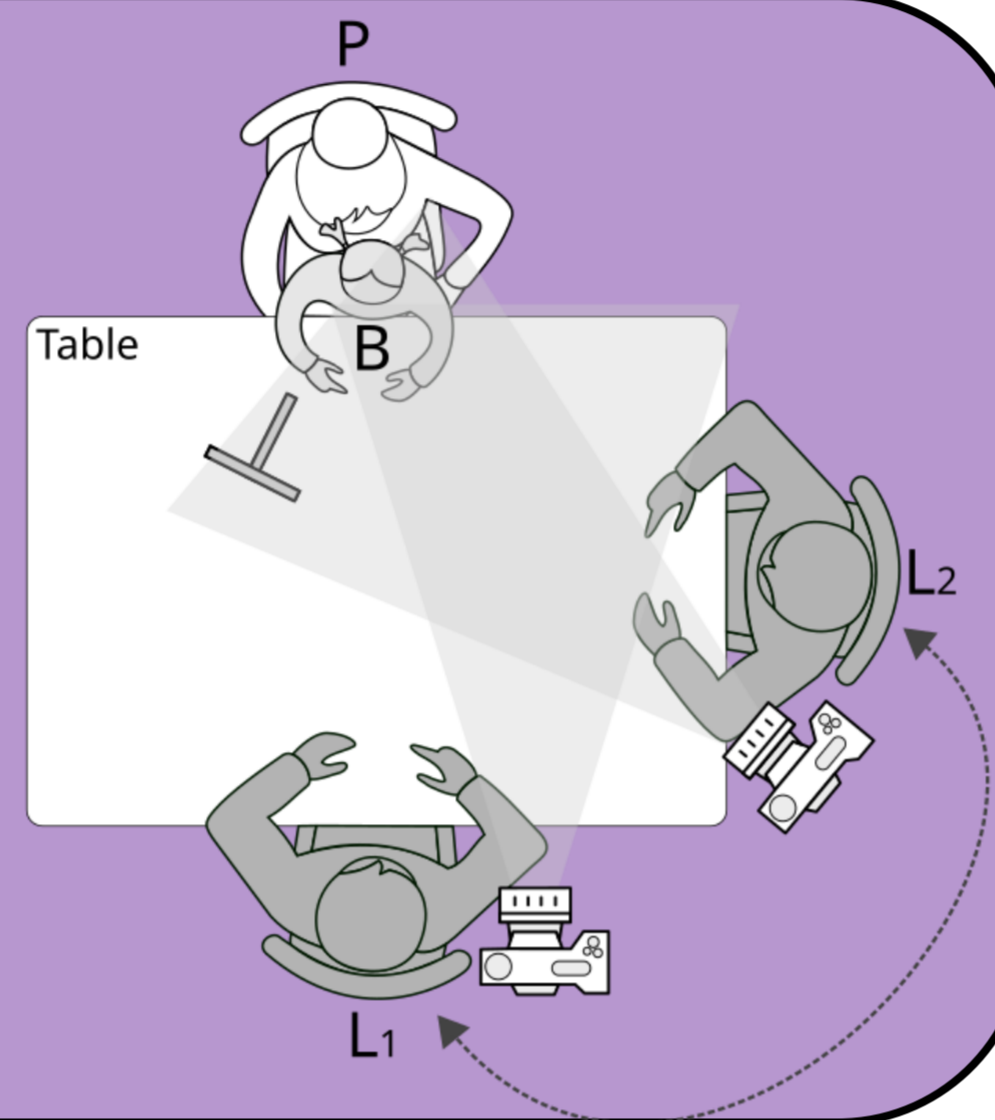
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- ◆ **Positive emotions** induced in **humorous contexts** can have a **positive influence on learning** in **adults** and **school-aged children (1)**.
- ◆ **What about babies?** A first study showed that **18-month-old infants** who laughed at the humorous demonstration improved **their learning in a tool use imitation task (2)**.
- ◆ **What mechanisms may explain this association:** *humor per se*, **surprise**, **positive emotions** or **arousal**?
- ◆ To tackle this question, a **multidimensional approach** was used.

Material and Methods

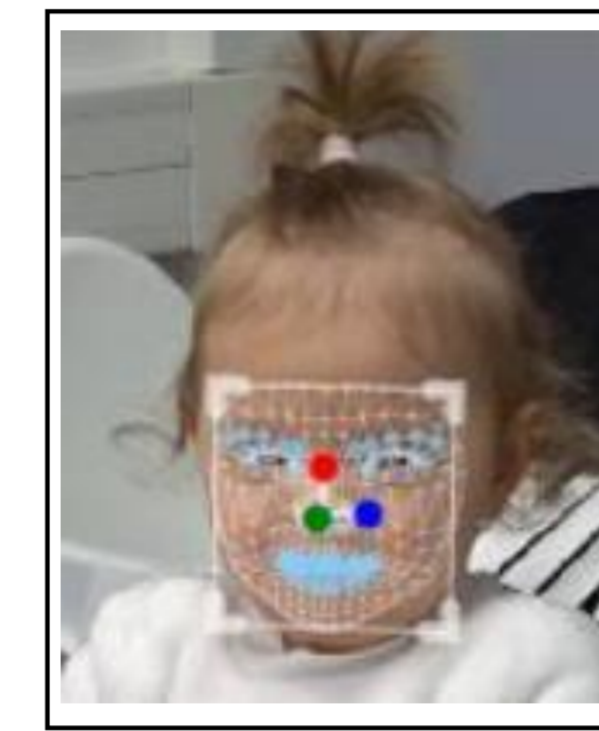
- ◆ **119 infants** from **14 to 22 months old**.
- ◆ **Task :** Infant (B) has to **imitate the use of a rake to retrieve an out of reach toy** after a **demonstration** by an experimenter (L1 or L2 depending on the phase).
- ◆ Two types of demonstration: **Neutral** or **Humorous**.



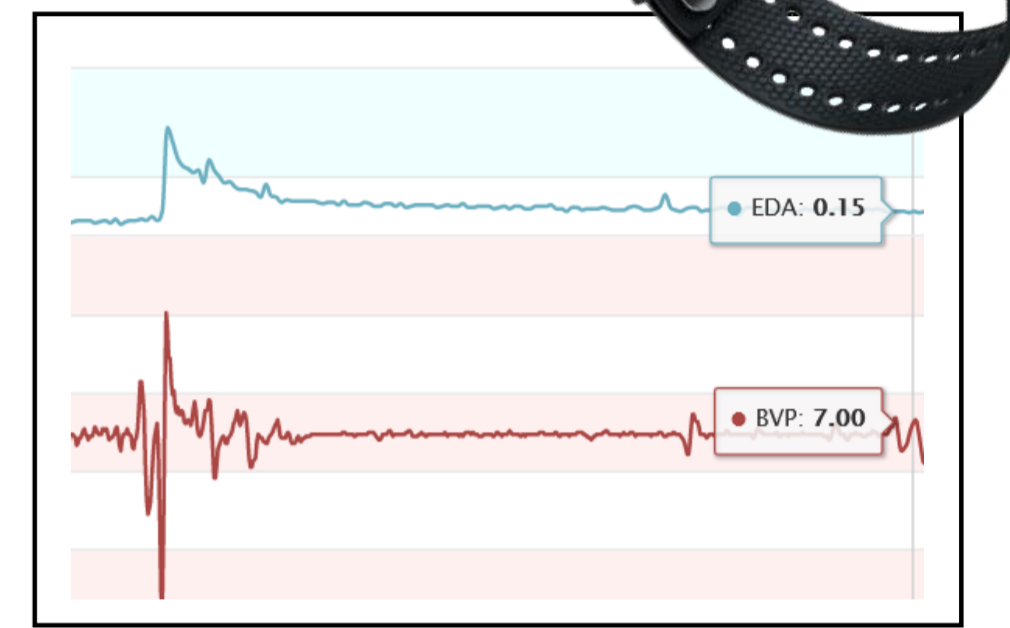
Behavioural Analysis
(using The Observer XT15 by Noldus)

ECBQ Temperament Questionnaire

A Multidimensional Method



Facial Expression Analysis
(using BabyFace Reader by Noldus)

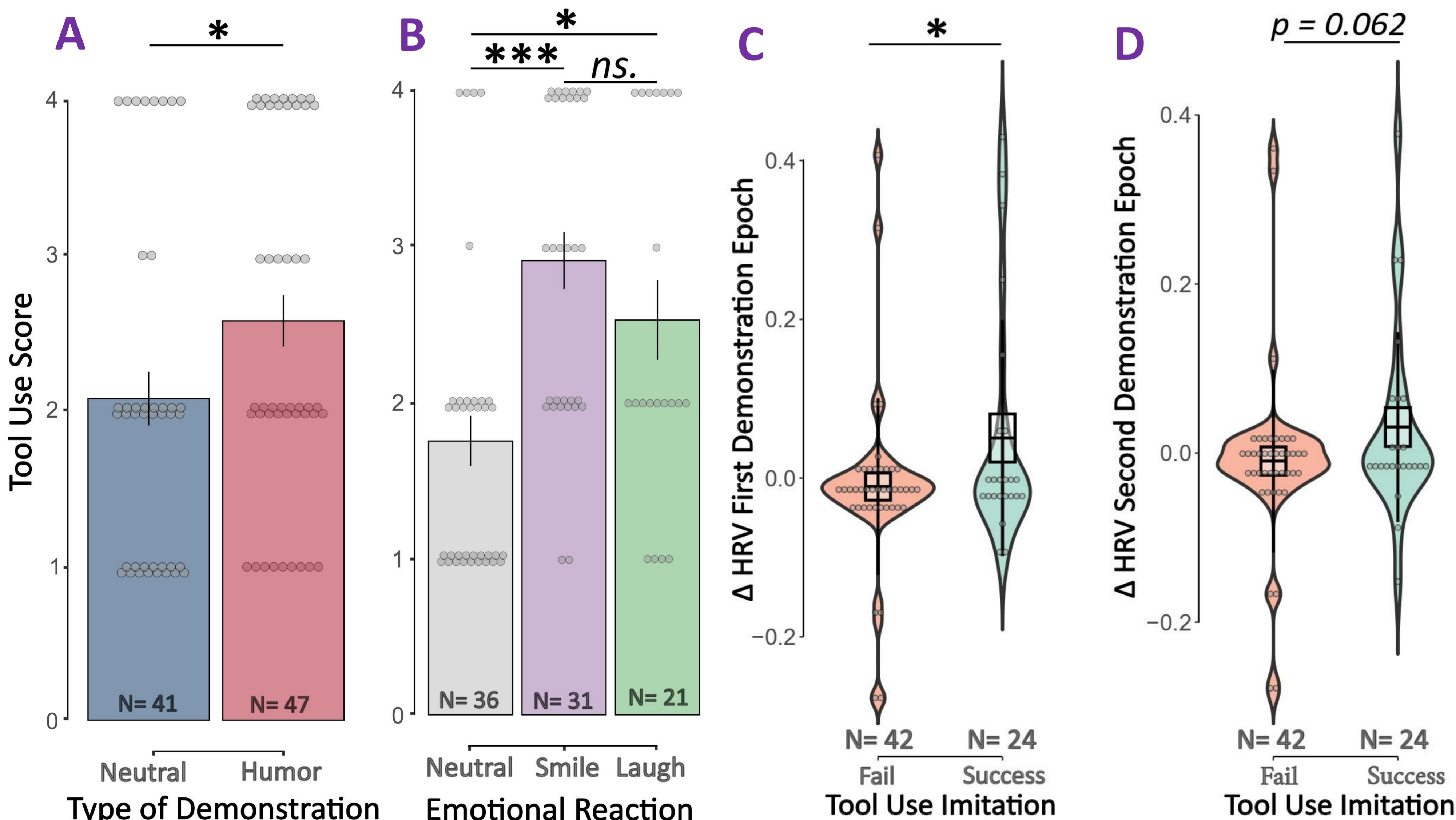


Physiological Analysis
(using E4 from Empatica)

Experiment exemple (Humorous Demonstration)



Results and Discussion



- ◆ Infants exposed to **Humorous Demonstration** learned **better** than the others (**Fig A**).
- ◆ In both demonstration types, **infants who smiled and laughed** during the demonstration **imitated more** (**Fig B**).
- ◆ Infants produce **more social referencing** during the **humorous** than the **neutral demonstration**: higher **frequency** ($p < 0.001$) and **gaze duration** ($p = 0.015$) **towards the experimenter**.
- ➔ These results suggest a **surprise effect (3)** induced by the **humorous demonstration** in addition to a **positive emotions effect (4)**.
- ◆ Infants with the **lowest arousal (ΔHRV^1)** at the **beginning of the demo** were also the **most successful** after demo (**Fig C**). This correlation was only a trend at the middle of the demo (**Fig D**). This result was independent of demonstration type and of infants' emotional reaction during the demo.
- ➔ **These results are consistent with the literature** suggesting a **positive effect of stress reduction on learning (1)**. The decrease of the effect is likely due to **infants' habituation to the task**.

¹ ΔHRV = difference between heart rate variability during the baseline and during the beginning of the demo (**Fig C**) or the middle of the demo (**Fig D**)

Conclusion

Humorous demonstrations (probably due to a **surprise effect**) and **infants' positive emotional reactions** improved **infants' learning performance**. A **stress reduction effect** (*i.e.* an increase in heart rate variability) was observed but **not related to demo type** and to **infants' laughing or smiling reaction**. It is possible that **infants expressed other emotions during the demonstration** that could explain this **HRV dynamic**. By associating **physiological data** with **facial expression analysis** with a **specific algorithm**, we hope to understand the **link between HRV, emotions and learning in infants** during a **humorous context**.

Bibliography

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