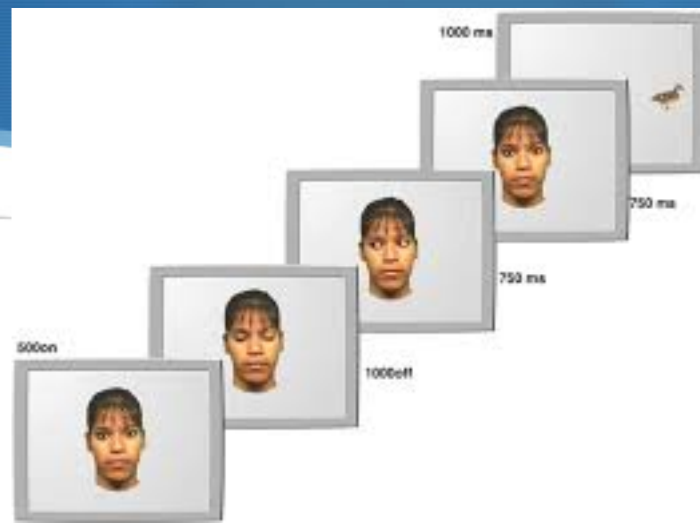
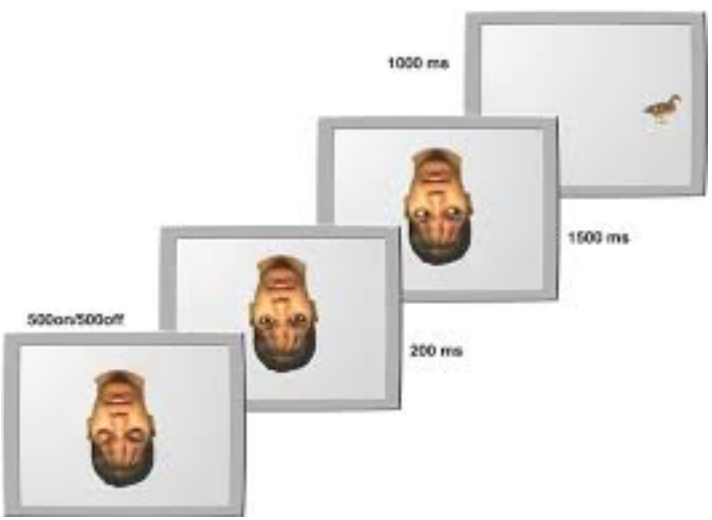
Just between you and me!!!

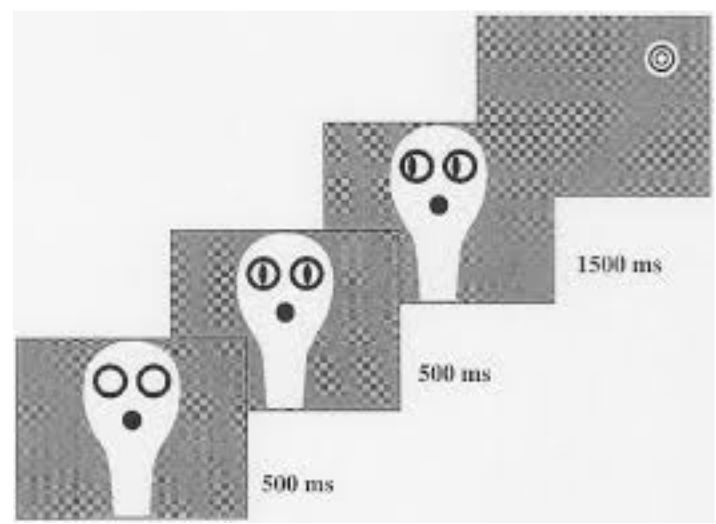
Teresa Farroni

….when I first met Mark…

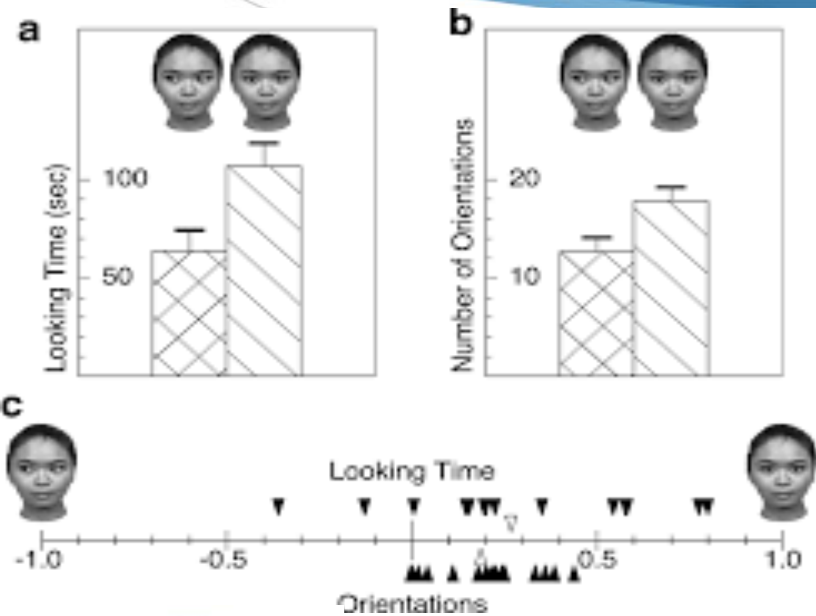
Acting on eye gaze!

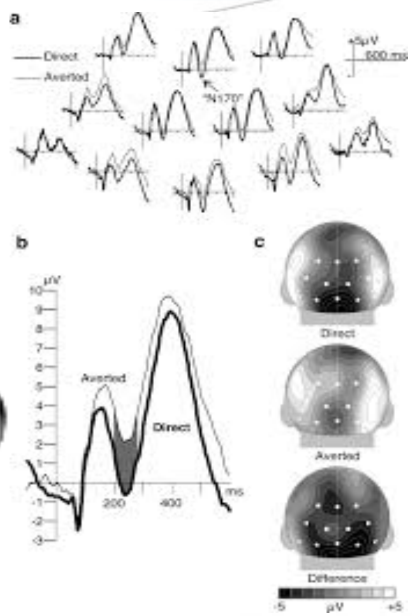






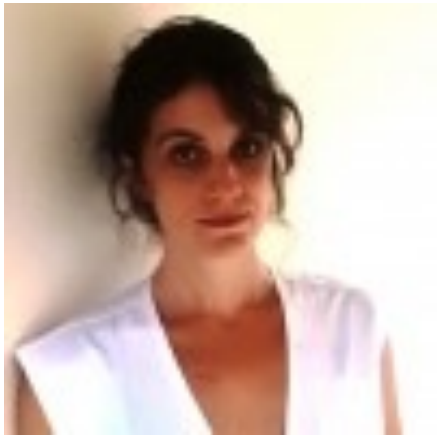
The importancy eye contact





1. Awarded prestigious Welcome Trust Career Development Research Fellowship (£297,505 GBP), Centre for Brain & Cognitive Development, Birkbeck, UK

2. Awarded prestigious Mentor Role



EYE GAZE AND EMOTION

Si… Rigato

(Mark and Teresa)

BODY PERCEPTION AND SELF

Maria Laur… ppetti

AFFECTIVE TOUCH

…eodora)

Le… a della Longa

(Emily)

AFFECTIVE TOUCH AND AUTISM

Laura Carnevale

(Tim)

PROPRIOPERCEPTION AND VR

Irene Valori

(Andy)

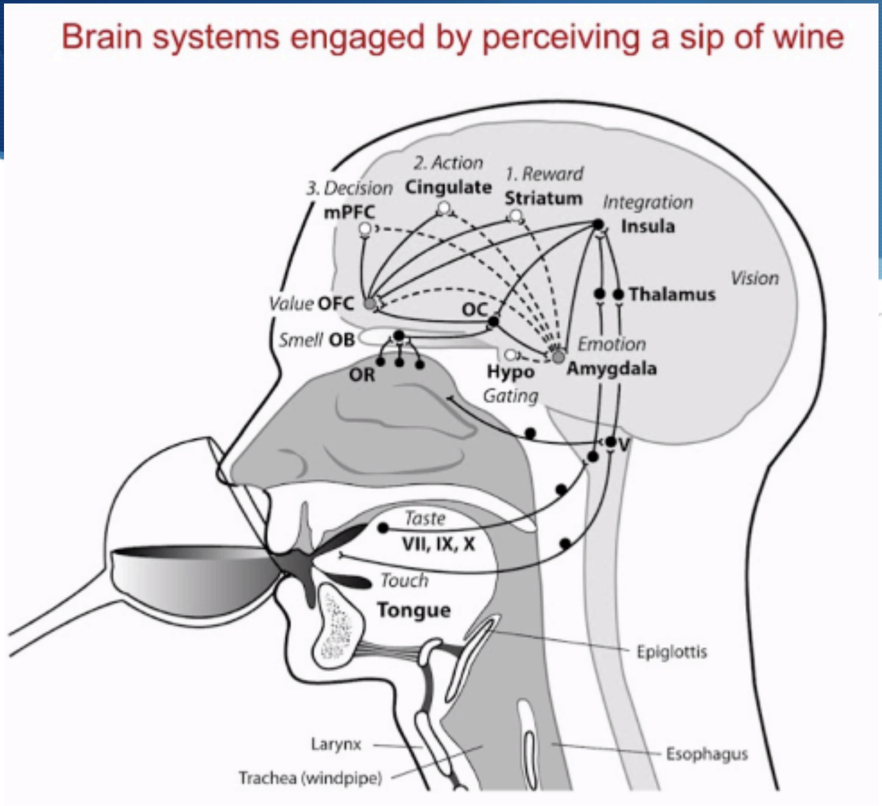
Giulia Orioli

PERIPERSONAL SPACE

Why studying the sense of touch?

- First and most direct manner of contact with the external world.
- Interface between our body and the external world → information about the external object and body itself (Serino & Haggard, 2010)

Affective Touch



Beyond its sensory-discriminative function, touch engages affective and motivational processes (Morrison, Loken & Olausson, 2010).

Social or affective touch → light and gentle touch linked to a class of slow-conducting, unmyelinated fibers (**CT afferents**), present only in the hairy skin of mammals (Gordon et al., 2013; Löken et al., 2009; McGlone et al., 2007; Olausson et al. 2010).

Cultural meeting: …an evolutionary mechanism that promotes social interaction and affiliative bonding!

Neurophysiology of affective touch

- C-tactile afferents: is a neurophysiologically specialized system
- Specific thermo-mechanical properties
- Activation of insula, pSTS, mPFC, ACC
- Interoceptive sub-modality
- Positive and affective components of touch

↓

Integration of physiological, cognitive, and affective aspects of socially relevant tactile information, providing a foundation for affiliative behaviour (Morrison et al., 2010).

Lines of research

Early affective tactile experiences have a crucial role in:

- facilitating learning of facial information **Study 1**
- establishing social engagement and interpersonal attachment **Study 2**
- promoting self-other differentiation → bodily self-awareness **Study 3**

Study 1 : Affective touch and face processing

METHOD

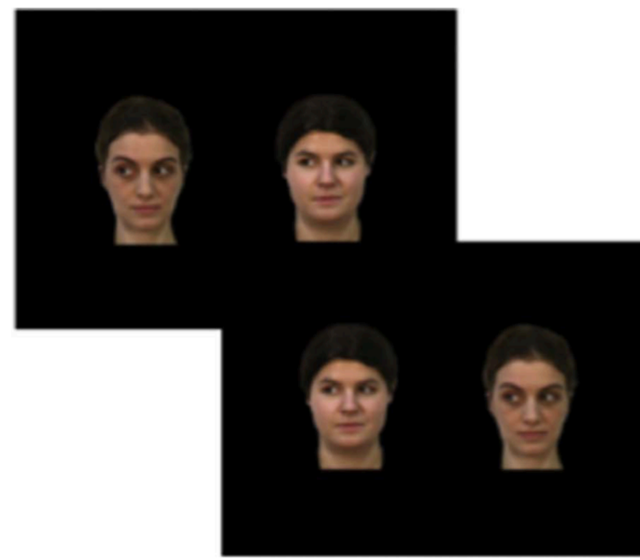
- Participants: 48 four-month-old infants

- Habituation to a face identity + Visual preference test between the same face and a new one.

HABITUATION

a

VISUAL PREFERENCE TEST

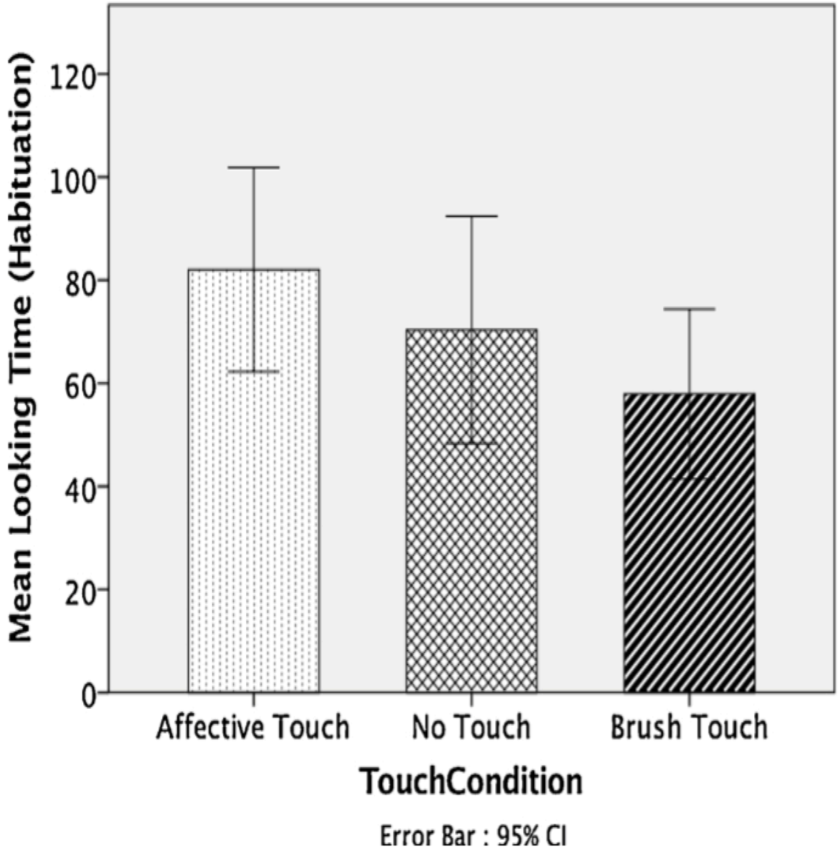


- Between-subject conditions: No-touch, Affective touch (parent's caresses) and Neutral touch (brush tapping) during the habituation period.

Study 1 : Affective touch and face processing

RESULTS: habituation

- No significant difference in the time to reach the habituation between groups ($F(2,45) = 1.73$; $p = 0.189$)

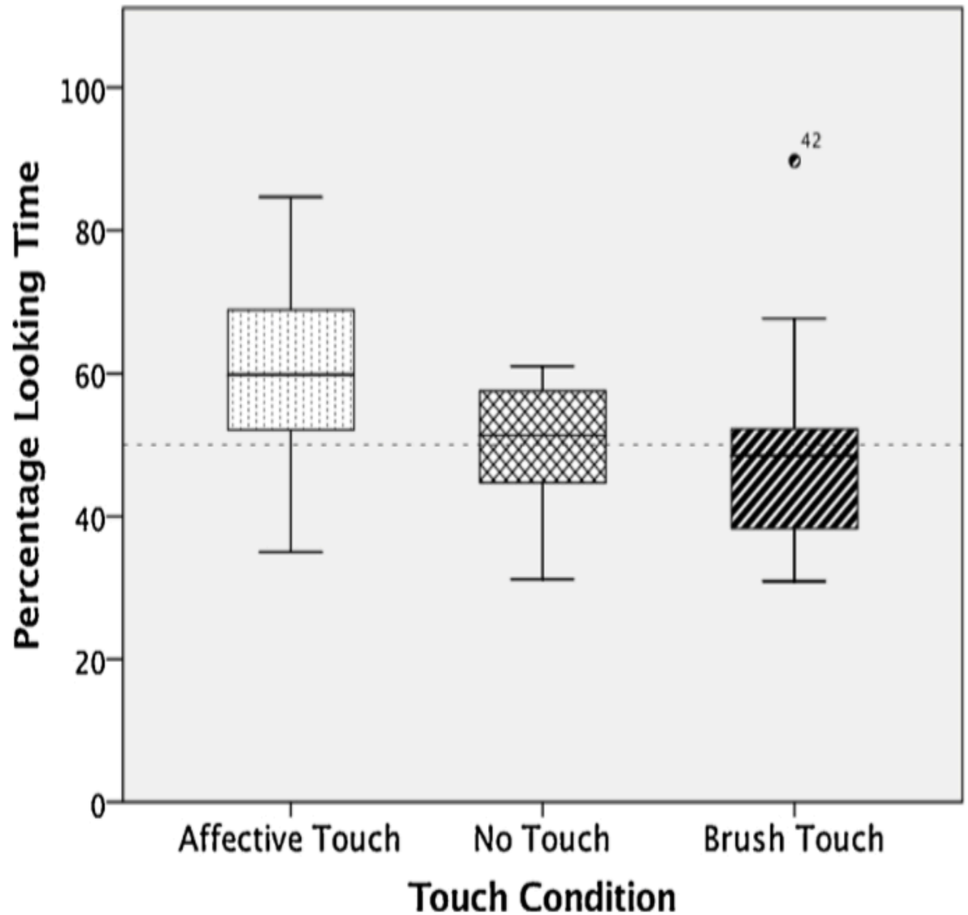


Study 1 : Affective touch and face processing

RESULTS: test

- **Novelty preference score**: percentage of time spent looking at the novel face over the total looking time

- Infants looked longer towards the novel face in the affective touch condition than in the brush (Mann-Whitney tests U = 65, p = 0.017) or in the no-touch conditions (U = 60, p = 0,010)



Study 1 : Affective touch and face processing

DISCUSSION

These findings suggest that:

- Affective touch is processed differently from general tactile stimulation
- Affective touch is an important modulator of facial information processing early in life.
- Affective touch may promote engagement in social interactions → **Does affective touch modulate infants' visual preference for faces?**

Study 2: Affective touch and social engagement

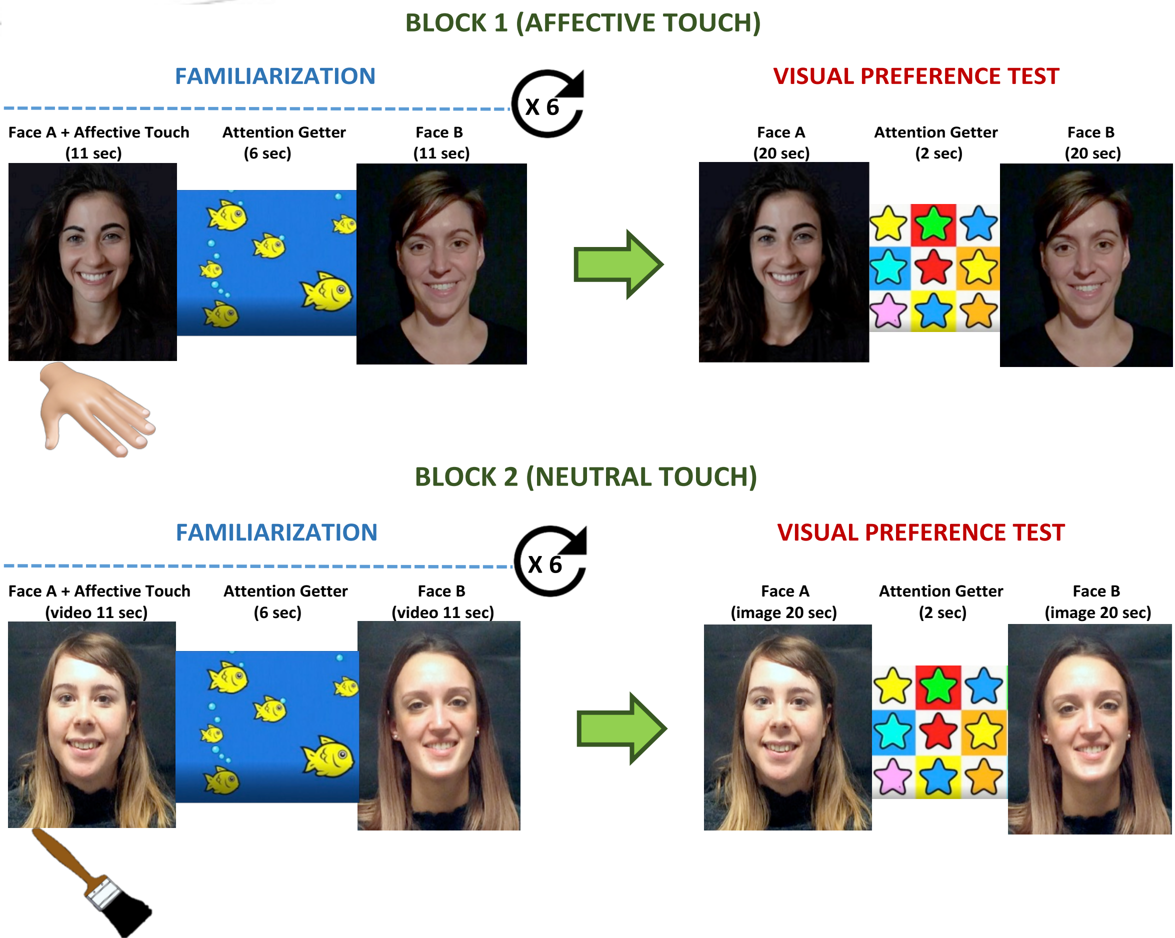
Aim: investigate affective-motivational aspects of touch in promoting social engagement and the underline physiological mechanisms.

- Affective touch is effective in regulating infants' emotional state and maintaining infants' eye contact and smiling (Stack & Muir, 1992; Pelaez-Noguera et al.,1996).
- 9-month-old infants showed a decrease in heart rate and an increase in attentional engagement during affective touch (Fairhurst et al. 2014)
- Neutral faces paired with affective touch were judged more approachable and elicited heart rate deceleration (Pawling, Trotter, McGlone & Walker, 2017).

Study 2: Affective touch and social engagement

METHOD

- Participants: 4-month-old infants (N=40)
- Familiarization Phase + Visual Preference Test
- Type of touch (affective vs neutral) manipulated between blocks
- Heart rate recording

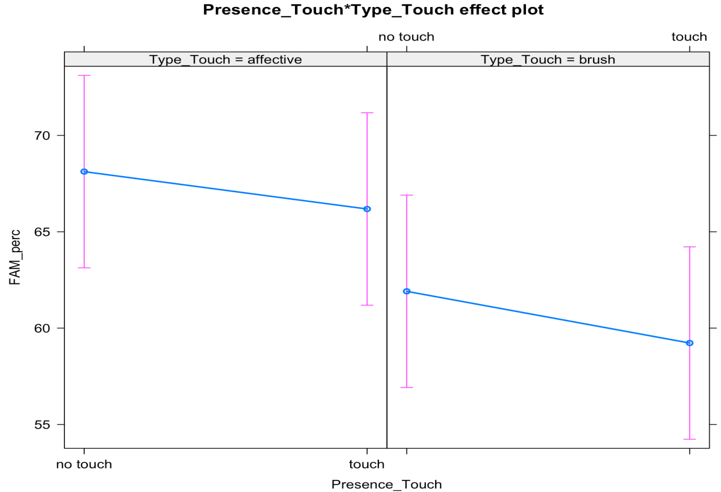


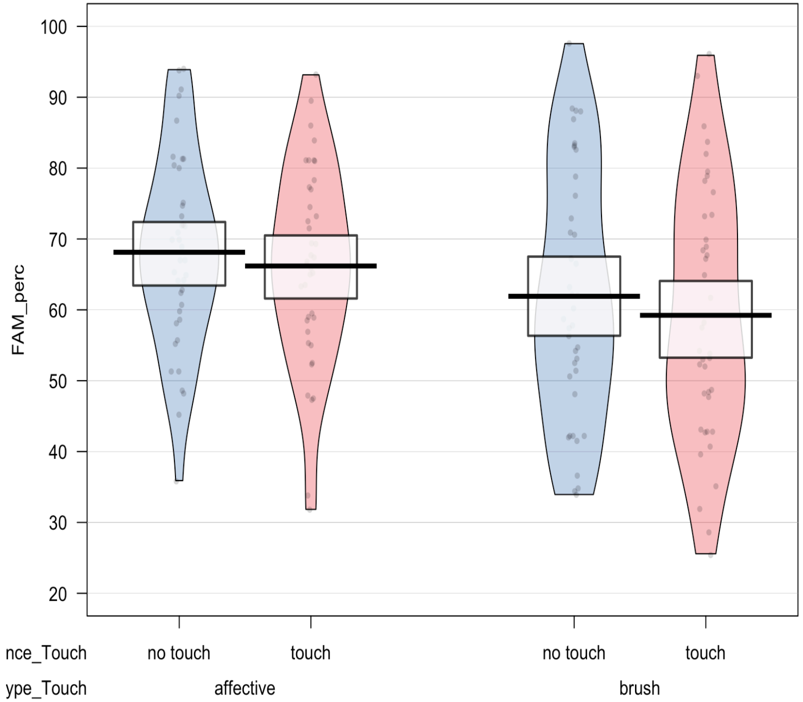
Study 2: Affective touch and social engagement

RESULTS: familiarization phase (visual behaviour)

Model ← lmer(FAM~PresenceTouch*TypeTouch+(1|Participant)

Main effect of Type of Touch
$F\ (1, 117) = 10.05, p = 0.002$

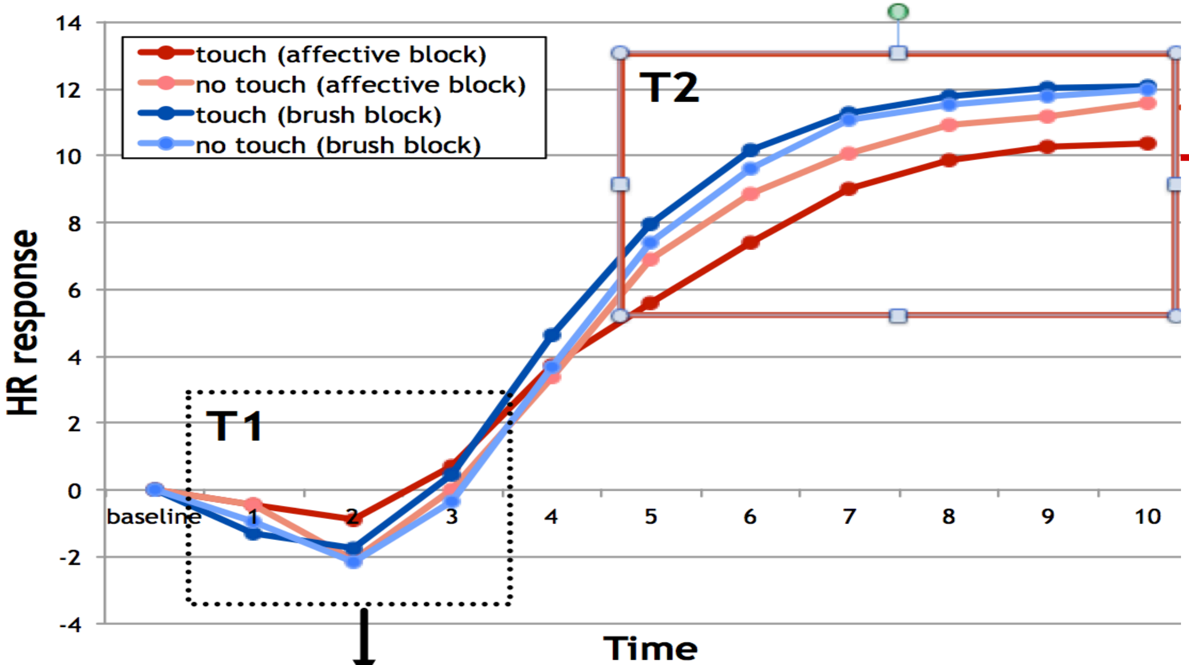




Study 2: Affective touch and social engagement

RESULTS: familiarization phase (heart rate)

Model ← T2~PresenceTouch*TypeTouch+(1|Participant)



Main effect of Type of Touch

F (1,856.8)= 8.24 p=0.004

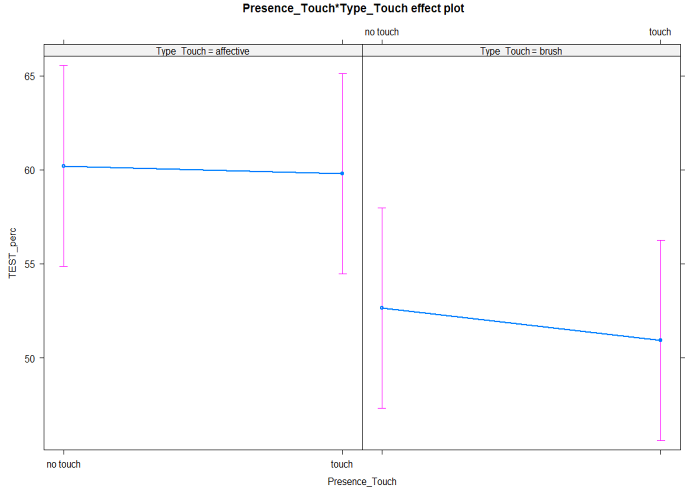
No significant difference between conditions

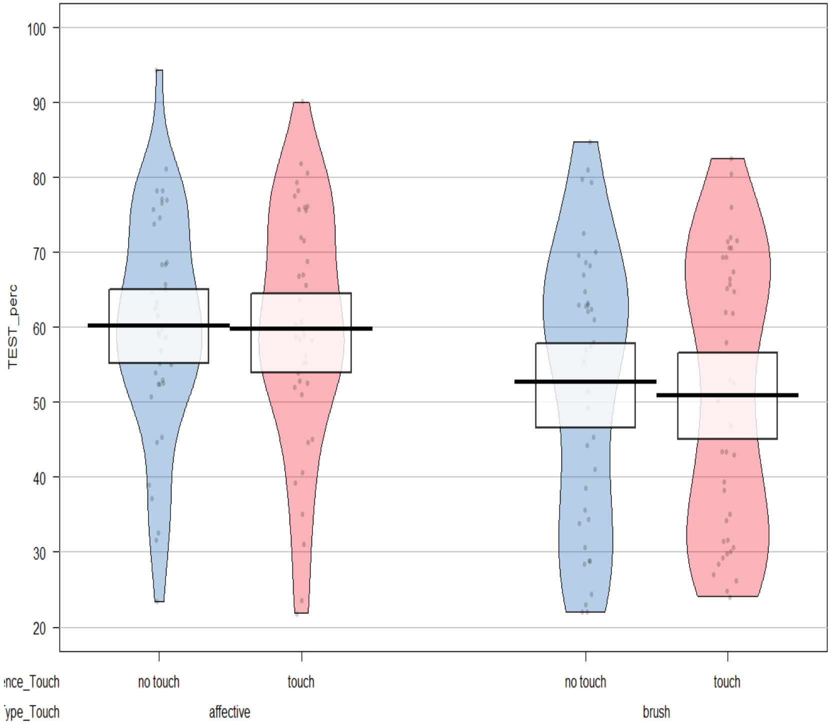
Study 2: Affective touch and social engagement

RESULTS: test phase (visual behaviour)

Model ←lmer(TEST~PresenceTouch*TypeTouch+(1|Participant)

Main effect of Type of Touch
F (1, 117) = 13.89, p= 0.0003

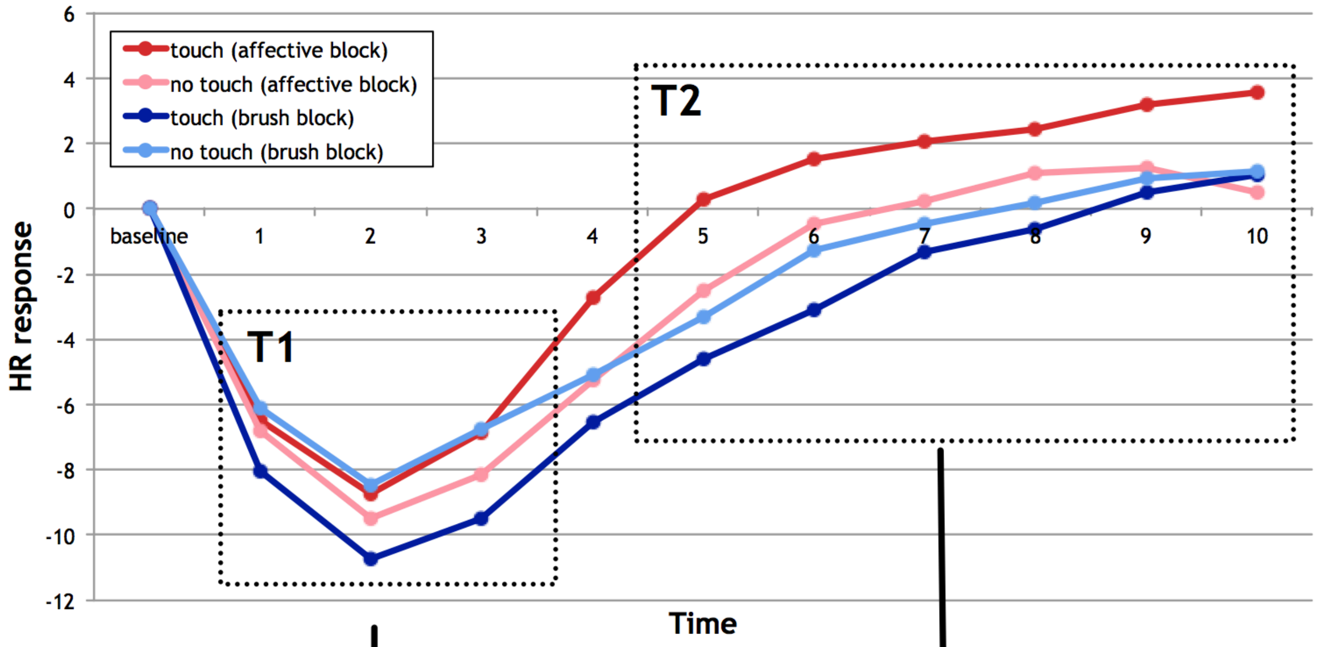




Study 2: Affective touch and social engagement

RESULTS: test phase (heart rate)

Model ← T*~PresenceTouch*TypeTouch+(1|Participant)



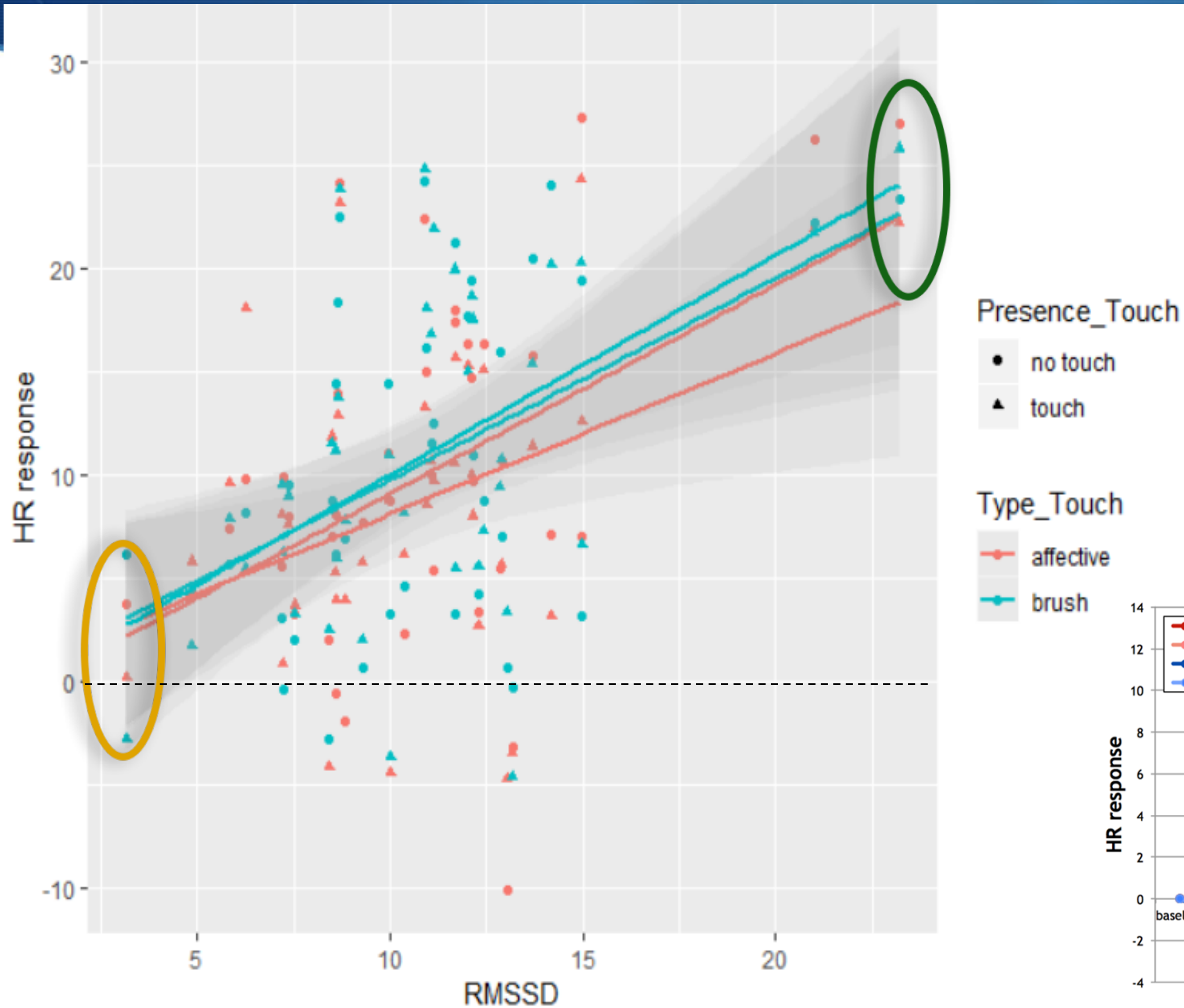
Any significant effect in neither the earlier nor the later time windows

Study 2 : Affective touch and social engagement

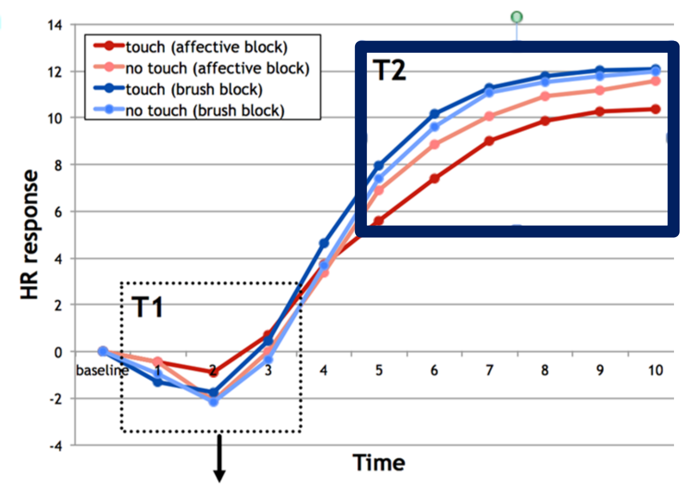
DISCUSSION

- Infants' looked longer towards faces associate with affective touch.
- Such effect seems to extend also to faces in the same experimental block presented without tactile stimulation.
- Physiological results showed a reduction in heart rate acceleration for the affective condition.
- These findings suggest that affective touch may carry a positive-motivational value that regulate arousal level and promotes longer looking times towards social stimuli.

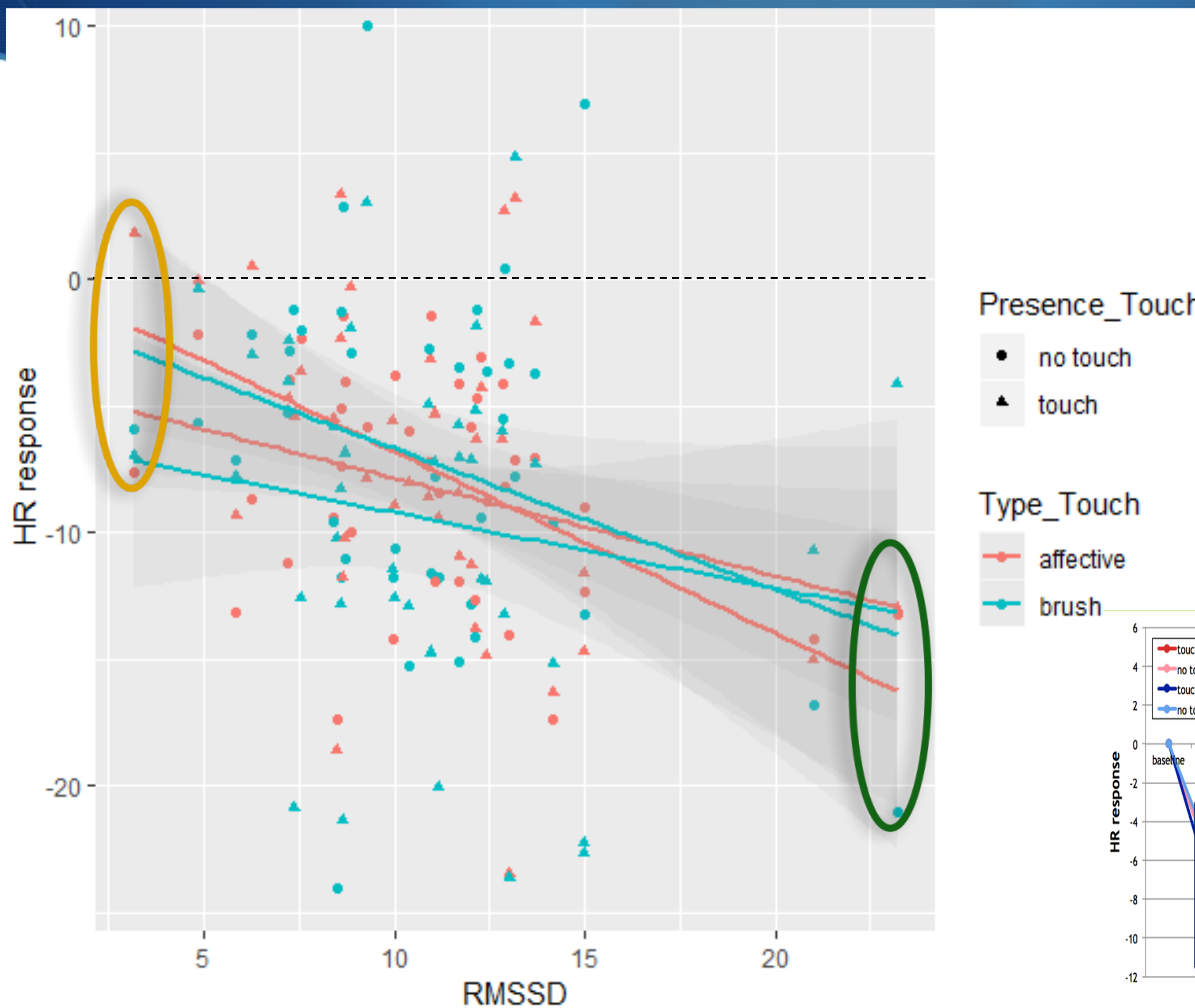
Study 2: Affective touch and social engagement



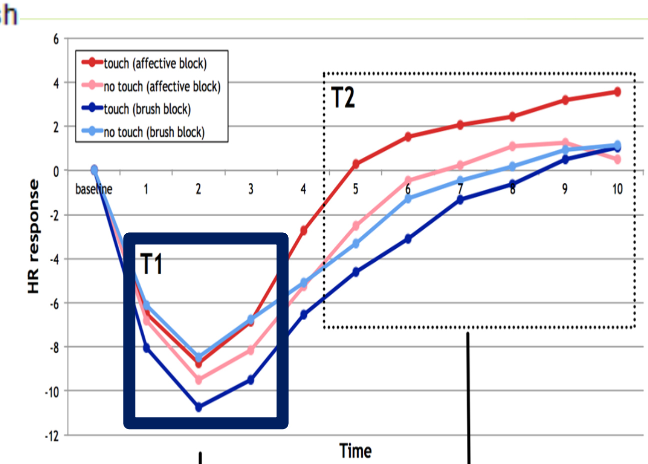
Familiarization: Correlation between baseline HRV and heart rate responses in T2 (r = between .40 and .52)



Study 2: Affective touch and social engagement



Test Phase: Correlation between baseline HRV and heart rate response in T1 (r = between -.17 and -.44)



UNIVERSITÀ DEGLI STUDI DI PADOVA

Vision and Proprioception in Immersive Virtual Reality: Comparison between Typical Development and Autism Spectrum Disorder

Irene Valori[a], P. E. McKenna-Plumley[a], R. Bayramova[b], C. Zandonella Callegher[a], G. Altoè[a], T. Farroni[a]

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- **Proprioceptive development** relies on a variety of sensory inputs, among which **vision** is hugely dominant.
- Compared to Reality, **IVR** seems to induce unique visuo-proprioceptive processes (Petrini et al., 2015) (e.g. disrupting proprioception), which can differently interact with individual sensory profiles. Therefore, the interaction with IVR can be different for children and adults, with typical or atypical development.
- In **ASD**, it has been shown that hypo-reliance on vision and hyper-reliance on proprioception might be core atypicalities with cascading effects on motor (e.g. stereotypies) and social difficulties (Izawa et al., 2012). We argue that IVR could be an effective tool to reduce proprioception and enhance the use of vision.

Focusing on **typical** development and **ASD**, the present research explores how the **integration** of **vision** and **proprioception** is involved in the interaction with **Reality** and **IVR**.
Individuals from 4 to 43 years old completed a self-turning task which asked them to manually return to a previous location with different sensory modalities available in both IVR and Reality.

METHODS

Task:

Self-turn paradigm: the experimenter rotates the chair a certain degree (*passive rotation*) from a **start position** to an **end** position. After each passive rotation, participants were asked to rotate back to the start position (active rotation). The position at which the participant stopped their active rotation is recorded as the **return position**.

Dependent variable: Proprioceptive accuracy of self-turn performances
It was calculated in terms of **Error** as the absolute difference between the start position and the return position. Greater values indicated a less accurate performance

Experimental Conditions

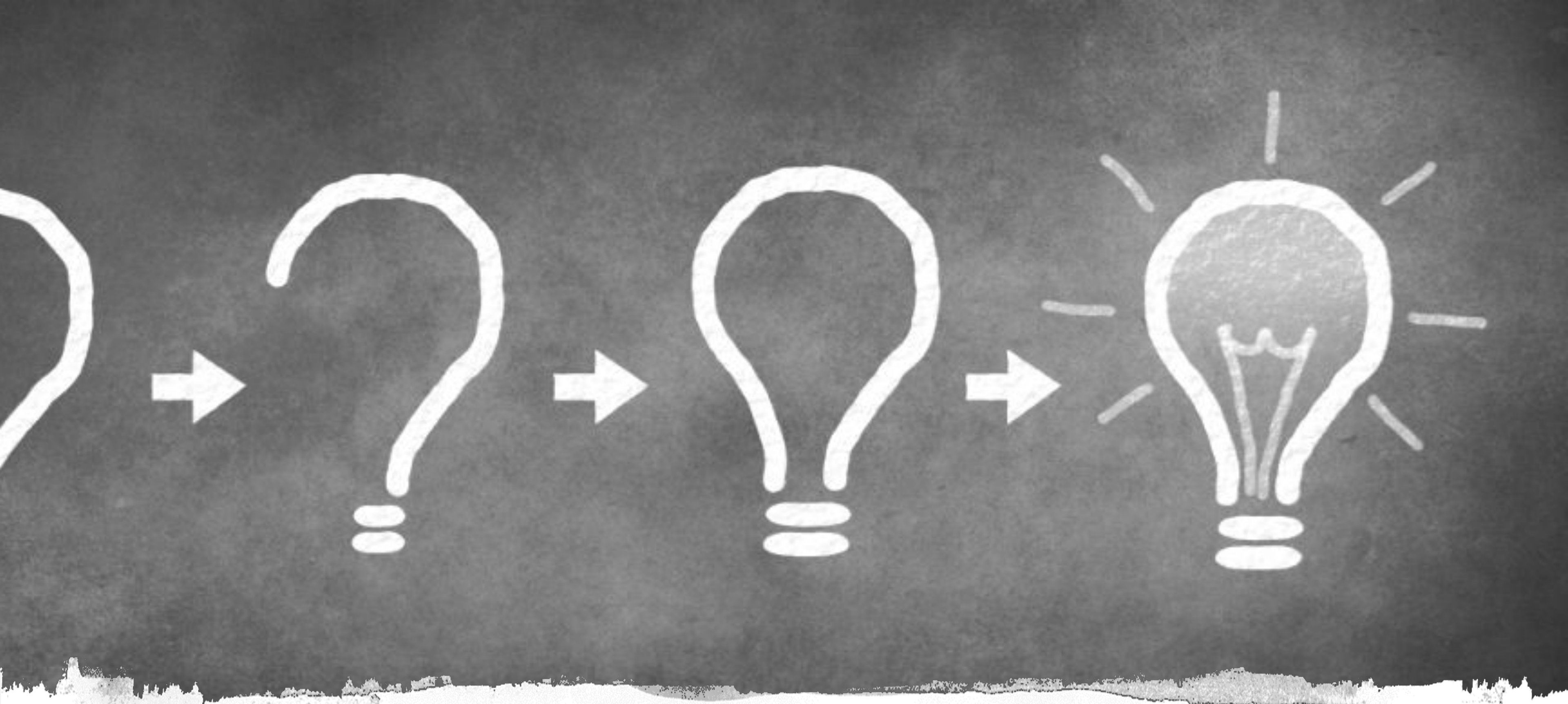
- **Perception**
  - **P** (Only Proprioception)
  - **VP** (Vision + Proprioception)
  - **V** (Only Vision)

- **Environment**
  - **R** (Reality)

  - **VR** (immersive Virtual Reality)

Head Mounted Display
Oculus Gear VR 2016, 101° FOV, 345 g, interfaced with a Samsung Galaxy S7

3 x 2 within-subjects design



Work in progress… stay tuned!

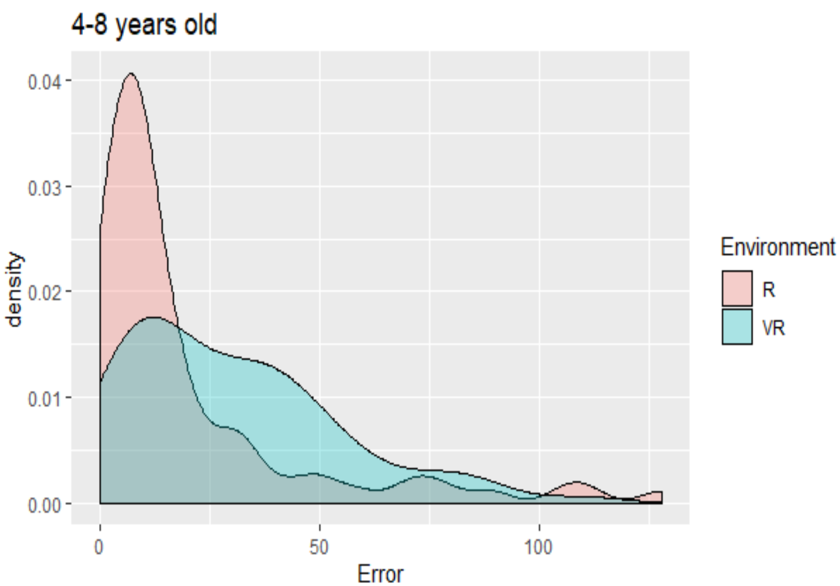
NUIEVE

CHEERS!

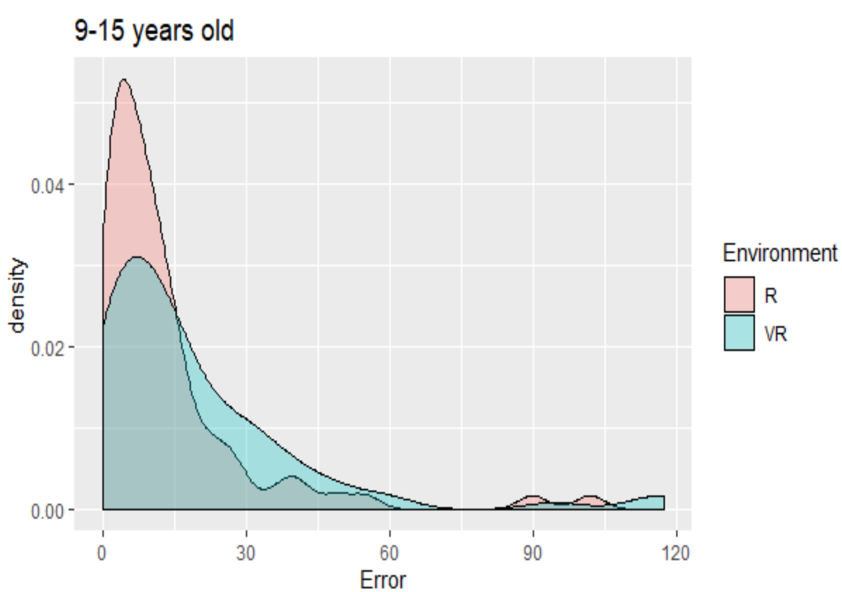
Typical Development

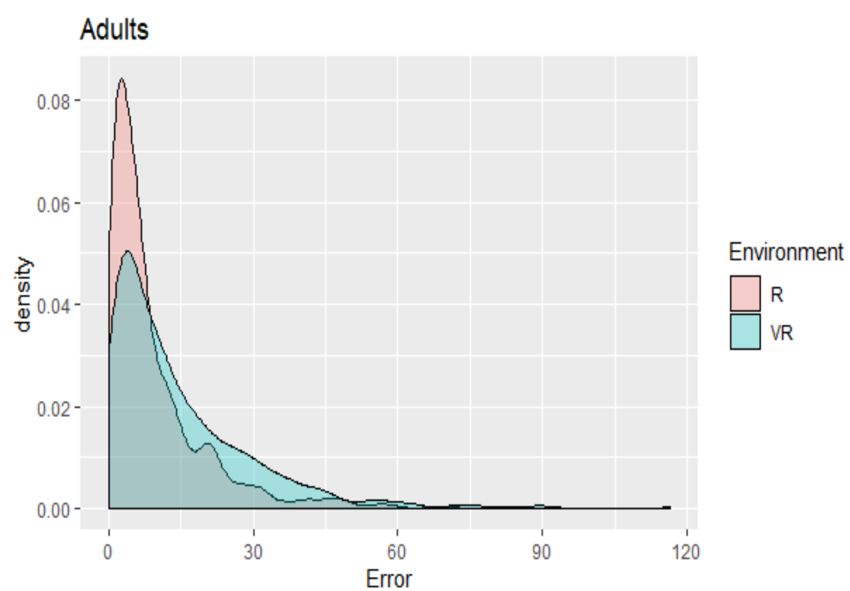
Results

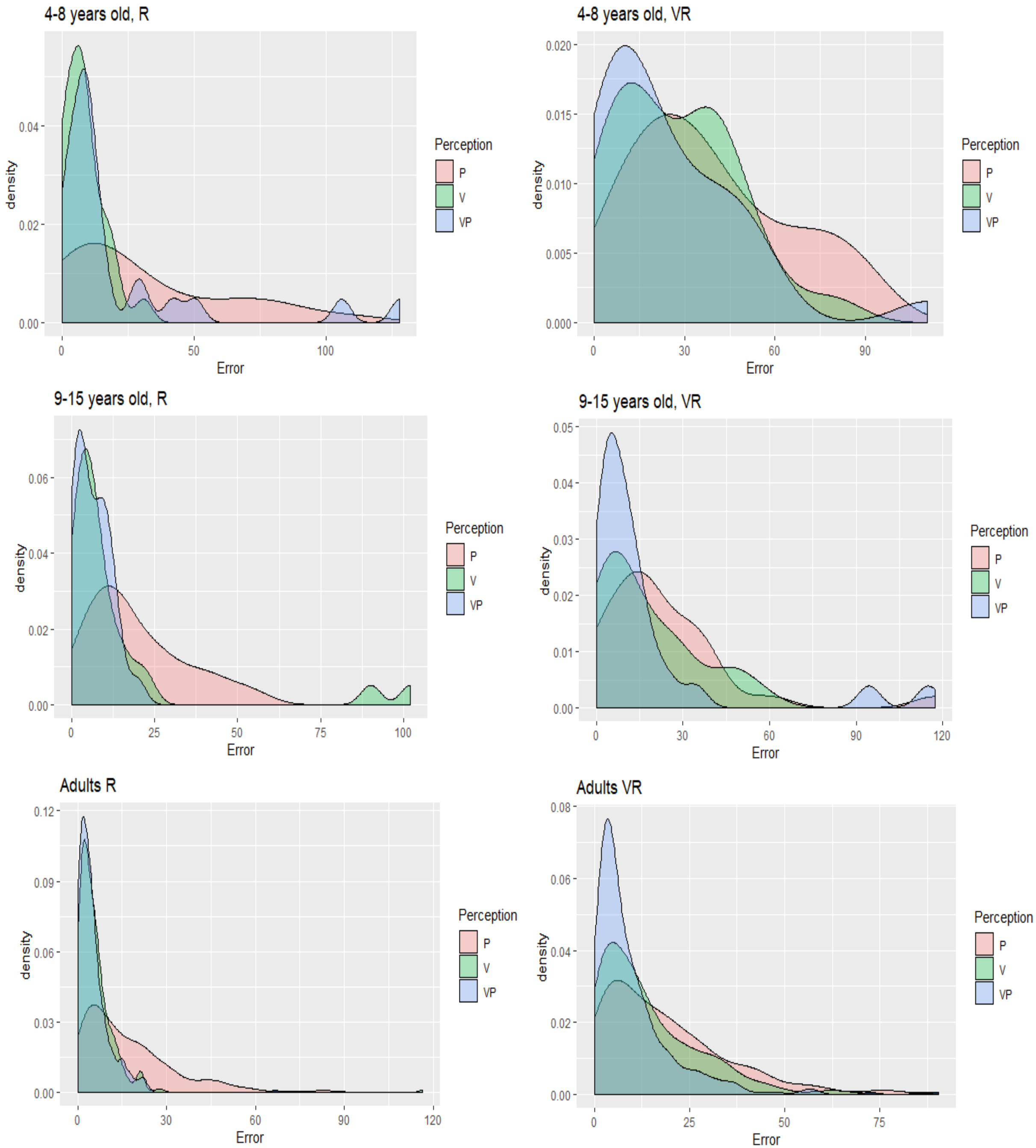
Environment
Marginalized over
Perception



Participants:
Typical Development
N = 13 (4-8 years-old children)
N = 13 (9-15 years-old children)
N = 70 (18-45 years-old adults)







Results

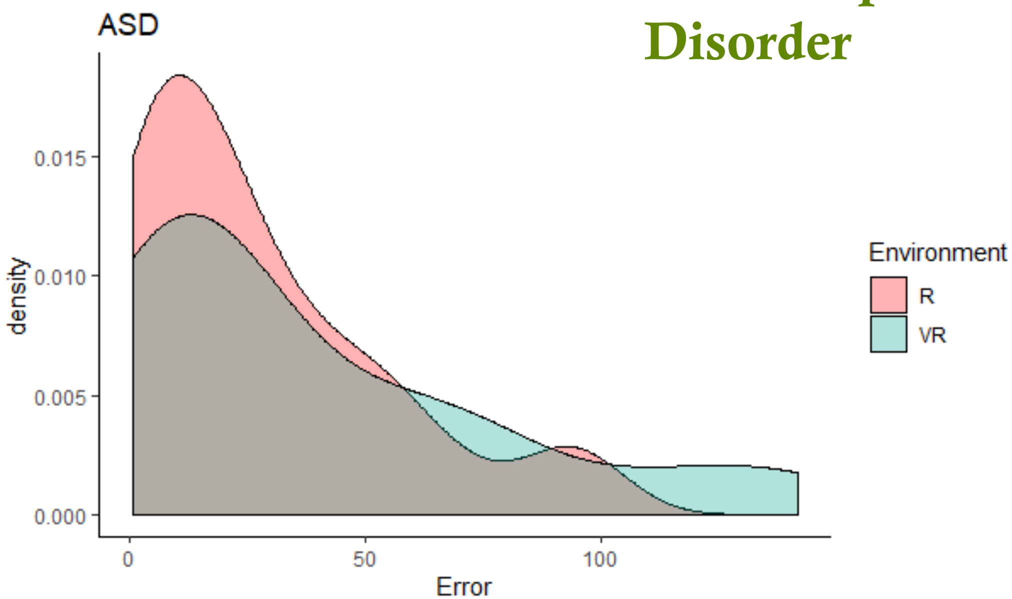
Environment*Perception

Participants:
Typical Development
N = 13 (4-8 years-old children)
N = 13 (9-15 years-old children)
N = 70 (18-45 years-old adults)

Autism Spectrum Disorder

PRELIMINARY

Results



Participants:
ASD Diagnosis
N = 2 (8 years-old children)
+ 5 (18-39 years-old adults)