NENS Exchange Grant - Research Internship Report

Researcher – Utkarsh Gupta, PhD Candidate

Home University – School of Psychology and Sport Science, Anglia Ruskin University
Home Group – Body and Self group
Team lead – Prof Dr Jane Aspell

Host University – Department of Psychology, University of Zurich
Host Group – Cognitive Neuropsychology (Focus: Body, Self and Plasticity)
Team lead – Prof Dr Bigna Lenggenhager

Period of internship – 01/11/2021 – 31/12/2021

Title - In search of lost childhood: the influence of virtual embodiment of a younger child on autobiographical memory of very early childhood experiences.

Background

One of the most interesting and debated phenomena related to early cognitive development is childhood (or 'infantile') amnesia, defined the inability to recall specific events from infancy or early childhood. Autobiographical memory (AM) is the conscious recollection of self-referenced personal experiences and factual knowledge (Fivush, 2011), suggesting the presence of an intrinsic representation of self during AM recollection. Recent cognitive neuroscience studies of the 'self' have suggested that a 'low-level' mechanism - of multisensory integration of bodily signals - forms the basic foundation of self (bodily self-consciousness) (Aspell, Lenggenhager, & Blanke, 2012).

Research on adult participants has demonstrated that episodic autobiographical recall is altered by manipulating BSC via illusory multisensory conflicts in body illusions (Bergouignan, Nyberg, & Ehrsson, 2014; Bréchet et al., 2019). Further, people have also been successfully embodied in avatars of different age groups using illusory manipulations (Banakou, Groten, & Slater, 2013). However, to date, no study has looked at how embodying children in younger bodies can affect AM recollection of events that occurred during their infancy or early childhood.

NENS exchange grant was awarded in October 2020 for a research internship to conduct a part of an experiment with the following research question: Does the embodiment of a toddler's body enhance the retrieval of infancy/early childhood autobiographical memories in children of 7 years of age?

Methodology

Participants – A sample size of 54 seven years old healthy children.
Paradigm – Full-body illusion to manipulate a participant's embodiment for a toddler's body (n = 27) or 6–7 year old child's body (n = 27), followed by recent and earliest AM recollection interviews.
Full-body illusion setup – The participants were asked to lie down on a recliner chair and requested to wear a head-mounted display (HMD – Oculus Rift virtual reality headset). Using Unity 2018.2 game engine coupled with immersive video player, pre-recorded videos with either toddler's body or 6-7 year old children's body were played (Figure 1A and 1B). Synchronous visuo-tactile stimuli were used to strengthen the illusion where the children

felt being stroked on their limbs synchronously with the visual stroking of bodies in the pre-recorded videos.

Autobiographical memory interview – A modified autobiographical memory retrieval task based on the Autobiographical memory interview (AMI) was used (Levine et. al., 2002). The types of memory to be recalled were 'earliest memory' (participant's first memory that comes to mind) and 'recent memory' (previous 1 year). The earliest memory recollection was reinforced using timeline template (Figure 2) in which the children were asked to paste their images from four timelines on a chart paper and understand the linear notion of time while recollecting past events of self (Tustin & Hayne, 2010).

Progress made during internship – In the first month of internship, the wide-angle videos of toddler and 6-7 years old child was recorded (Figure 1A and 1B). The English and German language version of embodiment questionnaire and memory script were created. Following this, the lab was set up and the experiment was thoroughly piloted to assess and amend the experimental design. In the second month of internship, participants were recruited using the Kleine Weltentdecker database managed by Prof. Dr. Moritz Daum at Department of Psychology, University of Zurich. Data was collected from 8 children. Unfortunately, due to sudden outbreak of covid positive cases in Switzerland, the face-to-face participations for the experiment were discontinued starting from 20/12/2021.

Implementation in home lab

Following the completion of this internship, we will be using the pre-recorded immersive videos, embodiment questionnaire and memory script created at host lab to complete the remaining participations at home lab. Our home lab will also be equipped with compatible virtual reality equipment, unity game engine and other technical components to re-create the experimental set up. Following this, the data will be collected from the remaining 46 participants.

Professional development

The NENS exchange grant gave me this special opportunity to carry out a research internship, as a part of my PhD program, with Prof Dr Bigna Lenggenhager and her research group. In this highly stimulating environment, I learnt about the virtual reality set-up for this experiment which can be implemented in other virtual reality based experiments with certain amendments. I further got the chance to collaborate with Prof Dr Moritz Daum and his research group to access the Kleine Weltentdecker database which facilitated the recruitment process. This enriching internship further provided me with the opportunity to work in an international neuroscientific environment, facilitate knowledge exchange and plan potential collaborations for further research. It has also helped me develop better insight about the opportunities that I can avail after the completion of my PhD.

Acknowledgement

Figures

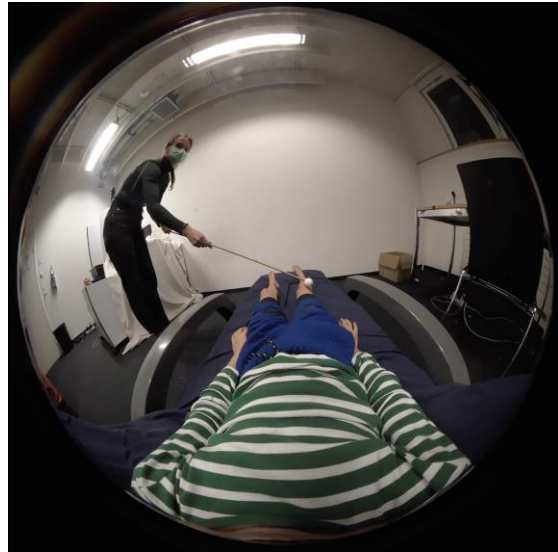A.   B.

Figure 1 – Snapshots from the pre-recorded videos used for full-body illusion procedure. A – Video for embodiment of a toddler's body. B – Video for embodiment of a 6-7 year old child's body.

Figure 2 – An example of timeline template on which the children placed their pictures from 4 time periods – 1-2 years old; 3-4 years old; 6-7 years old; and most recent.

Team picture

Team picture – From left to right: Annika (Masters student), Lia (Masters student), Utkarsh Gupta, Prof Dr Jane Aspell (Home supervisor), Dr Gianluca Saetta, Dr Marieke Weijs, Prof Dr Bigna Lenggenhager (Host supervisor), Prof Dr Moritz Daum, Dr Marte Roel Lesur, Dr Jasmine Ho.