

Symposium: Body, Self, and Other

Thursday, April 11th 2019, at 10:00

Room C-209 & Chais Auditorium (CL05), Arazi-Ofer building

IDC Campus, Kanfei Nesharim st., Herzliya

Program:

Room C-209

09:30 Gathering

10:00 Opening Remarks:

Doron Friedman, Director; The Advanced Reality Lab, IDC Herzliya

Session I: From Phenomenology to the Brain (and back?)

10:10 **Rotem Bennet**, University of Haifa and Technion

"The Body-Mind Continuum in VR: Studying Virtual Alterations of Neural Motor-Cognitive Control Loops"

Human cognition has developed “for action”, has co-evolved with the body and the world, and any thought is assumed to be deeply grounded in our bodily form, sensory experiences and physical interactions. However, not much is known on possible generalizations of this well-studied “embodied cognition” phenomenon to alternative body-world couplings, as expected to become highly prevalent in future VR experiences. In this talk, a series of “virtual re-embodiment” studies will be reviewed, where injecting a virtually-modified sensory feedback has respectively altered individual cognitive patterns and capacities. In particular, we shall present an experiment where virtual sensorimotor adaptation led to an increased overlap of motor-cognitive neural mechanisms, enabling precise motion-based prediction of individual mental-imagery performance, and leading us to view VR users as “virtual newborns” concurrently re-acquiring novel motor and cognitive patterns in arbitrarily modified virtual body-world dynamics. A currently running study will also be presented, in which the motor-cognitive feedback loop manipulations are further generalized to a multi-brain setup, where motion-capture and FNIRS brain-imaging of dyadic synchronized interactions are analyzed, in hope to refine our understanding of the neural patterns specifically underlying bi-directional brain-to-brain coupling. We shall conclude with introducing “VR²” – an immersive research software platform developed to enable these experiments, now offered to be shared freely with the XR research community.

10:25 **Noam Goldway**, Sagol School of Neuroscience, Tel Aviv University

"Cognitive Mechanisms Underlying Body Illusion in Virtual Reality"

One of the most fundamental properties of the human consciousness is feeling that we are separate from our environment. This perception, that our body belongs to us, is governed by several cognitive processes such as temporal contingencies, multi-sensory synchronization as well as body location and appearance. However, evaluating the importance of each of these modalities to the induction of bodily illusions is yet to be fully resolved. In the present study, we have investigated the contribution of different modalities that support self-perception using a virtual reality environment. Twenty healthy participants underwent a paradigm that tested their bodily self-experience using five conditions, aiming to delineate the contribution of synchronization, limb location and shape to the perception of body ownership and agency.

Results showed that synchronization, but not limb position effects “proprioceptive drift”, a behavioral measure indicating a change in perceived position of one's own, while subjective ownership experience was influenced by both synchronicity and limb position.

These results replicate previous findings that reported segregation between proprioceptive drift and subjective report but uniquely do so in a virtual reality environment. Further, our findings dissociate between different indices of embodiment, revealing that altered proprioception can be caused by visuotactile contingencies, while the subjective feeling of ownership may be affected by both the position of the virtual hand in space.

10:40 **Yochai Ataria**, Tel-Hai College

"The Phenomenology of Autoscopic Experiences"

In cases of illusory reduplication, human subjects experience a second own body or self in their environment. Such phenomena are broadly defined as autoscopic. During such experiences, both sense of embodiment and the sense of body ownership (SBO) alter. In addition, subjects with psychiatric conditions such as schizophrenia, depression, anxiety and dissociative disorders sometimes report these kinds of experiences. In general, there are three kinds or levels of autoscopic experiences: Autoscopic Hallucination (AH), Heautoscopy and out-of-body experiences (OBEs).

During AH, people experience seeing a double of themselves in extrapersonal space without the experience of leaving their body. Unlike out-of-body experiences, in AH the center of awareness *remains inside the physical body*. The autoscopic-illusory body feels like a three-dimensional ghost. This figure sometimes acts like a *reflection in the mirror* while on other occasions it is quite autonomous, particularly when executing activities the individual considered performing. Most importantly, although an autoscopic-illusory body can be perceived as a slightly smaller, genderless, older/younger self, it is nevertheless felt to be one's own double. During OBE, people seem to be awake and feel that their ‘self,’ or center of awareness, is located outside of the physical body and somewhat elevated. Others suggest that OBE can be defined as a kind of disembodiment: the experience that the subject of conscious experience is localized outside the person's bodily borders.

In this talk,

I will

present a phenomenological investigation of these phenomena; in particular, I will focus on the sense of body ownership. In addition, I will examine the relationship between the minimal self, sense of body ownership and the sense of agency during these experiences.

11:00 **Roy Mukamel**, School of Psychological Sciences and Sagol School of Neuroscience at Tel-Aviv University

"Neural Networks Mapping Actions to their Sensory Consequences"

A specific motor action can lead to different sensory consequences, and a desired sensory consequence can be achieved by different motor actions. This non-unique mapping between actions and sensory consequences is context dependent and requires learning in order to optimize behavior. During my talk, I will describe behavioral and neuroimaging studies in humans, in which we manipulate the link between actions and their sensory consequences by using virtual reality. I will discuss various training techniques to facilitate learning in healthy subjects and rehabilitation in patients with hemiparesis due to neurological origin even in the absence of physical movement.

11:20 **Noa Simhi**, School of Psychological Sciences, Tel Aviv University

"So You Walk the Walk, But Does It Help People Recognize You?"

While most person recognition studies focused on faces, we can also recognize people at a distance, when little facial information is available. In these cases we may rely on characteristic motion patterns of individuals, or dynamic identity signatures (DIS). However, we have shown that DIS contribute to person recognition only after familiarization, and are not used in unfamiliar person recognition. In this study, we hypothesized that distinct DIS may contribute to person recognition even after minimal exposure. To dissociate gait from identity, we used avatars in a virtual environment and presented each in different gaits. Participants rated the distinctiveness of each gait. These ratings were then used in a person recognition task. Subjects studied avatars with gaits which were high or low in distinctiveness rating. At test, they recognized these identities in a different scene and different cloths, but with the same gait. We found that recognition of identities with highly distinct gaits was more accurate, and performed at greater distances, than recognition of identities with low distinctiveness gaits. Presenting the avatars in multi-static images at test eliminated this advantage. We conclude that distinct DIS contribute to person recognition even after minimal exposure, and enable recognizing people from a distance.

11:35 **Coffee break**

Session II:
perspective from art and culture

The

11:50 **Noam Lemelshtrich Latar**, Dean and Founder, Sammy Ofer School of Communications, IDC Herzliya

"Is Art Important For VR as Empathy Machine?"

12:10 **Hava Aldouby**, The Open University of Israel, **Tehila Nadav**, Baruch Ivcher School of Psychology, IDC

"Possible Effects of Contemporary Visual Art on the Sense of Embodiment.

The paper presents a pilot study exploring behavioral and physiological aspects of aesthetic experience (i.e. our encounter with artworks), through the theoretical concepts of *haptic visuality* (Marks 2002; Barker 2009) and *presence* (Gumbrecht 2004), in view of the concept of SoE (Sense of Embodiment) — indicating the feeling of being located within one's physical body (Karnath & Baier 2010).

In contemporary art we observe a growing concern with textures and surfaces, and altogether an increasing desire for tactile, or as-if tactile engagement. In this particular experiment we ask whether digital photographic art, while essentially immaterial, might yet enhance the effect of presence via visually emphasized texture. An underlying hypothesis that we wish to explore is whether specific types of visual art affect the SoE. The effect of diverse visual stimuli on the SoE is investigated using the rubber hand illusion paradigm (Botvinick & Cohen, 1998) in an especially designed VR setting.

The more general aim of this interdisciplinary project is to cast a phenomenological look at early 21st century art's subtle negotiation of presence-related anxieties. This project is thus poised to take a daring leap: from somatosensory aspects, empirically identifiable in individual aesthetic experiences, to the larger cultural drive to augment human presence, in a shifting and uncertain world.

12:30 **Nofar Laor**, Hadassah Academic College, Jerusalem

"Not All Those Who Wander Are Lost: Mitigating the Effects of Compassion Fatigue in Alzheimer's Disease Caregivers Through the Use of a Virtual Reality Experience".

Alzheimer's disease (AD) is increasingly gaining recognition as a health- and social-care priority, however, due to the lack of disease modifying interventions, AD patients are afforded primarily palliative care. Importantly, Caregivers treating terminal illnesses (such as AD) are at risk to experience "compassion fatigue", here defined as an adverse consequence of caring for those in need, manifesting as anger, depression and apathy. As long-lasting routines are the last to be affected in AD, home-care is both associated with better outcome, and with an increased risk of compassion fatigue in informal caregivers.

Here,

following

works utilizing virtual reality (VR) in medical education, we've designed a VR paradigm aimed to simulate the experience of AD patients, allowing caregivers to experience AD-related cognitive deficits, thus supporting their ability to empathize with patients.

The VR experience, jointly developed by clinicians, animators and designers, focuses on disorientation in the domains of space, time and person, previously shown to be highly significant in AD. An experimental evaluation of the VR experience, revealed a high degree of agreement between subjective complaints by VR participants and AD patients, as well as higher emotional affect in participants personally familiar with AD - jointly attesting to the potential to mitigate the effects of compassion fatigue using VR.

12:50 **Claire Benn**, The Van Leer Jerusalem Institute, Nea Ehrlich, Ben Gurion University

"Virtual Reality and Realism: Understanding the Self as Other and the Other as Self"

Virtual reality (VR) has been lauded as giving us an unprecedented ability to walk a mile in another's shoes. However, this requires a merging of self and other. In this paper, we explore the ways in which identification with a body other than our own occurs in VR (in both 360° videos and animated games/interactive experiences), and what helps and hinders that identification. We argue for two claims. First, this identification involves a move away from both the first-personal (the self) and the third-personal (the other), instead experiencing ourselves and others from the second-person perspective: as someone to relate to, as someone to whom our connection is still to be ascertained, to someone to whom our relationship can be enhanced or disrupted. Second, that it is not visual realism, but rather 'performative realism' that generates the identification with another's body and perspective. We conclude by exploring the implications of our ability to inhabit the body of another, and the second-personal perspective, for our non-virtual relationships with others. Rather than accommodate the hype surrounding VR as an empathy-inducing simulation that can inspire moral agency, we offer a critical analysis of the ethical repercussions of the growing use of VR.

13:05 **Daniel Landau**, Sammy Ofer School of Communications, IDC Herzliya; Aalto University Media Lab, Helsinki

"Self-Study: Meeting Yourself in Virtual Reality and Self-Compassion".

Self-reflection is the capacity of humans to exercise introspection and the willingness to learn more about their fundamental nature, purpose, and essence. Between the internal process of Self-reflection to the

external

observation of one's reflection - runs a thin line marking the relationship between the private-self and the public-self.

From Narcissus's pond, through reflective surfaces and mirrors, to current day selfies, the concepts of self, body-image, and self-awareness have been strongly influenced by the human interaction with physical reflections. In fact, one can say that the evolution of technologies reproducing images of ourselves has played a major role in the evolution of the Self as a construct. With the current wave of Virtual-Reality (VR) technology making its early steps as a consumer product, Landau sets out to explore the new ways in which VR technology may impact our concept of self and self-awareness. '*Self Study*' aims to critically explore VR as a significant and novel component in the history and tradition of the complex relationship between technology and the Self.

13:20 Lunch break

Afternoon Session

Chais Auditorium (CL05), Arazi-Ofer building

14:00 Opening remarks:

Doron Friedman, Director, Advanced Reality Lab, Sammy Ofer School of Communications, IDC Herzliya

14:15 keynote: Mavi Victoria Sanchez Vives, ICREA Research Professor Institute of Biomedical Investigation August Pi i Sunyer, Barcelona, Spain

"Self-transformation through immersive virtual reality"

Our stable body representation can be challenged not only by neurological conditions but also by body transformation illusions. In the last decade we have demonstrated that through congruent sensorimotor correlations, we can induce the illusion that a virtual body in immersive virtual reality is our own body. The experience of "embodiment" of a virtual body that include physiological, behavioural, and psychological consequences. The physiological consequences include the impact of virtual embodiment on sensory processing such as pain perception or the use of a virtual body to better understand motor processing in the brain. The behavioural and psychological consequences of transforming the body are diverse and open the door to the use of virtual reality in psychotherapy and rehabilitation of violent behaviour. Our experiences in virtual reality can thus be used to bring a better version of ourselves to the real world.

Bio-sketch

Mavi Sanchez-Vives, MD, PhD in Neurosciences is ICREA Research Professor at the IDIBAPS (Institut d'Investigacions Biomèdiques August Pi i Sunyer), where she is head of the Systems Neuroscience group. She is also co-Director of the Event Lab (Experimental Virtual Environments in Neuroscience and Technology)

and Adjunct

Professor at the Dept. of Basic Physiology, University of Barcelona. Her main interests are cerebral cortex functional properties and the understanding of body representation. A pioneer in using virtual reality from a neuroscientific perspective, she is one of the founders of Virtual Bodyworks.

15:00 **Liad Mudrik**, Tel Aviv University

"New Ways to Study Consciousness and its Functions: How VR and AR Could Change the Way Consciousness is Investigated"

Generations of scholars of different disciplines have struggled with the mystery of conscious awareness. How does it come about? And, no less importantly, what does it do? To meet the challenge of scientifically operationalizing this question, different experimental manipulations have been developed. Though highly instrumental in the study of consciousness, the external validity of these methods is not clear. In this talk, I will present experiments which employ such methods, and point out their implications and limitations. I will then introduce our search for new means to probe conscious and unconscious processes, specifically using virtual and augmented reality.

15:35 Break

15:50 **Miriam Reiner**, Mantis Vision, BrainVU, and Technion.

"The Self in the Eyes – Changes in the Eye Dynamics and Embodiment".

16:10 **Amir Amedi**, The Hebrew University of Jerusalem

"Bridging the Gap Between Body & Mind: The Role of Topography (homunculi) and Connectivity in Body Perception Vs. Mental Imagery"

16:30 **Jonathan Giron**, Sammy Ofer School of Communication, IDC Herzliya,

"Studying Everyday Life Situations In Virtual Reality"

16:45 Break

17:00 – 17:45 **Panel: VR: the Ultimate Empathy Machine???**

Moderator: **Daniel Landau**, Sammy Ofer School of Communications, IDC Herzliya; Aalto University, Media Lab, Helsinki

Participants: **Yulia Golland**, Baruch Ivcher School of Psychology, IDC Herzliya

Beatrice Hasler, Sammy Ofer School of Communications, IDC Herzliya

Yossi Hasson, Baruch Ivcher School of Psychology, IDC Herzliya

17:45-18:30 **Panel – XR for Social Impact**

Moderator: **Doron Friedman**, Sammy Ofer School of Communication, IDC Herzliya

Participants: **Tal Haring**, Curator, Producer, Lecturer, and Head of New Media Development

At Gesher Multicultural Film Fund

Tom Mittleman, co-founder, Openmind 360

Son Preminger, Augmented Communication

Mavi Sanchez Vives, ICREA Research Professor Institute of Biomedical

Investigation August Pi i Sunyer, and Virtual Bodyworks, Barcelona, Spain

For Registration to morning and afternoon session:

[Virtual Reality Symposium](#)

The conference will be held in English | הכנס יועבר בשפה האנגלית