INCC Seminar Days 2024

Social cognition and neurodevelopmental disorder

Campus St Germain, Paris
45 rue des saints-pères 75006 Paris
October 10 – 11

Program Overview: 40min talk + 10min questions

Thursday October 10th Salle des thèses (Bat Jacob, 5th floor)	**Friday October 11th** Salle des thèses (Bat Jacob, 5th floor)
14h Welcome coffee	**9h** Welcome Coffee
14h30 François Quesque	**9h20** Fabrice de Chaumont
15h20 Julia Sliwa	**10h10** Mohamed Jaber
16h10 Coffee Break (20')	**11h** Coffee Break (20')
16h30 Ermanno Quadrelli	**11h20** Francesca Ferri
17h20 Claire Wardak	**12h10** Peggy Seriès
18h10-23h Apéritif/Dinner (outside the lab, registered persons only)	**13h** Lunch (on site)

This year we are experimenting with a new formula for INCC laboratory seminars, with the aim of bringing researchers together around a scientific theme chosen by INCC members last year. Our 2024 theme is *Social Cognition and Neurodevelopmental Disorders*. On the program, the latest research in this field will be presented by brilliant international and French researchers who have done us the honor of accepting our invitation. Different approaches will be represented: human and animal models, computational models!
Don't miss this unique event! We've also got plenty of time to recharge our brains, with coffee and dinner breaks on Wednesday and lunch on Thursday.
Come one, come all!

Titles and Abstracts

Day 1 - Thursday 10/10

14h30 François Quesque (Univ de Nanterre)
(Trying to?) Clarify Social Cognition: A conceptual and practical perspectives
This presentation explores the many conceptions of social cognition, both in practice and theory. On the practical side, it examines how social cognition is represented by students and assessed by clinical neuropsychologists. The theoretical aspect focuses on its historical development and the differing interpretations across disciplines. The terminology used to discuss these underlying concepts is also debated, along with the most commonly employed assessment tools. Lastly, a collaborative project initiated a few years ago is introduced, which has led to the creation of a shared lexicon for discussing these issues—perhaps the first step towards a unified understanding of social cognition.

15h20 Julia Sliwa (ICM, Paris)
Comparing human and monkey neural circuits for processing visual social scenes
Recognizing agents, their actions, and their interactions is essential for understanding the world around us. Using functional Magnetic Resonance Imaging, we discovered in the macaque monkey brain a network of areas centered on the medial and ventrolateral prefrontal cortex that is selectively engaged in social interaction analysis. Its extent and location suggest that this function is an evolutionary forerunner of human mind-reading capabilities. A comparative fMRI investigation in humans additionally revealed which neural strategies adapted to the needs of each species, and emphasized human interest in understanding actions of our peers directed towards objects. Together these studies show how our primate brains continuously decode the complex visual scenes unwinding in front of us: both the nature of material entities, such as individuals and objects, and their immaterial interactions.

16h30. Ermanno Quadrelli (Università degli Studi di Milano-Bicocca, Italy)
Behavioral and neural reactions to social exclusion across development
Social exclusion, a distressing experience that threatens fundamental psychological needs, has been extensively studied in adults, with research demonstrating its impact on physiology, cognition, behavior, and the processing of social cues. However, our understanding of how children and infants respond to exclusion events remains limited. In this talk, I will present findings from a series of studies exploring the developmental consequences of social exclusion, focusing on its impact on crucial skills implicated in the interpretation of others' behaviors. I will begin by examining how infants and children react emotionally, behaviorally, and physiologically during exclusion events. Changes in heart rate, as a marker of stress response, will be

analyzed to gain insights into the physiological impact of social exclusion. Additionally, I will investigate the role of genetic predispositions, such as the oxytocin receptor gene (OXTR), in shaping infants' emotional reactivity to exclusion. Next, I will discuss how ostracism affects children's propensity to learn through imitation. By examining changes in imitation behavior following exclusion experiences, we can gain valuable insights into the long-term consequences of social exclusion on social development. Overall, this talk will provide evidence suggesting that social exclusion can alter the processing of social cues from the earliest stages of life, potentially impacting how humans navigate social interactions throughout their development.

17h20 Claire Wardak (Univ de Tours)
Pupil reactivity to faces: an early biomarker in autism?
Pupil diameter, under autonomic nervous system control, has been proposed to index arousal, attentional engagement and several cognitive processes. This measure is particularly appropriate for young children and populations with neurodevelopmental disorders, as it is contactless and does not require any active behaviour, except looking at a screen. We have previously shown that autistic children exhibit a smaller pupil dilation in response to faces than their neurotypical peers, in particular for dynamic videos. In this talk, I will present how age can influence this pupil reactivity to faces. Then I will explore how the social content and the motion content of videos of faces can influence pupil response in autistic and neurotypical children. Finally, I will show that pupil measures could help discriminate autistic and neurotypical children thanks to a machine-learning approach. Overall, pupil diameter may be a relevant neurophysiological biomarker for early autism screening.

Day 2 - Friday 11/10

9h20 Fabrice de Chaumont (Institut Pasteur, Paris)
Designing automated behavioral experiment with MiceCraft
Classical scheme of animal cognition experiments is to expose animals to operant walls. Animals are taken from their home cage and are exposed to a test during between ten minutes and one hour sessions. Typical experiments dedicate the first sessions for the training. During this training, the animals are individually manipulated by a human to get habituated to the test apparatus and environment. This habituation process usually takes a week, then the core experiment can start. As the animals are tested at day time when they usually sleep, animals may not be very active nor motivated. Therefore animals are most often restricted in food or water while the test provides it as a reward. Tests are usually performed in a room where individual apparatus are replicated several times so that the operator can test several animals in parallel. To optimize the learning curve of the animals, they need to be exposed to the test every day. Therefore the scale of the experiment, or the number of animals that can be tested is therefore limited by the number of animals that can be tested every day

An alternative automatic scheme is to enable access to the tests directly from the home cage, without a human operator. This provides a number of enhancements: 1. it removes the handling operations. 2 animals can access the test during night instead of day, which corresponds to their normal high activity period and they can still sleep normally during days. 3. animals still live in groups. 4. We will also show in this publication that such a scheme where the animals are getting willingly to the test removes the need of restricting animals' water or food and provide comparable results. 5. All those points provide better animal welfare. 6. It enables additional reading: the number of times an animal gets willingly to the test, the time it spent in, at what time, in what order compared to the other animals.

10h10 Mohamed Jaber (Univ de Poitiers)
Pros and Cons of Animal Models in Autism
Animal modeling, particularly in rodents, offers a valuable approach to studying the behavioral disturbances and underlying neurobiological mechanisms of autism spectrum disorders (ASD), with the goal of advancing diagnostic and therapeutic strategies. This can be achieved by manipulating the environment through the administration of toxins or pharmacological agents, such as Depakine (Valproic Acid), and by altering genes associated with ASD, such as SHANK3 and CNTNAP2.
However, animal models cannot fully replicate the complexity of autism in humans. Mice and rats do not possess brain structures identical to those of humans, and while their social behaviors may share certain similarities, they differ significantly from human behaviors. In addition to these biological limitations, there are methodological and technological challenges in studying animal behavior.
This presentation will provide examples in this context and will highlight how preclinical research in ASD, despite these limitations, can help overcome barriers in clinical research, particularly in the field of diagnostics.

11h20 Francesca Ferri (University of Chieti-Pescara, Italy)
Multisensory integration and body representations in the schizophrenia continuum: exploring exteroceptive and interoceptive contributions.
Schizophrenia is primarily characterized by a disruption of the coree self, which is deeply rooted in bodily experience—the bodily self. In schizophrenia, this bodily self is profoundly disrupted, reflecting alterations in multisensory integration and body representations. This presentation will review how disturbances in exteroceptive and interoceptive processing contribute to various symptom dimensions across the schizophrenia continuum. Special focus will be given to recent evidence on the role of excitation/inhibition (E/I) balance in shaping these disruptions. We will examine how imbalances in E/I circuits affect multisensory integration, particularly in relation to bodily self-representation. Emerging research on interoception, specifically the role of breathing, highlights its impact on E/I balance and multisensory processing. We

propose that disordered breathing may be a critical factor in the altered bodily self in schizophrenia, influencing sensory integration and contributing to the breakdown of self-boundaries. This hypothesis opens new avenues for understanding the mechanisms underlying bodily self-disturbances and for developing targeted therapeutic interventions.

12h10 Peggy Seriès (University of Edinburgh, UK)
10 years of Bayesian theories of Autism: what have we learned?
Predictive coding and the Bayesian brain have become dominant theories of perception and cognition. In both theories, top-down signals (predictions or priors) are combined with bottom-up ones (prediction errors or likelihoods), weighted by their precision. This framework has also been proposed to provide an explanation for the diverse autistic symptoms, with an imbalance in the relative precisions of the two signals being at the root of the condition (for a review see e.g. Palmer et al., 2017). This hypothesis has now been studied for more than a decade.
I will describe the different variants of the theories and review the literature, including work from my lab, to discuss the extent to which they are now backed by quantitative evidence. I will also discuss limitations of current work and guidelines for future research.