PROGETTO 1/ PROJECT 1

Supervisore/*Supervisor*:	Cristina Baldoli
Titolo/*Title*:	Neonatal functional mapping of neurodevelopment: from infancy to early childhood.
Corso /*PhD Course*	Corso di Dottorato di Ricerca in Scienze Cognitive e Comportamentali
Curriculum:	
Link alla pagina personale OSR/UNISR/ *Link to OSR/UniSR personal page*:	https://www.hsr.it/dottori/cristina-baldoli

Descrizione del progetto/Project description (Tra i 2.000 e 3.000 caratteri spazi inclusi/ *Number of characters, including spaces*: 2.000 - 3.000):

Project Background & Hypothesis

Human brain functional development occurs over a protracted period compared and it results extremely difficult to predict later cognitive or behavioural outcome in infancy and early childhood as the result of the development of a coordinated system, providing the architecture for the rapid expansion and integration of behavioural and cognitive abilities in the first years of life (Johnson, 2001).

In the past decade, Magnetic Resonance Imaging (MRI) has become the gold standard to study brain function grounding neurodevelopment (Ment, Hirtz, & Huppi, 2009). In recent years, resting-state fMRI (Biswal, Yetkin, Haughton, & Hyde 1995) has been used to map the functional organization of the healthy neonatal brain, showing the emergence of connections partially or completely matching several resting state networks (RSN) including the default mode network (Doria et al., 2010; Gao et al., 2009; Smyser et al., 2010; Della Rosa et al., 2021) and detailed subcortico-cortical connections resembling those seen in adults (Toulmin et al., 2015, Canini et al., 2020).

This project moves from the hypothesis that when a system is immature or not yet available in neonates, brain function can provide insight into the tie-down points of that system to behavior and cognition later in infancy and early childhood. Through this lens, infant and child behavior could further help explain adult behavior and revealing general principles about neurodevelopment under different biological and environmental constraints.

Project Aims

The current project is aimed at

1. identifying, by means of resting-state fMRI, the neonatal brain functional precursors, at different levels, of the development of sensorimotor, visual, auditory, language and attention systems between 6 and 36 months and their interplay assessed through a newly created Functional Neurodevelopmental Skeleton Battery.

2. defining an integrated framework, which aligns neurodevelopmental information coming from neonatal brain functional connectivity markers with neurobehavioural and neurocognitive profiles emerging from the neurodevelopmental skeleton battery.

Competenze che deve acquisire lo studente/Skills to be acquired by the student (Max 600 caratteri spazi inclusi/ *Number of characters*, *including spaces*: max 600):

- neuropsychological evaluation strategies in early infancy and childhood.

- neurobehavioural and neurocognitive profile tracing at single and multiple timepoints in early infancy and childhood.

- fMRI data acquisition, preprocessing and analyses methods.

- Statistical data analyses procedures

- Results interpretation and writing a manuscript

** see Role of the PhD student sub-section for further details with respect to the three-year plan*

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