Quantifying ‘when’ and ‘where’ in the brain people are more similar to each other.

Title of the dissertation
Dynamic similarity of brain activity in humans: from single areas to functional networks

Contents of the dissertation
What makes us different from each other? The intriguing problem has been studied throughout the centuries by philosophers and scientists and affects the way we relate to other people around us. Our brains process the external world in a roughly similar way, but we are also individuals. Even mental disorders like Autism and Schizophrenia can be described as spectrum disorders with highly individual symptoms and traits.

This dissertation studied dynamic similarity of brain activity when subjects were viewing engaging feature-films with the aim to understand neural basis of mutual understanding. Standard methods to quantify similarity of brain activity were extended by introducing novel methods with accurate timing into the analysis. The thesis also investigated similarity of brain activity of individuals with Autism spectrum disorder to identify those brain networks that are highly correlated with the social and emotional idiosyncrasies of each individual. Borrowing approaches that are used in genetics, the thesis developed the intersubject analysis framework to study pairs of individuals to quantify what makes them similar and different and how this is reflected in similarities of brain activities.

The conclusion of the thesis is that mutual understanding and similarity of behavior might be related to similarity of brain function. Although the causality of such relationships is difficult to disentangle, the current work proposes tools to quantify them.

Field of the dissertation
Cognitive neuroscience

Doctoral candidate
Enrico Glerean, M.Sc.

Time of the defence
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Place of the defence
Aalto University School of Science, lecture hall A1 (A123), Otakaari 1, Espoo

Opponent
Assistant Professor Christopher J. Honey, University of Toronto, Canada

Custos
Professor Mikko Sams, Aalto University School of Science, Department of Neuroscience and Biomedical Engineering

Electronic dissertation

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