

NAME OF LABORATORY: Neuropsychiatry and Neuromodulation Lab

PI: Prof. Talma Hendler MD, PhD

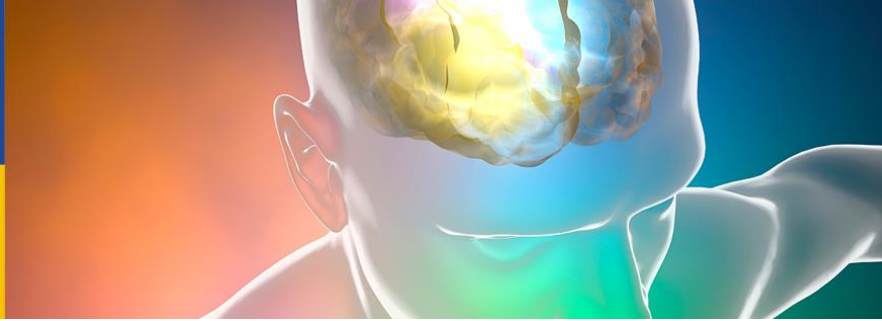
Director of Department: Prof. Talma Hendler MD, PhD

Study Goals: Our research is guided by both clinical and theoretical questions concerning the relationship that exists between our mind and brain. Theoretical questions relate to the identification of the cerebral mechanisms of emotional and motivational information processing, and how these processes affect human behavior. Such brain processes are examined under various challenging contexts such as pleasant or stressful social interactions and during states of anxiety and/or trauma. Our research also takes into account factors such as time, by observing these processes before and after exposure to various events. Clinical questions relate to the characterization of brain processes common to various mental disorders, with the goal of providing novel psychiatric protocols for diagnosis and treatment. From a diagnostic perspective our research focuses on defining mental systems that are responsible for mental resilience and/or impairment. Therapeutically, our research focuses on the development and application of various neural modulations, internally induced via brain-machine interfaces (neuro-feedback) or externally induced via electrical currents (TDCS).

The research in our lab is based on the use of functional brain imaging at various scales; from the level of a single neuron to the broad-spectrum of the whole brain (EEG fMRI). Our studies also include behavioral measures of cognitive and emotional processing (reported experience and performance), characterization and properties of mental states (such as anxiety and fear), and the clinical assessment of psychological criteria. In addition, some of our studies also collect genetic, cell and hormonal data that characterize individual tendencies or responses to various situations.

Main Research topics:

- Classification of the neural representation of emotional experience, focusing on the dynamic aspects of this process via movies and music (fMRI, EEG and IEEG).
- Classification of the neural representation of social emotional experiences during personal interactions
- Examination of the effects of mental (e.g. fear) and physical (e.g. sleep deprivation) stress on social emotions such as anger and empathy.
- Long term trajectory analysis (prospective exposure to traumatic events) of the development of Post Trauma based on recurrent indicators of brain activity and structure (fMRI), Neurocognition and psychiatric symptoms (clinical diagnosis)
- Develop EEG patterns representing activity of different brain regions for implementation in fMRI neurofeedback.
- Develop EEG patterns representing neural activity among networks associated with mental processes during varied levels of individual functional load.
- Feasibility studies of limbic system EEG patterns via neurofeedback therapy on patients with PTSD



- neuromodulation; for example what impact does the complexity of the medium or the protocol have on this ability.
- The multi-process characterization of brain disorders such as depression and anxiety (EEG and fMRI)

Staff: Project Manager – Aliya Solski, Software Engineer - Ilana Klovatz, Project Coordinator - Helen Baker, Programmer - Gilad poker, Researcher -Maya Bleich

15 students at various stages in their studies (research assistants, masters students, biomedical and post biomedical) .

Active Grants:

- **EU FP7 health program (Consortium): BRAINTRAIN**
- **Israel-Centers of Excellence program in advanced cognitive science.**
- **The Israeli office of commerce and industry (Industry-academia consortium(academic partner in the MAGNET program)**
- **EU Horizon 2020 program (consortium partner framework): The Human Brain Project**
- **NIH, USA**
- **The Israeli Ministry of Science, Technology and Space.**
- **Israel Ministry of Trade and Industry– KAMIN**
- **US Department of Defense**

Collaborations:

- Tel Aviv University – The School of Psychological Sciences and the Sagol School of Neuroscience
- Haifa University
- Bar-Ilan University
- Ben Gurion University
- the Interdisciplinary Center Herzliya
- New York University
- University of Florida
- Stanford
- Yale
- McGovern Institute for Brain Research MIT
- Donders Institute Nijmegen
- Mental Resilience Center-Mainz
- the Max-Planck Neurology Institute in Leipzig
- Cardiff University
- McGill University

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