



MINISTERIO  
DE ECONOMÍA  
Y COMPETITIVIDAD

## AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2013

SECRETARÍA DE ESTADO  
DE INVESTIGACIÓN  
DESARROLLO E INNOVACIÓN

SECRETARÍA GENERAL  
DE CIENCIA, TECNOLOGÍA  
E INNOVACIÓN

DIRECCIÓN GENERAL  
DE INVESTIGACIÓN  
CIENTÍFICA Y TÉCNICA

SUBDIRECCIÓN GENERAL  
DE RECURSOS HUMANOS  
PARA LA INVESTIGACIÓN

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### Título:

Cognitive Neuroscience and contextual processing

### Resumen de la Memoria:

My main interest is to study how the brain processes contextual information to guide goal-oriented behaviour and to facilitate the detection of task-relevant stimuli. During a post-doctoral position in UC Berkeley, I have developed a paradigm that utilizes EEG to examine the ability to utilize goal-directed predictive contextual information. I have identified neural correlates of contextual processing and have investigated how these are affected by aging and unilateral prefrontal lesions. From 2009 to 2013 I worked as a research Fellow in University of A Coruna, Spain. During this time I worked independently, securing a five year fellowship and two three-year grants, which have allowed me to set up an EEG lab and continue pursuing my research goals. I have continued to work on investigating the mechanisms of contextual processing and its application in different patient populations including Parkinson's disease, schizophrenia and depression. I have found that each patient population is characterized by different deficits in the processing and utilization of contextual information, as indicated by specific alterations of neural correlates of local contextual processing, and are associated with task-specific functional connectivity abnormalities. My aim is to develop these as biomarkers for frontal cognitive dysfunction. In turn these studies have shed light on the mechanisms and networks underlying our ability to utilize contextual information to guide goal-directed behaviour. In addition, I am interested in applying different electrophysiological signal analysis techniques, acquired during my Ph.D., working with Parkinson's disease patients implanted with deep brain stimulation electrodes to further investigate the role of prefrontal networks in contextual processing and its modulation across patient populations. To date my work has generated 20 articles, predominately first author, in high impact journals as well as presentations in international conferences. I have extensive experience in different methodologies (EEG, TMS) and analysis techniques.

### Resumen del Currículum Vitae:

Bachelor degree in Biology, Tel-Aviv University, Israel (1999). Completed with an average of 88.4/100, including a project on Characterization of electrophysiological response properties of auditory cells in the auditory cortex of hamsters. Masters degree in Physiology-Pharmacology/ Neuroscience, Faculty of Medicine, Tel-Aviv University (2001). Completed with an average of 92.7/100. Topic of master thesis: The effects of cholinesterase inhibitors on the quantitative EEG in patients with dementia. This masters thesis resulted in a first author publication in Acta Neurologica Scandinavica. Ph.D degree in Neurological Studies, Institute of Neurology, University College London. (2005). Awarded a PhD studentship from GlaxoSmithKline. Topic of thesis: Oscillations in the basal ganglia in Parkinson's disease patients and their influence on the cerebral cortex and behavioural performance; supervised by Prof. Peter Brown, Sobell department of Neurophysiology and Movement Disorders, Institute of Neurology, Queen Square, London, UK. This thesis resulted in four first author papers: Clinical Neurophysiology 2004, Neuroscience Letters 2005, European Journal of Neuroscience 2005, and Cerebral Cortex 2006, and three second author papers: Current Biology 2003, Experimental Neurology 2006, and NeuroReport 2009. Post-doctoral position, in the Robert T Knight Lab, Helen Wills Neuroscience Institute, University California, Berkeley, USA (2005-2008). Developed a novel paradigm to investigate contextual processing, an essential cognitive function. Utilized this paradigm to explore the role of the prefrontal cortex demonstrating electrophysiological evidence for effects of prediction, aging and prefrontal lesions, which resulted in three first author publications in high impact journals: Brain 2009, JOCN 2009, Cortex 2010. In 2009, after receiving a Parga Pondal fellowship, began to work as a research fellow in the Department of Psychology, University of A Coruña, Spain. Awarded two three-year grants (regional and national), establishing a lab and continuing research on contextual processing, across different modalities and populations, including professional athletes and patients with neurological or psychiatric disorders, such as Parkinson's disease, schizophrenia and depression. This research resulted in seven more first author publications: Brain Topography 2011, Clinical Neurophysiology 2011, Psychophysiology 2011, Experimental Brain Research 2012, PloSOne 2013, Brain and Cognition 2013, Clinical Neurophysiology 2013. This work is of significance in further understanding the underlying mechanisms of prefrontal cognitive functions and the role of frontal dysfunction in different pathological disorders. To date my work has generated 20 articles, predominately first author in high impact journals as well as presentations in international conferences. I have extensive experience in different methodologies (EEG, TMS) and analysis techniques (spectral analysis, ERP, coherence, functional connectivity, statistics).