Abstract:
The human ventral stream includes a constellation of regions that respond preferentially to objects vs. textures (object-selective cortex) and regions that respond preferentially to faces vs. objects (face-selective cortex) and places vs. objects (place-selective cortex). Activity in these regions is correlated with subjects object, face and place recognition, respectively. Understanding the nature of representations in these ventral stream regions is key for understanding the neural basis of recognition in humans. However, it is unknown what is the role of experience in shaping and modifying these representations. I will describe experiments in which we addressed this question and propose neural mechanisms underlying experience-dependent changes in the ventral stream. In one set of studies, we investigated the effects of long term experience over development, by examining whether selectivity in the ventral stream changes from childhood to adulthood. In a second set of studies we examined whether short term experience induced by object repetition modifies category selectivity in the ventral stream. Our data show that there is a long maturation process in the ventral stream in which face and place-selective regions take more than a decade to reach an adult like extent, in correlation with increased proficiency in face and place recognition memory. However, short term experience, induced by repetition, produces reduced responses across the ventral stream for all categories, without a change in category selectivity. Overall, our experiments suggest that different mechanisms underlie long and short-term experience-dependent changes in the human ventral stream, with the former yielding a change in the underlying representation and the latter reactivating the same representations, but in a reduced (scaled) fashion.