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Causal correlation paths across cortical areas in decision-making

Abstract:

A fundamental problem in neuroscience is to understand how neural spike activity encode, integrate and communicate information across different brain areas. An ideal paradigm to study this problem is a decision-making task based on external inputs. This is a complex process which requires to communicate information from the areas which perceive the stimuli to the areas that integrate them and report the decision.

A well-known task to study decision making was designed by Romo et al. The experiment is a vibrotactile discrimination task, in which monkeys must compare two delivered frequencies and then report the highest frequency by a cascade. The two frequencies are delivered with a time lag of 3 seconds allowing the brain to store in memory the traces of the first frequency, to perceive separately the second frequency and then to compare both to make a decision.

Hence, the processes of perception, memory, comparison and decision making can be independently studied. Previous studies have analyzed single-neuron responses recorded while subjects perform the discrimination task. The results show that stimuli are mostly encoded in sensory areas, while the comparison and the decision involve sensory as well as motor areas. In this report, we study the interaction between different cortical areas to characterize communication shows that may arise in the discrimination task. In particular, we analyze to what extent these communications are dependent of the key stages of the discrimination task: sensory encoding and perception, working memory, effective decision making and motor action.

Date:	**April 10, 2014**
Place:	**Room C1/028**
Time:	**12:00**