**Title**: Does efficient value synthesis in the OFC explain how risk attitude adapts to the range of risk prospects?

**Speaker**: Jean Daunizeau (Paris Brain Institute).

**Abstract:** Is irrational behavior the incidental outcome of biological constraints imposed on neural information processing? Recent studies indicate that orbitofrontal neurons encode decision value in relative terms, i.e. value signals in OFC neurons are normalized with respect to the context. Value-based decisions may thus exhibit irrational context-dependence effects. A candidate explanation is "efficient coding": OFC neurons may minimize information loss by adapting their (bounded) output firing properties to the recent value range. This is seducing, because it suggests that relative value coding is the brain’s best attempt to mitigate its own hard-wired biological constraints. However, whether the behavioral implications of this scenario are met, how it generalizes to realistic situations in which OFC neurons construct value from multiple decision-relevant attributes – which we coin “value synthesis” - and what its neurophysiological bases are, is unclear. Here, we approach these issues from a neurocomputational perspective. First, we show how artificial neural networks can self-organize through neo-hebbian rewiring processes to operate *efficient value synthesis*, i.e. value synthesis that is robust to neural perturbations. Importantly, we show that such mechanism predicts that value synthesis progressively adapts to the experienced range of decision attributes. In turn, the relative weight of decision-relevant attributes onto value-based decisions is inversely proportional to their respective range. We then test these predictions on two open fMRI datasets from the OpenNeuro.org initiative, where people have to integrate prospective gains and losses to decide whether to gamble or not. We show that peoples' risk attitudes critically depend on the range of gain/loss prospects they are exposed to (in the absence of feedback). We also show that, when adjusted to explain peoples’ irrational choices, efficient value synthesis in neural networks predicts (out-of-sample) the representational content of multivariate fMRI activity patterns in the OFC. Our results suggest that some forms of irrational behavior may be the corollary consequence of self-organization in OFC networks that operate efficient value synthesis.