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ENS DE LYON

11:00 VENDREDI 20 NOVEMBRE, 2015

ENS LYON - Site Monod* - Salle des Thèses Chantal Rabourdin-Combe

Probabilistic inferences in neural circuits: from insects to humans (to plants?)

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A wide range of behaviors across all species can be formalized as instances of probabilistic inferences. This includes odor recognition, navigation, motor control, decision making, multisensory integration, visual search, simple arithmetic and causal reasoning in humans, to name just a few. We will show that, in many cases, the probabilistic inferences involved can be optimally implemented in simple, and biologically plausible, linear and nonlinear neural circuits. This raises the possibility that seemingly unrelated behaviors could in fact rely on very similar neural mechanisms across different species. In fact, it is quite possible that even plants uses similar type of computation for decision making, as the mechanism required for these computations could be just as easily implemented in the metabolic pathways of single cells, or populations thereof.

Selected references

Ma, W.J., Beck, J., Latham, P.E. and Pouget, A. (2006). *Bayesian inference with probabilistic population codes*. **Nature Neurosci.** 9:1432-1438.

Ma, W..J., Navalpakkam, V., Beck, J., van den Berg, R. and Pouget, A. (2011). *Behavior and neural basis of near-optimal visual search*. **Nature Neurosci.** 14:783-790.

Pouget, A., Beck, J., Ma, W..J. and Latham, P.E. (2013). *Probabilistic brains: knowns and unknowns*. **Nature Neurosci.** 16:1170-1178.

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