

Models of the Mind

From Psychoanalysis to Neuroscience

An interdisciplinary dialogue between psychoanalysis, neuroscience and AI.

Karl Friston is a theoretical neuroscientist and authority on brain imaging. He invented statistical parametric mapping (SPM), voxel-based morphometry (VBM) and dynamic causal modelling (DCM). These contributions were motivated by schizophrenia research and theoretical studies of value-learning, formulated as the dysconnection hypothesis of schizophrenia. Mathematical contributions include variational Laplacian procedures and generalized filtering for hierarchical Bayesian model inversion. Friston currently works on models of functional integration in the human brain and the principles that underlie neuronal interactions. His main contribution to theoretical neurobiology is a free-energy principle for action and perception (active inference). Friston received the first Young Investigators Award in Human Brain Mapping (1996) and was elected a Fellow of the Academy of Medical Sciences (1999). In 2000 he was President of the international Organization of Human Brain Mapping. In 2003 he was awarded the Minerva Golden Brain Award and was elected a Fellow of the Royal Society in 2006. In 2008 he received a Medal, Collège de France and an Honorary Doctorate from the University of York in 2011. He became a Fellow of the Royal Society of Biology in 2012, received the Weldon Memorial prize and Medal in 2013 for contributions to mathematical biology and was elected as a member of EMBO (excellence in the life sciences) in 2014 and the Academia Europaea in (2015). He was the 2016 recipient of the Charles Branch Award for unparalleled breakthroughs in Brain Research and the Glass Brain Award, a lifetime achievement award in the field of human brain mapping. He holds Honorary Doctorates from the Universities of York, Zurich and Radboud University.



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Title: *Duet for One*

Abstract: we now regard the brain as an organ of prediction, generating phantasies and hypotheses that best explain sensory encounters. It is literally a phantastic organ. This is reflected in formulations of the Bayesian brain as making inferences about states of affairs in the world 'out there'. This understanding of sentient behaviour – and how the brain works – rests upon a deeper back story that can be traced to the physics of self-organisation. In this talk, I will try to tell this story, starting with the fundamentals of self-organisation, using notions from probability theory such as self-information and surprisal. We will see how this leads to the notion of self-evidencing; namely, a view of sentient behaviour in which we are compelled to seek evidence for our models of the world. One intriguing issue arises when these models include other people as the causes of our sensations, or indeed the hypothesis that "I am like you". In other words, higher forms of sentience may involve hypotheses about self and other that could have profound implications for the way that we understand ourselves (and others). Using simulations, I will try to illustrate how the physics of selfhood can lead to the kind of interactions that underwrite interpersonal exchange and possibly selfhood.