Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

How the prior information shapes couplings in neural fields performing optimal multisensory integration[1] HE WANG, Hong Kong Univ of Sci & Tech, WEN-HAO ZHANG, Carnegie Mellon University, K. Y. MICHAEL WONG, Hong Kong Univ of Sci & Tech, SI WU, Beijing Normal University — Extensive studies suggest that the brain integrates multisensory signals in a Bayesian optimal way. However, it remains largely unknown how the sensory reliability and the prior information shape the neural architecture. In this work, we propose a biologically plausible neural field model, which can perform optimal multisensory integration and encode the whole profile of the posterior. Our model is composed of two modules, each for one modality. The crosstalks between the two modules can be carried out through feedforwad cross-links and reciprocal connections. We found that the reciprocal couplings are crucial to optimal multisensory integration in that the reciprocal coupling pattern is shaped by the correlation in the joint prior distribution of the sensory stimuli. A perturbative approach is developed to illustrate the relation between the prior information and features in coupling patterns quantitatively. Our results show that a decentralized architecture based on reciprocal connections is able to accommodate complex correlation structures across modalities and utilize this prior information in optimal multisensory integration.

[1]This work is supported by the Research Grants Council of Hong Kong (N_HKUST606/12 and 605813) and National Basic Research Program of China (2014CB846101) and the Natural Science Foundation of China (31261160495).

He Wang
Hong Kong Univ of Sci & Tech

Date submitted: 11 Nov 2016 Electronic form version 1.4