# Spiking–neuron model for the interaction between visual and motor representations of action in premotor cortex

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Action perception and action execution are intrinsically linked in the human brain. Experiments show that concurrent motor execution influences the visual perception of actions. This interaction is mediated by action-selective neurons in premotor and parietal cortex. METHODS: Our model is based on two coupled dynamic neural field, one modelling a representation of perceived action patters (vision field), and one representing associated motor programs (motor field). The fields consist of coupled ensembles of Exponential Integrate-and-Fire neurons. The fields stabilize travelling localized activity peaks that are following the stimulus or propagate autonomously after a go-signal. Both fields are coupled by interaction kernels, resulting in a stabilization of traveling pulses that propagate synchronously in both fields. We used the model to reproduce the result of a psychophysical experiment that tested the detection of point-light stimuli in noise during concurrent motor execution. RESULTS: Consistent with the experimental data, we find a facilitation of the detection of visual action patterns by concurrent motor execution if the executed motor pattern is spatio-temporally compatible with the observed pattern, and interference if it is incoherent. CONCLUSION: Dynamic neural networks with biophysically realistic neurons can reproduce basic signatures of perception-action coupling in behavioral experiments.

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