**Title:**

Marr's computational level and mechanistic explanation: Extending the notion of mechanism

**Abstract:**

It has been suggested by many philosophers of bio- and neurosciences that the mechanistic model of explanation offers a satisfactory model of explanation for the neurosciences. It has been also proposed that the mechanistic model could be extended to cover computational explanations in computational neuroscience as well.

Computational neuroscience attempts to relate computational theories of cognitive – i.e. information-processing - mechanisms to known physiological mechanisms and biophysics of the brain. Thus, models in computational neuroscience aim to integrate different levels of organization. Marr's levels of computation, algorithms and implementation offer one account of the organization of such multilevel theories.

In our presentation we discuss various definitions of the notion of mechanism in the literature on mechanistic explanation in the biomedical sciences, and argue that computational explanation in the marrian sense (top-down explanation from the computational level to the algorithmic) employs a subtly different notion of mechanism from that operating in mechanistic explanation in the biosciences.

We then propose extending the notion of mechanism to cover computational explanation in Marr`s sense by recognizing what we call abstract mechanisms as bona fide mechanisms. We argue that this notion of explanation by means of abstract mechanisms is the best philosophical account of how the (marrian) computational approach integrates cognitive and (neuro)biological explanation into single unified neurocognitive explanatory framework.

In this way, computational and cognitive neurosciences – as well as physiological, biomedical and systems neuroscience – could all be covered under the mechanistic model of explanation, albeit the notion of mechanism and certain unique forms of explanation used in computational neuroscience would still mean that they employ of mechanistic interlevel explanations unique to neurocognitive explanations and not heretofore discussed in the literature on mechanistic explanation in the neurosciences.