
Early nervous systems and the origins of the animal sensorimotor organization

Fred Keijzer*^{†1}

¹Department of Theoretic Philosophy (University of Groningen) – Oude Boteringestraat 52 9712 GL Groningen, Netherlands

Abstract

The notion of an animal ‘sensorimotor organization’, central in discussions on embodied cognition, can be clarified by turning to the evolution of the very first nervous systems. Nervous systems are usually interpreted as input-output control devices, similar to artificial ones. Nervous systems receive information from sensors; process it and use the result to control effectors. However, it can be argued that this input-output view is best fitted to relatively complex centralized nervous systems and less suitable to deal with more basic forms, most notably diffusely connected nerve nets, and their evolutionary origins. Taking diffuse nerve nets as a basic condition, an alternative view can be developed that stresses the fundamental coordination problems faced by multicellular animals that first developed muscle-based motility. This form of motility involves the patterned contraction of extended muscle sheets dispersed over the body. The key problem here was not so much to act intelligently – a problem often solved without any nervous system – but to act as a *single multicellular bodily unit*. In this alternative view, early nervous systems were central in enabling a new, extremely powerful multicellular effector by providing ongoing patterned activations across the available contractile tissue of the organisms involved. Connecting sensors to such an effector then becomes a secondary development. While this evolutionary possibility is important in itself, it also offers a way to interpret the animal sensorimotor organization as a specific form of embodiment rather than an essentially arbitrary collection of sensors and effectors.

*Speaker

[†]Corresponding author: f.a.keijzer@rug.nl