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On the Bio-Logic of Cognitive Robotics: Soft Robotics as Functional Integrated Systems

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Control structures and environmental behavior in animals are very different from those performed by rigid robotic systems. Both reflect the differences in underlying material properties and open questions on cognitive processes in biological and robotic systems. Such differences and potential convergences justify the increasing interest in soft robotics (SF) born in the context of Embodied Intelligence (EI) research. In this paper I explore in what sense and under what conditions SR systems can be considered models of biological processes. I will do so by discussing which functional dimensions of a biological system meet the definition of EI and what assumptions the notion of a goal-oriented system entails. What soft robotics adds to traditional robotics is the possibility to build systems where the functioning of the mechanism emerges as a result of sensorimotor activity, constrained by the physical body development program. This guarantees a higher degree of plasticity of adaptive processes.