Towards Architectural Foundations for Cognitive Self-aware Systems

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Abstract. The BICA 2012 conference main purpose is to take a significant step forward towards the BICA Challenge -creating a real-life computational equivalent of the human mind. This challenge apparently calls for a global, multidisciplinary joint effort to develop biologically-inspired dependable agents that perform well enough as to to be fully accepted as autonomous agents by the human society. We say "apparently" because we think that "biologically-inspired" needs to be re-thought due to the mismatch between natural and artificial agent organization and their construction methods: the natural and artificial construction processes. Due to this constructive mismatch and the complexity of the operational requirements of world-deployable machines, the question of dependability becomes a guiding light in the search of the proper architectures of cognitive agents. Models of perception, cognition and action that render self-aware machines will become a critical asset that marks a concrete roadmap to the BICA challenge.

In this talk we will address a proposal concerning a methodology for extracting universal, domain neutral, architectural design patterns from the analysis of biological cognition. This will render a set of design principles and design patterns oriented towards the construction of better machines. Bio-inspiration cannot be a one step process if we we are going to to build robust, dependable autonomous agents; we must build solid theories first, departing from natural systems, and supporting our designs of artificial ones.