Background and Theoretical Foundations

Active Inference represents a paradigm shift in our understanding of cognition, perception, and action. Originating from the Free Energy Principle [@friston2010free], Active Inference provides a unified mathematical formalism for understanding biological agents as systems that minimize variational free energy through perception and action. Recent advances have extended Active Inference to scale-free formulations [@friston2025scalefree] and variational planning [@champion2025efeplanning], while metacognitive architectures [@metamind2025; @sofai2025] have demonstrated the practical applicability of these principles to AI systems. This section establishes the theoretical foundations that enable Active Inference to operate as a meta-theoretical methodology—specifying the frameworks within which cognition occurs.