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. This section establishes the theoretical foundations that enable Active Inference to operate as a meta-theoretical methodology—specifying the frameworks within which cognition occurs.

The Free Energy Principle

The Free Energy Principle (FEP) defines a "thing" as a system that maintains its structure over time through free energy minimization. This principle applies across multiple scales of organization:

Physical Level: Boundary maintenance through Markov blankets—systems maintain physical structure by minimizing thermodynamic free energy, creating boundaries that separate internal from external states.

Cognitive Level: Belief updating through Expected Free Energy