

Symbols and Notation

Core Active Inference Notation

Symbol	Description	Domain
$\mathcal{F}(\pi)$	Expected Free Energy for policy π	\mathbb{R}
$G(\pi)$	Pragmatic value of policy π	\mathbb{R}
$H[Q(\pi)]$	Epistemic affordance (information gain)	\mathbb{R}
$q(s)$	Posterior beliefs over hidden states	\mathbb{R}^n
$p(s)$	Prior beliefs over hidden states	\mathbb{R}^n
A	Observation likelihood matrix $P(o \mid s)$	$\mathbb{R}^{m \times n}$
B	State transition matrix $P(s' \mid s, a)$	$\mathbb{R}^{n \times n \times k}$
C	Preference matrix (log priors over observations)	\mathbb{R}^m
D	Prior beliefs over initial	\mathbb{R}^n

Meta-Cognitive Extensions

Symbol	Description	Domain
c	Confidence score	$[0, 1]$
λ	Meta-cognitive weighting factor	\mathbb{R}^+
Θ	Framework parameters	\mathbb{R}^d
$w(m)$	Meta-data weighting function	\mathbb{R}^+

Free Energy Principle

Symbol	Description	Domain
\mathcal{F}	Variational free energy	\mathbb{R}
\mathcal{S}	Surprise (-log evidence)	\mathbb{R}
ϕ	System parameters	\mathbb{R}^p
$p(o, s)$	Joint distribution over observations and states	Probability space

Quadrant Framework

Symbol	Description	Domain
$Q1$	Data processing (cognitive) quadrant	Framework element
$Q2$	Meta-data organization (cognitive) quadrant	Framework element
$Q3$	Reflective processing (meta-cognitive) quadrant	Framework element
$Q4$	Higher-order reasoning (meta-cognitive) quadrant	Framework element

Statistical Notation

Symbol	Description	Domain
$\mathbb{E}[\cdot]$	Expectation operator	Functional
$KL[p\ q]$	Kullback-Leibler divergence	\mathbb{R}^+
$\sigma(\cdot)$	Softmax function	Mapping to probabilities
∇	Gradient operator	Functional

Implementation Variables

Symbol	Description	Domain
t	Time step	\mathbb{N}
τ	Temporal horizon	\mathbb{N}
η	Learning rate	\mathbb{R}^+
α	Adaptation rate	\mathbb{R}^+
β	Feedback strength	\mathbb{R}^+