

**Full title: REBUS and the anarchic brain: towards a unified model of the brain  
action of psychedelics**

**Running title: REBUS and the anarchic brain**

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**SUPPLEMENTARY MATERIAL**

**Supplemental Glossary of terms**

**Bayesian model reduction:** Bayesian model reduction is a mechanism through which model parameters are pruned to reduce model complexity. It is a mechanism of model optimisation done in aid of model selection.

**Bayesian model selection:** Bayesian model selection is a mechanism by which a best performing model is identified from a set of models. Model performance is determined by a trade-off between model fit (specificity) and model complexity.

**Criticality:** The property of a complex system poised at a critical point between order and disorder on the cusp of a phase transition. At the critical point, the system exhibits emergent properties such as critical slowing.

**Critical slowing:** Critical slowing refers to a property of critical systems in which they are especially sensitive to perturbation. The term 'slowing' refers to the property of being slow to recover from a perturbation.

**Entropy:** The average surprise of outcomes sampled from a probability distribution or density. A density with low entropy means, on average, the outcome is relatively predictable (certain).

**Free-energy:** An information theory measure that bounds (is greater than) the surprise on sampling some data, given a generative model.

**Generative model:** or forward model is a probabilistic mapping from causes to observed consequences (data). It is usually specified in terms of the likelihood of getting some data given their causes (parameters of a model) and priors on the parameters.

**Hierarchical predictive coding:** Hierarchical Predictive Coding (HPC) is an account of brain function that states that top-down probabilistic generative models ('priors' in the Bayesian sense) impose expectations on the activity of hierarchically subordinate components of the system – effectively 'explaining away' the potential information that could be transmitted by the lower-level components. When this top-down imposition fails however, 'prediction error' occurs, which motivates an update of the top-down generative models.

**Precision:** (in general statistical usage) means the inverse variance or dispersion of a random variable. The precision matrix of several variables is also called a concentration matrix. It quantifies the degree of certainty about the variables.

**Prediction error:** mismatch between what bottom-up information is predicted and what is actually encountered. Prediction error is commensurate with 'surprise'.

**Prior:** The probability distribution or density on the causes of data that encode beliefs about those causes prior to observing the data.

**Spiritual bypassing:** A psychological phenomenon in which an individual uses spiritual ideas or practices as a means of emotional escape (hence 'bypass') from psychological challenges associated with personal trauma and/or developmental issues.

**Uncertainty:** A measure of unpredictability or expected surprise (cf, entropy). The uncertainty about a variable is often quantified with its variance (inverse precision).