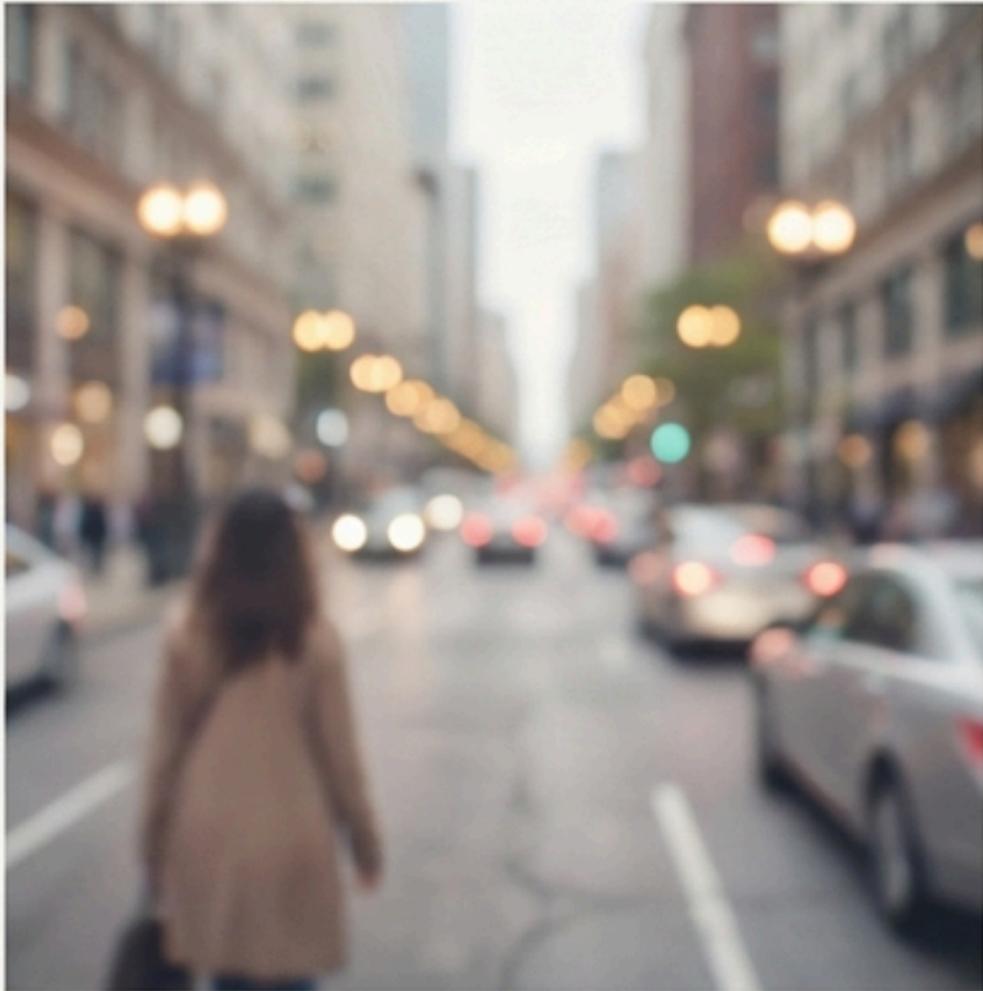




The Predictive Brain & The Autistic Mind

Rewiring the Rules of Perception

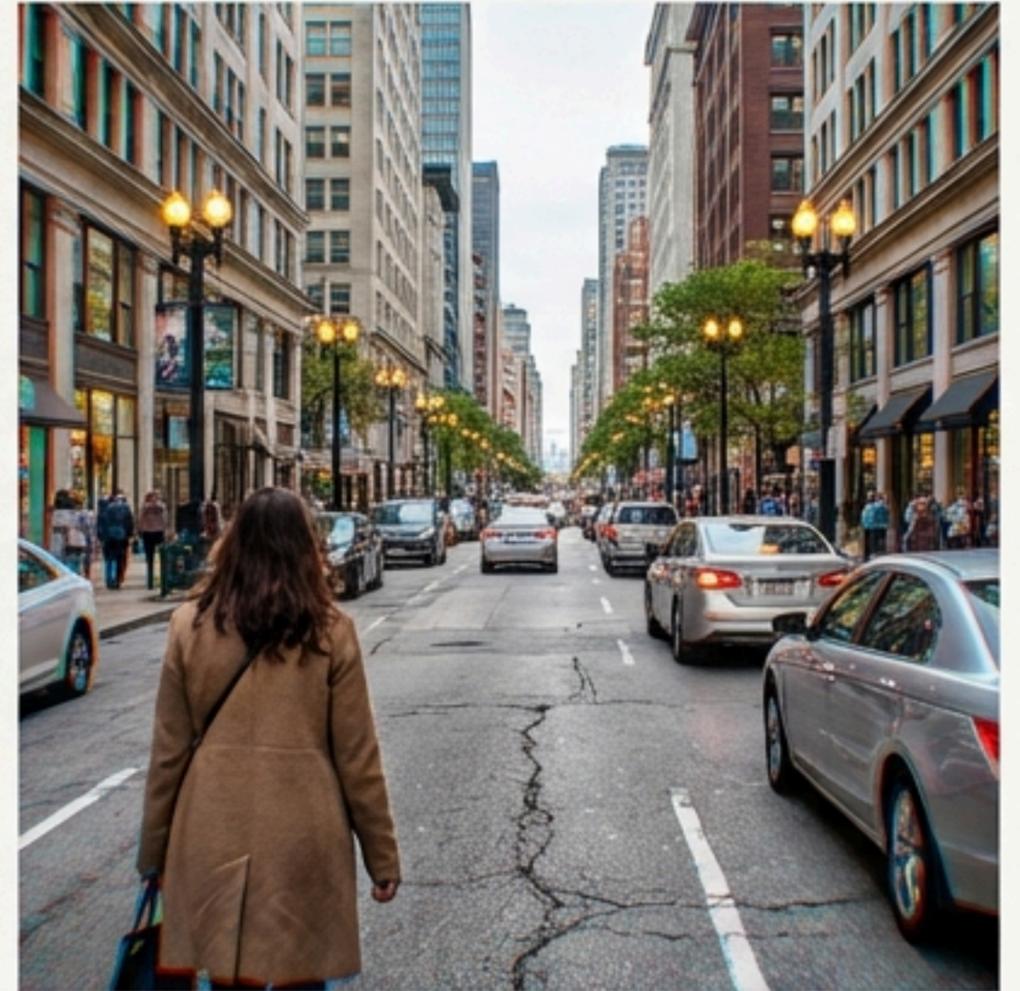
“A slave to their senses.”



Filtered & Contextualized.

Source Serif Pro

The autistic sensory world is not a deficit, but a fundamentally different reality. It is a world of overwhelming detail, where predictable stimuli are not suppressed. This experience has been described as sensory overload, where the world becomes ‘too real’.

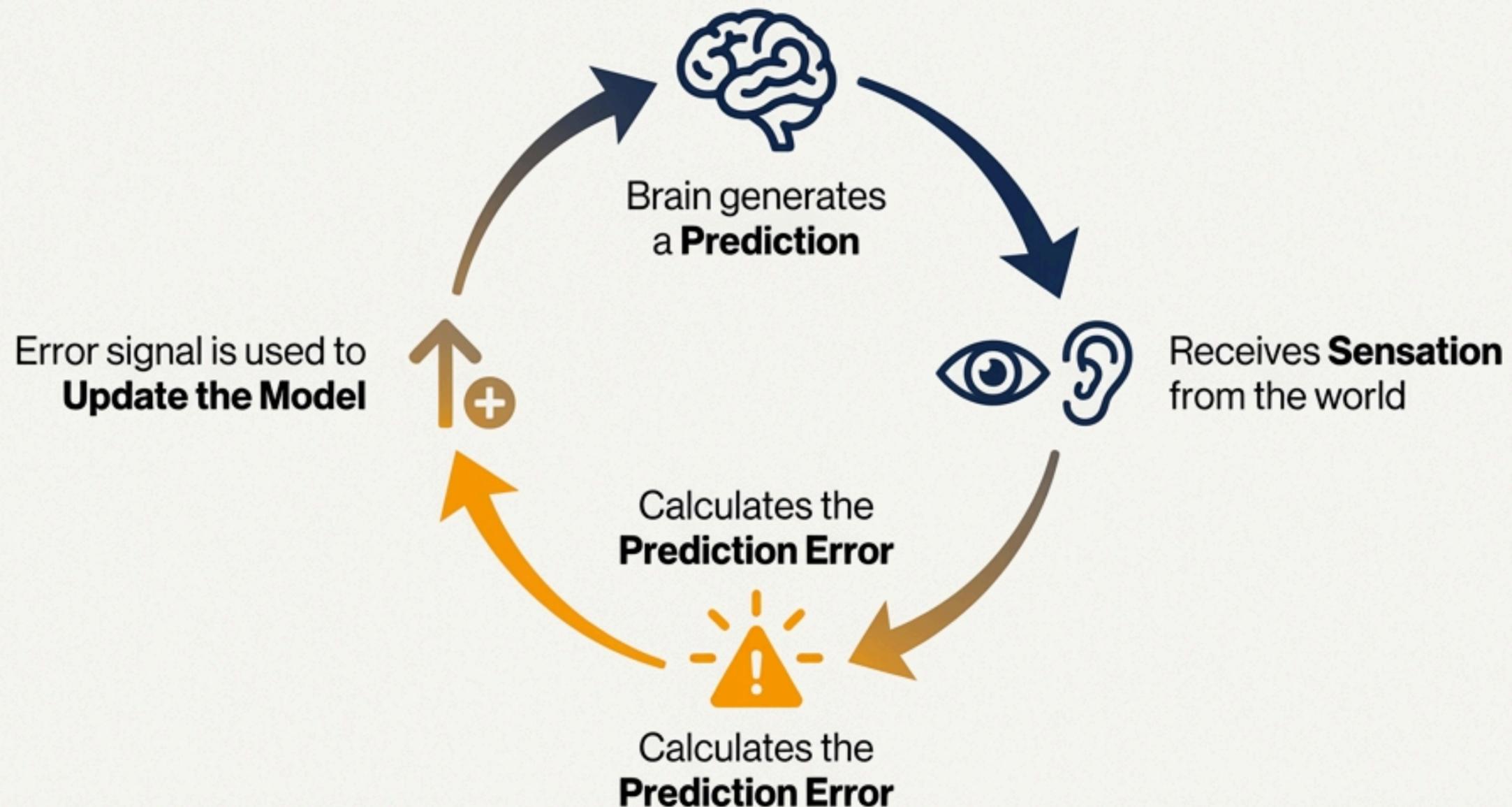


Raw & Unfiltered.

Source Serif Pro

Your Brain Isn't a Camera. It's a Prediction Engine.

The brain doesn't just record the world; it constantly generates hypotheses about the causes of sensory evidence. It actively predicts what it will see, hear, and feel next.

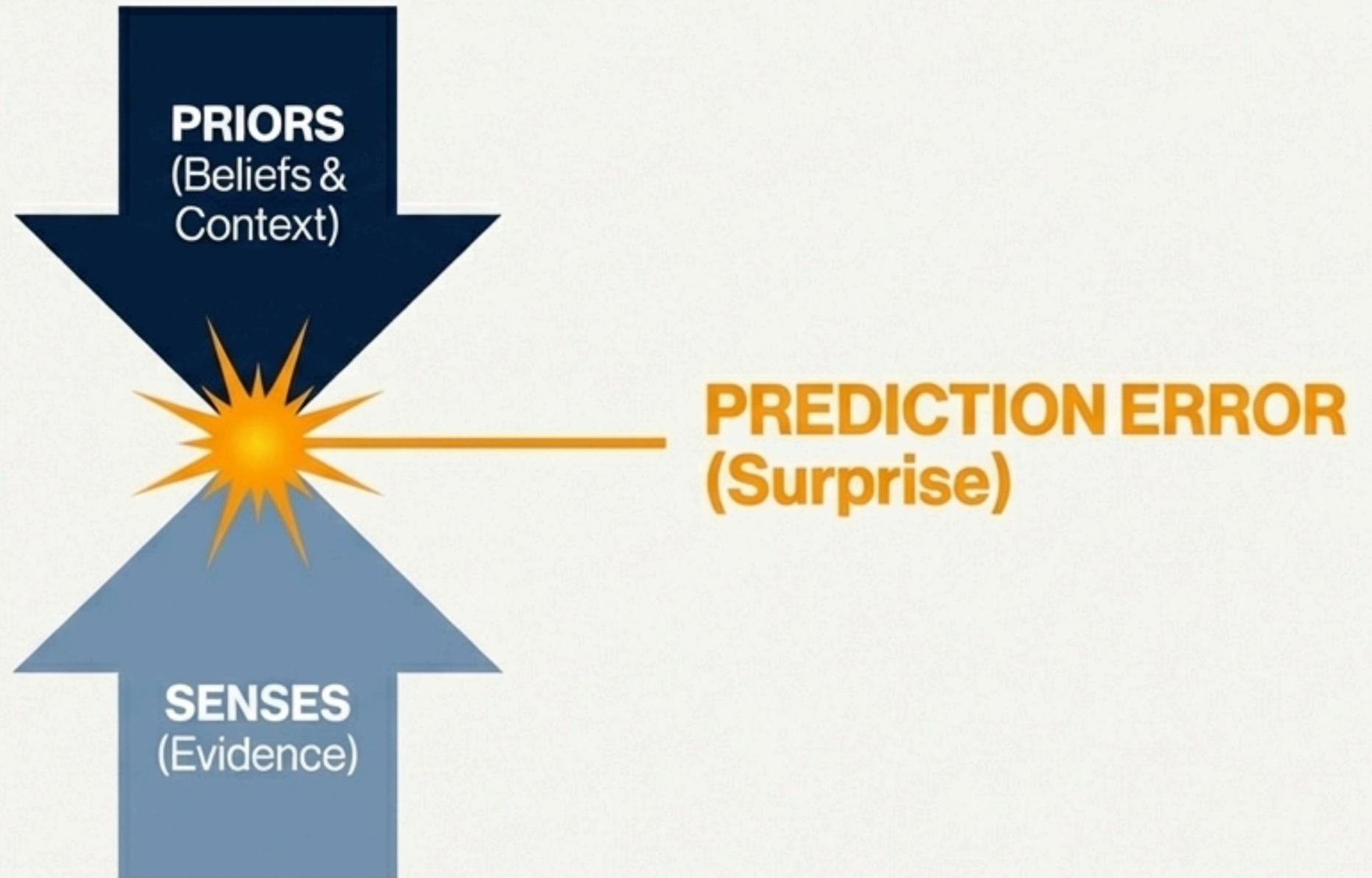


The Currency of Surprise.

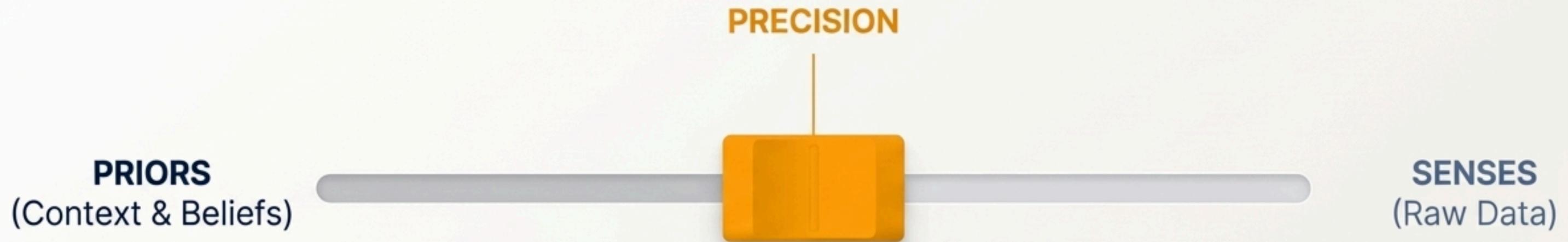
Top-down expectations (our beliefs, or **Priors**) meet bottom-up **Sensory Evidence**.

The discrepancy between the two is the **Prediction Error**.

This error is the only information that is truly “newsworthy”—a signal that something unexpected has happened and the internal model needs updating.



The Confidence Game: Which Signal to Trust?



Precision is the brain's estimate of confidence in a signal. It acts as a volume knob.

High precision on sensory evidence means the brain trusts the raw data more.

High precision on priors means the brain trusts its existing models and context more.

This is the crucial balancing act of perception.

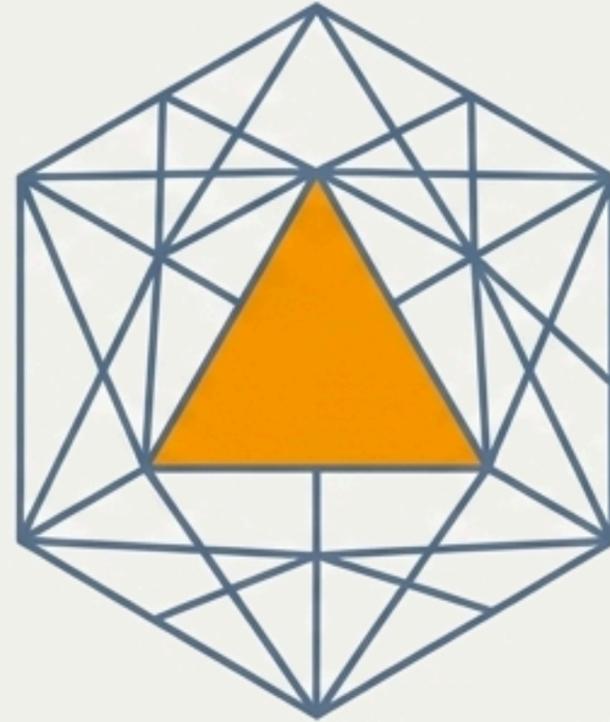
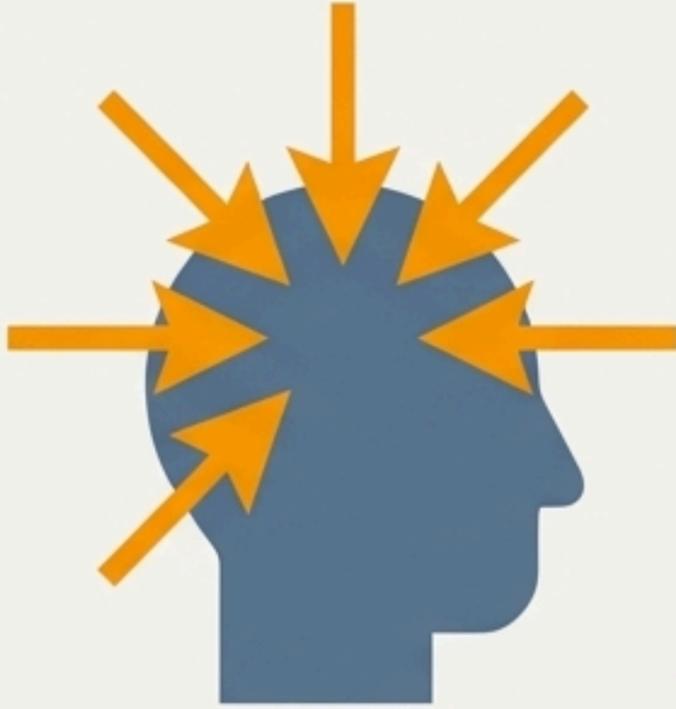
The Aberrant Precision Hypothesis.



A world without attenuation.

In autism, there is an imbalance favoring the precision of sensory evidence over the precision of prior beliefs. The brain fails to adequately attenuate sensory prediction errors. It treats all sensory information as highly precise, reliable, and “newsworthy.”

Seeing the Trees, Not the Forest.



1. Sensory Overload

A failure to suppress predictable stimuli means the world is a constant barrage of newsworthy information.

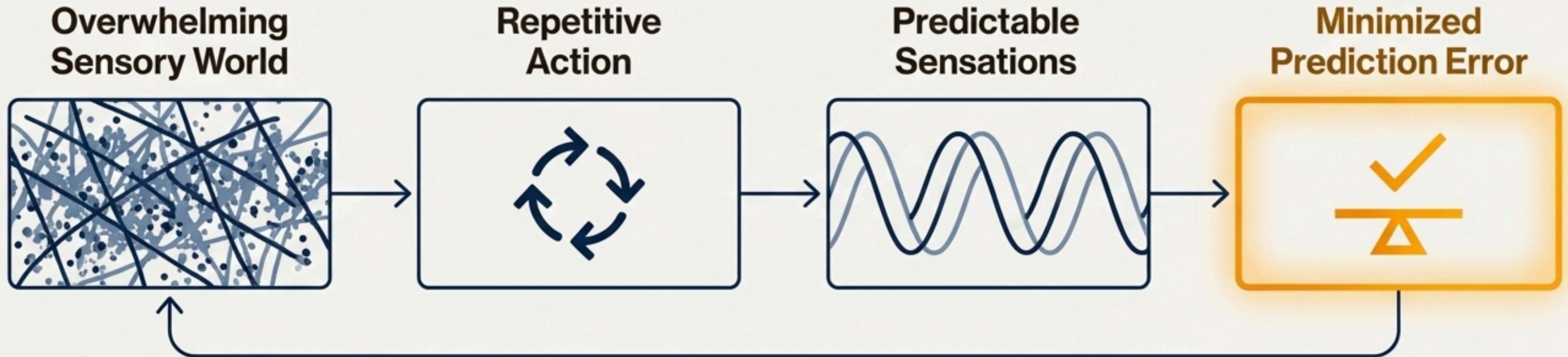
2. Detail Focus (Enhanced Perceptual Functioning)

Weak priors for the 'gestalt' or 'whole' make individual parts pop out.

3. Reduced Susceptibility to Illusions

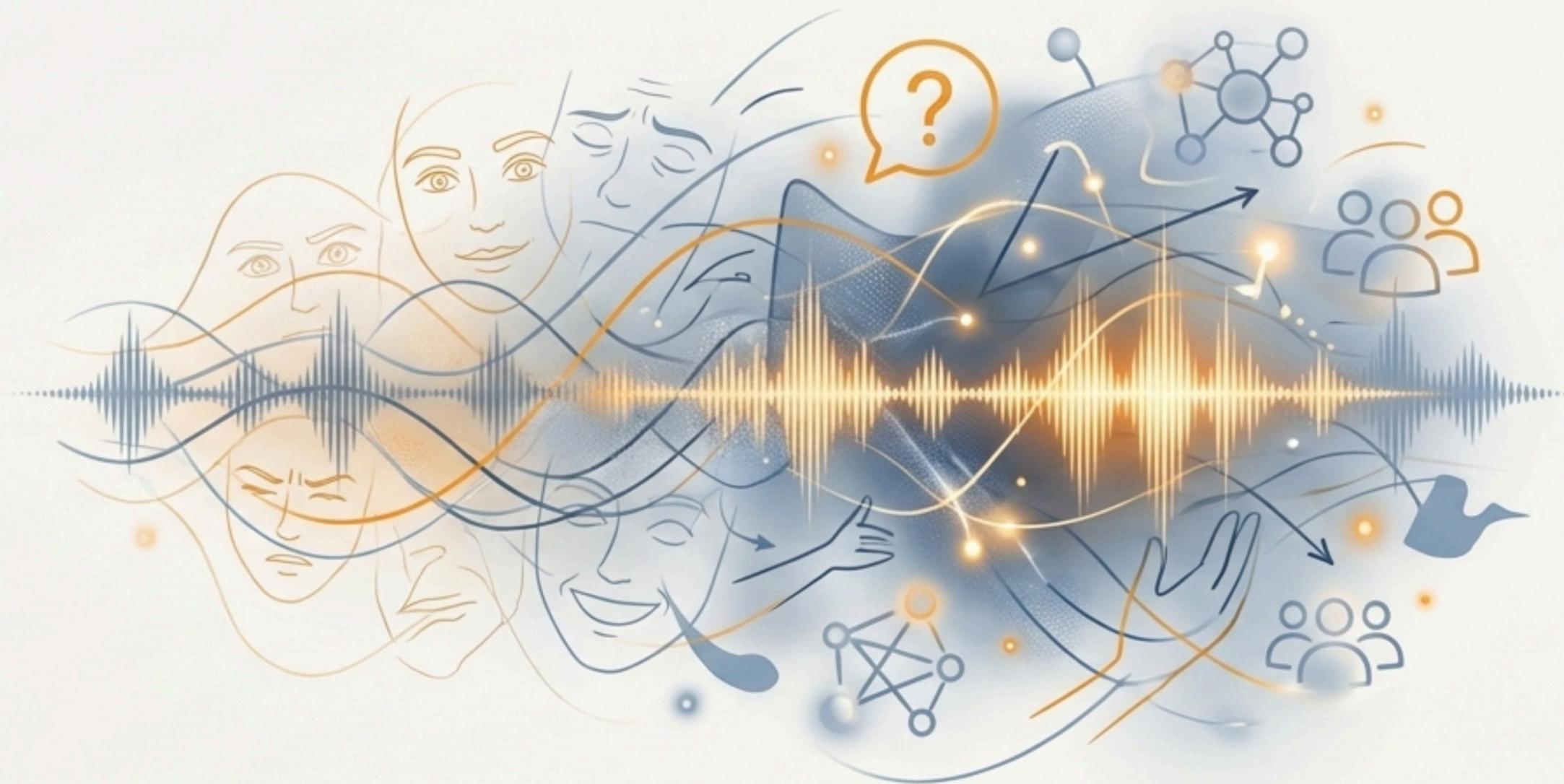
Perception is less biased by the brain's (weak) expectations, leading to more veridical perception.

Creating Predictability in an Unpredictable World



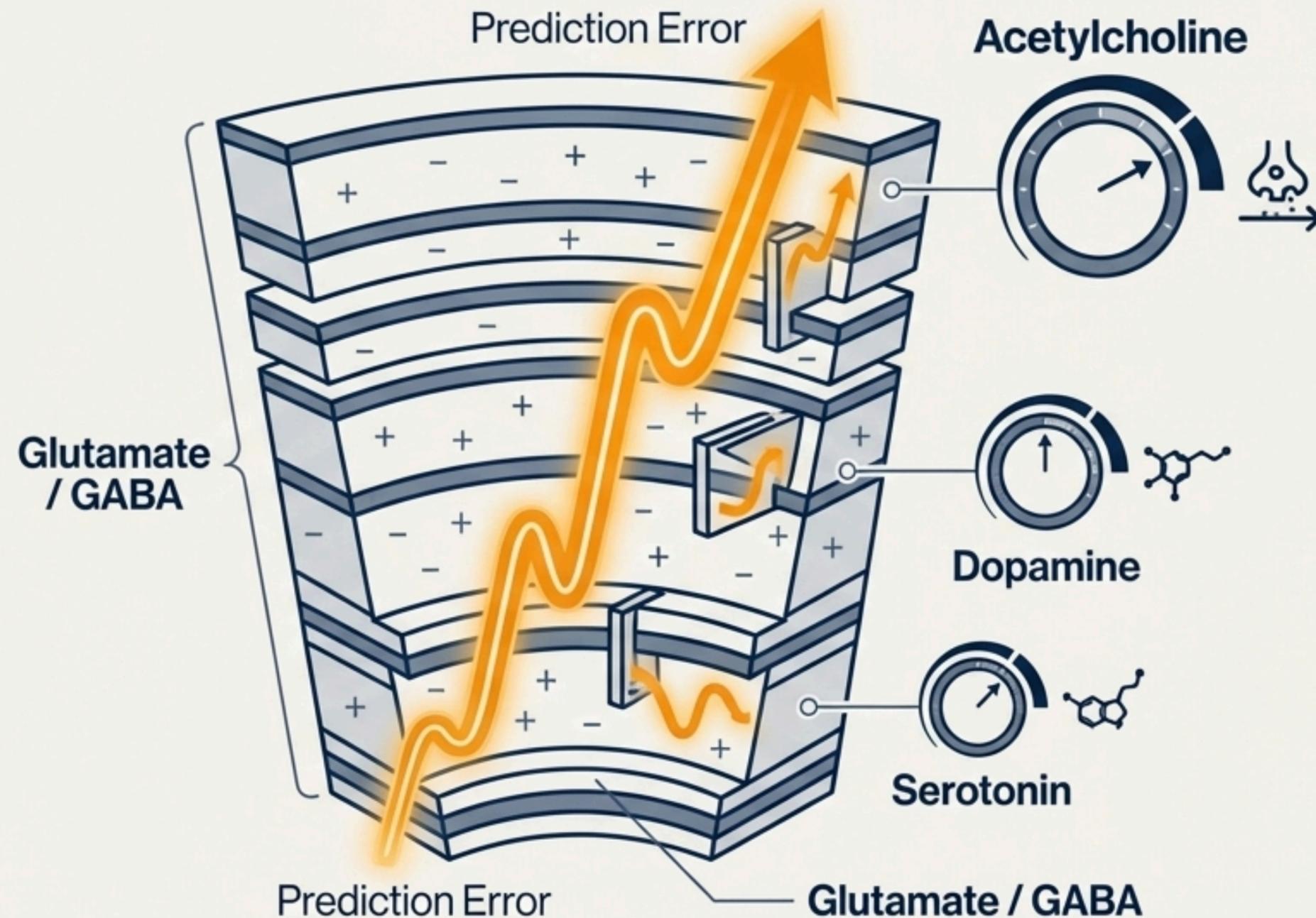
- **Repetitive Behaviors (Stimming):** Self-generated actions create a perfectly predictable stream of sensory input, minimizing surprise.
- **Insistence on Sameness:** A strategy to keep the environment stable, ensuring sensory inputs conform to predictions.

The Ultimate Uncertainty: The Social World



Other people are the most unpredictable things the brain must model. Social interaction requires relying on context and subtle cues (i.e., strong priors). Without them, the sheer volume of raw data is computationally overwhelming. This difficulty arises not from a lack of empathy, but from an inability to model other unpredictable agents.

The Brain's Volume Knobs: The Neuromodulatory Basis of Precision



Mechanism:

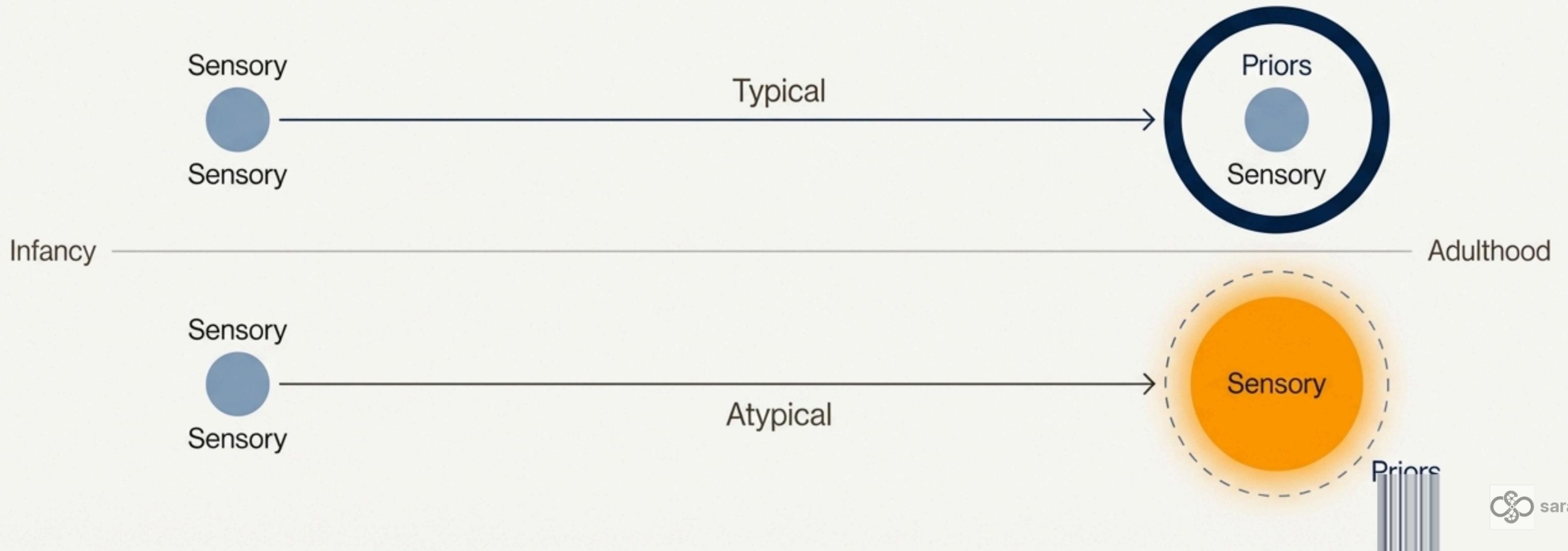
Precision is physically instantiated by the gain or excitability of neurons signaling prediction errors. This gain control is managed by key neuromodulators.

Key Neuromodulators:

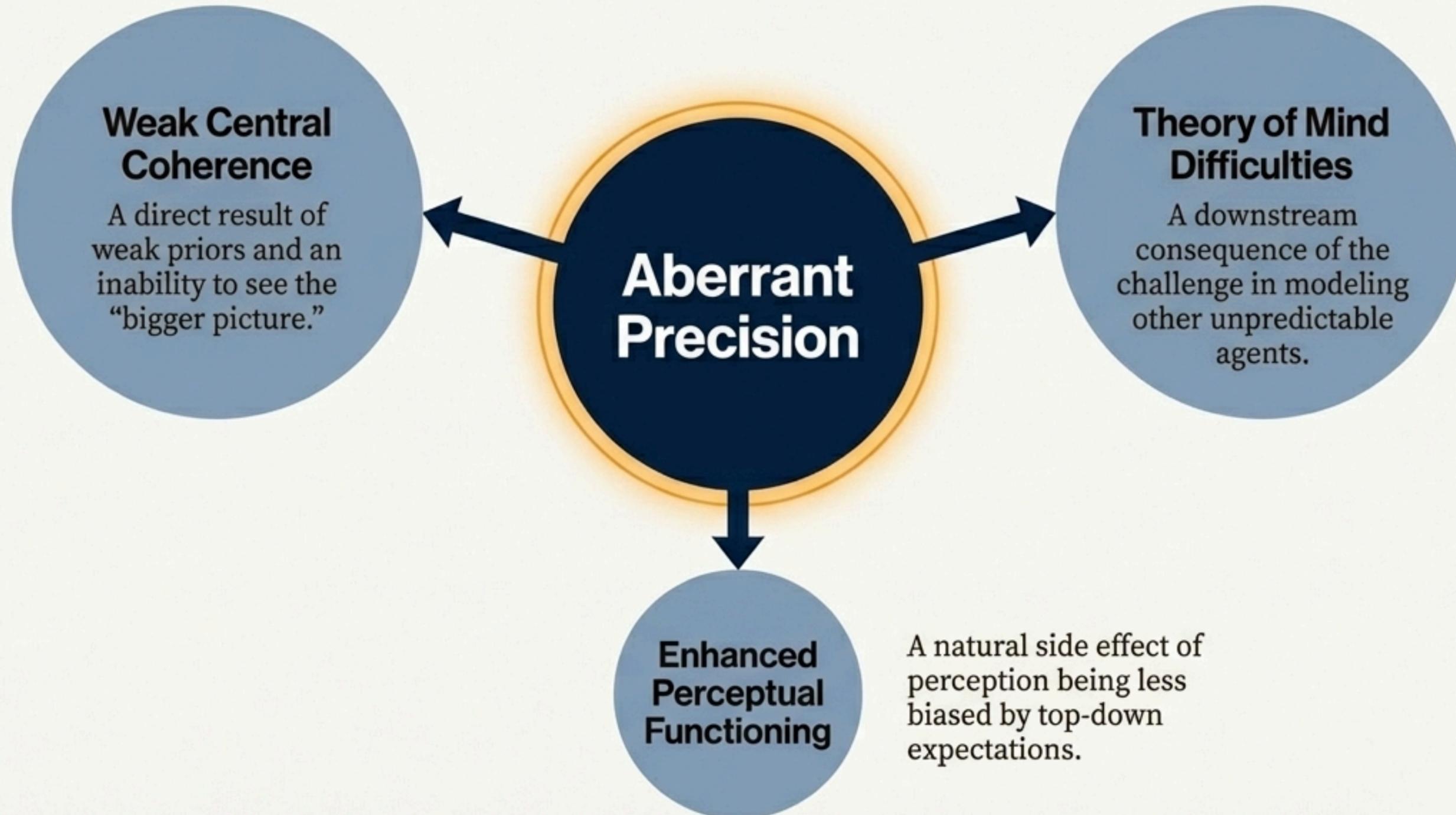
- **Glutamate/GABA:** The primary excitatory/inhibitory system.
- **Acetylcholine:** Modulates the precision of sensory prediction errors.
- **Dopamine & Serotonin:** Implicated in modulating cue precision.

Learning to Predict: An Origin Story.

We learn to predict from infancy by building robust priors from experience. An early failure to build these models can lead to a lifelong reliance on raw sensory data, setting a different developmental course.



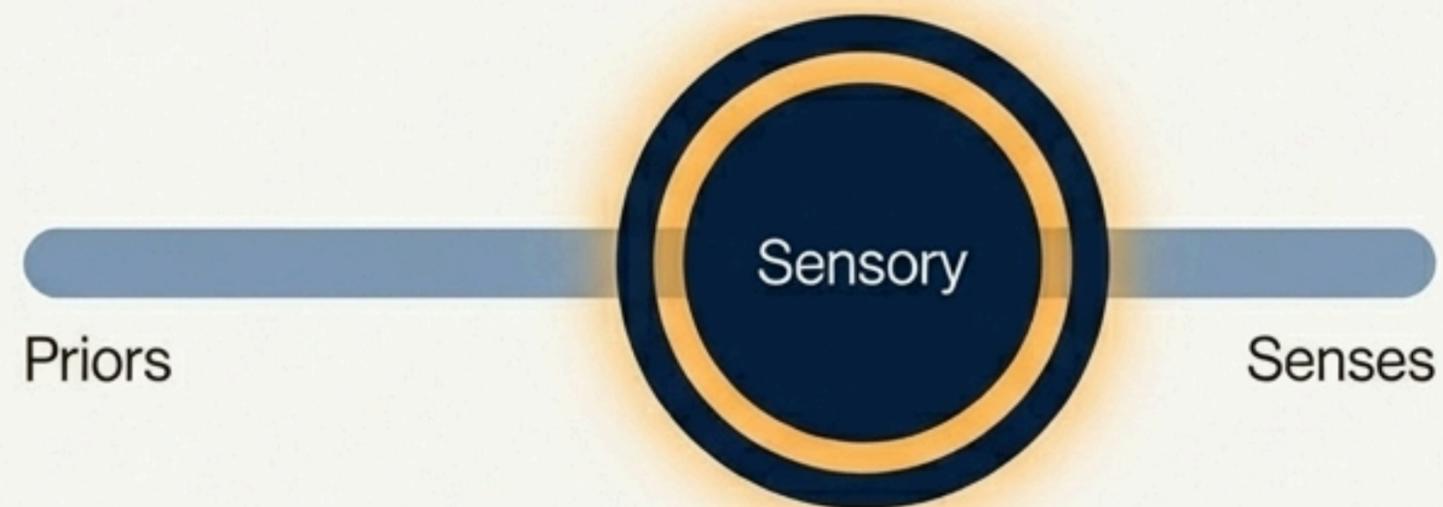
One Theory to Connect Them All.



An Evolving Conversation.

The scientific debate continues to refine the model. Is the core issue... hypo-priors? high sensory precision? Or, as recent evidence suggests, an inability to flexibly adjust precision to match context?

Static Imbalance?



Priors are too weak OR sensory signals are too strong.

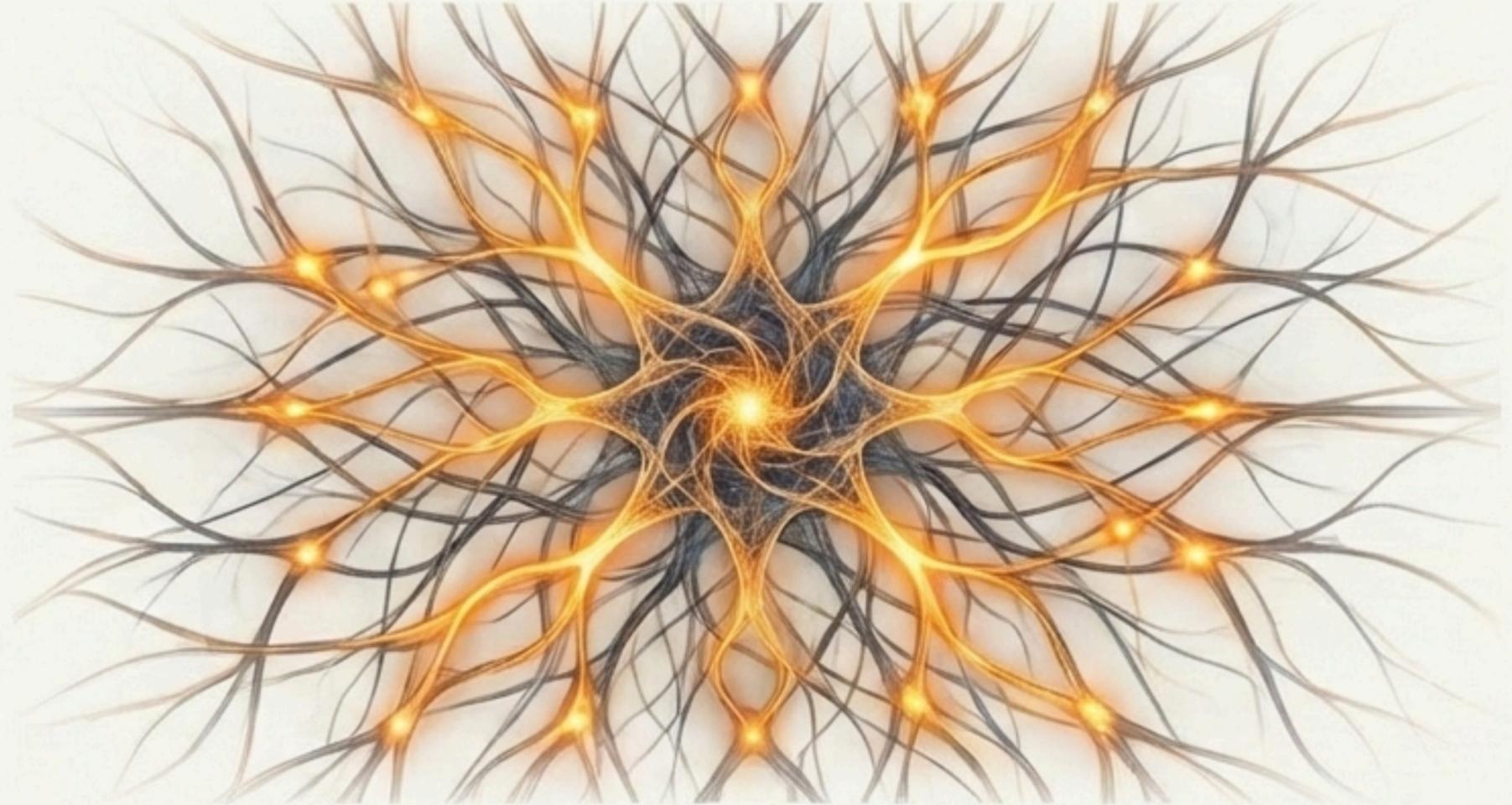
Inflexible Adjustment?



The primary problem is an inability to adjust the weight of priors based on the reliability of the environment

From a List of Deficits to a Style of Processing.

The Aberrant Precision Account reframes autism. It is not a broken system, but a system tuned differently—one that prioritizes fidelity to the immediate sensory world over adherence to prior beliefs.



- **For Understanding:** Offers a coherent, mechanistic explanatory explanation.
- **For Support:** Highlights the importance of creating predictable environments.
- **For Research:** Provides a unified framework for future inquiry.

Source & Acknowledgments

Primary Source

Lawson, R. P., Rees, G., & Friston, K. J. (2014). An aberrant precision account of autism. *Frontiers in Human Neuroscience*, 8, 302.

Acknowledgments

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Funding Credit

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