

# Why some beliefs stick, and how serotonin loosens them

May 19 2026, by Pranjali Malewar

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Credit: Image generated by the editorial team using AI for illustrative purposes.

Why do some people adjust quickly to rule changes while others keep repeating their own mistakes? A study in [Nature Mental Health](#) provides

a new answer that relies on serotonin and a phenomenon known as "belief stickiness."

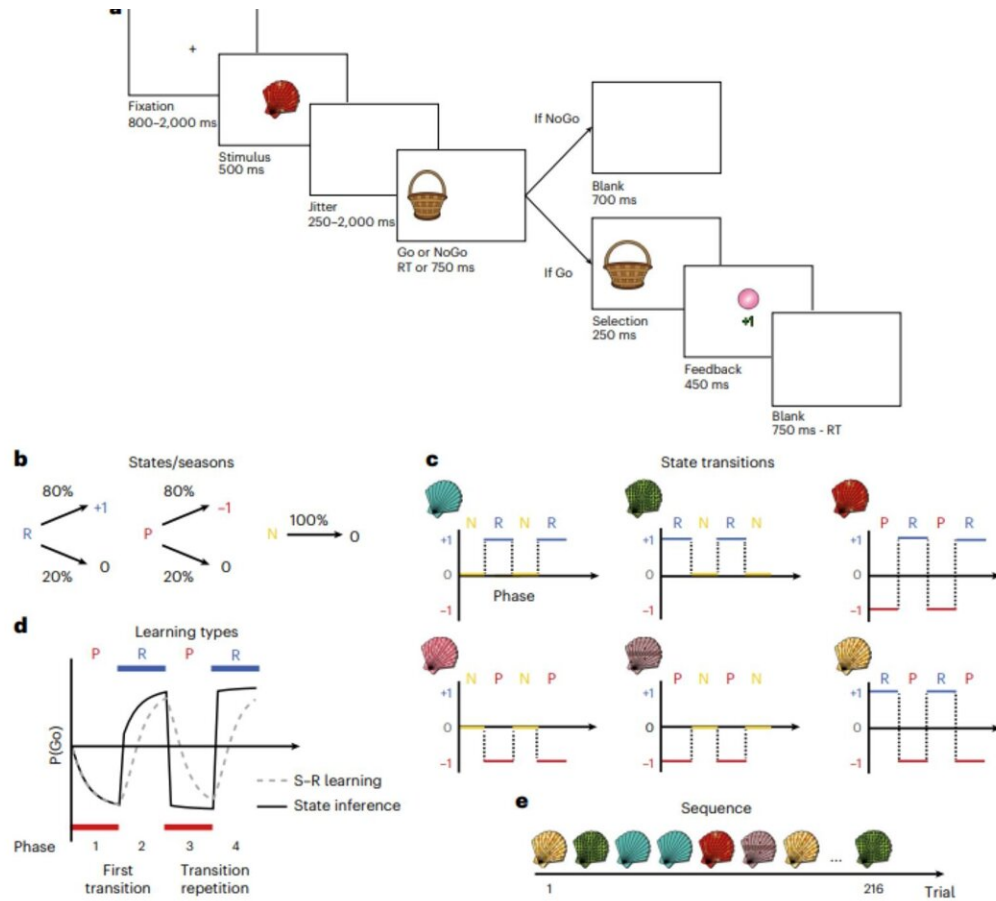
Serotonin promotes cognitive flexibility—the ability to change your thoughts and actions when conditions change. However, the exact mechanism behind the effect has been unclear until now. Belief stickiness is our tendency to hold onto preexisting assumptions despite evidence to the contrary.

While previous studies have demonstrated that serotonin is necessary for updating beliefs when confronted with new information, they have not established how this process occurs. Understanding this could explain the effectiveness of SSRIs in treating conditions such as obsessive–compulsive disorder (OCD), which is marked by inflexible, stimulated thought.

## **The orbitofrontal cortex connection**

Both animal and human studies have shown that the orbitofrontal cortex (OFC), is an important brain region for cognitive flexibility.

Dopamine is critical for reward processing and functions in the ventral striatum; serotonin depletion in the orbitofrontal cortex (OFC) impairs reversal learning, the ability to adjust behavior when rules are reversed. And, perhaps most importantly, OFC function in people with OCD is often impaired and SSRIs, drugs that enhance serotonin signaling, are the first line treatment.



The shell task. Credit: *Nature Mental Health* (2026). DOI: 10.1038/s44220-026-00621-9

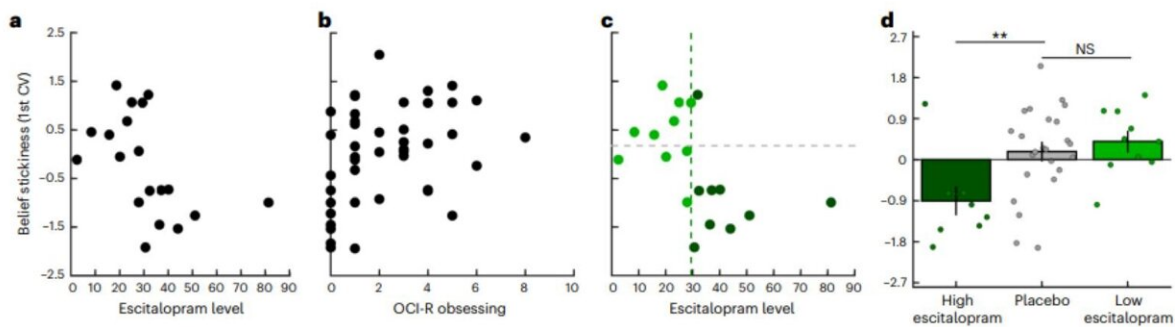
## Serotonin and stickiness

In this new study, the researchers suggest that serotonin reduces this stickiness, allowing the brain to let go of old beliefs and update its view in line with new incoming information more readily.

To test this hypothesis, the team carried out a randomized, double-blind, placebo-controlled trial in healthy men. Participants received fluoxetine (SSRI), a placebo, or single doses of escitalopram (15 mg, an SSRI).

To obtain measures of belief stickiness and state inference, the researchers used a new reversal-learning task and computational modeling. A routinely used questionnaire was applied to assess the obsessive symptoms, and blood samples were obtained to verify escitalopram levels while participants performed the task.

The main experimental tool was a new Go/NoGo reversal-learning paradigm; the Shell Task. Participants viewed one of six shells and had to make a Go decision to collect it or NoGo to let it pass in each trial.



Escitalopram levels and obsessive symptoms had opposite effects on belief stickiness. Obsessive symptoms and belief stickiness were assessed, respectively, by OCI-R obsessing scores and scores on the first canonical variate (1st CV) for  $\gamma$  and  $\zeta$ . Credit: *Nature Mental Health* (2026). DOI:

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Collecting a shell meant either receiving a pearl (reward), dirt (punishment) or nothing (neutral). Each shell cycled through these three states, changing unpredictably, and participants had to infer these shifts from outcomes rather than signals.

With 216 pseudo-randomized trials per participant, the task offered a

rich dataset. Compared to standard reversal-learning tasks, the shell task introduced multiple hidden states and a more naturalistic challenge, making it especially useful for probing belief stickiness and flexible state inference.

## **Clear results**

The results were straightforward: As [plasma levels of escitalopram](#) increased, belief stickiness dropped and state inference improved (participants became faster at detecting rule changes).

Participants who had been treated with the SSRI escitalopram showed less belief persistence and more successful inference of changes in the environment. Elevated escitalopram concentrations predicted higher efficacy in participants, who performed better than the placebo group.

The significant negative correlations between escitalopram and obsessive traits provide evidence that the actions of SSRIs may differ in part from that of OCD, and the net opposite effect might explain why obsessions are alleviated by this class of medications.

"In other words, with 95% confidence, escitalopram values above 39 nmol l<sup>-1</sup> decreased belief stickiness relative to placebo. Both this analysis and the median-split analysis show that if the escitalopram level is sufficiently high, escitalopram decreases belief stickiness relative to placebo," the authors write.

## **Obsessions as sticky beliefs**

The study also explored obsessionality. "The obsession 'my hands are contaminated,' for example, can be seen as a sticky belief about the state of one's hands that persists even after exhaustive handwashing," state the

authors.

More obsessive participants had clingy theorems and impaired state inference. The researchers propose that serotonin and obsessions work in opposite directions: Serotonin decreases belief stickiness, boosting flexibility. On the other hand, obsessions increase belief stickiness, reducing flexibility.

## **Why this matters for OCD**

This might account for the utility of SSRIs in OCD. SSRIs may help increase serotonin, therefore loosening the stickiness of neural circuits that formed due to arising beliefs and returning flexibility to responding to the environment.

Results show that increased serotonin levels in the frontal cortex, including the OFC, are attributable only to high concentrations of SSRIs. Chronic SSRI treatment may work even better because such long-term administration desensitizes autoreceptors, the brain's "brakes" on serotonin release, causing a freer flow of serotonin with additional decreases in belief stickiness.

The authors say, "Our theory that serotonin, possibly acting especially on the OFC, decreases the stickiness of state beliefs explains why serotonin depletions, particularly in OFC, hamper reversal learning. Increasing serotonin pharmacologically improves reversal learning, with that improvement being opposed by blocking serotonergic transmission in OFC, and variation in serotonergic neurotransmission in OFC correlates with reversal-learning performance.

"This theory also explains other aspects of cognitive flexibility beyond reversal learning, in which serotonin has been implicated."

## Caveats

The study has important limitations. A main limitation of the study was that it only included males, which diminishes generalizations across populations. There was also a relatively small sample size (44 participants following exclusions), meaning results should be interpreted with caution.

Escitalopram only produced the therapeutic effect at higher plasma levels, so dosage is an important factor as well. Moreover, the study was not conducted within an OCD patient population but rather a healthy one. Without additional research, it cannot be assumed that these findings can be directly applied to clinical populations.

## Broadening the scope

The researchers discussed possible future directions of the work. Women and clinical populations will be added in future studies. Another focus is to study the impact of chronic, as opposed to acute, SSRI administration.

The team also plans to study additional brain regions beyond the OFC, acknowledging that cognitive flexibility and belief updating likely rely on multiple areas of the brain.

Lastly, they intend to reanalyze [older OCD and serotonin studies](#) with more contemporary modeling tools that capture belief stickiness in order to provide novel insights into how rigid thinking patterns may be exacerbated or treated in patients.

**More information:** Vasco A. Conceição et al, Serotonin reduces belief stickiness, *Nature Mental Health* (2026). [DOI:](#)

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