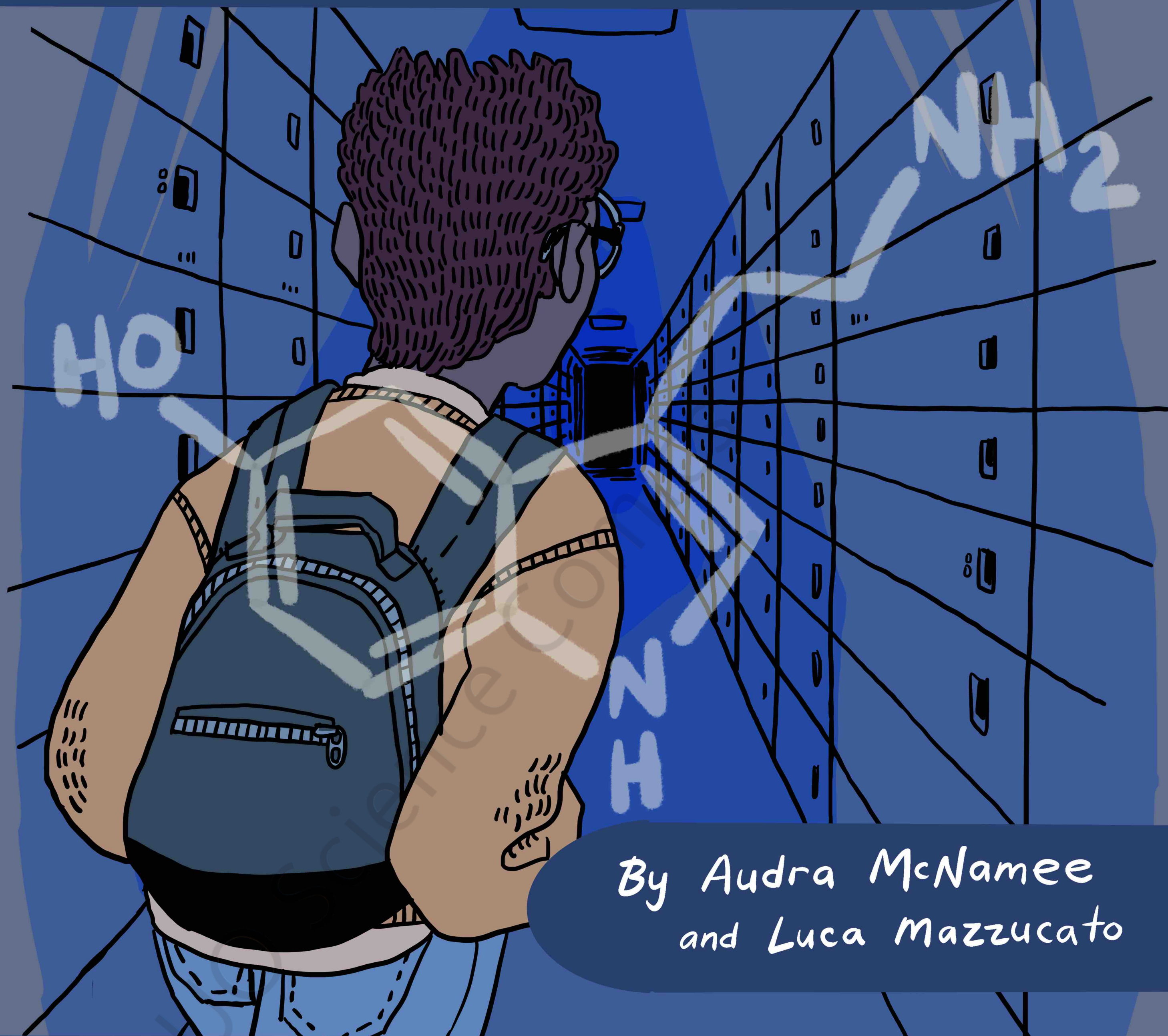


# A trip into Serotonin



By Audra McNamee  
and Luca Mazzucato

Created through the University of Oregon  
Science Comics Fellowship program



Great.



Late again.

I really thought I would be on time today.



Oof

should have caught the door.



like first to thank the university, and your professor, for inviting me to give this talk today. Is everyone looking at me?

I think people are looking at me.



Always home university, every area of usually contain

Sorry

I'm slouching, aren't I.



And I would like to acknowledge the work of people who were invaluable

Excuse me

Really wish people filled into the middle of the rows.



With all that out of the way, I'd like to introduce the topic of my talk:

**SEROTONIN**

**CAUTION**

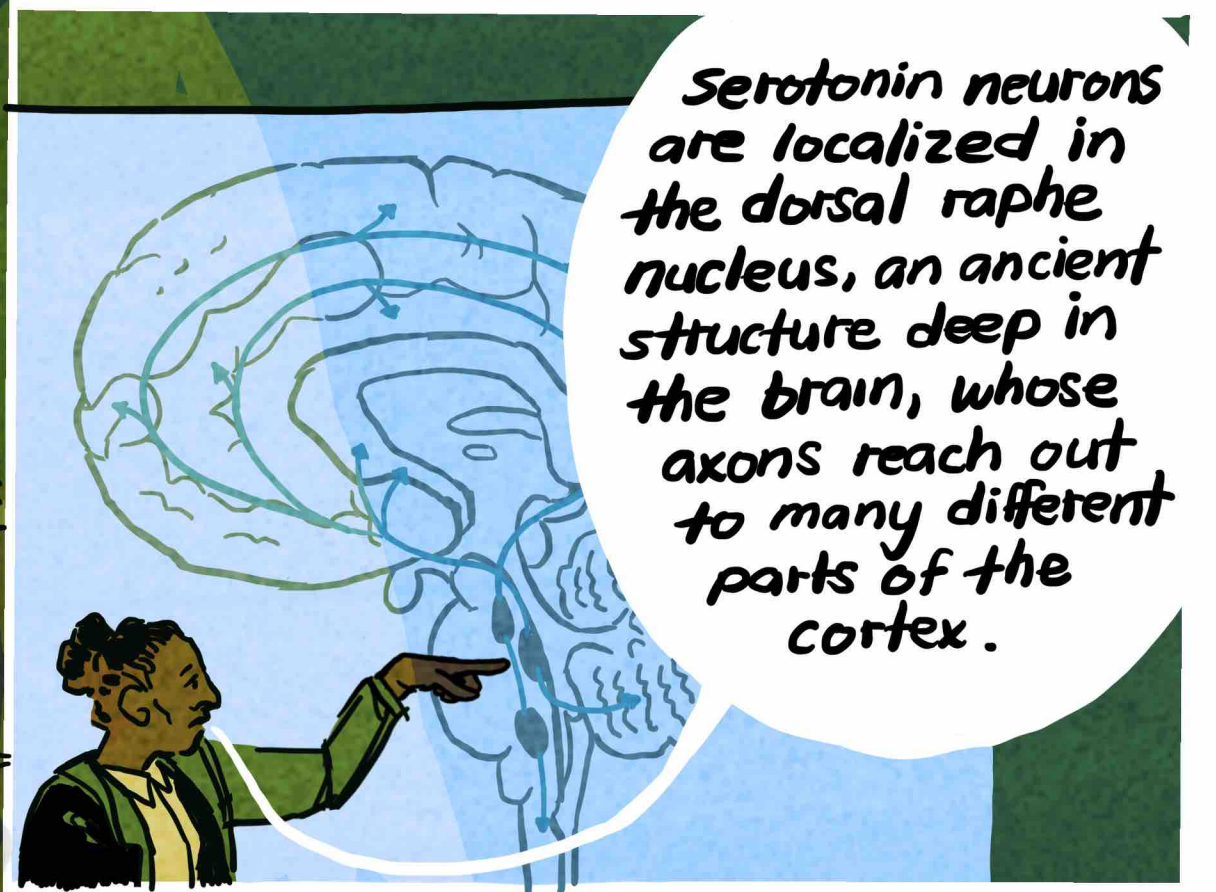
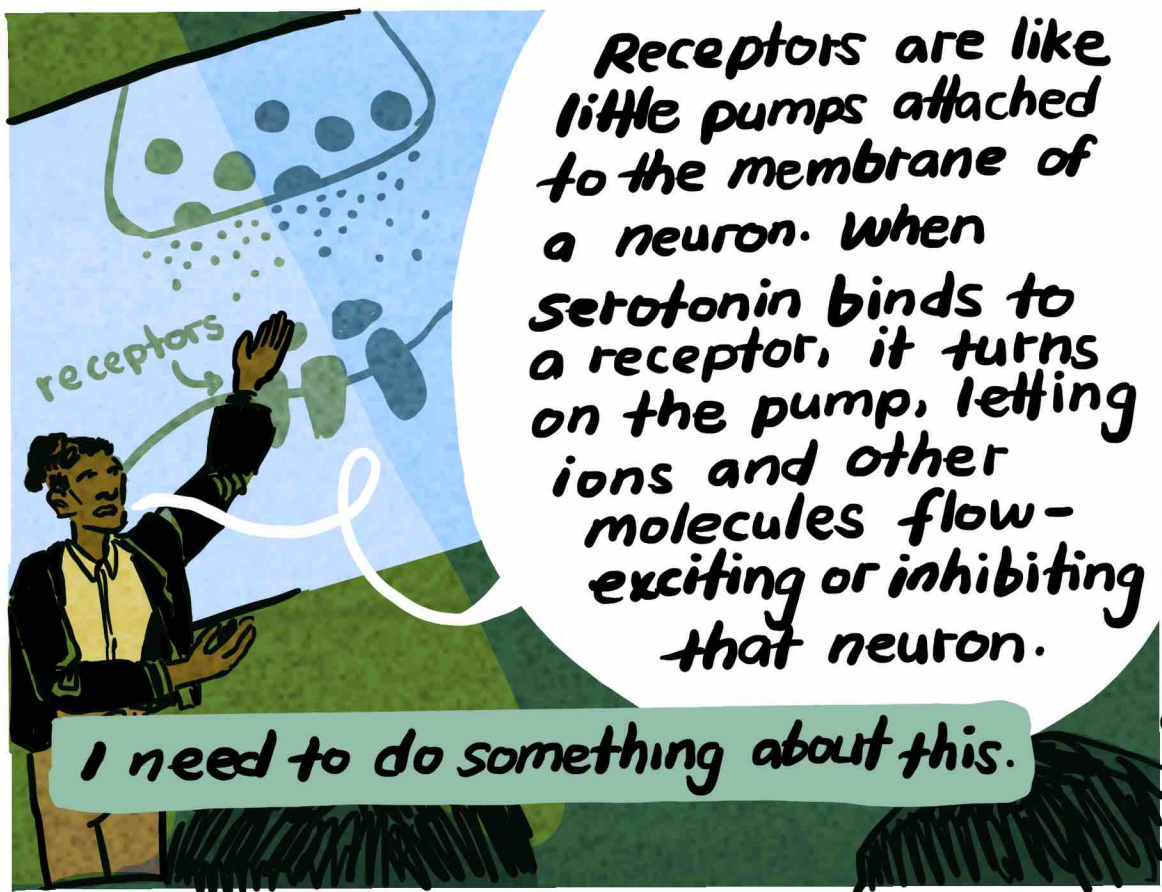
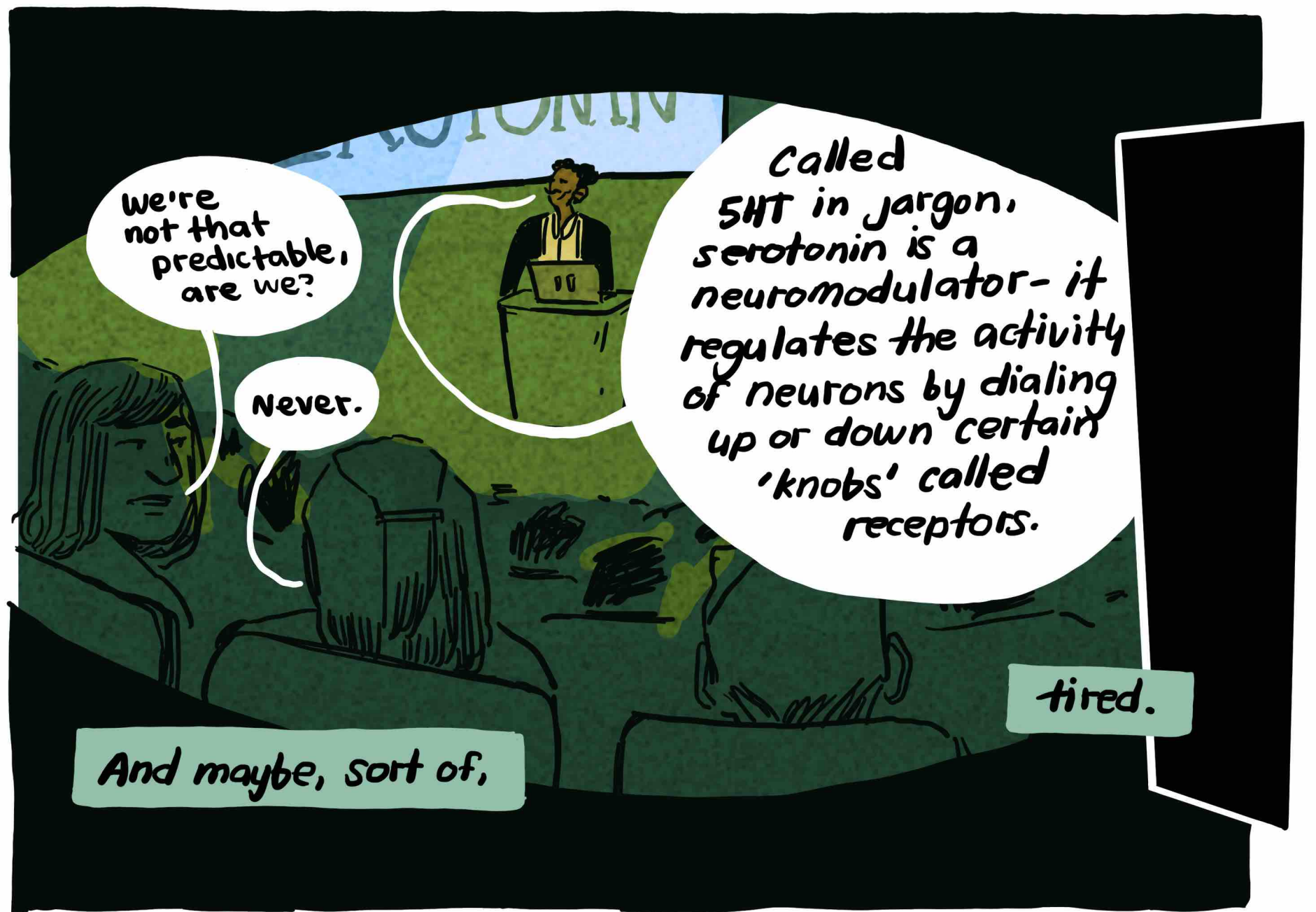
Area under construction:

This space will provide QR codes to sources and further reading for the enthusiastic reader

**CAUTION**

**CAUTION**

**CAUTION**



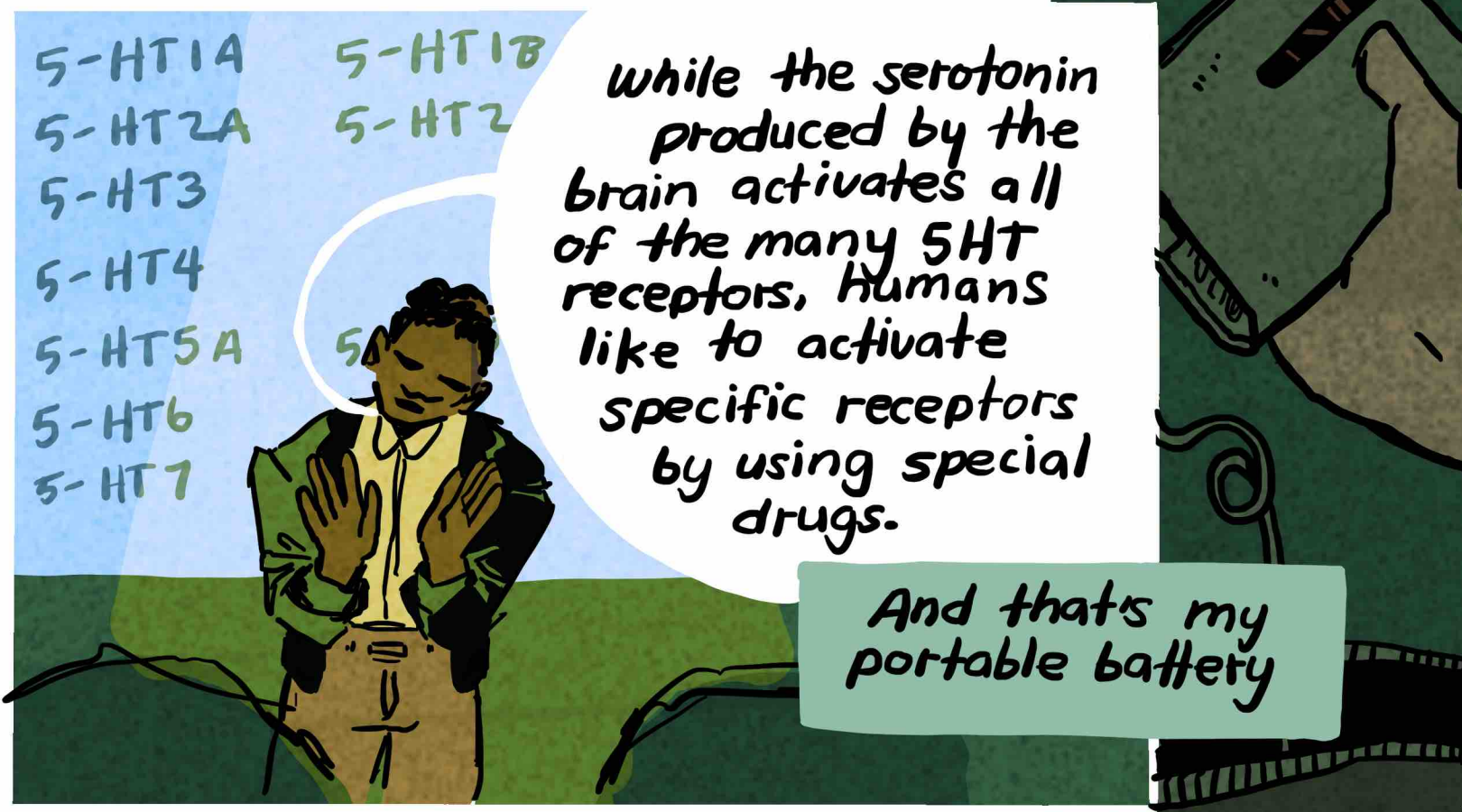
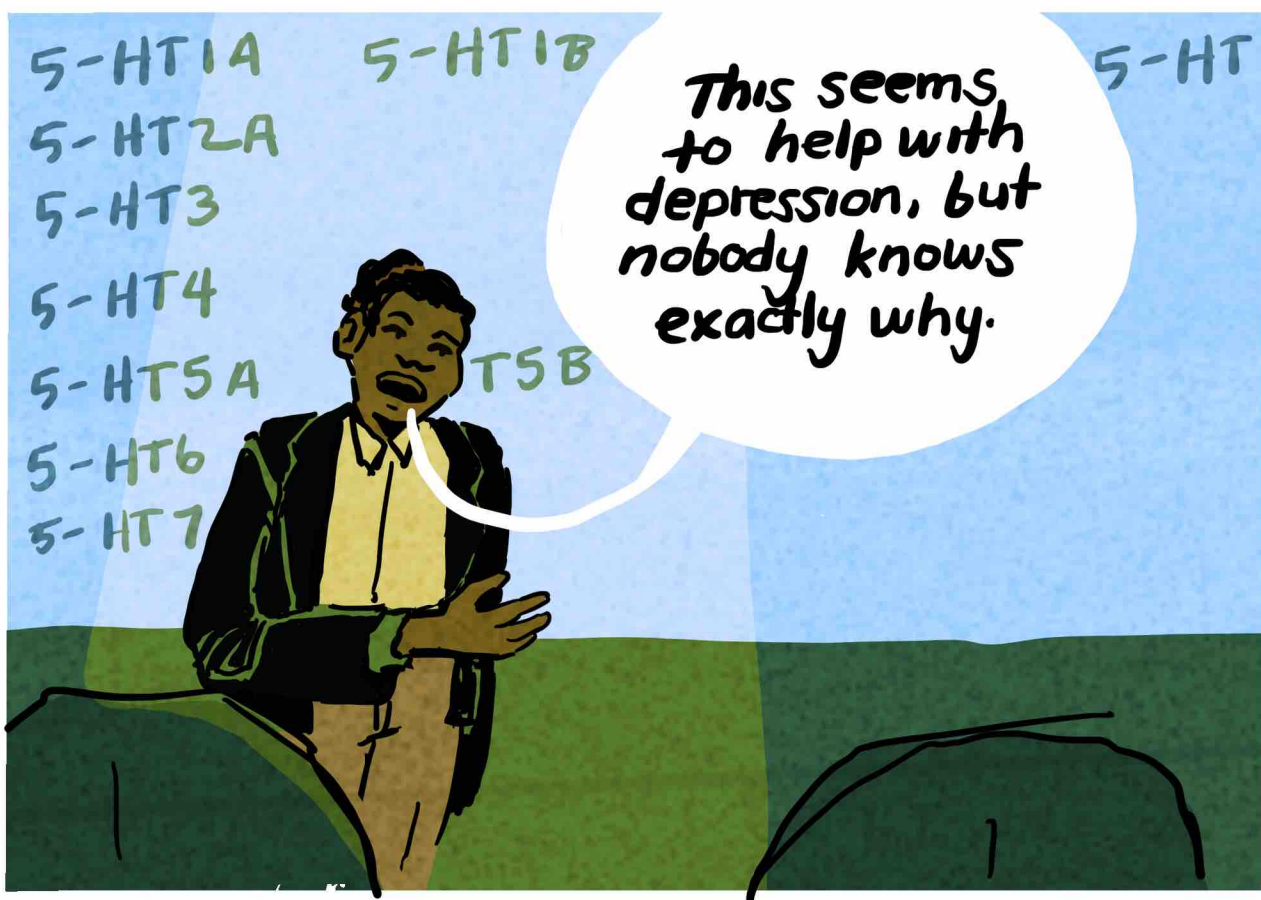
More on:

Neuromodulation of brain states:



Map of serotonin receptors in the human brain:





Check Out:

The many faces of serotonin receptors:



The neuroscience of psychedelic drugs and 5HT-2A:



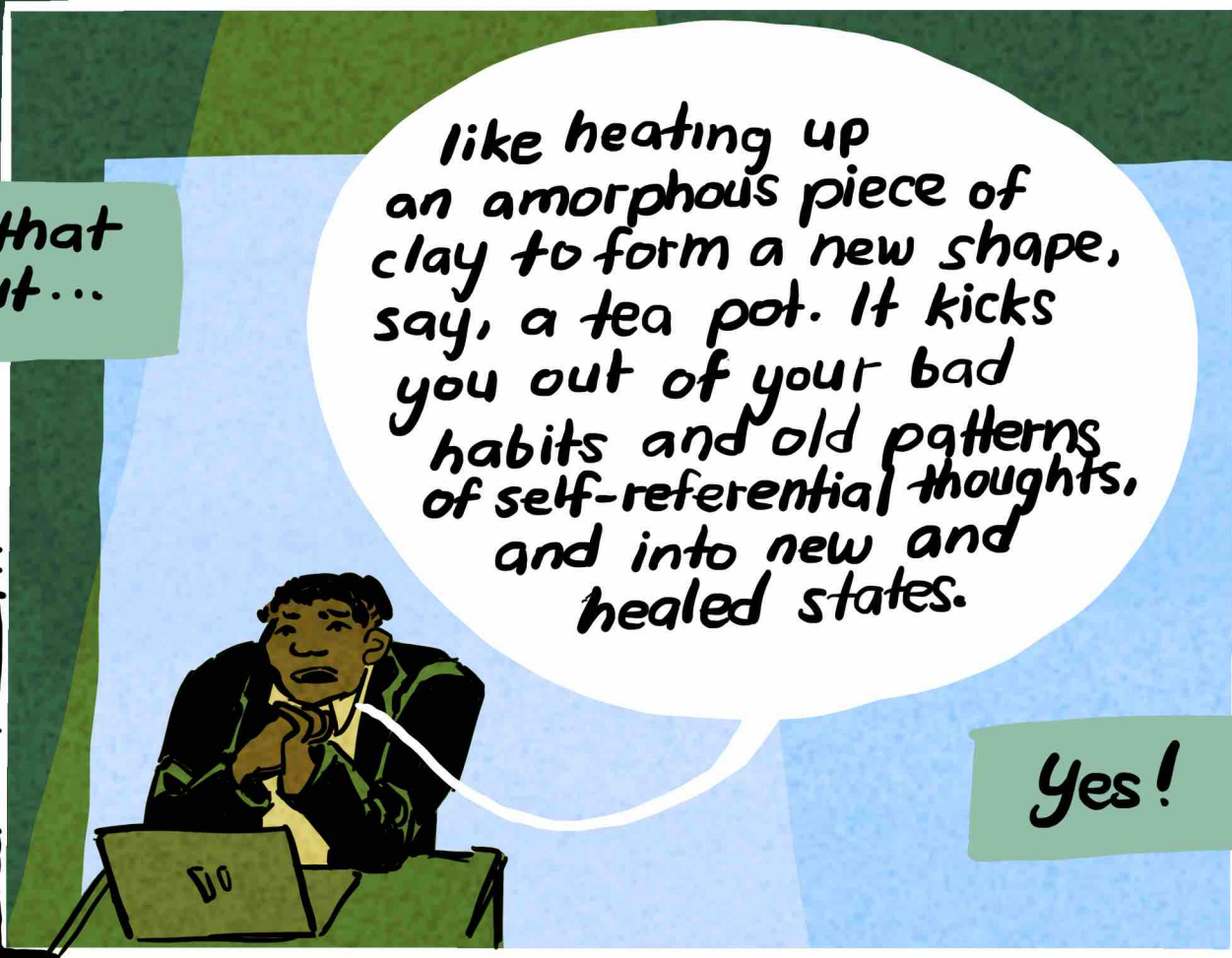


The 5HT-2A receptor is so powerful that clinically depressed patients were relieved of all symptoms after just one session with psychedelics, where all other treatments failed.

It hijacks the brain by opening a "window of opportunity" to rewire your neural circuitry.



I think that I found it...

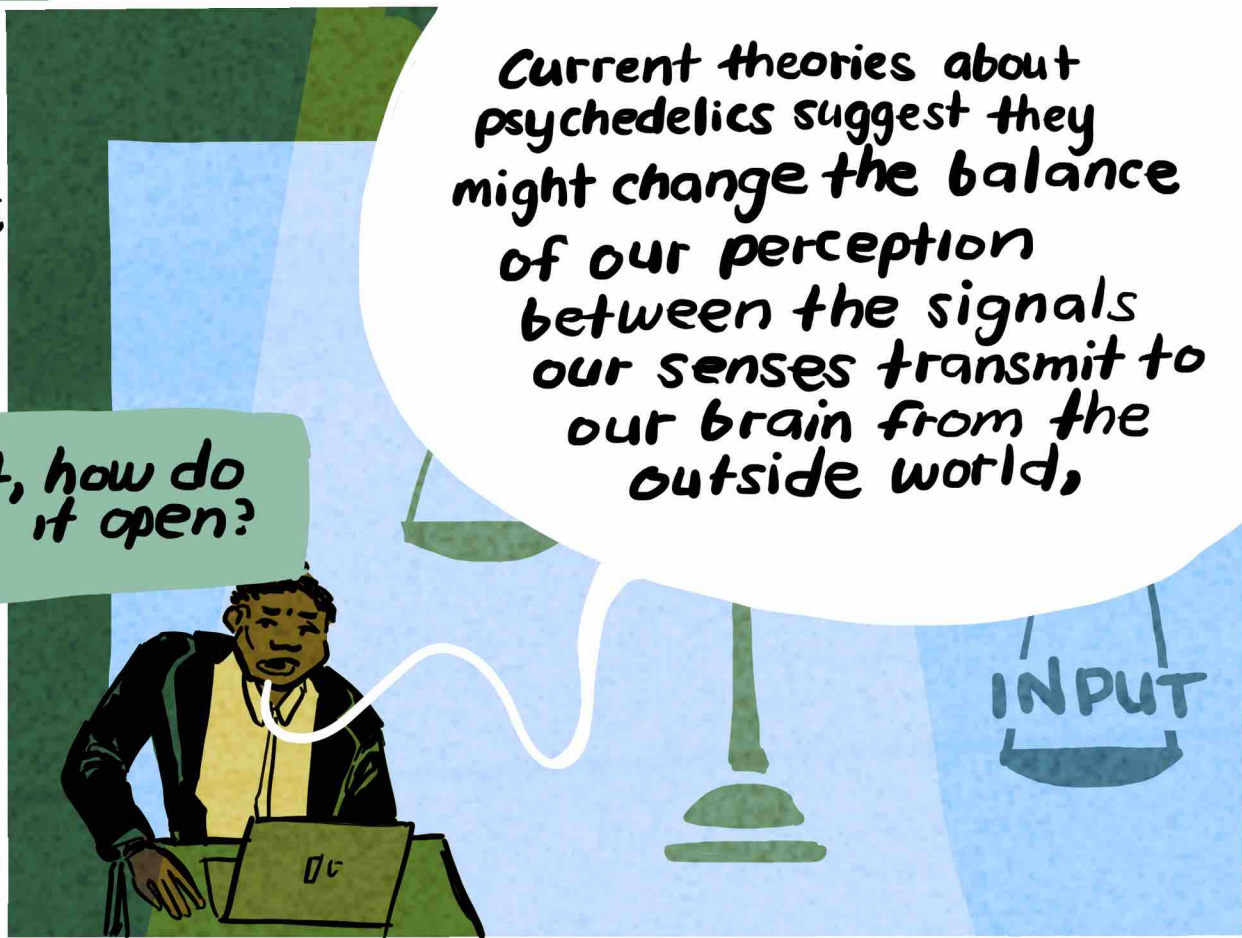


like heating up an amorphous piece of clay to form a new shape, say, a tea pot. It kicks you out of your bad habits and old patterns of self-referential thoughts, and into new and healed states.

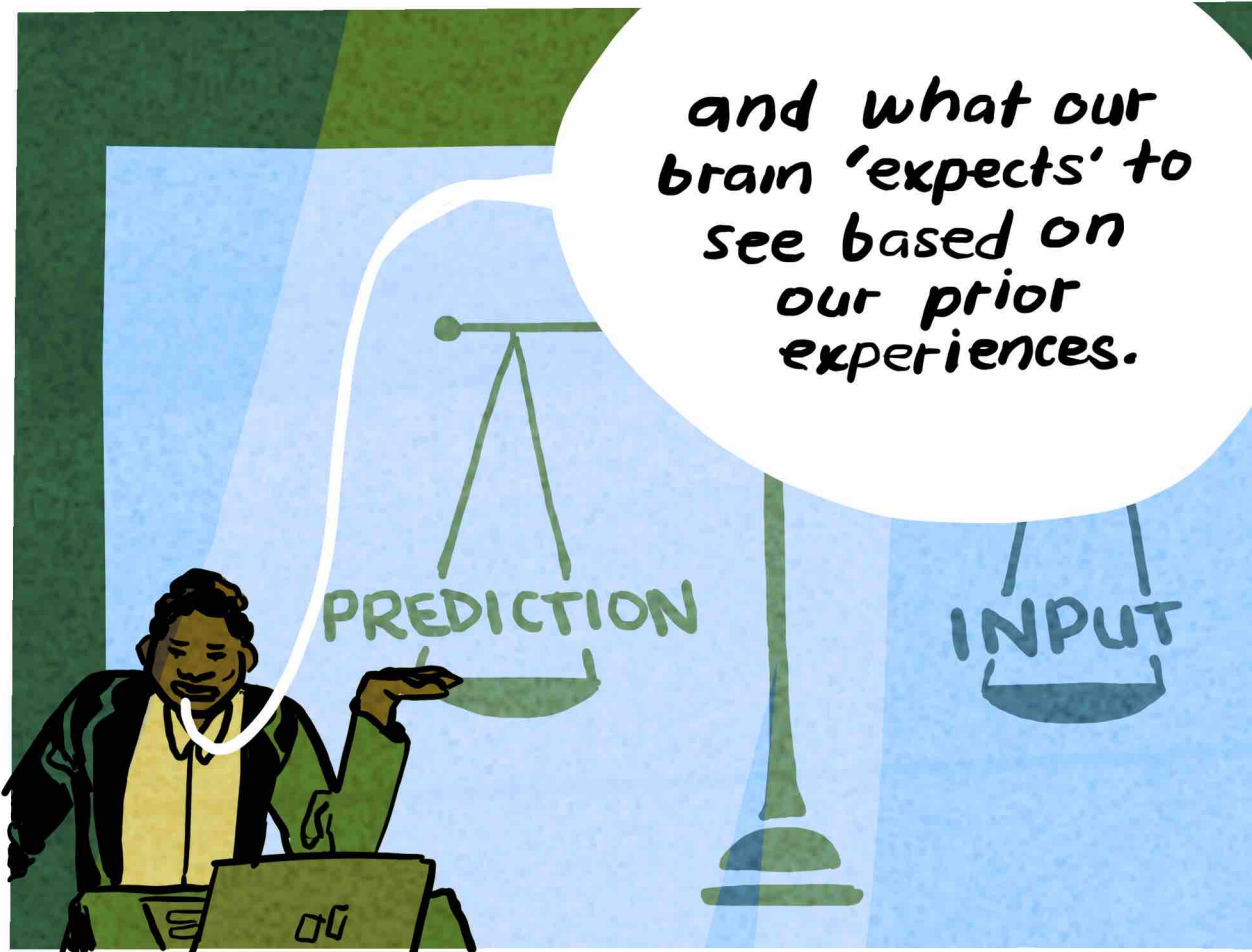
Yes!



Wait, how do I get it open?



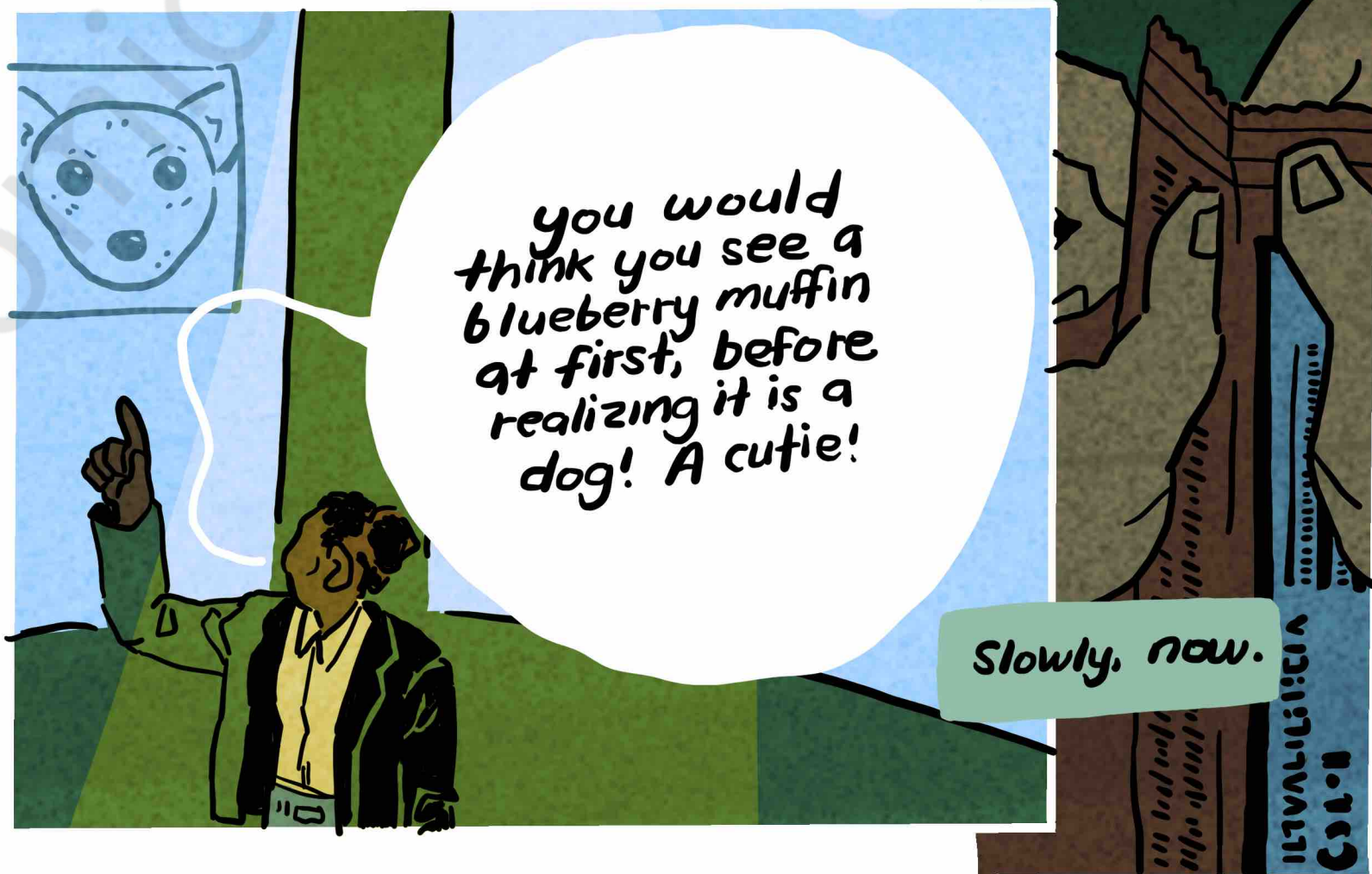
Current theories about psychedelics suggest they might change the balance of our perception between the signals our senses transmit to our brain from the outside world,



and what our brain 'expects' to see based on our prior experiences.



Usually the two are balanced. This is why, if I were to show you many images of pasteries...



you would think you see a blueberry muffin at first, before realizing it is a dog! A cutie!

Slowly, now.

### Observe:

FDA hail Psilocybin as 'breakthrough therapy' for major depression:



Talk on mysterious link between serotonin, behavior, and neural plasticity:

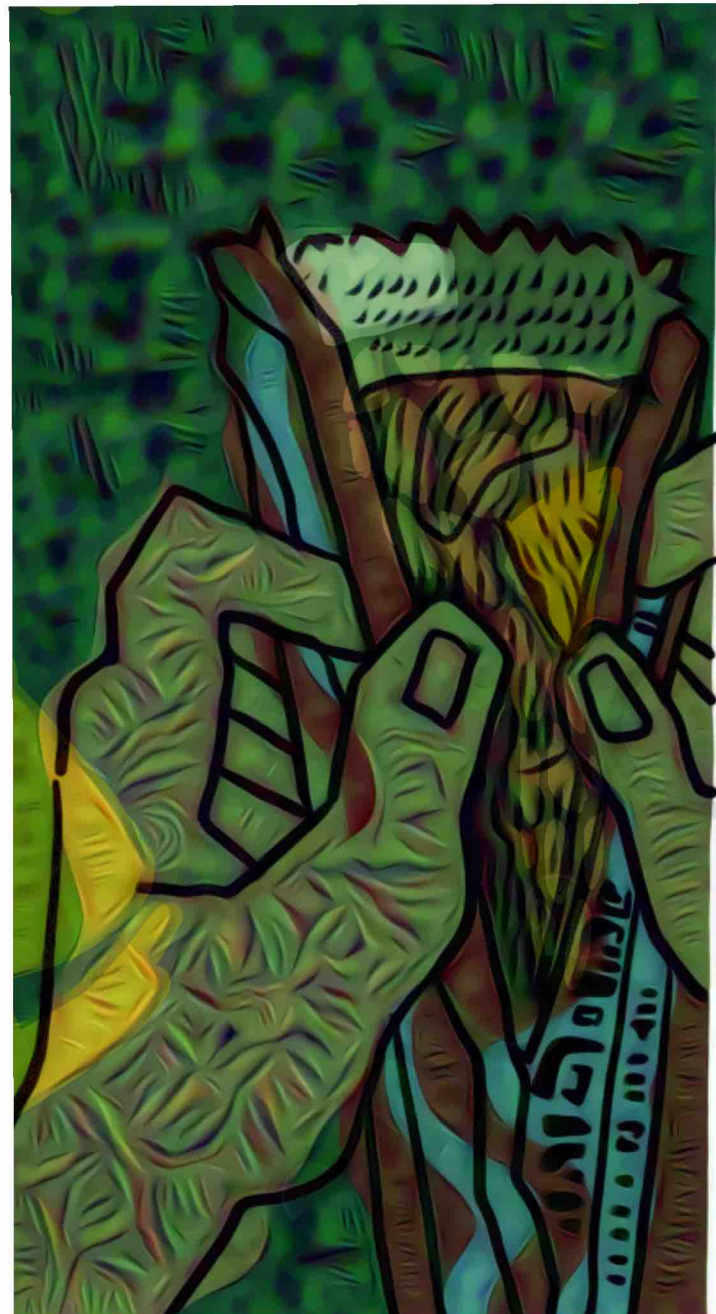


Psychedelic therapy:



Puppies or pasteries?





**Consider:**

A theory of hallucination:



The REBUS of psychedelics:

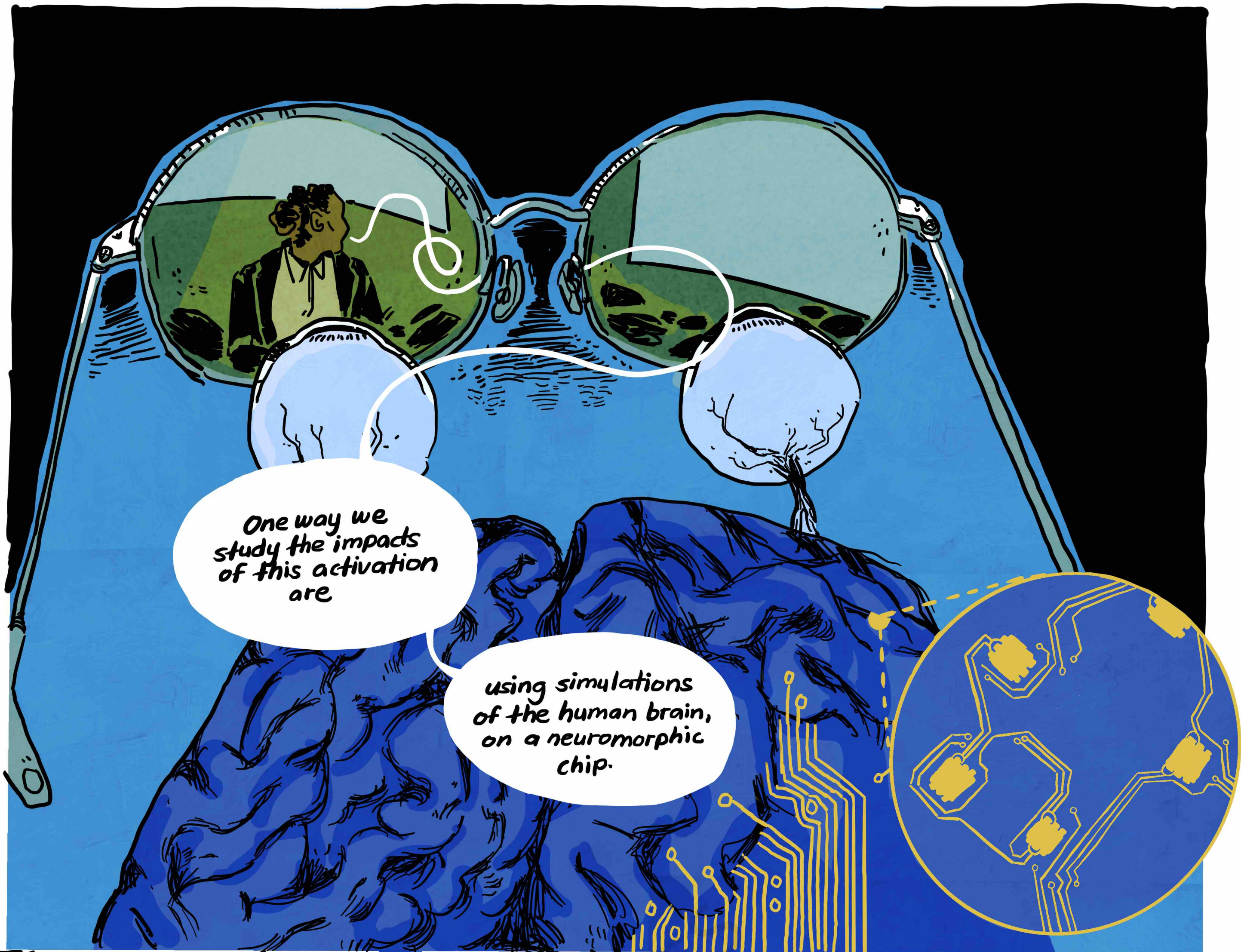


Visual responses in mice:



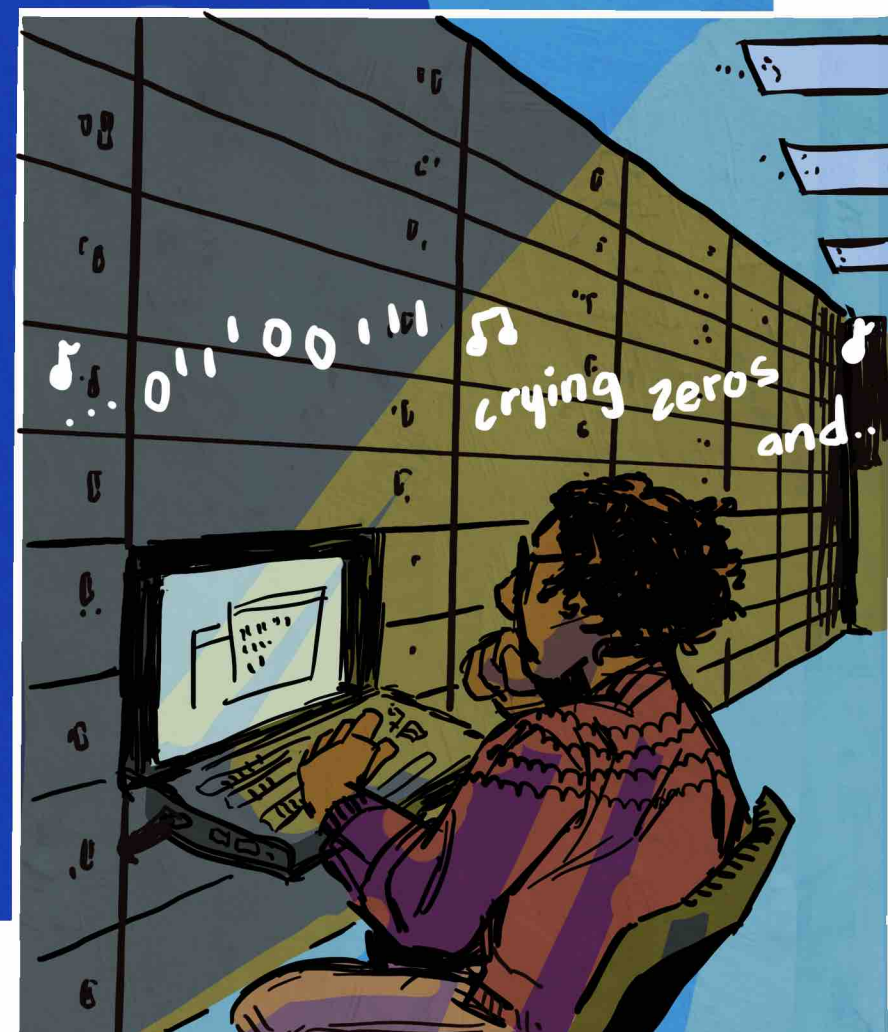
Subjective accounts of psychedelic experiences:





One way we study the impacts of this activation are

using simulations of the human brain, on a neuromorphic chip.



interested?  
**try:**

Neuromorphic  
engineering  
in science:



And  
fiction!





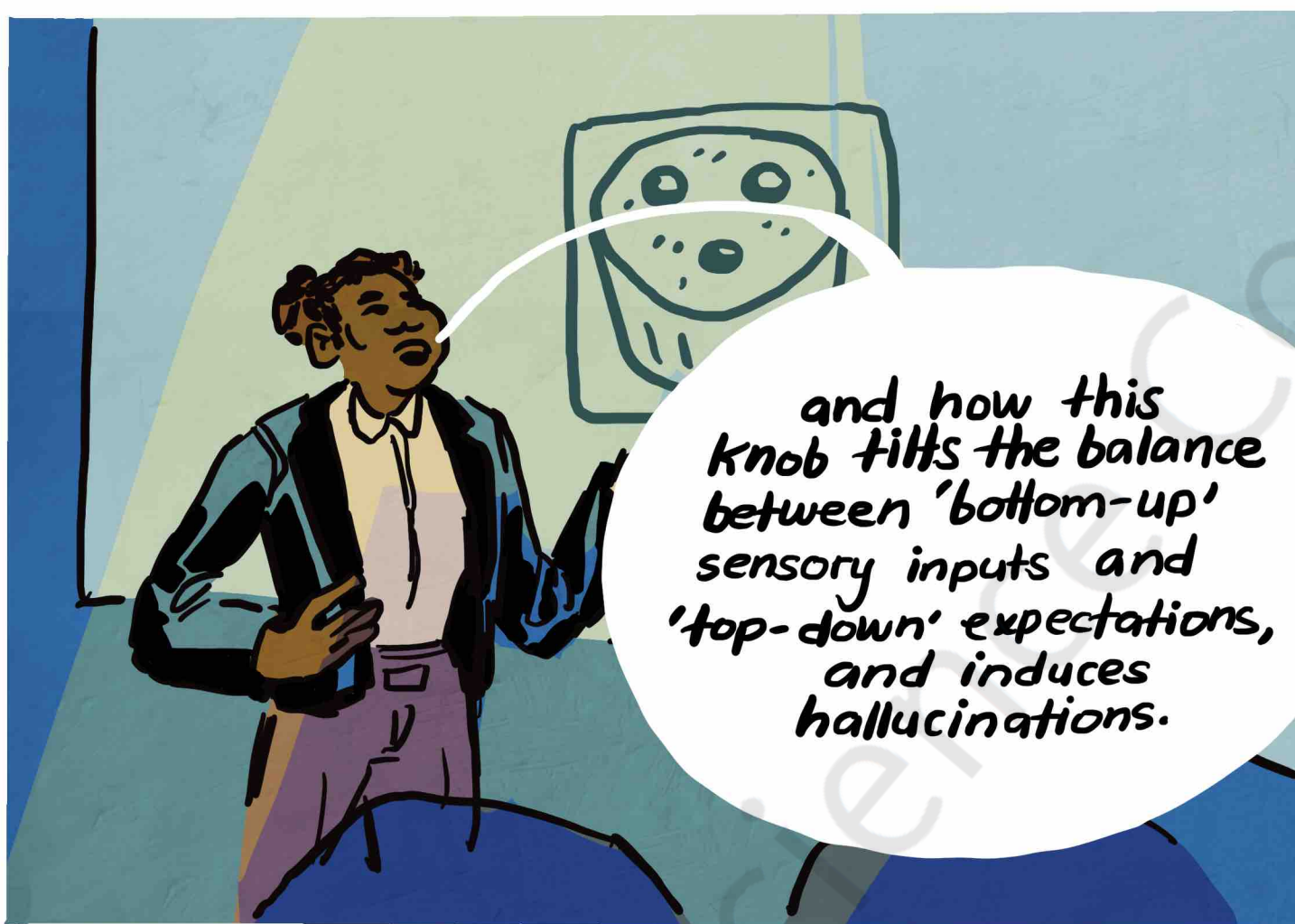
While we simulate a human 'mind' and record its perceptions, we can dial up or down any receptor in its neural network, including serotonin receptors. Our friend 5HT-2A is the knob shown here:



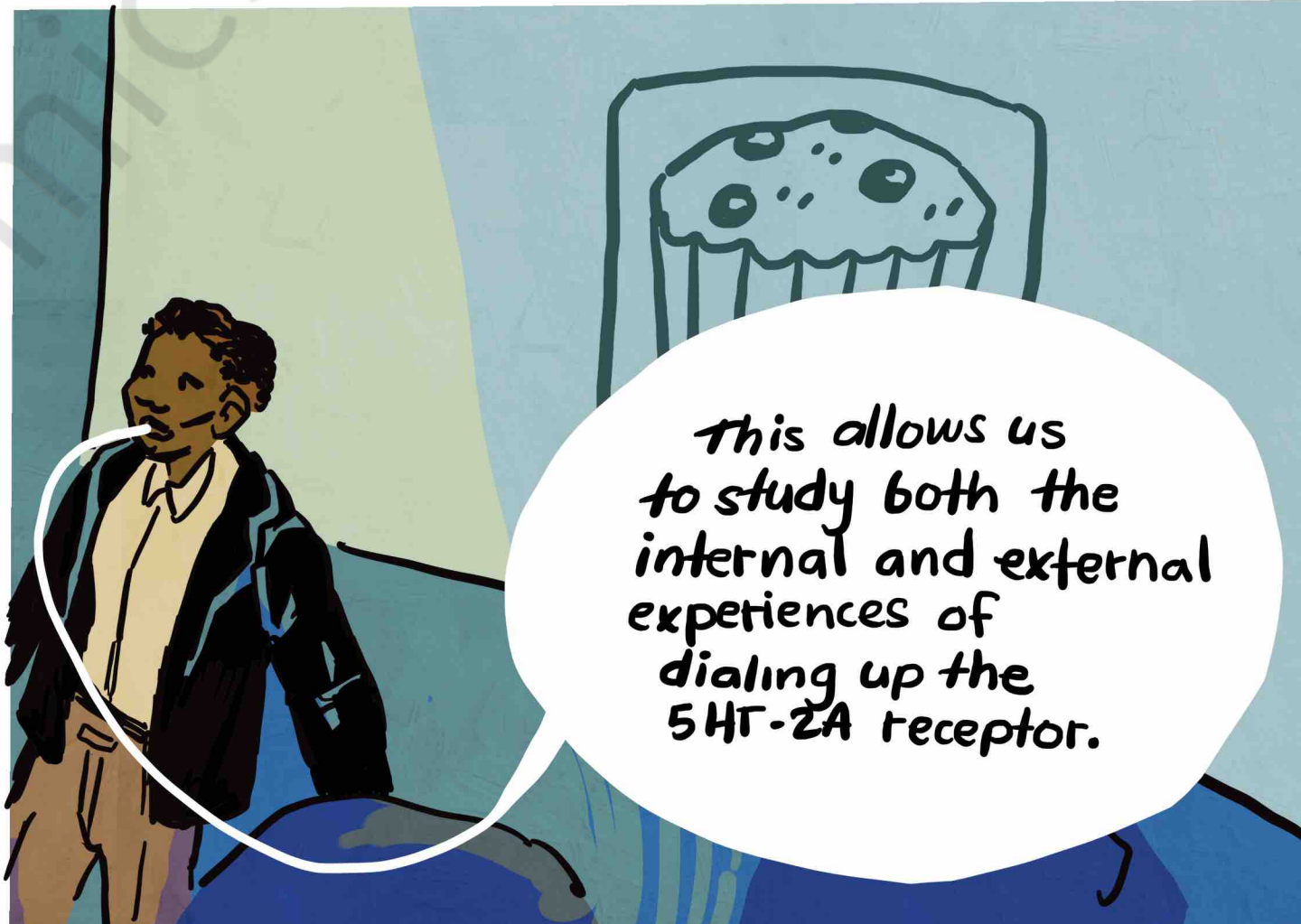
By dialing up the activation of 5HT-2A in the network simulation, we can study how psychedelic drugs hijack neural activity,



how this change in brain activity leads to altered perceptions



and how this knob tilts the balance between 'bottom-up' sensory inputs and 'top-down' expectations, and induces hallucinations.



This allows us to study both the internal and external experiences of dialing up the 5HT-2A receptor.

got questions?

Neural network simulation of your brain on LSD:



Controlling the speed of perception in neural networks:







meet the authors

Audra's work:



Luca's research:

