a trip into Serotonin

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Great.

Late again.

I really thought I would be on time today.

CLICK

Oof

should have caught the door.

like first to thank the university, and your professor, for inviting ve you this day.

Is everyone looking at me?

I think people are looking at me.

home university, ary area of s usually conta

Sorry

I'm slouching, aren't I.

And I would like t ledge the w ere invaluat

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:

CAUTION

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

CAUTION

You may know serotonin as the "feel good" hormone, but it's more complicated than that.

We're not that predictable, are we?

Never.

Called 5HT in jargon, serotonin is a neuromodulator- it regulates the activity of neurons by dialing up or down certain 'knobs' called receptors.

tired.

And maybe, sort of,

receptors

Receptors are like little pumps attached to the membrane of a neuron. When serotonin binds to a receptor, it turns on the pump, letting ions and other molecules flow- exciting or inhibiting that neuron.

I need to do something about this.

Bziip

Loud. But.

I have a bar in here somewhere

Serotonin neurons are localized in the dorsal raphe nucleus, an ancient structure deep in the brain, whose axons reach out to many different parts of the cortex.

Of course it's at the bottom.

When, for any number of reasons these serotonin neurons activate, their axons release serotonin in the cortical areas they project to.

serotonin stays around the synapses connecting local cortical neurons for a while, and modulates their activity.

Is that it...?

More on:

Neuromodulation of brain states:

Map of serotonin receptors in the human brain:

That's an empty granola wrapper

Some time after release, serotonin is reabsorbed.

blocked reuptake

In treatments for depression, SSRI drugs (selective serotonin reuptake inhibitors) block the reabsorption of serotonin, so it hangs out longer at the synapse.

5-HT1A 5-HT1B 5-HT
5-HT2A
5-HT3
5-HT4
5-HT5A T5B
5-HT6
5-HT7

This seems to help with depression, but nobody knows exactly why.

5-HT1A 5-HT1B
5-HT2A 5-HT2
5-HT3
5-HT4
5-HT5A 5
5-HT6
5-HT7

while the serotonin produced by the brain activates all of the many 5HT receptors, humans like to activate specific receptors by using special drugs.

And thats my portable battery

Psychedelic drugs like LSD bind especially well with the 5HT-2A receptor, among others. Even though they bind in a minuscule quantity compared to the natural activation by serotonin...

There's the Utah teapot

They induce super strong cognitive effects of all kinds— hence the big mystery.

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!

~CRINKLE~

NOTHIN' BUT GRAINS

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,

INPUT

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

PREDICTION

INPUT

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.

ILLYALLISTICS

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?

When your brain is on psychedelics, your usual expectations may lose their grip, or your sensory inputs may weaken. Then you interpret the world around you in a new way...

Nearly

leading you to see things

that aren't there.

Look at that texture

Common side effects of activating the 5HT-2A receptor include:

Distorted perception of time.

Dissolution of the ego- that constant internal chatter, the 'I' that experiences things, they fade away...

GEEZ

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.

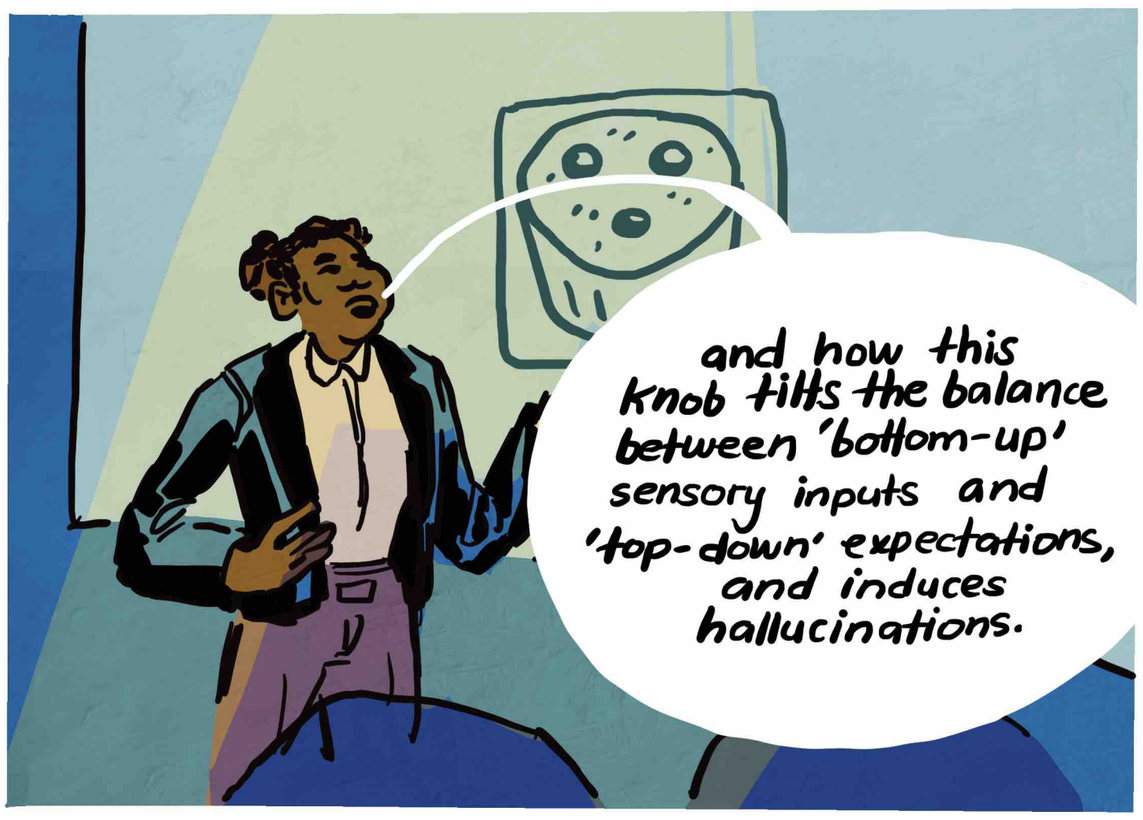
0 1 1 1 0 0 1 1 1

crying zeros and..

interested? try:

Neuromorphic engineering in science:

And fiction!



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: