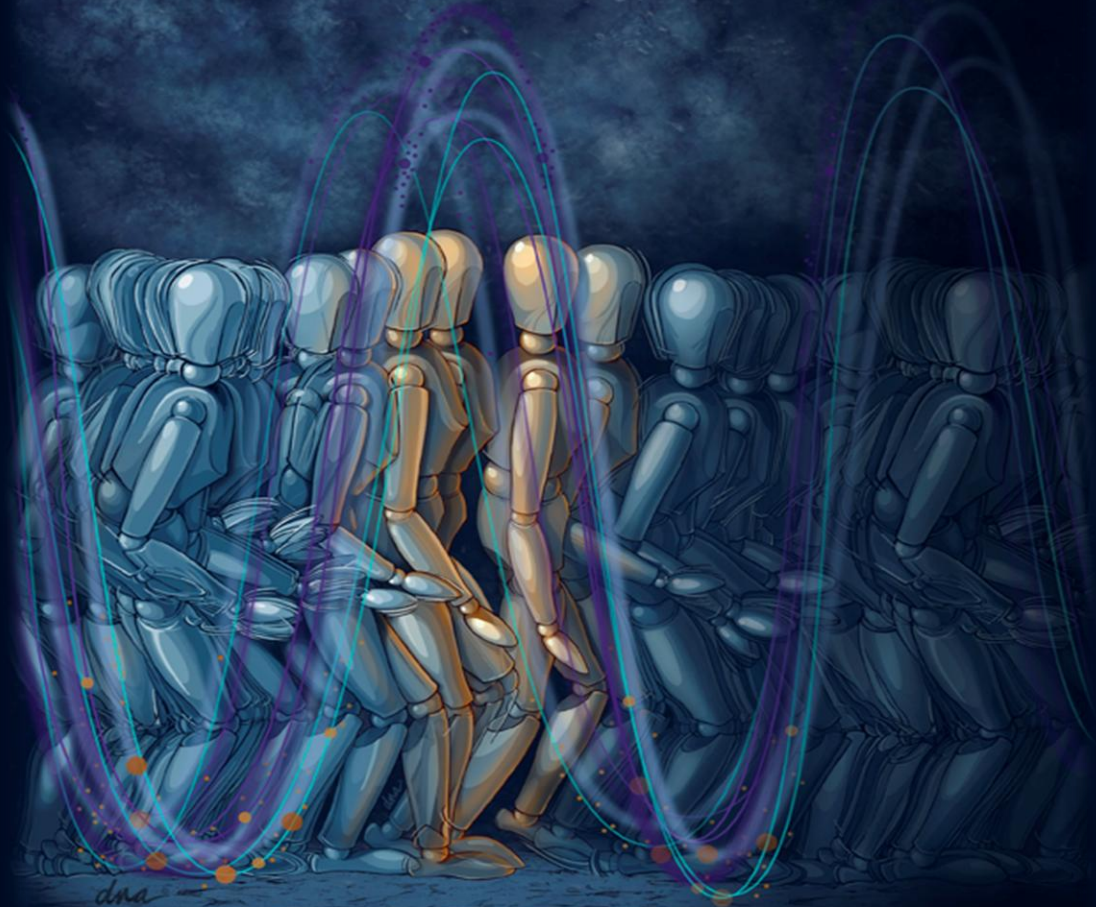


The Story of **AUTISM**

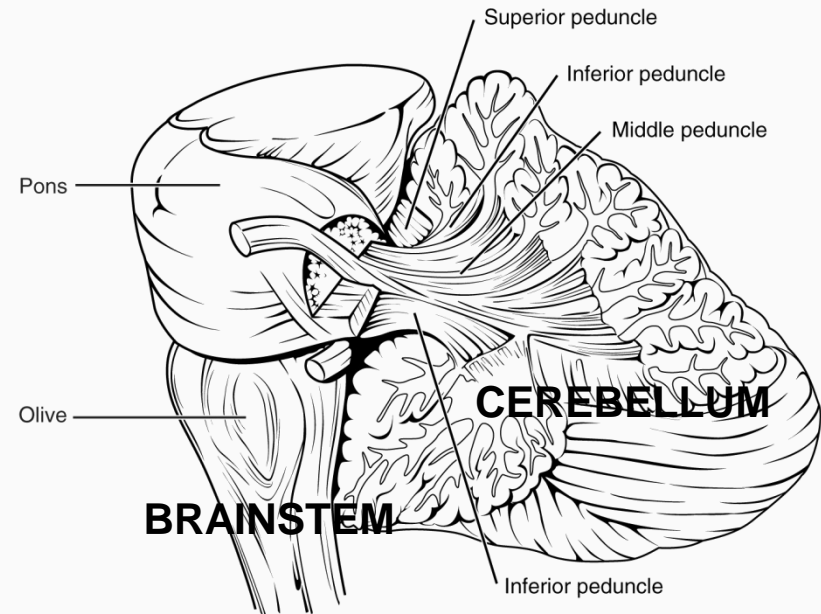
PART 17: **DYSMETRIA** **OF THOUGHT** **AND** **MOVEMENT**



The STORY OF AUTISM: Dysmetria of Thought & Movement

We talked earlier about the brain body feedback loop in which the cerebellum serves as the main error checker and corrector.

But to do this it has to rely on the accuracy of the information delivered to it by the climbing fibers from the brainstem.



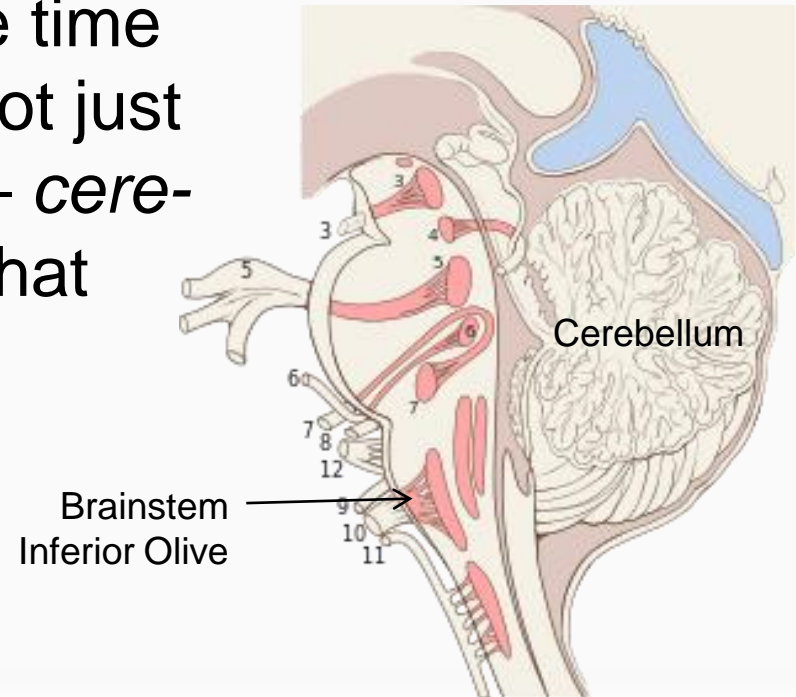
The STORY OF AUTISM: Dysmetria of Thought & Movement

It has to rely on the finely-tuned balance between the firing and pausing of its PCs, between the excitatory and inhibitory input the PCs relay down to the deep cerebellar nuclei (DCN) and that they relay out to the brain and body, to do its job effectively.



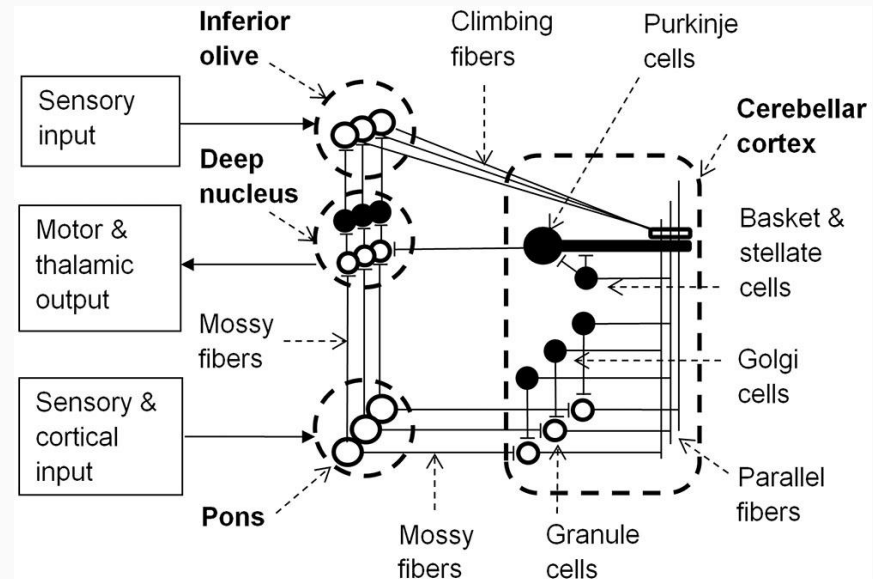
The STORY OF AUTISM: Dysmetria of Thought & Movement

But in the brains of babies who turn out to have autism, this critical brain body homeostatic loop is already compromised by the time they are toddlers. And it is not just the brainstem *inferior olive* – *cerebellum error checking loop* that goes off track.



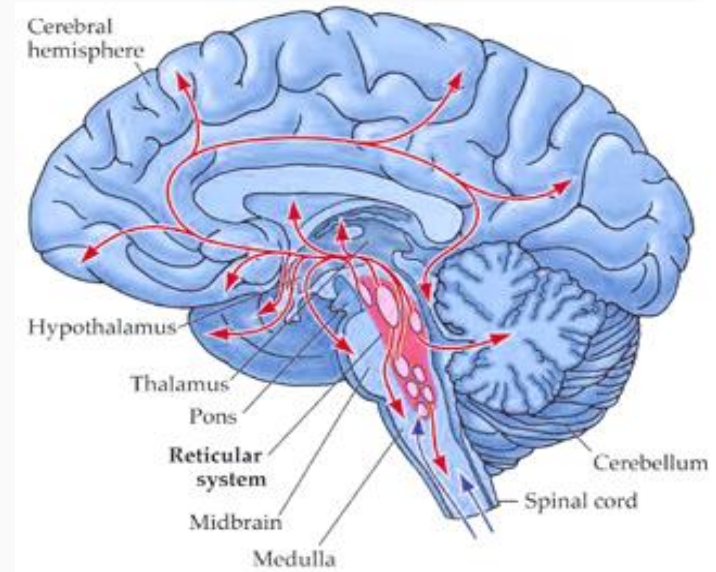
The STORY OF AUTISM: Dysmetria of Thought & Movement

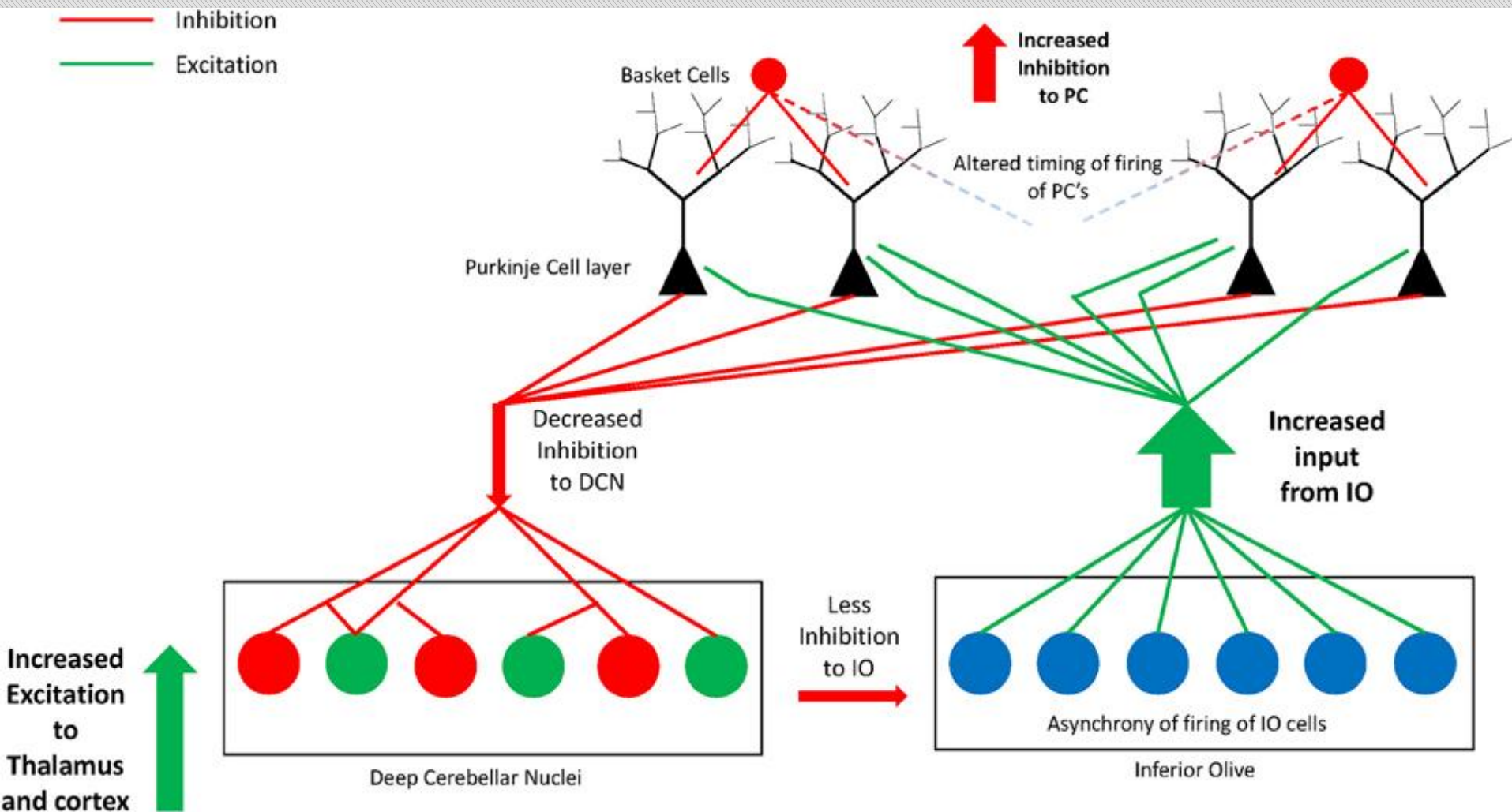
Other lower brain structures - the pons, reticular activating system and vestibular systems - also send input to the cerebellum. Most of this input would come through mossy fibers, but also involve basket and stellate cells.



The STORY OF AUTISM: Dysmetria of Thought & Movement

The excitatory connections from these lower structures would cause more inhibition of the molecular layer basket cells. This would result in pausing of PC firing, which would cause more excitation of the DNC output to the thalamus and cerebral cortex.





The STORY OF AUTISM: Dysmetria of Thought & Movement

This output is separate and apart from error correction, and seems to effect the timing of the brain's functioning, among other things.

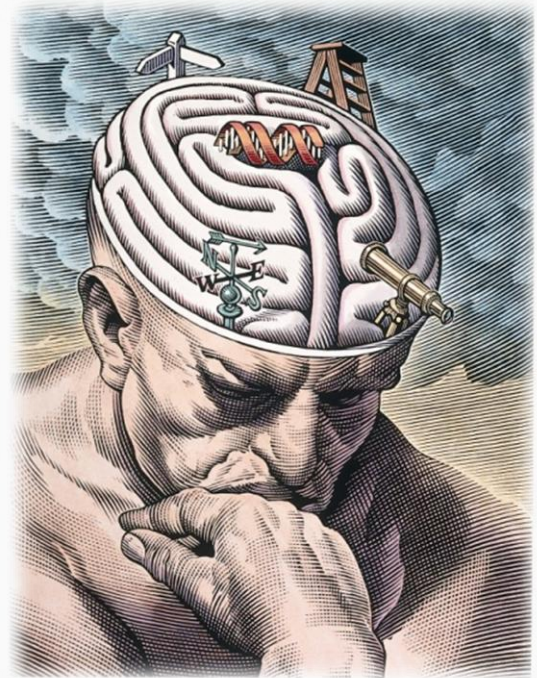
In autism, it can cause what my daughter calls “hyper thinking;” the inability to slow down your thoughts long enough to grab solid hold of them.



The STORY OF AUTISM: Dysmetria of Thought & Movement

Dr. Jeremy Schmahmann of Harvard University and Mass. General Hospital in Boston has a name for this. He calls it “dysmetria of thought.”¹⁰

The definition of dysmetria is the lack of coordination or the under-shoot or overshoot of movement.



The STORY OF AUTISM: Dysmetria of Thought & Movement

Schmahmann's hypothesis is that the cerebellum fine-tunes and coordinates our learning and thinking just like it fine-tunes and coordinates muscle movements.¹¹

- ▶ The timing and pause interval between PC firings determines whether the output of the Cerebellar Nuclei (DCN) will be inhibitory or excitatory.

The STORY OF AUTISM: Dysmetria of Thought & Movement

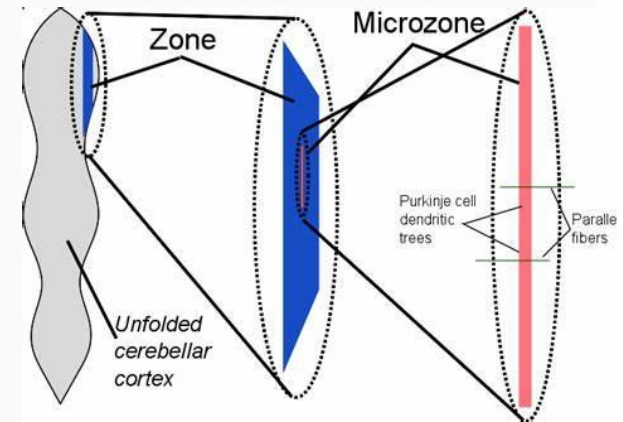
Dysmetria of thought and behavior implies an unpredictability and illogic to social and societal interaction.¹² *Kind of like what we see in autism.*

- ▶ If you feed incorrect data into the homeostatic control system of the cerebellum, you are going to get incorrect or incomplete data out, resulting in **dysmetria** of thought behavior and/or movement.

The STORY OF AUTISM: Dysmetria of Thought & Movement

In “Dysmetria of Thought,” Schmahmann theorizes that “something goes off” in a “microzone” of the cerebellum that affects it’s ability to regulate and fine tune the incoming data it receives.¹³

- ▶ That microzone may be the PC fiber firing mechanism that is activated or paused by other fibers in the molecular layer.



The STORY OF AUTISM: Dysmetria of Thought & Movement

This, in turn, impacts its output to the frontal lobes of the cerebral cortex.

- ▶ Flawed feedback input to the cerebellum from the brain and body senses results in flawed output.
- ▶ And this flawed input is what raises or lowers the homeostatic control or baseline that the cerebellum modulates thoughts and behaviors around.

The STORY OF AUTISM: Dysmetria of Thought & Movement

If this **dysmetria** begins at birth and is continuously reinforced through ongoing sensory motor dysfunction, then you get a permanent re-set of the entire brain-body equilibrium...



The STORY OF AUTISM: Dysmetria of Thought & Movement

...such that atypical thoughts and behaviors become the new “normal.”

This is autism.

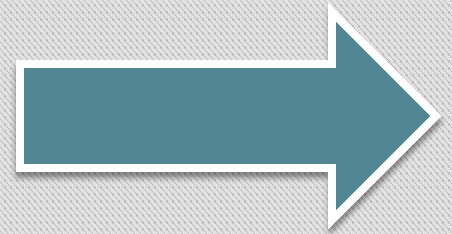


The STORY OF AUTISM: Dysmetria of Thought & Movement

FOOTNOTES:

10. <https://www.psychologytoday.com/us/blog/the-athletes-way/201611/how-does-brain-symmetry-influence-the-workings-your-mind>
11. <https://www.psychologytoday.com/us/blog/the-athletes-way/201503/the-cerebellum-deeply-influences-our-thoughts-and-emotions>
12. <https://www.psychologytoday.com/us/blog/the-athletes-way/201503/the-cerebellum-deeply-influences-our-thoughts-and-emotions>
13. <https://www.psychologytoday.com/us/blog/the-athletes-way/201611/how-does-brain-symmetry-influence-the-workings-your-mind>

GO ON TO THE NEXT PRESENTATION



The Story of **AUTISM**

PART 18:

THE IMPACT OF LOWER BRAIN STRUCTURES ON AUTISM

