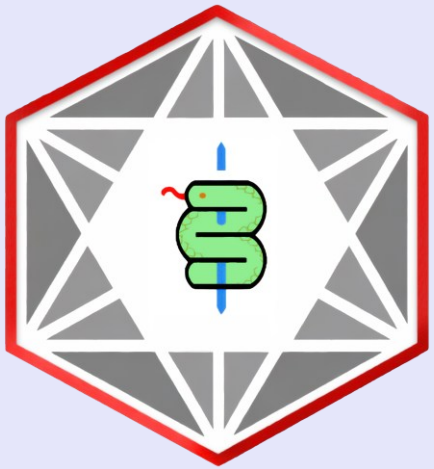
What can we learn about the brain from watching cat videos?



CLINICAL COGNITIVE SCIENCES LAB

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Ministry of Research and Innovations x Psychology Club, Nazarbayev University, 7th October 2025


2002


Primates, such as humans, have lived near snakes for a very long time, probably more than any other predator.
And, of course, many snakes are quite dangerous.
While some animals evolved resistance to snake venom, primates instead evolved better visual systems.
The human visual system contains many cells, in the thalamus and cortex, that appear to be particularly sensitive to features such as diamond patterns and
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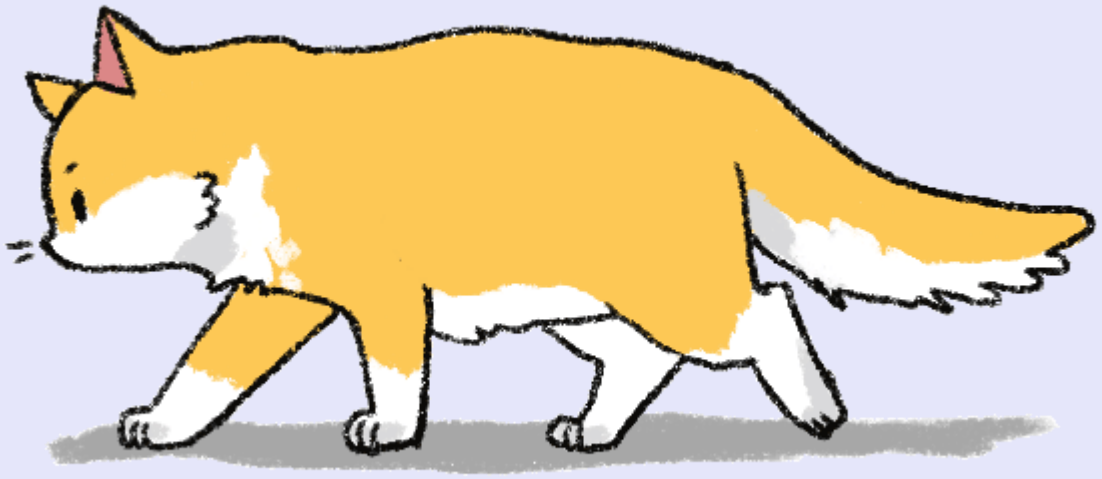
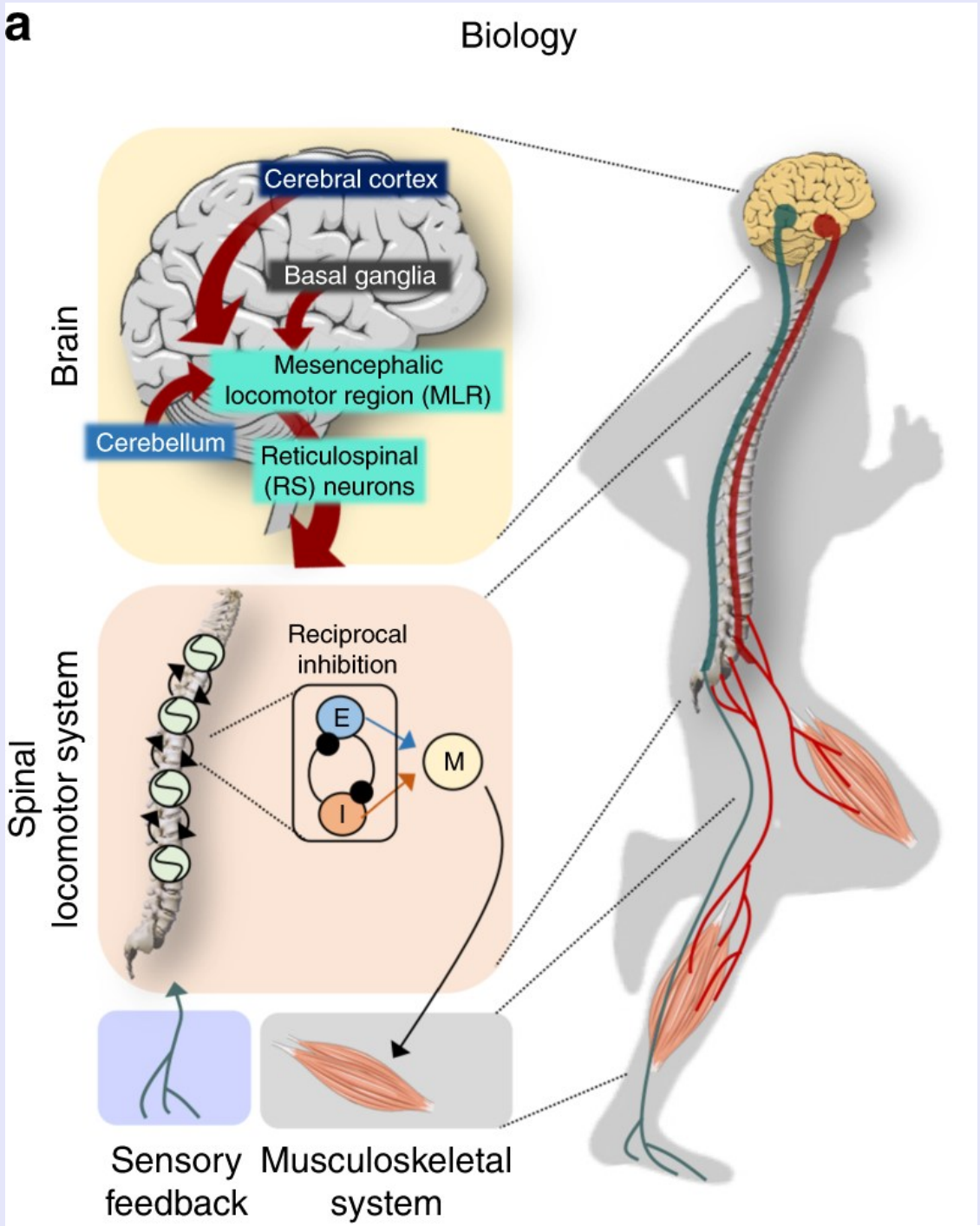
Cats and Dogs

- Cats are predators and need to be able to move quietly without knocking things over or falling on their asses.
- They have good visual control of their front legs: processed in their higher cortical and subcortical brain areas.
- Cats and other predators have a special way of walking called **direct register**.
- This is controlled by Central Pattern Generators in their spinal cords.
- They always place their back feet in the same place as their front feet.





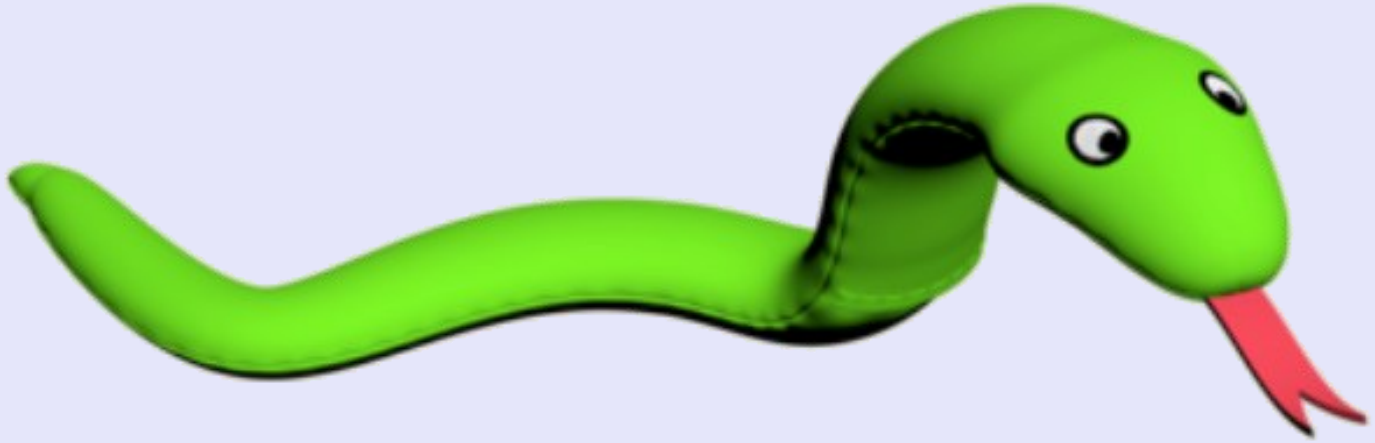
- Other vertebrates, like us humans, also have central pattern generators to aid locomotion.
- The brain is involved with motor planning
- But the coordination of rhythmic actions such as walking can be maintained by the central pattern generators in the spinal cord.

Direct Register

‘move calmly’

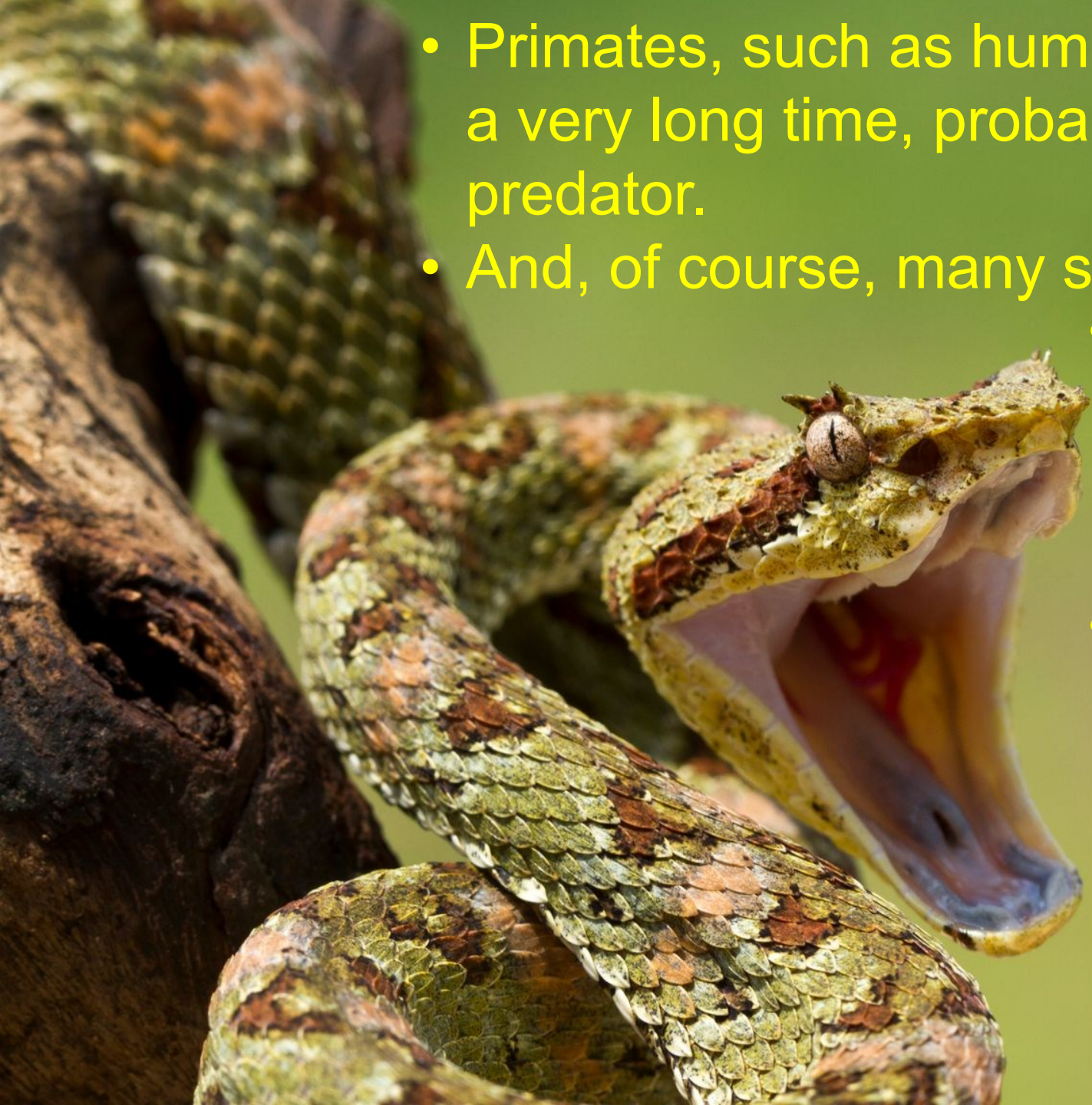
Cats and cucumbers

Cucumber or Snake?



- Humans too fear snakes.
- Every year between 421,000 and 1,800,000 people are bitten by venomous snakes.
- Estimates of deaths by snakebite are 20,000 – 94,000 each year.

Kasturiratne et al (2008). The global burden of snakebite: a literature analysis and modelling based on regional estimates of envenoming and deaths. *PLoS Medicine*, *5*(11), e218.



- Primates, such as humans, have lived near snakes for a very long time, probably more than any other predator.
- And, of course, many snakes are quite dangerous.
- While some animals evolved resistance to snake venom, primates instead evolved better visual systems.
- The human visual system contains many cells, in the thalamus and cortex, that appear to be particularly sensitive to features such as diamond patterns and slithering movement.

- Like other primates, our visual perception is very good, compared to that of many other animals.
- The need to hunt and find food is obviously one driving force.
- But it is probable that predation from other animals was the main reason that our perceptual system developed the way that it did.
- Our color vision is the way that it is because it is best for spotting camouflaged predators.

- For example, these people attacked by rhinos.
- The faster that we can detect threats from other animals, the more likely we are to survive.

Pessoa, et al., (2014). The adaptive value of primate color vision for predator detection. *American Journal of Primatology*, *76*(8), 721-729.

In fact, snakes may be the most important threat of all, which has altered how our perception has evolved the way that it has.

Isbell, L. A. (2009). *The fruit, the tree, and the serpent: Why we see so well*. Harvard University Press.

People recognize snakes faster than other animals or plants.

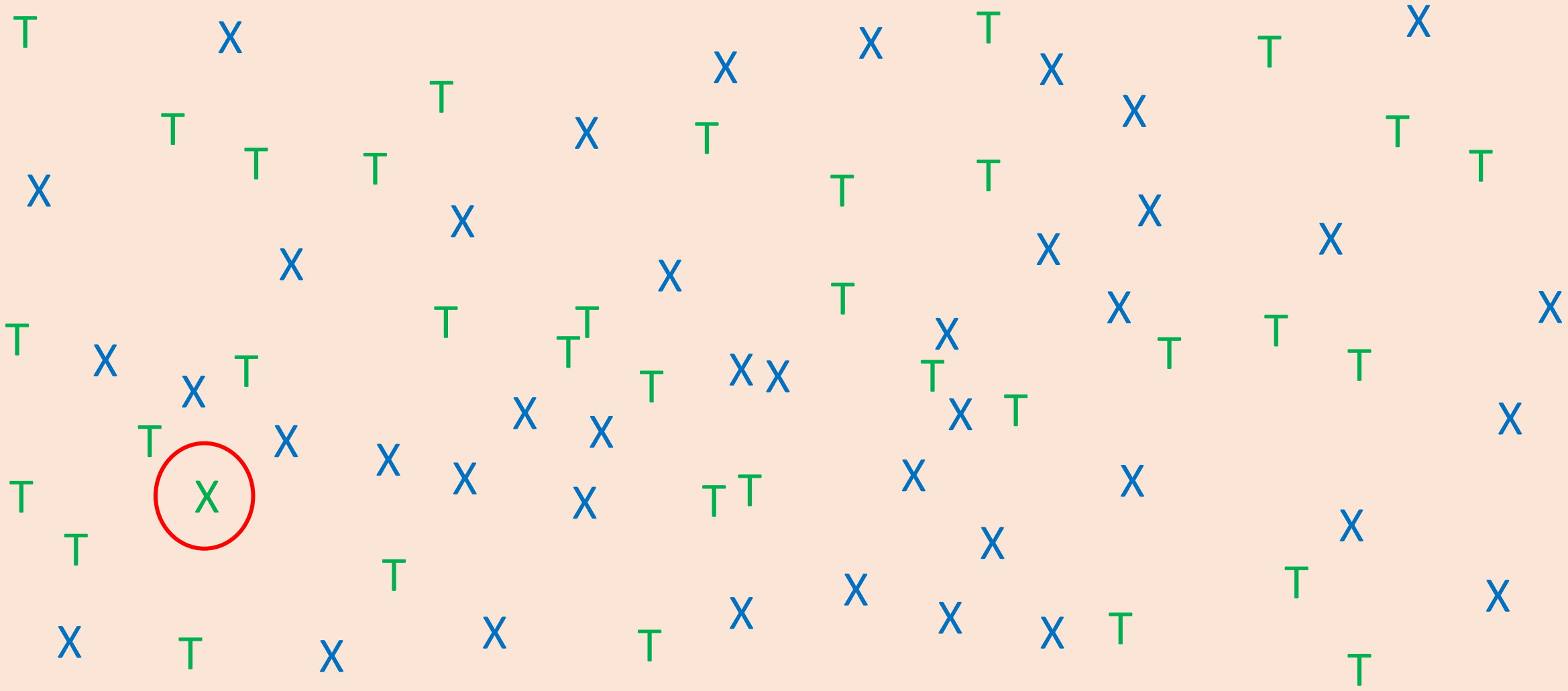
This bias is even seen in young children, suggesting it is an evolved strategy, not something learned from experience.

Fig. 1. A preschool child identifying the single flower target among eight snake distractors by touching the flower image on a touch-screen monitor.

LoBue, V., & DeLoache, J. S. (2008). Detecting the snake in the grass: Attention to fear-relevant stimuli by adults and young children. *Psychological science*, *19*(3), 284-289.

Feature and conjunctive search (Treisman & Gelade, 1980)

Task: Find the X



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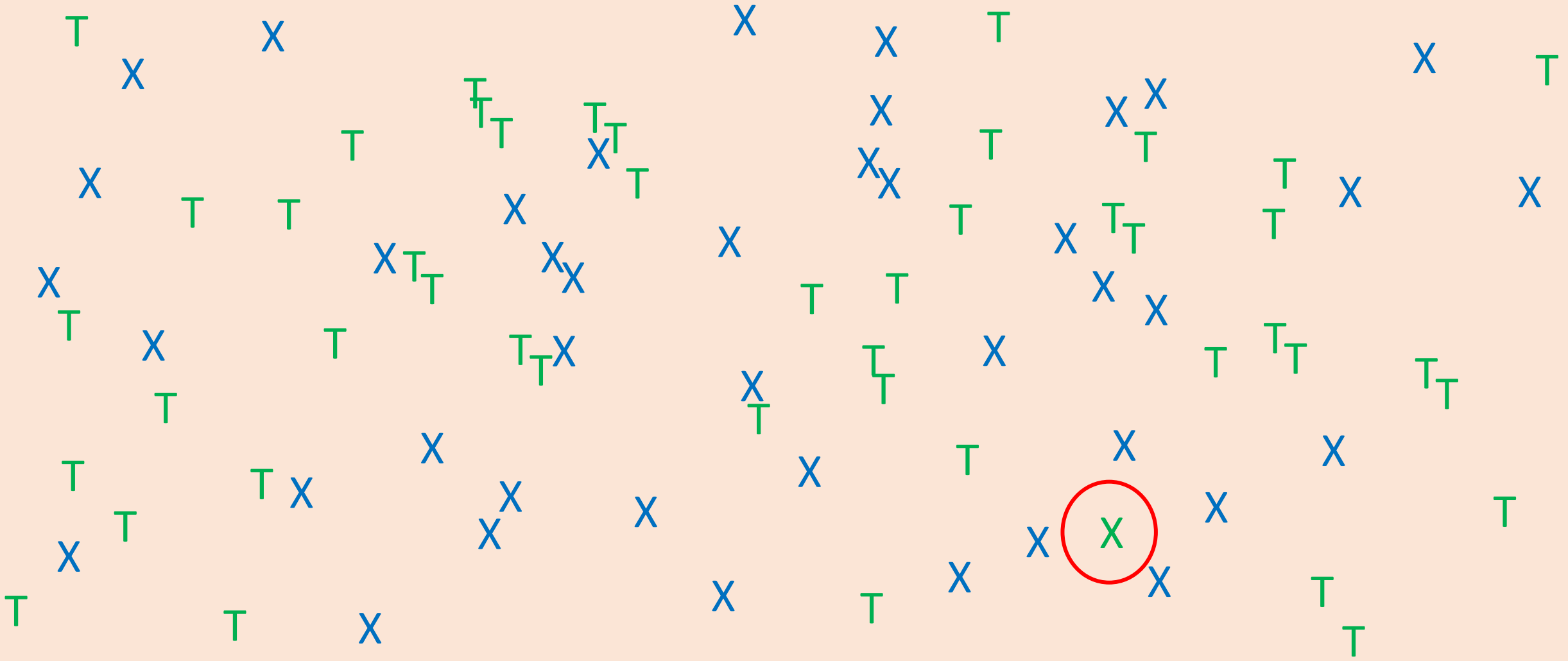

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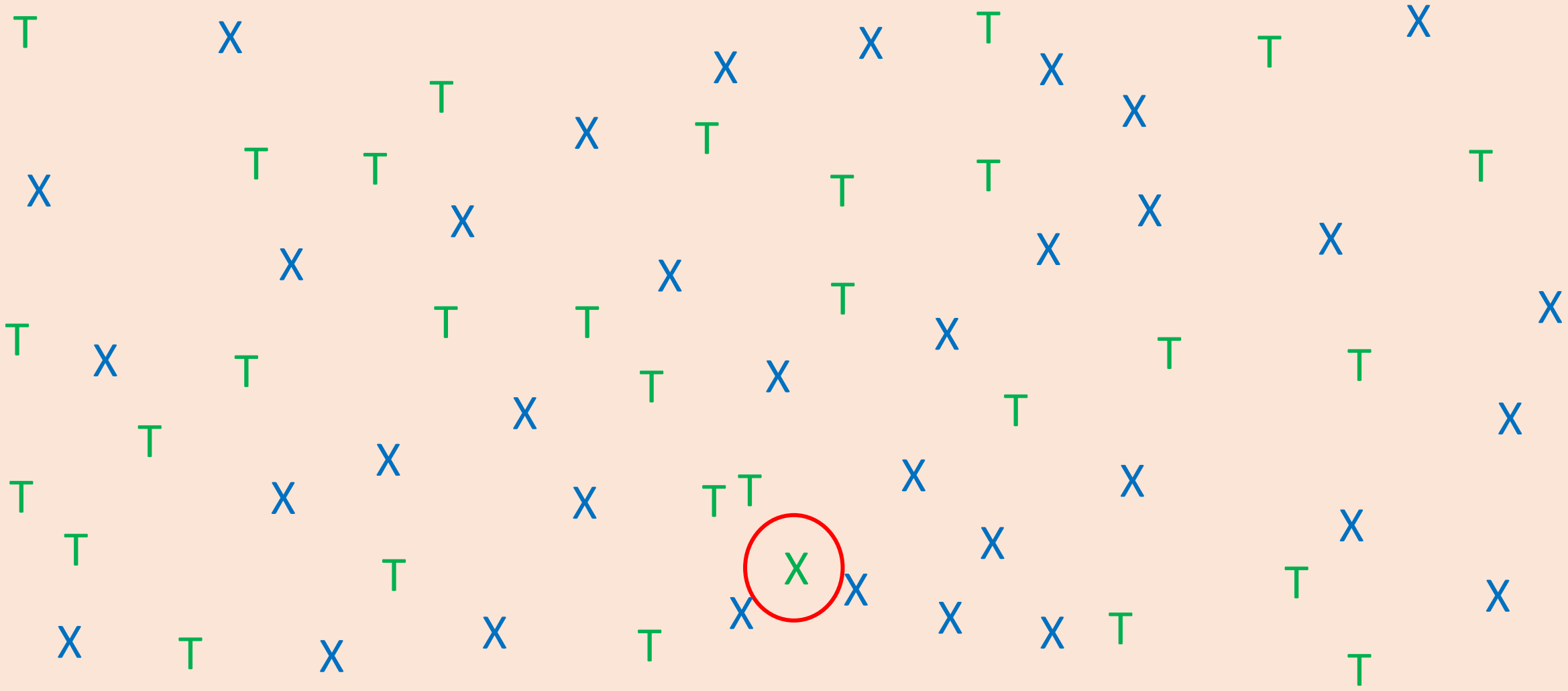

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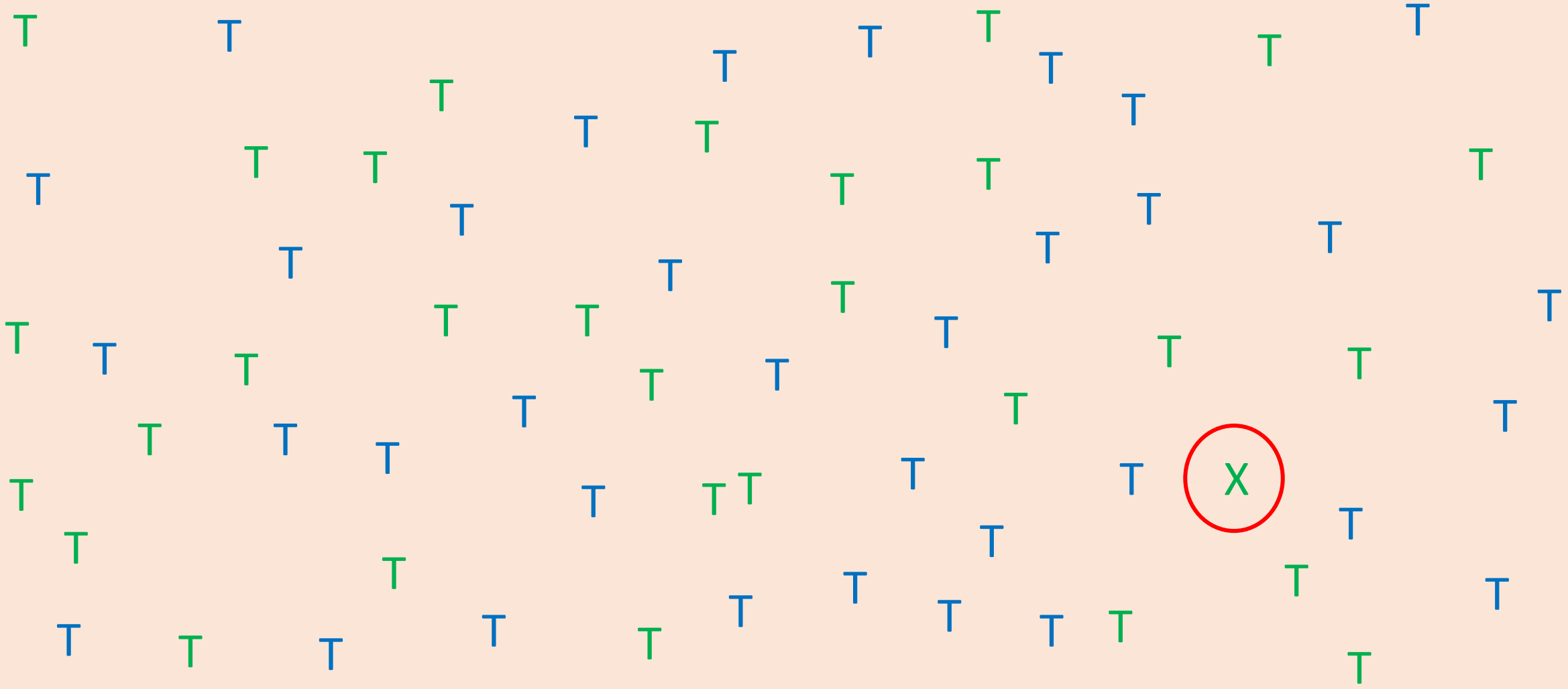

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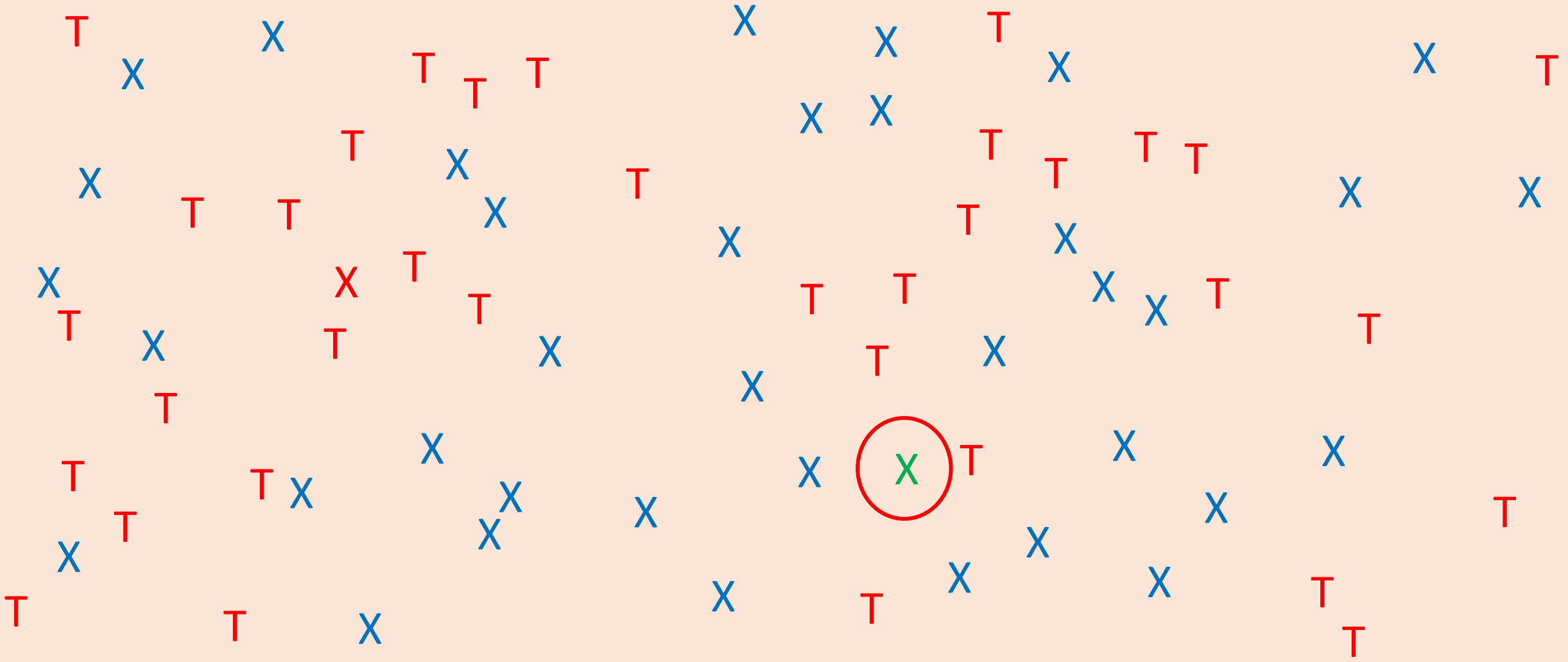

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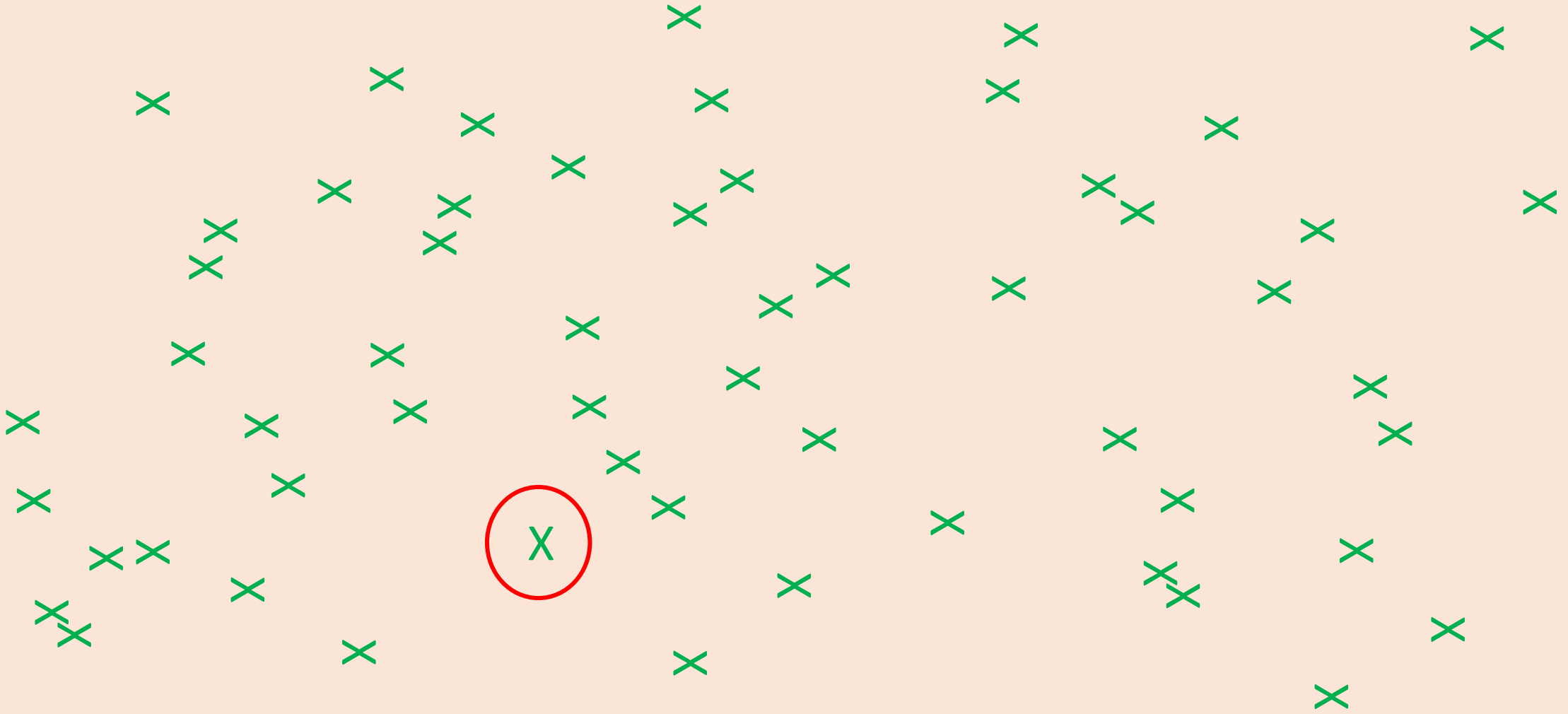
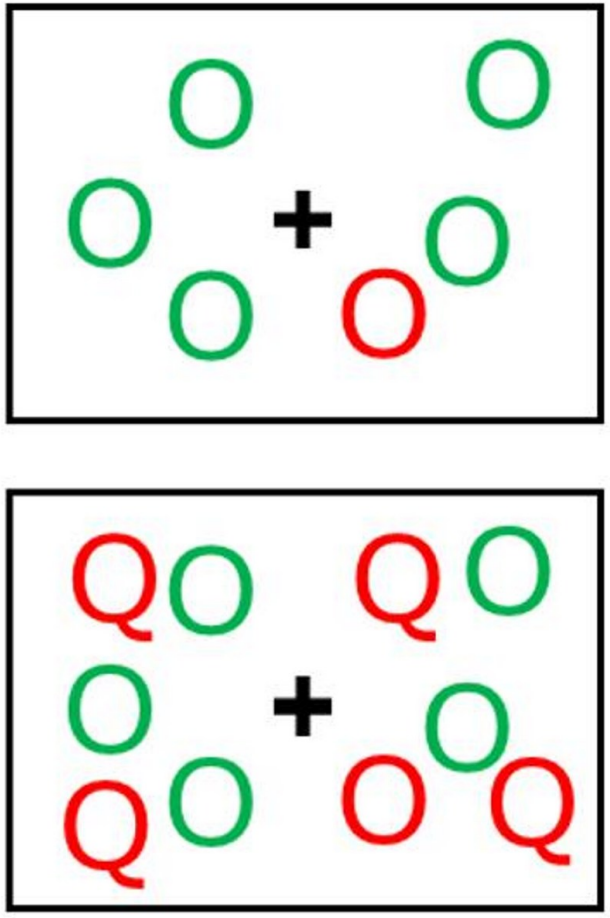


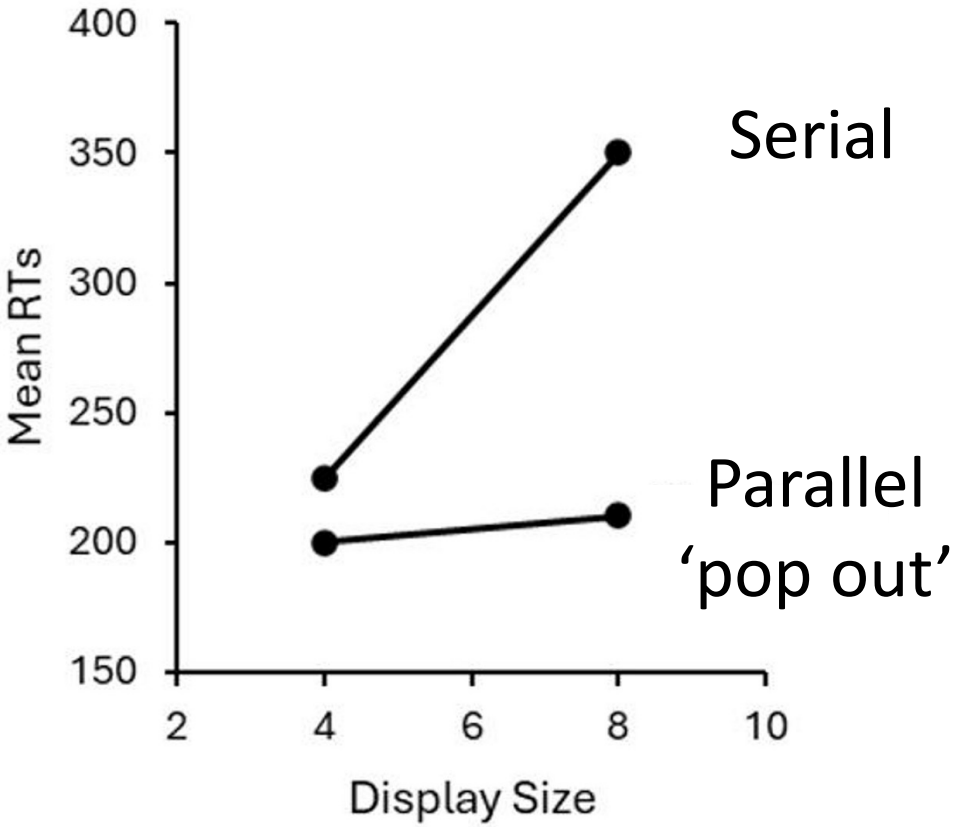
Treisman, A. M., & Gelade, G. (1980). A feature-integration theory of attention. *Cognitive Psychology*, *12*(1), 97-136.

Feature Integration Theory (Treisman & Gelade, 1980)

Some stimuli ‘pop out’ and it doesn’t matter how many things are on the screen; we see it quickly. This indicates parallel processing.

In contrast, for some stimuli time to find them is dependent on the number of things on the screen, indicating serial processing.





Is there a snake in the picture?

Ready?









Is there a snake in the picture?

Ready?

Is there a mushroom in the picture?

Ready?









Is there a snake in the picture?

Ready?





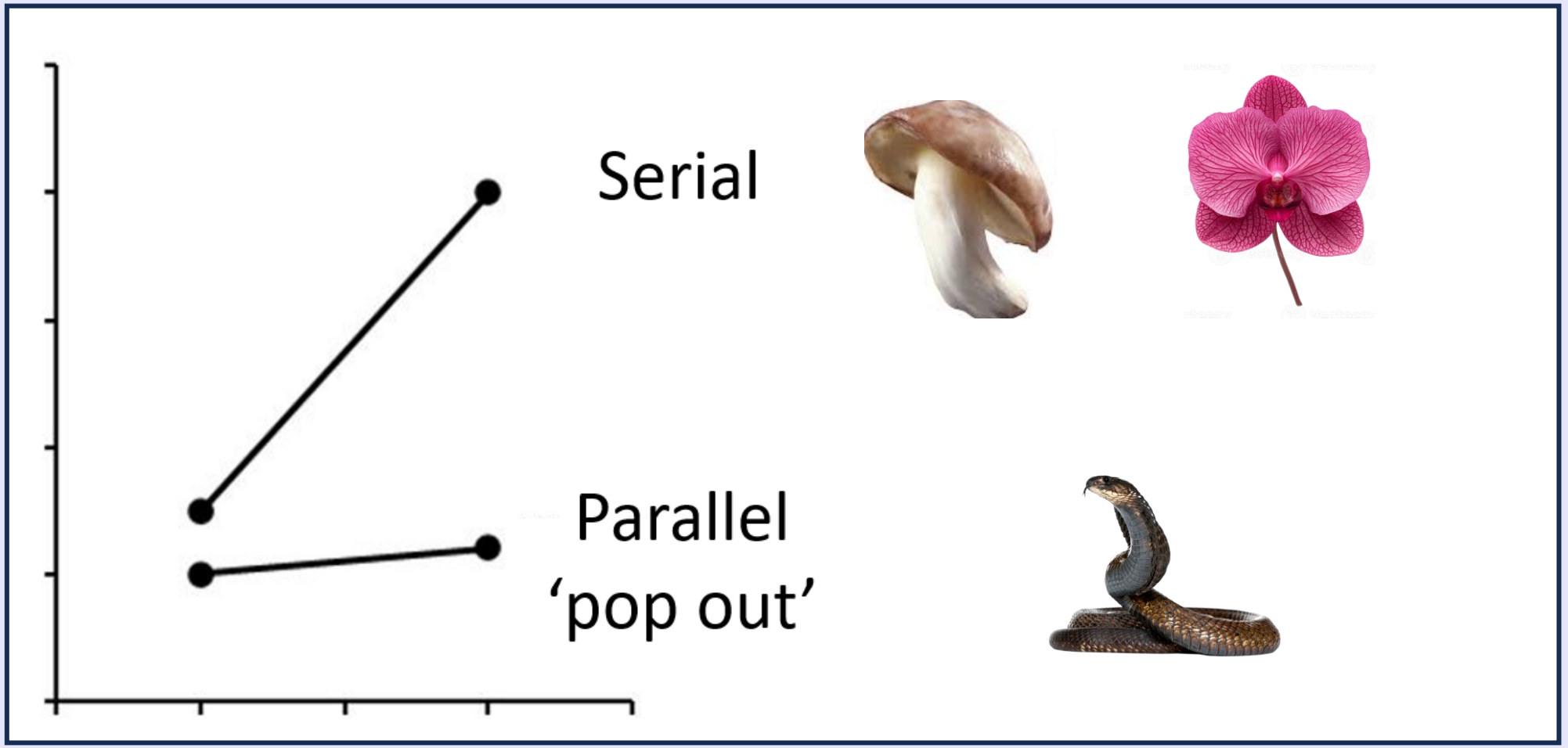




Is there a snake in the picture?

Ready?

Snakes ‘pop out’ indicating that we parallel process them. Other organic things like flowers and mushrooms do not, we use a serial process to detect them.



Öhman, A., Flykt, A., & Esteves, F. (2001). Emotion drives attention: detecting the snake in the grass. *Journal of Experimental Psychology: General*, *130*(3), 466-478.

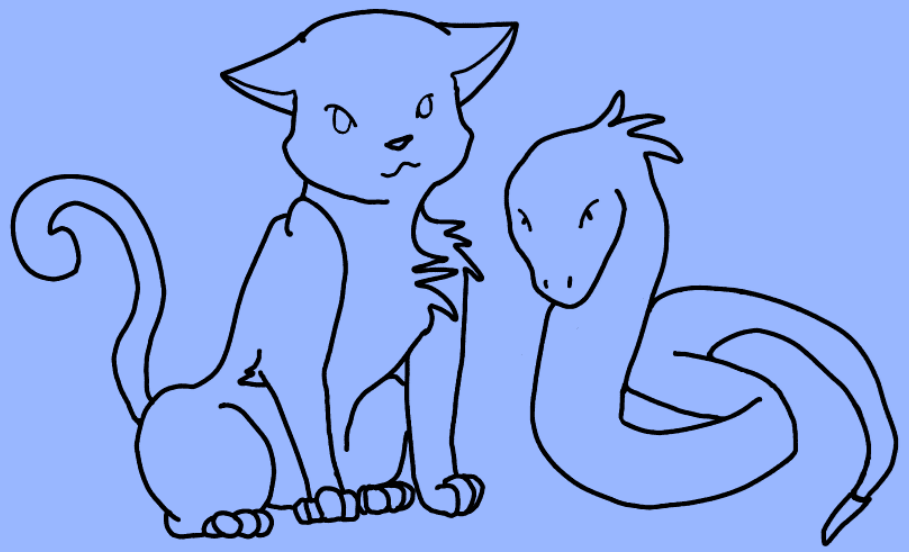

TikTok
@ qinhan111

Reaction Time (RT) Matters

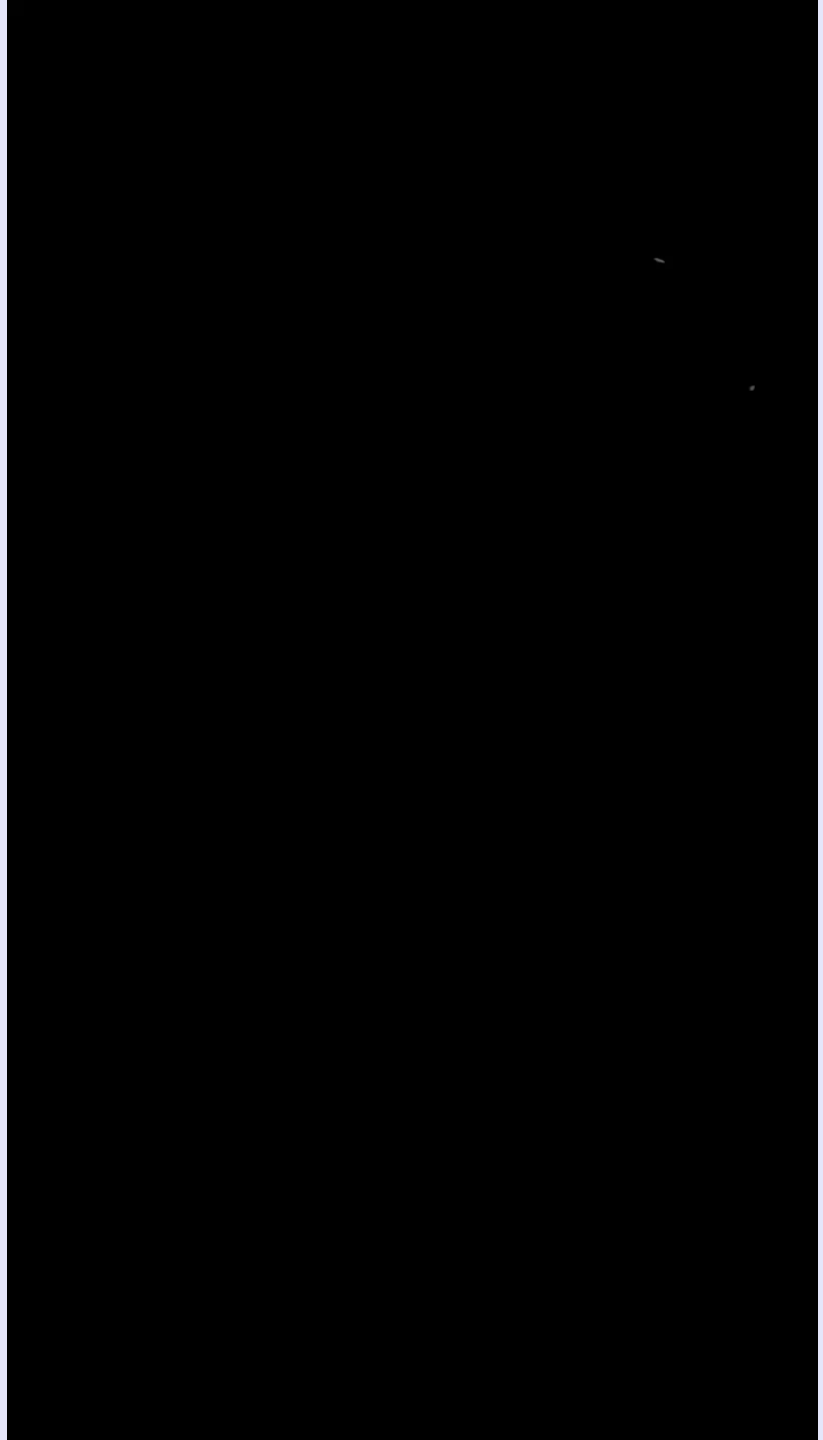
- ✓ There is a survival advantage to processing information, and reacting, quickly.

Human RT is around 200 - 300 Msecs

Average Cat
RT = 20 - 70
Msecs



Average Snake
RT = 44 - 70
Msecs

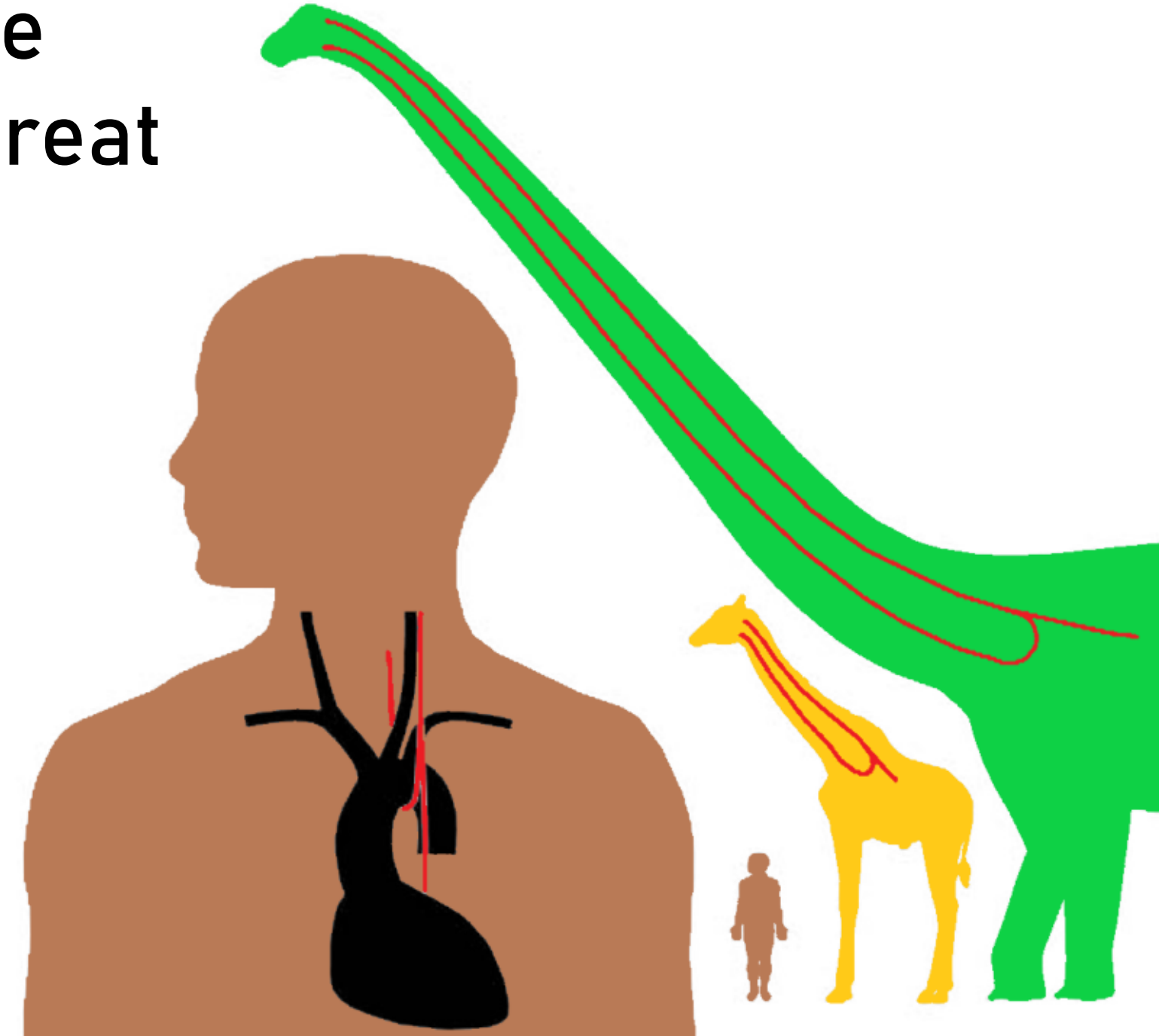


Myelination and salutatory conduction

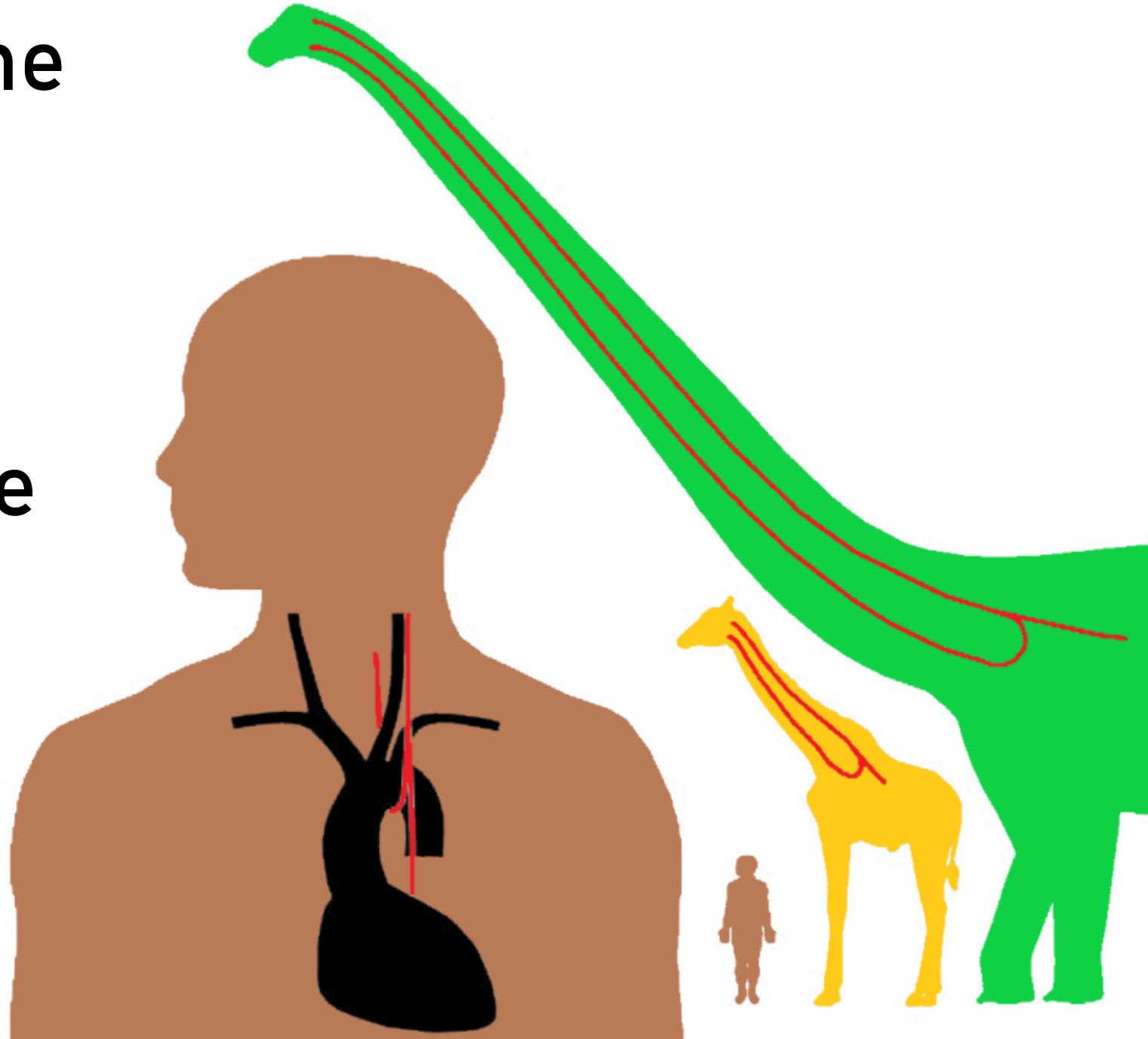
- Most neurons have myelin sheaths around them. These are made of fat and insulate the axon. But myelin sheaths have gaps between them, called nodes.
- The charge ‘jumps’ from node to node. The conduction down myelinated axons is much faster.
- Of course, the total length of the axon is also an important factor, short neurons, and small animals, can transmit messages, and respond, more quickly.


3
4
2
5
5
7

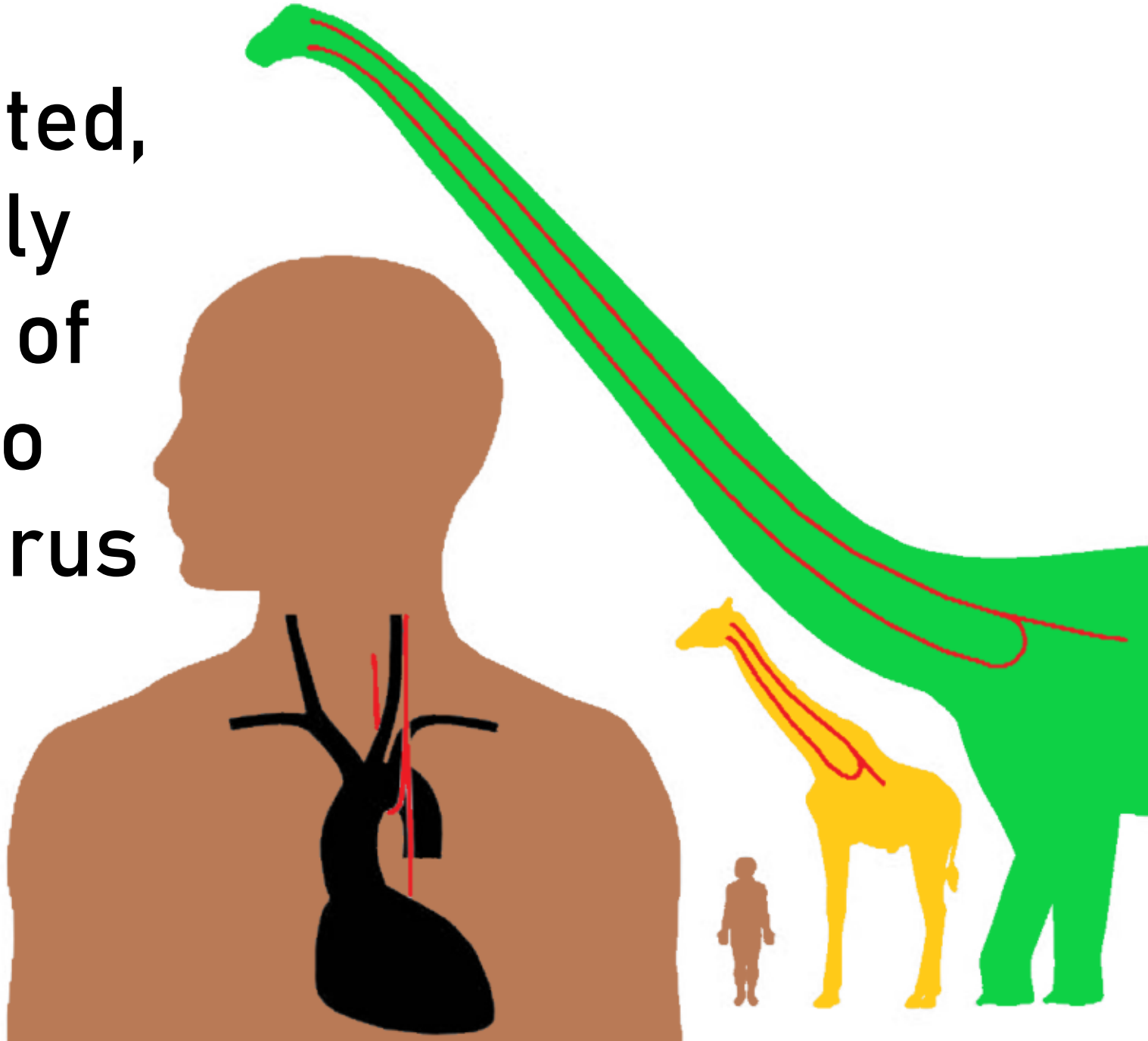
The laryngeal nerve loops around the great arteries during development

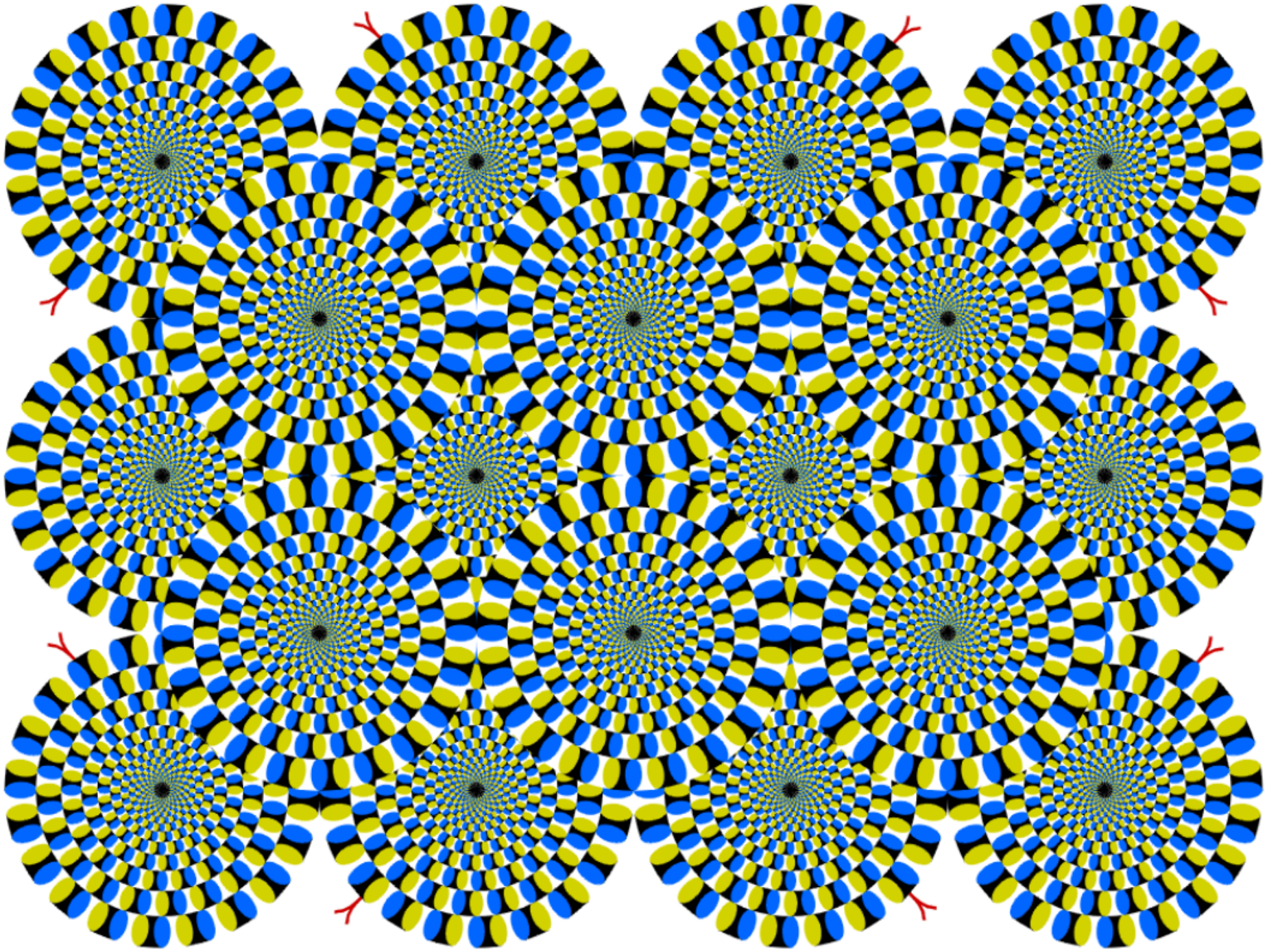


In Supersaurus, the longest -necked dinosaur ever, the length of each neuron would have been about
28 meters
(92 feet)



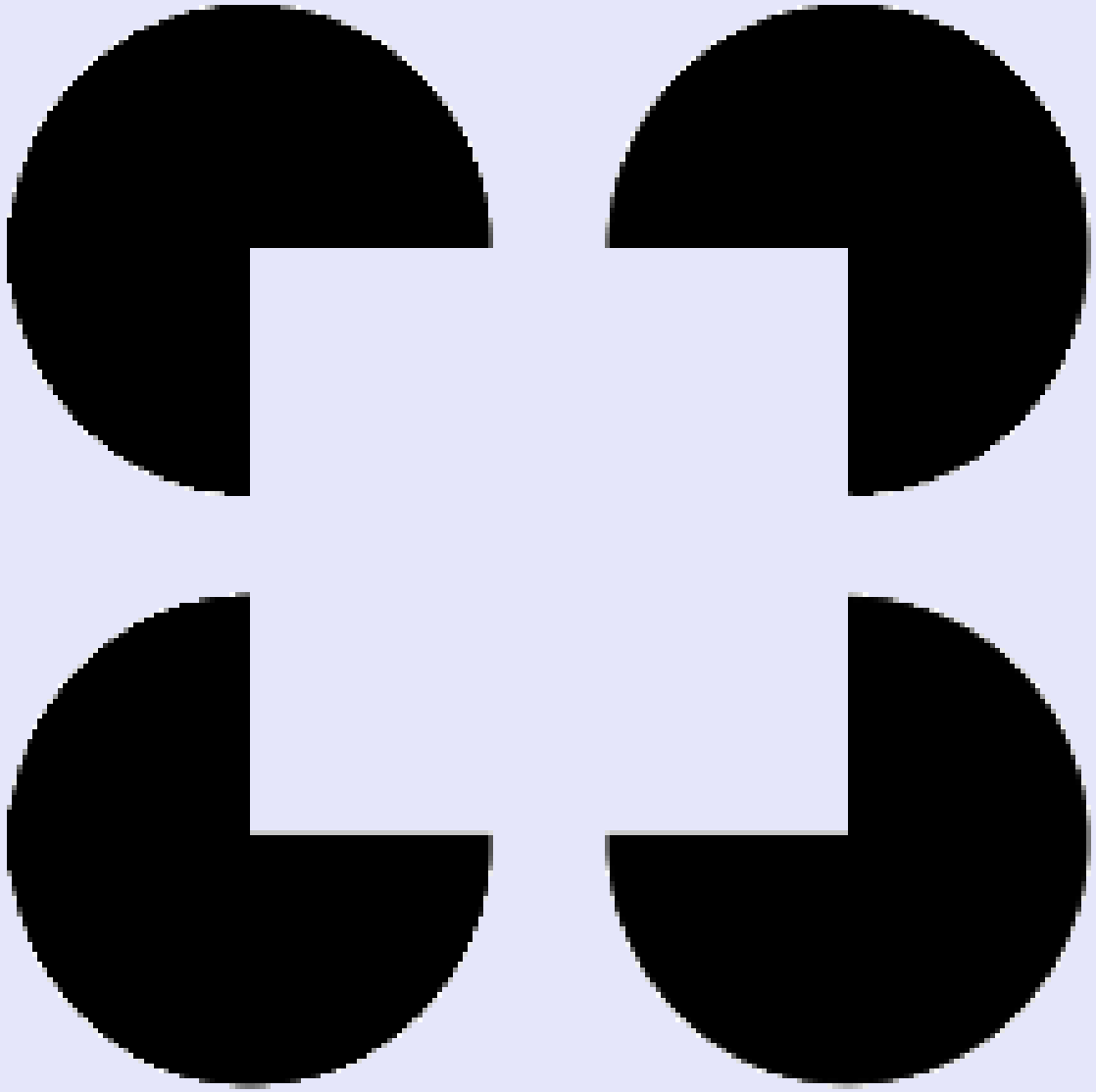
Because they were probably unmyelinated, nerve impulses likely took up to a minute of axonal conduction to reach the Supersaurus brain





Do cats see see the snakes moving too?

Bååth, R., Seno, T., & Kitaoka, A. (2014). Cats and illusory motion. *Psychology*, *5*(9), 1131-1134.



- Perception is not the same as sensation. Humans, cats, and other animals regularly experience illusions.
- We are generally not aware of them, until someone creates images to highlight them.
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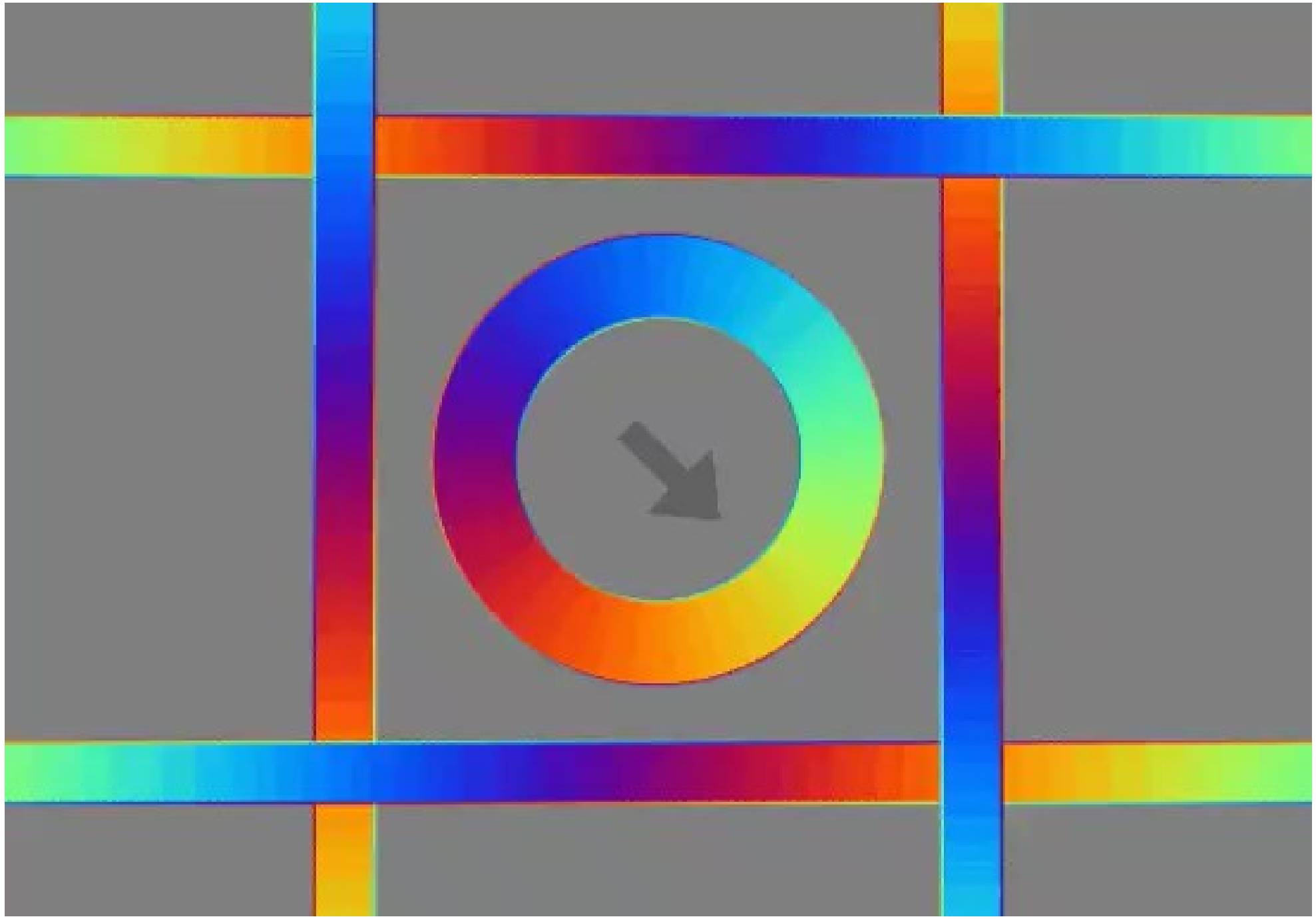
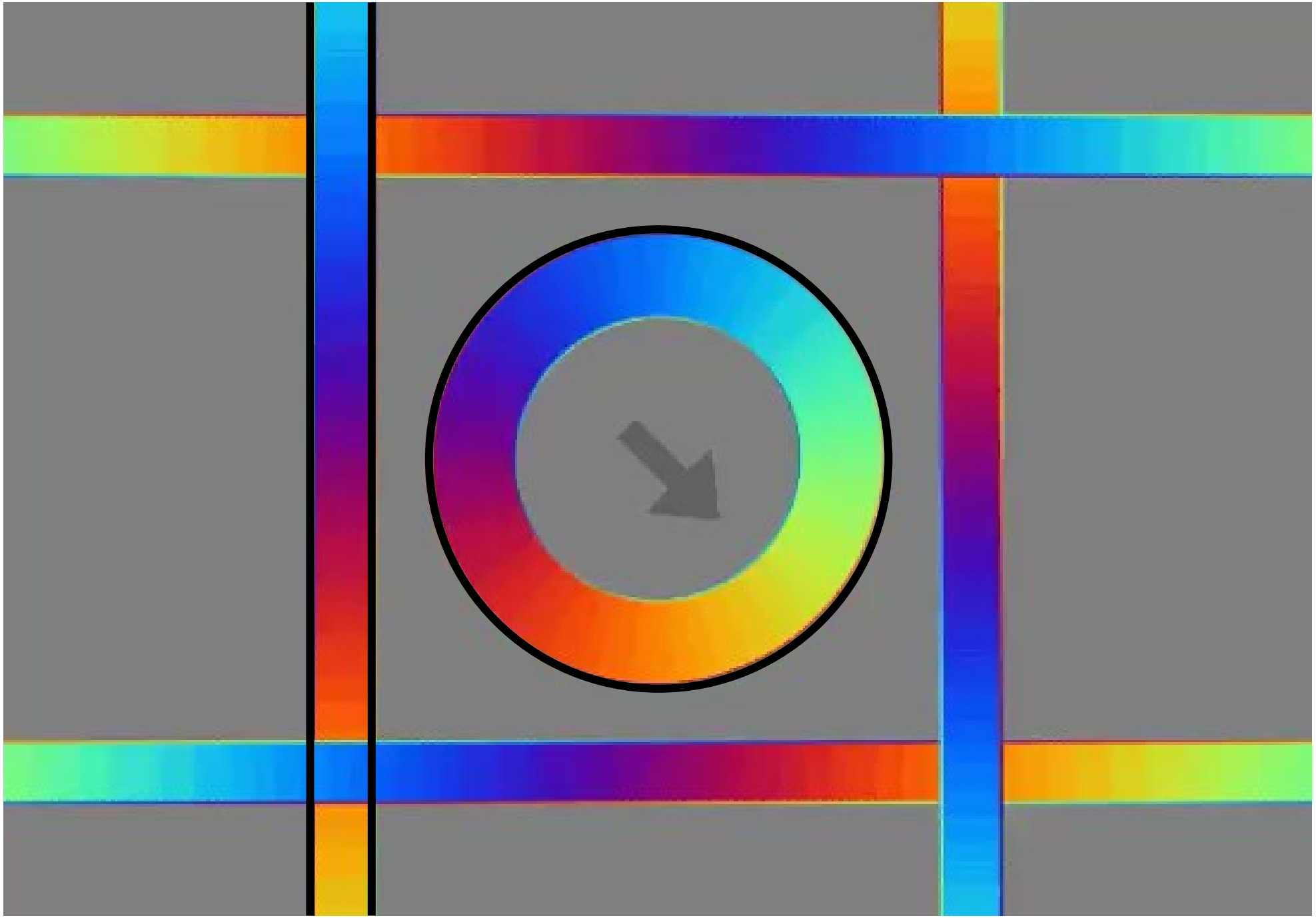




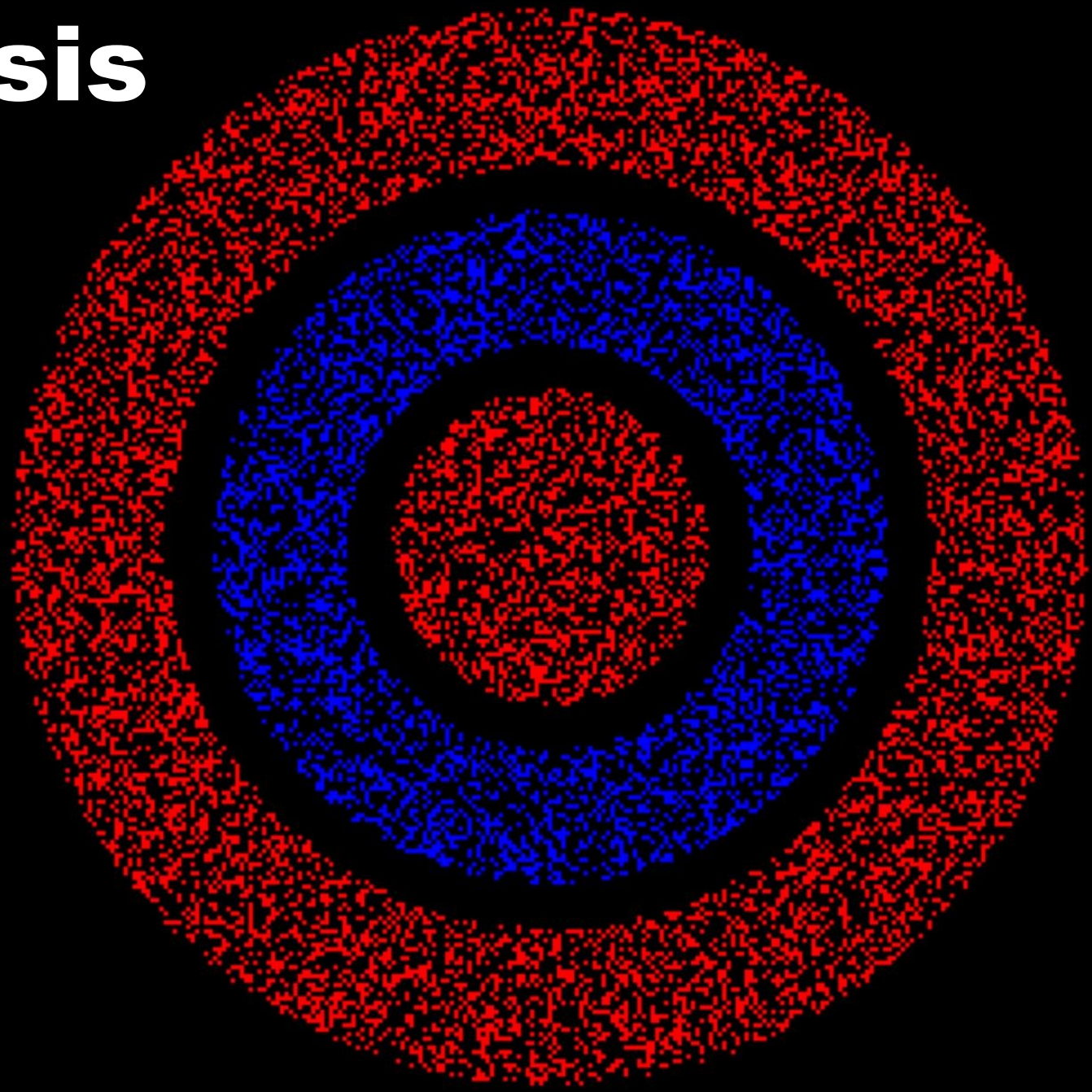
Chromostereopsis

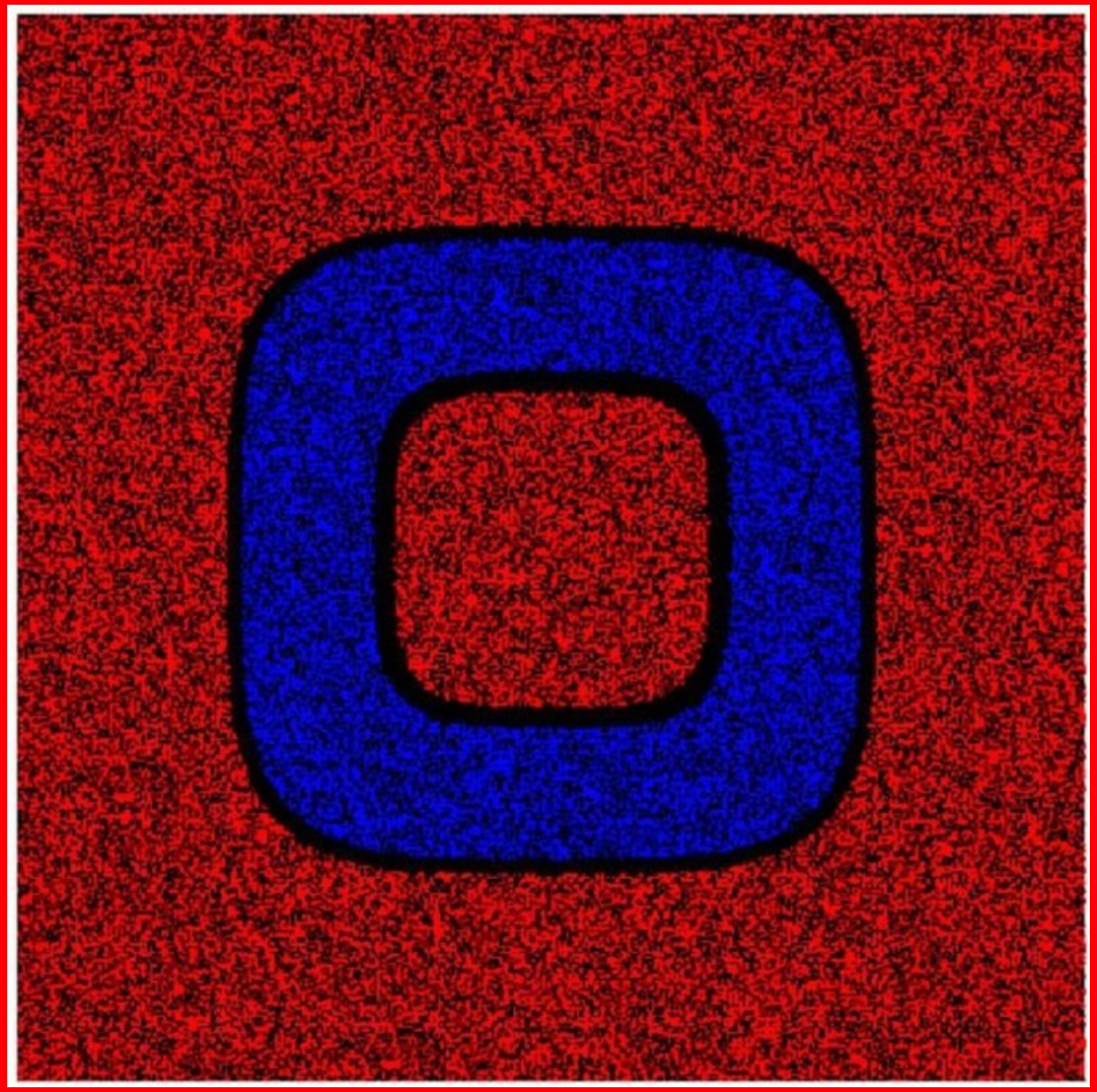
Which circle appears closer to you?

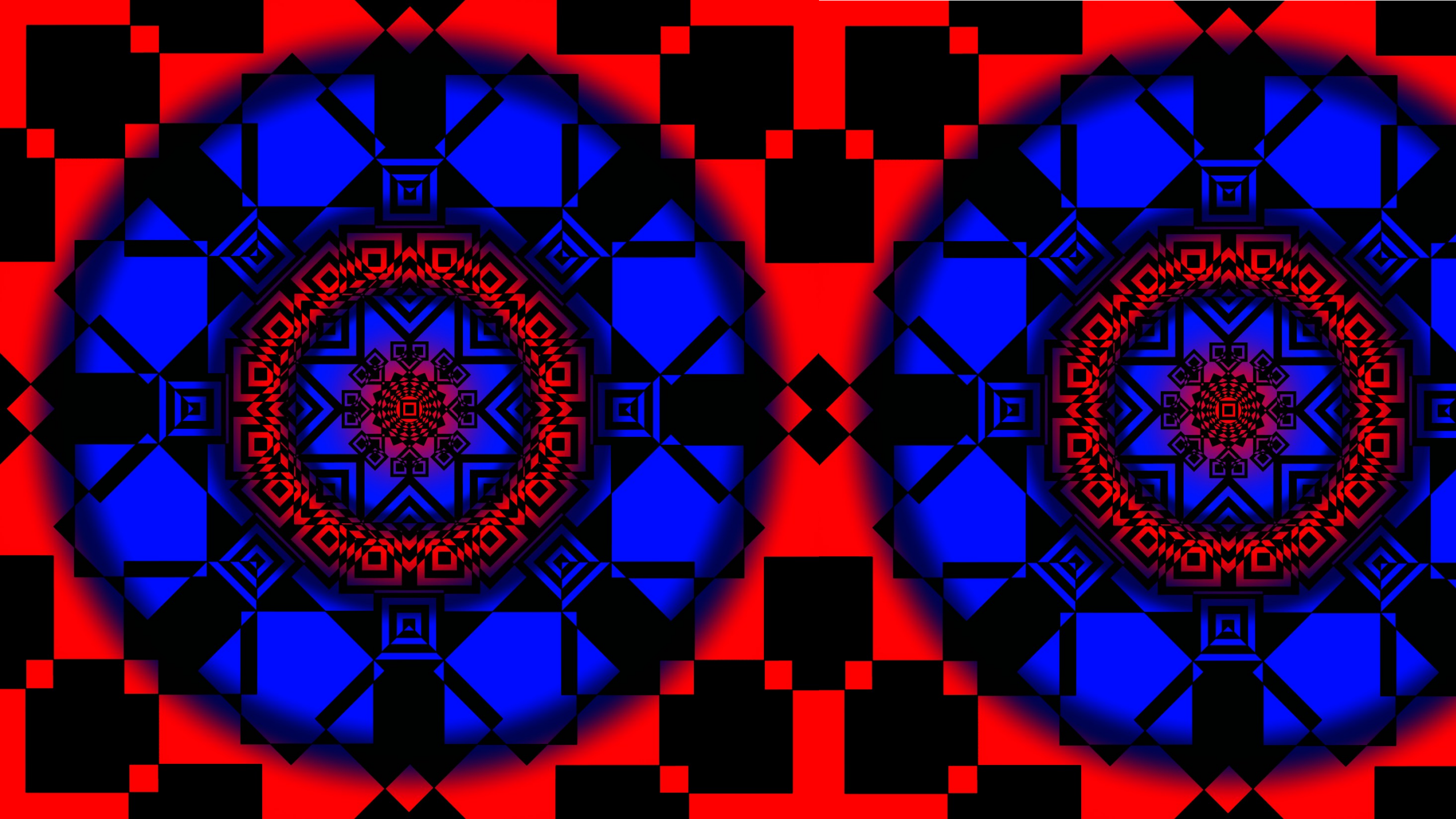
Blue

or

Red



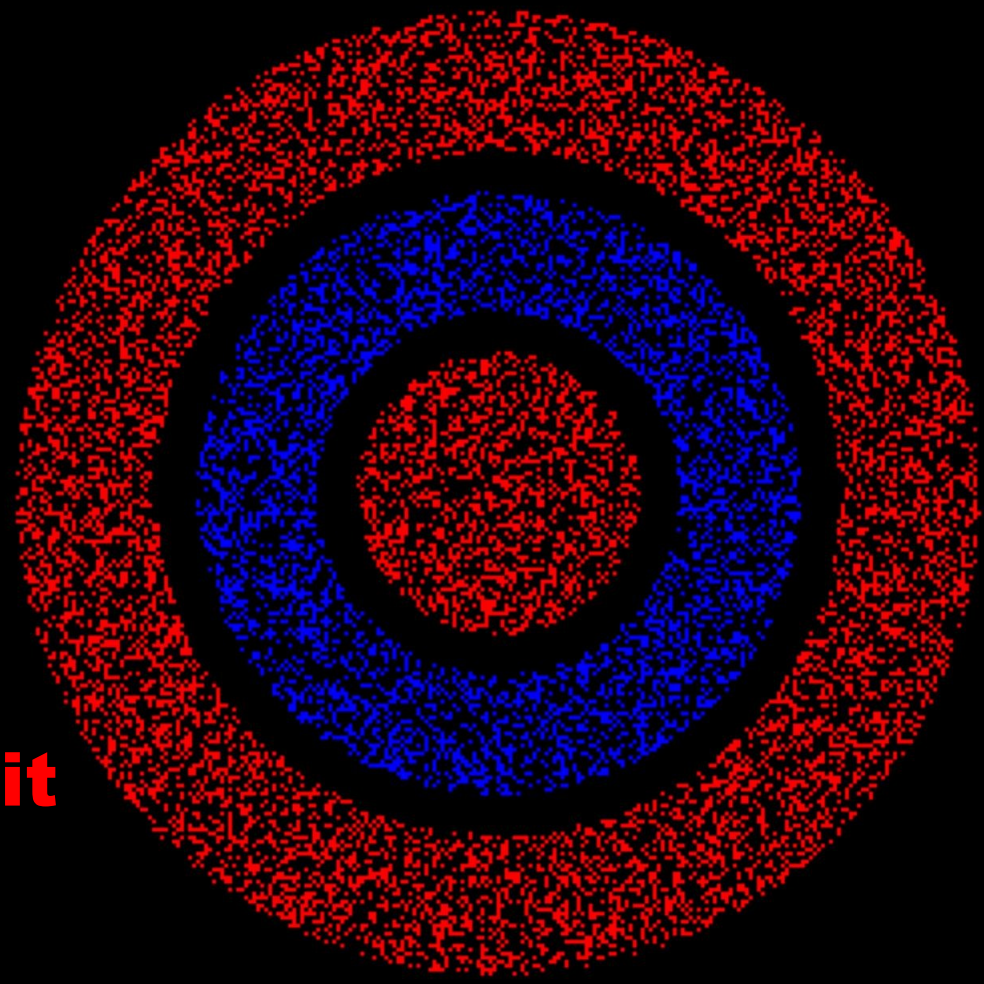




Chromosteriopsis

One kind of illusion is caused by something called chromosteriopsis. Most people see the red closer than the blue. The reason for this is not clear, but it is known to be a consequence of binocular vision: If you close one eye, the illusion of depth disappears.

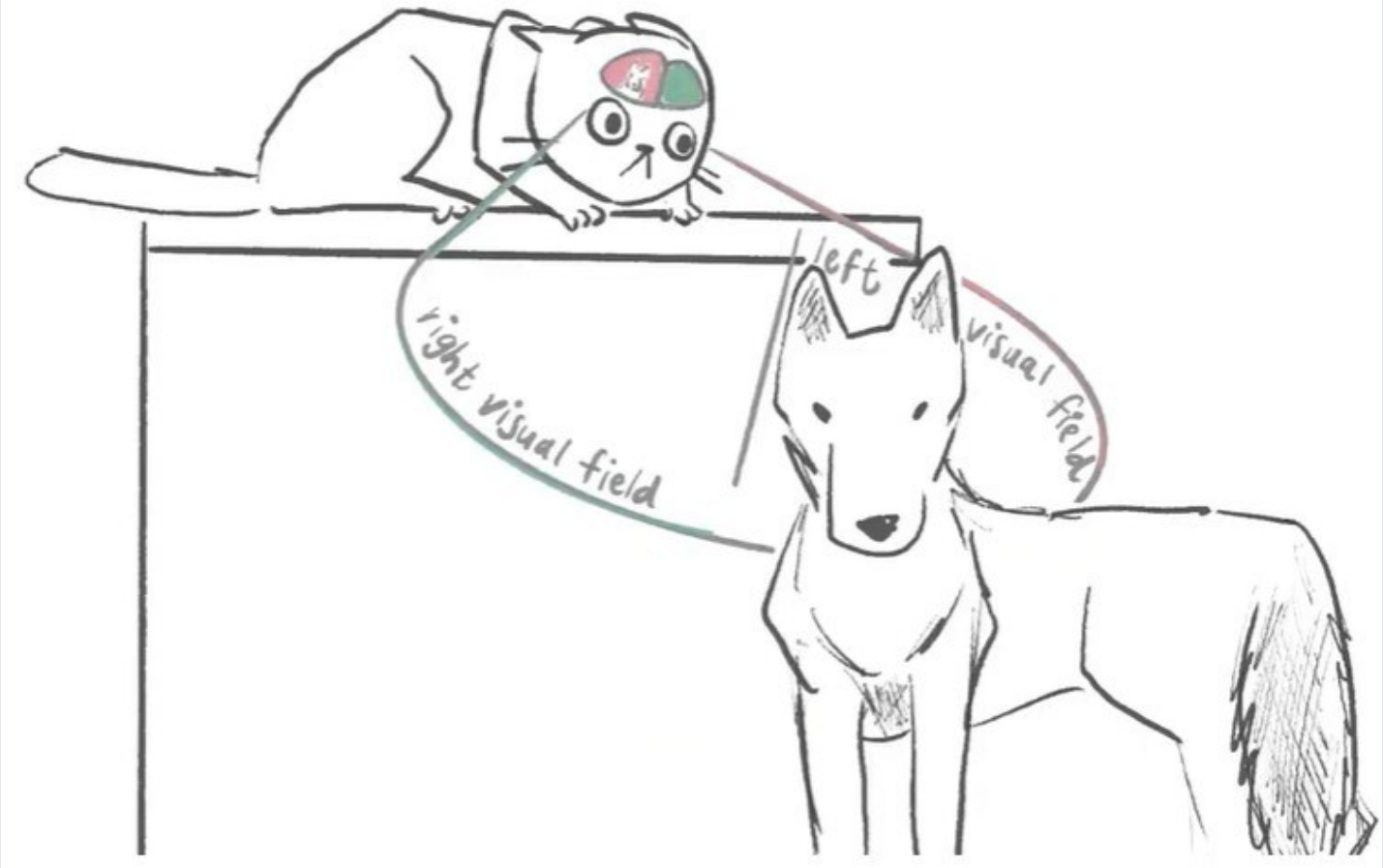
Try closing one eye while looking at it

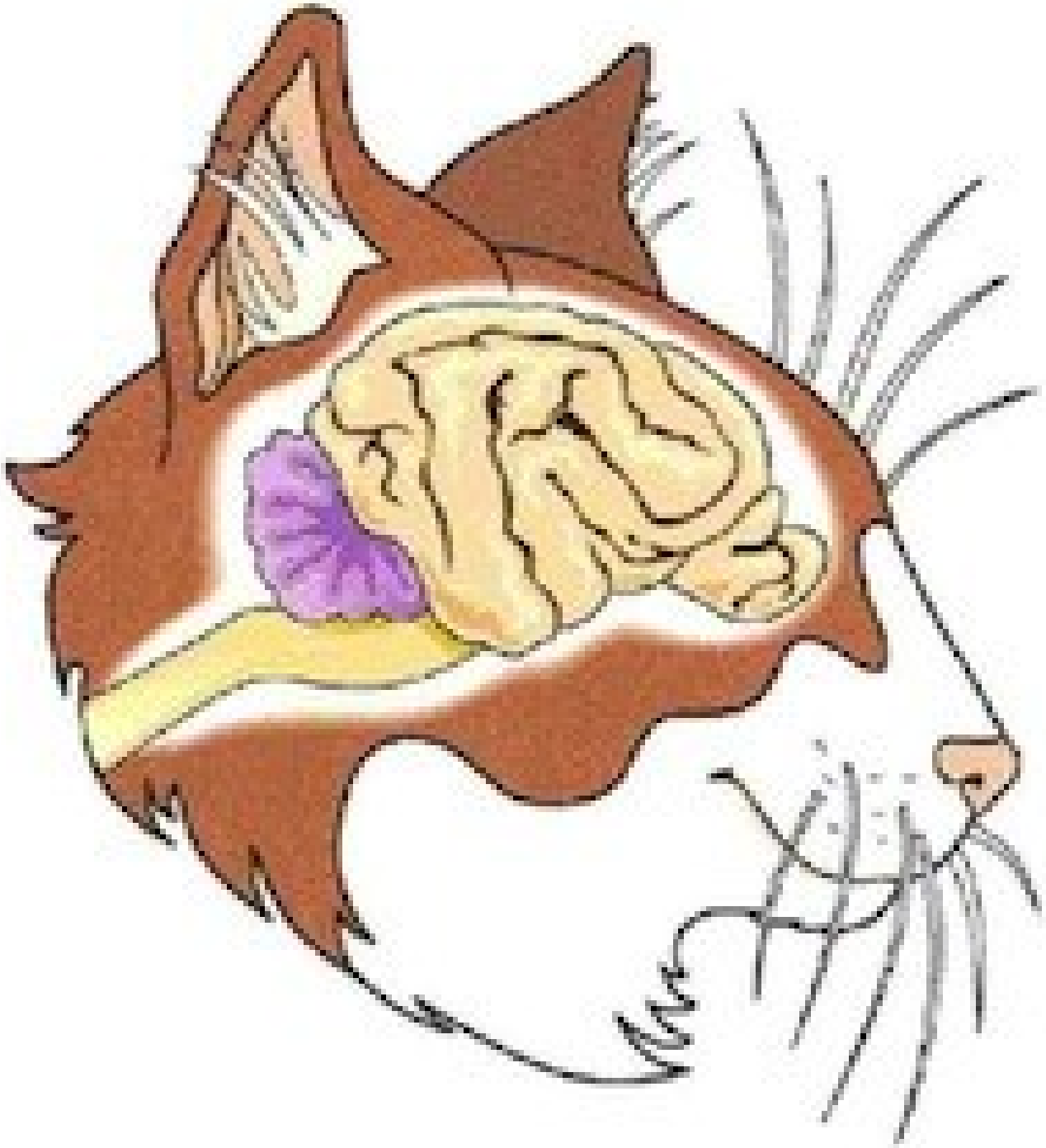



They find the weirdest
spots to sleep!

Why do cats prefer to sleep on their left side?

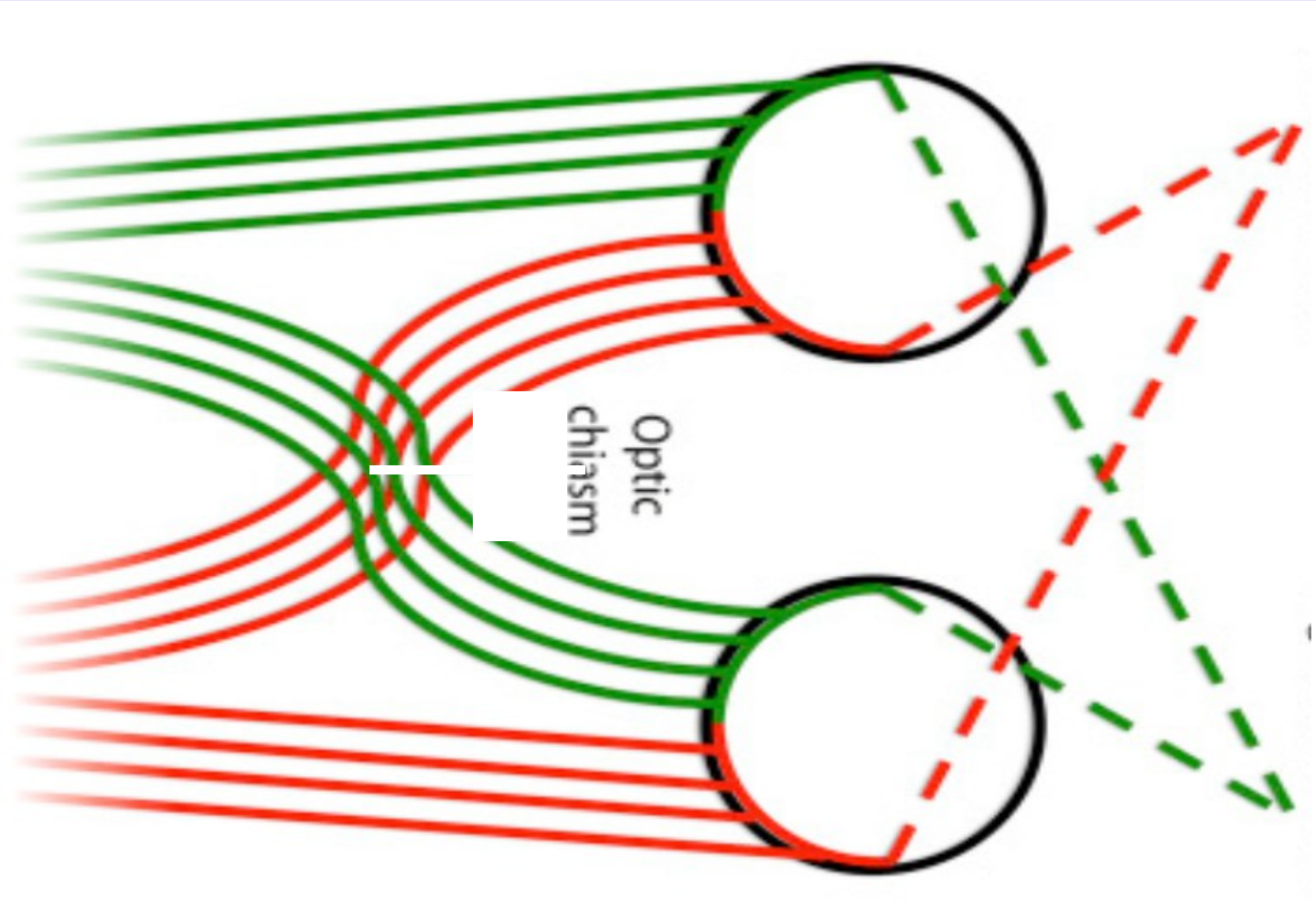
A cat sleeping on its left side will have best vision in its left visual field…





A cat sleeping on its left side, awaking suddenly, will have its right hemisphere maximally exposed, through vision, to events in the environment.

The left visual field sends information to the right hemisphere of the brain.



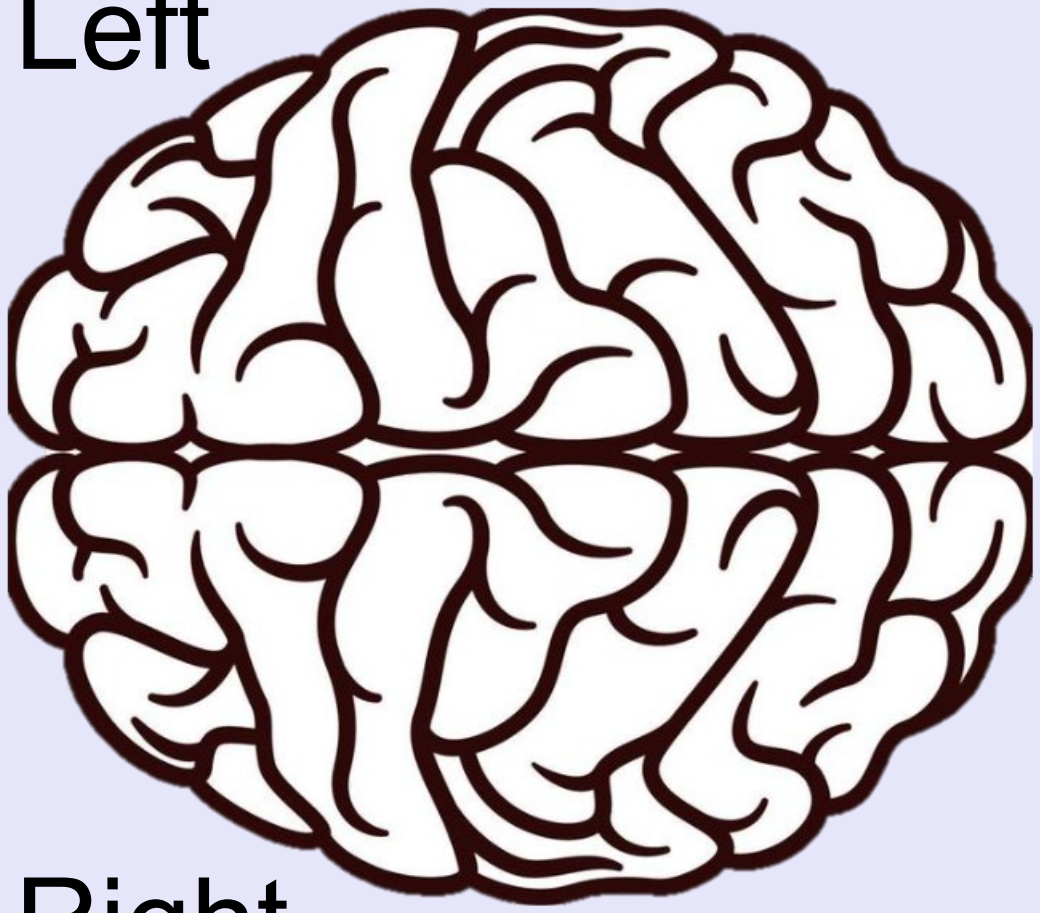
Left

Right

The right hemisphere is specialized for responding to danger

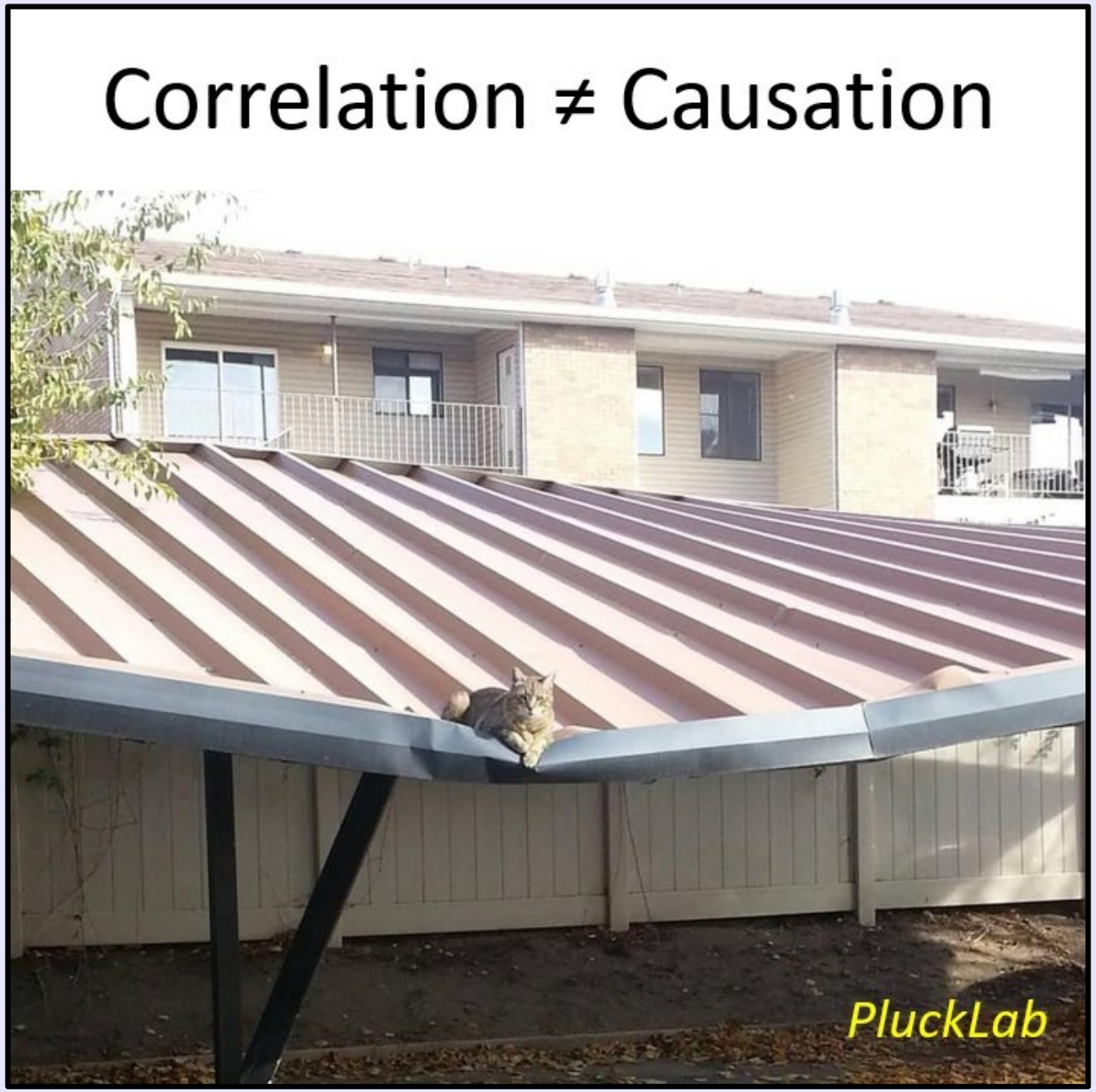
- Specialising one hemisphere (not both) allows it to be more finely tuned, learning threat associations through life.
- It also allows the left and right hemispheres to compute in parallel, speeding processing.
- In fact, it’s not just cats, the human right hemisphere shows this specialisation for threat detection too, as do most mammals.

Left



Right

Lastly, cats can also teach us about statistics



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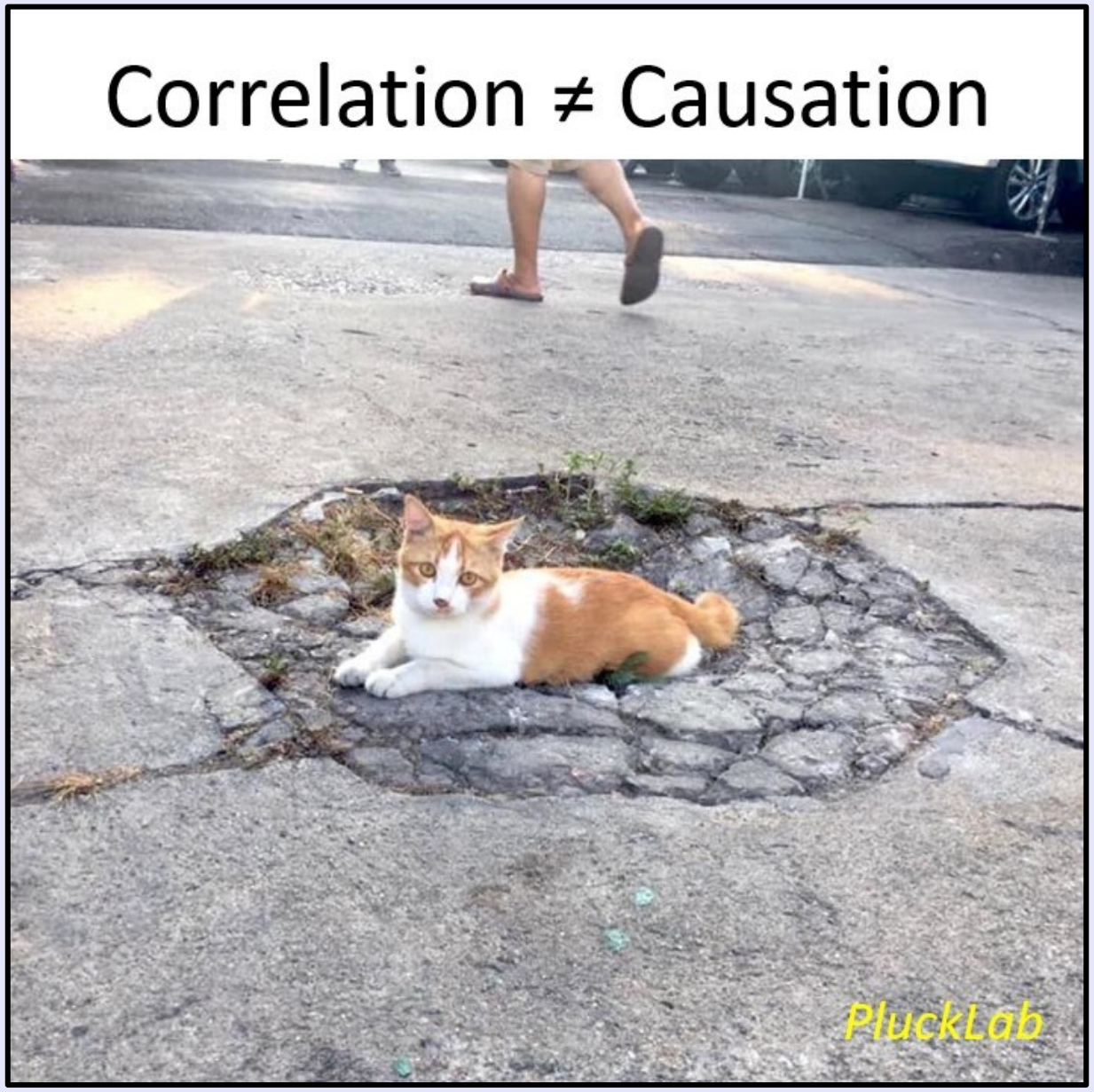

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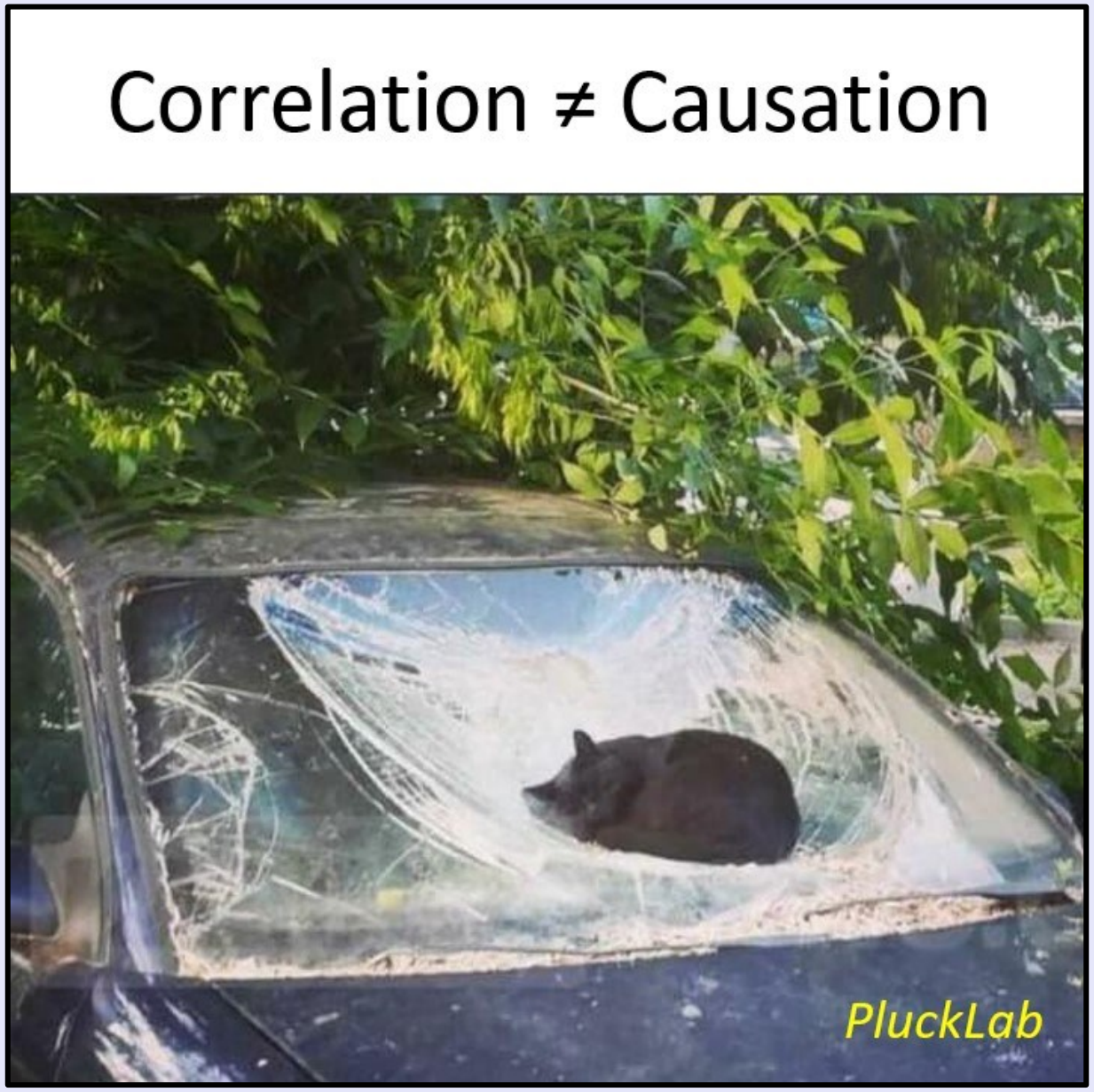

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Thanks to the funder: Chulalongkorn University, Faculty of Psychology- Research Affairs