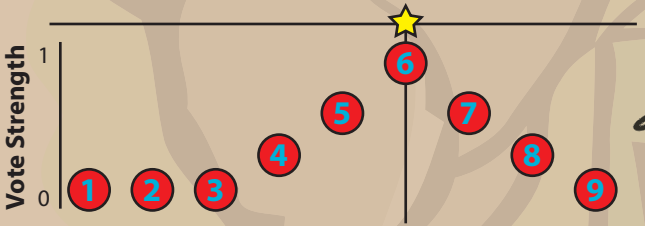
THE MYSTERY OF THE STOLEN ELECTION

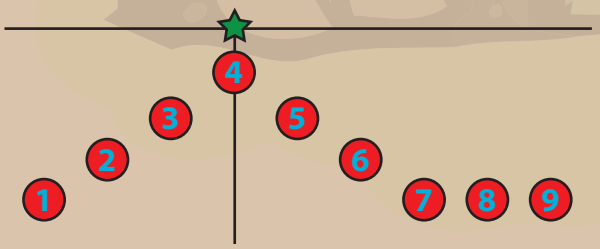
If I show you a star located somewhere on a line and ask you to remember its location...

What happens in the brain? Think of these circles as neurons in the brain. Their number corresponds to a location on the line.

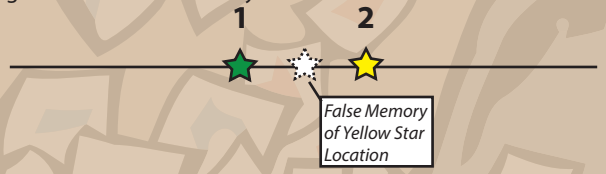
The neurons that correspond to the location of the star will become active. In other words, they will 'vote' that the star is in their location. If you thought people were partisan in their voting then you haven't met neurons. Neuron 1 always votes for location 1, neuron 6 always votes for location 6. But the good thing about neurons is that they are always honest. If they don't think the star is at their location they will stay home and not vote. If the star is near their location but they are unsure, they won't vote as strongly. In other words, the closer the star to the location they vote for, the more active they will be, and the more their vote will count.



This "bump" of vote strength is how the brain remembers the location of the star. Let's try another location.

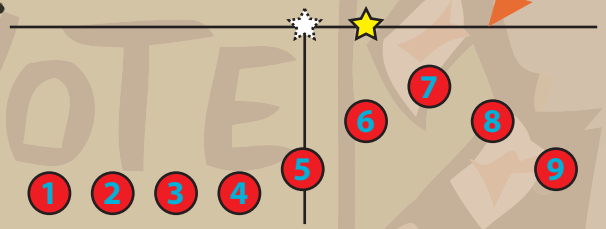


We found that if you ask someone to first remember the green star, then the yellow star, they misremember the location of the yellow star. They think it's closer to the green star than it actually is.



We expected that if we looked at the neurons we would find that the neurons **changed the strength of their vote** to most strongly vote for the location of the false memory at location 5:

Surprisingly, we instead saw this!!:

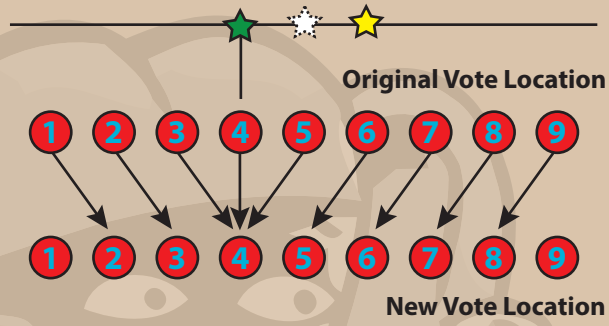


The neurons are **changing the strength of their vote** and voting for location 7. But if the neurons are voting for location 7, why do people say they remember location 5?

Oh no! Has someone stolen the election?

It turns out that nothing so nefarious has happened.

So what is going on instead? Well, what if instead of the neurons **changing the strength of their vote**, they instead **change the location for which they vote**? Neurons aren't known to switch their alligience, but what if the green star puts on such a great campaign that it nudges all of the neurons' votes just a bit toward it?



After seeing the green star, the neuron that initially voted 7 now actually votes 6! So when we then show the yellow star at location 6, the neuron that originally voted for 7 and now votes 6 has the stongest vote! There are also 3 neurons that vote for location 4 now!

So while we incorrectly think that the neurons are voting like **THIS...**

The neurons are actually voting like **THIS:**

Although location 6 still has the highest vote, it only has one vote. Location 4 doesn't have a high vote, but 3 neurons vote for it. The average vote therefore lies somewhere at location 5. This is exactly the location of the false memory!

So it turns out that by not telling us that they had changed their votes, the neurons fooled us into thinking the election had been stolen! This explains both why the neuron that originally voted for location 7 votes the highest, AND why the false memory is at location 5. This finding that neurons **'change the location for which they vote'** due to a previously remembered location is novel and has significant implications for how working memory neural networks work.

The mystery of the stolen election is solved!