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Psych 3513

Homework 1

1. **Title**: Learning from Prediction Error **Authors**: R. Shadmehr

   Abstract:

   Artificial intelligence provides algorithms for learning, but can the algorithms be a guide for how the brain learns? In the cerebellum, neurons group into populations that learn from prediction errors. However, unlike an artificial network, each neuron responds only to a specific region of the error space. Furthermore, the neurons that learn from the same error signal appear to group together into a single population. Thus, unlike an artificial neural network, in the cerebellum the fundamental unit of learning is not a single neuron, but a population of neurons that share a single teacher. This anatomical design of the cerebellum produces a learning system that exhibits remarkable features of memory: multiple timescales, resistance to erasure, and spontaneous recovery.

   Response:

   This talks about mainly the cerebellum, now what is the cerebellum exactly? The cerebellum sits directly under the brain and is not only more densely populated with neurons but also contains more total neurons. This goes to the concept of Hebbian learning where “Neurons that fire together wire together”. This research specifically looks at how certain groups of neurons in the cerebellum learn responds to certain variables the scientists are trying to predict. Next, the researchers are trying to figure out what effects the brains memory, this includes the erasure and recovery of the memory. Lastly, the researchers will compare how the learning in the cerebellum connect with the data they are trying to predict and also the effect on memory again.

2. **Citation**:

   Cascio, C. J., Moore, D., & McGlone, F. (2019). Social Touch and Human Development. *Developmental Cognitive Neuroscience*, *35*, 5–11. https://doi.org/10.1016/j.dcn.2018.04.009

   Response:

What this journal talks about is how physical touch will influence a human specifically in development but also on how the receiver looks out on life. It specifically looks into social touch being categorized into bottom-up touch, top-down touch. Bottom-up touch talks about the physical touch and also discriminatory touch which is produced by the character of your touch. Top-up touch includes societal settings like culture, relationships, and gender. The journal also looks into how this social touch will influence autism and the spectrum. The next point made is about how touch is affected throughout the human lifespan. This starts with infancy and goes all the way into adolescence and adulthood. What we see is an evolution from affective parental touch in infancy to non-familial touch in toddlerhood, to a sexual and romantic attraction focused interpretation of the touch. Lastly, the journal looks at autism and talks about how touch is affected and seen within the humans with it. Touch is perceived differently and thus changed in their perspectives.

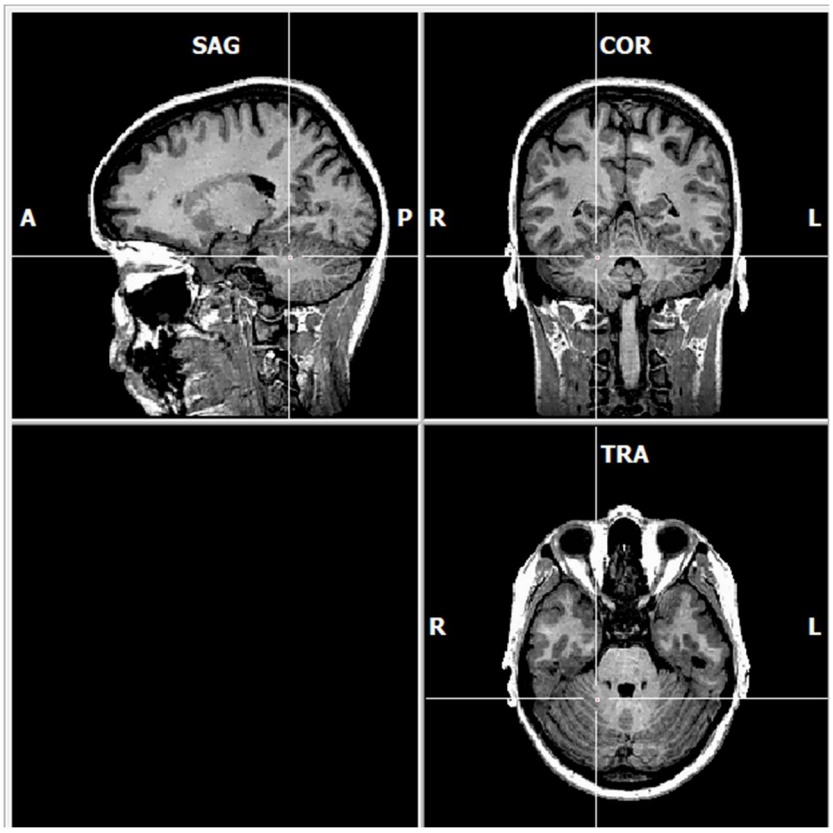
3. From exploring the website "Neuroscience for Kids" I learned many different things that weren't limited to 3 things. Firstly, I did not know the chemical effect alcohol had on the body and specifically that it is soluble in "lipid" and water solutions. I viewed alcohol as its own thing. I also had no idea what the Meninges was, like I have never heard the word and it honestly makes plenty of sense to why it is in the skull. Lastly, I did not know chocolate triggered the production of opioids and was so addictive! It is such a cool fact to know.
4. Neuro Professional Organizations - https://wp.stolaf.edu/neuroscience/orgs/
   Resources for Future Neuroscientists - https://www.petersons.com/blog/resources-for-the-future-neuroscientist/
5. Neuroscience Programs - https://neurosciencenews.com/neuroscience-programs/
   Top Neuroscience Masters- https://www.gradschools.com/programs/neuroscience
6. Replacement is the idea that we are to try to deviate away from testing on animals and more so on maybe the cellular level of bacteria or maybe on a computer where it is more ethical. This would allow for safer testing not only for the humans but also the animals that are being tested on. Reduction is to use less animals. This mainly revolves around having an intricate experimentation plan so that if the animal does die, it is not in vain,

and the project was useful. This makes sure each animal has a purpose and reduces the amount used for trivial manners. Refinement is to allow for the treatment of animals to be better. This means to value the happiness of the animals and to not suffer even when genetically modifying them. Ethically the treatment of them must be a priority.

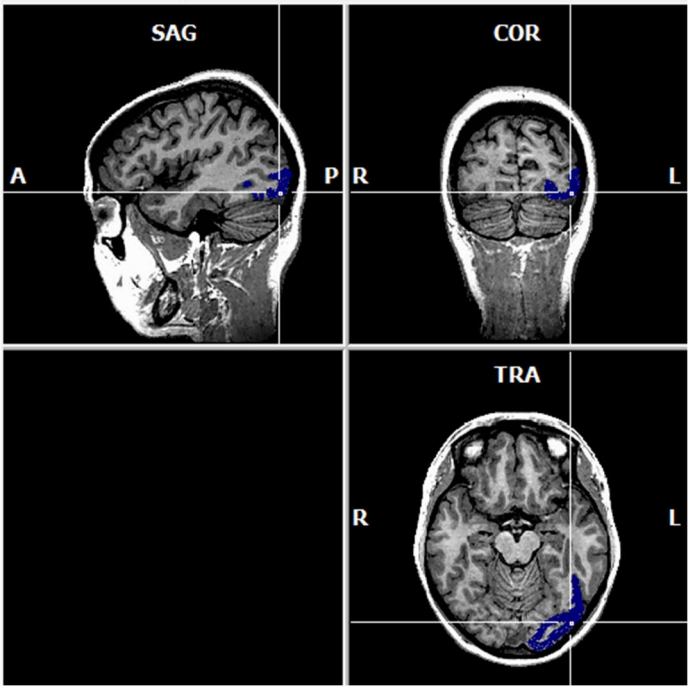
Works Cited:

Animal welfare and the 3Rs. Speaking of Research. (2017, November 27). Retrieved September 3, 2022, from https://speakingofresearch.com/facts/animal-welfare-the-3rs/

7.



8. **Inferior Occipital Gyrus:**



9. Alcohol and Drug Foundation - https://adf.org.au/drug-facts/cognitive-enhancers/
   WebMd - https://www.webmd.com/vitamins-and-supplements/features/nootropics-smart-drugs-overview

   Nootropics are considered “smart drugs” what they do is enable your brain to memorize more or be better at learning in a sense. Some specific ones are called L-Theanine, Creatine Monohydrate, or mixed amphetamine salts. L-Theanine is basically the same thing as coffee but just doesn’t have the jitters, this allows you to stay awake but also counteract the side effects. Creatine Monohydrate increases ATP production which helps with muscle regeneration and is what many body builders take. Lastly, the mixed amphetamine salts are basically what are in Adderall. What Adderall does is it improves focus by increasing dopamine and norepinephrine levels.

10. The disorder I am choosing is schizophrenia. Schizophrenia is an occurrence of when people interpret reality different form the rest of society, this includes hallucinating, delusions, and can be mixed with other brain disorders too. There is no cure for

Schizophrenia, but the treatment includes antipsychotic medicine which decreases the symptoms of the disorder. Cognitive behavioral therapy and supportive psychotherapy also help in patients that suffer from Schizophrenia. Schizophrenia also associates with many key brain structures; this includes the prefrontal and temporal lobes. These lobes control memory and that is the main target of this disorder.

Works Cited:

Karlsgodt, K. H., Sun, D., & Cannon, T. D. (2010). Structural and functional brain abnormalities in schizophrenia. *Current Directions in Psychological Science*, *19*(4), 226–231. https://doi.org/10.1177/0963721410377601

What is schizophrenia? Psychiatry.org - What is Schizophrenia? (n.d.). Retrieved September 3, 2022, from https://psychiatry.org/patients-families/schizophrenia/what-is-schizophrenia