The Mystery of the Human Cerebellum: What does it do? as presented by Dr. Nancy Andreasen

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Abstract

Computer aided medical imaging is one of the MIND institute's major research areas. They are a participating member of the Bio-informatics Network, and are operating at both the national level and the local level. Dr. Nancy Andreasen presents to us some of the research and findings of the MIND institute on the topic of the Cerebellum and it's functions. This discussion is prefaced by a survey of the history of computer aided imagery and it's medical applications.

The introduction of Computerized Tomography and computing approaches able to process the data gathered revolutionized imaging of the brain. Previous techniques were destructive and did not allow you to directly observe the process of the brain or mind. Further refinement to PET (Positron Emission Tomography) allows for even finer discrimination of mental processes.

The word cerebellum means little brain. It is commonly associated with fine motor function, co-ordination, and time perception. PET imaging has shown that the cerebellum is actually involved in a multitude of tasks including face recognition, recalling words, recalling stories, theory of mind, unpleasant emotions, and unconscious episodic memory.

The Purkinje cell is the largest cell in the human brain and is found in the cerebellum. It is comprised of an enormous number of dendrites and spines extending in one plane. It seems that these cells may be involved in monitoring

a large amount of data at once. The dendrites seem to connect to the traces of neurons on the surface of the cerebellum.

Researchers wondered where rhythmic timing came from within the brain. The thought was that slower rhythms were handled by the basal ganglia and faster rhythms were generated in the cerebellum. Studies have shown that rhythms are actually handled by the entire brain with a minor shift in the centers of activity.

All of the other studies that Dr. Andreasen presented showed that the cerebellum is involved in some way in most functioning. I found this very interesting since I am of the generation where Psychology was still teaching that function in the brain is localized instead of distributed.

I also appreciated the analogies between circuits and the brain. I found many similarities between their apparent visual structure. Dr. Kapur's questioning about the application of this knowledge towards the design of AI or smart chips was a very interesting question. I appreciated Dr. Andreasen's answer although I wish that she could have been more definitive about what she felt the best application and approach was.

1 Conclusion

In conclusion studies have recently shown that the cerebellum is involved in many tasks previously thought to be carried out elsewhere. It is through the invention and refinement of medical imaging that all of this information is being discovered.