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BRAINS

1.1 HOLISTIC VIEW OF THE MIND

The brain is a massively interconnected system with certain areas having some specialisation. Although there is specialisation, it is interconnected, hence, one cannot easily disconnect different features of the brain. Research in the last two decades have improved and changed my understanding of how our mind works. More and more it seems that we can not easily divide our thinking and feeling or all the other things that make up our person. Slowly, research seems to suggest that our body is an important part of understanding the world.

The first scientific exploration really open to the public was Damasio's work Descartes Error[2]. Herein he describes the the case of Phineas Gage and how emotions are important in our well behaviour. This is an important blow to pure rationalism and provides important steps towards the way we look at our inner workings these days.

The next piece in the puzzle is the concept of affordances by Gibson[5, 3] already made in the sixties. He propones the idea that we perceive the world in terms of what we can do ,i.e, in terms of pragmatic meaning. As with the initial proposal of any idea, it's an extremist position. Currently we see this idea reflected in the two stream hypothesis occupying the dorsal stream. Patients with damage to the ventral stream were able to navigate trough a room and perform task, but were unable to recognize the objects[9].

There is also scientific support for a relationship in the other direction. The tracked the gaze of a person trying to recollect a memory of a certain object. *We demonstrate that selecting an item from visual working memory biases gaze in the direction of the memorized location of that item, despite there being nothing to look at and location memory never explicitly being probed*[15]. Further research also implied that temporal spacing related to faster and more accurate reproductions of an object's orientation [16].

Thinking or cognition based on our body is called "Embodied Cognition". Some recent works have tried to apply this learning by enacting what happens or "Enactive metaphors"[4]. For example making gestures during math excercises decreased cognitive load and im-

proved performance in studies[7, 6]. In another study understanding of meteor paths was improved by enacting these in real life[12].

Of-course no discussion of the mind would be complete without talking about language. For me the two most influential thinks to know are "Sapir-Wolf hypothesis"[1] and "Metaphors we live by"[11] by George Lakoff and Mark Johnson. Few people still believe in the strong Sapir-Wolf hypothesis, namely that language **determines** thought and limits cognition[2], but the weaker version does seem to be widely spread. That is Language does **influence** thinking and cognition.

I'm not sure totally sure if how we talk about something influence how we think about something, but I'm sure that naming something greatly decreases the cognitive load of the concept. I would compare this to things we do in mathematics. for example working with a list of numbers can be difficult and complicated. However if we reduce this structure to the concept of Vectors, we can just manipulate this single object and later return back to the more detailed structure. This can be expanded to a vector of vectors i.e. matrices.

All these concepts converge to the concept of "Neural Reuse", the idea that neural structures for a certain purpose can be reused for a different purpose. A great number of examples have been collected in the paper by Anderson[1].

We also see this spillover in from more abstract concepts. A finding I find interesting is the effect of a collective or individualistic society on cognition and perception[8]. For example Asian people recollected more background object from a scenes compared to Euro-American people[13]. Another experiment compared categorization of objects, Asian people focussed more on the relational categories, while Euro-Americans focused on taxonomic categorization[10].

1 Linguistic Relativity

2 A great example of this is "doublespeak" in George Orwell's 1984[14]

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