Using Chaos to Understand Order:

Bayesian Computing and the Human Mind
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Much like a Pollock painting, the noise observed in the brain can appear to be a chaotic mess with no underlying order or meaning. However, Pollock paintings fetch tens of millions of dollars on the rare occasions they are up for sale. Even more interesting is the fact our noisy brains are for the most part capable of crystal clear thoughts. How then can one explain the logic behind paying so much for nonsense, and furthermore the clear logic the person used to decide to do so?
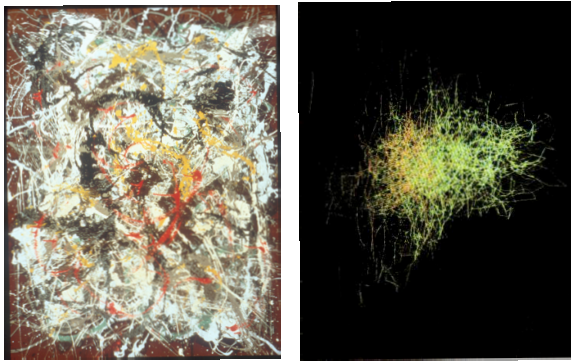

Figure 1) Left: Jackson Pollock, *Number 4*, 1950. Right: Mathematical reproduction of 3d recording of stimulation of the Olfactory section of the Cortex(Rotated 90º clockwise for continuity).

For a long time researchers have tried to model our brains after the current computer technology. Understandably, this has lead to vast shortcomings (just think about the time when Oregon Trail was "high tech"). The general idea was the brain recognized an image, then recalled the same, or similar image from memory. This is fairly insulting considering the capabilities of the human brain to perform the functions it does daily.

Alex Pouget, Assoc. Professor of Cognitave Neuroscience at U of Rochester is among those who recognize there is much more to the story. He is attempting to apply Bayes Theorem to model the brain. First proposed by Thomas Bayes over 200 years ago, it is a statistical means of calculating from the number of times an event has not occurred, the probability that it will occur in the future and the influence thereafter.

In English, he is saying the noise, or "variability" is actually the brain constantly reassessing [calculating] its current situation in order to optimally perform the next task at hand. The "noise" in fact, primes the brain for optimal function.

Pouget wants to show the variability in the brain is it performing constant calculations and thus find a common relationship of functions throughout the cortex to better understand our brains.

Others have also been applying Bayes Theorem to higher order computing, and the ultimate goal of the creation of artificial intelligence.

References:

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