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Fundamental principles by which the brain could process information: an information management perspective

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Background

One of the authors discovered that certain unconventional treatments for dyslexia, ADHD and other mental conditions use the same techniques that are used to remove capacity bottlenecks in large computers. Breakthrough experiences from one of those treatments led to the question: Would it be possible to build an information management model through which the capacity bottleneck theory could be confirmed?

Method

An architectural approach, as used in the information technology industry, brought two extremely limiting criteria to the forefront: the speed at which neurons operate and the enormous complexity that comes with computer-style parallel processing. Any such model had to be within the low speed requirement of about 100 straight-line neurons between thought and muscle activation, avoid computer-style parallel processing and yet allow for massive parallel processing.

Results

The architectural approach led to only eight fundamental design criteria. When those were put next to fundamental architectural criteria as known from the brain (columns, the layers of the neocortex, etc.), the information management model emerged. It became a two-way neural network switching model.

Discussion

Based on this model and in line with the emerging view of the brain operating in a self-organizing, pattern-forming and dynamic way, we propose fundamental principles by which neurons/patterns associate with each other, how neurons/patterns could activate each other, how the more relevant patterns/associations surface above the chaos of information and how the brain could process information in general.