

## Appendix 4

### Neurological Pathways

This appendix looks at how a potentially creative process occurs, what the brain is thought to be doing, and how it enables creative thinking from initial inspiration to final execution from a neurological perspective.

As alluded to in the context of spherical thinking, rather than residing in a single 'creativity center,' creative thinking emerges from the coordinated activity of different areas of the brain. This is achieved through multiple neural networks, of which three play crucial roles:

**The Default Mode Network (DMN)** is involved in several cognitive processes, including mentalizing (understanding the mental states of oneself and others), social cognition, and emotion regulation. Mentalizing is a crucial component of empathy and is impaired in many disorders, including depression, autism, and schizophrenia.

The DMN activates autobiographical memory retrieval also and is active during mind-wandering, daydreaming, and imagination. It also facilitates spontaneous idea generation and helps in making novel connections between seemingly unrelated concepts. In other words, it's the Ah-ha! network and it's not hard to see its vital role in creativity.

**The Executive Control Network (ECN)** includes the parts of the brain<sup>1</sup> that control cognitive functions like working memory, attention, and decision-making. The ECN enables the evaluation and refinement of creative ideas, maintains focus, and filters out irrelevant information. Importantly in the context of innovation (i.e., doing something practical with your creative ideas), it also helps transform abstract ideas into concrete plans. In the context of brainstorming, the final process of developing a plan to turn the chosen idea into something practical is ECN intensive.

**The Salience Network (SN)** centers on the part of the brain<sup>2</sup> that switches between DMN and ECN depending on what the cognitive task demands. The SN also identifies relevant internal and external stimuli and helps determine which ideas deserve further attention; in other words, the SN is crucial to the 'filtering' stage of brainstorming when crazy ideas are dumped leaving those that show promise.

<sup>3</sup> The dorsolateral prefrontal cortex and posterior parietal cortex

<sup>4</sup> The anterior insula and dorsal anterior cingulate cortex

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<sup>2</sup> The anterior insula and dorsal anterior cingulate cortex