

"Flight Simulation" of Human Social Interactions

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Abstract: It has long been theorized by scholars that reading fiction acts as a "flight simulator" to practice social communication, yet the mechanism behind tendency of humans to intentionally immerse themselves in fictional narratives, despite the absence of real world relevant data, remains a paradox that evolutionary scientists have been struggling to explain. This academic paper investigates the evolutionary origins and biological consequences of this universal human behavior by synthesizing existing data derived from fields like evolutionary psychology, literary neuroscience and social psychology. First, by examining the "Social Simulation Theory" this paper argues that human drive for engaging in fictional narratives is strongly supported by our pre-existing need for exploring novel environments in search of new stimuli that activated the brain's ancient reward system instantly. Second, by presenting neuroimaging evidence, this article demonstrates that human brain engages in "grounded cognition" to access fictional stories that requires activation of the same sensory and motor cortices used in real life experiences. Finally, this paper establishes that previously mentioned neural simulation and activation serves to strengthen brain connectivity, long-term neurological health, empathy, theory of mind and other cognitive functions. Ultimately, this research confirms that fictional stories are not just "entertainment technologies" but also evolutionary adaptation aimed at enhancing cognitive and social skills.

Keywords: Emotional drive, neural simulation mechanisms, grounded cognition, cognitive improvements, social simulation theory.



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INTRODUCTION

Every year 4 billion to 8 billion trees are cut down and processed into paper not just for essential records, but to print millions of copies of fictional books on a dead wood that could have gone to construction or fuel. Yet humans have decided that they are destroying roughly 15% of the world's annual timber harvest on publishing industry that was economically valued at \$151 billion (2024). From an evolutionary standpoint, this would be waste of precious recourses, however one should consider the fact that evolution is efficient and unless this behavior served biological purpose, evolution would get rid of it.

Through countless studies conducted, scientists established that storytelling is a form of adaptation aimed at functioning as a "flight simulator" for real-life interactions (Gottschall, 2012). It was consolidating evidence that supported storytelling instinct when researchers discovered that not only do humans invest so much on otherwise useless activity, but that it also improves cognitive performance overtime.

While fiction's evolutionary adoptive functions as well as cognitive benefits is well researched area, these theories stay isolated from neurocognitive data. Specifically, evolutionary perspective needs to be combined with the more recent data on neuroscience, particularly, grounded cognition (Hauk et al, 2004) to analyze how this storytelling habit lead to cognitive improvement (Berns et al, 2013). This paper argues that the evolutionary drive for exploration created a fixation toward fiction that forced the brain into simulating fiction in a way that engages neural mechanisms, and this continuous activation of brain regions later transforms entertainment into lasting positive cognitive changes.

Evolutionary Origins of Human Fixation on Fiction

Humans have always had a hunger for information just like they did for food. They even developed an exploration system that triggered curiosity to explore new places and novel opportunities. The development of this system led humans to acquire new information about the environment, since that could, later on, lead to discovery of more food recourses or other potential valuable sources, which was critical for survival. This is essentially the foundation for Dubourg and Baumard's (2022) "Entertainment Technologies" term that changed people's perspective from viewing humans' attachment to fiction from evolutionary glitch into an important tool, specifically technology, that worked to exploit human's already existing system for exploration. One of the reasons for why humans could sit there and be immersed in a fake world for hours were because fiction acted as a "superstimulus", in which, it exploited human's exploration system by providing more information than they could get, say, from walking in the park to observe their surroundings, so, incidentally, they could glimpse some information that can be helpful for them. Therefore, people might become understimulated instantly from walking around the park, but have the capacity to fixate on a fictional story that actually does not provide real valuable data points for hours on end with no signs of boredom. However, exploring fiction was not just for "entertainment", scientists figured. It has been proposed by Mar and Oatley (2008) that fiction acted like "a simulation of the social world", just like pilots need a flight simulator to learn how to fly, since, obviously learning how to fly in real time can actually lead to futile but unnecessary consequences. Same can be applied for fiction, because "narrative fiction provides a simulation of social experience", enabling humans to "flight simulate" social world complexities in their heads without any emotions or reactions that might fallow the real social world.

Neural Mechanisms Behind Processing Fictional Narratives

What Social Simulation Theory proposed could not be effective without "grounded cognition". This neural mechanism has been explained by Barsalou (2008), who stated that for social simulation to be effective, when it comes to fiction, brain needs to physically participate in the act. This meant that human brain needs to, physically and emotionally, re-enact what it is comprehending just to understand. It was also about making a distinction between human brain and computer, which only works through abstract concepts, and redefining it a system in which language needs to be "grounded" in the body for it to get registered. This argument has been supported by the fMRI studies held by Hauk and his team, in which, they made people move their hands or wiggle their tongues, they observed which part of the brain was "lighting up" under the machine and second time, they made these same people read about the movements they just executed and this time, same region of the brain that lit up while doing the act also lit up just by reading about it (2004). Another study by Berns et al (2013) connected the activation of the same motor cortex to another finding, which showed that neurons in the Central Sulcus (the sensory-

motor strip) stayed "highly connected", even when it was resting, after it has been exposed to prolonged activation by reading fictional stories that featured continuous action. In addition to this, it was found that brain regions used to understand stories and ones that used for social cognition - understanding other people - are nearly identical, in fact both of these happen in Default Mode Network, part of the brain that is only activated when we are disengaged from the world and instead focused on imaging things or simply thinking (Mar 2011). Therefore, fiction, which is simulator of human social interactions, is more directed use of DMN in which, instead of brain wondering aimlessly, it is made to simulate social interactions that results in speed and efficiency in communication between these brain regions.

Lasting Cognitive Changes Resulting from Immersion to Fiction

The lingering connectivity of the brain after activation was called "Shadow Activity" by Berns, meaning that simulation left a physical trace in the brain. This basically lays the foundation for long-term cognitive benefits. One of them is Theory of Mind which is defined as the ability of humans to understand that others might have thoughts and emotions different from their own. Kidd and Castano (2013) proved that people started to perform better at attributing mental states, theory of mind, just by looking at the pictures of the eyes after reading literary fiction. It meant that humans were not just reading fiction to imagine dragons, they were reading fiction to survive from evolutionary standpoint, because if people could read about a character and understand their mental state, then they could also read their neighbour, underlying mechanisms of which previously explained by Berns. Another empirical evidence presented was the study conducted by Wilson (2013), whose findings validated the fact that people who had a lifelong habit of reading fiction has 32% slower rate of mental decline. Reasons for this was established with the concept of "Cognitive Reserve", which explained that reading creates many neural connections (synapses) in the brain and it leaves abundances of synapses that later makes up for the lost ones that died because of natural aging process. In the end, continuously accumulated "Shadow Activity" over time does not just make the brain work more, but it helps it to work efficiently. First, by teaching readers how to be comfortable with ambiguity, meaning that their brain have simulated many what-if scenarios through reading fiction that they are less likely to make snap judgements in real time (Djikić, et al, 2013). Second, by forcing the brain to train working memory, since, when people read stories they need to keep track of names, motives or past events to understand the story and this requires constant retrieval of old information from temporal lobe to prefrontal cortex.

Conclusion

On the surface, human's storytelling instinct only seemed to serve as entertainment, one way of escaping reality, but evolution positioned it as biological training complex that hijacked human's exploration system and turned it into a literal "flight simulation" to help humans navigate social world. However, this "social simulator" would not have the intended benefit without "grounded cognition", which helped scholars to establish that human brain does not process information like computer does, instead, it process information through activating same regions that it uses to do the real act, such as motor cortex lighting up when we are reading about a character raising their hands, as if readers themselves were raising their hands. In the long run, continuous "firing" of these neurones serves to strengthen the connection between different regions. Strong connection between these regions, consequently, leads to boosted cognitive performance, such as cognitive reserve, memory, empathy. Therefore, evolution did not make a mistake in evolving humans to be storytellers and readers, it stayed efficient by turning simple activity such as like reading into a tool that ensures successful navigation of social world.

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