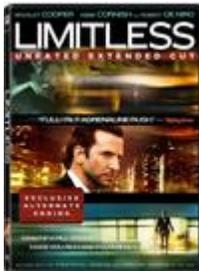


Neuroenhancement: Do “Smart Pills” Have Limits?

A review of the film



Limitless

(2011)

Neil Burger (Director)

Reviewed by

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What if there were a “smart pill” that could make you excel at everything? *Limitless* examines the power of the mind and how one struggling writer, Eddie Morra, played by Bradley Cooper, deals with his newfound supermental powers. The film begins by reasserting the popular myth that we use only a small portion of our brain’s potential (Beyerstein, 1999) and proceeds to show both the upside and downside of neuroenhancement.

The inciting incident of the movie occurs when Eddie, a down-and-out writer, first takes the smart pill, NZT, given to him by his shady former brother-in-law. Eddie is now able to effortlessly write his novel. He composes and writes like a speed demon, finishing his manuscript in days. Any trace of writer’s block is gone, and, according to his editor, he produces a masterpiece.

Eddie is hooked. He quickly discovers that his abilities extend beyond just enhancing his previously learned skills. He has access to every incidental memory in his life. He feels he can “tap into” his unconscious. This is more than just the rote retrieval of photographic memory. Like a dream come true, he uses his memory of obscure references to seduce his despised landlord’s girlfriend, a law student, who is impressed by the analysis he offers on her paper.

Whereas Eddie’s previous life had become the paragon of sloth, procrastination, timidity, and disorganization, NZT now gives him a boost in executive functioning; he becomes a self-starter, gets himself and his apartment spiffed up and organized, and is undaunted in his response to any new situation. Eddie Morra is now competent, self-assured, and on target. Not only are his intellectual abilities enhanced, but he is also more socially and emotionally aware. He can read others’ emotions, apparent needs, and intentions.

Soon Eddie yearns to reach beyond his life in the publishing world. He is taken in by the allure of big money to be made as a day trader. Even better than having the primed and plastic brain of a child, he learns complex equations and digests trends in minutes. If he needs to learn Mandarin Chinese, he can do that too. He is soon the hottest trader on Wall Street.

Limitless is timely in that it echoes the current interest in neuroenhancement. It has been estimated that more than 100 drugs may be under consideration as cognitive enhancers (Soyka, 2009). For example, cholinesterase inhibitors were originally developed to delay memory decline in dementias such as Alzheimer’s disease, and prescription stimulants are routinely used to improve attention and focus in disorders such as attention-deficit/hyperactivity disorder. They are now being used “off label” and are increasingly sought by healthy people of all ages with no diagnosed medical condition who want to sharpen their memory, attention, and focus (Larriviere, Williams, Rizzo, & Bonnie, 2009; McCabe, Teter, Boyd, Knight, & Wechsler, 2005).

In addition, cognitive enhancement can also occur through the use of noninvasive brain stimulation techniques such as transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS). Currently in clinical use for treating depression (D. R. Kim, Pesiridou, & O’Reardon, 2009), brain stimulation has also been demonstrated to offer improvements in healthy people in working memory (Ohn et al., 2008), language learning (Flöel, Rösler, Muchka, Knecht, & Breitenstein, 2008), and complex motor tasks (Y. H. Kim, Park, Ko, Jang, & Lee, 2004).

There is much debate in the medical and psychological community pertaining to the ethical use of medications to enhance neural performance, and *Limitless* speaks largely to the personal safety issue. One of the primary dangers of NZT is that its physical addiction creates life-threatening peril. Eddie begins to have memory blackouts. Without NZT, his mind and body crash, he cannot concentrate, and he goes through a physical withdrawal that could kill him.

Although the film's depiction of addiction may be played up in the name of dramatic tension, prescription drugs and brain stimulation used to enhance cognition for healthy people are not without risk. For example, prescription drugs carry a variety of risks related to safety and addiction, and TMS carries a risk, albeit rare, of seizures (Wassermann, 1998). These risks have led some experts in the field of addiction research to raise serious concerns about the use of neuroenhancement (Soyka, 2009).

There are a number of larger ethical questions that neuroenhancement brings up. For example, do cognitive-enhancing drugs create unfair academic and work-related advantages similar to those discussed in sports doping debates? Will neuroenhancements be able to alter not only cognition, but also social and moral thought?

NZT does give Eddie Morra an unfair advantage in every area of his professional life. He secretly uses his power to gain personal wealth and fame. Although his power is initially used for his personal gain, after a number of personal crises, in the end, Eddie turns to politics. Whether this choice is prosocial or the ultimate in power seeking is left up to the viewer.

The issue of how the "self" may be altered by neuroenhancement is broached more directly by Eddie's girlfriend, Lindey. After she takes NZT, she admits she may have done things that she wouldn't have done without the pill. Eddie, however, argues that he is the same.

This issue, although just hinted at in the film, represents perhaps one of the more contentious issues related to the future of neuroenhancement. Results of studies of neurostimulation suggest that people can be influenced to alter aspects of their moral reasoning. TMS to the right parietal junction influenced participants to disregard the intention of an act in favor of a morally reasonable outcome (Young, Camprodon, Hauser, Pascual-Leone, & Saxe, 2010), and inhibitory stimulation to the frontal cortex had an effect such that self-interest often trumped a more typical "fairness" response in a reward-seeking task (Fecteau et al., 2007).

If neuroenhancement can affect not only cognition but also mood and social and moral reasoning, do we then move into the brave new world of altering or creating entirely new selves? Currently there is no one drug that is *Limitless*. Even in this film, the pill's effect is largely on learning and cognition. But *Limitless* opens the door to bigger questions: How far can neuroenhancement take us beyond our current limits, and do we want to go there?

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