Letter to the Editor

The Mythical Brain: Is the Science of Movie *Lucy* Wrong?

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Abstract

The movie *Lucy* explores the idea that we use only 10% of our brains which, according to an editorial in Nature Neuroscience, is wrong. However, we may reframe the myth to reveal the underlying meaning: it is not about using just 10% of the brain, but about perceiving only a very small fraction of what the brain is doing. If we will, we can stop our usual, daily routine activities, or our usual day dreaming, and immediately we start noticing more. The alternative interpretation to *Lucy* is that the movie is not about the brain, but about consciousness. Change the metaphor and you get a totally different meaning.

Key Words: Movie Lucy. myth, brain, neuroscience, Consciousness.

In "The mythical brain" editorial[1] Nature Neuroscience addressed myths about the brain. That is, ideas about the brain shown by science to be wrong, but still accepted by the lay public. This is a recurring theme in science education, not only in neuroscience, and its importance is very clear. The catalyzer episode for this specific editorial was the movie *Lucy*, which explores the idea that we use only 10% of our brains - which according to Nature Neuroscience's editorial, is wrong. However, one of the movie's main character, played by Morgan Freeman, is a neuroscientist that gives lectures about the neurons, brains, intelligence and evolution. And the untruth in other neuroscientific claims in the movie, such that with one neuron, there's life, with two there's movement, seems to have gone unnoticed in the editorial.

Why was the 10% myth clearly addressed, while other myths related to neuroscience were not? Maybe because the 10% myth is used in the movie's marketing. But maybe there are other reasons as well. If unicellular organisms are alive and move, as well as plants and fungi, without needing neurons to do it, why haven't these myths received attention from the editorial? The distinction between these examples seems essential. Because a possible alternative interpretation to the movie is that, although the metaphor is neurocentric, the meaning is not. This alternative interpretation became even more appealing to me while listening to director Luc Besson talking about his work and the idea that we only use 10% of our brains: "It's *totally* not true. Do they think that I don't know this? I work on this thing for nine years and they think that I don't know it's not true? Of course I know it's not true! But, you know, there are lots of facts in the film that are totally right."[2] The alternative interpretation to *Lucy* is that the movie is not about the brain, but about consciousness. Change the metaphor and you get a totally different meaning.

Let's reframe the myth to reveal the underlying meaning: it's not about *using* just 10% of the brain, but about *perceiving* only a very small fraction of the brain's doings. And this is scientifically true! The brain is intimately connected to all the body, and lot's of its workings

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have to do with things which are far from our conscious experience. At every single second our hearts beat, our blood vessels dilate and contract, our lungs bring air in and let it out and the whole *autonomic* nervous system operate. Why have we called it autonomous? Because most of the time it operates independently of our will and consciousness of it. And so it is with many of the brains activities: it goes on and on, but unnoticed by us.

But if we will, we can stop our usual, daily routine activities, or our usual day dreaming, and immediately we start noticing more. Oh yes, I am breathing and my heart is beating while I write this letter, even though it's hard to feel it at the same time I write. And this is exactly the puzzle experienced by Lucy. How is it to become more conscious than in our everyday experience? How would it feel to be aware of all the bodily functions at once? What would be the possibilities if we could, at will, control the neuro-pycho-immune connections? How would it be to be conscious of all memories and sensations of one's own life? Poetically, Lucy starts remembering her experience breast feeding, the taste of her mother's milk in her mouth, all the kisses received from her parents in her entire life. And all this while she's undergoing surgery without anesthetics: she chose not feel pain. Is all this possible? We don't know. Probably unlikely. But until the molecular turnover dilemma challenging the neuroscience of memory and the strong placebo effect in pain are not overcome, impossible to definitively claim it's 100% wrong.

Not limiting the question to one's own brain and body, Besson has freedom to imagine further: the movie helps us imagine how would it feel to be conscious of other peoples memories, thoughts and emotions. Or yet, how would it feel to be aware of all the matter and energy flowing in a tree? A beautiful scene in the movie helps us see a tree closer to how it really is, beyond our static perception of it: truly alive, moving and pulsating with flows of matter and energy. In another surreal scene in an airplane, the movie help us imagine how would it feel to be aware of every cell and every molecule in the body. Is Lucy transcending the skin-encapsulated ego[3] while under the effects of a psychoactive chemical in an airplane? If it's about consciousness, and not just about the brain, these other meanings become possible. And they are there not just to entertain, but to educate. Scientists inclusive. And this other meanings stretch till the last scene: Why else would Lucy be *everywhere* after attaining a 100%? Any resemblance with Vedanta may not be coincidence.

The beautiful imaginative tour about conscious experience depicted in *Lucy* is, therefore, scientific valid and welcome, even though not all claims about brains and neurons are precise. And many of the movie's visuals and the perceptual situations lived by the main character remind of other questions about consciousness raised before, based on the very real consciousness changes elicited by psychedelic experiences[4]. Despite the large disinterest of most brain scientists in such "mind manifesting" substances for decades[5], their effects on conscious experience and hypothesis of the brain acting as a reducing valve for consciousness continue challenging neuroscience. And this is precisely the myth that neuroscientists are not always willing to openly talk about: neuroscience as having the final word about consciousness.

Despite the best efforts and recent advances[6,7], we still do not have proofs that the brain generate consciousness, nor that it is uniquely human[8]. Going even further, it is indeed possible that consciousness exists in other living organisms that move, learn and reproduce even without

neurons[7,9]. As many questions related to consciousness are still unanswered by modern neuroscience, attempts to bring this topic to the general public should not be prematurely dismissed. On the contrary, they should be welcomed as they increase the spirit of enquiry. As humourously expressed by Luc Besson in The Guardian "If you find yourself asking what's real and what isn't, I've won"[10].

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