



Reply to Saavedra (2015) about “vaccinate against brain-centrism”

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I saw the movie that Saavedra (2015) referred to. In Colombia, it was called “*Intensamente*” and in my opinion as a spectator the movie is amazing. I make this judgement as father that takes his kids to movies often, and hopes to find quality entertainment. **Furthermore, the movie contents should not have magic as main argument I think** (princes, princesses, fairies, magicians, etc.) but it shows an effort to tell a story with evidence and scientific reports. To mediate, even though I don’t have any participation with the movie or the production team of course, **the presentation about memories, personality, and dreams with emotions is interactive and with some real elements.**

It is a movie with strong scientific content and I agree with educative materials that having models and important sources knowledge for the education of children and teenagers. If some kids dream of being heroes, why not offer the possibility that children are conscious of their emotions and that they understand the role that emotions play in their daily interactions with others (Denham, 1986; Denton, McKinley, Farrell, & Egan, 2009), or how are memories formed or how the memory process can be damaged (Acevedo-Triana, Cardenas, & De Brigard, 2013; Schacter, 2002) and how emotions and consciousness are connected, for example (Alexandrov & Sams, 2005; Cabanac, Cabanac, & Parent, 2009; Tsuchiya & Adolphs, 2007).

I agree with Saavedra (2015) that there is oversimplification of the process shown by movie and I agree that we cannot forget some core mechanisms during functioning: hormones, feedback system, metabolic process, epigenetic changes, and others, that do not appear in the explanations. But with a little help it is possible to frame the phenomenon in a broader perspective (Shurkin, 2015; Sugimoto et al., 2013). Perhaps the strongest criticism is the infinite existence of emotions in both people and personifications of small emotions, which in turn should have an emotional meta-system to function and so on. So, together with the “ghost in the machine” problem that suggests the existence of a public life and a private life, that doesn’t reflect the reality of the organism’s functioning; on the contrary, it is related to a “mental life” and separates them from the body clearly falling into a distortion of reality, a form of any of the types of dualism (De Brigard, 2003).

I disagree with Saavedra's (2015) argument that phenomena related to brain images, which have more credibility but no evidence, are problematic in themselves. Studies in cognitive neuroscience –only by restricting to brain images in humans- are extensive and can vary in validity and veracity, but it is not possible to attribute their falsehood to a mainstream or hot topic. Manichaeism doesn't recognize systematically rigorous research using the mechanisms of brain imaging to explain a phenomenon and that is not only "fashionable". In this sense, the economic, political and health problems associated with creating illnesses to justify the creation of drugs are stated but unless there is very strong evidence to justify them, they are no more than a guess within conspiracy theories. The group of "diseases" is a very broad category and limits are hard to establish. In fact we consider them a convention, but physical phenomena for which there is an effective medication are not an "invention" of the pharmaceutical industry (see management effectiveness of positive symptoms in schizophrenia, for example Chakos et al., 2004).

Regarding the three points that the author suggests to "*vaccinate against brain-centrism*", I believe that some errors occur in the assumptions of ideas. Now, the expression: "vaccine" is unfortunate in itself with regards to its meaning, but at this point I think the author makes it in a metaphorical way, otherwise it would be a contradiction.

The first idea is "*we forget that the brain is in the body and the body interacts with and influences our brain*", and it has a faulty premise: to think that there may be a brain outside of a body. For now, it is not possible. But this idea is a misunderstanding when talking about the brain as the only organ that belongs to the nervous system. One annotation showing this approach is that when a real nervous system is observed, there is no real point of differentiation, i.e., the separation of brain, spinal cord, nerves, is truly artificial, the entire system is attached and is separated into parts under an arbitrary criterion (function, for example). So are other systems in the body (Escobar & Pimienta, 2003). Therefore, expressing the emphasis in the brain does not presume a lack of interaction or isolation. Conversely, if the brain is mentioned one must assume its interaction with other systems. I agree that different physiological and peripheral responses affect processes in the brain, but are not their cause.

In this regard, and as a way to clarify the emphasis, saying that the brain is the cause of X process is expressed, at least on a personal level, as the importance of the biological level in the process. If we address psychological phenomena, and it is clearly not possible to have a psychological phenomenon without a physical system (in this case biological), such as pain in general (understanding the need to transport this signal across peripheral nerves) these phenomena occur in a structure (brain) and can be eliminated by a therapeutic agent (analgesic). If we wanted to simplify the process of drug effect we could indicate that the effect is "on the brain", which could not be responses. Pain would not be possible without brain responses. For those interested in behavior the study of the brain should be indispensable.

The second idea is that "*... the body, including the brain, is active in a community with cultural regulations. It is within a historical-cultural framework that also interacts with the body and the brain*". This idea is an assumption that is more framed in a dualistic conception that presumes that culture is outside or it is an invisible air that dwells among us. (Pinker, 2001). Culture is a concept that frames a very large amount of social practices that are carried out by individuals and have allowed, as the author points out, an evolutionary development. Language, social adjustment, emotional interactions between individuals are all cultural events that respond to the evolutionary mechanisms, and would not appear if it were not that these individuals have the potential to perform them by having a "normal"

nervous system. Finally I will not refer to this sentence because it is not developed in the post, but I understand "*the evolutionary advantage of Homo Sapiens*" as a metaphor because it cannot be literal.

Finally, I partly agree that there is plasticity in the nervous system. To illustrate, there is increasing evidence of the relationship between psychological phenomena and changes in gene expression, which we call epigenetic (González-Pardo & Pérez Álvarez, 2013; Mifsud et al., 2011). The process of cause and effect is cyclical but I do not consider it to be a static term. My example would be using a concept in neuroscience, the process of neuronal communication (synapses). A neuron is presynaptic if it is in the position where the neurotransmitter is sent and is postsynaptic if it receives the message. If the process continues, the postsynaptic neuron -and if certain conditions are met-will become be presynaptic and others postsynaptic. With this I propose that "cause" is a term relative to the process, but if it is not there, the process cannot continue, if we remove the presynaptic neuron there is no postsynaptic cell, if we remove the brain there will be no interaction with the environment or lifestyle much less psychological phenomena.

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