Editorial

Neurotechnologies: the need for an ethical commitment in their implementation

In 1990, the Library of Congress and the National Institutes of Health of the United States launched the project known as "The Decade of the Brain" in order to promote the scientific study of the encephalon and emphasize the importance of deepening its knowledge for the good of mankind (Library of Congress, 1990). Their achievements were rather modest compared with the gains made today by two similar initiatives: the first raised by the European Union under the name of Human Brain Project, which seeks to apply in ten years the most brain simulation through the use of computer models installed on supercomputers. On the other hand, the project Brain Research through Advancing innovative Neurotechnologies (BRAIN), implemented by the United States, with the aim of developing technologies that enable a more accurate picture of the brain (combining the spatial resolution of neuroimaging techniques, with temporal resolution of EEG techniques) to favor a more detailed study of the same. Both projects aim, ultimately, to develop neurotechnologies that give way to a better understanding of the brain, in order to contribute to the solution of nervous system diseases, whether neurological or psychiatric, and the advancement of applications based on knowledge that is generated from the study of their connections: to provide more effective solutions in different fields of human knowledge, and that cover such diverse fields as education, engineering, economics or marketing.

But what are the neurotechnologies and what are their implications in our lives? Eaton and Illes in the magazine Nature Biotechnology 2007 define the neurotechnology as any development that allows monitoring or modifying brain function. Thus, from the Golgi staining methods developed in the late nineteenth century to the development of functional resonance techniques in sleep states, recently added to the arsenal of techniques to study the brain, constitute examples of neurotechnological developments that enable to delve into the depths of the nervous system.

However, in a world where everything that contains the neuro prefix, seems to generate a greater sense of scientism and credibility, it is necessary to warn of their indiscriminate use, as we are easily seduced by the spectacular images they offer.

The two aforementioned examples of neurotechnologies illustrate this point well. In the case of the Golgi staining methods that allow the display of a few neurons leaving intact neurons that are around, so it is possible to directly observe the neuronal structure under the microscope, no one, to date, has been able to offer an explanation of the reasons why only a few neurons are stained leaving intact the others. Likewise, functional neuroimaging techniques allow us to see with a lag of a few seconds which areas are activated in a timely task or which are interconnected in the states of rest;

however, the multicolor image displayed does not indicate whether it is an excitatory or inhibitory process, this being an issue that already, since the work of Pavlov (1929/1997), is essential in the construction of any theory that seeks to explain the brain function. Similarly, in the study of neuroimaging, there is a tendency to focus on the areas of greatest activity unaware that in the brain, like an orchestra with various instruments, the active areas are as important as the silent or opaque areas.

We are witnessing a continuous flood of new discoveries highly publicized in the media in which the discovery of the mechanisms of empathy (Interlandi, 2015) or brain activity generated by connecting ideas to be funny (Sample, 2014) are announced, among others; a series of headlines are similar to those that emerged in the nineteenth century, during the period of greatest growth of phrenology (Capen, 1834). Joseph Ledoux, in an article published in Psychology Today (2015), suggests that the amygdala is not the fear center, is one of the structures involved in the generation of a much more complex process in which several brain areas are involved, and he stressed the importance of not confusing the findings with the conclusions.

Despite the poor understanding that there is still in relation to the brain and how many neurotechnologies work, their commercialization has increased dramatically, in a market, which according to figures from the Commerce Department of the United States, will reach values close to 3 billion dollars by the end of 2015 (Neuroinsights, 2014). Today, we are attending a growing supply of "neuro" services with the promise to improve the academic performance of children, achieve greater labor competitiveness and enjoy more satisfying social and affective relationships. Unfortunately, studies in which most of these developments are based are far from standards of validity and replicability to ensure their effectiveness. Even worse, many of the professionals who are providing these services lack adequate education and training that enables not only to use good equipment but also interpret the results and make appropriate adjustments to ensure greater well-being for patients, clients or students. It is clear that, the growth and use of these neurotechnologies can bring huge benefits for people, but for this, it is necessary to promote further development of research in the area, to evaluate the effectiveness of these procedures and allow quality training of human resources responsible for its implementation.

It is important to emphasize that all neurotechnological development should be guided by the highest standards of quality and ethical commitment, which effectively ensures the greatest good for potential users, so you always keep in mind one of the principles of bioethics today, according to which not all technically feasible is ethically correct (Lucas, 2001).

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