AI and Neuroeconomics:
New Conceptual Models for Old-Fashioned Philosophical Problems

Ernesto D’Avanzo, University of Salerno, Fisciano, Italy

ABSTRACT

This article describes how Plato proposed the dualistic solution to the mind-body problem, providing an explanation along the lines of his epistemology. Francis Bacon, in 1600, formulated his vision of the scientific method that will be valid until the 1960’s when Karl Popper proposed his version, entering into controversy with the Lord Chancellor. Thanks to recent developments in artificial intelligence and computational neuroscience these problems have new empirical tools to be analyzed. An interesting aspect of this research program, better known as neuroeconomics, is the use it makes of the probability calculation tool for dealing with so-called decisions under uncertainty. The paper is an attempt to tell the birth, development, and some examples of these toolboxes, available to all those who want to apply them to improve knowledge inspired organizations.

KEYWORDS

Artificial Intelligence, Computational Neuroscience, Conceptual Models, Decision Theory, Mind-Body Problem

1. BACKGROUND

What is the relationship between mental events and physical events? The question identifies the mind-body problem debated in philosophy of the mind, and in so many scientific disciplines, such as psychology, physiology, and more recently neuroscience and cognitive science. Plato proposed the dualistic solution to the mind-body problem (Cooper & Hutchinson, 1997): mind and body, or mind and brain, are two separate substances that are incapable of interacting with each other. The Greek philosopher, of course, provided an explanation of the problem on the basis of his epistemology, identifying the mind with the soul and arguing that the mind was pre-existing to the body and that, after death, the soul survived.

Yet, the two entities postulated by Plato, soul and body, or if it preaches, mind and brain, interact, this is evident. Nevertheless, the Platonic solution to the problem does not explain how the will moves the body or, in other words, as an entity interacts with the other.

The philosophy, from Plato to this day, has tried to explain the problem turning to conceptual tools (Hart, 1996; Hutson, 1992). Science, by 1600, also committed to this front, has only begun to provide explanations of the mind-brain problem in a more systematic way employing empirical and/or formal tools. Descartes, for example, recognizes the existence of two substances, mind and body, also known as “res cogitans” and “res extensa”, and introduces the mechanistic element, that

DOI: 10.4018/IJSEUS.2018040104
is the reflected action which, in its modern version, is a biological control system which combines stimulation and response through the reflective arc (Robinson, 2003). The system contemplates a receptor organ, an effector, and a communication channel between the two.

Another systematic attempt, to address the problem, dates back to the early 1900s, when Gottlob Frege, Bertrand Russell (Russell, 1992), and David Hilbert tried to systematize mathematics on a logical basis and sought to describe, in that sense, every physical system, including the brain.

Nervous system models could find in the mathematical logic a tool to understand how signals from receptor organs, stimuli, such as “will” or the order to “go shopping”, cause responses to effectors organs, for example “move your legs”, and so on. The above-mentioned makes the idea of how the mind-body problem has always attracted the interest of the brightest minds. The scholars who are concerned have seen in it a challenge for the empirical and/or mathematical methods proposed for other areas of science such as the Marquis of Laplace, best known for his physical/astronomical investigations, who in his scientific theories has placed the problem of an immense fully deterministic intellect, to deserve the appellation of demon. Laplace’s demon is introduced in Section 2, along with some hints of the two major works of the Marquis in the physical field, and the implications they have for the mind-body problem and free will, two closely related topics. Section 3 analyzes what happens when you move from a dualistic position of the problem, à la Plato, to the monistic position that sees the mind identified, or “embodied”, with the brain. A look at the empirical research program proposed by neuroscience, with some references to its applications in the field of economic choices, offers a different view of the mind-body problem, at least compared to what comes out of Laplace’s vision. Section 5 presents a brief overview of two computer programs, Remote Agent and BACON, which represent the prototypes of successive, and successful, categories of programs, which make extensive use of machine learning methods and, in general, artificial intelligence (hereafter AI). Indeed, AI has proven to be a very useful tool to tackle other issues related to the foundations of sciences, such as the “scientific method”, briefly presented in Section 6.

2. LAPLACE’S DEMON: AN OMNISCIENT INTELLECT

Allen Downey, in his Think Complexity (2012), begins a famous passage written by Pierre-Simon Marquis of Laplace, in which the French scientist, inspired by his discoveries in mathematics and astronomy, argues that “the present state of the universe can be considered as the effect of its past and the cause of its future”. For Laplace, an “intellect” aware of “all the forces that set in motion the nature”, “of the positions of all objects whose nature is composed” well, for such an intellect, “wide to suffice to be able to analyze all these data”, “nothing would be uncertain and the future, just like the past, would be evident in his eyes”.

The passage quoted by Downey is taken from the Essai philosophique sur les probabilité, a work of 1814, which Laplace, then sixty-five, writes at the same time as the most demanding and controversial writing, the Mécanique Céleste, began in 1799 and ended two years before his death, occurred on March 1827 (Laplace, 1835).

Although the Mécanique was particularly interested in its importance in describing the astronomical physics enterprise, initiated with Isaac Newton, in the rigorous terms of differential calculus, the work is also rich in insights on the phenomena that today make the interest of the scientific community not only from an experimental point of view; just think of the hypothesis about the existence of black holes; or the nebula hypothesis according to the solar system would develop from a globular gas mass. Both of these postulates are the product of the French scientist; Immanuel Kant, in fact, had already introduced nebula hypothesis, in 1755 (Kant, 1755), but the Marquis of Laplace, a few years later, reformulated it independently of the German philosopher.

The whole reading of the Meccanique and the Essay is not only dictated by the common window of time in which the two works are produced; the comparison has a deeper motivation. It should first be noted that one of the major contributions of the Mécanique, as was mentioned earlier, lies precisely
Developing Decision-Making Skill: Experiential Learning in Computer Games
Kurt A. April, Katja M. J. Goebel, Eddie Blass and Jonathan Foster-Pedley (2012).  
*International Journal of Information Systems and Social Change* (pp. 1-17). 
[www.igi-global.com/article/developing-decision-making-skill/72330?camid=4v1a](www.igi-global.com/article/developing-decision-making-skill/72330?camid=4v1a)

Promoting Indigenous Financial Inclusion: Improving ICT Access Within Rural Australia
[www.igi-global.com/article/promoting-indigenous-financial-inclusion/199819?camid=4v1a](www.igi-global.com/article/promoting-indigenous-financial-inclusion/199819?camid=4v1a)