

BOOK REVIEW

Summoning a Forgotten Debate Over the Nature of Time

Jimena Canales, *The Physicist and the Philosopher: Einstein, Bergson, and the Debate That Changed Our Understanding of Time*. Princeton, New Jersey: Princeton University Press, 2015. 479 pp.

KANG Hyeong-gu[†]

On April 6, 1922, the physicist Albert Einstein debated the nature of time with the philosopher Henri Bergson in a conference room in Paris, in front of a gathering of prominent French scholars. This debate has had a decisive influence on our understanding of the concept of time to this day. But what is surprising is that this debate has not ended. Many people think that there are two kinds of time: physical-objective and experiential-subjective. We understand time as we perceive it, but our inaccurate experience of time should occasionally be corrected by the objective physical time as indicated by timepieces. But do timepieces really tell us anything about the essence of time?

Einstein and Bergson disagreed vehemently. Time is measured by a special device, which provides information on a numerical scale. But is measured time the totality of time? Or is the flow of time as a duration in our perception closer to the essence of time? Do timepieces record time only partially and abstractly? Although Bergson accepted the mathematical and physical implications of the theory of relativity, he believed that time had an essence that could not be measured or captured by the physical equations. According to him, this essence could be comprehended only by philosophy, not by physics.

Einstein rejected Bergson's argument. The philosopher's time does not exist in the world. Physical time based on the principles of physics and expressed in equations is objective time. The objectivity of physical time can be verified empirically by making this time coincide with the time of the measuring device. Our sense of the passage of time is nothing more than our subjective feelings about time. These feelings cannot be attributed to the real, objective world. Perhaps Einstein could have conceded that while physical time is objective, it may not reflect the entirety of time.

[†] Daegu National Science Museum (Exhibition Planning Division), hgkang82@daum.net

However, he maintained a stubborn attitude and chose to be remembered as the twentieth century Parmenides. Time as flow and duration does not exist. The flowing and lasting time that humans feel is just an illusion.

Jimena Canales shows that this debate between Einstein and Bergson was not definitively resolved. Advocates of the theory of relativity, such as French physicist Paul Langevin and German physicists Max Planck and Max von Laue, supported Einstein's position. However, French mathematician Henri Poincaré and Dutch physicist Hendrik Lorentz, who were very close to the discovery of special relativity and had a great influence on Einstein, did not believe that the special theory of relativity was the only way to interpret time. They thought it is just one possible way of interpreting time. They took the position that even if they accepted the mathematical and physical implications of the theory of relativity, the concept of time still did not need to be interpreted only through mathematics and measuring devices, as Einstein argued.

Arthur Eddington, British astronomer and physicist who supported the theory of relativity, could not accept Einstein's idea that time flow is an illusion. Alfred Whitehead, English mathematician and philosopher, even presented an alternative theory of relativity in a way that depicted time as flow and duration. Einstein traveled around the world after becoming famous, disseminating the objective and physical concept of time along with the theory of relativity. Einstein's philosophical position was defended by the logical empiricism of Reichenbach and Carnap. The Harvard-trained philosopher Willard Quine, who was influenced by Whitehead and Bergson, refuted logical empiricism. Another Harvard-trained philosopher, Thomas Kuhn, created a new trend in philosophy of science by suggesting the paradigm shift. Alexandre Koyré, whose historical work significantly influenced Kuhn, was also philosophically allied with Bergson and Whitehead.

The debate between Einstein and Bergson was more than an intellectual dispute. The economic and social cultures of Germany and France, the relationship between synchronization and measuring equipment, and the technical and artistic forms of film were all relevant to the positions of two scholars. Canales colorfully explains that the debate about the nature of time was intertwined with the art, politics, culture, and technology of the 1920s. By elaborating on these other aspects of the debate, Canales makes the convincing argument that the question of the nature of time concerned not only philosophers and scientists, but everyone.

For instance, both Einstein and Bergson were Jewish. Bergson belonged to the assimilated, politically conservative French upper class of French society. In contrast, Einstein belonged to the German middle class. In some ways, Einstein was similar to Galileo, who had tried to promote the new mathematics and strongly defended the scientific worldview. Einstein also defended physical time as objective and absolute. This made him a target of attacks from the philosophical and religious worlds. After Einstein formulated the theory of relativity, the Catholic Church and Bergson formed a bond. Conservative philosophy and religion cooperated to prevent

the tyranny of physics. In this debate on the nature of time, the social-economic positions and the relationship between the two men's views with the Catholic Church were entangled. Canales describes this entanglement well.

The main strengths of this book are its attention to the various characters and episodes in this debate. But this kind of narrative style has its own limitations. For example, although Einstein had an important influence on logical empiricism, it did not take his philosophical position. Hans Reichenbach, a proponent of the space-time philosophy of logical empiricism, did not think that the time-defining method of the special theory of relativity was absolute, as Einstein did. He made it clear that the definition of simultaneity in special relativity is arbitrary, and that using definitions other than Einstein's definition of simultaneity could yield other equally valid theories. In other words, Reichenbach accepted the theoretical pluralism related to the definition of simultaneity. In the philosophical reconstruction and interpretation of the theory of relativity, Reichenbach parted ways with Einstein. The inability to explore these details is an inevitable limitation of this book, which focuses on the debate. As a result, the debate itself is highlighted, while the subtle details hidden behind each episode are either omitted or somewhat exaggerated.

Canales' assessment of the latest quantum cosmology, that the debate over the nature of time today is taking place not between physicists and philosophers, but among physicists, is only partially correct. Physical reasoning and philosophical thinking work together in the study of nature. Proponents of the reality of time, such as Lee Smolin and Tim Maudlin, have reactivated philosophical thinking, thus revitalizing the role of philosophy in the investigation of nature. They seem to have revived the philosopher-scientist tradition (the tradition of paralleling philosophical thinking with scientific reasoning) among scientists. Therefore, it would be appropriate to view the debate on the reality of time, which is going on in quantum cosmology today, as a debate between physical reasoning and philosophical thinking rather than a debate between two kinds of physical reasoning.

However, the advantages of this book outweigh its shortcomings and limitations. Through this book, we see that the debate about the nature of time that began in the first half of the twentieth century continues today. In ancient Greece the question of change and existence was the point of contention between Parmenides and Heraclitus. This age-old theme has been repeated in the intellectual, economic, social, cultural, and technological context of the twentieth century, and still drives human intellectual inquiry. It is a permanent variation between the old and the new, and this book beautifully sings this endless song.