Prospects and new trends in the philosophy of science

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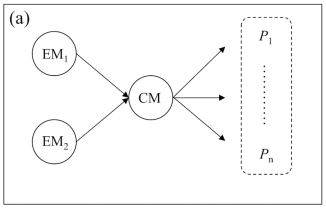
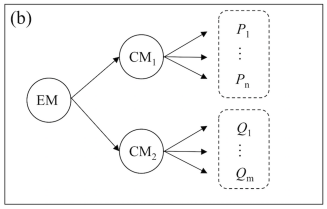
Q. What is the one thing you want to know the most right now?

I'm currently interested in the role of machine learning techniques, especially deep learning, in scientific research. Specifically, I am analyzing the implications of such research on philosophical debates regarding the "aim of science." Questions like "What is science?," "What does it aim to achieve?," or "What counts as progress in science?" have often been discussed by philosophers and scientists themselves, particularly when new methods or theories emerged that contradict previous worldviews.

One of the major changes in scientific practice in the last decade is the remarkable development of machine learning technologies, particularly those known as deep learning. These models demonstrate incredibly high performance across various tasks, but they also have what is called a "black box" nature, meaning it is not immediately clear what they are representing or how they are making decisions (which has led to the development of various interpretability techniques, too). I am currently interested in exploring how the use of these new technologies in scientific research might impact the long-standing debates about the aim of science.





Q. What do you consider to be a challenge at the moment?

What I've been thinking about lately is how to connect my interests with those in the philosophy of science. When writing a paper in the philosophy of science, the usual approach is to base it on existing debates or discussions on certain topics, and then present one's own idea. Recently, however, I've also been trying a more bottom-up approach, by investigating scientific methods or research practices that I find personally interesting or new. However, just doing this doesn't make a research paper in the philosophy of science. In order to turn it into a proper academic paper, I would need to connect the appeal or peculiarities of these subjects with issues in the philosophy of science, and develop an analysis around them. Of course, familiarity with various classics and previous research is important for this, but even so, there's no fixed way or standard method for this process. I've been thinking about how to do this, drawing inspiration from the works of skilled researchers.

Q. Could you share your thoughts on the future prospects of this field?

Philosophy of science has been established as a

field for about 100 years. During this time, there have been trends such as the rise of abstract, logic-based analysis known as logical positivism, and, in reaction to this, a growing focus on research practices. The scope of analysis has also expanded beyond physics to include fields such as biology, chemistry, geoscience, social sciences, methodologies like computer simulations, as well as the social institutions of scientific communities. Some topics, like the scientific realism debate, continue to be discussed through these developments, but overall, my impression is that many of the key issues have already been extensively addressed (although they do occasionally resurface) in the sense that, for each subject matter, various types of views have already been explored and discussed.

Given this situation, new research practices using emerging technologies such as machine learning would be one of the topics expected to see further progress in the future. The first wave has already come, so I expect that more detailed and specialized analyses would be developed in the future research. Related to this, another trend would be the increase in analyses of specific research practices, which could be described as the "anthropology of scientific methodology." The nature of formal reasoning has long been analyzed in the philosophy of science, and anthropological studies of laboratory practices have been conducted within the field of anthropology of science. What I mean by the anthropology of scientific methodology is analysis that bridges these areas, focusing on the practical aspects of reasoning, paying more attention to the uniqueness of each discipline or cultural/social context in which the research is conducted. I expect that this trend might grow even more than before. I also expect that research topics related to societal issues would grow even more in the future.

Q. What was the most enjoyable moment and the most challenging moment during your research?

Well, this may not be a single moment, but I had an exciting experience while collaborating with a professor at a university in the U.S. during my visit there. I learned a lot from the research process itself, but what was especially fascinating was that we were able to receive feedback from experts in the field. In Japan, we also ask for comments from colleagues, but it can often be difficult to find researchers working on the relevant topic. It was fantastic to exchange ideas with world-class experts and develop the paper based on their feedback. As for challenges, I routinely face various problems in my research. However, I enjoy tackling these issues as long as they are relevant to the topics I'm interested in.

Q. Do you have a message for undergraduate and graduate students who are interested in joining your lab?

When people think of philosophy, they often imagine someone sitting alone in a dark room, silently pondering and then presenting a grand idea using difficult terms. In my view, however, the ideal approach to philosophical research is, like, to open the curtains, spread a large sheet of paper on the table, and organize ideas through discussions with others. The results should then be presented in clear, plain language with sound logic. Philosophers can be easily trapped by complex expressions, but I believe that, precisely because we deal with difficult issues, clear and simple language,

along with solid reasoning, is crucial. In the philosophy of science, it's also necessary to illustrate these ideas with examples from science. Philosophy, after all, is a discipline of discussion, so it's not enough to simply present one's own ideas that have emerged from nowhere. It's important to stay up to date with the latest research, listen to others' arguments, and then present your own ideas in a way that engages with these perspectives. Furthermore, after formulating your own view, it's essential to subject it to criticism and then revise it based on that feedback. While it can be a demanding process, I'm looking for those who find this kind of work enjoyable, or who are eager to engage in it (and who are not too far removed from my area of expertise).

(The English translation was created based on a translation by ChatGPT.)