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The Discussion between Heisenberg and Dirac Regarding the Nature and Meaning of Scientific Knowledge

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Abstract

In this paper we aim to put under discussion two issues. The first refers to the way in which physicists' ideas on the nature and meaning of scientific knowledge may add up to a philosophical discourse. The second issue we argue about refers to the face-to-face discussion between two renowned physicists, Dirac and Heisenberg, in the attempt to highlight the benefits of direct dialogue as opposed to an academic correspondence carried out in writing through the medium of books, articles or letters. For each of these separate issues we come to analyze, we used two relatively recent articles signed by Alisa Bokulich.

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1. Introduction

In the history of thinking, especially the recent one, we find more forms of getting, presenting and debating ideas or theories about phenomena or subjects considered legitimate and useful for a better understanding of problems under debate. Within the more restrained space of the philosophy of science and scientific knowledge, there is a great variety in the ways ideas and theories are presented and discussed about. Therefore, scientifically inclined authors, but especially authors shaped by philosophical tradition, express their ideas about what they consider relevant subjects through articles or even books.

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Expressing a point of view in the classical manner, although necessary, is not sufficient for a veritable dialogue in a certain field. This explains why, usually, the authors and their views were conveyed in dialogue, or conversation, by other authors, deemed secondary in importance, which undertake work as historians or sociologists of the philosophy of science. They play the role of the editor who gathers between the same covers exemplary or relevant contributions of some authors in the field. In the 20th century such volumes were edited over many years and across many editions especially because they bring together articles which have become true landmarks for those concerned with an introduction in the respective fields.

There is yet another way of presenting and debating ideas, and that is the direct dialogue between authors. This dialogue can be written, between authors who are separated in time and space, or it can be a face-to-face dialogue, in which the exchange of ideas is made lively and directly. In the first category, letters exchanged by representative authors like Einstein, Bohr, Heisenberg, Schrödinger, Dirac and others are famous in the field of philosophy of science, and in the second category, we can mention the dialogue between Heisenberg and Dirac, or the dialogue between Heisenberg and Kuhn.

In all these forms of public manifestation of ideas it can be argued whether, for each category at a time, the minimal conditions of dialogue had been met, so that we can say authors really related to one another and a genuine dialogue occurred. The reader, or the one passionate about the common issues of these authors is many times under the circumstance of becoming aware that, though authors communicate through books, articles, letters, interviews or discussions, oftentimes they do not speak about the same things. Consequently, the minimal conditions for these contributions to be considered dialogues are not rigorously and genuinely met. This shortcoming can be found in branded authors of 20th century physics but also in renowned authors of philosophy. If this be the case, it is no wonder we discover each author was speaking about different things and misunderstandings between them came not from opposing views on the same subject but from the fact they spoke about different subjects altogether; hence, eventually, misunderstandings were only apparent, even when authors contradicted one another in precise matters. To this we add the temptation of the general public to have access to discussions or disputes between authors considered exemplary due to this type of more or less personal conflicts. Similarly, for didactic reasons, these ways of receiving philosophical traditions by contrast, opposition or philosophic argumentation - like punctual criticism (reproaches) - were always preferred.

2. The benefits of direct dialogue in the philosophy of science

In this article we analyse a talk between Heisenberg and Dirac regarding a number of subjects in the philosophy of science and knowledge; we consider this talk relevant because it clarifies the positions of the two in relation to their own philosophical ideas and constructs. The usefulness of following the direct discussions between authors stems from the fact that it enables us to witness the way in which these authors use their opinions and theories beyond the manner in which they expose the same ideas into books and articles. In other words, there is a difference between how these authors present their ideas to the public and how they use them for themselves.

The talent and skills of authors in this respect are oftentimes not identical. Thus, there are authors that prefer a succinct, synthetic style, like Heisenberg, whereas others prefer more argumentative methods, based on clarifications and detailing. Works of the first will be less numerous and will often need specifications whereas works of the latter are extensive, being more suitable to comparisons and analyses. These styles can be found both in the works of consecrated authors and in the works of the founding scholars of quantum mechanics. From a meta-philosophical point of view, these preferences of expression contribute to the crystallization of styles, traditions or even trends in philosophy and their analysis in time can lead to a collection of such styles.

According to Heisenberg and Dirac, their discussion took place in 1929, during a rather long voyage by sea between San Francisco and Yokohama; its central topic was the way in which various theories of physics create or not a process of continuous knowledge of reality. Of course, this discussion on the nature and meaning of scientific knowledge touches some specific topics, such as: the methodology of science, change in science, the relationships between theories and the scientific progress.

The dialogue between Heisenberg and Dirac is not carried on specific themes in quantum mechanics - a subject under debate at the time and to which both have contributed heavily - but it is a talk in the area of philosophy of

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