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THE VALUE LADENNESS OF SCIENTIFIC PRACTICE: “COVIDIZATION” OF RESEARCH AND TRUST IN SCIENCE

Abstract: In recent years, philosophers of science, including social epistemologists, have increasingly begun to focus on the role of value judgments in research activities and their consequences on the epistemic integrity of scientific inquiry. These considerations initiated a series of new practical and theoretical challenges, and “revived” old descriptive and prescriptive disagreements over the form of the relationship between values and scientific practice. In this article, we will attempt to frame the way in which values in science are discussed today, point to concrete examples that serve to illustrate the pervasiveness of value judgments in the scientific endeavour, and consider the question of how it is possible to ensure credibility in science and protect its epistemic integrity in the light of a value-laden framework.

Keywords: science, value-neutrality, the credibility of scientific results, public knowledge

The claim that scientific practice is deeply influenced by values is widely held and defended by philosophers of science today (Douglas, 2009: 15, Steel, 2015: 2; Elliott 2017: 8; Goldenberg, 2021: 100; Oreskes, 2019: 147–159 et al.).¹ However, this viewpoint has not always been accepted. For a time, it was believed that even though science has obvious political, moral, and socio-economic repercussions, it can and should be an enterprise that does not involve value judgments. This ideal of value-

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free science began to gain its dominance at the end of the 1950s. Although at the time there were theorists who were ready to admit that such an ideal is neither advisable nor realistic and warned that it is not possible to understand the practice of the sciences without considering the specific value judgments that are formed within it (Rudner 1953:6; Frank 1954: 143), discussions on values in science would almost completely fall silent during the 1960s (see: Douglas, 2009: 50, 62–5).² From the 1980s onwards, there has been a growing body of literature that seeks to show that when making decisions and providing answers to a number of questions that fall under their domain, scientists make extensive use of value judgments. But even today, when almost no one would be ready to deny that research practice is strongly permeated with values, attitudes that value-neutrality should be the goal of science are still present (Shrader-Frechette, 1991: 44; Ruphy 2006: 192; Koertge, 2000: 53). Such a belief is the result of recent conflicting and complicated proposals on how we should understand the nature, domain, and role of value in scientific work, as well as of an old concern that more transparent attempts to articulate the idea of value-laden science would damage the public's trust in the reliability of its results (Du Bois, 1912, 1935; Compton 1936; Merton, 1938). Having that in mind, significant literature in recent years has been developed with an aim to provide a satisfactory analysis of scientific practice that will take into account its strong interwovenness with values, but without unacceptable consequences regarding its epistemic integrity and the reliability of scientific results (Kitcher 2001; Douglas 2009; Elliot 2017; De Melo-Martin & Intemann, 2018, etc.). In this article, we will present a framework for understanding the way in which values in science are discussed today, focus on some concrete examples that highlight the range of ways in which value judgments influence scientific work, and consider the question of how it is possible to preserve trust in science and protect its integrity in the light of a value-laden scientific framework.

II

One way to approach the consideration of the relationship between values and science is to point to situations in which value judgments can enter research practice and interfere with scientific reasoning. Here, we will offer four different contexts in light of which it is possible to identify

2 More on the specific historical episodes that preceded and accompanied the ideal of value-free science, as well as on sporadic, marginalized and short-term deviations from it, see: (Douglas 2009: §3).

the relevance of value judgments to the researchers' decisions.³ A closer look at them should contribute to the clarification of the manners in which values can influence the shaping of epistemic and organizational processes of science, as well as to a clearer understanding of the sources of conflict around the standards for assessing values' epistemic desirability in different stages of the scientific endeavor. In addition, the following examples will serve to summarize the main features of our viewpoint regarding the role of values in scientific practice which, in turn, will pave the way for addressing the concerns about public skepticism toward issues of scientific expertise and its resistance to scientific claims.

i) Selection of research problems

Since there are far more lines of inquiry that can be implemented in real-time, the selection of research problems and their corresponding goals tend to be influenced by the value preferences of the members of the scientific community. The extent to which normative-value frameworks can influence research directions could be effectively captured by the recent emergence of the *covidization of research* (Pai, 2020). This phenomenon is exemplified by the fact that in the period from January 1, 2020, to August 1, 2021, more than one in six active members of the scientific community decided to adapt or redirect their research activities to include the study of various aspects of the coronavirus pandemic-induced crisis (Ioannidis, et al., 2021). As a result of such a shift in research priorities, the number of works related to the study of COVID-19 (210,863) reached 3.7% of the total number of scientific works (5,728,015) that were published and indexed in Scopus (*Ibid*). Such a turn was, among other things, supported by the financial considerations of researchers.⁴ But regardless of the extent to which researchers' choice sets were motivated by ethical, theoretical or financial reasons, they were manifestly not immune to social influences and were based on specific value judgments. In a similar manner as in the example of *covidization of research*, value judgments play an influential and important role in deciding which research topics we (as

3 In the literature, there are several different illustrations and classifications, see: (Machamer & Wolters 2004; Dorato 2004; Ward 2021; Elliot 2017) which include examples of how value-based choices and compromises affect model tuning (for example: De Melo-Martin & Intemann, 2018: 121) or dissemination of research findings (Elliot 2017); examples that we have not highlighted here.

4 Data show that by the end of June 2021, 14 billion dollars have been allocated for research activities related to the coronavirus pandemic, often at the cost of canceling or postponing the opening of regular invitations for research funding (Ioannidis, et al. 2021; Pai, 2020).

individuals) want to pursue, which areas of research are the most significant or promising for us (as a society), and which directions of research, given the limited resources for funding of science, should be prioritized.

ii) Establishing standards for performing responsible research

In addition to guiding our choice of research programs, value judgments significantly influence the steering of research projects as well as the decisions on whether they will be implemented at all. For example, the implementation of programs that include methodological approaches not in accordance with the informed consent of research subjects, those which violate the confidentiality of information about research participants, or those which propose experiments that would result in their physical (or psychological) harm (that is, violation of the principle of *primum non nocere*), cannot be allowed for obvious legal and moral reasons. In this sense, value judgments that include social, moral, and legal considerations, limit the range of means by which particular problems will be studied and shape the standards for the responsible conduct of research.

iii) Epistemic risk and loss function

As in choosing the subject of research and establishing standards for its responsible performance, value judgments play a significant role in determining how, within the framework of their statistical procedures – accepting or rejecting a statistical hypothesis – scientists deal with the risk of making a mistake in their decisions. Empirical knowledge achieved by scientists is beset with a variety of epistemic risks and in their procedures of arriving at it, scientists always face the risk of making two types of errors: accepting the wrong (type 2 error) or rejecting the true hypothesis (type 1 error). Since, taking a study design as given, these two errors are supplementary – the probability of committing one can generally only be reduced at the expense of increasing the probability of the other – the choice of how to manage or balance between those errors can be described as a loss function. It is important to underline that there is no firm methodological rule stating what the loss function should be i.e. what the acceptable balance between the risks of committing the two types of error is. These decisions are typically made in light of the interests and values which determine how grave the consequences of going wrong in either direction are. The quick sketch of an admittedly idealized context of medical research can illustrate how the loss function is decided by invoking value judgments. Let's consider a group of scientists developing a drug for an already well-managed disease that is somewhat superior to the existing treatments in terms of

efficacy. In this situation, rejecting the null hypothesis would require extremely strong evidence (i.e., a very low probability of type 1 error), so the process would be repeated many times in different populations under different circumstances, which would be followed for a long time to ensure with high probability that the new drug is superior to the existing treatment. Suppose, on the other hand, humanity is facing a progressive disease whose early clinical symptoms indicate certain fatal outcomes, against which no existing treatment is at all effective. Under these circumstances, a lower level of evidentiary support would be required to implement the drug and, in this admittedly simplistic case, researchers' relative tolerance for committing type 1 and type 2 errors would shift significantly towards the former. In other words, they would be more tolerant of providing a drug that may turn out to be insufficiently effective (type 1 error), than risk discarding one which may be effective (type 2 error).

Or, consider an example in economics. A central bank researcher is trying to predict whether or not the coming year will be an inflationary episode, and consequently whether interest rates should be raised. This, in turn, has political consequences – for the distribution of wealth between borrowers and savers, for example. Both the choice of the loss function (which side to err on) and choice of a statistical model to use (usually more than one is acceptable) come from values, and those have to do with the view of the researcher of what the consequences of going wrong in either direction might be. In other words, they risk having the end in mind – an economist who strongly believes in the power of markets to self-correct, for example, might tend to require stronger evidentiary support that inflation will occur than one who believes in government intervention to reduce inflation, or she might select a statistical model which is less likely to predict inflation next year. Drawing on examples like this, over the past several years, philosophers of science have been increasingly exploring not only how values influence the way scientists judge the output of their statistical test but also how value-laden determinations of loss function shape the statistical choices the researchers make while designing and directing their research programs.⁵

iv) Selection and definitions of variables

Formulating a statistical research problem inevitably involves a simplification of the world in the sense that we are choosing to focus on a few variables whose impact we want to measure. In macroeconomics, these

5 See: Zollman K., Values, Objectivity & Data Science – Philosophy of Data Science, Link: <https://www.youtube.com/watch?v=9USkWtX-ydc>

variables are typically aggregated. Economists often formulate questions in terms of the impact of a phenomenon on GDP, which is just the sum of all income generated by domestic households and firms. But the decision to focus on the sum is also a decision not to focus on the distribution of income (between rich and poor workers, or between workers and capital owners, etc.), which is a whole set of value judgments. Moreover, selecting GDP as the outcome of choice is a value judgment that income is what is *good* in an economy, but there are other indicators of economic and social progress. A discussion of these can be found in *Beyond GDP: Measuring What Counts for Economic and Social Performance* (2018), a book where Joseph Stiglitz and others discuss the limitations of GDP and propose a range of complementary measures of economic well-being, which include measures of economic insecurity, wealth and income inequality, social and environmental sustainability, trust in institutions and quality of life. Including any of these indicators in a research proposal represents a value judgment as to its importance.

A similar point emerges if we consider analyses of the concept of mental disorder. Let's restrict our attention to the definition of mental disorders as "harmful dysfunction". While "dysfunction" can be understood as the inability of an internal mental mechanism to perform a specific function for which it was predestined by evolution, the question of whether the dysfunction will have a detrimental effect on a person's well-being will depend on the social values (Wakefield, 1992: 385). For example, brain dysfunctions that can interfere with reading would not be considered "harmful" within the preliterate communities, while today children and adults who have difficulties in reading are diagnosed with dyslexia or decoding difficulty which is, along with dyscalculia and disorders of written expression, classified as a learning disorder (Üstün, Chatterji, & Andrews, 2002: 31; Snowling & Hulme 2012: 594). In a similar vein, it is suggested that many other classifications of diseases incorporate value influences and that on the questions of whether something is a medical disease or how it should be 'correctly' defined for purposes of research and diagnosis, there is often no value-free way to provide answers (Kukla, 2019).

So, from the decision to engage in science and that certain research projects are worth pursuing, to the evaluation of the output of statistical tests, to selecting and defining variables, moral, social, political, etc., values play a significant role in research activities and are inherent in scientific practice (cf. Rudner, 1953: 2; Douglas 2009: 112; Kitcher 2001: 63–82; Elliott 2017: 15, 166). In this regard, it should be emphasized that the study of the influence of values on the selection of research programs

and the formation of standards for their responsible performance (at least until recently) was not a subject of special interest to philosophers of science, since it was considered that value-laden decisions made in these so-called “external” stages of scientific endeavors do not threaten the reliability of its epistemic procedures (more on this: Dorato 2004: 57; Machamer & Wolters 2004: 1–4; Douglas, 2009: 45, 98; Kitcher 2011: §1; De Melo-Martin & Intemann, 2018:119). The polarization of opinion in the literature on science and values mainly refers to the determination of the kinds of values and the degree to which they should influence the development of the “internal” phases of science, which include data characterization, assessment of available evidence, acceptance of hypotheses, model development, etc. The first line of debate has argued that only those values that are “epistemic” in nature (“scientific”, “internal” or “cognitive”) such as the degree of evidentiary support, consistency, predictive and explanatory power, etc., can play a legitimate role in these processes, while the influence of “non-epistemic” (“non-scientific”, “external” or “social”) values that include moral, legal, political and socio-economic considerations must be eliminated or at least minimized (Shrader-Frechette 1994: 53). At the other end of the spectrum is the understanding that “non-epistemic” values should *in some form* “enter” all stages of scientific work since they are necessary to provide guidance for scientist when making judgments (Douglas, 2009: 112; De Melo-Martin & Intemann 2018: 119–22, Steel, 2015: 2), and that scientific communities which take that into account will be more successful, both in achieving their epistemic goals and in establishing a constructive relationship with the general public (De Melo-Martin & Intemann 2018: 119; Goldenberg, 2021: 125; Elliott, 2017: 166; Longino, 2004: 137).

Although launching into this discussion would go beyond the scope of this paper, it should be noted that philosophers have started to use the terms “epistemic” (scientific, internal, or cognitive) and “non-epistemic” (non-scientific, external, or social) in a very confusing way, which has led to the displacement and blurring of demarcation lines between these two camps. Thus, while some authors point to the fragility of separation between epistemic and non-epistemic values (Machamer & Osbeck 2004), others attempted to formulate a clearer demarcation criterion, trying to work out the exact meaning of the terms. As a result, once coextensive terms “epistemic” and “cognitive” (Lacey 1999: 221) began to diverge (Laudan, 2004: 19; Douglas, 2009: §5), as is the case with the meanings of the terms “non-epistemic”, “external”, “non-scientific” or “social” (Dorato, 2004: 53). Subsequently, others drew attention to examples in which non-epistemic values can be interpreted or seen as epistemic (Douglas 2009:

90; Wilholt 2006: 80). Still others indicated that there are values for which it is not clear how they should be classified and that the lines of demarcation are not easy to draw at all (Machamer & Wolters 2004: 3). As a result, there is a growing body of literature that points out that the principled difference between epistemic and non-epistemic values is not viable (see: Longino 2004: 128; Douglas 2009: 90).

Indeed, if this is the case and we take into account the failure of previous attempts to single out one class of values that could play a normatively acceptable role in scientific reasoning and on which the “protection” of science from problematic value influences could be based, the question arises: how to approach the fact that science is strongly imbued with values and that many of its activities take place precisely on their background? Following the example of some recent proposals, we can suggest that traditional attempts to classify values be replaced by approaches that focus on more detailed considerations of the question: how, when, and in what situations they “enter” scientific practice (Douglas 2009: 87) and those that point to the necessity of precise articulation of their role in different research activities (Elliott, 2017: 73; De Melo-Martin & Intemann 2018: §9). That the active mapping of values and their more precise articulation (focusing on individual local contexts, examining individual examples, and analyzing their details) could play a significant role in attempts to identify their potential adverse impact on science and the reliability of its results, will be illustrated in the light of the aforementioned emergence of *covidization of research* in the following section.

III

During the aforementioned covidization of research there has been a tendency in parts of the scientific community to focus excessive attention on efforts to understand the emergence of the coronavirus pandemic at the expense of dealing with questions in scientists’ primary area of expertise (Pai, 2020). As some authors emphasize, while it is encouraging to see the extent to which the scientific community can be motivated and united in order to respond to existing social challenges, the question is whether its response – the amount of resources and energy spent – is proportional to the size of the existing crisis and what the real advantages of such hyper production of works are (Ioannidis, et al. 2021: §4). Unfortunately, existing analyzes suggest that much of the growing literature on the coronavirus pandemic crisis is of poor quality (Khatter, et al. 2021; Bagdasarian, Cross, and Fisher, 2020; Ioannidis, et al., 2021, 2022). Having

that in mind, the question arises as to whether some theorists are correct to claim that the values which influence the choice of research problems play only a sporadic role in achieving the epistemic goals of science. Namely, as already indicated, until recently the study of the influence of values in this phase of the scientific process was not of immediate importance in the context of the discussion about values in science because it was considered that they do not have an epistemically relevant character and therefore no immediate effect on the reliability of scientific results. And yet, it seems that the example of the covidization of research suggests that value judgments should not be assigned with privileged status in the “external” phase of the scientific process. Without pretending to go into consideration what motives contributed to the covidization of research, it seems quite reasonable to say that any decision of the members of the scientific community – regardless of the stage or phase in which it was made – based on the values that unjustifiably favor unidirectional research activities or impede the acquisition of appropriate evidence, may have an adverse effect on the epistemic engagement of science. In this regard, relying on strategies and approaches that propose constant monitoring and, if possible, critical reviews of the role of values in different research domains and from the perspectives of different stakeholders can contribute to preventing, where possible, the future neglect of equally important research projects as well as the lowering of epistemic standards in those ongoing. In other words, transparent and active discussions regarding the determination of facts and the way in which values pervade scientific procedures could be a useful set of tools for offering a more complete representation of their epistemic consequences and determining more precisely which value judgments (given a theoretical, social, technological, organizational, etc. context) can be assigned with normatively acceptable roles.

However, another question related to the previous considerations arises: would a transparent discussion of value-laden science lead to an erosion of public trust in science and have a negative impact on the public’s motivation to comply with recommendations based on scientific judgments? Although even a partial review of numerous recent studies on public trust in scientific claims would go beyond the scope of this paper, what can be emphasized here is that they strongly indicate that the political and ideological orientations of individuals are a significant factor in establishing and maintaining trust in scientific evidence (De Melo-Martin & Intemann, 2018: 123; Elliot 2017:9).⁶ These findings correspond to recent viewpoints that the problem of mistrust in science should primar-

6 See: (Pavličić, 2020 Pavličić, Petrović and Smajević Roljić, 2022) for a discussion on the issue of public mistrust of scientific authorities.

ily be understood as a consequence of individuals' beliefs that scientific findings somehow threaten their values, religious convictions, political-ideological orientations or economic interests (Oreskes, 2019: 147, Kitcher 2011: §1). Such views are often accompanied by insights that a skeptical public "is better understood as a rejection of the values underlying the scientific consensus" (Goldenberg, 2019: 22) rather than as a consequence of the fact that the consensus includes values.

Does that mean that public trust in scientific results depends entirely on whether scientists adopt the values that society set for research? Although at the moment it is not possible to give a precise answer to this question, it is worth noting that there is an increasing number of examples that indicate that the failure of scientists to be transparent and honest about the assumptions underlying their research activities has contributed to the public's concern that certain political interests were prioritized over the search for scientific truth in their reports (see: De Melo-Martin & Intemann 2018: 115). Indeed, if that is the case, some authors are quite right to claim that scientists' further resistance to speak openly about value judgments would only worsen the situation by creating the impression that their values are somehow problematic and endangering their knowledge-seeking engagement (Oreskes, 2019: 153). Therefore, the scientific community should establish a more transparent and active dialogue on values-guided decisions between itself and the public, and implement complementary strategies which promote values that are inclusive and representative of the interests of different stakeholders. While the inclusion of the broader public in the scientific enterprise would contribute to determining research priorities and establishing more realistic expectations from science, open and critical discussions would help to form informed and reflective judgments in the light of which scientists themselves could identify the damaging impact of their values on the reliability and the significance of their studies. Although it is certainly necessary to conduct significant experimental research in order to determine what concrete strategies and tactics would enable an effective, acceptable, and quality institutional involvement of public opinion in science, it is quite reasonable to say that a fair relationship between science and the public (their mutual understanding, cooperation and maintaining trust in the scientific community) requires a socially responsible science that strives to preserve its epistemic integrity and is transparent about its goals.

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Vrednosno opterećena naučna praksa: „Kovidizacija” istraživanja i poverenje u nauku.

Apstrakt: U poslednjih nekoliko godina, radovi iz filozofije nauke i socijalne epistemologije nauke su sve više počeli da se fokusiraju na pitanja kakvi su status i uloga vrednosnih sudova u sprovođenju naučnih aktivnosti i kakve posledice njihova prisutnost može imati u pogledu epistemičkog integriteta naučnih istraživanja. Ova razmatranja su inicirala niz novih teorijskih i praktičnih nedoumica i „oživila” stara kako deskriptivna, tako i preskriptivna neslaganja u pogledu poimanja odnosa između vrednosti i naučnoistraživačke prakse. U ovom članku tematizovaćemo način na koji se danas diskutuje o vrednostima u nauci, ukazati na primere koji jasno svedoče o uplivu vrednosti u aktuelnu naučnoistraživačku praksu te razmotriti pitanje kako je moguće u svetlu pristupa koji uzima u obzir vrednosnu opterećenost naučnoistraživačkog rada očuvati poverenje u nauku i zaštititi njen epistemički integritet.

Ključne reči: nauka, vrednosna neutralnost, kredibilitet naučnih rezultata, javno mnjenje