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Agnieszka Lekka-Kowalik
John Paul II Catholic University of Lublin, Poland
e-mail: alekka@kul.pl
ORCID: 0000-0002-4834-318X

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Non-cognitive Values: A Warrant of the Rationality and Responsibility of Science

1. The rise and decline of the ideal of value-free science

The ideal of value-free science was well formulated by Max Weber when he defended the character of sociology and economics to be as scientific, rational, and objective as the natural sciences.[1] In this ideal, part of scientificity was freedom from value judgments in research. However, three restrictions must be made. This ideal does not mean that value judgments cannot be an object of scientific discussion. On the contrary, debates on value judgments are important for the empirical causal study of human action and its motives as well as for determining which value positions are genuinely opposed. Yet, the result of a scientific discussion on value judgments can only be: (1) to work out the ultimately "coherent" value-axioms; (2) to deduce "consequences" from particular value-positions in terms of evaluative attitudes which would follow from particular value-axioms – the argumentation is entirely on the level of meanings, but the procedure depends on the empirical inquiry of facts to be evaluated; (3)

1 Max Weber, "The Meaning of 'Ethical Neutrality' in Sociology and Economics", in: *Max Weber: The Methodology of Social Sciences*, ed. Edward A. Shils, Henry A. Finch (New York: Macmillan, 1949), 1–47; Max Weber, "'Objectivity' in Social Science and Social Policy", in: *Max Weber: The Methodology of Social Sciences*, 49–112.

to ascertain the consequences that would necessarily follow from a practical realization of a particular evaluative attitude, for certain unavoidable means must be used, and certain inevitable but not intended side-effects must be expected. This is purely empirical inquiry, but it has indirectly influenced the value-position because it might show that (a) the intended goal is not realizable; (b) that the realization would be illusory, for there would occur unintended side-effects that would frustrate the plan; (c) that certain means and side-effects were not taken into account in the initial plan; (4) new value-axioms and value-postulates derived from them might be discovered with which a value-postulate under discussion conflicts at the level of meaning or at the level of consequences. We deal with a question that is really empirically answerable when we have an unambiguously established goal, and we then ask about proper means. The thesis "X is the only means to achieve Y" is a converse of the claim "Y always – or usually – occurs after X".

The ideal of value-free science does not mean that value judgments cannot be empirically studied. They can, but as evaluative expressions of value attitudes. When they become an object of empirical study, they lose their "obliging power" and are treated as "existing items": judgments actually formulated by persons. The ideal does not mean either that science has no connections to values. On the contrary, science is value-relevant in two ways: we presuppose that the scientific empirical truth is a value, and value judgments determine the scientific interest that governs the selection of problems for empirical inquiry.

The main theses belonging to the ideal of value-free science state that: (1) Science does not ask the question of whether anything – the world as a whole and the human being in it – has any meaning or goal, and it is not entitled to formulate value judgments about its research objects; (2) Science does not indicate goals or norms of action – an empirical discipline can show (a) the necessary means; (b) the unavoidable side-effects; (c) the conflict of value judgments with each other in their practical consequences. The decision on how to solve such conflicts and therefore which goals should be accepted, which side effects should be tolerated, and how far unintended consequences should be taken into account in a planned action is a matter of negotiation and choice made outside of science. This ideal is taken as capturing the true nature of science. In this sense, it is not descriptive but prescriptive: science *should* be value-free, even if scientists make "forbidden" value judgments in their research practice.

Many convincing arguments were developed to show that the ideal of value-free science is not tenable in principle, not just in practice. One was given by Thomas Kuhn who claimed that the acceptance of a theory

as "good" is a value judgment rather than the result of any algorithmic procedure, for researchers may use a different list and hierarchy of features of a good theory and since none of those features is precise, researchers may understand them differently.[2] The advocates of the ideal of value-free science admitted this fact as well, and proposed a modification of the ideal: science should be free from non-cognitive values, where cognitive values are those that are marks of a "good" theory. However, a weaker version of this ideal is not tenable. One reason stems from the claim that science provides means. But agreeing to provide means constitutes a tacit acceptance of goals as worthy of realization, for otherwise there would be no reason to provide means. Of course, the reason might be money – science provides means to those who pay for research. Yet, as Henry Byerly and Leslie Stevenson rightly observe, "by accepting funds from certain sources – and agreeing to make their results available to those funding them – scientists are participating in social processes by which knowledge, and hence, power, is given to certain social groups rather than others"[3] and thereby scientists *qua* scientist accept the values of those groups (corporations, governments, armies, and the like). In this sense, science is laden with cognitive values. This is a much stronger "value-ladenness" than just "value-relevance" for the choice of research topics.

Another argument refers to the nature of language. Behind the ideal of value-free science stands the belief that we can make a sharp distinction between descriptive and evaluative predicates. This is, however, not the case, as our language contains the so-called thick ethical concepts, which are both evaluative and descriptive. To give some examples of such predicates: cruelty, trustworthiness, pathology, democracy, poverty, terrorism, work, rationality; the judgment: "This was an act of terrorism" describes a certain event and at the same time implicitly evaluates it as something bad and should not have happened.[4] The thick ethical concepts occur in scientific descriptions of some phenomena and they are "laden" with non-cognitive values. In order to save the ideal of value-free science, we

2 Thomas Kuhn, "Objectivity, Value Judgment, and Theory Choice", in: Thomas Kuhn, *The Essential Tension: Selected Studies in Scientific Tradition and Change* (Chicago: University of Chicago Press, 1977), 320–339.

3 Henry Byerly, Leslie Stevenson, *The Many Faces of Science. An Introduction to Scientists, Values, and Society* (Boulder: Westview Press, 2000), 253.

4 For detail considerations see for example: Hilary Putnam, *The Collapse of the Fact/Value Dichotomy and Other Essays* (Cambridge MA–London: Harvard University Press, 2002); Maria Ossowska, "Rola ocen w kształtowaniu pojęć", in: *Fragmenty filozoficzne III. Księga pamiątkowa ku czci profesora Tadeusza Kotarbińskiego* (Warszawa: PWN, 1967), 459–469.

would need to exclude arbitrarily such concepts from scientific language and in consequence to exclude also many legitimate domains from the realm of scholarly activity. Science would then be then value-free, but not because it is really so, but because we made it so by cutting everything that would not fit the ideal. Another – and much stronger – argument appeals to the nature of scientific praxis. It deserves detailed consideration.

2. Non-cognitive value judgments as a constitutive element of research

The above title expresses the kernel of the argument for the value-ladenness of science. One cannot develop research without passing judgments employing predicates of a non-cognitive nature. Let us consider three cases. The first one, considered almost 80 years ago by Richard Rudner, appeals to the fact that scientists test hypotheses. At a certain moment, they have to decide whether they have sufficient evidence to accept or reject a hypothesis under consideration – testing cannot go *ad infinitum*. Since scientific knowledge informs action, this decision depends on moral evaluation of the consequences of making an error, i.e. accepting a false hypothesis or rejecting a true one.[5] To give an example: the acceptance of the hypothesis that a certain product does not contain a lethal dose of poison requires more and stronger evidence than the acceptance of a hypothesis that a certain kind of plants grows only in Australia, as in the former case a cognitive error would cause morally bad consequences in practice. Heather Douglas develops this argument by showing that even the classification of data depends on the moral (so non-cognitive) evaluation of consequences of a cognitive error. She analyzes the research on carcinogenic effects of dioxin. Uncertain data are classified as cases of cancer, and, therefore, the level of carcinogenicity of dioxin is estimated higher than it would have been were those data classified as non-cancer. The reason is that it is better from a moral point of view to overestimate the level of carcinogenicity of dioxin than to underestimate it, because research results have an impact on the use of dioxin and on security measures, and the underestimation would create a serious risk for the health and life of people.[6]

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5 Richard Rudner, "The Scientist *qua* Scientist Makes Value Judgements", *Philosophy of Science* 20, no. 1 (1953): 1–6.

6 Heather Douglas, "Inductive Risk and Values in Science", *Philosophy of Science* 67 (2000): 559–579.

The judgment that there is sufficient evidence to accept a hypothesis or that data should be classified in a certain way is internal to science. Equally internal is the judgment on which hypotheses are worthy of testing. Let us construct an example based on the one originally developed by Michael Scriven:[7] The researchers accept a grant from the Ministry of Education to develop means of maintaining classroom discipline. Researchers propose various hypotheses, among them the one that the students should be wired to a console controlled from a teacher's desk, and the teacher should administer an electric shock whenever discipline is broken. Yet, this latter hypothesis cannot be taken seriously as a *proper* means because it ignores the nature of subjects – persons and their dignity – to which the means should be applied. Thus, when the problem is operationalized, researchers must take into account its value dimension. Research on, for example, pesticides is a similar case – scientists must take into account the safety and health – obviously values – of various beings (people, dogs, bees, etc.) when formulating and operationalizing the problem. Let us also stress that value judgments might be negative. The judgment "people have dignity and therefore I as a researcher need to take into account their well-being when developing pesticides" is a value judgment; but the judgment: "stones do not have dignity and therefore their well-being does not need to be considered as a part of my problem" is a value judgment as well.

Kirsten Intemann developed another argument.[8] Considering the case of research on clinical depression she shows that to recognize symptoms, very often contradictory, as the symptoms of one disease, researchers must accept a certain conception of good human life and this conception contains value judgments. In fact, the term "good human life" is itself a value-predicate.

An extensive discussion of the value-ladenness of science[9] is not necessary here as the above cases are sufficient to show that judgments with non-cognitive value-predicates are present on various levels of scientific practice and those judgments are necessary to carry on research. Such judgments cannot be treated as external to science, as contamination of

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7 Michael Scriven, "The Exact Role of Value Judgements in Science", in: *Ethical Issues in Scientific Research*, eds. Edward Erwin, Sidney Gendin, Lowell Kleiman, (New York: Garland Publishing Inc., 1994), 29–50.

8 Kirsten Intemann, "Science and Values: Are Value Judgements Always Irrelevant to the Justification of Scientific Claims", *Philosophy of Science* 68 (supp.), no. 3 (2001): 506–518.

9 For a detail discussion on the value-ladenness of science see: Agnieszka Lekka-Kowalik, *Odkrywanie aksjologicznego wymiaru nauki* (Lublin: Wydawnictwo KUL, 2008).

science, or a kind of "weakness" that should disappear in the course of the development of science and its methods. On the contrary, it seems that the more science is developed and put to social use, the more the awareness of the place of value judgments in science is necessary. In short, ignoring the fact that value judgments (where "value" means "non-cognitive value") constitute a necessary element of research makes science neither more objective, nor more rational and autonomous, nor more free. Let us consider that issue further, showing its consequences for understanding the responsibility of science.

3. Value judgments and the objectivity and rationality of science

The question of what objectivity is and whether it boils down to intersubjectivity is one of those vividly discussed. However, we do not need to solve this issue in order to show how the presence of value judgments in science bears on any solution. There are no serious doubts that the goal of science is to describe and explain the workings of the world. So at least partially the objectivity of science is to describe things as they are. Our human cognition is aspectual, so any description is also aspectual. Yet, the relationship between aspects is *also* a part of reality and cannot be ignored in research because research would become *less* objective. A dog is a material being but it is also a sentient being. Ignoring the latter fact in an experimental design is based on a value judgment "this aspect is negligible in the case of my research". What justification can be provided for such a claim? It cannot be simply the nature of the dog, as it has a normative dimension: there are things which we should not do to the dog. This normative dimension can be revealed when we consider a postulate not to keep dogs in bad conditions (it is not necessary for the argument to specify what bad conditions are). If the dog's nature did not have a normative dimension, we might postulate that science modifies dogs in such a way that they would like chains or beating. Yet, no one seems to suggest such a research proposal. Ignoring the normative dimension of the dog's nature stems then from an arbitrary decision of a researcher. And arbitrariness does not promote objectivity. On the other hand, using a value judgment "dogs' sentient nature is respectable" in a justification why an experimental design does not contain such a step as vivisection warrants objectivity understood as taking into account the world as it is in one's cognition and action.

The presence of value judgments in science has consequences for understanding scientific rationality. When decisions are made on how to

organize research, in their content and justification the whole spectrum of values must be taken into account, not just cognitive values. That is, when scientists justify their research decisions, in the justification of those decisions – even if not explicitly – value judgments occur where values include a non-cognitive value. Providing justification is a requirement of rationality. In this sense, value judgments are vehicles of rationality. The examples were considered above. However, the examples show something more: the rationality of science should be seen as practical rationality, and not merely instrumental rationality. That is, the formulation of a problem, the choice of methods, the elaboration of data, the acceptance of research results, providing those results to the sponsors and general public, and applying them to technical or social issues should be evaluated separately in light of values involved. Without the right to pass value judgements legitimately in science, researchers would be treated as "minds to hire", who should employ scientific methods to a problem defined outside of science and provide results without paying attention to consequences of research and its dissemination. They would be like machines that run their program regardless of circumstances and effects and those who have power might be able to "switch on" those machines. It would be an amputation of human reason.

This idea is captured in one of the contemporary proposals of a new paradigm of doing science – the so-called *Mode 2 Science*.[10] One of the main attributes of that proposal is that any research is developed in the context of application. This context is set by the process of a dialogue between "research stakeholders" including scientists and research institutions as well as persons and institutions participating in the creation of a research project, paying for research, carrying it out, being vitally interested in the implementation of its results, taking risks connected to that project, etc. The dialogue between stakeholders brings various perspectives, including value-presuppositions, and in that dialogue, a research problem is formulated and operationalized, methodologies are determined, ways of using results defined. The context of application is supplemented by the context of implication – a dialogue concerns also the consequences of research and the implementation of its results. The fact that reliable knowledge will be acquired is not by itself a sufficient justification of a research project – research must be socially robust. Criteria for reliability and robustness are

10 Michael Gibbons et al., *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies* (London–Thousand Oaks–New Delhi: Sage Publications, 1994); Helga Novotny et al., *Rethinking Science: Knowledge and the Public in an Age of Uncertainty* (London: Polity Press, 2001).

also determined by stakeholders. It is not then so that scientists determine research questions, methods, and possible applications of results and leave the rest to others; but also it is not so that scientists accept "orders" to solve a particular problem without asking about goals which knowledge is to serve and consequences of having it.

The relationship between value judgments and objectivity and rationality of science bears on the understanding of the responsibility of science. Let us consider that issue in detail.

4. Scientific responsibility extended

There is a general agreement that scientists are responsible for the reliability of knowledge they achieve in research. As it is shown above, reliability of knowledge depends on decisions on how to operationalize a problem, when evidence is sufficient, how to organize data, which theses should be accepted as auxiliary claims in drawing conclusions. Those decisions involve value judgments about the nature of research objects. This in turn requires that scientists are responsible also for the consequences of their research decisions. Taking this responsibility is a requirement of rationality – for scientists respect their own value judgments. Once they accept that students are persons with dignity and rights – and such a judgment describes reality – the responsibility arises for not violating that dignity and rights during research, as does, of course, the responsibility for violating them. This is a kind of responsibility internal to science, for no one is entitled to make research decisions unless one claims – against evidence – that scientists are not really human but just obedient machine-like "minds to hire".

Another kind of responsibility appears when we consider the social roles of science. Hans Jonas in his book *The Imperative of Responsibility* shows that certain beings – recognized as values or bearers of values – make claims on acting agents when their existence and development depends on those agents' power and will. This fact creates an obligation to execute that power for the good of those beings. The good of those beings-values becomes a criterion that sorts out possible actions into those required, forbidden, and permissible. The more power, control, and the ability to foresee action consequences agents have, the greater responsibility for beings occurring within their causal influence they bear. Jonas's analysis is directly applicable to science, for it obviously – also through technology developed on its basis – powerfully shapes society and the development and now maybe even the existence of society depends

on science; and society is a bearer of values (and via culture a creator of values) and in an obvious sense not only cognitive values. This fact creates a special obligation for scientists to work *qua scientists* for the good of society or more generally – for the good of humanity. This, in turn, means the acceptance that providing explanatory knowledge about the workings of the world – so the goal of science – is good for society, but also that scientists should ask – and answer – questions of whether this particular piece of knowledge should be provided to those particular subjects (institutions, groups, individuals) here and now, what consequences the dissemination of that piece would have, what applications might be developed, and what dangers those applications might bring. Those questions and answers are elements of doing science, and not something external to it, and therefore scientists should participate in the social discourse on science policy as well as societal use of scientific research and their possible consequences. This is what socially responsible science is about.[11] And the recognition of non-cognitive values embedded in society justifies that responsibility. The fact that the scientific responsibility includes social responsibility justifies in turn the call for the social accountability of science.[12]

5. Some practical conclusions

Four theses were argued above: that value-free science is a distortion of the nature of science, that value judgments referring to non-cognitive values are part of scientific practice, that those judgments are warrants that the objectivity and rationality of science are secured, and that therefore the responsibility of science must broaden to include both cognitive and social responsibility. Once they are accepted, some practical conclusions follow as to the development of science. The first is that science is "nested"

11 In view of the enormous achievements of contemporary science, the issue of socially responsible science is gaining importance. See for example Heather Douglas, "The Moral Responsibilities of Scientists", in: Heather Douglas, *Science, Policy, and The Value-Free Ideal* (Pittsburgh: University of Pittsburgh Press, 2009), 66–86; Lawrence Badash, "Science and Social Responsibility", *Minerva* 42 (2004): 285–298; David B. Resnik, Kevin C. Elliott, "The Ethical Challenges of Socially Responsible Science", *Accountability in Research* 23, no. 1 (2016): 31–46.

12 For some other aspects of the responsibility of science see Agnieszka Lekka-Kowalik, "Science as Action: Three Realms of Freedom and Responsibility", in: *Freedom and Responsibility. Sacrum, Culture and Society*, eds. Piotr J. Juchacz, Roman Kozłowski (Poznań: Wydawnictwo Naukowe UAM, 2003), 111–126.

in philosophy. Scientists *qua scientists* pass value judgments when designing and doing research but the justification of those judgments is not to be found in science but in philosophy, for it is philosophy that considers the essence and status of values. Yet, taking into account the fact that there are many philosophies, the question then arises: which philosophy is proper as a nest for science as a social practice with the power to shape the natural and social environment. Any answer to that question needs to be argued separately but the above considerations suggest one feature of such a proper philosophy: it must recognize the objectivity and truth of at least some value judgments. Otherwise, we would need to say that, since science employs value judgments in its practice and value judgments are subjective and cannot be true or false, we would need to agree that science somewhere at its bottom is not – and cannot be – objective.

The second conclusion is that it is part of doing science to consider the consequences of dissemination and application of knowledge, accepting funds from sponsors, or developing technologies. The fact that projects are divided into small units and it is difficult to see a broader picture does not remove the need for such considerations but calls for deeper cooperative reflection among scientists and maybe even institutionalization of such reflection. The development of research ethics may be seen as a case of that institutionalization.

The third conclusion concerns the education of scientists. It must include not just the latest knowledge and skills necessary to do innovative research but also the awareness of what scientific objectivity, rationality, and responsibility consist in. The recently developed ethical committees and science policy bodies include scientists, and scientists must be prepared to participate in them with the awareness that non-cognitive values are involved in doing science. The attempts to include research ethics into curricula of various scientific and technology disciplines is the right step in reshaping scientific education.[13] Moreover, participation in social discourse requires also some skills to formulate good arguments beyond one's domain of expertise, which calls for broadening scientific education to include such disciplines as practical logic, ethics, general methodology.

And the fourth conclusion is that scientists who ignore non-cognitive values embedded in scientific practice are not good scientists, even if the piece of knowledge they acquire is reliable. For thereby they ignore

13 See for example ALLEA, "Ethics Education in Science", access 14.09.2021, http://www.allea.org/wp-content/uploads/2015/07/Statement_Ethics_Edu_web_final_2013_10_10.pdf.

also the nature of science and its responsibility for people, society, and environment. In this perspective, Nazi doctors were not great scientists and morally bad people – they were bad scientists as well. So, science should promote the ethos of extended responsibility, for only then science is what it should be: a means of creating a better world.

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Summary

Although the presence of cognitive values in science has been accepted for half a century, until recently it was claimed that the presence of non-cognitive values threatened the rationality and objectivity of science and it was a sign of a scientist's weakness. This view appeared to be correct when cognitive and non-cognitive values were treated dichotomously, and science was seen as a set of theories and procedures. The analysis of science as a social practice shows however that this dichotomy cannot be maintained and that the scientist, when planning and conducting research, makes assumptions which include value judgments encompassing certain non-cognitive values. Ignoring the presence of non-cognitive values does not secure objectivity and rationality of science. On the contrary, since they are constitutive elements of scientific research, pretending that they do not work in research exposes science to ideologization. Rational subordination of science to them becomes a vehicle and a warrant of not only rationality but also objectivity and social responsibility of science. This in turn allows us to restore the proper place of science in culture.

Keywords: science, non-cognitive values, value judgments, objectivity, rationality, responsibility