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LACEY'S CONCEPT OF VALUE-FREE SCIENCE

Abstract: *Many philosophers of science have maintained that science should be value-free; still others believe that such ideal is neither achievable nor desirable for science. Hugh Lacey is presently one of the main supporters of the idea of value-free science and his theory is probably the most debated today and attracts the most attention and criticism. Therefore, in this text, I will primarily analyze his theory of value-free science. After briefly defining the notion of value I highlight which strategy Lacey chooses to lay a firm foundation for the concept of science without value, with his starting point being the differentiation between cognitive and non-cognitive values. Then I describe three basic characteristics of Lacey's value-free science: impartiality, neutrality, and autonomy. However, the overall plan and design of his project, together with some concrete steps he takes, are not without problems in our view. I will try to point out some of these problematic issues and provide brief suggestions for alleviating them.*

Keywords: *value-free science; impartiality; neutrality; autonomy*

Laceyovo pojetí vědy bez hodnot

Abstrakt: *Mnoho filosofů vědy hájí názor, že věda by neměla být zatížena hodnotami; jiní jsou nicméně přesvědčeni, že takový ideál je nejen nedosažitelný, ale není ani žádoucí. Hugh Lacey je v současnosti jedním z hlavních zastánců ideje vědy bez hodnot a jeho teorie je dnes pravděpodobně nejdiskutovanější a přitahuje nejvíce zájmu i kritiky. V předkládaném textu se proto primárně věnujeme jeho koncepci vědy nezatížené hodnotami. Poté, co v krátkosti charakterizujeme pojem hodnoty, vykreslujeme strategii, kterou Lacey volí, aby položil pevné základy své koncepce. Výchozím bodem je rozlišení mezi kognitivními a nekognitivními hodnotami, následuje popis tří základních charakteristik vědy bez hodnot: nestrannosti, neutrality a autonomie. Nicméně celkový rozvrh a výstavba tohoto projektu nejsou z našeho pohledu bez nedostatků, proto v závěru textu na některé z těchto problematických aspektů poukazujeme a pokoušíme se podat stručné návrhy na jejich odstranění.*

Klíčová slova: *věda bez hodnot; nestrannost; neutralita; autonomie*

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The problem of science, where it is not influenced by value judgments, may be familiar to us nowadays, as its history dates back well into the past. Numerous authors have tried to track its historical roots. Proctor refers primarily to the contributions of Francis Bacon, 19th century German universities, Max Weber and positivists.[1] Meanwhile, Lacey identifies several major sources for this idea: *metaphysical* (associated with Galileo), *epistemological* (associated with Bacon), *metaethical* (related to the notion of value judgments being subjective and therefore non-rational), and *logical* (based on the Humean distinction between facts and values.[2] Douglas, however, argues that the development of a concept of value-free science in its current form can only be traced back to the 1960s.[3]

Lacey is presently one of the main supporters of the idea of value-free science, who, in his work, seeks to build on the above-mentioned classical authors, on the one hand, and to reflect the criticism of these classical concepts from postmodern positions, on the other. Douglas, another author interested in value-free science, writes: "The most careful examiner and defender of the value-free ideal for science since the 1990s is probably Hugh Lacey."[4] Of course, there are other authors who discuss the problem of value-free science: while we can mention the texts of Shrader-Frechette[5] or Longino,[6] Lacey's concept is probably the most debated today and attracts the most attention and criticism.

Therefore, in this text, we will primarily analyze his theory of value-free science as follows. First, we briefly define the notion of value. Then we highlight which strategy Lacey chooses to lay a firm foundation for the concept of science without value, with his starting point being the differentiation

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[1] Robert N. Proctor, *Value-Free Science? Purity and Power in Modern Knowledge* (Cambridge, MA: Harvard University Press, 1991).
[2] Hugh Lacey, *Is Science Value Free? Values and Scientific Understanding* (London: Routledge, 2005), 2–7.
[3] Heather E. Douglas, *Science, Policy and the Value-Free Ideal* (Pittsburgh: University of Pittsburgh Press, 2009), 44.
[4] Ibid., 16.
[5] Kristin Shrader-Frechette, *Risk and Rationality* (Berkeley: University of California Press, 1991); Kristin Shrader-Frechette, *Burying Uncertainty: Risk and the Case against Geological Disposal of Nuclear Waste* (Berkeley: University of California Press, 1993); Kristin Shrader-Frechette, *Ethics of Scientific Research* (Lanham: Rowman and Littlefield, 1994).
[6] Helen E. Longino, *Science as Social Knowledge* (Princeton: Princeton University Press, 1990).

between cognitive and non-cognitive values. Any talk of value-free science effectively means science without any non-cognitive values. Such science has three basic characteristics, which Lacey describes thus: impartiality, neutrality and autonomy. We describe these characteristics in three separate sections. In formulating a concept of value-free science, Lacey also tries to reflect some aspects of the postmodern criticism of science. While he rejects the most radical form of such criticism, he attempts to integrate some postmodern approaches with the traditional concept of scientific research.

The overall plan and design of his project, together with some concrete steps he takes, are not without problems in our view. In the last section we will try to point out some of these problematic issues and provide brief suggestions for alleviating them. However, we generally regard Lacey's project for value-free science, even in its current form, as an important contribution to the philosophy of science, while some of the controversies that it had sparked have been beneficial to the ongoing discussions within this discipline.

The Concept of Value

The starting point for the exploration of the ideal of value-free science should be to define the concept of value in this context. This concept is usually not applied in a clear, well-defined way. In different contexts, you can encounter different ways of using this term. Lacey submits the following list of meanings of the term "personal value" as used in common discourse:

1. A fundamental good that one pursues consistently over an extended period of one's life; an ultimate reason for one's actions.
2. A quality (or a practice) that
   a. gives worth, goodness, meaning or a fulfilling character to the life one is leading or aspiring to lead.
   b. is partially constitutive of one's identity as a self-evaluating, self-interpreting and a partly self-making being.
3. A fundamental criterion for one to choose what is good among possible courses of action.
4. A fundamental standard to which one holds the behavior of self and others.[7]

[7] Lacey, *Is Science Value Free?*, 23 (added emphasis).

Lacey's observation emphasizes the fundamental nature of values, which is probably adequate for values that are *personal*. Such a definition, however, cannot be understood as a general definition of the value per se, which, in any case, Lacey does not provide. Against personal and social values (which he considers belong under the same heading), he places cognitive values (we will discuss them later).

In addition to this definition of the concept of personal value, Lacey lists in parallel the concept of "objects of value," i.e., objects to which one can relate and which are constitutive of a worthwhile life and personal identity. Examples of such objects include works of art, scientific theories and devices. Connected with the concept of objects of value is that of an "appropriate relationship" with it. Examples of such relationships are, according to Lacey, production, reproduction, respect, nurturance, and maintenance.[8]

Personal relationships are related to human behavior, in the context of which it is only possible to interpret them. The empirical concept of human behavior is founded in *desires* and *beliefs* – people act because they *believe* that the action will lead to satisfaction of a specific *desire*. These individual desires are usually manifested in behavior in certain mutual relationships with other people. The person himself evaluates his behavior and, at the same time, other people judge him. The set of desires, their interrelationships, and their evaluations bear, at their core, the values of the acting agent. Only through these values is it possible to offer a full explanation of each action. The behavior of an individual is not a random sequence of diverse actions, but their meaning can only be explained by their relationship to values of the acting person. Values are sometimes characterized as second-order desires.[9]

The discourse on values has a specific grammar. Lacey distinguishes several types of statements:

1. Value judgments: "v is value" or "v_1 is subordinate to v_2."[10]
2. Fundamental expressions: "X values that f be characterized by v."[11]
3. Measuring expressions: "v is manifested in f to such and such degree."[12]

[8] Ibid.
[9] Charles Taylor, *Human Agency and Language: Philosophical Papers*, Vol. 1 (Cambridge: Cambridge University Press, 1985).
[10] See Lacey, *Is Science Value Free?*, 39.
[11] Ibid., 45. See also Rudolf Carnap, "The Elimination of Metaphysics Through Logical Analysis of Language," *Erkenntnis* 2 (1932): 60–81.
[12] See Lacey, *Is Science Value Free?*, 39.

The first statement type applies different values to the mutual relationship and allows for the creation of value hierarchies. The third type of statement allows us to talk about the extent to which an entity has a certain value. However, it is the second kind that will be of particular significance for our discussion, because, on its grammatical basis, Lacey tries to distinguish cognitive values from non-cognitive values. Possibility of this distinction is the primary thesis of Lacey's approach: cognitive values are values attributed to human belief and (scientific) theories, while non-cognitive values are everything else (social, personal etc.).

Cognitive values then play important role in what he calls "rational acceptability" of a theory.[13] Rational acceptability of the theory is manifested by its high cognitive value (singular), which is defined by the high degree of the manifestation of cognitive values (plural) in the theory.

Cognitive Values

Lacey's fundamental assumption is that there are specific kinds of values: namely, cognitive values. If we start from the basic value expression, "*X* values that *f* be characterized by *v*," then *X* designates a person, *v* designates a cognitive value and *f* designates a person's belief or scientific theory. Belief is a propositional attitude whose fundamental expression is "*X* believes that *p*" (*X* is an agent, *p* is a proposition). We can say that belief is true, when proposition *p* is true.[14] We can furthermore distinguish beliefs that one simply *has* (it informs one's action) and those that one *holds* (one reflectively endorses that it informs one's action).[15] Some beliefs may be regarded as "knowledge" if they satisfy other complex requirements. Cognitive values are, in many cases, shared; indeed, Lacey even says: "It is difficult to get away from the sense that there is a *correct set of cognitive values* that one ought to aspire to identify."[16] This claim, however, does not presuppose that these values cannot change throughout the course of history. There are historical disagreements about specific members on the list of cognitive values with regard to scientific theories. Different authors propose different (sets of) cognitive values, such as:[17]

[13] "Judgments of degree of rational acceptability are framed by the ideal truth, but we have no indicator of truth other than rational acceptability." Lacey, *Is Science Value Free?*, 46.
[14] Ibid., 45–46.
[15] Ibid., 47.
[16] Ibid., 52 (added emphasis).
[17] Ibid., 53.

certainty;[18] inductive derivability;[19] accuracy, consistency, predictive and explanatory scope, simplicity and fruitfulness;[20]

+ instrumental efficacy;[21]

+ high degree of falsifiability;[22]

+ capability to explain problems with historically preceding theories through a narrative;[23]

– simplicity, explanatory scope.[24]

Lacey himself presents a list of cognitive values, but without any definite endorsement. The primary problem of this concept is not the uncertainty surrounding the list of cognitive values, but what this uncertainty shows – the ambiguity of how to define cognitive value in general.

The discussion of the correct list of cognitive values thus reveals that the above-presented characterization of cognitive values is inadequate, while cognitive values that are acceptable (and desirable) in science must also meet certain other requirements. To resolve this problem, Lacey lists two other requirements defining cognitive value:[25]

1. It be needed to explain (perhaps under idealization or rational reconstruction) theory choices that are actually made, and the character of controversies engaged in by the community of scientists.
2. That it is a criterion of cognitive value – an indicator of sound scientific understanding – be well defended.

The first of these principles was introduced by McMullin, but his rationalization is purely historical and traditionalist: "The characteristic values guiding theory-choice are firmly rooted in the complex learning experience

[18] René Descartes, *Discourse on Method* (Indianapolis: Hackett Publishing, 1998).
[19] Francis Bacon, "Novum Organum Scientiarum," in *The Works of Francis Bacon*, Pt. 1, eds. James Spedding, Robert Leslie Ellis, and Douglas Denon Heath (Stuttgart-Bad Cannstatt : Frommann-Holzboog, 1963). Isaac Newton, *Philosophiæ Naturalis Principia Mathematica* (London, 1687).
[20] Thomas Kuhn, "Objectivity, Value Judgment and Theory Choice," in Thomas Kuhn, *The Essential Tension* (Chicago: University of Chicago Press, 1977).
[21] Hilary Putnam, *Reason, Truth and History* (Cambridge: Cambridge University Press, 1981).
[22] Karl R. Popper, *The Logic of Scientific Discovery* (New York: Harper, 1959).
[23] Alisdair MacIntyre, "Epistemological Crises, Dramatic Narrative and Philosophy of Science," *The Monist* 60, no. 4 (1977): 453–72.
[24] Bas C. van Fraasen, *The Scientific Image* (Oxford: Clarendon Press, 1980).
[25] Lacey, *Is Science Value Free?*, 91.

which is the history of science; this is their primary justification, and it is an adequate one."[26]

Lacey endorses this attitude, but adds: "There is no good reason to hold, however, that the values guiding theory choice that are rooted in this complex learning experience are necessarily *all* cognitive values."[27] This is an ambiguous expression – Lacey means that some of the values, which are traditionally considered to be cognitive, may in fact be non-cognitive values (and vice versa), which in practice may have an influence on the process of choosing the accepted theory in science. Therefore, if some values are not warranted enough (Principle 2), then they should be excluded from the list of cognitive values. As an example, he refers to the values associated with "materialistic strategies" of scientific research, i.e., the values associated with quantitative and mathematic scientific methods of understanding, which posit science as a means of controlling natural forces.

The second of Lacey's principle refers to the question about whether the given value "serves the objectives of science."[28] For this to be possible, it is necessary to first determine the purpose of science. Lacey provides the following definition: "The objective of science is to gain understanding of phenomena. This includes to encapsulate (reliably in rationally acceptable theories) possibilities that are open to a domain of objects, and to discover means to realize some of the hitherto unrealized possibilities."[29] His definition intentionally tries to evade Baconian references to the practical usability of science for controlling nature. The use of dictionary of "open possibilities" and "means to realize" seeks to provide a more general account of the objective of science, as opposed to the account associated with "materialistic strategy," which Lacey tries to avoid. Defining the objective of science and cognitive values thus enables him to proceed with defining his concept of value-free science.

[26] Ernan McMullin, "Values in Science," in *PSA 1982*, vol. 2, eds. P. D. Asquith and T. Nickles (East Lansing: Philosophy of Science Association, 1983), 19. See also Ernan McMullin, "Rationality and Paradigm Change in Science," in *World Changes: Thomas Kuhn and the Nature of Science,* ed. Paul Horwich (Cambridge: MIT Press, 1993). Lacey also quotes Kuhn, who wrote in a similar spirit: "those values are in part learned from that experience and they evolve with it" (Kuhn, *Objectivity, Value Judgment and Theory Choice*, 335).
[27] Lacey, *Is Science Value Free?*, 91.
[28] Ibid., 93.
[29] Ibid., 102.

Science Free of Values

How can we generally explain the claim of value-free science when we have shown that influencing scientific research with certain values, is in some cases, unproblematic? The essential feature of science is that it is headed, in Lacey's terms, towards "understanding of phenomena." The social value of theory is thus closely related to its rational acceptability as manifested by the cognitive value of a theory. Within the different theoretical approaches to scientific research, there may be different views on whether the goal of true knowledge is attainable, or that it is only an ideal, such as the Kantian regulatory idea. There is relatively general agreement that science, as a process and a set of methods, aims to achieve a specific kind of knowledge; and, as a system, it is a system of methods appropriate to this goal, which have been developed throughout the course of history. This central role of methods, the ideal of knowledge or truth, or, in Lacey's case, the concept of rational acceptability, also determines the role of other values in science.

If we talk about value-free science, we mean science in which the influence of moral, personal, social or aesthetic values is limited. On the contrary, any science, as far as the contemporary concept of science is concerned, must reflect cognitive values as much as possible.

The input of non-cognitive values into the context of scientific research is permissible if they support, or at least do not hinder, the attainment of knowledge. On the contrary, if the influence of non-cognitive values in the context of scientific research negatively affects research, with respect to cognitive values, i.e., it affects the direction towards knowledge, and these non-cognitive values take precedence over cognitive ones, then such interference is considered unacceptable.

In an informal context, the distinction is nowadays captured by terms "good science" and "bad science" (or "junk science").[30] The term "bad science" is used to refer to scientific outcomes suffering from some of a whole range of different issues. Such problems may be of a specifically methodological nature, e.g., a setup of an experiment that has not accounted for confounding variables, the use of an inappropriate sample size or time frame, or the use of selective data.[31] These methodological problems obviously limit the possibility of achieving reliable results in research. However, some kinds

[30] The term "pseudoscience" refers to activities that do not respect scientific methodology.
[31] E. C. M. Parsons and Andrew J. Wright, "The Good, the Bad and the Ugly Science: Examples from the Marine Science Arena," *Frontiers in Marine Science* 33, no. 2 (2015): 2.

of bad science may suffer from different than methodological issues, like plagiarism.[32]

Methodologically wrong research can be caused by the influence of non-cognitive values in its course, for example, if a researcher has a personal financial interest in research leading to a positive conclusion, he might use selective data before the statistical processing stage, such that the values that do not match the desired result are removed. In cases of conflict of interests the notion of junk science is often used.

To formally limit these issues, Lacey formulates three basic principles that characterize value-free science: impartiality, neutrality and autonomy.

Impartiality

Impartiality is the primary characteristic of value-free science, and Lacey repeatedly acknowledges that the remaining two principles – neutrality and autonomy – are dependent on and derived from it. Therefore, we will firstly focus our discussion on this principle. The concept of impartiality primarily concerns the sound acceptance of scientific theories. The basic principle of impartiality is the aforementioned distinction of cognitive and non-cognitive values, with the other two principles based on this distinction. The result of this arrangement is the following set of three basic principles of impartiality of science:

1. The cognitive values are distinct and distinguishable from other values, and they may be manifested in theories developed under a variety of different strategies.
2. [Scientific theory] T is accepted of [domain] D under [strategy] S if, and only if, T is accepted of D under a strategy S; and so, in relation to [empirical data] E, manifests the cognitive values highly according to the most rigorous available standards; and to a higher degree than any rival theory manifests them in relation to the data appropriate in the light of the strategy under which it developed – where T meets the constraints of and the items of E have been selected in accordance with S, and some of the rivals are (were) developed and appraised under different strategies.

[32] There is lot of kinds of bad science, see Daniele Fanelli, "The Black, the White and the Grey Areas: Towards an International and Interdisciplinary Definition of Scientific Misconduct," in *Promoting Research Integrity in a Global Environment*, eds. Tony Mayer and Nicholas Steneck (Singapore: World Scientific Pub Co Inc, 2011), 79–90.

3. T is rejected of D if, and only if a rival theory (T') is accepted of D, and T and T' are inconsistent, regardless of the strategies under which T' developed.[33]

From these three basic principles, there is an implication that defines science, when operated in accordance with them, as value free. Non-cognitive values and also any opinion as to whether theory is, for some reason, significant cannot be used as reasons to accept the theory in the context of science that we define as value free:

4. Values and assessments of a theory's significance are not among the grounds for accepting and rejecting theories. [34]

In the whole definition, there are a few problematic issues. The first is the question of "strategies" – Lacey is convinced that contemporary science is based on "materialistic strategies," whose primary characteristic is that they are based on the ideal and the value of the ability to control natural forces:

> Certain *values* connected with the *control of nature* rank especially highly in modern value complexes. I will argue [...], that the nearly unanimous adoption of *materialist strategies* in modern scientific practices becomes intelligible largely in virtue of its mutually reinforcing interaction with these *values*.[35]

Materialistic strategies are then characterized from a methodological point of view as follows: they compromise the "generally quantitative and mathematical [...] kinds of terms that apply to phenomena considered as generated from underlying structure, processes and laws rather than considered as an integral part of daily life and social practice."[36] Materialist strategies are also considered successful because they facilitate what they promise: to exercise control over (material) things.

Lacey is convinced that there are other strategies that can make scientific research meaningful, while formulating the principles of value-free science in such a way that even these non-materialistic strategies are acceptable within the context of science that can be called value free. The disadvantage of materialistic strategies, according to him, is that they abstain from social

[33] Lacey, *Is Science Value Free?*, 230.
[34] Ibid.
[35] Ibid., 111.
[36] Ibid., 68.

and ecological values.[37] Widening the definition of impartiality, so that it does not solely presuppose materialistic strategies, opens up space for other "fruitful" (non-materialistic) strategies.

As examples of non-materialistic strategies, Lacey proposes "grass-roots" approaches and feminist theories.[38] In the first case, he contemplates the concept of "development" in the context of Third World countries and introduces the revised concept of "authentic development" (we will discuss this in the conclusion in more detail). Feminist strategy is understood by Lacey as generally compliant with the principle of impartiality (see the next section), because he interprets it as an approach that is, in essence, based on bias elimination. The limitation of the autonomy of science (defined later in this text) by the feminist approach is settled by the claim that "autonomy does not hold even of research conducted under the materialist strategies."[39] This is of course in contradiction with the idea that autonomy is an ideal (similarly to other principles), which, although not met in reality in every scientific inquiry, it is nevertheless necessary to strive for its fulfillment in science when understood properly as value free. In the case of feminist strategies, it seems that Lacey is complacent about being completely resigned to this ideal. As a result, it seems that the ideal of autonomy is considered insignificant, or that he abandons it entirely or partially when it stands in the way of feminist scientific strategy.

Lacey is thus trying to build a theory of value-free science that reflects and is integrates with the feminist critique of science.[40] Nevertheless, his approach to value-free science has become the target of feminist criticism, which is the subject of further extensive discussion in the literature.[41]

The key point in the concept of impartiality is Principle 2 – Lacey admits, however, that, in current scientific practice, as it is functioning in reality, there are numerous exceptions: the cases where scientific theories are accepted by the scientific community for reasons other than their high manifestation of cognitive values. That said, this does not mean that these principles are not understood in contemporary science as an ideal, while accepting a theory that does not match them does not count as failure.

[37] Ibid., 139.
[38] Ibid., 224.
[39] Ibid., 201.
[40] Longino, *Science as Social Knowledge*.
[41] For example, Stéphanie Ruphy, "'Empiricism All the Way Down': A Defense of the Value-Neutrality of Science in Response to Helen Longino's Contextual Empiricism," *Perspectives on Science* 14, no. 2 (2006): 189–214.

Neutrality and Autonomy

The concept of the value neutrality of science includes three basic principles:[42] 1) no value consequences; 2) consistent with all value judgments; 3) even-handedness in application. These three principles of neutrality in their formally developed form are expressed by Lacey as follows:

1. Practices of scientific (systematic empirical) inquiry variety of strategies generate theories, that are accepted in I, such that:
2. accepting these theories implies no value commitments;
3. accepting them neither undermines nor supports holding any one of the ranges of viable value complexes; and
4. in principle, for any value complex that remains viable as the stock of theories (accepted in accordance with I) expands in the course of research that puts its presuppositions to empirical test:
   a. there are some accepted theories, developed under materialist strategies, that are significant to some extent; and
   b. there are some accepted theories, some of which may be developed under non-materialist strategies, that are highly significant.[43]

The first principle states that adopting a theory consistent with the principle of impartiality does not imply the necessity of accepting some (non-cognitive) values. Generally, it is valid with regard to direct logical implication, as a result of the Humean differentiation between normative and factual assertions. Factual statements cannot have normative implications. Given a theory (e.g., that things have some property, or are somehow related, or that natural law applies), there cannot be any *directly implied* normative statement (e.g., saying what someone should do).

However, on closer inspection, the first principle of neutrality also seems debatable. Scientific theory may have an indirect influence on normative statements, based on the validity of other normative statements. For example, assuming the acceptance of "health" as a non-cognitive value regarding the quality of human life and the adoption of a related normative imperative "to seek to preserve health," then accepting the scientific theory that smoking cigarettes seriously damages health can imply a normative requirement not to smoke. Therefore, we need to interpret the first principle of neutrality in the sense that scientific theory itself cannot have any direct

[42] Lacey, *Is Science Value Free?*, 75.
[43] Ibid., 240.

value consequences. However, its acceptance in the context of other values and normative assertions can have normative consequences.[44]

The second principle asserts that a theory, which is accepted with regard to the principle of impartiality (cognitive values of such a theory are manifested to a higher degree than in a competitive theory), is neutral with respect to non-cognitive value judgments. That means that such a theory is consistent with different (non-cognitive) value systems. As this is not necessarily true, Lacey introduces the concept of "viable value complexes," defined on the basis of impartiality: "A value complex is viable if its presuppositions are consistent with the body of theories which have been accepted (of the relevant domains) in accordance with impartiality."[45] The second principle, therefore, merely asserts that the theory, adopted on the basis of the principle of impartiality, is consistent with all the value systems whose assumptions respect the principle of impartiality.

The third principle expresses that theories are neutral with respect to their application, such that science can even serve, at least to some extent, the interest of all (viable) value complexes. However, Lacey acknowledges that, in the context of today's practical science, a much simpler modified version of a third principle of neutrality is accepted, which reads as follows:

> 3' For any viable value complex, there are (in principle) some accepted theories that are significant to some extent.[46]

Lacey is concerned that this principle does not sufficiently reflect the alternative strategies we have mentioned previously. Therefore, he prefers a more complex Definition 3 as introduced beforehand, which paves the way for alternative strategies, given that theories are explicitly expected to further those as well. We consider this approach to be problematic; however, we postpone a detailed discussion until the following section.

The principle of autonomy concerns an environment where research, which is performed in accordance with the principles of impartiality and neutrality, can take place. This environment consists primarily of the scientific community and the processes that connect this community with its surrounding environment. The principle of autonomy thus primarily

[44] "In some historically striking cases [...], the consequences of accepting a theory have indeed included undermining certain fundamental values." Ibid., 76.
[45] Ibid., 78.
[46] Ibid., 238. "I do not doubt that most members of the scientific community would endorse an articulation like N' [i.e., 3'] rather than N [i.e., 3]" (ibid., 244).

concerns external influences on scientific research. Ideally, the autonomy of the scientific community should relate to the choice of subject matter and the methods of research. The scientific community should be autonomously constituted, i.e., constituted by itself, deciding on whom its members are and who are not. The scientific community should manage its own institutions, including educational ones. To the public, the scientific community should act as the entity responsible for its above-mentioned functions.

Lacey offers the following provisional definition of autonomy:

1. Scientific practices aim to gain theories that are accepted in accordance with I[mpartiality] and whose acceptance accords with N[eutrality].
2. They are conducted without "outside interference" by the scientific community which: a) defines its own problems, etc.; b) has unique authority with respect to matters of method, etc.; c) determines who is admitted into the scientific community, and what counts as competence and excellence; d) shapes scientific education and scientific institution; e) forms its members in the practice of the "scientific ethos"; and f) exercises its responsibility to the public fully by acting in accord with items a)–e).
3. The scientific community conducts its investigations in self-governed institutions which are free from "outside interference," but provided with sufficient resources in order to conduct its investigations efficiently.[47]

It is obvious, as Lacey recognizes, that such a description of autonomy does not correspond to the current scientific reality of the world. The economic interconnection of scientific communities with their surroundings (government, the public sector and the commercial sector) explains why the subject of research is often determined externally (and in turn externally funded). Lacey recognizes that Points (a) and (d) can be weakened, for example, by working together with outside institutions unless this is inconsistent with the principle of 1) the impartiality and neutrality of research.[48]

Conclusion and Critique

The theory that Lacey puts forward in his text is undoubtedly an important contribution to the theory of value-free science. We must highlight, in particular, his reflections on the distinction between cognitive and non-cognitive values, as well as his attempt to define the three principles of the

[47] Lacey, *Is Science Value Free?*, 248.
[48] Ibid., 84.

value-free science: impartiality, neutrality, and autonomy. On the other hand, it is not possible to ignore the fact that his approach appears (if we disregard the minor critical remarks that we have stated previously) to be burdened by some fundamental problems.

The main difficulty is the very concept of different scientific strategies. The definition of the objective of science as put forward by Lacey, i.e., to gain understanding of phenomena, does not, according to him, lead immediately and necessarily to materialistic strategies. Materialistic strategies are not just quantitative and mathematical; they are related to what Lacey repeatedly calls "modern values of control." He seems to accept the idea that there are some autonomous, self-serving values concerning the control of nature, which modern science serves. Conversely, he would appear to ignore the fact that controlling nature is usually the only means to effectively attain other goals such as health, acceptable living conditions or, in some cases, even goals such as better entertainment. Instead, he explicitly links values relating to the control of nature to the "Western" concept of "modernizing development" (which includes economic growth, technology transfer and industrialization), which is associated with individualism and, in turn, capitalism. Thus, being guided by materialistic strategies, science is guilty of lagging behind in the area of human values in some Third World countries.[49]

Against this backdrop, he puts forward alternative strategies, which, rather than recognizing these autonomous values about the control of nature, are motivated differently. In reaction to the concept of "modernizing development," he proposes the concept of "authentic development," which is based on concepts of oppression and suffering. For Lacey: "Authentic development is meant to be a response to concrete and multidimensional sufferings of large numbers of people."[50] Therefore, the measure of authentic development is concerned with not only "material progress and economic innovation per se," but also the "poor claiming their human agency" and "the unleashing of their capabilities for exercising responsibility in shaping the conditions which structure their lives."[51] Authentic development thus evolves primarily out of local grassroots movements in, for example, South America. Lacey also introduces the concept of "appropriate technol-

[49] Ibid., 182–83.
[50] Ibid., 184.
[51] Ibid.

ogy," which is defined as a "technology that serves the interests of authentic development."[52]

Such an approach represents, in our view, a fundamental mixing of science (and its cognitive values and methods) with questions (and values) about politics and the moral domain, i.e., phenomena that are non-cognitive and non-scientific in their nature. It seems that the main and essential difference of this "grassroots" strategy in science is the choice of goals to be pursued by research. For us, referring to the selection of scientific research goals as "scientific strategy" is unfortunate (it also differs from Kuhn's usage of this term). Applying such terminology introduces a confusing lexicon into the discourse of scientific methodology. Paradoxically, in work whose main purpose ought to lie in a precise definition of values relevant to science, i.e., cognitive values, and consequently in defining the core of science as being methodologically limited to the consideration of these values, the introduction of the conceptual apparatus of "research strategy" leads to a conceptual mixing of scientific (and cognitive) concepts and political concepts (concepts related to "social justice" etc.).

The argument that such mixing always occurs in practice as well does not hold, because one of the purposes of philosophical work is to provide not just the sociological description of the real operation of science, but also a conceptual analysis, whose aim is a precise conceptual definition and delimitation, which can also be understood as an ideal that is unreachable in real scientific practice, yet serving a regulatory function for the same practice.[53]

If we were to offer an alternative approach, we would also start by distinguishing cognitive and non-cognitive values. However, the analysis of the relationship of non-cognitive values (e.g., political or moral) to scientific research must distinguish the basic forms of how these values can generally influence scientific practice. Such a distinction may, for example, take the form of a 1) influencing the goals of scientific research, 2) influencing the process of science and 3) influencing the use of scientific results in practice.[54]

Influencing the *goals of scientific inquiry* relates to the selection of issues and problems that scientific research has to deal with, i.e., what scientific programs should be initiated and how should they be funded. When choos-

[52] Ibid., 187.
[53] It is also related to demarcation problem. See Karl R. Popper, *Conjectures and Refutations. The Growth of Scientific Knowledge* (New York: Basic Books, 1962), 42.
[54] Ruphy identifies only the first two of these. See Ruphy, "Empiricism All the Way Down."

ing the objectives of scientific research, political and other non-cognitive values always play some kind of role, because scientific research is often funded by the state or by other social entities, which inevitably have their own interests. In this context, it may be legitimate to ask whether it would be more appropriate to target scientific efforts in order to produce better luxury products, which would only be used by celebrities in the most advanced countries of the world, or technology to alleviate the suffering and poverty of Third World populations. However, in contrast to Lacey, we believe that different decisions in this area do not constitute different "scientific strategies."

The issue of influencing the *process of science* concerns the influence of non-cognitive values on the selection of the "best" scientific theories and on the application of the methodological rules of science. The universal principle in this context is that only cognitive values should affect the choice of scientific theories (well expressed in Lacey's principle of impartiality). If we talk about "bad science" or "junk science" (the most appalling examples being "vaccinations cause autism" theory or "intelligent creation" theory), we are also talking about influencing the choice of the best theory according to non-cognitive values.

The value of influencing the *use of scientific results* is related to the influence of non-cognitive values on how the results of science will be used or applied. Similarly, as in the first point, there is always influence, more or less, from political and other non-cognitive values when deciding on the use of scientific results, and for the same reasons as already mentioned. Using the results of scientific research is a matter of subtle political decision-making and thus influenced by non-cognitive values, in turn interfering with the process of science itself. Whether the results of scientific research are used to benefit the richest or the poorest is not a matter of different "scientific strategies." It is a political decision that is external to science.

These distinctions are not explicitly echoed by Lacey. While he speaks of the distinction between pure science and applied science, he immediately dismisses this distinction by pointing out the assumed practical irrelevance of such a distinction "since scientific research is conducted in institutions, pure and applied are never fully separated."[55] This, of course, may be true in practice, but it does not imply that it might be impossible to separate out the different levels of scientific research and apply different methodological requirements to them. As a result, efforts to integrate political concerns and ideas of social justice with scientific methodology and principles of value-

[55] Lacey, *Is Science Value Free?*, 187.

free science reduce the value of Lacey's work, which is otherwise based on sound foundations.

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