

# Can the threads of fact and value be disentangled?

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Although there is a *distinction* between fact and value, i.e., between the way states of affairs are and any valuation of the way they are or might be, there is not a sharp *separation* or *dichotomy* between them. Facts and values are *entangled* (Putnam, 2002). In this article, I will explore some aspects of the entanglement (other aspects are explored in Lacey, 2006b), but none having to do with relations of logical entailment. Thus, I will not address the well-known Humean argument that value judgments cannot be deduced from statements that express facts, and its Baconian complement that the way the world is cannot be derived from our value commitments. Rather, I will be concerned primarily with relations among the facts we claim to know and the values we hold, which arise in human practices. This includes the practices of gaining knowledge and using it to inform our actions; indeed, I will point to ineliminable roles for ethical and social (as well as cognitive) values at the very core of the scientific practices that aim to gain knowledge of facts, i.e., knowledge of the way states of affairs and phenomena of the world are.

## 1 SEPARATE ‘WORLDS’ OR SEPARATE ‘BOOKS’

According to Alexandre Koyré, consolidating the hegemony of the mathematical and experimental character of modern science led to the: “discarding by scientific thought of all considerations based upon value-concepts, such as perfection, harmony, meaning and aim, and finally [to] the utter devalorization of being, *the separation of the world of value from the world of facts*” (Koyré, 1957, p. 4; my italics).

### 1.1 Two books

Galileo was a forerunner of the view that Koyré describes. He wanted to carve out a space where facts could be investigated scientifically without being subject to the Church’s authority and, thus, where facts would be appraised in the light of criteria that do not defer to the Church’s biblical interpretations and theological and moral declarations. In attempting to do this, Galileo, made use of another metaphor, not ‘two worlds’, but ‘two books’: ‘the book of the universe’ and ‘the book of revelation’, or – since Galileo intended to separate the appraisal of scientific facts from the purview, not only of the Church’s authority, but also of any value outlook or extra-scientific authority – ‘the book of scientific facts’ and ‘the book of values’.<sup>1</sup>

Two key proposals underlie Galileo’s position (Mariconda & Lacey, 2001):

(1) The criteria for evaluating scientific knowledge are distinct from any ethical / social / personal / religious / political value commitments;<sup>2</sup> or, in contemporary idiom, there is a sharp separation between

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<sup>1</sup> Galileo certainly did not want to be open to the charge that he was separating scientific facts from the purview of the religious/value outlook of the Church, so that he could submit them to the purview of another outlook, such as that of the Protestants.

<sup>2</sup> Galileo’s own criteria included empirical adequacy, explanatory power, avoidance of *ad hoc* suppositions, and simplicity (Mariconda & Lacey, 2001).

cognitive values and ethical, social and all other kinds of values; moreover, the cognitive values cannot include ‘consistency with the presuppositions of a particular value/religious outlook’ (Lacey, 2003; Lacey, 2005a, ch. 3; Lacey, 2005b).

(2) The language of scientific theory – the language of ‘the book of scientific facts’ – contains no value categories. This ‘book’, Galileo says, “is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures without which it is humanly impossible to understand a single word of it” (Galileo, 1957, pp. 237-238). The language is mathematical, exact, abstract – without teleology and anthropomorphism, without relationship with human interests (Finocchiaro, 1997, pp. 354-355) and salvation history. It is thus able (as it unfolded in the course of modern science) to represent the law, structure, interaction and process underlying phenomena, and thereby to deal with “the facts of Nature, which remain deaf and inexorable to our wishes.”

It follows from (2) that, since the language of theory contains no value terms, value judgments cannot be among the logical consequences of scientific theories. Then, scientific theories – those in which scientific facts might be expressed – are consistent with any value outlook, and do not favor any one (by way of their logical implications) at the expense of others; i.e., they are *neutral – cognitively neutral*.<sup>3</sup>

Galileo’s metaphor, I repeat, is ‘two books’, not ‘two worlds’, ‘two books’ written in different (untranslatable) languages, where each book, using its appropriate categories, expresses facts about the *one* world. Galileo did not deny that ‘facts’ – *true statements about the (one) world* – are expressed in the ‘book whose interpretation is subject to the Church’s authority’: e.g., that selfishness can be overcome, that transgressions can always be forgiven, that sin represents a diminution of human beings, that God created the world, and that Jesus Christ is both God and man. Clearly the language used in expressing these ‘facts’ includes categories relevant for making value judgments; and, whether or not the ‘facts’ may logically entail value judgments, they provide support for particular value judgments (e.g., that it is bad to sin) in various ways.<sup>4</sup> Galileo denied that *the language of science has a monopoly for stating the facts*, but he affirmed that the criteria for evaluating whether or not a particular statement expresses a scientific fact have nothing to do with religious or value commitments. Galileo did not separate ‘the world of facts’ from ‘the world of values’. Instead, he divided facts up, so that we find them in two (or, from our contemporary perspective, more) separate books, where the criteria in play in the ‘book of scientific facts’, as well as the scientific facts themselves, have nothing to do with value commitments or with serving or being responsive to religious (or political or business) authorities. *In the other book (s)*, however, there is not a profound separation of fact and value.<sup>5</sup>

## 1.2 Two worlds

“Two books” gave way to “two worlds”. “Two worlds” retains (1) and (2); but it interprets (2) to mean that the language of scientific theory is appropriate for grasping *the way the world really is*, and not just for stating certain kinds of facts about objects of the world.<sup>6</sup> Science investigates ‘the world of

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<sup>3</sup> See Mariconda & Lacey (2001) for the distinction between *cognitive neutrality* and *neutrality-in-application* (sect. 2.1); and Lacey (2006a: Introduction, sect. 1) and Oliveira (2003) for discussion of these and additional theses of neutrality. Note that (2) implies, according to Galileo, that the Church has nothing to fear from scientific developments, for they will be consistent with anything that is properly within the Church’s authoritative purview and will not favor any other religious/value outlook at the Church’s expense (see Note 1).

<sup>4</sup> See Note 12.

<sup>5</sup> Although variations on ‘two books’ have become a staple of defenses of the essential compatibility of science and religion, its interpretation confronts numerous difficulties, many of which are connected with the fact (indispensable for the theological notion of ‘sacrament’) that a given object – the human body, a piece of bread, the movement of the heavens – may be articulated in both books. This represents an important truth that may be generalized: that an object may instantiate many different kinds (see sect. 3, Thesis 3). See also Mariconda (2006).

<sup>6</sup> Interpreted in this way, (2) expresses a metaphysical view, which – unlike currently established results of scientific research (Lacey, forthcoming) – is inconsistent with Christian theology (Mariconda & Lacey, 2001; Lacey, forthcoming).

facts', where facts – representing the way states of affairs of the world really are – are articulated so that they dissociate the objects they are about from their social and ecological contexts, from their relationship to human experience, and from any link with values. Thus, the language of scientific theory does not deploy sensory, intentional, or value categories, but only categories that enable facts to be articulated in theories in such a way that states of affairs are represented as generated, in accordance with laws (which generally have mathematical form), from their underlying structures and their components, interactions and processes, and enable the possibilities they permit to be articulated as generable from the underlying order.

Scientific investigation, thus, proceeds within (what I call) the *decontextualized approach* (DA), in which 'facts' are treated as *bare facts*, 'stripped' from any link with values (MacIntyre's metaphor), 'devalorized' (Koyré), or 'disenchanted' (Weber); they are also stripped of their sensory qualities. In order to come to know bare facts, to understand them, and to discover more of them, we need to engage in research conducted within DA, which encompasses a great variety of strategies.<sup>7</sup> Bare facts, insofar as they can be known, can be formulated using the categories of theories developed under the strategies of DA, including strategies that will be created in the future. Thus, bare facts do not logically imply any value judgments, since the language used to state them lacks value categories. Values have no grounding in the world as it really is.

Hume, it appears, is right: value judgments cannot be deduced from statements of fact – however, in the light of 'two worlds', it is not because logic forbids the move from 'is' to 'ought', but because the predicates of statements of fact do not include categories needed to state value judgments. Then, it is materialist metaphysics – the view that bare facts are all there really are in the world; or that facts are reducible to bare facts; or that facts can only be stated in 'the book of the universe' – that underlies forbidding the logical move. As we have seen above, Galileo proposed that facts articulated in the 'book of the universe' are *cognitively neutral*, consistent with all value outlooks, and logically implying none of them. When it is also held that facts can only be stated in this 'book' and no other, we seem to be left with values as subjective preferences, or as objects open to being explained but not rationally justified<sup>8</sup> – so that some sort of dualism is unavoidable.

Not only does 'two worlds' raise questions about how to understanding 'the world of values', and about *the place of values in a world of fact*,<sup>9</sup> it also poses the questions: does materialist metaphysics state a fact – and, if so, what is the evidence for it? Or, does it express a value (a subjective preference?), involving the commitment to do the best we can to grasp the world with the categories of DA – and, if so, what would explain holding such a value (developments in evolutionary psychology?), and is there any justification for holding that this commitment is 'rational'?

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<sup>7</sup> I have argued in detail elsewhere (Lacey, 1998; Lacey, 1999; Lacey, 2005a) that scientific research must be conducted under a *strategy*, which consists of a set of *constraints* on the kinds of theories and hypotheses that may be entertained in a research project, including prescriptions for the categories that may be used in formulating theories, and specification (in general terms) of the kinds of possibilities that may be explored; and a set of criteria for *selecting* the kinds of empirical data that acceptable theories should fit, thus specifying what are the relevant empirical data to procure, and the appropriate descriptive categories to use for making observational reports, as well as the phenomena, and the aspects of them, that are to be observed, measured, and/or experimented upon. For summaries of the argument, see Lacey (2005a, Introduction; 2006a, Introduction, sect. 2); for discussion of the variety of strategies that may fit into DA, and of the possibility of conducting research under strategies that do not fit into DA, see Lacey (2005a; forthcoming).

<sup>8</sup> Putnam (2002) points out that this view, considered as applying generally to values, is plainly implausible, because cognitive values cannot be reduced to subjective preferences. Furthermore, explaining the 'fact' that certain bare facts are known, and others not, involves reference to the research activities in which they come to be known, and 'facts' about these activities cannot be described without using intentional categories.

<sup>9</sup> Here I borrow from the title of Wolfgang Köhler's seminal book (Köhler, 1938)

## 2 WHERE FACTS AND VALUE ARE ENTANGLED

Something is missing. ‘Separating’ the two ‘worlds’ is strangely myopic. I do not contest (1) and (2) (sect. 1.1): cognitive values are distinct from other kinds of values, and bare facts do not entail value judgments. Yet, important as they are, when we fixate on them, and only consider logical relations and criteria of appraisal, we may fail to look at where facts and values do interact: *in human action – the place of facts in a world of value*.<sup>10</sup> We may fail to see the role of values in the practices we engage in for the sake of gaining knowledge of facts, and of facts in the processes of the formation and transformation of the values we hold; we may fail to see the interaction of facts and values in scientific practices: in the actions involved in gaining scientific knowledge and in its practical (technological) application.

### 2.1 Valuing ‘progress’ and ‘rationality’

It is a striking *fact* that the tradition of modern science, ever since Bacon’s famous valuing of the ‘domination of nature’, has linked itself to the values of ‘progress’ and ‘rationality’, in such a way that holding *these* values is treated, neither as a matter of subjective preference, nor as just a rhetorical linkage deployed opportunistically to attract sponsors for research. The linkage is usually tempered, however, by the claim that scientific results are neutral, not only in the sense of *cognitively neutral* (sect. 1.1), but also *neutrality-in-application*: i.e., in the context of application, in principle, the totality of confirmed theories can inform evenhandedly, without favoritism, interests fostered by the wide range of value outlooks that may be viably sustained today.<sup>11</sup>

### 2.2 ‘Facts’ that are not ‘bare facts’

*Cognitive neutrality* is a logical thesis. *Neutrality-in-application* is one open to empirical appraisal. The former, therefore, does not provide a ground to affirm the latter. Clearly *neutrality-in-application* could not express a *bare fact*, and it cannot be investigated within DA. Yet, if it were confirmed in empirical inquiry, in the light of criteria of appraisal that do not include non-cognitive values, it would be odd to say that it did not express a *fact*, a *confirmed fact*. This makes clear (as most of us take for granted) that not all *facts* are *bare facts*. Moreover, if *neutrality-in-application* were disconfirmed, that would seem to imply *ceteris paribus* that the (ethical and social) value of at least some research conducted within DA is open to question – thereby illustrating that sometimes confirmed facts may support, though they do not logically entail, value judgments<sup>12</sup> – just as observed facts may provide evidence for scientific theories, though the evidence never entails a theory. Does this not resonate more with ‘two (or many) books’ than with ‘two worlds’?

### 2.3 Is ‘neutrality-in-application’ a fact?

*Neutrality-in-application* may not be a fact. Well-confirmed results obtained from research conducted within DA, even when considered as a totality, may not be able to serve evenhandedly all actually held value outlooks. From the perspectives of some value outlooks there may be few valued projects that offer scope for applying many of these results, or applying them may lead to undermining the conditions needed to maintain the embodiment of the outlooks in social institutions and movements.

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<sup>10</sup> The title of an article by Hilary Putnam (1990) and (independently) of an unpublished paper – based on ideas about facts and values in MacIntyre (1981) – presented by Alasdair MacIntyre in 1980 at a conference at Swarthmore College that dealt with issues raised in Köhler’s book. (Köhler had been a professor at Swarthmore College for many years after leaving Germany in the mid 1930s).

<sup>11</sup> See Note 3.

<sup>12</sup> I will not attempt to address in this article how such support might work. It is, however, of central importance for understanding the entanglement of fact and value (see Putnam, 2002; Lacey, 2006b; Bhaskar, 1986).

Results obtained in the course of research and development of transgenics provide a case in point.<sup>13</sup> These results, consolidated under the strategies deployed in molecular biology and biotechnology, explain whatever efficacy has been demonstrated of using transgenics; and research, conducted under these strategies, is exemplary of what may be conducted within DA, where no value categories are permitted and so where *cognitive neutrality* is guaranteed. Transgenic technology, however, has practically no place in organic farming and especially in agroecology, a form of farming that is highly valued ethically and socially by many small-scale farmers and popular rural movements that uphold (what have been called) the *values of sustainability and popular empowerment* (VS&PE), which include achieving a balance of crop productivity, ecological sustainability, preservation and utilization of biodiversity, social health, strengthening of the agency of local communities, including their participation in the development process, and respect for their cultural and traditional values;<sup>14</sup> and its expansion threatens to eliminate key conditions needed for developing agroecology. From this perspective, transgenic technology is accorded little, or even negative ethical value. On the other hand, it is highly valued where the *values of capital and the market* (VC&M) are paramount, since it is readily deployed to serve the interests of agribusiness and capital-intensive farming; and that is why it has already been implemented on a large scale. When we look at the results of research on transgenics, therefore, doubts are raised about the empirical support for *neutrality-in-application*; despite their accord with *cognitive neutrality*, they are not applicable evenhandedly across conflicting value outlooks.

There should be nothing puzzling about this. Transgenic technology is not only a product of research conducted within DA, but also (in most cases) of research that has strong corporate-allied sponsorship. This is reflected in the fact that most currently used transgenics are not simply biological objects; they are also commodities, commercial property for which patents may be held. It also underlies the fact that the availability of transgenic technology and the push to continue to develop it rapidly – unlike its efficacy – should be explained, not by the internal dynamic of science and its criteria for cognitive evaluation, but by the interests of the sponsors of the research. Those who accord little ethical and social value to transgenic technology need not challenge any soundly accepted results or deny its efficacy, for what they are posed against is the socio-economic interests that control it and the farming practices that are fostered by these interests. Moreover, in the light of their own values (e.g., VS&PE), they have greater interest in the results of research that does not dissociate from the human, social, ethical and ecological aspects of agricultural phenomena, like those obtained in research on agroecology, which aims to strengthen the embodiment of VS&PE in contemporary farming practices (Altieri, 1998).

### 3 FIVE THESES PERTINENT TO THE ENTANGLEMENT OF FACT AND VALUE

Implicit in the transgenics case are illustrations of a number of intertwined theses, pertinent to the entanglement of fact and value, that have considerable generality.

Thesis 1. *The ethical/social value that may be accorded to a particular class of facts, and to gaining knowledge of them, may vary with the value outlook that is held.*

What value is accorded to a fact normally depends upon the role it may play in informing actions or practices: can the fact inform actions or practices that manifest the values that are held? The facts (bare facts) about transgenics are accorded high value where VC&M are held, and little where VS&PE are held; and for the latter there is little value to gaining knowledge about the possibilities of transgenics. Furthermore, actions and practices have outcomes, including unintended outcomes, and there are facts

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<sup>13</sup> See Lacey (2006a) for support (and detailed references) for all claims made below about transgenics-intensive farming practices and the alternatives to them (e.g., agroecology).

<sup>14</sup> See Lacey (2006a, sect. 3.23) for elaboration and references.

about them. The value accorded to these facts often depends on their contribution to the legitimacy of the action or practice. E.g., those who hold VC&M tend to have little interest in coming to know the facts (which are not bare facts) about the risks that are incurred by transgenics in virtue of their being commodities.

Some facts – according to *neutrality-in-application*, effectively all bare facts – may be accorded value from the perspectives of competing value outlooks. Moreover, some bare facts capture human interest in a way that has little to do with whether or not they inform actions or the legitimation of actions. Some knowledge (e.g., of the structure of the solar system) is generally considered ‘valuable for its own sake’. Human beings may be interested in gaining such knowledge because of its impact on how they see the world and their place in it. It is not uncommon, in the rhetoric deployed in public research policy, to push for support for projects, which *de facto* serve only certain interests, by suggesting that the knowledge sought actually has intrinsic interest.

*Thesis 2. Some facts are explained in part by reference to the values held by human agents; moreover, that there are facts (or plenty of them) about certain objects, and none (or few) about others, is sometimes explicable in large part by reference to the values of agents.*

*There are plenty of facts about transgenic crops – it is not just that there are a lot of known facts about them – and relatively few about agroecological practices, because the development and use of transgenics, but not of agroecology, has been advanced in service to the social values embodied in current predominant economic and political institutions. What is the case is partly dependent causally on what agents value being the case. The world – the ‘world we live in’ – contains many objects that are causal products of intentional action, including many objects of scientific investigation (e.g., experimental phenomena).*

*Thesis 3. The ‘world of facts’ – even of bare facts – is in part a causal consequence of the ‘world of values’.*

*Thesis 3 states a fact (but not a bare fact) that is well-confirmed. The ‘world as it really is’ cannot be identified with the ‘world dissociated from the context of value’; and affirming this fact is not dependent on the values of investigators or knowers.<sup>15</sup>*

It is a fact, e.g., that ‘RoundUp Ready’ soybean seeds are seeds that have a particular genomic structure that contains genetic materials taken from other species. It is also a fact – to which their trade name testifies – that they are commodities, objects bought and sold on the market, to which intellectual property rights are held. There would be no objects having such a genomic structure (and thus no bare facts about them) but for the existence of the latter (non-bare) facts. The latter facts are relevant for assessing the social value of these seeds and the social value of knowing bare facts about them; and – Thesis 1 – such assessment varies with the social values held, (though judgments about knowledge of the bare facts should not). Unless such bare facts have social value, they will not be brought into existence. In addition, socio-economic facts about these seeds are relevant to finding out the effects of using them on the environment and on social relations. If we only read the ‘book of bare facts’, while ignoring all of the ‘book of social ecology’ except, when convenient, its chapter on ‘the market economy’, we will not be able to identify adequately the facts about the risks of using these seeds (Lacey, 2006a, ch. 4).

*Thesis 4. The kind of facts we want to come to know – and sometimes, in coming to know, also to bring into existence – reflects our assessment of their social value.*

Different value outlooks lie behind research on transgenics and on sustainable agroecosystems – on transgenics, the values of technological progress (see sect. 4) and VC&M; on sustainable

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<sup>15</sup> If the reductionist programs (in psychology and the social sciences) were eventually to be successfully carried out, this judgment would remain in place, although it would be interpreted in a way that would have different significance.

agroecosystems, VS&PE. One research program employs virtually exclusively strategies that fit into DA; the other, while it draws upon available relevant knowledge of bare facts, does not dissociate from the social and economic relations of objects and explicit connections with social values.

Moreover, the kinds of facts that there are (and can be), and that are known, depends on the availability of financial and other support for the relevant research projects; and that availability depends to a significant degree on the values embodied in wealthy and powerful social institutions. There is plenty of support available for research on transgenics, little for research on sustainable agroecosystems. Thus, there plenty of facts about transgenics have been brought into being, and there is plenty of knowledge about them available to inform farming practices, and relatively little about sustainable agroecosystems.

*Thesis 5. What practices can be engaged in, and so what values can be manifested in people's lives and embodied in social institutions, depends significantly on knowledge of relevant facts – and, indeed, on whether or not relevant facts exist – being available to inform them.*

Knowledge of the relevant kinds of facts, on application, strengthens the social embodiment of the values that are expressed in specified practices. Gaining knowledge about transgenic technology contributes to strengthen the penetration of VC&M into agricultural practices, especially when there is little support for gaining the knowledge needed to inform competing practices, e.g., agroecology. The more these values penetrate into the space of agricultural practices, the possibility of engaging in alternative forms of agriculture (and of manifesting to a significant degree the values expressed in them) is weakened. Arguments for the legitimacy of using transgenics often appeal to the claim: there are no alternatives that could be sufficiently productive to feed the world's population in coming decades. As things stand, this claim is not well supported empirically, since those who appeal to it limit their research to what can be conducted within DA, and so they do not explore the possibilities of agroecology (Lacey, 2006a, ch. 5). Nevertheless, if VC&M, and the values of technological progress, come to penetrate into essentially all agricultural niches, it may then *become a fact that there are no alternatives*. (With the unfolding of practices expressing these values, what was once not a fact may then become a fact, for the conditions that sustained it not being a fact may become eliminated.)

#### **4 PRIORITIZING THE DECONTEXTUALIZED APPROACH IN RESEARCH AND VALUING TECHNOLOGICAL PROGRESS.**

The theses stated in the previous section contribute to explaining the strong linkage between modern science, with its almost exclusive reliance on DA, and the value of 'progress'.

Many of the results consolidated in research conducted within DA can be applied in service to various ethical/social interests (e.g., capitalist and socialist) – others, we have seen, cannot. They have also enabled us to explain many phenomena that have gripped the interest of large numbers of people, and to discover others that are almost universally regarded as of great practical value. Moreover, there are probably no research strategies whose projects do not draw upon some results consolidated within DA. This explains the *centrality* and *indispensability* of conducting research within DA. But, it does not explain not the *priority*, virtually to the exclusion of competing strategies, that it has been granted – the priority expressed, e.g., when, as is commonplace, scientists consider molecular biology to be 'real science' and agroecology to be just some sort of remnant of the 'irrational' past. This kind of priority is best explained, I think, in terms of the linkage with 'progress', with holding a set of values connected with the control of natural objects that I will call *the values of technological progress* (VTP).

##### **4.1 Is science beholden to a corporate agenda?**

In Section 3, I used the transgenics case to illustrate five general theses. There are other features of this case that are not so readily generalized. The dynamic of research and development of transgenics is

inseparable from the role of current uses of transgenics in furthering VC&M. But I do not want to suggest that scientists usually see themselves as pursuing an agenda shaped by VC&M or the corporate interests that embody these values. Many see themselves as engaged in the quest for *objective* and *neutral* knowledge; and some proponents of transgenics, e.g., explicitly are motivated by humanitarian concerns and criticize severely the priorities of corporate-driven research. Even so, they all tend to emphasize the priority of engaging in research conducted within DA, and they look to technoscience to solve humanitarian science, e.g., ‘golden rice’ to deal with vitamin A deficiency in the diets of numerous poor children, rather than to agroecology which can also provide a social causal analysis of what sustains that deficiency.

Mainstream scientists tend to ask: (a) how can we engage in research in molecular biology and biotechnology so that its results can be used to serve the poor? Not: (b) how can we engage in agricultural research so that all people in a region are fed and nourished, in a context that accords with VS&PE? – a question that permits non-technoscientific answers. And they do not frame their questions by the more general one: (c) What agricultural methods (in what combinations and with what variations) *could* be sustainable and sufficiently productive to meet the food and nutrition needs of the whole world’s population in the foreseeable future? – a question that permits, but does not guarantee, answers that will emphasize the importance of transgenics. They simply presuppose that technoscience, research conducted within DA, will be the source of solutions to socially urgent problems (Lacey, 2006a, ch. 2).

I have indicated above (sect. 2.3) why research conducted virtually exclusively within DA, which does not address questions (b) and (c), may be in tension with *neutrality-in-application*. The genuine humanitarian concerns of, e.g., the developers of ‘golden rice’ do not lead me to change my mind, for robust knowledge and understanding, accepted in accordance with generally accepted cognitive criteria, can be gained in research conducted under strategies that do not fit into DA, e.g., those deployed in agroecology – and some of that knowledge and understanding is important for investigations of risks and agricultural alternatives (Lacey, 2006a, chs. 4 and 5).

## 4.2 Prioritizing research conducted within the decontextualized approach.

Why, then, is research conducted within DA more or less exclusively prioritized? Why, e.g., is it so easy to take for granted that molecular biology is *real* science, but agroecology is not – and, more generally, that the way the world *really* is can only be expressed in statements of bare facts? As is well known, the history of modern science has been accompanied by influential metaphysical arguments that the world really is such that, in principle, it can be fully grasped using categories that may be deployed in strategies that fit into DA. I will not rehearse here why these arguments fail (see Lacey, forthcoming). Instead, I will restate the conclusion of arguments, which I have made in several writings over the past decade (Lacey, 1998; Lacey, 1999; Lacey, 2005a), that the key to answering these questions has to do with the ethical and social value widely attributed to engaging in research more or less exclusively directed towards gaining knowledge of certain classes of bare facts.

I have argued that there are mutually reinforcing interactions between adopting DA and holding VTP. Holding these values involves, among other things, according high value to expanding our capacity to exercise technoscientific control and the scope within which we can exercise this capacity, and to innovations that increase the penetration of technoscientific objects, processes and solutions to problems ever more intrusively into modern lives, experiences and institutions; and to not subordinating the value of the control of natural objects systematically to any other ethical and social values, so that implementing technoscientific innovations tends to be taken to have *prima facie* legitimacy, and there is considerable tolerance for the ecological and social disruption caused by many technoscientific innovations.<sup>16</sup>

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<sup>16</sup> For a more detailed account of VTP and its presuppositions, see Lacey (2005a, ch. 1; 2006a: Introduction).

Usually, according to the ‘two worlds’ view, values are interpreted as subjective preferences, or simply as objects to be explained but not rationally justified (sect.1). In the rhetoric of the modern scientific tradition, however, VTP are not treated in this way. Rather they are held to bear the marks of rationality and universality, as if their grip could not be evaded. This rhetoric has force because, explicitly or not, it treats VTP as having certain presuppositions, which include, e.g., that on-going technoscientific innovation expands human potential and provides benefits for human beings in general, that technoscientific solutions can be found for virtually all problems (see sect. 4.1) and for some problems there are only technoscientific solutions, and that VTP represent a set of universal values that must be a part of any viable value outlook today. I call these proposals presuppositions of VTP because, first, *ceteris paribus* there seems to be a practical contradiction between endorsing them and not holding the values,<sup>17</sup> so that, secondly, those who contest VTP find that they need to challenge these proposals. Although many scientists consider these presuppositions to be truisms, they express empirical claims and evidence cannot be obtained for (or against) them by means of research conducted exclusively within DA. It is easy to understand the appeal of VTP, given the way in which technoscience has been instrumental in transforming the world of lived experience, and the power associated with it. But that does not take away from the fact that by subordinating scientific research to VTP, as one does (according to my argument) when one prioritizes DA to the point of exclusivity, one is left unable to investigate the presuppositions on which the subordination rests. This is something that may be easily ignored because, in the contemporary world, the institutions that embody VC&M – whose trajectory is treated by the dominant powers today as irresistible – in virtue of being the foremost bearers of VTP today, reinforce the widespread holding of VTP.

### 4.3 The relevance of Theses 4 and 5

Referring back to Thesis 4, the mainstream of modern science has emphasized the priority of gaining knowledge of certain classes of bare facts, and its research practices have brought many bare facts into existence, because of the social value attributed to such bare facts, due largely to the deep embodiment of VTP in modern social/economic/political institution. This is not to reduce facts to values, or to consider ethical/social values (or consistency with their presuppositions) as among the criteria for appraising statements of fact. It is to make clear, however, that if we dissociate from the values that are in play in research practices, we cannot make sense of why we have at hand the facts we do, and not others. Facts are located in the ‘world of values’.

But this is just one side of the picture. I have maintained in my writings (Lacey, 1998; Lacey, 1999; Lacey, 2005a) that there are *mutually reinforcing relations* between adopting DA and holding VTP. It is not just that holding VTP explains the value accorded to bare facts. Thesis 5 dialectically complements Thesis 4. The success of research conducted under DA, and the widespread application of its results, contributes to the widespread embodiment of VTP in the predominant modern institutions. If we want to understand the values that are actually held in the contemporary world, we cannot ignore key social facts about it. In particular, to understand the transformation that has occurred over the past few centuries in the values that people hold, it is necessary to look at the impact on society of gaining scientific knowledge within DA.<sup>18</sup>

## 5 ‘MANY BOOKS’ AND OTHER METAPHORS

We cannot disentangle the treads of fact and value. The ‘world of fact’ is not separated from the ‘world of value’, so much so that if one reads only the ‘book of bare facts’ then one cannot discern

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<sup>17</sup> The existence of ‘practical contradictions’ like this one is an important aspect of the entanglement of facts and values (Lacey, 2006b). See also Note 12.

<sup>18</sup> There is no space to argue for these claims in this article; see Lacey (2006b).

the impact that gaining scientific knowledge has had on the profound transformation in the values that people hold. And the *facts* about this transformation concern the same world that contains the states of affairs that are represented in statements of bare facts. Not all facts can be represented in the ‘book of bare facts’. Another ‘book’ complements it, perhaps not (or not only) the ‘book of revelation’, but the ‘book (s) of human value’; and facts in this book may be stated using categories that also are used in value judgments. ‘Two books’ is a more versatile and illuminating metaphor than ‘two worlds’; and the books are separate enough that we do not have to entertain seriously that consistency, either with revealed truths or with the presuppositions of value outlooks, may be a criterion for appraising factual statements.

Galileo thought that, while he went about the business of scientific research, he could shelve the ‘book of revelation’ out of sight, perhaps (although he did not say so) pulling it out from time to time to see what it might have to say about the ethics of scientific research. The ‘book of human value’, however, cannot be shelved out of sight. To be sure, leaving aside cognitive values, it has nothing to do with the appraisal of facts, *qua* whether they are known or not. But only in this book do we find the resources to understand why there are certain entries and not others (and when they become entries) in the ‘book of bare facts’, and why there are not available today other ‘books’ addressing, with comparable effort and systematicity, other facts about natural objects that are not reducible to bare facts. In this complementary ‘book’ nature is not devalored or stripped of its value-laden clothes.

I allude here to a moment in Ian Hacking’s presentation to this conference\*, when he showed a slide with the image on the back of the Nobel Prize medal of the voluptuous Isis unclothing herself before the gaze of the scientist, symbolizing the revelation of nature’s secrets to the scientist. No doubt, it is also meant to symbolize that just as the scientist will gain pleasure from having access to nature’s secrets, so too she will gain pleasure from his play with her naked body, as if nature is enhanced or fulfilled – her unfulfilled potential realized – consequent to the scientist’s probing.



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\* V Encontro AFHIC (Associação de Filosofia e História da Ciência do Cone Sul), Florianópolis, May 22-25, 2006.

This is an ambiguous image. Clothes do hide secrets; they also offer protection. Even if nature freely disrobes in response to the scientist's advances, he may feel free to discard her when his pleasure is satisfied, to leave her abandoned without access to her clothes – the upshot being that nature is changed. Using a metaphor from Bacon (though not quite as he uses it), what becomes known is not 'nature free and at large', but 'nature under constraint'. If one reads only the 'book of bare facts', that difference cannot be stated; and 'unclothed' nature, nature devastated ecologically because of the implementation of a range of technoscientific discoveries, is not distinguishable – *qua* object of scientific knowledge – from 'fully clothed' nature that has not been devastated. Or, when nature is unclothed, she can be 'possessed', turned into property, a resource to serve only her 'possessor's' ends, a possibility that is becoming ever more of a reality as scientific discoveries are treated as objects to which intellectual property rights may be held.

I prefer another image. Nature has been badly hurt, and science has provided the knowledge that has made possible many of the practices (certainly not all of them) that have produced this hurt. Could we think of the scientist *now* as having the call to binding the wounds of nature, tending to her recovery in a nurturing partnership? So that scientific research becomes conducted, framed by the question: what are the priorities of research, and under what strategies, if we aim to move towards a situation where nature and society, nature and human beings – all living human beings – contribute mutually to each other's well being? Yes, let nature disrobe to meet her lover, where he and she together can look after their offspring, while remembering that the secrets thereby revealed do not include all the facts of nature. What facts would we prioritize if we embraced the values implicit in these questions?

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