

## HEALTH, FOOD, AND SCIENCE: AN ETHICAL ASSESSMENT OF RESEARCH AGENDAS

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### ABSTRACT

We offer several new arguments for the view that existing research agendas in the health sciences and the agricultural sciences are morally deficient. More specifically, the following kinds of distortion of the agenda are discussed: in the health sciences, the health problems of the poor are more or less neglected, as well as non-medicinal solutions to health problems, and in the agricultural sciences, insufficient attention is paid to agroecology. We justify the claim that these three kinds of distortion are problematic on ethical grounds, showing that they are *moral* failures. Instead of starting from one ethical theory to show this, we present different ethical justifications, based on different ethical theories (Bentham's utilitarianism, Rawls's theory of justice, Pogge's rights-based account of minimal justice, Kitcher's ethical theory, and classical liberalism). This should make our conclusion (i.e. that the distorted research agendas in the health sciences and the agricultural sciences pose a moral problem) at least initially convincing to adherents of different ethical theories.

### KEYWORDS

Scientific agenda-setting; neglected diseases; agroecology; science policy.

### 1. Introduction

It has been claimed that the commercialization of science has skewed the scientific research agenda. More and more research is designed to serve specific commercial interests of for-profit companies (Brown 2000; Carrier 2008). Other interests, such as the health interests of the poor, are neglected in science (De Winter 2012). As a response to this problem, several strategies to 'repair' the scientific research agenda have been proposed (e.g., Brown 2008a; Kitcher 2007; Love & Hubbard 2007; Hollis & Pogge 2008; Reiss 2010; Stiglitz 2006).

Since we wanted to contribute to a better, more fair research agenda ourselves, we have called for specific reforms of the existing policy of scientific agenda-setting in academic papers (De Winter 2014), popular writings (De Winter & Kosolovsky 2013a, 2013b), many talks at conferences, and also in personal communications with politicians. Our aim was

to make sure that science also serves the interests of certain disadvantaged groups. We have learned, however, that a lot of people do not accept that there is a problem in the first place. While they see that the scientific research agenda is primarily tailored to the commercial interests of for-profit companies and that it does not reflect other interests, they doubt that this is a problem. Some ethical arguments for the claim that it *is* a (moral) problem have already been offered (Kitcher 2011a, pp. 121-123; Pogge 2005), but these only concern one specific kind of distortion (the neglect of medical research for people whose basic needs are not met), and they are often insufficient to actually convince people. Therefore, we think it is useful to further explore whether and why exactly the existing scientific research agenda is morally problematic. Several new ethical arguments are offered in this article.

We will proceed as follows. First, we describe three ways in which this agenda is currently distorted (section 2). The first two ways concern the health sciences: the health problems of the poor are more or less neglected, and non-medicinal solutions to health problems (e.g., change of lifestyle) are more or less neglected. Furthermore, we argue that the research agenda in the agricultural sciences is skewed as well: it is skewed towards mainstream agricultural research, i.e. research that ignores the socio-economic conditions and social and ecological effects of agricultural production. This is the third kind of distortion. The reason why we focus on these three kinds of distortion is that they are obvious and relatively straightforward illustrations of the idea that the existing scientific agenda, which is to a great extent set on the basis of commercial interests, is morally troublesome. We take examples from different disciplines (health sciences and agricultural sciences) to show that such problems are not restricted to one field. Although the examples come from different fields, they are related to each other: each of them can be linked to the commercialization of science and the impact that commercial interests have on scientific agenda-setting (as we will clarify below).

It should be clear that we do not claim that the kinds of distortion to be discussed in this article are the *only* ways in which the scientific agenda is currently skewed or morally problematic. Distortion may occur in other scientific fields as well, and even within the health sciences and the agricultural sciences, the agenda may be skewed in ways that will not be considered in this article. By not discussing those other kinds of distortion, we do not want to raise the impression that we deny their existence, nor that we consider them relatively less morally problematic. The latter judgment would require a complex comparative analysis in which each kind of distortion is extensively considered. As we haven't been able to perform such an analysis, we do not want to make any such judgment.

In fact, our time constraints only allowed us to analyze the three aforementioned kinds of distortion, and we present the results of that analysis in

this article. More specifically, after describing the three kinds of distortion in section 2, we argue that they are morally problematic in section 3-7. Instead of starting from one ethical theory to show this, we develop (new) ethical arguments on the basis of different ethical theories: utilitarianism (section 3), John Rawls's theory of justice (section 4), a rights-based account (section 5), Philip Kitcher's ethical theory (section 6), and classical liberalism (section 7). These arguments all point in the same direction: existing agendas in the health sciences and the agricultural sciences are morally deficient. The main purpose of this article is to provide a valuable starting point for a more extensive debate on these matters.

## 2. Three Kinds of Distortion

### 2.1. *Health Problems of the Poor*

A first way in which the research agenda in the health sciences is distorted is that disproportionately little research is tailored to the health interests of the poor.<sup>1</sup> While the health problems of the affluent, including their most trivial ailments such as acne and hair loss, are extensively investigated, life-threatening diseases that disproportionately affect the poor receive only little research attention (Carrier 2008, p. 219; Pogge 2009, p. 81; Reiss & Kitcher 2009, p. 264). This problem is also known as the problem of neglected diseases. Often cited examples of neglected diseases are tuberculosis and malaria, but data on research and development (R&D) investments suggest that other equally high-burden diseases, such as pneumonia and diarrheal illnesses, are even more neglected (Moran et al. 2009).

The problem of neglected diseases can in part be explained by the increasing industry support of biomedical research. For-profit pharmaceutical companies are mainly interested in biomedical research that contributes to the development of products that can be sold with a large profit margin, since such research serves their financial interests best, which is their primary concern. As the poor cannot afford such expensive products, investigating their diseases is not very interesting from a business perspective, contrary to investigating the diseases of those who do have the money to afford them (World Health Organization 2006, pp. 28-29; Pogge 2009, p. 81).

Of course, there are also diseases from which both the rich and the poor suffer (e.g., diabetes, cancer). The poor can then benefit from the solutions developed for the people with purchasing power. But this is not always the

<sup>1</sup> In this article, we use the term 'the poor' to describe populations in developing countries, and not poor people in developed countries. The reason is that many developed countries have healthcare systems that enable poor inhabitants to purchase expensive medicines.

case: the poor often lack the resources to obtain the products developed for the rich. So R&D for preventive, diagnostic, and therapeutic tools that are adapted to the resources and social and economic conditions of the poor, is needed (Flory & Kitcher 2004; World Health Organization 2006, p. 28). However, for-profit pharmaceutical companies are only minimally interested in such R&D, as it does not provide the large profit margin they seek.

But the priorities of the pharmaceutical industry form only part of the explanation. Public R&D funds go, just as private R&D funds, primarily to research on the health problems of the rich. This is because public R&D funds of high-income countries, which have the largest R&D budgets at their disposal, are primarily allocated to research that is tailored to their own health interests, rather than to the health interests of middle- and low-income countries (World Health Organization 2006, p. 59).

## ***2.2. Non-medicinal Health Interventions***

A second way in which the research agenda in the health sciences is distorted is that it is skewed towards R&D for patentable medicines. While R&D for patentable medicines is extensively supported, few resources are allocated to research that supports the development of other solutions to health problems. Solutions for which research funding is hard to obtain, are: diets, exercise schemes, guidelines on how to avoid being infected by a certain disease, measures to reduce pollution, measures to eliminate social disparities in access to proper nutrition, decent housing, and medical care, measures to eliminate exploitation and unhealthy working conditions, etc. Research funding is hard to obtain for such solutions because they are not commercially interesting (also see Brown 2008a, 2008b; De Vreese, Weber & Van Bouwel 2010).

Distortion towards R&D for patentable medicines seems mainly due to the fact that a lot of health research is supported by industry. In general, for-profit companies concentrate on their own financial interests, which causes them to only invest in health research if this has high returns. Therefore, it is easier to find industry funding for research that holds out prospects of a lucrative product, that is, R&D for patentable medicines (that can be sold to people with sufficient purchasing power).

But the problem is not restricted to industry funded research. The Bayh-Dole Act, which was enacted by the United States in 1980, permits government funded agencies, such as universities, to obtain patents on products that are developed using federal grant money (Siepmann 2004, p. 209; World Health Organization 2006, p. 38; Patino 2009, p. 139). Other countries have adopted similar legislation (Siepmann 2004, pp. 220-224; Mowery & Sampat

2005, p. 123). These patents enable government funded agencies to make money on the basis of the products they develop. As such, government funded agencies are, just as for-profit companies, stimulated to develop patentable medicines instead of non-medicinal solutions, such as lifestyle changes or social measures.

### **2.3. Agroecology**

The agricultural research agenda is distorted as well. Let us clarify how. Two kinds of agricultural research can be distinguished: mainstream agricultural research and agroecological research. In mainstream agricultural research, crop yields are investigated as functions of materialist variables, such as the use of fertilizers, insecticides, water, machinery and strains of seeds. The aim is to maximize food production. In agroecology, crop yields are investigated not only as functions of materialist variables, but also of social and other variables. Agroecological research does not abstract from the socio-economic conditions and social and ecological effects of agricultural production. It aims at food production that enhances local well-being, agency, and community, as well as ecological and social stability (Lacey 1999, pp. 186-196).

Mainstream agricultural research enjoys a privileged status in modern science (Lacey 2009), and relatively few resources are allocated to agroecology (Vanloqueren & Barret 2009). One of the reasons is that the products of mainstream agricultural research can often be protected by patents (or other intellectual property rights) that secure future revenues from investments in R&D. This stimulates private companies and universities to conduct mainstream agricultural research. Since lucrative patents are less common in agroecology, it is under the existing regime of intellectual property rights less interesting for private companies and universities to focus on agroecological research (Vanloqueren & Barret 2009, p. 977).

This is not the only cause of the focus on mainstream agricultural research. Another contributing factor is the ‘publish or perish’ culture in the academic world. Opportunities to publish in high-impact scientific journals (and thus also the career opportunities for academic researchers) are significantly better for those performing mainstream agricultural research than for those performing agroecological research (Vanloqueren & Barret 2009, p. 979). This is an additional incentive for academic researchers to pursue mainstream agricultural research.<sup>2</sup>

<sup>2</sup> For several other contributing factors, see Vanloqueren & Barret (2009).

### 3. Utilitarianism

Now we turn to the question why exactly these three different kinds of distortion are morally problematic. As mentioned above, we will answer this question on the basis of five ethical theories: utilitarianism, John Rawls's theory of justice, a rights-based account, Philip Kitcher's ethical theory, and classical liberalism. We start with utilitarianism. More specifically, we start from Jeremy Bentham's original version of utilitarianism.

According to Bentham, an action is morally right if its tendency to augment the happiness of the community is greater than its tendency to diminish the happiness of the community. The happiness of the community should be understood in terms of the enjoyment of pleasures by its members, and their security from pains. Consequently, the tendency of an action to augment/diminish the happiness of the community depends on certain properties of the pleasures/pains it produces. More specifically, Bentham mentions the following seven properties: (1) the intensity of the pleasure/pain, (2) its duration, (3) its certainty or uncertainty, (4) its propinquity or remoteness, (5) its fecundity, i.e. the probability that it is followed by sensations of the same kind (pleasures if the sensation considered is a pleasure, pains if the sensation considered is a pain), (6) its purity, i.e. the probability that it is not followed by sensations of the other kind (pains if the sensation considered is a pleasure, pleasures if the sensation considered is a pain), and (7) its extent, i.e. the number of persons that are affected by it (Bentham 1789, pp. 31-32). By taking into account these properties of the pleasures and pains that an action produces, one can determine the tendency of the action to augment the happiness of the community, and its tendency to diminish the happiness of the community. Whether the action is morally right can be determined by balancing these tendencies: if the former tendency is greater than the latter, the action is morally right (Bentham 1789).

Let us use this theory to argue that the aforementioned kinds of distortion are morally problematic. First consider distortion towards the health interests of the affluent in the health sciences. We assume that health research augments the happiness of the community by diminishing the pains associated with disease. This includes the physical and psychological pains that disease causes among sufferers, the psychological pains that it causes among the families of patients, and the psychological pains (e.g., fear) that it causes among people at risk of getting the disease. Of course, the contribution to the community's happiness of health research can vary significantly, depending on which disease is investigated, and on the intensity, duration, etc. of the pains caused by the disease. It also depends on whether effective treatments for the disease already exist. When effective treatments are already available, new medicines can only diminish the pains that are not eliminated by existing treatments. Hence, in such cases, the development

of new medicines may contribute relatively little to the happiness of the community.

Depression, diabetes, and high blood pressure are just three examples of health conditions for which new drugs have been developed even when very effective treatments already existed (Reiss 2010, pp. 433-434). This is because depression, diabetes, and high blood pressure are conditions that affect wealthy people, and a lot of money can be made by selling medicines to them. Even medicines that present small or no improvements on existing treatments may generate huge profits, as long as they are sufficiently marketed to the wealthy patients. This explains why there is so much research on the conditions under consideration. But unfortunately, developing new medicines for wealthy patients suffering from these conditions does not contribute significantly to the happiness of the community. Because very effective treatments for the relevant conditions are already available (at least to wealthy people), such new medicines will not eliminate much pains that are not eliminated without them.

Compare this with the situation in the Third World. In developing countries, a lot of people lack access to essential medicines, either because essential medicines are too expensive, because they are not available in drug outlets serving the poor, or because they simply have not been invented. As a result, a disproportionate share of the global burden of disease is situated in developing countries (Hollis & Pogge 2008, p. 116). Therefore, the happiness of the global community might substantially increase if preventive, diagnostic, and therapeutic tools that are adapted to the resources and social and economic conditions of developing countries, would be developed. Such tools could help in eliminating, or at least diminishing the many pains currently associated with disease in developing countries.

In light of these considerations, the conclusion seems simple: R&D for preventive, diagnostic, and therapeutic tools that are adapted to the resources and social and economic conditions of developing countries will probably contribute more to the happiness of the global community than R&D for new medicines for patients who already have access to effective treatments for their conditions. Therefore, the current research agenda, with its focus on medicines for the affluent, is morally problematic (from a utilitarian point of view). The ideal research agenda, that is, the agenda resulting in the greatest happiness for the global community, would probably feature a lot more research that is tailored to the health interests of the poor. But to draw this conclusion, not only the happiness of potential patients should be considered (as we did above), but the happiness of everyone; we should also consider the impact of an altered research agenda (which features more health research for the poor, and less R&D for relatively unneeded medicines) on the happiness of the others involved, such as private investors, the researchers performing the R&D, insurance companies, etc.



First, consider private investors. How their happiness would be affected by an alteration of the agenda depends on how exactly that alteration would be realized. If it would involve, say, the elimination of intellectual property rights in the field of medicine (see, e.g., Brown 2008a, 2008b), we can expect their happiness to diminish, since it is on the basis of these intellectual property rights that they are able to make money, which appears to make them happy. There are, however, also ways to realize the alteration that do not jeopardize the profit opportunities of potential investors in pharmaceutical research. Governments of advanced countries could, for instance, establish a prize fund to reward medical innovation (partly) on the basis of the impact of this innovation on global health (measured in, e.g., quality-adjusted life years). The more valuable a medical innovation for global health, the more money the innovator receives from the fund (see, e.g., Love & Hubbard 2007). Such a fund would stimulate pharmaceutical companies to use their resources for health research that is tailored to the needs of the poor, rather than for R&D for relatively unneeded medicines that are marketed to the rich, since the former kind of research would probably deliver higher rewards from the fund. This strategy to alter the agenda does not diminish the profit opportunities of potential investors, but instead generates alternative opportunities for them. Therefore, there is no reason to assume that it would reduce the happiness of potential private investors.

What about those performing the research? Some may prefer the lines of research currently pursued, and others may prefer doing research that is tailored to third-world health issues. Under current conditions, it is more difficult for the latter category of researchers to do the research they prefer (and get paid for it), since private companies are not keen to support health research for the poor. If something like a medical prize fund as indicated above would be created, it would be easier for these researchers to get to do the research they like. We can therefore expect them to be happier under such a regime. The researchers who prefer R&D for relatively unneeded medicines may, on the other hand, become less happy when less resources would be allocated to the R&D of their preference. But the reduction of their happiness would be compensated by the increased happiness of those who prefer health research for the poor. Note, furthermore, that health research for the poor may bring a specific kind of joy to researchers that R&D for relatively unneeded medicines cannot: the joy of really helping people by making an important contribution to global health. Thus, there is no reason to assume that the research community in general would be less happy when it would perform more health research for the poor and less R&D for relatively unneeded medicines than it currently does.

Despite these considerations, it is very difficult to estimate the actual impact that altering the agenda would have on the happiness of private investors and the research community. This is also true for other agents



involved in the medical sector. For health insurers, the impact on their happiness depends on how they would cope with the new regime, which new opportunities they would see, and how they would exploit them. For governments, it depends on their attitudes towards an agenda featuring more health research for the poor, and on the attitudes of their electorates. How the situations of hospitals, physicians, etc. in different countries would be affected by altering the agenda is difficult to predict as well. It should, however, be remarked that any negative effect that an altered agenda may have on these agents' happiness is likely to be outweighed by the positive effects it is expected to have on the happiness of potential patients in the Third World. Due to the number of people seriously suffering from ill health in the Third World, research that aims at third-world health development could make *a lot of* people *much* happier. Even if private investors, health researchers, insurance companies, etc. would be negatively affected by an agenda which features relatively more health research for the poor, the aggregate impact on the happiness of the global community would probably still be positive. Since we expect the total happiness of the global community to be greater when the research agenda would feature more health research for the poor, the current neglect of such research is morally deficient from a utilitarian point of view.

Now consider the second kind of distortion in the health sciences: distortion towards R&D for patentable medicines. In order to diminish the pains due to disease as much as possible, we need the most effective strategies to tackle diseases. But by strictly focusing on R&D for patentable medicines, we may miss out on some of the most effective strategies. This is because often, medicines are less effective than non-medicinal solutions to health problems. For example, in a comparative trial on patients with a high risk of developing diabetes, 22% of the patients receiving a medical treatment developed the condition, while this percentage was only 14% for the group that underwent a diet and exercise program (Reiss 2010, pp. 433-434). This indicates that by neglecting R&D for non-medicinal solutions, we may fail to develop the most effective solutions to health problems, and hence, the solutions that would lead to the greatest happiness of the (potential) patient community.

What about other agents involved in the process: private investors, the research community, etc.? Here, our considerations are similar to those we had with the first kind of distortion. Paying relatively more research attention to non-medicinal solutions does not imply that in general these agents become less happy. Private investors, for instance, do not necessarily have to give up part of their profits. This is because the idea of a prize fund could be extended to non-medicinal solutions:<sup>3</sup> governments of advanced countries

<sup>3</sup> Love & Hubbard (2007, p. 1536) note that prize fund payments need not be limited to patented inventions. Also see Syed (2009), who argues that not only pharmaceutical

could create a prize fund to reward the development of innovations which are most valuable for public health, regardless of whether these innovations are medicinal or not – the more valuable the innovation for public health, the higher the payments from the fund. Such a fund would stimulate private investors to support R&D for non-medicinal solutions whenever such R&D is more promising from a public health perspective than R&D for patentable medicines, and so distortion towards R&D for patentable medicines would be reduced. There is no reason to believe that private investors would be less happy under such a regime than under the existing regime. This is also true for the research community. Some researchers may prefer R&D for patentable medicines, but others may prefer R&D for non-medicinal health interventions. Hence, there is no reason to presume that, in total, the research community would be less happy when there would be more of the latter R&D and less of the former R&D on the agenda.

Admittedly, it is difficult to predict how an alternative agenda would *actually* affect the happiness of private investors, the research community, and other agents from the medical sector. But in light of the potential public health benefits of an agenda which is not skewed towards R&D for patentable medicines (see above), we can expect the general happiness of the community to be greater if the agenda would not be skewed towards R&D for patentable medicines. Therefore, the existing agenda is morally problematic (for a utilitarian).

Finally, consider distortion towards mainstream agricultural research in the agricultural sciences. Research in the agricultural sciences could augment the happiness of the global community by contributing to the reduction of world famine. Worldwide, 870 million people are undernourished, which leads to these people having a weak immune system and being unable to concentrate or take initiative. Children are especially vulnerable. Hungry children are often too weak to fight off disease and may die from common infections like measles or diarrhea. Furthermore, malnutrition makes children lose all desire to play and study.<sup>4</sup> In light of these effects of malnutrition, and the extent of famine, it seems that reducing famine could make a lot of people a lot happier.

Unfortunately, mainstream agricultural practices have dramatically failed at reducing world famine. They have even made things worse (Hammers 2002, p. 69). Firstly, they have had several negative environmental effects – depletion and poisoning of soils, disruption of streams (and other negative effects of dam construction), increased dependence upon fertilizers, herbicides, and pesticides, and desertification (Lacey 1999, p. 187) – which further

innovations that are covered by patent protection should be eligible for receiving payments from the Health Impact Fund proposed by Hollis & Pogge (2008).

<sup>4</sup> See <http://www.wfp.org/hunger/what-is>.

contributed to famine.<sup>5</sup> Mainstream agricultural practices have also led to reduced quantities of other outputs of traditional crop production (Lacey 1999, p. 187). This may have caused malnutrition by preventing local people from having a well-balanced diet. Furthermore, under the current regime, food production has become vastly more capital intensive, requiring expensive inputs (Lacey 1999, p. 187). This has probably contributed to famine as well, since one of the main causes of famine is the fact that the poor do not have enough money to buy or produce enough food for themselves and their families.<sup>6</sup>

There are also some other ways in which mainstream agricultural practices may have diminished happiness. Such practices have increased unemployment, and they have caused rural people to migrate to cities, in which they often live in unhygienic and psychologically threatening conditions, and in which there is increased homelessness (Lacey 1999, p. 187). These effects may be associated with severe physical and psychological pains for the many people involved.

Agroecology promises to offer a solution to these problems. It aims at food production that avoids the negative environmental and social effects of mainstream agricultural practices. As demonstrated in a recent report of the United Nations Special Rapporteur on the right to food (De Schutter 2011), agroecology could double food production in entire regions within 10 years, and alleviate rural poverty, one of the main causes of famine. Furthermore, the report reveals that agroecology could mitigate climate change, which is also a factor contributing to famine.<sup>7</sup> It seems then that agroecology will be much better at diminishing the pains associated with famine than mainstream agriculture (also see Altieri 1999). Accordingly, we can expect agroecological research (in which agroecological practices are developed) to contribute more to the happiness of the community than mainstream agricultural research (in which mainstream agricultural practices are developed).<sup>8</sup>

Of course, the happiness of private investors currently profiting from mainstream agricultural research and of researchers working in this field should be taken into account as well. A shift towards agroecology need, however, not necessarily have a negative impact on their happiness. The shift could, for instance, involve the creation of a prize fund to reward

<sup>5</sup> See <http://www.wfp.org/hunger/causes>: one of the main causes of famine is over-exploitation of the environment.

<sup>6</sup> See <http://www.wfp.org/hunger/causes>.

<sup>7</sup> See <http://www.wfp.org/hunger/causes>.

<sup>8</sup> It should be noted that agroecology does not exclude mainstream agricultural practices. Some mainstream agricultural practices may be acceptable from an agroecological point of view.

agroecological innovation.<sup>9</sup> Private investors could then financially benefit from supporting agroecological research. Furthermore, certain kinds of mainstream agricultural research could be incorporated in an agroecological research program, which means that a shift towards agroecology does not entail that mainstream agricultural researchers become useless and unemployed. Any (inevitable) negative effects that a shift towards agroecology might then still have on these agents' happiness are, in our view, outweighed by the expected positive effects on global happiness summed up above. Therefore, the current focus on mainstream agricultural research is, from a utilitarian perspective, morally problematic.

#### 4. Theory of Justice

A second way to argue that the different kinds of distortion are morally problematic, is on the basis of John Rawls's (1999) theory of justice. The theory is based on the idea of an original position in which principles are evaluated. It is assumed that any principles that are agreed to by parties in this original position, are just. Principles that cannot be rationally accepted by such parties are unjust. For readers unfamiliar with Rawls's work, let us describe the original position.

Parties in the original position are situated behind a veil of ignorance, which means that they do not know certain kinds of particular facts. They do not know their own place in society, class position, social status, wealth, intelligence, strength, and the like. The parties are also ignorant about their own conception of the good, the particulars of their life plan, or their personal psychological features (e.g., aversion to risk, liability to optimism or pessimism). Nor do they know to which society or generation they belong. While they are uninformed about *particular* facts, parties in the original position do know *general* facts. They understand political affairs, economic principles, social laws, and the laws of human psychology. Their knowledge of general facts about human society is unlimited. Furthermore, parties in the original position are rational, and they must try to protect their liberties,

<sup>9</sup> We do not know of anyone who has proposed the creation of a prize fund in the field of agricultural science. There is, however, at least one reason to believe that it is an even more promising policy option in this field than it is in the health sciences. Currently average profits in the pharmaceutical sector are huge (e.g., according to the Fortune 500, the pharmaceutical industry had a profit margin of 19.3% of revenues in 2008). We can therefore expect that a system based on prize money will only satisfy pharmaceutical companies if the prize money is very high; the prizes have to provide comparable profits. In the food production sector on the other hand, average profits are much lower (according to the Fortune 500, the food production sector had an average profit margin of 0.6% of revenues in 2008). This means that a relatively small prize fund to reward agroecological innovation will be sufficient for agricultural companies to be happy to conduct agroecological research.

widen their opportunities, and enlarge their means for achieving their aims, whatever these are (Rawls 1999, pp. 118-123).

What we need to show then, is that parties in such a position cannot rationally accept the existing agendas in the health sciences and the agricultural sciences. This would mean that these agendas are, according to Rawls's theory of justice, unjust. Let us start with the health sciences.

Health research delivers means which help people to achieve their aims. Health is an important requirement for a lot of people to be able to realize their dreams and complete their life plan, and illness prevents people from achieving the goals they have set for themselves. Hence, by helping to tackle illness, health research helps people to attain their goals.

We have seen that currently the health sciences focus on the rich. Even when rich patients already have access to effective treatments for their health conditions, more resources are allocated to the development of new medicines for them. But the contribution of such R&D to the ability of people to achieve their goals is very limited. Most rich patients could, after all, use the existing treatments to make sure that the disease does not interfere with their aims; they do not need new medicines for that. Research that is tailored to third-world health issues is likely to contribute more to people's ability to achieve their goals. Plenty of people in the Third World currently do not have a standard of living adequate for their own health and lack access to essential medicines. This often makes it difficult for them to accomplish even the most basic goals, such as providing food for their children. Therefore, health research for the poor, which has the potential of significantly improving the standard of living in the Third World, could help plenty of people in accomplishing their goals.

So we can expect more people to be able to achieve their life goals if more resources would be allocated to health research for the poor, and less to the development of medicines for health conditions for which effective treatments are already available. So for parties in the original position, who do not know whether they are rich or poor, such a reallocation of resources would increase the probability that they are able to achieve their aims. Therefore, parties in the original position cannot rationally accept the current allocation of resources in the health sciences and the corresponding research agenda. This means that this agenda is, according to Rawls's theory of justice, unjust.

Some may have problems with this kind of reasoning. An interesting objection has recently been offered by Greg Mankiw. He asks us to consider kidneys. People need only one healthy kidney, but most of us have two. Some, however, get kidney disease, which leaves them without a functioning kidney. This could make it difficult for them to achieve their life goals, as it often cuts life short. Parties in the original position would then, according to Mankiw, definitely sign a contract according to which they have to be a

kidney donor in case they have two healthy kidneys, in order to assure that a healthy transplant is available if they have kidney disease. In that way, they increase the probability of being able to attain their life goals, right? The conclusion would then be that implementing such a policy would be just according to Rawls's theory of justice. But this conclusion seems unacceptable. We think of persons as having a right to their own organs, and reasoning from an original position cannot vitiate that right. Therefore, reasoning from an original position in order to decide what is just and what isn't, seems problematic (Mankiw 2013).

This objection can be rebutted by considering the concrete ways in which the kidney policy could be implemented. If the policy only involves stimulating people to voluntarily donate a healthy kidney, then it is not necessarily unacceptable. It *would* be unacceptable if it involves obligating people with healthy kidneys to cede one kidney, in the sense that if they refuse to do so, government officials come and get the kidney. But parties in the original position would probably not endorse such a compulsory policy. The reason is that most people do not want to live in a society in which the government can just take the organs of its citizens, even if these organs are redundant; this conflicts with most people's conception of what it is to have a decent life. So if parties in the original position would endorse the compulsory policy, they would substantially increase the risk of living a life that they would not consider decent. Therefore, we can expect them to reject such a policy, even though it may increase the likelihood of finding a kidney donor in case they need one. So the objection that parties in the original position would definitely endorse a kidney policy that is unacceptable, does not hold.

Let us now apply Rawls's theory of justice to the two other kinds of distortion. We start with distortion towards R&D for patentable medicines. Although this does not seem to be a problem of injustice (but rather of inefficiency), one can argue that it is morally problematic on the basis of Rawls's theory. We have seen that sometimes, non-medicinal solutions are more effective than medicines. Thus, we can imagine that in some cases R&D for a non-medicinal solution is a more promising strategy to tackle a certain health problem than R&D for a medicine. Since parties in the original position want to minimize the probability of suffering from the health problem under consideration, they would in such cases prefer that the former kind of R&D is supported.

One may object that if a person in the original position is actually someone whose aim is to make a living by conducting R&D for patentable medicines (which he cannot know since he is behind a veil of ignorance), then supporting R&D for non-medicinal health interventions whenever these are more promising from a public health perspective (instead of systematically supporting R&D for patentable medicines) may make it more difficult for him to achieve this aim. This would be easier for him in a world



in which R&D for patentable medicines is systematically preferred over R&D for non-medicinal health interventions, as it currently is. But the person's actual aim can also be to make a living by conducting R&D for non-medicinal health interventions. More support for such R&D would then make it easier for him to achieve his aim. So in sum, more R&D for non-medicinal health interventions and less R&D for patentable medicines does not reduce the probability of being able to make a living doing what one likes to do most.

In fact, supporting R&D for non-medicinal health interventions whenever this is more promising from a public health perspective, *increases* the probability that parties in the original position are able to achieve their aims. The reason is that if the most promising R&D is supported, then parties in the original position are less likely to suffer from the health problem under consideration, which means that this health problem is less likely to prevent them from reaching their goals. Parties in the original position can therefore not rationally accept the existing regime, which favors R&D for patentable medicines even when this isn't the most promising strategy. Accordingly, distortion towards R&D for patentable medicines is unjust (according to Rawls's theory of justice).

Rawls's theory can also be used to argue that distortion towards mainstream agricultural research is morally problematic. Just as being healthy, having access to food is for plenty of people a crucial requirement for being able to achieve one's aims. Even the most basic goals, such as raising one's children to healthy adults, are very difficult to accomplish for those suffering from famine. We can therefore expect from parties in the original position that they try to maximize the probability of having access to food. This will result in a preference for funding agroecological research over funding mainstream agricultural research. This should be clear from what we have seen above. In section 3, we have seen that agroecology is more promising than mainstream agriculture with respect to reducing world famine. So for parties in the original position, the probability of having access to food will be higher if research aims at developing agroecological practices (rather than mainstream agricultural practices). Accordingly, parties in the original position cannot rationally accept the current focus on mainstream agricultural research and the relative neglect of agroecological research. This implies, according to Rawls's theory of justice, that the current agenda in the agricultural sciences is unjust.

## 5. Human Rights

Thomas Pogge (2005) has developed a human rights-based account to assess social rules and institutional orders. The idea is that for a social system to be minimally just, it is required that it does not violate human rights, that



is, it should afford human beings secure access to the objects of their human rights insofar as this is reasonably possible. Different social systems can be ranked on the basis of how close each system comes to fulfilling the human rights of those upon whom this system is imposed – the closer it comes to fulfilling these human rights, the closer it comes to being minimally just.

Take, now, Article 25 of the Universal Declaration of Human Rights:

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

It seems that the existing international institutional order violates this human right. Under the existing international regime, potential innovators are not inclined to develop urgently needed medicines for poor people in developing countries, as we have seen. Moreover, existing regulations on intellectual property rights enable pharmaceutical companies to sell those medicines that do exist for third-world diseases at artificially high prices, which makes these medicines unaffordable for the poor. The result is that the right to health is not fulfilled for plenty of people in the Third World. Furthermore, under the existing regime, potential innovators are stimulated to systematically focus on R&D for patentable medicines, even when R&D for non-medicinal health interventions is likely to result in more people having a standard of living adequate for their health.

We can think of alternative schemes under which the right to health would be fulfilled for more people. The existing system could for instance be replaced by a system in which health innovators are rewarded with publicly funded prizes that are proportional to the innovator's contribution to global health (see, e.g., Love & Hubbard 2007). Under such a system, we can expect distortion towards the health problems of the rich to be reduced. Because a huge share of the global burden of disease is situated in the Third World, research that is tailored to third-world health issues has the potential of making a substantial contribution to global health. Accordingly, such research could deliver high rewards in the prize system, and this prospect would stimulate potential innovators to conduct such research. R&D for relatively unneeded medicines for the rich would, on the other hand, not be rewarded with high prizes, and so such R&D would become less interesting for potential innovators. If we assume that the prizes also apply to R&D for non-medicinal health interventions, then we could also expect potential innovators to conduct such R&D whenever it is likely to contribute more to global health than R&D for patentable medicines. So distortion towards patentable medicines would be reduced as well under the prize system.

Since the prize system would stimulate potential innovators to focus on those projects that are most promising from a global health perspective (instead of systematically preferring R&D for patentable medicines for the rich), implementing this system would probably lead to better global health. The right to health would probably be fulfilled for more people, that is, more people would have a standard of living which is adequate for their health. This means that the prize system is closer to being minimally just (in Pogge's sense) than the existing system. Accordingly, the existing system and the corresponding distortions of the health research agenda are morally problematic.

A similar reasoning can be developed with respect to the agricultural sciences. The existing international regime, with its focus on mainstream agriculture, has not reduced world famine, but has contributed to it instead, as we have seen in section 3. We have also seen that a global shift towards agroecology is a promising strategy to tackle this problem. So a policy that would realize such a shift (e.g., via a prize fund to reward agroecological innovation)<sup>10</sup> can be expected to lead to less people suffering from famine, so that the right to food (which is part of Article 25 of Universal Declaration of Human Rights, see above) is fulfilled for more people. This means that such a policy is closer to being minimally just (in Pogge's sense) than the existing regime. We can therefore consider the existing regime and the corresponding focus on mainstream agriculture in the agricultural sciences morally problematic.

## 6. Well-ordered Science

A fourth ethical theory that can be used to evaluate research agendas, is developed by Philip Kitcher.<sup>11</sup> According to Kitcher (2011a, 2011b), decisions on norms and values should accord with those that would emerge from an ideal conversation, in which all humans are represented, and which satisfies the conditions of mutual engagement. The conditions of mutual engagement include epistemic and affective conditions. The epistemic conditions are: the participants do not rely on any false beliefs about the natural world, they know the consequences for one another of the actions and institutional arrangements they discuss, and they have complete knowledge of the wishes of others, and of the ways in which these wishes are modified through the course of their interactions with one another. For the affective conditions to be satisfied, each participant should seek the best balance

<sup>10</sup> See De Schutter (2012) for other concrete policy suggestions.

<sup>11</sup> Kitcher calls his position 'pragmatic naturalism'. This position is, however, broader than his ethical theory, as it also has meta-ethical and historical aspects (see Kitcher 2011b).

among certain desires present in the population, more specifically, all those desires that are factually well-grounded and ethically permissible (i.e. in harmony with the functions to which the participant's ethical code responds). The participants should consider not only their own and the others' solitary desires, but also their assessments of these desires, their assessments of these assessments, and so on (Kitcher 2011b, pp. 344-348). If certain ethical conclusions would be reached in a panhuman conversation that meets these epistemic and affective conditions of mutual engagement, then we should endorse them, according to Kitcher (2011a, p. 51, p. 112).

This ethical theory yields an ideal for science (Kitcher 2011a, p. 114): the ideal of well-ordered science developed in Kitcher (2001). The first part of this account is a sketch of what Kitcher calls 'the process of ideal deliberation': a fictional process of democratic deliberation about scientific research in which all human beings are represented (Kitcher 2001, p. 125). Let us recapitulate Kitcher's description of this process.

First, the ideal deliberators, who represent the entire human species, are informed about potential lines of inquiry and the epistemic and practical value of these lines of inquiry. They use this information to transform their initial personal preferences about the outcomes that they would like scientific inquiry to promote, into *tutored* personal preferences. The ideal deliberators exchange these tutored personal preferences and explain to each other why they want scientific inquiry to promote particular outcomes to particular degrees. Each deliberator then modifies his/her preferences on the basis of the transmitted information, so that the preferences of others are taken into account. Next, a list of collective preferences concerning the outcomes that inquiry should promote, coupled with some index that specifies how intensely each outcome is desired, is produced (Kitcher 2001, pp. 118-119).

There are four possible scenarios for the production of this collective wish list. A first is that all deliberators favor the same list. This would then be the collective wish list. Secondly, it is possible that the ideal deliberators do not favor the same list, but that there is one list that they are all prepared to accept as fair. In that case, collective preferences are expressed by this fair list. A third possibility is that, while the ideal deliberators favor different lists, more than one list is accepted as fair by all deliberators. Which of these fair lists is the collective wish list is decided by majority vote. Finally, it is possible that there is no list that each deliberator is prepared to accept as fair. Majority vote then determines which list, out of all preference lists favored by at least one ideal deliberator, expresses collective preferences (Kitcher 2001, p. 119).

The next step is for experts in the field to assess, for particular research projects, how likely it is that they deliver what the ideal deliberators collectively want. The output of this step could be a single set of definite values,

with each value representing the probability that a certain research project delivers a particular desired outcome. But the output could also be a more complex report, since three kinds of complications can arise. Firstly, experts may not be able to determine exactly what the chance is that a research project delivers a certain outcome. They may only be able to assign a range of probabilities, possibly even a wide range. Secondly, the experts may disagree on the (ranges of) probabilities. A third possible complication is that there is disagreement on which persons are consulted as experts in the field. If any of these complications arises, the report should reveal which (ranges of) probabilities are assigned by which expert(s), and to which extent the different experts are supported by the group of deliberators consulting them (Kitcher 2001, pp. 119-120).

A third thing needed for agenda-setting, besides the collective wish list and a report on probabilities, is a set of moral constraints on inquiry (e.g., experiments on animals should not lead to their death). This set is determined in a similar way as the collective wish list. First, the ideal deliberators exchange their ideas about which moral constraints are appropriate. Next, they modify these ideas so that the views of others are taken into account. Four scenarios are then possible to arrive at a collective set of moral constraints. The first is that there is consensus among the ideal deliberators about which set is the best one, and the second is that there is no consensus on this, but that there is one set of moral constraints that they all consider a fair representation of different perspectives. If there are several sets of constraints that each ideal deliberator accepts as fair, majority vote determines which of these sets is the collective set. If there is no set that each deliberator accepts as fair, the collective set is selected by majority vote from among all sets favored by at least one ideal deliberator (Kitcher 2001, pp. 121-122).

At this point, we have a list of collective preferences about the outcomes that inquiry should promote, information about how likely it is that particular research projects deliver these outcomes, and a collective set of moral constraints on inquiry. These things are used at the next stage of the process of ideal deliberation: the formation of possible research agendas by a disinterested arbitrator. For each potential level of investment in research, the arbitrator selects, from among all resource distributions that are compatible with this level of investment and with the collective set of moral constraints on inquiry, the ones that yield maximal expected utility. The expected utility of a certain distribution of resources is determined on the basis of the collective wish list and the report on probabilities (Kitcher 2001, pp. 120-121).

The next step is for the ideal deliberators to determine the amount of resources to be assigned to research and how these resources are to be distributed. If the deliberators agree on the level of investment in research,

and if the arbitrator has identified a single allocation of resources at that particular level, then this is how resources are allocated. If this is not the case, then the scientific research agenda is determined by majority vote. Either way, the result is, according to Kitcher, “the course of inquiry that best reflects the wishes of the community the ideal deliberators represent” (Kitcher 2001, p. 121).

For science to be well-ordered, it is required that the actual scientific research agenda corresponds with the one that would be chosen through the process of ideal deliberation (Kitcher 2001, pp. 122-123). If the actual agenda differs from the one that would result from ideal deliberation, then science is not well-ordered in Kitcher’s sense. This account can be used to criticize current research agendas in the health sciences (also see Kitcher 2011a, pp. 121-123) and the agricultural sciences.

The fact that the health interests of the poor are neglected in the health sciences is due to the fact that the poor have little or no impact on the research agenda: they do not have enough money to direct research towards the products that they are interested in, nor can they influence the agenda in any other ways. In Kitcher’s ideal deliberation on the other hand, the poor *do* have the power to make sure that their interests are adequately served in science. As all human beings are represented in ideal deliberation, as a majority of the world population lives in developing countries, and since fundamental disagreements are resolved by majority vote in ideal deliberation, the poor can enforce a health research agenda that takes their health interests seriously. We can expect them to do this.

How would the ideal health research agenda look like then? Flory & Kitcher (2004) suggest the fair-share principle as a guiding principle, i.e. the proportions of global resources assigned to different diseases should agree with the ratios of human suffering associated with those diseases. A research agenda that is roughly in accordance with this principle can be accepted by all as fair. Therefore, we can expect ideal deliberation to result in such an agenda rather than in an agenda such as the existing one, with substantially more resources per suffering for the health problems of the rich (Reiss & Kitcher 2009). Because the existing agenda would not be accepted through ideal deliberation, the health sciences are currently not well-ordered (in Kitcher’s sense). Given the link between Kitcher’s ideal of well-ordered science and his ethical theory (see above), the conclusion is that the existing agenda is not as it should be (according to Kitcher’s ethical theory), and hence, morally problematic.

Distortion towards R&D for patentable medicines conflicts with Kitcher’s ideal of well-ordered science as well. Let us explain this. In order to tackle a health problem, it is sometimes more useful to develop a non-medicinal solution than to develop a medicine. Accordingly, R&D for a non-medicinal solution can have higher expected utility (determined by a disinterested

arbitrator on the basis of the collective wish list and the experts' report on probabilities) than R&D for a medicine. The disinterested arbitrator would in such cases rather put the former R&D on the agenda. This is at odds with the existing regime, which systematically favors R&D for patentable medicines, even when its expected utility is comparatively low. This indicates that the health sciences are currently not well-ordered (in Kitcher's sense); R&D for non-medicinal solutions should not be systematically neglected.

Finally, consider distortion towards mainstream agricultural research in the agricultural sciences. The main beneficiaries of a shift to agroecology would be poor people in developing countries. They are the prime victims of famine (to which mainstream agriculture has contributed, see above), and so they would benefit most from the famine reduction that agroecology aims at. Furthermore, agroecology could, as we have seen, alleviate rural poverty, which is another potential benefit for the poor.

But the poor are not the only ones benefiting from a shift to agroecology. Agroecology tries to avoid the negative environmental effects of mainstream agriculture, such as depletion and poisoning of soils and desertification. We have seen that agroecology could also mitigate climate change. Since depleted or poisoned soils, desertification, and climate change could, at least in the long run, have a negative impact on the lives of the rich as well, the rich, too, benefit from a shift to agroecology.

These considerations indicate that agroecology will probably be much better at serving the collective wishes of the community than mainstream agriculture. Therefore, we can expect the disinterested arbitrator to devise agendas that focus on the development of agroecological practices. This conflicts with the existing agenda in the agricultural sciences, which mainly features mainstream agricultural research. Hence, the agricultural sciences are currently not well-ordered (in Kitcher's sense) and the current agricultural research agenda is morally problematic.

## **7. Classical Liberalism**

That the four ethical theories considered so far can be used to argue that existing agendas in the health sciences and the agricultural sciences are morally problematic, may not come as a surprise to most readers. But what about liberalism? Doesn't a liberal ethical theory entail that companies should be free to investigate whatever they like, and that the government should not intervene in agenda-setting? Actually, we don't think so. To support this, let us start from classical liberalism as characterized by John Tomasi (2012). Tomasi distinguishes three defining features of the classical liberal tradition: it is "committed to (1) a thick conception of economic liberty grounded mainly in consequentialist considerations, (2) a formal



conception of equality that sees the outcome of free market exchanges as largely definitive of justice, and (3) a limited but important state role in tax-funded education and social service programs” (Tomasi 2012, p. 22). Let us use the first feature to examine current research agendas.

Classical liberalists attach great importance to a variety of economic liberties. This includes the liberty to employ one’s body and time in the productive activities that one has chosen, and under conditions that one has accepted, the liberty to buy, sell, save, and invest as one likes, and the liberty to start, run, and close down businesses (e.g., factories, shops, farms). Classical liberalists put these economic liberties on a par with other social values, such as freedom of religion, of speech, and of association. For the classical liberalist, the economic liberties are neither more nor less important than such other basic rights and liberties (Tomasi 2012, pp. 22-24).

Some may maintain that when the government manipulates the scientific agenda, it violates certain economic liberties, such as the liberty of investors to invest in the projects of their preference, or the liberty of scientists to perform the research they like. But this depends on *how* the government manipulates the agenda. If it coerces investors and scientists to pursue certain specific lines of research and forbids other lines of research, then it indeed violates certain economic liberties. But if it affects the agenda by replacing the existing system (in which innovators make money by selling their products at artificially high prices to rich buyers) by a prize system in which innovators are rewarded with prize money proportional to the value (e.g., for global health or for reducing world famine) of their innovations, then economic liberty is not necessarily damaged. Under the prize system, investors and scientists can still pursue whatever research they like, the only thing that changes is the relative profitability of different lines of research.

Some may object that if implementing a prize system reduces the profitability of lines of research that are currently highly profitable (e.g., R&D for relatively unneeded medicines for the rich), then in a way it does undermine the liberty to engage in such research. The idea is that by making certain projects less economically feasible, it becomes more difficult for people to pursue these projects, and so their freedom to do so is compromised. But a similar point could be made with respect to the existing system. Under the existing system, it is difficult to pursue health research for the poor, R&D for non-medicinal health interventions, or agroecological research. So if we apply the above reasoning here, then the conclusion is that the existing system undermines people’s liberty to engage in these kinds of research. The point we want to make is that implementing the prize system does not threaten economic liberty any more than sticking to the current system.

But we want to say more. More specifically, we wish to argue that someone who is truly committed to economic liberty should really condemn the



three kinds of distortion considered in this article. The argument goes as follows. There are several economic activities (e.g., starting a business, working) which are difficult, if not impossible, to perform for someone suffers from severe illness or famine. So for someone to actually have the freedom to, say, start the business he likes or do the job he likes, it is required that he is more or less healthy and has access to a well-balanced diet. Both are necessary conditions for someone to fully enjoy the relevant economic liberties.

We know that these conditions are not met for millions of people, whose poor health or hunger renders them incapable of engaging in particular economic activities. This problem may have been less severe if the health research agenda would not be skewed towards the health problems of the rich and R&D for patentable medicines, and if the agricultural research agenda would not be skewed towards mainstream agriculture. After all, we can expect more people to have adequate health and food if there would be more health research for the poor (instead of R&D for relatively unneeded medicines for the rich), more R&D for non-medicinal health interventions (whenever this is more promising from a public health perspective than R&D for patentable medicines), and more agroecological research (instead of mainstream agricultural research). Since having adequate health and food are necessary conditions for being able to fully enjoy certain economic liberties, the classical liberalist should, given his commitment to economic liberty, regard the current research agendas in the health sciences and the agricultural sciences as morally problematic.

## 8. Conclusion

Whether one is a utilitarian, an adherent of Rawls's theory of justice, a human rights advocate, an adherent of Kitcher's ethical theory, or a classical liberalist, the conclusion seems to be the same: the distorted research agendas in the health sciences and the agricultural sciences are morally problematic – there is too little health research for the poor, R&D for non-medicinal health interventions, and agroecological research. Of course, there are many more ethical theories besides the five we discussed, some of which may even lead to the conclusion that the current scientific agenda is unproblematic.<sup>12</sup> So claiming, on the basis of what we have seen here, that the latter conclusion is unjustifiable or indefensible, or that no rational person can accept it, may be a bridge too far. What we do hope, is that the ethical arguments developed in this article are helpful for those who strive

<sup>12</sup> We think, however, that most ethical theories imply that the three kinds of distortion considered *are* morally problematic.

for research agendas that are more responsive to the needs of disadvantaged groups. The arguments provide an initial ethical backing for the claim that existing research agendas in the health sciences and the agricultural sciences are morally deficient, and they should at least provide a good basis for further discussions.

### Acknowledgments

Jan De Winter is a Ph.D. fellow of the Research Foundation (FWO) – Flanders. Research for this paper by Laszlo Kosolovsky was supported by subventions from the Research Foundation (FWO) – Flanders through research project G.0122.10. We are very grateful to Jeroen Van Bouwel and Erik Weber for reviewing earlier versions of this paper.

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