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Biotechnology: Science versus Value—Laden Decisions

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Abstract

This paper explains the philosophical justifications of values on decisions in biotechnology, and compares the ethical values of animals and plants in our day-to-day activity in general and in modifying their genes in particular. We have posed some questions on the current ethical views with regard to the morality on manipulating plants. Since plants, like all other organisms, are destined to be used by humans and so far, we uphold the stability and integrity of the living system, and it is ethical to genetically manipulate plants and use them for our interests. However, we should have the moral obligation to regard their inherent value as we do for animals.

Keywords

Biocentric; Ethics; Instinct; Morality; Trophic Level; Utilitarian

1. Introduction

There is unsettled debate among politicians, religious leaders, the public, and the scientists about whether nature has to be preserved or should be modified to the benefit of humankind. This debate ranges from breeding plants and animals up to human cloning. The proponents of modification of nature attempt to ascertain their beliefs even by citing religion, suggesting that God created the world with all its systems and it is up to the human mind to explore this system and make use of it. While the opponents of the change believe that nature is morally special and nature as it resulted from evolution has its own contribution to preserve the Cosmos. The choices we make, however unconsciously, reflect our judgments about how people ought to live and how we ought to treat others. These kinds of judgments are the essence of morality or ethics. Policy decisions about biotechnology are no exception. These decisions reflect values, and are made even more serious by the fact that thousands, even

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millions, of peoples' lives are affected. If critically seen, both groups have presented equally competent arguments. The question lies on assessing and evaluating the additional benefits of diversity over and above the value of the resources themselves, and this can govern decision outcomes.

2. The Issues of Values

Values involve consensus among people who directly or indirectly are being influenced by the decision they make (Newberry, 1998). According to Odenbaugh (2003), values are emotional connectors between individuals. In both definitions, values depend on individuals' perception of what is right and wrong. The challenge is to answer the question "What is right and wrong?" The answer to this question requires answering what value is from different philosophical viewpoints. For instance, to Plato cited in Dupius (1973), values are mental constructs. To him it is not what comes through the senses rather what we make of out of what comes through the senses. However, to Plato and other idealists values are immutable or unchanging (Armstrong, 1989). To the contrary, others like John Locke (sense empiricist) as cited in Crcic (1989), "nothing exists in the mind that was not first in senses". That is values are inherent in the real object outside of the human mind. However, we acquire them in the course of our interaction with our environment through sense organs. Nevertheless, both the idealists and the Realists agree on one point that is values are absolute. This implies if there are established values about something (nature in our case) they are not changing.

As opposed to the idealist and realist philosophers who believed in the immutable nature of values, the pragmatists interpret value in terms of the profit it yields to the human benefit (Dupius, 1973). This implies that the value of something is judged from its instrumental relevance. Put in other words, to the pragmatist, the values exist in the real object outside of the human mind, but it is the human mind that gives meaning to them (Armstrong, 1989).

In the pragmatist philosophy, one way of determining what is good and bad or right or wrong is the same as that for determining if an idea is true or false. Thus, given a problem in a human behavior, we can ask, "would performing a certain action be right in order to solve a given problem?" The answer to this question according to Popkin and Stroll (1993) is to be judged in terms of whether the action yields satisfactory results in the resolution of difficulties. This conclusion can lead to another question "whose problems" (the scientist, or the Public at large in our case)? The pragmatists evaluate satisfaction not merely from the perspective of the actor (scientist), but by including all those who will be directly or indirectly influenced by the action (Moore, 1996). Bermald cited in Dupuis (1973) said,

The truth of those experiences most vital in the social life of any culture is determined not merely by the needful satisfaction they produce, but also by the extent to which they agreed up on by the largest possible number of the groups concerned. Without their factor of agreement or consensus, the experience is simply not true.

To Inqdahi (2002), whatever scientific methods one used to prove the truth, unless the truth is accepted and valued by the largest community, it will not be accepted as a truth. To him scientific methods are subsidiary and the acceptance and rejection of facts and their use is subject to the unforced consensus of those who are involved in it.

To sum up, in the idealist philosophy, values are not inherent in nature (plants and animals). The human mind attaches value to nature. In realism, values are inherent in nature (plants and animals) and man perceives these values through the sense organs. In both cases, however, if once values are formed in whatever means, they are unchanging. From the two philosophical points of view, biotechnology should not change the ultimate nature of plants and animals. Because, the immutable values attached to nature cannot be altered. On the other hand, in the pragmatist philosophy values are relative to time, space and conditions. This implies that the values we attached to nature depend on how the larger community perceives their relevance from utilitarian perspectives. To this point MacNaughton cited in Dupius (1973) said, "I do not see how anything can have value outside of a value that human beings can place on it, because value is uniquely human."

3. The Roles of Values in Decision Making

Science and values provide completely different guides to decision making. Values are emotional connectors among individuals where as science is value neutral. The scientific process attempts to minimize the influence of values believing that they introduce biases into decision-making. Scientists strive to be dispassionate observers

to prevent personal values from influencing the decision making process.

There is a dichotomy therefore, between science and value driven decision-making. Most societal controversies that take place are based on differing values among individuals within the society. Science on the other hand is a deliberate rational process. Science based decision-making attempts to arrive at decisions based on scientific certainty. However, some degree of uncertainty exists in science and its results. The conflict between values and science arise for two reasons.

1) The consequences or outcomes of science are not fully predictable with accuracy and

2) The purpose of science may contradict with the established values, for instance, biotechnology with "playing God".

Most of the time decisions regarding new technologies are made with some degree of uncertainty and conflict. This decision-making environment could be considered as a political environment. This is a decision environment facing biotechnology right now.

With in such a context, the process ultimately becomes political-decision that considers multi-perspective influence. That is, if the out-comes of innovations have even small uncertainty, it leaves the door open to the societal values to influence the decision making. With the decision situations that fall in complexity, linear method of solving problems such as based on pragmatic purpose, does not always work effectively. In order to resolve conflicts between the aim of science and the role of societal values and arrive at sustainable solution, stakeholders must come together, discuss the issue, and find common ground. A basic premise of all free societies is that decisions are based on shared set of values among their members. These commonly held values bind societies together, and they form the basic rules by which societies are governed.

It is proved that the answer to the question "what is the source of true knowledge" is changing according to the changes taking place in the society. For instance, during the Renaissance period the source of true knowledge was considered to be the classical Greek and Roman literature, while in 17th and 18th century reason was considered as the true source of knowledge. In the naturalist society, the source of true knowledge is experimentation and systematic observation. Similarly, our understanding of the nature of truth influences the values to anything. Therefore, if the nature of truth changes it is undoubtedly true that the nature of values changes.

Facts never stand by their own. They are always part of the situation with a unitary character. Therefore, making decisions based on facts may unduly emphasize one aspect, which may result that the entire analysis become inadequate. The possibility of introducing new technology that increases the utility and adequacy of practical judgments is not, thereby, excluded but the decision has to involve the value judgments. In support of this view Inqdahi (2002) portrayed that in order to use the results of biotechnology to the fullest scientists should discuss science not only just in terms of utility or efficiency gains, but also to engage the public on broader moral concerns about the impact of their research and findings on society and about the moral deficiencies of a society without biotech. This means any decision in biotechnology has to consider moral and ethical values such as whether or not it violets the existing religious and agreed up on values, it considers the long term effect of the new technology (safety concern), its utilitarian practical relevance and the new technology's environmental impact.

4. The Issues of Values in Biotechnology

In the previous parts, attempts were made to analyze the nature of values and the role they play in decision-making. In this part, a conceptual analysis of values in biotechnology is presented.

Though it is too early to raise the question of values attached to biotechnology in Ethiopia in particular and in Africa in general, because the technology itself is yet at its infancy stage, it is equally unwise to overlook the relevance of values on decisions regarding biotechnology together with its introduction. This is due to the fact that some impacts of biotechnology such as use of improved seeds, pesticides, fertilizers, etc are being observed in the life of the people. The political hot issue raised in Zambia (BBC News, 2002) whether to use GM corn for food or not is a case in point.

One of the Challenges of biotechnology is the belief of conservatives and religious men who consider it as an act against nature. They believed that biotechnology is an act of intervening nature inappropriately. The second challenge comes from the environmental philosophers who believe that nature has intrinsic and extrinsic value in it. They explained that conservation of nature provides society with much-valued ecosystem (Daily, 1997). The ecosystem in turn provides purification of water, detoxification and decompositions of wastes, generation

and renewal of soil and partial stabilization of climate. These services all affect the good of the human species. It is most certainly that it is the interaction among these species that makes our welfare more significant. They further argue that the preservation of nature rests on the fact that it has the aesthetics experience that such nature provides, or even the intrinsic value that the species and ecosystem possess.

On the other hand, proponents of biotechnologies justify that science and technology are vital to meet a broad range of global challenges related to economic growth, better health, sustainable development and enhanced safety and security. For instance, many scientists agree that, with few exceptions, genetically modified products (GMP) are safe for humans to eat. Nevertheless, GMPs have raised many other issues that are ethical, religious, and moral to name few (Tsegay, 2004). In response to such views, the proponents of GM food raise the following questions.

- How is biotechnology different from other activities?
- Is cross-species mixing of genes unnatural?
- Is agricultural biotechnology fundamentally different from traditional plant breeding?
- How are we going to fight starvation?
- How can we protect blindness unless we produce plants with sufficient vitamin A? and others.

In light to the current food insecurity in most part of the world and the series health problems prevailing, especially in developing countries, it is plausible that both plants and animals be genetically engineered and made more productive, and their medicinal value is investigated. The quest of biotechnology in this line is, therefore, sounding and be embraced. Another strong argument the biotechnologist raise is the intrinsic values of science, which involves scientific progress, personal autonomy, liberty, etc. The statement "Science is value neutral" implies that scientists always work to prove the truth using accurate and reliable procedures. The only governing rule in science is the justifiability of the truth. This in turn facilitates scientific progress. As far as the results of scientific experiments follow accurate measurements, according to biotechnologists, individual values have nothing to influence the growth of science.

Biotechnology is also helping to balance ecosystem by developing new GM crops tailored to specific environment reference This shows that equally GMPs have both intrinsic and extrinsic values. Therefore, as far as the results of biotechnology have significance for the welfare of humankind the traditional values attached to it should revise their unchanging values. These ideas strengthen MacNaughtom's view that states the absence of values outside of the human mind (Dupius, 1973). First, we have societal values that possibly can affect biotechnology. Second, we will have to think about how the value claims under scrutiny cohere or conflict with other value claims we make. Ensuring public safety, for example, tends to conflict with our belief in individual liberty. So too would constrain human intervention into nature. Similarly, constraining agricultural biotechnology might be at odds with our desperate need to fight starvation. Thus, the real question is how we should incorporate into agricultural biotechnology policy decisions, those values that are less than universally held. If those values are in fact in the same category as the concern for safety, then this question is already partly answered. They should be dealt with in the same way as concerns about safety, by taking them seriously and deliberating about them. Raising related questions should substantiate the above philosophical arguments.

5. Should There Be Differences on the Ethical Values of Modifying Genes of Plants and Animals?

The development and use of transgenic plants and animals has a considerable opposition and people are seriously concerned (Tsegay, 2004). These oppositions and concerns are real in light to the potential consequences genetically modified organisms could cause. Nevertheless, the potential benefit of improved varieties is so visible that devising strict managerial protocol, we believe, is better than completely banning the science and its products. Both the managerial procedures and the science of gene technology require ethics of profession (not abusing ones responsibility and morality).

The primary question in ethics is, therefore, deciding what is morally right in our deeds. Usually, the prevailing societal rules and judgments are the standards for the ethics of science. The criterion for what is morally right, wrong, obligatory etc. is the comparative amount of good over evil produced. Actions, intentions, judgments etc. should be morally (and non-morally) good and the actors have to be responsible. Therefore, we may have the right to interfere in nature. But, how far? Which part (group) of nature does demand moral value? Only those with sentience? Although there might be many ethical views to these questions, we have focused on two

theories, and forwarded our conviction (view) on morality to nature as hybrid view.

5.1. From the Utilitarian Point of View

The Utilitarian view advocates, "All sentience organisms have moral standing". This is properly discussed in Sandøe et al. (1997). According to Sandøe et al. (1997) and Inqdahi (2002) what matters for a utilitarian is the interest of those (animals) that are being affected by what humans do. We would have agreed strongly with this view had it extended its consideration to plants too. Plants are also living entities like animals, which deserve our due considerations. To our knowledge, animals do not have consciousness. Of course, they have preferences but their preference is based on instinct (telos or adaptations according to Brom, 1997) not on consciousness. The so-called "awareness" in animals we talk about (Heeger & Brom, 2000) may be limited to what their instinct tells them. They react because of their behavioral adaptation (instinct). Then if instinct is considered sentience and sentience is not more than random search for ones preference, plants do have preferences (tropisms) too. Although at a fixed position, they react to stimuli. For example, if a plant is grown in shady area, its leaves grow towards light and the roots towards water. We consider this like the preferences in animals. It is true that animals are in a higher form of development, but we are arguing against the completely different attention given to animals and plants.

With regard to the use of animals for human interest, the argument forwarded by the utilitarian view is justifiable. This view states, "It is possible to kill an animal so far it does not suffer, it has been happy in its life and is replaced by another animal, which will live a happy life". It is in line with the actual reality of life and has avoided mere theoretical explanations about absolute rights of animals, which are not feasible. For example, it is mere rhetoric to state the absolute rights of animals and forget that animals are to be used for the interests of human (some vegetarians might be case in point).

5.2. From the Biocentric Point of View

This view is more wide and comprehensive. It states, "all living organisms have moral standing" (Sandøe & Brom, 2000). Yes, indeed, living entities have their inherent value and they demand morality although the extent may vary. Plants, like animals, have moral value (inherent worth) for themselves. This has to be respected. Killing (cutting) a big Ficus tree from a hot semi-desert area would mean devastating the environment and at the same time doing immoral to the plant. Empowering evil over good is unethical. In contrary, Hoyte and Weiskel (2005) and Driessen (2005) indicated that it is unwise to ignore biotechnology in the world where many millions of people suffer in starvation. It is with presence of all such contradictory views that decisions regarding biotechnology are made.

5.3. What We Think of Morality (A Hybrid View Is Possible)

In this section, we would like to express a hybridized view, which we believe is true and meaningful. Ethical thinking and philosophical arguments are high up in the intelligentsia. The commoner may not understand strict discipline of ethics but still have socially structured ethical thinking. Almost all, except those breaching from social norms like the believers of some religious cults, know that it is immoral to kill humans, cause sufferings for animals, and kill (cut) plants unnecessarily. These societal norms (morality) have their sources in religion schools and the family.

In our view, nature and natural things are inter-wined. We believe in a creator and the creator has created nature in a balanced way. The world biomes have inter-wined ecosystems with definite strata in each ecosystem. Plants, being the basis of the ecosystem, are destined to be eaten by other living things above their trophic level, others take what they harvested away. Other animals are in turn hunting those animals killing plants for food. Human is always at the top of the trophic level. This entail it is only human who has a moral duty and this duty should be proportional to the organisms' inherent value. By saying this, we are trying to argue that we should not consider only sentience organisms as having moral standing. Heeger and Brom (2000) have clearly elaborated what they called the shortcomings of Taylor's view. They concluded, "Although all living organisms may have their own inherent worth, only those animals with awareness deserve human moral concerns". While moral concern to animals is true, lowering the intrinsic value of other organisms, for example plants, to the non-moral kind is denying the ethical due regard they deserve. Whatever small differences they may have in meaning,

Taylor's description (Heeger & Brom, 2000) of "inherent worth, a good of their own, inherent value" is meaningful and appropriate. These mean that those organisms, which possess these features, have moral standing of their own type. This entails that the morality they deserve may vary accordingly. An animal by all standards does not have an equal moral value as humans, so is the moral concern rate of plants to animals. Nevertheless, to totally disregard their inherent values and deny the morality concern they deserve is not justifiable.

6. Then, Is It Ethical to Modify Plants for Human Use?

In nature, there is genetic hybridization and evolution of new species. Modifying plants for human purposes is not different from what is happening in nature except it is made faster and precise. Moreover, as already mentioned above, members of the ecosystem depend for their living one on another. All organisms are destined to be used by humans. Thus, it is quite moral to interfere in nature and modify the genetic system of plants. This in turn demands that humans be responsible and morally considerate. By responsibility and morality, we are referring to that, the plant should not be irresponsibly chopped, denied access to nutrients, purposely subjugated to all sorts of hazards as fire, drought, etc. until they are used by humans for their interests. Furthermore, plants should share the values we have for animals.

7. Conclusion

In this paper, attempts were made to elaborate the nature of values from the different philosophical grounds. The analysis has proved that there is no consensus as to what value is and how values should interfere decisions with regard to the results of science and technology. On one side, scientists require personal liberty to advance science (value neutral). On the other hand, the results of science are directly influencing human life. This implies that science cannot be free of values. The analysis has also shown that both conservations of plants and biotechnology (modifying plants) have intrinsic and extrinsic values. Furthermore despite the varying degree of values, we have a strong belief that the value given to animals should also be given to plants. Therefore, we believe that it is not wise to consider one aspect of argument and to ignore the other while making decisions with regard to modifying plants whatever the purpose may be. Moreover, we believe on the importance of the decision to be based on valid criteria and we recommend that the criteria at least include the following:

- The value certain biotechnological innovation has for human beings;
- The long-term effect the technology may bring on maintaining the balance of ecosystem;
- The extent, to which, the technology violates the already established societal values.

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