

## Biomedical Moral Enhancement for Human Space Missions

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### *Abstract:*

Biomedical moral enhancement is an idea which states that human moral intuitions and patterns may be artificially improved by biomedical means. The rationale which lies behind moral bioenhancement is rooted in the idea that humans – in a moral and behavioral sense – are not evolutionally adapted to current ecological challenges. This idea is discussed in the paper in relation to human space missions to Mars and beyond. Because the space environment is a hazardous environment, there are some reasons to consider the idea of moral bioenhancement for the purposes of mission success and the safety of astronauts/space settlers. This paper discusses that idea in the context of a broader discussion on moral enhancement, moral bioenhancement related to earthly issues, and the idea of moral progress.

*Keywords:* moral enhancement, biomedical moral enhancement, human space missions, moral progress, space philosophy, space ethics.

## 1. Introduction

Human space exploration is challenging for many reasons. First of all, space exploration is hazardous due to such factors as galactic cosmic rays (GCR), solar energetic particle events (SEP) or altered gravity. Physical and physiological challenges are not a unique kind of challenge which may be faced during space missions. A specific kind of challenge are moral and behavioral challenges. In this paper, the latter are discussed. As on Earth, the space environment will involve different moral situations. Isolation and the confined environment in space may be more challenging than many other places on Earth, due to the distance from Earth. The following idea is discussed in this paper: if the space environment is challenging for human moral behaviors, there are some reasons to consider the idea of moral enhancement. This paper starts from the idea of biomedical moral enhancement discussed in relation to Earth, and then moves to the specific case of its possible application – a human mission to Mars and beyond.

## 2. Moral Enhancement and Moral Progress – an Outline of the Idea

It is worth keeping in mind the fact that something like moral enhancement already exists in the human population; it has been broadly applied for centuries and, as such, is morally and socially required. Moral enhancement may include all socially practiced ways and methods of human education in relation to moral intuitions and behaviors. For instance, parental education is a basic and possibly the most important and most effective way of moral enhancement. Humans are morally enhanced not only by parents but also by social institutions which work in more or less direct ways. As the theory of cultural evolution shows, transmission of ideas and cultural traits occur in vertical, horizontal and oblique directions [7]. Vertical transmission is a transmission from parents to offspring. Horizontal transmission includes transmission among peers in a population. Oblique transmission is a transmission from unrelated adults to children. Moral enhancement may happen in all three directions. While parental education – a kind of vertical transmission – may be considered one of the most important and effective methods of moral enhancement, the other two are no less important. They include such institutions as the justice system or cultural habits and legal norms. Institutions which enhance human morality in a more indirect way are the free market economy or different kinds of social networks including social media.

The idea of moral enhancement is associated with the idea of moral progress. It remains an open question as to whether moral enhancement is identical with moral progress, or if moral enhancement does not necessarily mean progress. However, as James Schwartz rightly argues, the term enhancement assumes that we attempt to approach some target which is perceived as something better than we currently possess [6]. When the term enhancement is applied to morality, it should consequently mean that morality is not a fixed phenomenon, but it comes in degrees and it may be described in terms of progress and regression. While we can and possibly we should use the alternative terms such as – following Schwartz's suggestion – modification which is a value-neutral term, here we are obligated to apply the term enhancement in the way in which is used in the discussion on moral bioenhancement [1], [5]. Because the term enhancement is not a value-neutral term, rather it implies that we are going to approach a better version or a better level of a particular feature, there are good reasons to identify moral enhancement with moral progress.

The idea of moral progress is discussed by, among others, Allen Buchanan and Russell Powell [1]. The idea of moral progress is often questioned and, as such, is usually considered a politically incorrect idea. What kind of controversy is included in that idea? When one assumes that progress in morality is possible, the next unavoidable and logical assumption must be the idea that individuals and societies as well are divided into those more or less developed in a moral sense. It is hard to find a clear and simple criterion which could be used to distinguish moral progress or moral regression. If one person accepts a woman's right to abortion on demand, while another questions such a right, can we call some of them morally better developed than the others, or vice versa? While some of us may be prone to argue that it is better for the world and for humanity if people are rather friendly and helpful than hostile and aggressive, it is not clear how to define precisely this moral progress, and to determine whether something like moral progress really exists. Another challenge lies in the fact that not always are these mentioned criteria of friendliness, kindness or empathy at work.

Buchanan and Powell offer such a criterion which makes it possible to define morality in terms of progress or regression independently based on collateral, associated factors such as the above-mentioned kindness or empathy. They point out that moral progress may happen when our morality gets more and more inclusive. Their main criterion is just this moral inclusion. Moral inclusion means that more and more people will be included to become the subjects of our moral good patterns and intuitions and, in fact, human rights. The progressive morality is a kind of morality which excludes as few other humans as possible. The ideal progressive morality will include all humanity, and it even should go further, beyond the borders of the human species. Such inter-species inclusive morality is really the case of the current humanitarian approach to the non-human animals when some part of humanity decides to apply moral rules to other animal species.

When we take for granted the criterion of moral progress elaborated by Buchanan and Powell, we now get a conceptual tool which enables a relatively simple and correct assessment of moral progress or moral regression. We can compare two persons in the context of their different attitudes towards a particular pattern and then we can evaluate their attitudes in terms of moral progress. For instance, if one of these persons accepts slavery but another one is against it, the latter one represents the moral progress because he includes in the moral circle people who for the other person are only “slaves.” If one argues for equal rights for homosexuals but another person argues that homosexuals should be only tolerated without having full human rights, the first person possesses a progressive morality. He treats equally homosexuals and heterosexuals, and he gives homosexuals the same human rights and the same moral standing. His moral circle is larger and, as such, more inclusive than the moral circle of another person who questions an equal moral standing for homosexuals. We can multiply examples of moral progress by applying the mentioned criterion formulated by Buchanan and Powell. From the historical point of view, we may find – at least in Western culture – a kind of transition from the exclusivist to a more and more inclusivist moral approach. The moral circle has included more and more people. That process, in fact, consists in including new groups/categories of people/citizens who before the process of their moral – and also often legal – inclusion were discriminated against and, as such, were beyond the moral circle. Women did not have many rights until the 20<sup>th</sup> century. Later, moral progress included people other than white Europeans and Americans. Before that, non-white people could be exploited as slaves because it was assumed that they were beyond the limits of the same morality as white people. While today non-white people other have the same rights and no one questions their moral standing, the inclusivist approach to homosexuals and other sexual minorities still remains a challenge. Because of their sexual preferences, homosexuals are often excluded from the full set of human rights which are a domain of heterosexuals. The idea of human rights and the human rights movement are the best examples of moral progress.

The idea of moral progress understood as a transition from moral exclusivism to moral inclusivism is a common sense idea. Such an idea may be a useful rhetorical tool in discussion with those people who question the equal full moral and legal rights of some groups such as sexual, religious or ethnic minorities. An important assumption in the theory of moral progress is the idea that the human evolutionary past makes humans more or less hard-wired for the exclusivist morality. This is a challenging assumption which may be questioned. That idea states that because of the long past in small hunter-gatherer groups, humans find the idea of a peaceful and friendly approach to all other humans still more or less challenging. It is assumed that because of that long evolutionary pressure, humans may be prone to exclude from their moral circle people who are not similar to them. Even if someone is trying to be friendly towards others, he may find the idea of treating all humanity in the same equal way in a moral sense, more or less challenging. This is why in human history people often divided themselves according to their in-group features, and why they emphasized the importance of their difference from others. That difference often worked as a sufficient rationale to assign to one’s own group a special moral status and, analogically, to treat other groups as morally less important, deprived of the same moral rights. While some ethicists, philosophers and evolutionists may claim that because of that evolutionary history we have, as a default moral domain, the exclusivist morality, others argue that the exclusivist morality is no less context-dependent than the inclusivist morality. The point of controversy lies in the following question: how strong and to what extent are the past evolutionary pressures able to affect and to determine our current moral intuitions? Buchanan and Powell represent that latter approach. They argue that we should not overestimate the putative causal role played by the human evolutionary past. They suggest that both kinds of morality, exclusivist and inclusivist, are context-dependent, and that humans are morally flexible, not fixed. This assumption makes them a kind of moral and psychological optimist. Consequently, they argue that the transition from the exclusivist to the inclusivist morality is not so hard – if possible at all – like so-called evoconservatives take for granted. The evoconservative approach overestimates the importance of the human evolutionary past and states that humans are hard-wired for the exclusivist morality, and they are not able – or

they are able only to a small extent – to leave the borders of the exclusivist morality moving towards the more inclusive moral approach.

Buchanan and Powell argue that moral progress occurs by different kinds of “proper demoralizations” and “proper moralizations.” Proper demoralization means that those acts which were treated in the past as morally wrong, today are considered morally permissible. Analogically, proper moralization includes those kinds of acts which were morally accepted in the past, but which today are considered morally impermissible. The definition of moral progress as an inclusion of new groups of people works here as a criterion of proper demoralization or proper moralization.

Moral enhancement is one of the branches of human enhancement in general which includes physiological and psychological enhancements. There are some evolutionary reasons for moral enhancement but not necessarily for biomedical moral enhancement. It is worth keeping in mind that while a moral enhancement as such is both morally desirable and morally required, its particular form – the moral enhancement by biomedical means – is not necessarily the best option and not always – if at all – should be considered and applied. The justification for moral enhancement is rooted in the following idea. Human morality as such is considered a kind of exclusivist morality. This is a kind of morality which does not involve in the same equal way all human beings. Consequently, the exclusivist morality divides humans into at least two groups. One of the groups includes humans who are the subjects of our good moral intuitions and who are treated with the full respect. They are people who get from us the full human rights. It is worth mentioning here that we should not mix up two different issues. One of them is the special status of relatives and friends who possess a special moral standing both in exclusivist and inclusivist moral approaches. Someone who possesses the exclusivist morality usually treats his relatives and friends in the same way as someone who shares the inclusivist morality. The point of the difference lies elsewhere. From the biological but also social point of view it seems to be natural and expected that humans should treat their relatives and close friends in a different way than they treat the rest of the human population. It is also acceptable from the biological and social perspectives that the members of our group which includes both micro- and macro-levels such as a professional community but also the population of a city, region or country, may be treated in a special way when compared with others. The point of the difference between the exclusivist and inclusivist moralities lies in the fact that the exclusivist morality limits some basic moral patterns, intuitions and human rights to particular kinds of humans who possess particular features. For instance, depending on the kind of the exclusivist morality, the right to possess all human rights has been assigned in human history only to men, Catholic, Christian, or white, just to mention a few historical examples. In the Western countries which accepted slavery and the racial policy in the past, the kind of moral exclusivism has excluded non-European inhabitants of the colonized countries [3]. There were no moral obstacles towards people classified beyond the moral circle to make them slaves of European or American citizens. Today, the same societies which finally abolished slavery, treat all people equally – in fact, they assign the same moral status to all people. There is no kind of people beyond the moral circle who could become slaves again. As such, those societies became the inclusivist societies in a moral sense.

Another example is the human attitude towards homosexuals. Not everyone is prone to agree that homosexuals should possess the same rights as heterosexuals. The main obstacle lies in their sexual preferences. The representatives of the exclusivist moral attitude towards homosexuals assume that because of the homosexual preferences – different than their own heterosexual ones – homosexuals cannot be the subjects of some moral and, consequently, legal rights which are guaranteed for heterosexuals. Those heterosexuals who do not want to give the same moral rights and, in fact, some basic human rights to homosexuals, are the moral exclusivists. They may become the moral inclusivists only when they extend their moral intuitions and patterns to homosexuals and remove the criterion of sexual preferences as the necessary condition for an equal moral standing. However, even then, their morality does not necessarily become fully inclusivist if they attempt to exclude other groups. But, at least, their exclusivist morality has a good chance of becoming more inclusivist.

The ideal of inclusivist morality which treats in the same way all humans in terms of moral and human rights, is challenging for many people despite the fact that, from some point of view, it should be something easy and obvious. Someone could ask why such secondary traits as sexual orientation, religious denomination, or the color of skin should exclude humans from being the subjects of equal moral and human rights. The evolution of the exclusivist morality, but also the fact that it is so common even today, is usually explained in terms of the human evolutionary past. It is assumed that the so-called Environment of Evolutionary Adaptedness has shaped the basic human moral intuitions which were highly exclusivist. This kind of evolved morality is designed to work in small populations of related individuals. Consequently, virtually everyone who is beyond the circle of relatives may be treated as an enemy or, at least, as someone who is beyond the limits of those evolved moral intuitions. As this story assumes, a human morality which has been evolved in small groups and for small groups, is not evolutionarily designed for humans living in large groups of unrelated individuals. This is a kind of an evolutionary challenge which may be explained in terms of a mismatch between the evolutionary human moral psychology and modern moral ecology [1]. It may be assumed that in the ancestral environment, there was no need for moral enhancement because humans are biologically equipped in moral intuitions such as kin selection, and direct and indirect reciprocity which did their job efficiently in small communities through thousands of thousands of years. The idea of the exclusivist morality states that the human ancestors did not have a selective pressure for the evolution of a kind of morality which will work equally towards all humans. It is possible that such inclusivist morality would be even deleterious in situations if it has been developed only by one group but not by another.

When the number of people started to grow in the Holocene to reach its peak in the modern times, the need for moral enhancement became more and more urgent. The new challenge arose: the amount of people became so large that it was not possible any longer to fight permanently with any neighbor. Collaboration and a kind of a peaceful co-existence is a new social and political, but also ethical necessity. The basic cultural tools of moral enhancement include religion, philosophy (mostly moral philosophy), or law. There are at work also some indirect ways of social and cultural enhancements such as the already mentioned free market economy which were not invented for the purpose of moral enhancement. That function has been coopted to the primary economic function like in many other forms of social networks. Today, the important role in global moral enhancement is played by the international institutions such as the UN or NATO, just to mention a few. This is a kind of moral enhancement which works on the global scale. It is worth mentioning the fact that the current attitude towards the non-human animals, which is getting more and more humanitarian, is also an example of a kind of moral enhancement.

### **3. Biomedical Moral Enhancement**

While the human moral enhancement as such is both desirable and required, it is not clear what kind of tools should be applied to achieve a better, more progressive morality. Some of the tools are already known because they were applied broadly through centuries, such as religious systems or international law. However, two remarks are worth keeping in mind. First, there are good reasons to assume that particular tools of moral enhancement – let us assume that such tools like religion or law as such are effective – need some proper moral ecology to work. The same religion may enhance morality in one environment, but it may be ineffective or even hazardous in another environment. Consequently, it is hard to state that a particular way of moral enhancement is always effective as such. A particular tool of enhancement should be a part of a broader constellation. We find that religion has played a substantial role in European history, but the same religion today is marginalized. It is possible that religion has stopped playing any role today, at least not on the global scale. Consequently, it is hard to estimate precisely the expected effects of application of a particular tool of moral enhancement even if the same tool worked well in the past.

Second, the challenge is increased today when humanity is confronted with new ecological challenges and existential threats. But that challenge does not refer only to looking for the most

effective ways to cope with current risks. This is a question about so-called human nature: what kind of theory of humanity, and the philosophy of human beings should be elaborated today? What is the ideal set of moral features and moral intuitions virtually possessed by the human being? Policy planners and ethicists should answer those and other questions and decide what kind of moral features should be developed or just implemented. First, the main fields of risks and threats should be identified. Then, the set of desirable human moral intuitions should be formulated. The possible candidates include altruism or empathy. However, it is hard to predict whether the population of altruists would be able to prevent an ecological disaster. But even if we assume that the main global challenge is climate change, and the best countermeasure is the moral human enhancement for altruism and empathy, possibly interspecies altruism and interspecies empathy would be the right choice.

The currently applied ways of moral enhancement are non-biomedical and, as such, they are non-invasive, non-heritable and possibly reversible. They are non-invasive in a physiological sense because they do not take the form of pills or injections and, as such, they do not interfere with the human body. But there are good reasons to treat them as invasive in a psychological sense. This is the case of, among others, the religious education of children. Moral enhancement is non-heritable in a genetic sense because acquired moral traits are not inherited to succeeding generations in genetic terms. However, they may be heritable in terms of cultural vertical, horizontal or oblique transmissions [7]. Human enhancement is also possibly reversible. Applied moral norms may be replaced by others even if they seem to be deeply rooted in the moral system of a particular human. While all three criteria may be discussed as context-dependent in relation to moral enhancement, moral enhancement as such is non-invasive, non-heritable and virtually reversible when compared with genetic moral enhancement.

Biomedical moral enhancement is an ethical issue due to the fact that – in contrast to moral enhancement – it is invasive, may be heritable and possibly is irreversible. However, there are at work several possible ways of biomedical moral enhancement which differ substantially. Those differences affect their ethical status. Let us consider two basic ways of biomedical moral enhancement, pharmacological and genetic. Pharmacological enhancement may include pills and injections and, as such, is treated as ethically less challenging than genetic enhancement. However, genetic enhancement comes in degrees in the ethical sense. Somatic gene editing is less controversial than germline gene editing due to the fact that the former does not need to be passed on to succeeding generations. We get a rationale for biomedical moral enhancement, when we find that the ideal peak of moral inclusivism cannot be reached by non-biomedical means. If the social and ecological crisis requires an urgent intervention, we have a strong reason for moral bioenhancement – when we make sure that some substantial changes in human moral intuitions and patterns are required. The question arises as to whether anyone may be convinced that only biomedical moral enhancement is able to shape human morality in a desirable direction.

The advocates of biomedical moral enhancement argue that the mismatch between evolved psychology and the current ecology is too large, and ecological issues are too urgent to be able to wait a long time for possible progress in human morality on the global scale. Another question arises here. Is an ideal moral inclusivism ever possible on the global scale without biomedical enhancement?

Buchanan and Powell argue against the idea of moral bioenhancement proposed by Ingmar Persson and Julian Savulescu. The idea of biomedical moral enhancement states that there are good reasons to improve human morality by biomedical tools [5]. Because human moral ecology evolves much faster than human psychology, artificial enhancement of our morality is being considered. Buchanan and Powell argue that while that idea is an interesting proposal, it is hard to create an appropriate social, ethical and legal order in which any kind of biomedical enhancement could be applied in mass to the human population. As an alternative for the moral enhancement made by biomedical means, the authors argue for the standard methods of enhancement such as an institutional support for human rights, among others [1].

#### **4. Moral Enhancement in Space**

There are good reasons to look for effective tools of moral enhancement for space missions, mostly for the future possible human space settlement. Isolation and distance from Earth are mentioned as the most challenging factors in space, close to space radiation and altered gravity [4]. It is worth keeping in mind that isolation as such is not a challenging factor itself as far as an isolated individual has a chance to change his environment. However, isolation in space connected with the distance from Earth is getting more and more challenging than any comparable state of isolation on Earth. The challenge arises when the future space settler will attempt to come back to Earth – let us assume that human life and human civilization will remain on Earth. This is not obvious in the future, mostly in scenarios in which space settlement is considered as a kind of space refuge. However, when life on Earth will be possible in the future, some people for some reasons should have the right to come back to Earth when they decide to leave a space colony. Robert Cowley rightly discusses it as an obligatory precondition for any idea of space colonization [2]. He adds that such a right requires a proper transportation system between Earth and a space colony. This is an important remark which shows how human rights are strongly affected and dependent on some basic infrastructural and material issues. This issue is discussed by Buchanan and Powell when they argue that the idea of human rights got a chance for realization after World War II in rich countries of the West.

However, an appropriately fast and regular transportation system between a space colony and Earth may be challenging, at least in the first period of a space settlement program. This virtual technological gap opens space for a specific moral enhancement space program. Human moral enhancement for space is not considered only to guarantee the mission's success. Such a kind of enhancement is considered also for the interest of space settlers who may be not able to cope with stress and all the psychological pressures during the long-term space missions. When fast travel back to Earth is impossible, human moral enhancement may become not only morally permissible but even morally required. Consequently, when the state of the art in space technology is not effective enough, human enhancement in general and human moral enhancement in particular may be the only reasonable and feasible option.

#### **5. Biomedical Moral Enhancement in Space**

As far as no human has ever lived on a planet other than Earth, no one may guarantee that the training programme and candidate selection will prepare effectively and sufficiently future deep-space astronauts in a moral and behavioral sense. Before the successful completion of the first human mission to Mars or another space body, the idea of moral bioenhancement will be an option which should be considered. A decision by mission planners to not apply moral bioenhancement may be – theoretically – a strong argument to hold them accountable for mission failure if the reason for possible failure lies in the morality and behaviors of the astronauts.

There are good reasons to argue for the biomedical moral enhancement of the future deep-space astronauts. The rationale is apparently evident and strong: the specific, difficult conditions of a space settlement/space base including a relatively high risk of the mission failure which provides strong reasons to prepare astronauts as well as possible. Objections to applying moral bioenhancement are weaker than expected benefits – it is assumed here that criteria of safety and efficacy are met. However, philosophical discussion on that topic is complicated due to the fact that it is assumed here that the moral bioenhancement will be applied for first time in human history for the purposes of a space mission. If moral bioenhancement has already been applied in other fields of human life, biomedical moral enhancement for space would no longer be an ethical issue. But the challenge arises that some laboratory tests, and proper legislation and public policy are required to make possible biomedical moral enhancement for space. This is why such philosophical consideration is a kind of vicious circle. An argument for moral bioenhancement for space would

require working out such a kind of social and public policy which already makes discussion, law and laboratory tests on moral bioenhancement possible and acceptable.

It is possible that while we may/possibly should wait some time for the progress in space science and technology to make possible better/faster interplanetary transportation and habitats as safe as possible, the same is not necessarily true for the human psyche. The argument goes as follows. There are some reasons to postpone the decision on a human space program to avoid unnecessary risk. Current risky factors may be neutralized by the technology which will be developed in the near future. But what about moral enhancement and human psychology? It is possible that the unique tool for modification of human moral and behavioral patterns in such a specific environment will be always only moral enhancement by biomedical means. If we assume that informed consent is a necessary requirement, there should be no problem with that when such an enhancement would be applied only to adult volunteers. The ethical challenge arises when we consider the scenario of mass colonization, or when interplanetary travel becomes more or less available for an average person. Should we treat as morally acceptable a situation in which everyone who will travel to a space settlement – both volunteers as well as people obligated to travel – has an obligation to be morally enhanced biomedically? James Schwartz discussed a similar case in regard to disabled people [6]. One could say that there are plenty of activities on Earth in which some kind of moral and behavioral selection is at work. Due to the specificity of the hazardous space environment one could argue that – in regard to volunteer space settlement – future astronauts/settlers should be not selected but adapted by moral bioenhancement. The challenge arises when one considers the case of obligatory space missions such as for those under military service or in a situation where space settlement is considered as a kind of space refuge. Mostly in that latter scenario, not every settler should be obligated to be enhanced but mission organizers should provide proper infrastructure and system solutions to guarantee the appropriate level of security and collaboration.

There are good reasons to say after Schwartz that space travel should be treated in the same way as current airplane travel – everyone has a right to it and no requirements are at work. No one should need to be enhanced to be a passenger on an airplane. As long as space travel and space settlement will be an exclusivist undertaking, one may argue that one of the required preconditions is an obligatory moral bioenhancement. However, when space settlement becomes more available for a larger part of the population, there are good reasons to not apply moral bioenhancement but to offer alternative solutions which will not exclude un-enhanced humans. Human bioenhancement is considered here as an extra activity which cannot be treated as a basic and natural precondition – at least not for such a kind of service which is available to everyone.

## **6. Conclusions**

Moral enhancement is a kind of enhancement which is probably inevitable since humans started to live and collaborate at the level of large groups. However, the crucial role is played by the theory of human behavior. The stronger the role assigned to the Environment of Evolutionary Adaptedness, the stronger the need for moral enhancement which is understood as a transition from the intuitive exclusivist morality to the inclusivist morality. While moral enhancement as such is commonly shared and applied, the question arises as to whether there is any rationale for making that process faster and more effective by biomedical means.

The context of future human space missions and the idea of space settlement opens space for new arguments. As long as human space exploration will be dangerous, difficult and limited only to narrowly selected and trained personnel, biomedical moral enhancement may be considered a reasonable option. However, the rationale for a mission also may play a role. Biomedical moral enhancement may be considered as a kind of intervention which is required when other alternatives are not available. It is worth considering the value of biomedical moral enhancement as such. It is hard to say that such a kind of enhancement for any reasons could be inherently wrong. Such enhancement like any other kind of radical enhancement should be reversible. Reversibility may be

a crucial criterion in relation to moral bioenhancement when the applied or modified function in space provides different capacities and outcomes than on Earth. But the final decision on biomedical moral enhancement should depend on mission targets and enhancement targets.

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