ETHICAL AND PHILOSOPHICAL DIMENSIONS OF HUMAN PRESENCE IN SPACE

Nikola Pirovski

Department of Anatomy, Faculty of Medicine, Trakia University, Stara Zagora, Bulgaria
e-mail: nikola.pirovski@trakia-uni.bg

Keywords: *space ethics, human presence, body, time, meaning, long-duration spaceflight*

Abstract: *Human presence in space is usually framed as a technical and organizational challenge: how to reach, survive, and accomplish the mission. This paper defends a more modest but fundamental thesis: even with flawless technical safety, human presence in space can be existentially threatened if the lived experience of body, time, and meaning is neglected. Materials and Methods: The analysis is conceptual and philosophical, drawing on phenomenological descriptions of bodily experience, temporality, and meaning, as well as on existing literature in space medicine and ethics. No new theoretical framework is proposed; the focus is on three concrete dimensions of human existence in space habitats. Results: First, the cosmic environment radically transforms the experience of the body. In microgravity, isolation, and constant dependence on life-support systems, the body shifts from "I can" to "I am being maintained," risking the transformation of the astronaut from a living subject into a functional component of the mission. Second, time in closed habitats tends to collapse into operational time: personal, biographical rhythm is subordinated to strict schedules and delayed communication with Earth. Third, in fully artificial environments where every gesture is regulated, questions of "why I am here" and "what I am doing with this life" become both more urgent and harder to articulate, leading to a quiet erosion of meaning. Discussion: These three dimensions body, time, and meaning show that existential risk accompanies technical risk. An astronaut may be physically safe yet existentially insecure if their embodiment, temporality, and sense of purpose are systematically undermined by the design of the mission and habitat. Conclusion: The ethical question of human presence in space should begin from these concrete experiences rather than from abstract principles. Attending to the lived body, personal time, and meaning does not guarantee mission success, but neglecting them makes any "safe" mission existentially precarious for the human being who inhabits it.*

ЕТИЧЕСКИ И ФИЛОСОФСКИ ИЗМЕРЕНИЯ НА ЧОВЕШКОТО ПРИСЪСТВИЕ В КОСМОСА

Никола Пировски

Катедра по анатомия, Медицински факултет, Тракийски университет, Стара Загора, България
e-mail: nikola.pirovski@trakia-uni.bg

Ключови думи: *космическа етика, човешко присъствие, тяло, време, смисъл, продължителен космически полет*

Резюме: *Човешкото присъствие в космоса обикновено се формулира като техническо и организационно предизвикателство: как да се достигне, да се оцелее и да се изпълни мисията. Настоящият доклад защитава по-скромна, но фундаментална теза: дори при безупречна техническа безопасност човешкото присъствие в космоса може да бъде екзистенциално застрашено, ако се пренебрегва живият опит на тялото, времето и смисъла. Материали и методи: Анализът е концептуален и философски. Той се опира на феноменологични описания на телесния опит, темпоралността и смисъла, както и на съществуващата литература в областта на космическата медицина и етиката. Не се предлага нова теоретична рамка; фокусът е върху три конкретни измерения на човешкото съществуване в космическите хабитати. Резултати: Първо, космическата среда радикално трансформира опита на тялото. В условия на микрогравитация, изолация и постоянна зависимост от системите за поддържане на живота тялото преминава от модуса „аз мога“ към модуса „аз съм поддържан“, което крие риск астронавтът да се превърне от жив субект в функционален компонент на мисията. Второ, в затворените хабитати времето има тенденция да се срива до оперативно време: личният, биографичен ритъм се подчинява на строги графици и на забавената комуникация със Земята. Трето, в напълно изкуствена среда, в която всеки жест е регулиран, въпросите „защо съм тук“ и „какво правя с този живот“ стават едновременно по-належащи*

и по-трудни за артикулиране, което води до тиха ерозия на смисъла. Дискусия: Тези три измерения – тяло, време и смисъл – показват, че екзистенциалният риск съпътства техническия. Астронавтът може да е физически в безопасност, но да бъде екзистенциално несигурен, ако въплъщението, темпоралността и чувството за цел системно се подкопават от дизайна на мисията и хабитата. Заключение: Етичният въпрос за човешкото присъствие в космоса следва да започва от тези конкретни преживявания, а не от абстрактни принципи. Вниманието към живото тяло, личното време и смисъла не гарантира успех на мисията, но пренебрегването им прави всяка „безопасна“ мисия екзистенциално рискована за човека, който я обитава.

Introduction

Even when every technical system functions flawlessly, a deeper vulnerability remains. A person may be physically protected and yet lose the ordinary supports that make life recognizably human – a body that acts, a sense of lived time, and a durable feeling of meaning [1, 2].

In fact, the space environment does not merely “load” the human being. It reveals the extent to which our everyday existence is bound to weight, to the horizon, to the rhythm of day and night, and to the possibility of touching the ground. When these self-evident conditions fall away, the person confronts not only the question of how to survive, but of what remains of oneself as an embodied and temporal being. Here the issue is no longer merely adaptation, but the very possibility of preserving a human mode of existence [3].

The philosophical tradition of Russian cosmism has long placed this question in a wider horizon. For thinkers such as Tsiolkovsky and Fedorov, going into space is not simply a technical expansion of space, but a test of the very idea of the human – a being that bears responsibility not only for itself, but for life as a cosmic phenomenon. Bulgarian authors have likewise drawn attention to the “cosmic being of man” as a theme that requires a philosophical, and not only an engineering, approach [4, 5]. The ethics of presence in space begins long before the flight itself: it begins with the question of what it means to be human when the familiar terrestrial supports are removed.

In space the moral situation changes. Vulnerability is structural rather than accidental; dependence is built into the habitat itself; the possibility of fully informed consent is limited by uncertainty and by the hierarchical character of the mission [2, 6]. Beyond these practical difficulties stands a more fundamental philosophical question: what kind of human presence remains possible when the familiar supports of embodiment, time, and meaning are weakened or removed.

The present paper does not propose a new ethical system. It simply examines closely three dimensions of everyday existence in space habitats – the body, time, and meaning – and argues that neglecting them leaves even the safest mission existentially fragile for the people who must live in it. The ethical question of human presence in space therefore begins from the texture of this lived experience, and not solely from principles.

Materials and Methods

The present analysis is conceptual and philosophical. It does not rely on new empirical data, but on a phenomenological description of three fundamental dimensions of human existence in space habitats – bodily experience, temporality, and meaning.

The starting point is the understanding that prolonged residence in an artificial, closed, and technologically mediated environment changes not only physiology and psyche, but the very structures of everyday experience. The method therefore combines:

- a phenomenological approach to embodied and temporal being;
- an ethical analysis of vulnerability and responsibility under conditions of structural dependence;
- a dialogue with the traditions of space ethics and Russian cosmism, which regard the human being as a creature with a cosmic dimension.

No new theoretical system is proposed. The aim is to show how the concrete transformations of body, time, and meaning generate ethical questions that cannot be adequately captured by technical or biomedical safety criteria alone.

Results

Transformation of Bodily Experience

In terrestrial life the body is the primary medium of action and orientation. It rests on weight, senses the resistance of surfaces, and is constituted through the vertical. In microgravity this fundamental given is withdrawn. The body ceases to be a “place” from which one proceeds and becomes an object that must be continuously stabilized, monitored, and maintained by external systems.

This change has an ontological character. The person no longer experiences oneself primarily as an acting subject ("I can"), but as a being whose existence is mediated and dependent ("I am being maintained"). The ethical problem arises precisely here: to what extent can a mission claim success if it preserves biological functions while simultaneously eroding the experience of embodied autonomy? Bulgarian philosophical reflection has already framed the question of the "cosmic being of man" as a theme that transcends purely technical dimensions [4].

Compression and Depersonalization of Time

Temporality in the space habitat undergoes a radical reduction. On Earth time is saturated with qualitative differences – the alternation of day and night, seasons, social rituals, unforeseen events. In orbit or on an interplanetary voyage these markers disappear or turn into artificial conventions. What remains is the operational time of shifts, procedures, and delayed communication.

The consequence is not merely monotony, but a gradual depersonalization of biographical time. When the future is reduced to the repetition of the same cycles and the past grows ever more distant, the person risks losing the sense of one's own history. One continues to perform tasks, yet finds it increasingly difficult to connect those tasks with a wider horizon of meaning. The ethics of presence requires us to ask whether the habitat leaves space for personal time – for memory, for expectation, for projects that are not exhausted by the operational goals of the mission.

Crisis of Meaning

In a fully artificial and regulated environment the question of meaning acquires existential urgency. On Earth meaning is ordinarily sustained by a network of relations, places, traditions, and open possibilities. In space this network is radically reduced. What remains are the mission, the limited human community of the crew, and the distant image of Earth.

Some cosmonauts describe experiences of expanded perspective and deep connectedness. Others, however, encounter a gradually growing emptiness – a sense that life has been reduced to a set of functions. Philosophically speaking, the problem is not that meaning can be lost. The problem is that contemporary mission design rarely provides conditions in which meaning can be sustained, reworked, or newly created. If human presence in space is to be more than the successful functioning of biological organisms, it must also provide space for the meaningful constitution of existence.

These three transformations – of the body, of time, and of meaning – show that existential risk is not a side effect, but is intrinsic to the way long-duration missions are currently designed.

Discussion

The three dimensions – body, time, and meaning – show that existential risk is intrinsic to the way the human being is placed in an artificial and technologically mediated environment. The question is not only whether the astronaut survives, but what mode of being remains possible.

From the standpoint of the phenomenology of embodiment, the body is not an object among other objects. It is the "lived body" – the zero point of orientation from which the world discloses itself as a space of possible actions [10]. When gravity no longer supplies a stable vertical and every movement is mediated by the systems of the habitat, the experience of oneself as an acting subject weakens. The person continues to exist biologically, yet risks losing the primary sense of oneself as an embodied being who inhabits the world, rather than merely inhabiting a machine [3, 9].

Temporality undergoes a similar reduction. Biographical time – that which binds past, present, and future into a unified history – is subordinated to the operational rhythm. When days repeat without qualitative difference, the sense of one's own temporal density weakens. The person risks becoming a pure function of the schedule.

Meaning is the most difficult dimension to formalize. In an environment in which almost every action is predetermined, the question "why am I here" intensifies. Some experiences expand the horizon of meaning; others testify to a quiet erosion. The problem is not that meaning can be lost, but that mission design rarely provides conditions in which it can be sustained or newly created.

Russian cosmism has long placed this question in a wider horizon. For Fedorov and Tsiolkovsky, going into space is not merely a technical expansion, but a test of the very idea of the human as a being that bears responsibility not only for itself, but for life as a cosmic phenomenon [5, 6]. Hannah Arendt warns that space projects can deepen "earth alienation" – the tendency of the human being to flee the conditions of its terrestrial existence rather than to make sense of them [11].

Contemporary philosophical reflection on presence in space continues to raise the same questions with new urgency [12, 13]. If presence in space is thought of solely as a technical achievement, it risks missing what is most important: whether the human being there can still be human in the full existential sense of the word.

The experiences of body, time, and meaning associated with space are not the privilege of cosmonauts alone. To a certain degree they appear on Earth as well – among people whose daily schedules are so overloaded and technologically mediated that personal time shrinks to a sequence of tasks, the body is experienced primarily as an object of maintenance and optimization, and the question of meaning is deferred. The difference lies in intensity and in the impossibility of "stepping out": in orbit the problem cannot be postponed. That is precisely why space functions as a magnifying glass. It makes visible those transformations of experience that in everyday terrestrial life remain blurred and partially compensated.

Open questions remain to which the present analysis does not claim to give a final answer:

- What mode of being remains possible when the lived body and biographical time are systematically undermined by the environment?
- Can the ethics of presence in space begin from the concrete experience of embodiment, time, and meaning, rather than from principles derived solely under terrestrial conditions?

These questions do not require immediate solutions. They require to be posed – before missions, during them, and after them – if human presence in space is to be more than the successful functioning of biological organisms in a closed system.

Conclusion

Human presence in space is not exhausted by the technical possibility of reaching, surviving, and accomplishing the mission. It raises the question of what mode of existence remains possible when the familiar supports of body, time, and meaning are radically altered.

Attention to these three dimensions does not guarantee mission success. Neglecting them, however, renders any "safe" mission existentially precarious for the particular human being who must inhabit it. The ethics of presence in space therefore begins not from abstract principles, but from the texture of lived experience – and from the readiness to ask what remains human when the terrestrial self-evidences fall away.

Acknowledgements:

Trakia University scientific project: Assembly of Faith and Knowledge 19/2026

References:

1. Szocik, K. The Bioethics of Space Exploration. Oxford University Press, 2023.
2. Rajput, S., I. Mayor, M. Diamond, M. Rosenberg, V. Cole, N. Bhakare, O. Aziz and A. L. Wilder. Medical ethics of long-duration spaceflight. npj Microgravity, 9, 85, 2023.
3. Nezami, A. and E. R. Ferrè. Space Oddity: Microgravity as a neurocognitive catalyst for transformative consciousness experiences. Frontiers in Psychology, 17, 1769177, 2026.
4. Колева, Б. Философски размисъл за космическото битие на човека. Български философски преглед, 7, 162–172, 2017.
5. Tsiolkovsky, K. E. Kosmicheskaya filosofiya [Cosmic philosophy]. Original manuscript 1935; first published posthumously in Tekhnika – molodyozhi, 1981.).
6. Fedorov, N. F. Filosofiya obshchego dela [Philosophy of the common task]. Vols. 1–2, ed. V. A. Kozhevnikov and N. P. Peterson. Verny / Moscow, 1906–1913.
7. Kanas, N. and D. Manzey. Space Psychology and Psychiatry. 2nd ed. Springer, 2008.
8. White, F. The Overview Effect: Space Exploration and Human Evolution. Houghton Mifflin, 1987.
9. Jeevendrampillai, D. and A. Parkhurst. Towards an anthropology of gravity: Emotion and embodiment in microgravity environments. Emotion, Space and Society, 35, 100680, 2020.
10. Merleau-Ponty, M. Phenomenology of Perception. Routledge, 2012.
11. Arendt, H. The Human Condition. 2nd ed. University of Chicago Press, 1998.
12. Ushno, I. Homo Aerospace: Philosophical reflections on humanity's future in space. Philosophy and Cosmology, 33, 2024.
13. Garasic, M. D. and M. Di Paola (Eds.). The Philosophy of Outer Space. Routledge, 2024.