

Author's Note on Contributions

1. Habilitation work: a monograph

Ivanova, N. “(Re)Programming Life. Synthetic Biology Between Industry and Biohacking” (Paradigma, 2024)

This book sets out to answer the following research questions: 1) What is engineering logic and how does it apply to the biological sciences? 2) What epistemological patterns emerge as a consequence of the algorithmization of life? 3) What scientific practices, institutions, and communities are formed as a consequence of these patterns? 4) How and to what extent are the boundaries between the living organism and the machine blurred?

The research methods merge theoretical and empirical approaches. Bernard Stigler's ideas about the pharmacological role of technology in the evolution of the human spirit and civilization provide the theoretical framework, which guides the research process. The study is based on a detailed examination of numerous scientific articles in the domains of synthetic biology and computer science. Ethnographic, anthropological and cultural research of scientific practices and formations is also taken into account. The theoretical study is backed up by five months of ethnographic fieldwork at the synthetic biology lab at the Learning Planet Institute (Paris, France) and a one-and-a-half year bioart project at the biohacking lab La Paillasse (Paris, France).

The subject of the monograph is the invasion of engineering logos into the sciences studying life at the molecular level and their transformation into technologies programming life at the molecular level. The prism through which this topic is viewed is the pharmacological nature, both toxic and therapeutic, of the new technology resulting from the fusion of engineering and biological principles. The aim of the monograph is to outline some of the philosophical issues that arise in the application of engineering logic to the biological sciences, focusing primarily on the transformation of the social-epistemological structures and practices of doing synthetic biology and the transdisciplinary field emerging around it in relation to these changes. To a lesser extent, some inevitably emerging issues related to the ontological status

of newly created organisms are addressed. Cutting-edge concepts and tendencies related to the algorithmization of life, are introduced to the Bulgarian scientific community, but also to the general public, for the first time.

The monograph outlines a conceptual framework to illuminate the ontological, epistemological, social, ethical and aesthetic issues arising as the engineering paradigm enters the life sciences. It is the first time in the Bulgarian research field that the ideas of Bernard Stigler have been comprehensively presented and, to my knowledge, it is also the first study internationally to study synthetic biology through the prism of Stigler's concept of the pharmakon. In terms of scientific application, the contribution of this study is the creation of the aforementioned platform for dialogue and exchange of ideas, techniques and practices between people of art, science and technology in Bulgaria (symbiomatter).

The monograph is aimed both at specialists in the humanities - philosophy, sociology, cultural studies and the arts - and at the general public outside academic and intellectual circles, interested in the possibilities of participating in the making of the future, and not only in passively adapting to its becoming. It could also be of interest to life scientists who would like to learn about the broader cultural and social contexts to which their work relates.

2. *Articles and reports published in scientific journals, refereed and indexed in world-known databases of scientific information*

Ivanova, N. 2023. Clashes in Temporality between AI and Artistic Creation, *Balkan Journal of Philosophy* 15 (1)/2023, pp. 61-68. DOI: <https://doi.org/10.5840/bjp20231518> (Q3)

Art creates a specific relation to time and especially to the present moment. It opens the experience of the present towards its indeterminacy and emergence. On the contrary, AI does not know the present. It recognizes only the past and future. We could even say that artificial neural networks do not "know" time at all. Instead, they know only logical functions which process patterns of information. Yet, what makes time "time" is genuine transformation, which happens outside of the abstract realm of logic. I support these observations by analysing two works of

art: Bill Viola's *The Raft* (2004) and Hito Steyerl's *This Is the Future* (2019). While artistic creation opens up the intervals "in-between seconds" for an unpredictable and transformative event to occur (*The Raft*), AI closes these intervals and fastens the future into predictability calculated on the basis of past data (*This Is the Future*). Although this machinic operation makes the present even more unpredictable and prone to catastrophes, its potential for transformation seems to be withdrawn.

Ivanova, N. 2023. Paradigm Shifts in Cognition, Special issue on Philosophy of education, *Filosofiya-Philosophy* 32 (3s)/2023, pp. 11-21. (Q3)

This essay studies the paradigm shifts in cognition occurring in human history due to the invention of three fundamental technologies of information and communication: writing, printing, and computation. What I question is not so much the operation of specific cognitive faculties (perception, memory, imagination, understanding or reason), as much as following Yuk Hui we can call the "condition of philosophizing" (Hui 2019, p. 47). Hence, the essay inquires into the paradigm shifts in the condition of thought due to the invention of different technologies of cognition. Or put otherwise, borrowing a notion of Gilles Deleuze (1968, pp.169-217), I look into three different "images of thought": the boundaries that define what can be thought and how it can be thought.

Ivanova, N. 2016. Non-Anthropocentric Creative Mechanisms in Multispecies Symbiotic Assemblages, *Technoetic Arts: A Journal of Speculative Research*, 14:3/2016, pp. 225-233. DOI: <https://doi.org/10.1386/tear.14.3.225> 1. (Q4)

“So well established was the cliché which connected TB and creativity that at the end of the century one critic suggested that it was the progressive disappearance of TB which accounted for the current decline of literature and the arts.” [1] Some biochemical evidence does indeed invite a hypothesis that *M. tuberculosis* originally joined the human holobiont as a brain evolution-enhancing endosymbiont, thus possibly contributing to the development of human consciousness and creative potential. [2][3][4] Exploring the complexity of

mycobacteria's entanglements within human corporeality leads us to questions that challenge anthropocentric conceptions of creativity in a twofold manner. As noted above, the tubercle bacillus forms machinic assemblages (Deleuze and Guattari) and operates as an endosymbiont with human bio-systems. It is possible that these endosymbiotic assemblages contribute to human creativity and destabilize simple notions of its origin. In a double reflection, the concept of creativity itself could be revisited along alternative lines: it cannot be considered anymore only as the production of human cultural artefacts and experiences, but rather it can be understood as ubiquitous activity performed by heterogeneous highly dynamic machinic assemblages (comprising of human, animal, computational, social, molecular, bacterial, viral, and other processes), which lead to the production of novel modes of existence.

3. *Articles and reports published in non-indexed peer-reviewed journals or published in edited collective volumes*

Ivanova, N. 2023. Imaginaires de la créativité computationnelle. Trans. L. Cranach. In *Créativités artificielles – La littérature et l'art à l'heure de l'intelligence artificielle*, A. Gefen (ed.). Dijon: Les Presses du réel, 2023, pp. 67-82. ISBN: 978-2-37896-262-3.

This paper addresses some contradictions in the concept of the so-called 'computational creativity' (CC). Since the last decade, CC has captured the attention of researchers not only from the field of technologies but also from the humanities as a growing number of artificial intelligence tools become associated with creative practices. Computer scientists consider automating creativity as the 'final frontier' of artificial intelligence (Colton & Wiggins, 2012), which would not only 'rationally explain' the products of the 'creative genius' (Still and d'Inverno 147), but, in a more practical vein, systematize, formalize, and thus, make executable by machines what has once been deemed an inexplicable and divine strike of inspiration. 'What makes CC different is that it adopts an explicitly algorithmic perspective on creativity, and seeks to tie down the study of creative behavior to specific processes, algorithms, and knowledge structures' (Veale and Cardoso 2). This essay explores the technocratic imaginaries of creativity in some detail via selected examples of artistic practices engaged,

critically or instrumentally, with the promises of CC. It follows Boden's typology of creativity (exploratory, combinational, and transformational) since it serves as the guiding rationale for CC research.

Ivanova, N. 2023. „Water and Fire. Gabrovtsi Art-Nature Symposium.“ *Визуални изследвания (ВТУ) / Visual Studies (UVT)*, 3/2023, pp. 287-293.

This paper presents a critical review of the works created during the ART–NATURE Symposium, which was held in the village of Gabrovtsi near Veliko Tarnovo in July 2022, and organized by the Duppini Art Group. Land art artists from Iran, Turkey, the USA, Greece, Romania, Italy, Korea, Spain, and Bulgaria came together for a ten-day event including artistic work, exchange of ideas, and collaboration. It culminated in a series of outdoor exhibitions where the public could enjoy the completion of their projects. Expressed in works of water and fire, the river of the Symposium sprung from a swirl of agony, rushed through the various cascades and ripples of life, and closed with the transition from physical death to spiritual rebirth through nature and art. We start with death full of blackness and finish with death full of light.

Ivanova, N. 2022. Dimensions and Limitations of AI Ethics. In *EthicAI=Labs*, G. Dimitrova-Dimova (ed.), Sofia: DA LAB Foundation/Goethe Institute Bulgaria, pp. 75-79. ISBN 978-619-91242-4-6.

This article addresses the "ethical turn" in the studies of AI which is framed by the discourses of the so-called "empirical turn" (Verbeek). In this context, the main research goal in the field of AI ethics is implementing ethical principles within machines considered as growing increasingly autonomous in their agency. Outlined are the ethical theories and design approaches to achieving this goal as well as some of the technical and conceptual challenges faced by the AI researchers. However, in discussing the question of implementing ethical restrictions in machines to prevent them from harming humankind and better serve its pursuit of happiness, an ethical contradiction arises (Gunkel, 2020: 547). If we want to speak of ethics, shouldn't we begin to consider artificial system's rights and not only their obligations? This understanding dissolves the power

relationship between humans and machines discussed above. And finally, this article points to a fundamental limitation of AI ethics research in that the existing discourses rather serve as “a tool for policy making” without any ambition of radically questioning the framework (ontological, metaphysical, transcendental or politico-economic), which provides the conditions of innovation and existence of technologies as such.

Ivanova, N. 2021. “Notes on Post-pandemic Education.” (2021) In *Philosophy During the Time of Pandemic*, S. Nesković and B. Todorova (eds.), CESNA B Belgrade, pp. 185-191.

The COVID-19 pandemic has resulted in ‘the most severe disruption to global education systems in history’ (UNESCO). As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. However, digital technologies cannot be considered simply as a tool to be implemented into the existing education system and that is best demonstrated by the failures of most countries around the world to implement ad hoc distance learning on a mass scale. As a response, various stakeholders such as governments, IT companies, educational institutions and NGOs are beginning to collaborate their efforts into devising new systems of education. By outlining the profound transformations brought by technologies of information in the domains of knowledge production, processes of understanding (memory, learning, reasoning) and communication through history, this essay poses the following question: What should the underlying concept of pedagogy guiding the invention of new education systems be?

Иванова, Н. 2019. „From synthetic to sympoietic biology: pharmacological character of biotechnologies.“ *Philosophical Alternatives 2/2019*, стр. 5-22.

This article outlines conceptual framework, which would allow to explore current revolution in biotechnologies in their double role of a pharmakon (the concept as developed by Stiegler and Derrida): on the one hand, the development of biotechnologies intensifies the tendency of technosciences for

full control over matter and life, on the other hand, however, technologies open new fields for radical imagination and future protentions, as well as for transformation of power-knowledge structures. In more specific terms, the object of this research is the movement for open biotech, which includes various dimensions such as synthetic biology, garage biology, bioart and biohacking. While some of those (synthetic biology and biohacking in its narrow transhumanist sense) could be regarded as an epitome of anthropocentric desire for full control over matter, human body and the rest of the living beings, others (garage biology and bioart), on the contrary, deconstruct control via dynamic involvement of the artist-researcher into the co-generating power of sympoietic commonalities between humans, nonhuman living systems and nonliving beings as the boundaries between them as well as their identities remain fluid. In this text I attempt to analyze how these apparently contradictory tendencies actually presuppose and approach each other, what is the movement which generates them (algorithmization of living matter, systems and processes) and what philosophical questions are posed by this movement. The current essay schematizes the conceptual framework of research, as some of the presuppositions are presented in detail, while the solutions are in need of further study, both practical and theoretical.

Ivanova, N. 2004. “Auratic Work of Art in the Paradigm of Apollonian Aesthetics”, *Filosofiya-Philosophy*, 13:1/2004, pp. 39-47.

The essay questions the nature of the auratic work of art (developed by Walter Benjamin), first as a object of cult and then as a purely aesthetic object. As a manifestation of a spiritualized entity, the artwork possesses an aura that brings us face to face with the absolute or the world in its totality. This paper develops the thesis that the auratic work is a manifestation of a canon of representation that is far from the only possible one - the Apollonian aesthetics. Its main characteristics are the principle of individuation, measure, self-limitation and the idealized harmony of form. Such is the aesthetics of the beautiful, whose canons guided the creation and reception of high art during Antiquity, the Middle Ages, the Renaissance and Modernity.

A work of auratic art, according to its concept, is the finished product of creative activity on the part of a single subject, its author. It is a kernel of compressed meaning that is realized in the mind of its perceiver (reader, viewer, listener) in its passive reception (reading, contemplation, listening). Its completed structure is immutable after its creation and obeys the "principle of irreversibility" (Roland Barthes). The auratic work presupposes a unit that is always in place: the unit of the reading subject, which is forced and disturbed only to be returned more fully to itself.

Иванова, Н. 2004. "Open Text in the Paradigm of Dionysian Aesthetics", *Filosofiya-Philosophy*, 13:2/2004, pp. 53- 61.

This paper explores the concept of the "open text" as a transitional stage from Apollonian-auratic work to post-auratic digital artifacts. The notions of poststructuralism, deconstructivism and postmodernism considered here fit in a certain way with the Dionysian aesthetic paradigm, the carnivalesque inversion of values and grotesque imagery. The Apollonian principle of individuation is annulled. Dionysius is the scattered multiplicity that is constantly changing faces. From a substantialised, enclosed object, the work becomes a methodological field, a process of producing meanings. Since it is nothing but a system of signs, its essence is not in the message but in the structure. Such a structure is decentred, non-linear and reversible. As a result, the hierarchical oppositions active creator - passive perceiver, writing - reading, creation - reception are inverted. The postmodern writer is born together with his text, his identity is formed in the process of reading-writing. Writing is no longer a representational but a performative activity. In turn, the reader is forced not simply to perceive the work, leaving herself to her own pleasure, but to engage in completing it by deriving a unified structure in the narrative and thus making sense of it. In the process, the reader also cannot remain identical to herself.

Иванова, Н. 2003. „WEB art: new modes of creation and appreciation of the works of art.” *Philosophical Alternatives* 12:5&6 /2003, стр. 178-189.

The emergence and development of computer technology has not left artists indifferent. Ever since the mid-20th century, many artists, musicians and writers

have been experimenting with software programs created especially for them and trying out an unconventional type of art. Because it is digital art, an ideal "art gallery" for its presentation is the ever-growing worldwide web of the Internet. Unlike mass media, this new kind of medium is interactive. Web art is a cultural phenomenon with rather experimental artistic value. Since it has emerged recently, it is still poorly explored theoretically. It is the role of criticism to make sense of the creative potential of new aesthetic phenomena and to seek their place in contemporary culture and its future.

The aim of this article is to explore the ways in which the recipient of computer art becomes a co-author in the creation of interactive works. Web art authors, sensitive to the changes in the contemporary postmodern world, find it necessary to involve the recipient as an active participant in their artistic experiments. Their works come to life the moment the audience activates them, or change depending on their reaction. Moreover, new artistic techniques enable the recipient to try to create artworks themselves. To illustrate this point, some examples of algorithmic art exhibited online are presented, such as fractal images and Conway's Game of Life.

Ivanova, N.2002. "Literature in the form of digital hypertext transforms the experience of reading". In *Philosophical Readings Arbanassi 2002, Iv. Hristov (ed.)*, Sofia: LIK, pp. 156-163.

This paper explores the reincarnations of literary works in the postmodern era under the influence of digital technologies. While classical texts have a clearly marked beginning, climax and end and possess a unity of meaning, postmodern texts are fragmentary and challenge the reader to find his or her way through multi-layered labyrinths of symbols without a clear referent. Digital technologies create a natural environment for experimental literary forms of the postmodern type (so-called hypertext), and the Internet connects readers in real time and they become the collective author of the intertextual worlds they inhabit. The change we observe in the reading of digital hypertext and multimedia games is conditioned by new technical means of expression, which leads to a paradigm shift of authorship. The collective cacophony of stories, commentaries, and transgenre works effectively enacts the "authorless discourse" dreamed up by Foucault, where "all discourses, regardless of their status, form, value, and the

treatment to which they are subjected, develop in the anonymity of muttering."(Foucault "What is an author?") The boundary between author and reader is blurred in this anonymity.

4. *Studies published in scientific journals, refereed and indexed in world-renowned databases with scientific information*

5.

Charrieras, D. and Ivanova, N. 2016. "Emergence in video games production. Video game engine as a technical object." *Social Science Information*, 55:3 /2016, pp. 337-356. DOI: <https://doi.org/10.1177/0539018416642056> (Q2, SJR 0.47) /50

This article is interested in the creative practices in video game production. More specifically, the research focuses on the ways in which the use of game engines – a toolkit that offers a set of functionalities to automatize the handling of a range of processes (graphics, sound, game physics, networks, artificial Intelligence) – make possible or impossible certain forms of emergences in video games production. The manipulation of objects in these game engines is done according to a certain programming paradigm. Two main programming paradigms currently govern the internal design of game engines: object-oriented/inheritance-based deep-class hierarchical design and component- based data-driven design. We will describe how different programming paradigms lend themselves to certain affordances to explore the ways in which game workers can interface with game engines. We will use the framework developed by Gilbert Simondon on the artisanal and industrial stage or mode of production. This will enable a better understanding of the technogenesis of different kinds of game engines and the ways in which they can be conceptualized as technical individuals enduring through their associated milieus. This way of describing game engines emphasizes non-anthropocentric forms of creativity and specific modalities of emergent techno-human processes that are too often underestimated in various accounts of cultural production processes.

Ivanova, N. 2016. "Meditation-image as Transfiguration of Experience: Bill Viola's Video Art." In *Technovisuality—Cultural Re-enchantment and the Experience*

***of Technology*, Helen Grace, Amy Chan Kit-Sze, Wong Kin Yuen (eds.), London/New York: I B Tauris, pp. 154-175. ISBN 9780857725639. (WoS)**

The concept of the meditation-image is built on the specific correspondence between the time-image of the video and the time-perception of the viewer. It can be formally defined as a special type of affection-image (Deleuze) viewed in extremely slow motion. From the viewer's perspective, it is experienced in a meditative mode of consciousness. In meditation, time is said to stop or slow down extremely, decentering and enriching perceptions.