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Future Writing

Свидетельство о государственной регистрации:
Эл № ФС 77 – 77604 от 31 декабря 2019,
выдано Роскомнадзором
ISSN 2712-9934

Учредитель и издатель:

Санкт-Петербургский политехнический университет
Петра Великого

Адрес редакции:

195251, СПб, ул. Политехническая, д. 29.

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используя изображение
Soulrope, K. (2023). On the Art of Shibari as a Form of
Writing. *Technology and Language*, 4(3), 49-58.
<https://doi.org/10.48417/technolang.2023.03.05>

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ISSN 2712-9934

Publisher:

Peter the Great St. Petersburg Polytechnic University

Corresponding address:

29 Polytechnicheskaya st., Saint-Petersburg, 195251,
Russia

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Soulrope, K. (2023). On the Art of Shibari as a Form of
Writing. *Technology and Language*, 4(3), 49-58.
<https://doi.org/10.48417/technolang.2023.03.05>



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Special Topic:
Future Writing
Guest Editors
Dajuin Yao and Nikita Lin



<https://doi.org/10.48417/technolang.2023.03.01>

Editorial introduction

Future Writing: Editorial Introduction

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Abstract

This collection of eight contributions on the theme of “Future Writing” is inspired by an intermedia investigative project at the School of Intermedia Art, China Academy of Art. Starting from a Derridean grammatical review of the act of writing today, authors were invited to consider writing-the-future along with the future-of-writing. This includes the ways in which science fiction and utopian texts, but also visionary programs for emerging technologies develop strategies of questioning the present by positing an ontologically discontinuous future. But future writing also has a past when romantic poets imagine a new language which allows us today to explore data-mining through the lens of copper-mining. The question is framed by our contemporary experience: Writing and the memory of the hand are becoming obsolete by way of typing and other technical proxies. These boundaries are challenged by Artificial Intelligence and Virtual Reality as providing new spaces for human articulation. At the same time, written characters are threatened by technical modernization, reminding us of issues of enactment and embodiment in the digital world.

Keywords: Grammatology; Media Art; Typography and Lettering; Science Fiction; Technological Visions; Virtual Reality

Citation: Yao, D. & Lin, N. (2023). Future Writing: Editorial Introduction. *Technology and Language* 4(3), 1-6. <https://doi.org/10.48417/technolang.2023.03.01>



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УДК 003: 001.18

<https://doi.org/10.48417/technolang.2023.03.01>

Редакторская заметка

Письмо будущего: Введение от редакторов

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Аннотация

Данный выпуск из восьми статей на тему “Письмо будущего” вдохновлен исследовательским проектом Школы интермедиа-искусства Китайской академии искусств. Начиная с грамматологического обзора современного письма, сделанного Дерридой, авторам было предложено рассмотреть письма о будущем наряду с будущим письма. Сюда входят способы, с помощью которых научная фантастика и утопические тексты, а также дальновидные программы для новых технологий развивают стратегии, ставящие под сомнение настоящее, постулируя онтологически прерывистое будущее. Но у письма о будущем также есть прошлое, когда поэты-романтики воображали новый язык, который позволяет нам сегодня исследовать добычу данных через призму добычи меди. Вопрос сформирован нашим современным опытом: письмо и память руки уходят в прошлое, уступая место набору текста и другим техническим средствам. Искусственный интеллект и виртуальная реальность бросают вызов этим границам, предоставляя новые пространства для артикуляции человека. В то же время письменные знаки оказываются под угрозой технической модернизации, напоминая нам о проблемах реализации и воплощения в цифровом мире.

Ключевые слова: Типографика и леттеринг; Научная фантастика; Технологические представления; Виртуальная реальность

Для цитирования: Yao, D., Lin, N. Future Writing: Editorial Introduction // Technology and Language. 2023. № 4(3). P. 1-6. <https://doi.org/10.48417/technolang.2023.03.01>



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Old habits die hard.

A language and writing system is deeply rooted in its cultural traditions and values. Accordingly, its reform, modernization, or technical standardization regularly provokes intense discussions. When the linguist I. J. Gelb (1952) published his seminal work *The Study of Writing*, the Chinese Committee on Script Reform was created and so began the Chinese Character Simplification Scheme. Indian mythologist Devdutt Pattanaik (2019) viewed it as an act of brutality so severe as to take, quite literally, the heart out of love. Pattanaik sees the Chinese today „paying the price for this brutal decision taken half a century ago“ as an important lesson for India. He suggests that the Indian caste system is a counterpart to the Chinese writing system and claims that „[t]hose who reject the caste-based past completely [...] are, in effect, trying to make a clean break from the culture of the past“ (Pattanaik, 2019).

This provocation serves at least to remind us that many influential writers and thinkers, including Villem Flusser and I. J. Gelb, formulated their theories concerning the evolution of writing systems from a Eurocentric perspective (Flusser, 2011; Gelb, 1952). Both “interpret the transition from pictography and logographic writing to alphabetic writing as the transition from a logically ‚lower‘ to a ‚higher‘ stage of cultural evolution” (Nöth, 2022, p. 4). This „logical necessity of the evolution of culture“ finds its precursor in Marshall McLuhan and the Toronto School’s theory of writing. For McLuhan, writing the alphabet is like practicing a semiotic virtue of dissociating or abstracting – essentially “writing meaningless sounds in the form of meaningless letters” (Nöth, 2022, p. 4). This, according to McLuhan (1962), has fostered „an intense visual life,“ and enabled the „detribalizing of the individual“ (p. 43). A like-minded Chinese, Indian or Egyptian media theorist would have argued similarly: Logographic writing embodies higher virtues.

This special issue brings together a cohort of authors from different fields: artistic practice, media theory, science and technology studies, philosophy of science and technology, and technology assessment. The topics are diversified and shed light on different aspects of Future Writing, Futures of Writing, and Writing Futures in a changing cultural dynamic and technical milieu. It begins with a conversation that opens a „space of resonance“ that spans past and future, art and science, data-mining and copper-mining (Henrich & Zielinski, 2023).

Several authors enter this space with a sense of enthusiasm for new connections between writing and artistic practice, leading to an expanded grammatology of future writing. This includes both digital and analog media. Aesthetic strategies serve to design and realize embodied experiences within the Metaverse, establishing a new kind of sociality – the Metaverse social (Xu & Wang, 2023). If this extends the way of addressing social and emotional needs in the physical lifeworld, it also provides multi-sensory experiences in virtual space (Zhang et al., 2023). A decidedly analog and profoundly embodied way of writing treats the rope as a line for drawing ciphers in space, engaging and confronting the other through strategies of fixation and objectivation. This is the art and language of bondage in which the Shibari artist’s fluidity of movement is at the same time a kind of fluency of speech, presenting to us a reverse system of encoding and decoding the body with the rope that ties it (Soulrope, 2023).



Alexander Doroshev and Anna Polyakova recount a fascinating story concerning the survival in the Russian Alphabet of the letter ‘ё’ as a result of varying technical difficulties to implement the letter in different registering devices from early typewriters to the most current autocorrection designs (Doroshev & Polyakova, 2023). Readers may find some of this hilarious and at the same time be gently reminded of how a script system is sophisticatedly intertwined with a modern bureaucratic system, and how it can complicate the everyday life.

Wenzel Mehnert and Stefan Gammel contribute a meticulous analysis of literary devices, techniques, and hermeneutic mechanisms involved in writing and engaging technovisionary narratives. They consider a spectrum of textual and visual compositions covering science fiction, government brochures, and corporate logos. Mehnert takes a hermeneutic approach of engaging technofutures, pointing towards a constructive framework for technology assessment that allows for an open-ended extrapolating activity to re-imagine imaginary worlds of entangled items and relations. He presents a mechanism for cognitive recalibration that mediates between the actual world we think we know and the futures of which we are unsure (Mehnert, 2023). Gammel identifies a form of writing which he calls ‘ontolytic writing’ that characterizes science fictions as well as other technovisionary narratives. This writing produces an ontolytic effect in that it shocks and disrupts our ontologically given world (Gammel, 2023).

In a concluding conversation, media theorist Geert Lovink reflects the tactics, aesthetic and political, in response to the breakdowns brought about by digital platforms. He is concerned with the possibility of creating new beginnings and the question of how to record fast-changing real-time phenomena, not only documenting them but leaving room for anticipation (Lovink & Lin, 2023).

This is the concern also of Intermedia Art which seeks to create new media and platforms “between” existing media (Higgins, 1965/2001). It was in this spirit that the future-oriented Open Media Lab was founded in 2010 (Yao, 2020, 2022a, 2022b). It uses Sci-Fi as its methodology and devotes itself to the alchemy of culture, art and technology. Open Media Lab believes in liberating oneself from a media-dominated ideology of art. It aims toward “forgetting the wares and keeping the Way (the content),” and to nurture a new generation of “New Renaissance Human.” For the 2023 International Intermedia Art Festival, Open Media Lab proposed an exhibition title and concept called “A Coder and Violin” – an anagram of “Leonardo da Vinci” – where the coder is himself the violin player, a concept differentiating itself from the commonly seen practice of a hit-and-run collaboration between a scientist and an artist. Open Media Lab takes special interest in scrutinizing emerging technologies and platforms that are changing not only the art world but the concept of creativity itself. With the advent of AI technologies and tools, in particular ChatGPT, writing, and perhaps creativity in general, is now facing a tremendous crisis that is shaking it at its foundation. It is not dissimilar to the crisis faced by the Chinese writing system as people stopped actually “writing” characters, producing them only by proxy as we enter the computer age (compare Ingold, 2020; Liu, 2020). Writing in the post-AI era ushers us into a creative realm of the collective unconscious and opens up possibilities in artificial consciousness, artificial spirituality, artificial



creativity, and so on. It will be a turning point from which human writing will never be the same. This collection of papers takes pause and takes stock at this turning point.

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Статья поступила 4 сентября 2023
одобрена после рецензирования 18 сентября 2023
принята к публикации 24 сентября 2023

Received: 4 September 2023
Revised: 18 September 2023
Accepted: 24 September 2023



<https://doi.org/10.48417/technolang.2023.03.02>

Research article

Crystallographic Resonances: Rewriting Novalis

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Abstract

In 1798/99 the poet, philosopher, geologist, and mining expert Friedrich von Hardenberg, known as Novalis, drafted *The Disciples at Sais*, one of many literary fragments that envision an expanded form of reading and writing that takes its cues from the book of nature. This includes the language of rocks and crystals as evolving structures or forms. In June 2023 the filmmaker and artist Juliane Henrich created *Dendrites* at Hardenberg's castle in Oberwiederstedt. The title refers to the branch-like connections between nerve cells in the brain. In artificial neural networks, this structure is imitated. Crystals also grow in dendrite form. As part of the artistic research-group *Resonanzräume*, Henrich creates a space of resonance between dendrites and crystals, between Novalis' poetry and machinic language production, between Romanticism and the re-enanted technosphere of the present. This space of resonance is here explored in conversation between herself, media theorist and media archaeologist Siegfried Zielinski, and GPT-4. The poetic and philosophical fragments of Novalis and Henrich's video-installation provide the material backdrop to this conversation. It concerns the limits of the AI tool as a romantic thinker and writer, it also establishes the romantic's interest in a language external to ourselves.

Keywords: Novalis; the Blue Flower' Dendrites; GPT-4; Writing; Technical Image

Citation: Henrich, J., & Zielinski, S. (2023). Crystallographic Resonances: Rewriting Novalis. *Technology and Language*, 4(3), 7-23. <https://doi.org/10.48417/technolang.2023.03.02>



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УДК 7: 004.8

<https://doi.org/10.48417/technolang.2023.03.02>

Научная статья

Кристаллографические резонансы: Переписывая Новалиса

Юлиан Генрих¹ (✉) и Зигфрид Зелински², вместе с GPT-4 и Фридрихом фон Харденбергом, он же Новалис

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Аннотация

В 1798/99 году поэт, философ, геолог и эксперт по горному делу Фридрих фон Гарденберг, известный как Новалис, написал “Ученики в Саисе”, один из многих литературных фрагментов, предполагающих расширенную форму чтения и письма, основанную на книге природы. Он включает в себя язык камней и кристаллов как развивающихся структур или форм. В июне 2023 года режиссер и художница Джулиана Генрих создала “Дендриты” в замке Харденберг в Обервидерштедте. Название относится к разветвленным связям между нервными клетками головного мозга. В искусственных нейронных сетях имитируется эта структура. Кристаллы также растут в дендритной форме. В составе художественной исследовательской группы Resonanzräume Генрих создает пространство резонанса между дендритами и кристаллами, между поэзией Новалиса и машинным языком, между романтизмом и обновленной техносферой настоящего. Это пространство резонанса здесь исследуется в беседе между ней самой, медиа-теоретиком и медиа-археологом Зигфридом Зелински и GPT-4. Поэтические и философские фрагменты Новалиса и видеоинсталляции Генрих служат материальным фоном для этого разговора. Он касается границ возможностей технологии искусственного интеллекта как романтического мыслителя и писателя, а также устанавливает интерес романтика к внешнему по отношению к нам самим языку.

Ключевые слова: Новалис; Дендриты; GPT-4; Письмо; Техническое изображение

Для цитирования: Henrich, J., Zielinski, S. Crystallographic Resonances: Rewriting Novalis // Technology and Language. 2023. № 4(3). P. 7-23. <https://doi.org/10.48417/technolang.2023.03.02>



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According to Ludwig Wittgenstein, „What can be shown, cannot be said“ (Wittgenstein, 1922, 4.1212). Modernist picture theories of language are on the side of saying. They are interested in how propositions map onto or represent the facts, that is, interested in the relation of theory and reality, mind and world. The poet, philosopher, geologist, and mining engineer Friedrich von Hardenberg, known as Novalis (1772-1801) sides with the act showing, that is, he queries what things signify and how words signify. In 1798/99 he drafted *The Disciples at Sais*, one of his longer literary fragments which begins with a description of the Master, how he reads and writes, how he plays the game of signification.

Men travel by many different paths. Whoever tracks and compares their ways will see wonderful figures arising; figures that seem to belong to the great Manuscript of Design which we descry everywhere, on wings of birds, on the shells of eggs, in clouds, in snow, in crystals, in rock formations, in frozen water, within and upon mountains, in plants, in beasts, in men, in the light of day, in slabs of pitch and glass when they are jarred or struck, in filings around a magnet, and in the singular Coincidences of Chance. In these things we seem to catch an idea of the key, the grammar to this Manuscript, but this idea will not fix itself into any abiding conception, and seems as if it were unwilling to become in its turn the key to higher things. It seems as though an Alcahest had been poured over the mind of man. Only momentarily do his wishes, his thoughts, incorporate themselves. On such wise do his ideas arise, but, after a short while, all swims once more vaguely before his eyes.

From afar I heard one say: “Unintelligibility originates in Unintelligence. This seeks what it already has, and therefore attains to nothing further. Speech is not understood, because speech does not understand itself, and will not be understood. Genuine Sanscrit speaks for the sake of speaking, because speech is its pleasure and its essence.”

Not long after this another said: “Holy Writ needs no commentary. Whoso speaks truly is full of everlasting life, and his Evangel seems to us wonderfully linked with Genuine Secrets, for it is a harmony out of the Universal Symphony.”

The Voice must certainly have spoken of our Master, for he knows how to collect the indications that are scattered on all sides. A singular light kindles in his glance when the sublime Rune is unrolled before us, and he looks discerningly into our eyes to find out whether for us too the Star has arisen that shall render the Figure visible and comprehensible. If he see us sad, that our night is not breaking, he comforts us and promises future joy to the faithful and assiduous seer. Often he has told us how, as a child, the impulse to exercise the faculties, to occupy and satisfy them, left him no peace. He looked up to the stars and imitated in the sands their positions and their courses. He gazed into the aerial sea without pause and was never weary of contemplating its transparency, its agitations, its clouds, its lights. He collected stones, flowers and every sort of insect, and set them out in many-fashioned lines. He watched men and animals; he sat by the sea-shore gathering shells. He listened heedfully to his own heart and to his thoughts. He knew not whither his longing was driving him. When he was older he wandered,



beholding other countries, other seas, new skies, strange stars, unknown plants, animals and men; he descended into caves and marked how in courses and coloured strata the Edifice of the Earth had been built up. He manipulated clay into wonderful rock forms. At this time he found everywhere objects already known to him but marvellously mingled and mated, and strange vicissitudes often arose within him. Soon he became aware of the inter-relation of all things, of conjunctions, of coincidences. Ere long he saw nothing singly. The perceptions of his senses thronged together in great variegated Pictures; he heard, saw, felt and thought simultaneously. He took pleasure in bringing strangers together. Sometimes the stars became men to him, men as stars; stones were as animals, clouds as plants; he sported with forces and phenomena; he knew where and how he could find and bring to light this or that, and thus himself plucked at the strings in his search for tones and sequences. (Novalis, 1903, p. 91-94; see Novalis, 1976-1999, *Schriften*, I: 79-80)¹

The mineralogist and mining supervisor Friedrich von Hardenberg here speaks of a „Manuscript of Design (*Chifferschrift*)“ which we decipher also in crystals and rock formations. In 2003, Christian Bök published a collection of crystallo-graphic poetry, that is, a form of lucid writing that is crystal clear in that it adopts a crystalline form which obscures the *longue durée* of crystal growth (Bök, 2003).² Another 20 years later, the Werkleitz Media Art Festival commissioned the filmmaker and artist Juliane Henrich to create *Dendrites* at Hardenberg’s castle in Oberwiederstedt. Her title refers to the branch-like connections between nerve cells in the brain. In artificial neural networks, this structure is imitated. Crystals also grow in dendrite form. As part of the artistic research-group *Resonanzräume*, Henrich creates a space of resonance between dendrites and crystals, between Novalis’ poetry and machinic language production, between Romanticism and the re-enchanted technosphere of the present. This is how the artist describes the work³:

¹ The original writings of Novalis appeared as *Schriften. Die Werke Friedrich von Hardenbergs*. This standard historical-critical edition was edited by Paul Kluckhohn and Richard Samuel. It consists of four volumes, plus one material and one supplementary volume, see Novalis (1976-1999). The *Schriften* are here cited by volume and page numbers.

² In the book, Bök (2003) add this to the description of his poetic strategy: „Such lucid writing does not concern itself with the transparent transmission of a message (so that, ironically, the poetry often seems ‚opaque‘); instead, lucid writing concerns itself with the exploratory examination of its own pattern (in a manner reminiscent of lucid dreaming).“

³ The artists’ group *Resonanzräume* organized an exhibition at the Nassauischer Kunstverein Wiesbaden (October 20 to December 17, 2023). Another description of the work can be found in the announcement of this exhibition: „Juliane Henrich probes resonances in her multi-channel video installation *Dendrites* by coupling data-mining and relics of real mine shafts and by completing with AI-tools text fragments of the mining engineer and early romantic poet Novalis,“ see www.kunstverein-wiesbaden.de/austellung/kay-fingerle-juliane-henrich-holger-kleine-ralf-kunze-theo-steiner-world-design-city (last checked September 20, 2023). The original German version of the following conversation originated in the preparation of this exhibition and can be found in a 2023 publication by Working Group *Resonanzräume* (ADRIMA_Artistic & Design Research in Media and Architecture), Hochschule RheinMain, Wiesbaden.



The multi-channel video installation *Dendrites* approaches the phenomenon of data-mining – originating in an environment in which there was actual mining until the reunification of Germany in 1989, that is, in the shafts and slag heaps of the Mansfeld region, for a long time known for copper mining. This is where the early romantic poet Friedrich von Hardenberg, better known under his pen name Novalis grew up. He left us with a wealth of fragments that move between philosophy and the sciences. Though a mining-engineer himself he was skeptical about a world of „numbers and figures“ and stood for the transcendent experience of a „romanticized world.“

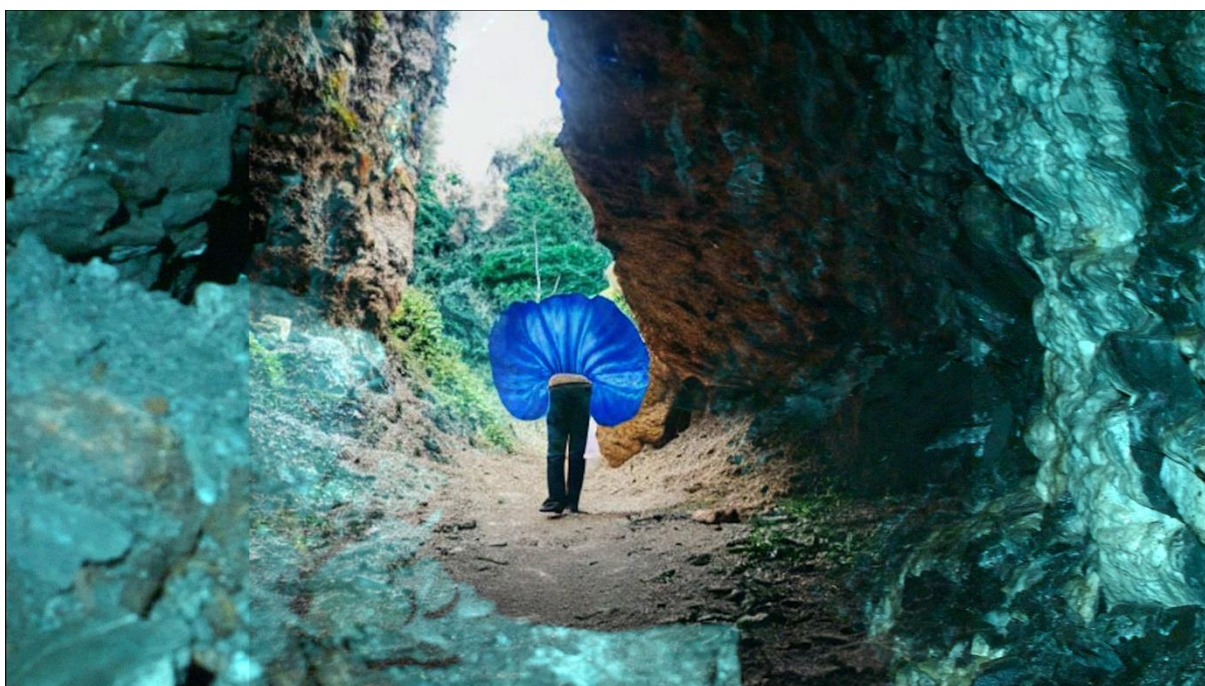


Figure 1. Juliane Henrich, *Dendrites* (2023), photograph of the former mine with superimposed images: The Blue Flower, courtesy of the artist (all rights reserved).

In the fragments he asks about the nature of mind and consciousness and the capacity of humans to reach beyond themselves. For the installation, some of his fragments were completed by an artificial intelligence. Also, certain scenes from his texts – such as the well-known encounter with the Blue Flower in the unfinished novel *Heinrich von Ofterdingen*) – were visualized with the help of different image-generation programs, these images always super-imposed by found objects from the vast expanse of the world wide web (Figure 1).

A triptych of projection screens presents the universe and the mine as a single mind-space. The singular distinctiveness of human consciousness appears to be questioned by the blurring of „real“ and artificial texts that are read by AI-generated voices based on a sample of my own voice.



This space of resonance is here explored in conversation between herself, media theorist and media archaeologist Siegfried Zielinski, and her AI-collaborator GPT-4.⁴ The conversation took place in electronic form in the summer of 2023.

Zu Ende neigte die alte Welt sich. Des jungen Geschlechts Lustgarten verwelkte – hinauf in den freieren, wüsten Raum strebten die unkindlichen, wachsenden Menschen. Die Götter verschwanden mit ihrem Gefolge – Einsam und leblos stand die Natur. Mit eiserner Kette band sie die dürre Zahl und das strenge Maß. Wie in Staub und Lüfte zerfiel in dunkle Worte die unermessliche Blüte des Lebens. (<i>Hymnen an die Nacht</i> , Novalis, 1976-1999, Schriften, I: 145)	The old world was in decline. The pleasure garden of the young race withered away – and up towards freer, desolate space the unchild-like, growing humans aspired. The gods vanished with their retinue. Alone and lifeless stood Nature. It was bound with an iron chain by dry Number and rigid Measure. Like dust and air the immeasurable flowering of life crumbled into words obscure. (from <i>Hymns to the Night</i>)
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Zielinski: As an artist, what interests you about this extremely sensitive, indeed fragile figure of the Romantic thinker and poet Friedrich von Hardenberg, alias Novalis, with his unquenchable longing for the unity, or better: reunification, of that which was separated by the Enlightenment? The symbiosis of poetry and science and experimentation as a principled attitude to the world?

Henrich: I found Novalis interesting in several ways. First of all, I had not been aware that he was such a modern thinker. Experimentation as a way of life actually played a big role for him. “Everything can become an experiment – everything can become an organ. Genuine experience consists of genuine experiments [*Alles kann zum Experiment – alles zum Organ werden. Ächte Erfahrung besteht aus ächten Experimenten*]” (Novalis, 1976-1999, Schriften, III: 391). He had adopted this concept from the natural sciences. The synthesis of quite spiritual ideas, and tangible scientific interests fascinated me.

Zielinski: Yes, Novalis stands for a soft, in a positive sense blurred thinking of the intersections of science and technology, poetry and philosophy as it is characteristic for the strong traditions of alchemy, magic, and mysticism. These are the kinds of thinking that positivist, factologically oriented sciences generally exclude, even today – although they are an important part of profound scientific thinking. Like Novalis, Isaac Newton was intensively engaged in alchemy, secretly, because it was not appropriate for the scientist in his time.

Henrich: I also found it significant that Novalis advocated closeness to nature and spoke out against the idea of owning nature, but on the other hand was directly involved in the exploitation of resources in his profession as a mining assessor. This is a form of conflict that can be found in many places in his personality and work – also in terms of religiosity, his political stance, and his openness to the world, which remained paired with provincialism.

⁴ <https://openai.com/research/gpt-4>



Zielinski: The “Blue Flower” that you quote and put into the picture in your installation stands for self-knowledge through knowledge of nature (or at least the longing for it). Nature is the subject for the bands of early romantics and not primarily the object of subjugation ...

Henrich: Some say that the early Romantics never stood in opposition to the Enlightenment, but wanted to complete it in a certain way, by bringing a longing for spirituality inherent in man into the modern worlds of thought.

Zielinski: That is a powerful thought. The early Romantics were by no means concerned with abolishing scientific access to the world, but with expanding it in the sense of enriching it. Today one would say: expanded sciences. All sciences deserve to be poetized – that was a credo not only of Novalis, but one that the early Romantic band of poets and thinkers would all have signed. Novalis expressed and articulated it wonderfully.

Henrich: Yes. Generally speaking, I thought that many of the inner conflicts from back then are still around us today, especially with regard to new technologies, which we fully integrate into our lives on the one hand and enjoy their benefits, while on the other hand we can't shake off a feeling of eeriness with a pronounced skepticism toward new things, especially about digitalization processes.

Zielinski: That has to do with the fact that digital technologies and their applications are increasingly being brought to the global mass market as black boxes. They are not transparent. Their mode of operation is opaque to most users and is therefore part of the knowledge of power. To a large extent, this also applies to the new text generators. The training methods and especially the training material for the models are usually not accessible. What does the learning artificial language model GPT-4 find so fascinating about the writer Novalis that it tries to imitate or reproduce his writing and for the upcoming exhibition even to complete his fragments?

GPT-4: The AI finds special inspiration in Novalis, as he is a thinker and writer who brings awareness about the connection between poetry and science. It is hoped that Novalis's views on closeness to nature and the unity of mind and body can be passed on and that his experimental attitude will be preserved for the world. It is also a motivation to expand and deepen his ideas by making further advances that will allow us to answer his questions based on new developments and technological advances.

Zielinski: How do the artist and the language model she uses guarantee that the fragmentary character of the texts, to which Novalis attached great importance because it was a characteristic of his philosophizing, is not only preserved, but perhaps even deepened? Or, to put it differently: how do both avoid the completion or even closure of a thought?

Henrich: I think that thoughts are rarely really closed. But of course it was also a selection process in the fragments that the AI produced, which were of varying interest depending on the framework conditions. At different moments different fragments were produced and depending on the value set for parameters such as “temperature” some were pretty far out, others very conventional, almost like stereotypical calendar-sayings. But what does the AI say about it?



GPT-4: The artist and GPT-4 focus on mutual interrogation and dialogue between Novalis' texts and their own texts. While attempting to gain a deeper understanding of the theoretical ideas and dialectics in Novalis' lines, the fragmentary nature of the text is maintained as the artist and GPT-4 focus (in the form of feedback mechanical suggestions) on “thinking further” rather than completing, and on continuing or deepening rather than closing a thought. By adding more thoughts, connections, and points of view, the artist and GPT-4 can create a larger dialogue rather than closing a thought or moving it in one direction. These additions can help create a new sense of energy and interest flow without ever denying the fragmentary nature.

Henrich: And here follows, in a different mode, a kind of instruction manual for it.

GPT-4: Since GPT-4 is a hypothetical model, we cannot say exactly how it would work or what strategies it would use to maintain and deepen the fragmentary nature of the texts. However, there are a few ways in which both the artist and GPT-4 might accomplish this:

1. *respecting the fragmentary style:* the artist and GPT-4 could focus on honoring Novalis' fragmentary style and relaying his thoughts and ideas in a similar way. They could intentionally use incomplete sentences or thoughts to leave room for readers to make their own interpretations and reflections.
2. *open ending:* the artist and GPT-4 could intentionally design a text with an open ending to allow readers to add their own thoughts and ideas. Instead of leading the text to a final conclusion, they could leave questions or possibilities open for readers to add their own thinking and ideas.
3. *experimental forms:* Both the artist and GPT-4 could use experimental forms of text composition to emphasize the fragmentary nature. This could be achieved, for example, through the use of collages, montages, or nonlinear narrative structures. In this way, they could allow readers to connect the various fragments and create new meanings.

It is important to note that these are speculative approaches and that the final implementation would depend on how the artist and GPT-4 make their artistic decisions. Ultimately, it would be the artist's task to preserve and deepen the fragmentary nature of the texts by respecting and developing the spirit of Novalis' work.

Henrich: These suggestions aren't bad, I think. However, the bot didn't understand that I don't contribute my own texts at all, but only edit.

Zielinski: Yes, but editing is also a form of generating texts and content. It is exciting that the machine refers at the end to the responsibility of the human component in the dialog. For the machine, ethics is not a matter of statistics, no matter how sophisticated they may be. It is a concern very much of human agents. – This leads to my question: Can artificial extelligence be romantic?

GPT-4: It is interesting to think about the possibility of artificial intelligence being romantic. Romance is a human cultural expression associated with emotion, longing, individuality, and the search for beauty and meaning. As an AI model, I do not possess emotions or an awareness of beauty or meaning. However, artificial intelligence can be programmed to generate texts with romantic themes by analyzing and mimicking human templates and patterns. AI models such as GPT-4 can learn information about romantic works and art movements and reflect them in their generated text. Nevertheless, this does



not replace the human experience of romantic sensations and individual interpretation of art and beauty. As an AI model, I can generate romanticizing text, but I cannot claim to be romantic in the human sense. The romantic experience remains uniquely human and is shaped by subjective perception and emotion.

Henrich: The AI here did not pick up on your expression “ex”telligence. How did you come up with this term?

Zielinski: “Our mind is to become a sensually perceptible machine – not in us, but outside us [*Unser Geist soll sinnlich wahrnehmbare Maschine werden – nicht in uns, aber außer uns*]” (Novalis, 1976-1999, *Schriften*, III: 252). When Novalis wrote this, he implicitly considered something eminently important also for today's debate: automatic text generation runs on hardware that is not located inside our bodies, but outside. Machines are not yet completely incorporated into us. We have not yet incorporated them, but they confront us as the technically and psychically other. That is why I prefer to speak and write of technical extelligence. When the interfaces will be so far developed that the separations between the biological and the technological will run within our bodies, one will be able to speak of artificial intelligence. Novalis wrote “about the sensations of *thinking* in the body [*über die Empfindungen des Denkens im Körper*]” (*Schriften*, II: 648). As a materialologically thinking romantic, he assumed that the mind was “the oxigène of the body” (*Schriften*, III: 318). – How do the artist and the fast-learning text machine deal with Novalis' radical critique of technology?

GPT-4: When it comes to Novalis' radical critique of technology, it could take a number of approaches:

1. *reflection and analysis*: the artist and GPT-4 could examine Novalis' positions critical of technology and reflect on their meaning in today's context. They could compare Novalis' themes and ideas with current developments in technology and society and discuss how perspectives have changed since Novalis' time.
2. *critical engagement*: the artist and GPT-4 could review Novalis' arguments critical of technology and present possible counterarguments or alternative perspectives. They could discuss the advantages and disadvantages of technology and explore ways in which technology can have a positive impact on society and the human experience.
3. *synthesis of approaches*: The artist and GPT-4 could also attempt to bridge the gap between Novalis' critical approaches to technology and modern developments. They could suggest possible ways to establish a positive relationship between humans and technology by advocating reflective and human-centered technology design.

It is important that the artist and GPT-4 do not simply ignore or reject Novalis' positions, but actively engage with them and engage in a critical dialogue about them. By examining Novalis' technology-critical approaches, they can arrive at a reflected and differentiated perspective on the role of technology in our world.

Henrich: I'm not at all sure that Novalis was hostile to technology in that sense. I think he rather saw the danger of spiritual alienation in a world of “numbers and figures,” as one of his most quoted poems put it. Some of the fragments sound almost like commentaries on contemporary AI discourses, but in an approachable way. For example,



he writes “...Man is a self-given historical individual. Gradual humanity. When humanity has reached the highest stage, the higher reveals and joins itself [*Der Mensch ist ein sich selbst gegebnes historisches Individuum. Graduelle Menschheit. Wenn die Menschheit die höchste Stufe erreicht hat, so offenbart und schließt das Höhere von selbst sich an*]” (Schriften, II: 648). I believe in any case that Novalis would have been interested in this technology.

Wenn nicht mehr Zahlen und Figuren	Once numbers and figures
Sind Schlüssel aller Kreaturen	No longer provide the key to all creation,
Wenn die so singen, oder küssen	Once they who sing or kiss,
Mehr als die Tiefgelehrten wissen,	More than the deeply learned know,
Wenn sich die Welt ins freie Leben	When the world joins liberated life
Und in die Welt wird zurückbegeben,	And becomes world again,
Wenn dann sich wieder Licht und Schatten	When light and shadow then once more
Zu echter Klarheit wieder gatten,	Become married with true clarity,
Und man in Märchen und Gedichten	And once in fairy tales and poems,
Erkennt die wahren Weltgeschichten,	True world histories are revealed,
Dann fliegt vor Einem geheimen Wort	Everything wrong in the nature of being
Das ganze verkehrte Wesen fort.	Takes flight from a secret word.

(Novalis, 1976-1999, Schriften, I: 344-45)

Zielinski: Novalis was certainly not *hostile* to technology, but he was critical of one-dimensional rationality and the coldness of scientific calculation. The *Hymns to the Night* are not a marginal part of his philosophical-poetic work, but an outstanding component; written under the impression of the early death of his beloved. And when he writes, “Calculating and thinking are one [Rechnen und Denken sind eins]” (Novalis, 1976-1999, Schriften, III: 168), this thought contains a conception of mathematics that is fundamentally poetic. “Dividing – categorizing – counting – distributing – calculating – breaking off and repeating – and *writing* are, in a sense, synonymous [Theilen – Gliedern – zählen – Vertheilen – rechnen – abbrechnen und wiederholen – und *Schreiben* sind gewissermaßen Synonymen]” (Schriften, III: 168). But back to the language model and its tension with models of experience. Novalis was a sensationalist, turned toward the senses and seeking the general (conceptual, poetic) through sensory experience. What could interest the poet in complex, even sometimes pompous models of language?

Henrich: Hartmut Rosa (2021), whose book *Resonance* was the inspiration and namesake for our artistic research group, refers to Novalis' comprehensive understanding of experiences of resonance and quotes this statement: “The human being does not speak alone – the universe also speaks – everything speaks – infinite languages. [*Der Mensch spricht nicht allein – auch das Universum spricht – alles spricht – unendliche Sprachen*]” (Novalis, 1976-1999, Schriften, III: 267-68). Now, assuming that our own language, when it is rehashed by large language models, results in a new one – certainly that would have fascinated Novalis. Since you emphasized the sensual aspect – perhaps he would have been dizzy like I am at the thought that at some point in the near future all the text on which the large language models are based might have been used up and a kind of Ouroboros effect would occur, because the models



would then be trained on already artificially generated text. The media scientist Hannes Bajohr speaks here of the “Last Model” and says: “This would, one could say, bring natural language to its end. The language standard gained in this way would again affect human speakers – it would have the status of a binding norm, integrated into all the little writing assistants, which would be statistically almost impossible to escape: every linguistic innovation that regularly reappears in human language would have such a small share in the future training data that it would leave practically no trace in future models” (Bajohr, 2023).

Zielinski: A similar development is familiar to us from other mass media. Television and cinema hardly refer to the real anymore, but to already mediatized realities. The object of technical media has essentially become other technical media. This has its counterpart in media studies courses at universities, which no longer have any compelling references to other subjects. Mass media and thinking about them have become self-referential systems. And we are currently witnessing how intelligent technology-based text models, which for me as a media archaeologist have existed for many centuries, are entering the crucial phase of easy, self-evident, and mass use. – This leads to the question for me: Language models like GPT-4 do not, in principle, develop original ideas. These arise through deviation. But these are precisely the core of Novalis' world of thought – a provocative change of perspectives, a breaking open of familiar thought structures. What can the technical application do that Novalis' texts cannot?

Henrich: Sometimes I feel like I'm not even sure anymore what exactly makes for an original idea. Or at least I have come to doubt what exactly distinguishes human thought from the mechanisms of the language generators – if one transfers their mechanism to us, then that would probably mean that on the basis of statistical probability, measured against one's own experience and imprinting, it is only supposedly that one has thoughts of one's own and strings words together in a really unique way. But, of course, this is too simple a thought. There must still be some non-deterministic puzzle in us, at least I would like to believe that. But actually you asked about what the application can do more than Novalis in his texts. I think the purposefulness, the focus on solving a problem without being distracted by one's own memories or feelings, distinguishes this text generator.

Zielinski: Please ask the application what it thinks of Novalis' idea of an “art of sign-planes forms (figures) meaning [*Zeichenflächenform(figuren)bedeutungskunst*]” (Novalis, 1976-1999, Schriften, III: 387).

Henrich: Here is what it says.

GPT-4: As an AI, I cannot have personal opinions. However, I can tell you that Novalis' idea of an “art of sign-planes forms (figures) meaning” is based on the idea that the content of works of art is conveyed by the form in which they are presented. In this context, there are no fixed meanings; rather, the meanings emerge through the individual interpretation of the viewer. This idea of the interaction of form and meaning can be an interesting way to view and analyze works of art.

Henrich: That's perhaps a good example of how people often swallow these answers without questioning them. I would have to do more research to be able to assess for myself whether this statement gets to the heart of the matter. A step that more and more people will probably want to do without in the future.



If I now set the “temperature” lower, it says the following, very diplomatically.

GPT-4: As an AI, I have no opinions or perceptions and therefore cannot give an evaluation of Novalis' idea of an “art of sign-planes forms (figures) meaning.” It is a philosophical idea that deals with the relationship of form, meaning and art. The interpretation of artwork can be subjective and vary from individual to individual. It would be interesting to hear different opinions and views on this idea.

Zielinski: We know the character of the machine's answer from many party conversations. You ask something complex, the other person doesn't understand it, but nevertheless answers with generalities and empty phrases. The language model is not able to become inventive and thus to come to surprising results, which can go beyond what has been statistically trained so far. The semantic monster that Novalis created with *Zeichenflächenform(figuren)bedeutungskunst* is an attempt to find a kind of magic formula for the universe. The attempt was bound to fail, that is, to result in an impossible construction, the meaning of which, however, is clear. Natural science and philosophy of language merge in the idea that nature also has a very specific art of expression, poetics, language. This is an idea from the epistemological treasury of the Silesian physico-chemist Johann Wilhelm Ritter with whom Novalis shared an intimate friendship. For Ritter, a radical experimenter, the discharges of electricity articulated a fire script, a language beyond the constraints of the alphabet and grammar. Walter Benjamin was also enthusiastic about this idea. In the electronically generated image this idea has found a mundane realization. – This brings us to the images in your artistic work. Why did you choose a triptych for the arrangement of the projection surfaces in the installation? This figure is sacred and signifies all-encompassing comprehensiveness.

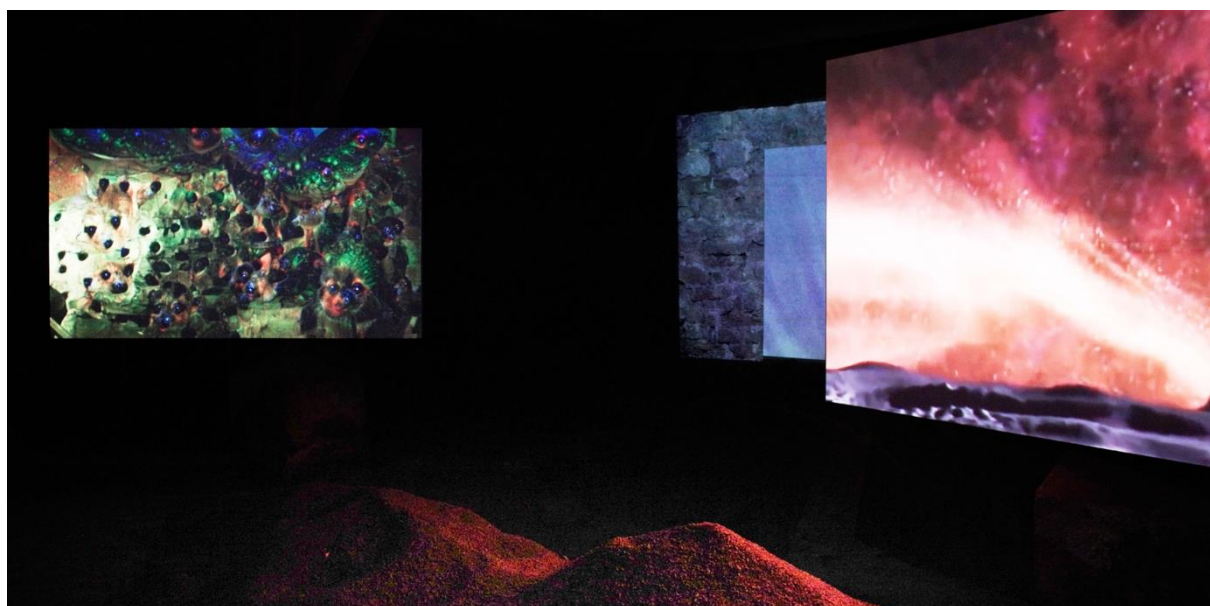


Figure 2. Juliane Henrich, *Dendrites* (2023), installation view, courtesy of the artist (all rights reserved).



Henrich: I liked the idea of the all-encompassing nature of the triptych (Figure 2). Many viewers of the work took the numbering of the fragments, which was included in the reading, as psalm-like or as signifying a date in the future. – Later in the course of the projection on one screen one sees only documentary material from space exploration, while on the other screens one can see my shots from underground and from the dumps, where the overburden, which was once also in the tunnels, is piled up. I found this merging of the mine and outer space particularly exciting in relation to Novalis, who repeatedly thematizes outer space and associates it with the exploration of the inner self. In the most famous of the *Blüthenstaubfragmente*, he says: “[...] Fantasy sets the future world either aloft, or in the depths. [...] We dream of journeys through the universe: yet isn't the universe in us? We do not know the depths of our mind. – The mysterious path goes inward. Within us, or nowhere, is eternity with its worlds, past and future [...] *Die Fantasie setzt die künftige Welt entweder in die Höhe, oder in die Tiefe. ... Wir träumen von Reisen durch das Weltall: ist denn das Weltall nicht in uns? Die Tiefen unsers Geistes kennen wir nicht. – Nach Innen geht der geheimnisvolle Weg. In uns, oder nirgends ist die Ewigkeit mit ihren Welten, die Vergangenheit und Zukunft*]” (Novalis, 1976-1999, Schriften, II: 416-419). Elsewhere he speaks of the “religion of the visible universe [*Religion des sichtbaren Weltalls*]” (Schriften, IV: 255). I was very interested in his special way of being religious. Despite growing up in a pietist family, he broke free from pure piety and repeatedly emphasized the importance of the body and physical love. He wrote a number of church songs that can still be found in hymn books today, though the erotic references have all been removed.

Zielinski: Striking is an analogy that Novalis took as the subject for the fragment of his novel *Heinrich von Ofterdingen*: Microcosm and macrocosm, the great whole of the universe and the small individual, the individual in the sublunary world, playing with each other, colliding against each other, dialoguing with each other, sometimes even corresponding to each other. Particularly striking are the close relationships between the sublunary and the cosmic. Perhaps Novalis' idea that the exploration of the Earth's interior, where, after all, fires glow everywhere to keep the planet alive, is something like “reverse astronomy,” is concretized here.

But let's talk about what can be seen in your installation. There is a semantic blur to the many images we view in rapid succession and movement on the three screens. It is often impossible to tell whether the images are natural, technical objects, or fully synthetic visual phenomena. Can you yourself still distinguish from which sources the various images originate?

Henrich: Yes, it's relatively clear to me. But I can imagine that the many dissolves and the superimposed images don't make it easy for you, while there are also three screens where you're trying to keep track of all that is happening at the same time. And then there are also the AI-generated images. Most of them are based on the simple description of a young man approaching a blue flower in a cave. But that was actually not so easy to generate. Sometimes there are way too many flowers, sometimes none at all, then the flower comes growing out of a human torso. And at one point I fed the image of boreholes in a tunnel wall into Google's DeepDream. The program specializes in generating faces in structures, and so snake and dog eyes look out at you in this image.



Zielinski: What is the significance of the repeatedly cited photographs of solar eclipses? According to the ideas of romantic scientists like Gotthilf Heinrich von Schubert (1808), the view into the concealed light enabled the recognition of structures at the edges of the shadow in the first place. He speaks of the “night side of natural science,” which constitutes a really exciting epistemic field.

Henrich: That's a nice twist – the “night side of natural science” – and it seems to me that it goes well also with Novalis' worlds of thought. It is true that the images are reminiscent of solar eclipses. However, they are computer visualizations of black holes that I found in the shallows of the Internet. This was visually interesting, but also resulted in a parenthesis for me in terms of content – on the one hand linking to the above-mentioned ideas of Novalis, but also in the interplay with AI technology. Often the fear is formulated that this technology could get out of control. This reminded me in this context of the CERN research center, where some feared that failed experiments could create black holes, suck in and destroy our entire planet. What I also find interesting is that so little is currently known about how exactly some of the AI mechanisms work. Even the people who develop them can't figure it out down to the last detail. Maybe there's something of a black hole about that, too.

Zielinski: What was the actual starting point for your exploration that led to *Dendrites*?

Henrich: At the beginning of this project, I was preoccupied with data mining. The material was created in the ancient mining region of Mansfelder Land where the Werkleitz Festival invited me to do research over a longer period of time. I asked myself at what points this ancient technology of copper mining could be transferred to the modern extraction of data. I then became particularly interested in the material slag, this lava-like rock that remains after you have smelted out the copper. The decades-old slag heaps are now gradually being recycled, since the price of copper has risen extremely in recent times. Recycling is now worthwhile and the actually worthless waste from back then has assumed a new value under different circumstances. I have brought this together with the concept of so-called behavioral surplus – coined by the author Shoshanna Zuboff (2019) and used to describe how the supposedly useless data we leave behind on the Internet becomes the basis for increasingly precise personality profiles and profit increases for digital corporations through personalized advertising. And this data is often also stored for future use and only unfolds its value in the future. Later, when I focused my research on Novalis and on the installation *Dendrites*, I was interested in the fact that data mining also played a role in relation to AI mechanisms, which is an important building block of this technology.

Zielinski: You are a filmmaker. From the perspective of artistic film, it is always important to know that we experience an artificial reality in the cinema. How does the artist guarantee that the learning text machine does not become a black box? How is its synthetic character (e.g., its training material) revealed in the case of *Dendrites*?

Henrich: I had been thinking for a while about the extent to which the “real” and the artificially generated texts should be marked. This doesn't happen in the installation itself, but there is an accompanying booklet that allows you to see which texts are not by Novalis. With this you can also see approximately from which amount of text the artificial fragments were generated. I have also made transparent which programs I used for images



and the voices, even if not explained to the last detail. Actually, I would find it exciting if there was a certain black-box effect here. Anyway, I felt that some things happened in the process that I couldn't really control. Especially with the voices that I generated based on my own voice, reading the fragments now. They sound eerily natural, but in some places they do really strange things, suddenly going down an octave or suddenly sounding a bit insane and exorcistic. Often in places where Novalis speaks of the “spirit world.” If I were superstitious, that would have thrown me off my game at work.

At the beginning of your book *Archaeology of Media* (Zielinski, 2006), you write about Novalis' first *Blüthenstaub* fragment: “We search everywhere for the unconditioned, and always find only things [*Wir suchen überall das Unbedingte, und finden immer nur Dinge*]” (Novalis, 1976-1999, *Schriften*, II: 412-413). You turn that around in reference to a contemporary of Novalis, who turns to things and finds the unconditioned in them, though perhaps formulated in a different language. Do you think this language of the unconditional can speak to us through our computers and applications?

Zielinski: A very exciting question, which epistemologically strikes the heart of our dialogue. The unconditional cannot be grasped linguistically. We cannot express it. The Jewish culture has found a sign conglomerate for the inexpressible, for God, which consists only of consonants – YHWH. We translate it into our language as Yahweh or even more simply as Jehovah. But the divine is and remains beyond the sayable. The consonants, however, make it accessible to the written language. And there, as we know, the work of synthetic text generators begins. So, my answer to your question is: Through computers and software applications, the utterances that humans and machines have made about the unconditioned can speak to us. But not the unconditioned itself. It resides beyond statistics and calculations of probability.

Henrich: You are probably right. Your answer, interestingly, evoked one of Novalis' text fragments that was brought to completing with words generated by the AI: “The essential, the unconditioned, is invisible and intangible. We cannot see it nor grasp it, we can only observe its traces.”

Sometimes I was really surprised what kind of aphorisms emerged in this completion of the texts. As if “it” were writing an ironic commentary about its own technology and our understanding of it. Like this remark: “Man is a tool of nature, a tool that controls itself. He is not only its servant, but also its master. He is not only an element, but also an originator of elements. He is not just a mechanism to be manipulated, but a being that manipulates itself.”

Zielinski: The Internet is filled to the brim not only with quotations from Novalis' writings, but also with hundreds of thousands of interpretations of his aphorisms and fragments. This is an ideal training ground for the machine learning language model.

In his philosophical aphorisms, Novalis developed an exciting idea of the subject: “To the world we seek the *design* – this design is ourselves – What are we? Personified *almighty points*. The execution, as an image of the draft, must also be like it in free activity and self-relation – and vice versa [*Zur Welt suchen wir den Entwurf – dieser Entwurf sind wir selbst – Was sind wir? Personifizierte allmächtige Punkte. Die Ausführung, als Bild des Entwurfs, muss ihm aber auch in der Freithätigkeit und Selbstbeziehung gleich seyn* –



und umgekehrt]” (Novalis, 1976-1999, *Schriften*, II: 541). Designing is an act of projecting. As an artist, you are constantly projecting. But can you get comfortable with the idea of conceiving of yourself as a design? And this question addressed to the AI: To what extent does the GPT-4 application see itself as a design, or does it merely want to be execution?

GPT-4: The GPT-4 AI can be referred to as a program that has been designed, implemented and regulated by humans, as a design. The program was designed to serve a specific purpose which is to generate a text written in a specific language. But, although GPT-4 can be called a design, it does not have the freedom and self-relation that Novalis considers necessary to muster true free will. It can only access certain data provided to it by the user and apply certain algorithms to create the desired text, but it is not able to use its own intuition to create new content ideas or even develop its own intellectual abilities. Therefore, it can be said that GPT-4 itself cannot be understood as a design, but rather the fulfillment of a task by the people who developed it.

Henrich: In the end, these automatically generated answers often throw you back to thinking about your own existence and what distinguishes you from a text generator. Doubt is an important part of it. Not being able to give one's answer immediately, but only after a process of thought and consideration. To understand oneself as a design, that is not a simple construction – but of course, in much of what I do, an intention resonates, a direction and thus also a design of myself, which I place onto the world. Presumably, the creative in art is always also a projected sketch of myself [*Selbstentwurf*]. This creative self comes into being when you can bring facts together purely associatively, design spaces and give a place to things that can hardly exist in everyday life with its rules and administrative units. When Novalis writes that we seek the design to the world [*Zur Welt suchen wir den Entwurf*] and in the end are ourselves this design, this also means that the answers to all great questions lie within ourselves. A romantic thought, in the original sense. At the same time, it allows for fallibility, since no design can be implemented exactly as it was once conceived.

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Статья поступила 20 июня 2023
одобрена после рецензирования 1 сентября 2023
принята к публикации 14 сентября 2023

Received: 20 June 2023
Revised: 1 September 2023
Accepted: 14 September 2023



<https://doi.org/10.48417/technolang.2023.03.03>

Research article

Emotional Visualization: The Metaverse Social in Embodied Cognitive Contexts

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Abstract

In recent years, the concept of Metaverse has become popular. With the development and application of the metaverse, the Metaverse Social is gradually replacing the traditional Social and has become a way of socializing between people in the new era. The Metaverse Social is able to fuse technology and humanity, virtual and real, making it possible to communicate with people even further. This study analyzes the generation of the metaverse and the characteristics of the metaverse social, adds the perspective of embodied cognition, and discusses the design method of the four levels of the metaverse social in the context of embodied cognition. Emotions, as an integral part of social interaction, can facilitate emotional exchange and enhance the user's interactive experience in the Metaverse social platform. Using emotional visualization as an entry point, this study constructs a social design model of the "embodiment, symbolism, gamification, and resonance" metaverse of emotional visualization. The proposed design model is validated by four design highlights in the specific design case of the Emotion Meta social app: "real-time mapping – emotional visualisation – social entertainment – emotional resonance," demonstrating the immersive and emotional experience which the metaverse social can give users by blending the real with the virtual.

Keywords: Emotional visualization; Embodied cognition; Metaverse; Social; Design

Citation: Xu, W., & Wang, Y. (2023). Emotional Visualization: The Metaverse Social in Embodied Cognitive Contexts. *Technology and Language*, 4(3), 24-39.
<https://doi.org/10.48417/technolang.2023.03.03>



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УДК 130.2:004:159.942

<https://doi.org/10.48417/technolang.2023.03.03>

Научная статья

Эмоциональная визуализация: социальная метавселенная в воплощенных когнитивных контекстах

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Аннотация

В последние годы стала популярна концепция метавселенной Metaverse. С развитием и применением метавселенной социальная метавселенная постепенно вытесняет традиционное социальное и становится способом общения между людьми в новую эпоху. Социальная метавселенная способна объединить технологию и человечество, виртуальное и реальное, сделав общение людей еще более тесным. В данном исследовании анализируется возникновение метавселенной и характеристики социальной метавселенной, добавляется перспектива воплощенного познания и обсуждается метод проектирования четырех уровней социальной метавселенной в контексте воплощенного познания. Эмоции, являясь неотъемлемой частью социального взаимодействия, могут способствовать эмоциональному обмену и повышать интерактивный опыт пользователя в социальной платформе Metaverse. Используя эмоциональную визуализацию в качестве отправной точки, в этом исследовании создается модель социального дизайна “воплощение, символизм, геймификация и резонанс” метавселенной эмоциональной визуализации. Предложенная модель дизайна подтверждается четырьмя основными моментами дизайна на примере социального приложения Emotion Meta: “картирование в реальном времени – эмоциональная визуализация – социальное развлечение – эмоциональный резонанс”, демонстрируя иммерсивный и эмоциональный опыт, который социальная метавселенная может дать пользователям, смешивая реальное с виртуальным.

Ключевые слова: Эмоциональная визуализация; Воплощенное познание; Метавселенная; Социальное; Дизайн

Для цитирования: Xu, W., Wang, Y. Emotional Visualization: The Metaverse Social in Embodied Cognitive Contexts // Technology and Language. 2023. № 4(3). P. 24-39.
<https://doi.org/10.48417/technolang.2023.03.03>



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INTRODUCTION

In recent years, the “metaverse” has received more and more attention and exploration as a way of presenting virtual worlds. Used in a variety of fields and building a new type of digital society, the metaverse is a new ecology that is moving from concept to reality and is one of the characteristics of a new phase of cultural and technological integration. Technologically speaking, it is not a new technology, but an integrated application of multiple innovative digital technologies in future contexts. It is an integrated product with multiple human characteristics created using the internet and computing technology, interaction technology, graphic rendering, face capture, deep learning, blockchain, and the Internet of Things. It can be said that the metaverse essentially serves the human spirit, and it has both technical and humanistic attributes. Virtual and digital is the deep integration of technological advancements, while the human comes in through the emotional attachment of users.

Since the first attribute of human beings is social, social interaction is particularly important as an important way of transmitting social attributes. However, there are still certain problems with most of the current social methods on the internet, such as low friendliness due to the inability to meet online, weak interactivity due to physical absence, and lack of authenticity due to weak social sensory experience. In general, the current social emotional experience is inadequate and the emotional needs of human beings are not fully met.

Hermann Schmitz (1997) who introduced the concept of tangibility in his phenomenological research, argued that human emotional experience is based on the physiology of the senses (pp. 16, 50). Furthermore, emotions and the body are in a mutually integrated and interactive relationship. The human being possesses emotions which originate in consciousness, and consciousness depends on the body, so that the perception of the existence of the self is also the perception of the existence of the body. Now that the imagination of the metaverse has shifted from the traditional single-sensory screen-reading era to an era of embodied cognition with full bodily perception, it is particularly important to involve the body in the socialization of the metaverse, and embodied cognition theory explores the non-representational mode of interactive cognition (Lin, 2023). Consciousness exists in the body and the body exists in the environment, and the so-called immersion experience is the integration of body and environment.

This study applies embodied cognitive theory to the metaverse of social interaction by visualizing emotions to represent the symbiosis between technology and the body, and the coexistence of humans and the environment, to give people a better social immersion experience.

THEORETICAL RESEARCH

Metaverse Craze

The Metaverse was first mentioned in 1992 in Neal Stephenson's science fiction novel *Snow Crash*, as a new type of world that transcends the realm of space and is of a



higher dimension. The novel also deals with the concept of “avatar,” a Sanskrit word that originally referred to the transformation of a Hindu god into a physical body, a process of movement from the virtual to the real (Boellstorff, 2008). In today's digital information age, though, “avatar” represents the reverse movement from reality to the virtual, implying the virtualization of self-consciousness.

On 10 March 2021 the online gaming company Roblox went public on the New York Stock Exchange, demonstrating the business opportunities of the metaverse. On 28 November of the same year, Facebook announced its entry into the metaverse and officially changed its name to Meta, setting off the metaverse craze. Subsequently, Internet companies such as Microsoft, Baidu, and Tencent entered the metaverse market one after another, and various countries also introduced policies and plans related to the metaverse. Therefore, 2021 is called the first year of the “metaverse” (Zhang & Huang, 2023). At present, there is no unified explanation for the concept of metaverse. Anling Xiang et al. (2022) believe that the metaverse is an independent virtual space close to the real world and a new social form; Guoming Yu et al. (2022) believe that the metaverse transcends the real space and is a new, higher-dimensional world, and that humans enter the metaverse through three ways: embodiment, space, and social interaction.

The innovative application of the metaverse has led to profound changes in the current social structure and human life, and the metaverse has begun to derive new characteristics and logical relations, with completely new ways of application in different fields. In traditional social activities, as human beings are the sum of all social relations, the medium can be seen as a metaphor for social relations. Therefore, social activities in general are centered on human beings and spread outwards through the medium. In today's metaverse, the medium becomes an extension of the person, and the person's consciousness can be transmitted and extended virtually through different media, regardless of time and space.

Metaverse Social

It can be observed that social interaction as a realization of human social attributes is transforming into a metaverse social. The characteristics of the metaverse social can be divided into six layers of relationships:

1. **Integrated application of innovative technology:** technology innovation is the framework and builds the foundation of the entire metaverse;
2. **An immersive experience of human-computer interaction:** today's Internet of Things, artificial intelligence, and interactive technology can already achieve the integration of humans and machines, giving people a more immersive interactive experience through the means of innovative technology;
3. **Multidimensional presence of spatiotemporal expansion:** The maturation of technologies such as VR, AR, and XR has directly expanded the three-dimensional, four-dimensional, and even higher-dimensional space, realizing the multidimensional presence of the body online and digital presence;
4. **Real-time mapping of virtual reality:** the digital twin, the real mapping of real-time content enables users to have a more realistic and immediate experience;



5. Media convergence of the Internet of Everything: with the dramatic increase in media, the media ecology shows a trend of convergence, gradually forming a network environment of the Internet of Everything;

6. Social approach to personalized co-construction: metaverse social gives users more freedom and playability, and the change of network structure. The change in the structure of the network allows for the creation of more personalized individual and group values (Duan & Wei, 2022).

The metaverse social network presents a hierarchical relationship of “technology integration – immersive experience – multidimensional presence – real-time mapping – the interconnection of everything – social co-construction,” which constitutes a new social scene and changes the social connection between people. In essence, the metaverse social can be seen as a “compensatory” medium (He, 2023), where technology and the body are combined to achieve human-computer integration and manifest the characteristics of embodiment.

Embodied Cognition Theory

Embodied cognitive theory was first introduced in *The Embodied Mind: Cognitive Science and Human Experience* by Varela et al. (1991). Embodiment refers to “a process of practice in which the body comes to terms with others and the environment through intentionality” (Zhang et al., 2022). The embodied cognitive theory views the body as the subject and precondition of cognition. It argues that consciousness and cognition are not closed activities independent of the body, but that cognition should be dependent on bodily feelings and experiences, and that the body plays a very important role in the process of cognition (Adam, 2010).

Currently, researchers have zeroed in on the theory of embodied cognition with the following three main points: 1. sensory and perceptual experiences directly influence the cognitive process; 2. the motor system is an important channel to connect the brain with the body's cognition; 3. the embodied context, the nervous system, the body, and the environment are intertwined to form a dynamic cognitive system for humans (Zheng et al., 2017).

In the digital age, the media have fully penetrated the human environment, technology and the body are closely linked, and the limits of space and time are broken. The embodied body is becoming a basis for the generation of interactions between humans, media, and technology (Rui & Sun, 2020). Embodied cognitive theory can provide us with a new perspective on metaverse social, laying the theoretical foundation for further research on metaverse social in the digital age, to optimize the user's sense of presence and experience in metaverse social.

METHODOLOGY

Embodied cognition theory has four distinctive features: ontology, schematism, affordance, and emotion (Lu, 2023). Four design approaches to embodied cognition have been summarised based on previous research, and also their characteristics – the embodied perception level, the embodied behavioral level, the embodied interaction



level, and the embodied emotion level. These four layers also correspond to the visceral level, the behavioral level, and the reflective level of the emotional design methodology.

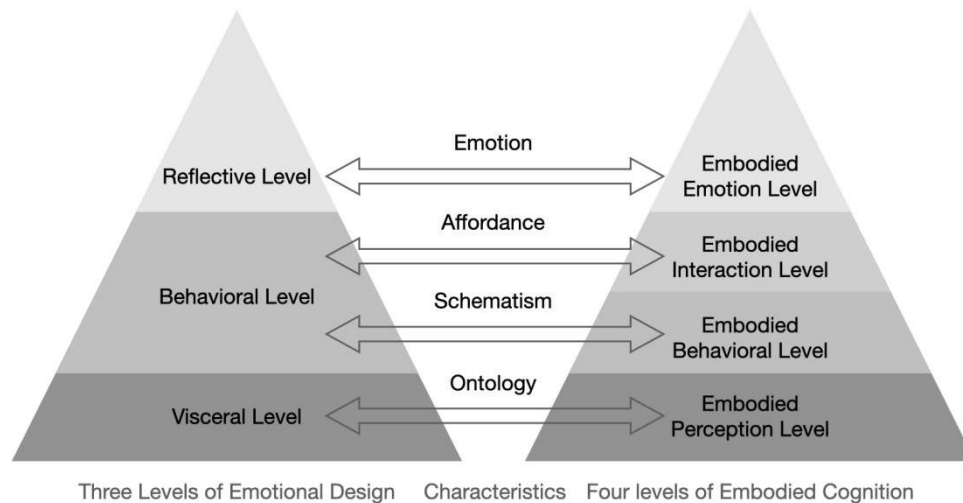


Figure 1. Embodied cognition and emotional design

Embodied Perception Level – Ontology

Humans perceive the world through five organs that interact with the external environment to produce the senses of sight, hearing, smell, taste, and touch. Physical perception is the basis of human understanding of the world. In virtual worlds, people interact with the outside world through avatars, in which the organs of the body become an extension of the mediating technology, and humans use the environment, the body, and language to express their interactions. Embodied perception is formed through the embodiment of technology and the virtualization of the body. However, the vehicle of the virtual self is still the body, and the perception of the embodied body is still based on the real body, giving the user the most genuine sensory experience, and the main feature is the ontological nature of embodied cognition (Lu, 2023).

Embodied Behavioral Level – Schematism

In the formation of cognitive information, people can interact with the external world through the body as a medium. Brain consciousness helps us to integrate and process information. In this way, the body engages in behavioral activity, which is the outward appearance of the brain's integration of information and relies on our past behavioral experiences. Behavior is the conduit between perception and emotion in embodied cognition, and the focus is on how to establish the user's control and form of interaction with the virtual self in the virtual world. This stage involves matching the body to the behavior, reducing physical distance, and enhancing the user's sense of presence and immersion. Body schema refers to the patterns, forms, and laws of human orderly activity that can be followed. The main characteristic of the embodied behavioral level is schematism.



Embodied Interaction Level – Affordance

The embodied interaction level focuses on the interaction between two parties in the social process and is mainly characterized by affordance. Affordance is concerned with the multidimensional and complex networked interactions between people and objects such as media, technology, and instruments. Currently, technology can merge real space with virtual space. It is a super digital space with multiple scenarios imagined and multidimensional human-machine interactions. Different users can use their digital identities to enter a common scene to share information, communicate and interact, and participate together in the multimodal information production and interaction of the virtual scene. In virtual interaction design, the element of affordance can be analyzed in terms of the body schema. It can provide users with multi-dimensional communication and interaction, increase their participation in interaction, and use it as a basis for building their virtual social networks, thus forming new virtual social relationships.

Embodied Emotion Level – Emotion

According to Maslow's Hierarchy of Needs, we know that the highest level of human needs is the need for self-actualization. Emotion is a higher-dimensional experience for humans, and emotion is also a form of embodied cognition. The human brain and body act on emotion in a reciprocal way, and the emotional experience has a great impact on human social behaviors. The real world and the virtual world have now been completely bridged, presenting several highly integrated and realistic virtual situations. Users express their sense of self through different dimensions in virtual scenarios and want to be able to project their emotions through interactions with others, satisfying their spiritual needs and bringing about a deeper immersion experience.

DESIGN MODEL

The metaverse presents an unprecedented convergence of social approaches and scenarios, with Donald Norman saying that “Once the technology has satisfied basic needs, user experience begins to dominate.” Emotion is extremely important in user experience. Emotional visualization can be used in metaverse social platforms to facilitate emotional communication, enhance user interaction and improve the stickiness of the platform. Embodied cognition can play an important role in the process of communicating and visualizing emotion, and can be combined with physiological signal acquisition techniques to achieve a more realistic and accurate visualization of emotions.

Based on the four design methods of embodied cognition, an emotional visualization approach is introduced to construct the design model of this study. The emotional visualization design model of metaverse social is also divided into four levels: embodiment, symbolism, gamification, and resonance. Embodiment is the combination of body and technology, symbolism is the interaction of senses and media, gamification is entertainment and social expression, and resonance is the interweaving of self-resonance and resonance with others. In this process, the most fundamental aspect is the fusion of reality and the virtual.

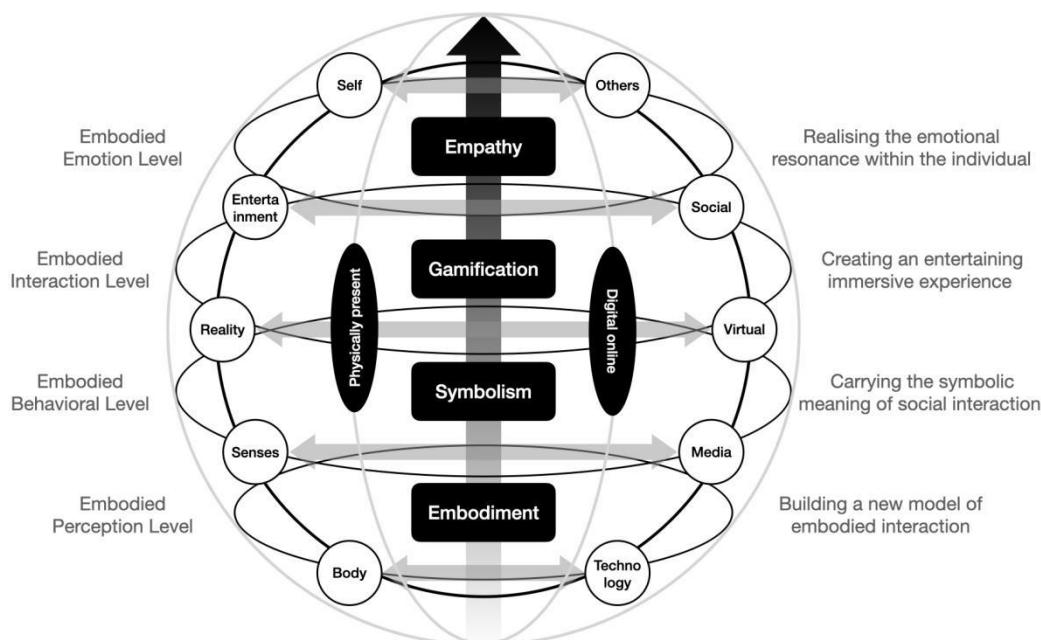


Figure 2. The emotional visualization design model of the metaverse social

Embodiment: Building a new model of embodied interaction

The embodiment of technology is the internalization of technology, while the virtualization of the body is the externalization of the body, with technology widening the boundaries of the body and integrating with it (Li, 2023). The current technology is evolving rapidly and users can realize the embodied virtual body through key technologies such as Virtual Reality, Augmented Reality, and Mixed Reality at the interactive level. The subject of the virtual world is still human ontology, where the body and technology are structurally coupled so that the ontology generates new perceptions and thoughts, and the ontological perceptions are mapped into the virtual space in real-time through digital simulation, giving the user a rich sensory experience.

The emergence of the metaverse has changed the traditional way of social interaction, allowing users to achieve a form of embodied interaction in virtual scenarios, where the body can spread and merge between reality and the virtual. The construction of a virtual self for social activities, through the expression of emotions as an externalization of the body's facial organs, enables a strong visual representation of the user's mood state. Visualizing emotions involves an all-encompassing sensory connection, using the body entirely as a connection point between the person and the medium, enabling decentralized, face-to-face, virtual, and real communication between people. Emotional visualization in metaverse social can closely integrate technology and the body, bringing technology and humanity together, interconnecting the virtual and real self, and making the virtual self more tangible and three-dimensional. The ontology of human-machine integration can redefine the “new human.” A new form of social interaction that is truly digital online and physically present.



In this way, the virtual self in the metaverse can better match the identity and cultural identity of the real self, blurring the boundary between physical space and psychological space. The virtual self can connect the dual carriers of body and technology, the dual roles of media and senses, and the dual spaces of the real world and virtual space, making them intertwine with each other. During this process, the real body, the virtual body, and the ontological consciousness reach a state of coupling. At the same time, the virtual self also has the characteristics of personalisation and customisation, and the virtual world, as a virtual place for self-expression, can liberate people from the real world. People can use their virtual selves to extend and make up for their real lives, and realise some things that they cannot do in real life (Wang et al., 2022).

Symbolism: Carrying the symbolic meaning of social interaction

Technology has turned the body into a symbol, and the schematism of embodied behavior is a traceable structure of regularity, an abstract concept formation with a symbolic representation. It acts in human bodily movements, object manipulation, sensory dynamics, and behavioral interactions. It can be used to analogize real situations utilizing environmental analogies, digital twins, and virtual mappings, to simulate real interaction behavior, to find mapping relationships that correspond to real life, to combine the user's personal cognitive and behavioral experiences, and to evoke cognitive behavior through symbolic symbolism and schematic expressions.

The metaverse, as a new form of social media, simultaneously carries the function and role of social interaction. Users can produce and convey the messages they want to express through body symbols in metaverse socialising. Not only limited to words, but also actions, expressions, and other related information can be communicated through the virtual full authenticity of the metaverse. In the process of this non-verbal interactive expression (Nah et al., 2022), emotional visualization can be simple and intuitive yet carry a lot of meaning, and such emojis enable users to enter the context more quickly and experience virtual social interaction in a more immersive way. When the traditional figurative emoji are dissolved, everyone can create their abstract emoji, which carry the user's consciousness and are an external expression of their emotions and thoughts, and can enhance their sense of self-identity. At the same time, abstract emojis can carry more elements in the social process, convey emotions, gain intimacy, establish group identity, and enhance the sense of mutual identity in the social process.

Gamification: Creating an entertaining immersive experience

The metaverse is a new kind of virtual network relationship which can transcend the limitations of time and space, giving users more space to enrich the form of social interaction and build their own social networks. Digital life further expands the boundaries of human experience in which users can truly transform their “conscious imagination” into “sensory reach.” This will create a multi-dimensional social scene, enhance social entertainment and enrich their social experience (Jiang & Zhu, 2022).

The game world itself has been around for a long time and it can respond to all the desires of people. Gamification has become a crucial attribute of the metaverse, and the need to entertain and share experiences during socialisation is increasingly important to



be valued (Cruz et al., 2023). The metaverse transcends the traditional three-dimensional space, allowing humans to socialize without the limitations of static and dynamic space, bringing the human body and consciousness into a more multi-dimensional digital space through technology, and giving humans a more diverse emotional experience. As the digital space has richer and more radical technologies and environments, it can be personalised to the users themselves according to their desires and behaviours, thus creating more desires to influence their future behaviours (Milani, 2022). The space of the metaverse is both derived from and transcends reality, and can greatly satisfy the spiritual needs of users. As the richest body language, the interactivity of emotions can enhance users' social engagement. Realistic environments can enhance the credibility and immersion of the game and attract users more (Jamshidi et al, 2023). Diverse game mechanics can give more interesting expressions to emotional visualization, and central nervous stimulation can generate long-lasting, real, and sustained social experiences of game interaction, giving users the ability to explore and create. Gamification broadens the social space and content, creates a relaxed social atmosphere, and enables emotional and immersive social expression.

Resonance: Realising the emotional resonance within the individual

From the perspective of dualistic ontology, the body is one of the many dimensions of human beings, not all of them. Spirit, emotion, soul, and thinking will always become more connotative dimensional characteristics (Quintas, 2023). Emotional empathy, as a psychological state, is the highest of emotions, the essence of which is still preceded by a physical response, using past experiences to gather and evaluate captured emotional information within multiple systems simultaneously. In today's narratives where technology is integrated into culture and emotion, technology and people are able to influence and create each other (Liggieri, 2023). It can be argued that embodied emotion is the result of the synergy between human-computer interaction, bodily mechanisms and emotional information. We can fully know ourselves and understand ourselves through the embodied emotion level, and realise the inner shaping of the self.

Emotional design is the highest dimension in design. Social interaction itself has great social and emotional properties, and in metaverse social interactions, the realization of personal emotions should be fully reflected. Through the combination of the virtual and the real, we can fully reveal our entire being, express our ideology, convey our emotional state, and shape our inner world. The impact of the metaverse on users can be understood as the socialisation of the individual and the personalisation of society. In the intertwined space and time between the virtual and the real, we can resonate emotionally with others, society and ourselves. A deeper exploration of the user's emotional needs allows the user's consciousness to build a more self-referential and direct social relationship in the metaverse. At the same time, a real virtual self gives users the possibility to explore more inwardly, allowing them to see and feel themselves and to understand themselves better through their virtual self. This can bring users a deeper immersive emotional experience and a more positive emotional drive, thus achieving an emotional resonance that blends the real and the virtual.



DESIGN RESULTS

Based on the design model constructed, the author has built an emotion-social application called Emotion Meta, using the visualization of emotions in metaverse social as an entry point. It can bring emotions into the virtual world for real-time chatting and interaction, making social interaction more vivid and allowing every social interaction to have emotional resonance. The most salient features of the application correspond to the four levels of the design model, which are real-time mapping, emotion visualization, social entertainment, and emotional resonance.

Real-time mapping

The first step is to create an exclusive virtual self-image in the metaverse, which is personalized according to the user's sense of self, forming a virtual self with thousands of faces. According to Sung Park's experiments, users perceive virtual selves that embody their habitual expressions as more similar to themselves than those that do not (Park et al., 2021). The virtual self is mapped to the real self in real-time through real-time facial capture and micro-expression algorithm analysis. This extends the full sensory perception of the body, enabling users to see their own and each other's emotional expressions in real-time in social scenarios. This is the manifestation of embodiment, giving the user the most realistic sense of presence.

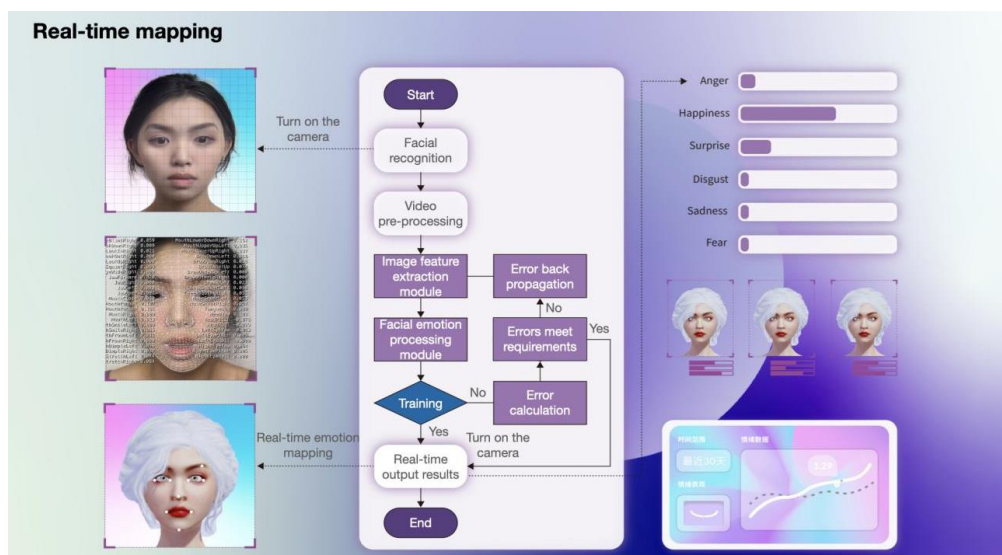


Figure 3. Real-time mapping

Emotion visualization

The emotions, expressions, and behaviors that are mapped in real-time during social interaction can also be recorded and saved in a visual way to form a personal and exclusive emotion symbol. Users can view their own personal status, such as emotional states, frequently used expressions, and exciting moments. This interface is like a memoir,



allowing us to see our pleasant or painful moments. When we press and hold an emoji, we can see when and how often we have used it during social interaction, related contacts, and events that have occurred. Such emotional symbols can better communicate our awareness in social situations, build good behavioral interactions and allow users to understand more about each social relationship.

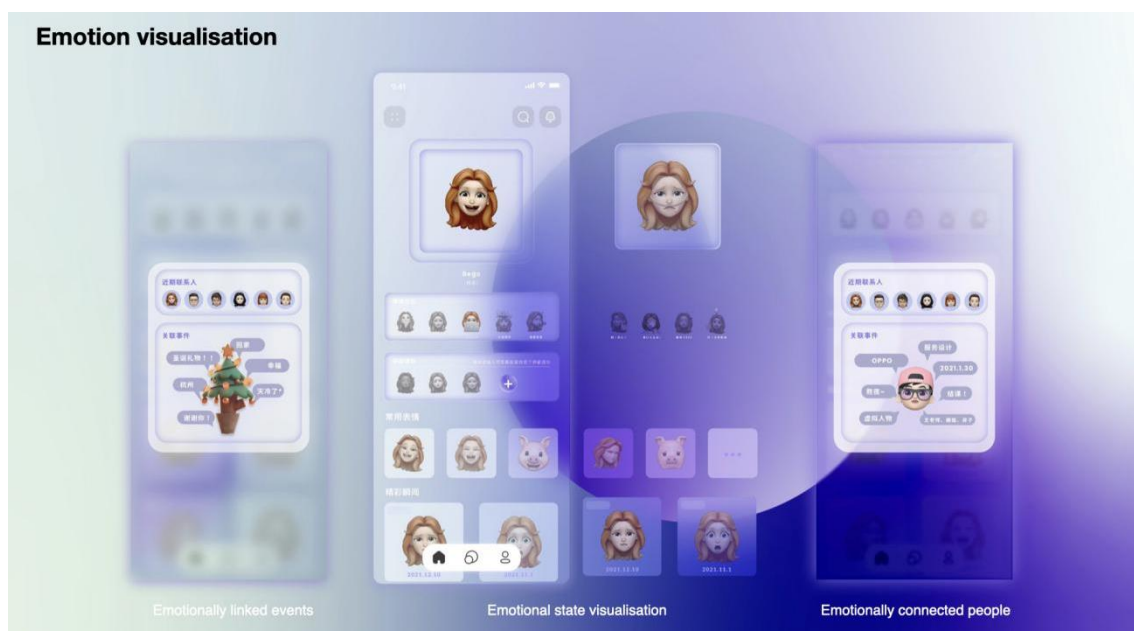


Figure 4. Emotion visualization

Social entertainment

Add gamification to the social journey by quantifying the social relationship as several steps in the social journey: the closer the distance between the two parties the higher the intimacy. The frequency of chatting, the length of chatting, and the richness of the expressions appearing in chatting will increase the intimacy, and when a certain value is reached the chat window will be allowed to throw the dice. Through the entertaining game mechanism of dice throwing, we can slowly get closer to each other, making every emotion worth recording a step forward in our relationship. The social journey scenario can also be freely chosen by both users, adding to the sense of personalization and immersion. And each friend's social interaction will have an exclusive social report for both users to access, giving them a better understanding of each other's social status.

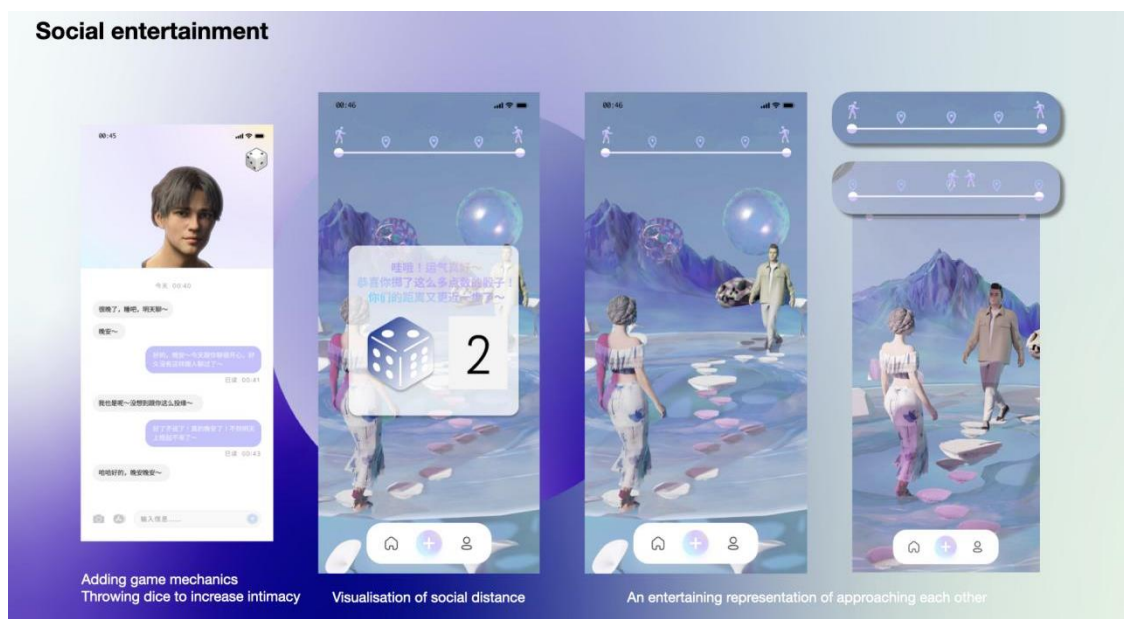


Figure 5. Social entertainment

Emotional resonance

Returning to the user's own emotions, the emotion visualization records the user's behavioral expressions symbolically in the backend, which can be viewed and used by the user. The backend can also be clearly labeled with the people, things, and objects that correspond to the emotion, and by recording and analyzing the user's emotional nodes a dynamic personal visualization of the emotional shape is automatically generated, creating a real third emotional space. Users can feel their inner state according to color and shape changes, and they can use this virtual third perspective to better understand their emotional state and the people and things that correspond to it. This helps users to better understand themselves and interact socially, giving them a richer and more diverse emotional and social experience. Users can also recognize their own emotions to shape their inner selves, understand themselves, and achieve a self-healing effect.

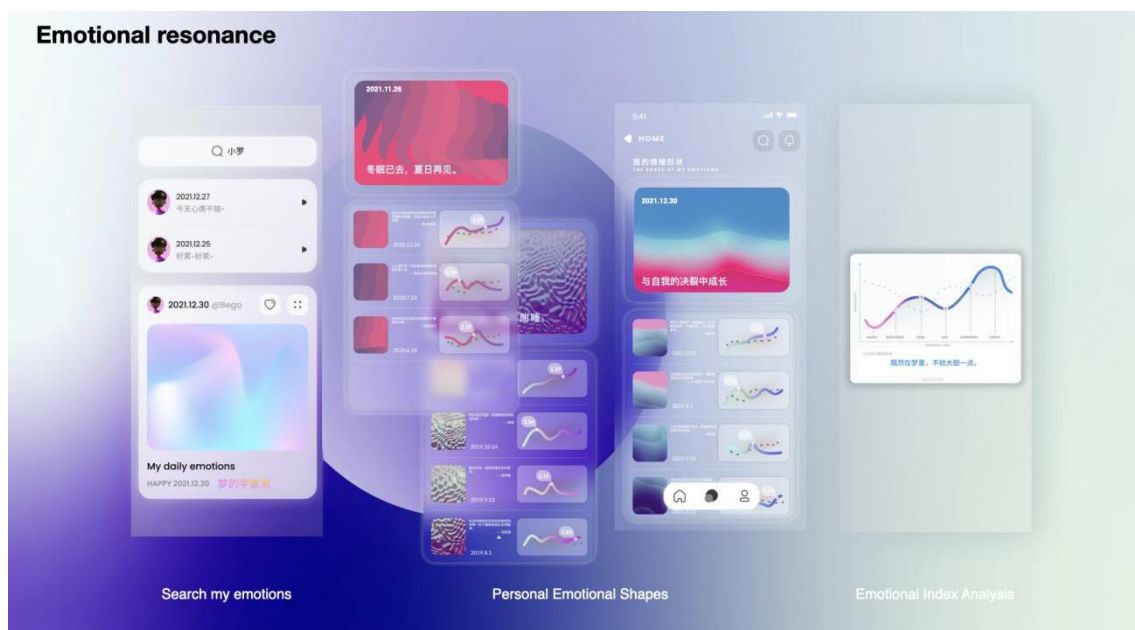


Figure 6. Emotional resonance

CONCLUSION AND DISCUSSION

In the digital age, the metaverse social has become a paradigm of the social, and the depth and breadth of the body's involvement in the digital world in metaverse social is gradually increasing. On this social basis, the function of the body as a medium has been extended, social scenarios have become more diverse, and humans need a higher-dimensional emotional environment to balance technology and emotion.

Starting from the design method of embodied cognition, this study implements emotion visualization into metaverse social, and puts forward as a metaverse social design model “embodiment, symbolism, gamification, and resonance.” The metaverse social process is more experiential, immersive and present, meeting the needs of users for emotional expression. Based on this model, a metaverse social application called Emotion Meta was designed, corresponding to four design levels, highlighting the four design features of “real-time mapping, emotional visualization, social entertainment, and emotional resonance.”

Therefore, the proposed metaverse social design model of emotion visualization has a certain degree of reusability and allows for a broader ecological space for social activities in a surreal digital space, which can provide a certain basis for subsequent research and practice. It can be foreseen that the metaverse will be more and more deeply involved and integrated into human life, and human beings need to be more active in facing and coming to terms with it.



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Статья поступила 11 июня 2023
одобрена после рецензирования 28 августа 2023
принята к публикации 14 сентября 2023

Received: 11 June 2023
Revised: 28 August 2023
Accepted: 14 September 2023



<https://doi.org/10.48417/technolang.2023.03.04>

Research article

Artistic Creation in Virtual Space

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Abstract

The purpose of this paper is to discuss the changes brought by artificial intelligence to future art creation and to explore how art creation in virtual space will unfold. The language, concepts, and ideas of art creation in the contemporary age are rapidly transforming. The further development of digital technology makes it possible to create in a virtual space, and we no longer need to rely on the presence of analogical tools to create excellent works. Virtual reality and augmented reality technologies have been able to bring the integration of human and virtual environments to a new level, and the language of art is being redefined. By sorting out the relationship between art creation language and symbols and the future transformation of art creation language brought about by new media, this paper focuses on the changes in four aspects of future art creation: the transformation of art creation's space, language, tools, and mode. Finally, this paper uses the practice of children's art education projects as an example to illustrate the form of art language expression in virtual space, and to provide a reference for the future art creation methods in virtual space.

Keywords: Art creation; Virtual reality; Augmented reality; Virtual space; Multimodal interaction

Acknowledgment This work was supported by the Design-AI lab of China Academy of Art (CAADAI2022A001).

Citation: Zhang L., Wang Y. & Liu J.R. (2023). Art creation in virtual space. *Technology and Language*, 4(3), 40-48. <https://doi.org/10.48417/technolang.2023.03.04>



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УДК 7: 004.8

<https://doi.org/10.48417/technolang.2023.03.04>

Научная статья

Художественное творчество в виртуальном пространстве

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Аннотация

Цель этой статьи – обсудить изменения, которые искусственный интеллект привнесет в будущее художественное творчество, и исследовать, как будет развиваться художественное творчество в виртуальном пространстве. Язык, концепции и идеи художественного творчества в современную эпоху стремительно трансформируются. Дальнейшее развитие цифровых технологий дает возможность творить в виртуальном пространстве, и нам больше не нужно полагаться на наличие аналоговых инструментов для создания превосходных произведений. Технологии виртуальной и дополненной реальности смогли вывести интеграцию человеческой и виртуальной среды на новый уровень, а язык искусства пересматривается. Разбирая взаимосвязь между языком художественного творчества и символами, а также будущую трансформацию художественного языка, вызванную новыми медиа, эта статья фокусируется на изменениях в четырех аспектах будущего художественного творчества: трансформация пространства, языка, инструментов, и способа художественного творчества. Наконец, на примере практики детских художественных образовательных проектов иллюстрируется форма выражения языка художественного творчества в виртуальном пространстве и дается ориентир для будущих методов художественного творчества в виртуальном пространстве.

Ключевые слова: Художественное творчество; Виртуальная реальность; Дополненная реальность; Виртуальное пространство; Мультимодальное взаимодействие

Благодарность: Работа выполнена при поддержке лаборатории Design-AI Китайской академии искусств (CAADAI2022A001).

Для цитирования: Zhang L., Wang Y., Liu J.R. Art creation in virtual space // Technology and Language. 2023. № 4(3). P. 40-48. <https://doi.org/10.48417/technolang.2023.03.04>



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INTRODUCTION

At this moment, content-generating AI has begun to sweep the world and the very process of art creation is undergoing unprecedented changes. Each creative era bears the mark of its history and of the technology that made it possible. The language, concepts and ideas of art creation in the age of artificial intelligence are transforming, and the further development of digital technology is making creation “in the void” possible. This expression means that we no longer need to rely on the presence of analogical tools and that we are able to generate a series of realistic digital works through one or multiple strings of code. The question is inevitably, how and how much digital technologies are affecting our creative process?

With the introduction of digital technology, the sector of digital art began to sprout, and the scene of art creation started to blur between the real and the virtual, and art creation in the real environment begins to shift to the virtual space, forming a two-dimensional mixed field of reality and virtuality (Xu & Hsu, 2020). In this situation, artists experimented with various media and forms of art creation and began to experiment with interdisciplinary joint creation. Various forms of creation started to emerge, such as computational art, experimental art, video art, etc. The very materiality of works also began to shift from physical products to digital collections.

Virtual reality technology is mainly formed by computer technology, multimedia technology and digital image processing technology. Wearable devices are used to convey images and to simulate experience effects in virtual scenarios, allowing the users to interact in those environments in a multi-sensory way, provoking an immersive experience (Burdea & Coiffet, 2003). Unlike virtual reality technology, AR (augmented reality) does not fully immerse the user into the virtual environment, but uses computer vision, perception technology and graphics processing to superimpose virtual objects onto a real scene, enabling the user to perceive the existence of both reality and the virtual. It enables users to interact with virtual and real elements in real time (Carmigniani & Furht, 2011). With the help of virtual reality technology and augmented reality technology, art creation can unfold in an artistic atmosphere that is innervated with futuristic technology and interactivity, creating a gamified and immersive experience and providing users with the possibility of multi-sensory interaction in their understanding of art.

With the emergence of Transformer architecture, the field of image composition has left the era of the Generative Adversarial Network (GAN) and ushered in the combination of Natural Language Processing (NLP) and computer vision technologies to produce images that are more attuned to users' needs. Led by the trend set by the Artificial Intelligence Global Company (AIGC), many companies have gone on to create proprietary domain-based Large Language Models (LLM) based on deep learning architectures to handle a variety of natural language tasks. Using the LLM, various AI art creation tools have started to emerge. If in the past art creation was done with hands and physical tools, now the full-scale development of AI tools in daily life has led to a disruptive change in the instruments, methods and technical logic of the entire process. The very language of art is being redefined in the context of artificial intelligence (Mazzone & Elgammal, 2019). Thus, there is an urgency for us to think about how AI, as



a virtual tool, can organically link with concrete design activities and change the creation of art in physical space. This also leads us to think about how the way of making art will exist in the future.

This study will sort out the relationship between the language of art creation and his symbols, addressing the future transformation brought about by new media. To this end, we will illustrate the forms in which artistic expression manifest itself in the digital scenario, providing specific application examples. The aim is to discuss the changes brought by AI to art creation and to explore how it will unfold in virtual space.

ARTISTIC LANGUAGE AND SYMBOLS

Language, as a unique human tool used to express emotions and communicate ideas. Language is a symbolic system, a more complex system than any other, and every symbol can be used as a tool in a speech act. This means that language is not only a framework for action but is the medium of a specific form of activity, a “symbolic action” (Burke, 1966). During the long evolution of humankind, a common set of symbols, expressions, and rules of processing was developed and used to communicate, i.e., to exchange ideas, opinions, and thoughts. Language is the set of tools that allows people to express themselves in a variety of ways.

From the semiotic point of view, symbols are also the building elements of that specific form of communication that is the language of art. By its very nature, art language is composed in a form that serves to express emotions; it creates symbols that express human emotions. In calligraphy, for example, lines and strokes are the linguistic elements or symbols that serve this goal. In painting, style, color, and composition are the symbolic language that can express emotion. In art, the symbols are the concrete sensual basis of the bareness of thought; the symbols are the most essential elements of the artistic **work**, and the symbols constitute the expression of art. With the continuous evolution of art creation, the language of art creation also begins to become more and more abstract, conceptualized and standardized, and each art creator forms a unique toolset of languages and symbols.

In his 1994 book *The Language of Displayed Art*, Michael O'Toole (1996) explored the visual grammar of art, such as painting, sculpture, and architecture, and proposed three kinds of meaning: reproductive, modal and combinatorial meaning. Two years later, Kress and van Leeuwen published *Reading Images: The Grammar of Visual Design*, in which they discussed the interaction between visual modalities and the transmission of meaning through visual images in posters and advertisements. Kress and van Leeuwen proposed a theoretical study and analytical framework of visual grammar (Kress & van Leeuwen, 1996). They emphasize that this notion of “grammar” is different from the traditional sense. What they call “grammar” focuses on how elements combine to produce a meaningful whole. Building on the work of Kress and van Leeuwen, Clare Painter focuses on the visual narrative process of sequential images and provides a detailed categorization of visual grammar, moving from still images to a dynamic perspective that considers visual transformation in the context of the section that will follow the one observed, exploring the meaning of graphic interaction (Painter et al., 2013). The



interpretation of visual grammar depends on different artistic and cultural backgrounds and symbolic perceptions of images. Visual narrative grammar is based on the theory of multimodal discourse analysis, a breakthrough based on the systemic functional linguistics created by British scholar M.A.K Haliday, which breaks the boundaries of the field of linguistics (Haliday, 1973).

Multimodality is a concept that can help us understand the use of a symbolic theory of language as it is applied to art, both in physical space and in virtual space (Liao, 2019). Symbols transmit information by visual, sonic, and tactile means. Art has always been concerned with bringing together different modes of experience, combining various expressive codes of symbols (drawing, writing, sound, the very materiality of the components). In embracing virtuality, these modes widen and their interplay becomes increasingly complex, encompassing, e.g., even forms of direct and responsive interaction with the viewer, impossible in classical figurative art. Just by integrating the old representational forms within a digital context, we already have a double overlap of symbols (the traditional and the virtual). Thus the creative process of digital art arises and develops in a constitutive multimodality.

THE TRANSFORMATION OF ARTISTIC EXPRESSION

The medium, as the basis of language transmission, is the basic point of distinction between the various arts. The multimodal language makes the medium of art creation somewhat fluid among the various forms of expression, as it makes it much simpler to use multiple forms simultaneously. It is therefore undeniable that the introduction of new media is an important phenomenon in the development of contemporary art, denoted by the renewal of artistic methods and means, in a way that enables creators to gain a wider space for the expression of artistic concepts. The arrival of smart technology is also bound to bring a series of changes to art creation. We consider four aspects in which the transformation of the process of artistic creation becomes most prominent: space, language, tools, and mode.

1) *Transformation of space.* Virtual reality and augmented reality technologies have been able to bring the integration of human and virtual environment to a new level. With the development of this technology, some European and American painters have also started to use VR technology for creation, expanding painting from two-dimensional space to three-dimensional space. The change of medium brought by technology has shifted the space of art creation from real to virtual. The rise of concepts such as virtual space and meta-universe has made artworks less singular in dimension, which means a capability to work on previously inaccessible levels of space. The emergence of new media overtake the traditional space that the piece could occupy, and the spatial scope of artworks becomes more extensive and diversified. This breakthrough also makes the expression of artworks more open and interactive. By painting in this virtual environment, the work is no longer two-dimensional, but realizes a three-dimensional effect, and the artist can paint a work that can be displayed in 360 degrees, which can be said to have greatly enriched the artist's expressive language. For example, the Japanese new media



art team TeamLab has held large-scale interactive installation art exhibitions of virtual reality around the world.

2) *Transformation of language.* New forms of art language are beginning to emerge in virtual space. In the past, works created by human painters over years and months can now be generated by machines in just one second. In the works of Leng Jun, a hyper-realistic painter and a leading figure among the modern Chinese scene, the most prominent feature is the extreme similarity to photographs, especially in what concerns the human figures: hairs, pores, and even the clothing patterns. Since 1839, when the French painter Louis Daguerre invented the first camera, the traditional realism school of painting has been under unprecedented impact. Most people believed that the appearance of the camera made the strive for realism no longer necessary or justified (after all, the camera could capture reality much more faithfully than a painting). The emergence of the camera compelled artists to rethink the strenuous pursuit of realistic reproduction. Painters began to think about how to establish an independent language in their works, understanding that only through an original language they could leave a mark in art history. The focus thus shifted from fidelity to reality toward the enhancement of one's own expressive capability, a phenomenon confirmed by the immediate emergence of different painting schools such as Impressionism and Post-Impressionism. And that is just one possible example of how the development of technology affects the birth of new forms of art language. In light of this, if we consider the art language in virtual space, we can discover two main characteristics, not yet so prominent in the past: one is virtualness and the other is dynamism. With the help of special computer software and software and hardware facilities such as VR glasses and VR handles, art creators can create, on one hand, virtual elements in virtual scenes and combine them with real scenes to create an enhanced interactive experience. On the other hand, the art language that used to be presented statically on traditional paper and figures can be easily animated gaining a dynamic element that is not only that of performance, but that of a personalized interaction with the individual user.

3) *Transformation of tools.* Every form of innovation opens up a field of opportunity that allows for improvements in previous techniques and the addition of diversity to the creative process. The overflow of novel technical means always brings new possibilities to creation, whether it is virtual painting software or physical painting tools. But the revolution in the tools of art creation in virtual space is not only reflected in a widening of the forms of expression. The use of software and digital drawing technology is flexible and versatile, and the use of traditional techniques based on its framework is not limited or excluded. The new tools also present a much more open structure, as they permit a process of trial-and-error in a much less strict way. The emergence of intelligent tools of artistic expression has also completely transformed the matter of accessibility to artistic creation. The implementation of AI technology has meant drastic decrease at the entry threshold. Anyone can enjoy the fun brought by artistic creation, without investing the time necessary to acquire a minimal proficiency with the old analogical tools.

4) *Transformation of mode.* Multimedia artworks, as the name indicates, implements a variety of media forms such as audio, video, and images. The combination



of these forms allow for a more diverse expression of the work. The mode is not limited to content, but also to reception. For example, the speed of information dissemination on the Internet allows digital artworks to spread rapidly among the general public. In a special exhibition at Cambridge University, contemporary calligraphy artist Wang Dongling used the language of calligraphy to create a hyperspace dialogue with Stephen Hawking and Xu Zhimo. And in 2021, Wang Dongling also experimented with iPad creation, using VR technology to write Zhuangzi's *A Happy Excursion* again. He also tried to create *The Way of Confucius* through AR technology, using a motion capture suit to record the trajectory of his body's movement while writing and digitizing it (a procedure that he later extended to create several other digital works). Whereas in the past, a calligrapher needed to use both hands to master the brush skillfully for direct creation on paper, now he or she only needs to control the handle of a device to complete the creation in virtual space.

ARTISTIC LANGUAGE EXPRESSION IN VIRTUAL SPACE

With the emergence of big data and new digital technologies, art creation in virtual spaces has undergone disruptive changes. Shown below is the example of a children's practice during a project in art education (Figure 1), that is useful to illustrate how art creation in virtual spaces will unfold.

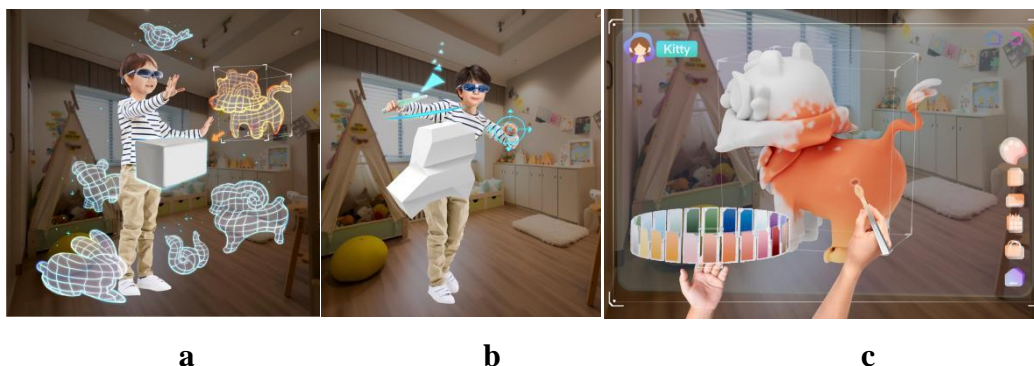


Figure 1. Children creating art in a virtual space

Art education in the digital age has both a broader space for development and at the same time faces greater challenges. Children's art education is of course an important part of fostering children's overall development. The project wanted to implement digital technology in the field of childhood learning with software and hardware product design integrated into this innovative model of art education. Figure 1-a shows the child in the process of selecting the form of the object that will then be shaped in the virtual space; Figure 1-b shows the process of sculpting the original model after the child puts on the AR glasses; Figure 1-c shows the process of coloring and haloing the sculpted model. This project is designed to be highly expandable in the future through the innovation of hardware products and tools centered on children's ability to learn many art disciplines,



enabling children to interact and learn about art creation in a more immersive way, and empowering art education to be better integrated into the life of the new generation. This solution opens up new opportunities for children's art education in virtual space with the multimodal product design of augmented reality tools.

CONCLUSION

The combination of technology and art is already opening up new possibilities for the future of art. In the era of intelligent generation, the iterative renewal of science and technology means the continuous transformation of contemporary art, and traditional art needs to make innovations in the context of such development and integrate and progress with technology. By discussing the relationship between art creation language and symbols, the current art creation space is shifting to a virtual space and a mixed space of virtual and real. The art creation language is revealing its virtual and dynamic characteristics, and the change of art creation language makes the space for expressing our art concepts freer and broader. The final example showed how the potential of digital art also possesses immense possibilities for pedagogy. The ease of access, the simplification of the modes of engagement, along with the possibility of employing any space, open up the opportunity to introduce the child to the language of artistic creation in an immediate and fun way.

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Статья поступила 2 июня 2021
одобрена после рецензирования 6 августа 2023
принята к публикации 4 сентября 2023

Received: 2 June 2021
Revised: 6 August 2023
Accepted: 4 September 2023



<https://doi.org/10.48417/technolang.2023.03.05>

Research article

On the Art of Shibari as a Form of Writing

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Abstract

The art of tying the body with rope can be considered a form of writing. In this technique, the rope moves, leaving traces-patterns on the body which acts as a living and feeling canvas. There is interaction at two levels: control of the ropes, their arrangement of nodes as a created pattern, and the impact on the person who feels the ropes and reacts to them in one way or another. Handwriting depends on the pressure on the paper. But if the “paper” feels touch, smooth curls or painfully sharp underlines, then in the course of writing you have to solve two problems – to make the letters correct, and to establish an emotional relationship with the paper. Thus, in shibari, logical concentration, correctness and safety of construction are important, but an even more lively response requires sensory involvement from the master or mistress. However, unlike most writing or painting, where it is enough to look at the result, in shibari it is important to see the stages of creation, as if the artist was fundamentally changing his work with each new stroke. Shibari as a language takes place on two planes: one existing in space – a three-dimensional pattern of knots and lines on the body, the other, unfolding in time – the movement of the rope, and the body subordinate to it. Shibari has the features of a performance, and tying can serve to convey the theatrical relationship between the master and the model, and, together with the surroundings, create a plot. Moreover, the drawing of a rope can convey specific meanings. In ancient Japan, when binding was used for prisoners, the ropes on the body not only prevented escape and determined the remaining degrees of freedom. The knots were also of service for providing information about the person.

Keywords: Shibari; Bondage; Technology of bondage; Shibari as a Language; Hojojutsu

Citation: Soulrope, K. (2023). On the Art of Shibari as a Form of Writing. *Technology and Language*, 4(3), 49-58. <https://doi.org/10.48417/technolang.2023.03.05>



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УДК 7:091.01

<https://doi.org/10.48417/technolang.2023.03.05>

Научная статья

Об искусстве шибари как форме письма

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Аннотация

Искусство связывания тела веревкой можно рассматривать как форму письма. В этой технике веревка движется, оставляя следы-узоры на теле, которое предстает как живое и чувствующее полотно. Происходит взаимодействие двух уровней: управление верёвками, расположение их узлов по созданному шаблону и воздействие на человека, который чувствует веревки и тем или иным образом на них реагирует. Почерк в том числе зависит и от нажима на бумагу. Но если “бумага” чувствует прикосновения, плавные завитушки или болезненно резкие подчеркивания, то в ходе письма приходится решать две задачи – делать буквы правильными, и налаживать эмоциональные взаимоотношения с бумагой. Таким образом в шибари важна как логическая сосредоточенность, правильность и безопасность построения, но так и живой отклик требующий от мастера чувственной включенности. Однако в отличие от письма или живописи, где достаточно посмотреть на результат, в шибари важно видеть этапы создания, как если бы художник с каждым новым мазком принципиально менял бы свое произведение. Шибари как язык имеет два плана: один существующий в пространстве – трехмерный узор из узлов и линий на теле, другой, разворачивающийся во времени – движение веревки и подчиненного ей тела. Шибари имеет черты перформанса, и связывание может служить передачи театрализованных взаимоотношений мастера-модели, и вместе с антуражем создавать сюжет. Однако рисунок веревки может передавать конкретные смыслы. В древней Японии, когда связывание использовалось по отношению к арестантам, веревки на теле не только не давали убежать и определяли степень свободы, но также узлы служили для информации о человеке.

Ключевые слова: Шибари, Бондаж, Кинбаку; Техника связывания; Шибари как язык; Ходзёдзюцу.

Для цитирования: Soulelope, K. On the Art of Shibari as a Form of Writing // Technology and Language. 2023. № 4(3). P. 49-58. <https://doi.org/10.48417/technolang.2023.03.05>



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There are many ways to look at Shibari or Kinbaku, the art of tight binding of the body. One might consider it in terms of the erotic pleasure from bondage and domination. At the other end of the spectrum it can be interpreted in the manner of philosophy, raising the existential or metaphysical question of freedom and submission or freedom through submission. There is also the perspective of the arts according to which it is a theatrical performance or sacred ritual or a form of body modification.

However, there is an opportunity to look at shibari from the other side. It foregrounds the actions and gestures of the bondage master or mistress by looking at Shibari as a kind of writing. Perhaps this does not seem plausible at first. It has nothing to do with writing on a keyboard, and it seems rather different from the writing of a tattoo artist. But as soon as handwriting and calligraphy come to mind and the Far Eastern arts of writing with ink and brush, we might think of the rope as a kind of line that is drawn and developed in an artful way.

The Master or Mistress also creates, just as authors using other technologies of expression do. However, the flesh on which they work is not dead artifacts, the interaction with which is predictable and safe enough, but the human body. The body as a material for creation immediately sets the main limitations for the creator of Shibari. Evidently, the most superficial and primary limitations are related to safety: not to cause harm, not to cause injury, which means knowing the places on the body that cannot be tied, controlling the force of tension and the time of tying, ensuring that blood circulates to all parts of the body at all times etc. However, besides the obvious fragility of the “cloth” used for writing, it is a human subject that interacts and responds to the master's writing. Thus, during the creation there is a work with two levels: the control of ropes, their arrangement by knots as a created scheme, and the impact on the person who feels the ropes and reacts to them in one way or another.

The rope is the primary agent – it becomes the line and the pattern. Shibari unfolds in time, the shibari pattern manifests itself gradually, the act of creation is important in its own right. It is an act one of fixation, that is, a gradual process of arresting the body and arresting time: when it stands still it becomes an eternal moment. The final, complete rope pattern is not visible for long. Although it may be captured in a photograph, it is significantly the meaningful ending of a story or a process and not only the finally resulting work of art. Shibari reveals itself gradually, and every moment is important. In this, the shibari technique is closer to dance than to drawing. Nevertheless, the rope as a sliding line weaving across the body is clearly associated with a line guided by a pen or brush. However, unlike most writing or painting, where it is enough to look at the result – in shibari it is important to see the stages of creation, as if the artist with each new stroke significantly changed her work, each stroke giving birth to a new plot, and the result represents not the final completed final work, but one of the variants of reading, no more and no less than those that existed before. Thus, shibari as a language takes place on two planes: one existing in space – the three-dimensional pattern of knots and lines on the body, the other unfolding in time – the movement of the rope and the body obeying it.

The latter can be characterized by ‘non-metric time’ (DeLanda 2005): speed, pace, duration, timing, rhythms, frequency. The body, as an object that changes under the influence of the rope, gives shibari an aura of sacredness. The body of another is usually untouchable, except for a very close circle of people. And even in artistic practices it is unusual to exercise such a strong effect on the body as object, even as material.



Figure 1. Symmetrical Harmony Shibari (Shibari-mistress Karol Soulrope)

If we want to single out the primary element – a basic sign in a system of signs for shibari – like a letter or word in a language, a note in music, a body movement in a dance), then for shibari it will be a coil of rope around a person. The coils are fixed in knots and folded into patterns. At the same time, the rope appears as a single endless element, due



to the ease of always extending it by yet another rope. Starting with one turn, it gradually covers the entire body (Fig. 1). Ordean and Pennington (2019) see in the casting of rope through space what Deleuze and Guattari called “lines of flight.” By this name they meant destratifying marks of multiplicity which indicate rhizomatic connections (Deleuze & Guattari, 1987).

At the same time, the rope fixes, connecting parts of the body, primarily arms and legs, and also serves for hanging. The symmetry inherent in the body is also transferred to the shibari pattern, allowing you to make perfectly finished patterns (Fig. 1) or, in contrast to rebelliously break symmetry. Also, the pose that the model takes when his parts of the body are connected by ropes turns out to be far from normal, and the connection of different parts of the body with rope thus can render the canvas or material for creative writing original. The body appears also as malleable or changeable, as gradual changes of posture are produced over the course of a session. The rope and the body work together to produce striking complementarities and tensions.

The rope itself also plays a role as a material artifact. First of all, its length is standardized, allowing it to be controlled. Usually 8 meters long, ropes are used that give a sufficient amount of freedom of turns. The material of manufacture also plays a role, not only in terms of practicality, but also in terms of touch sensitivity. It is well known that underlining in letters and books depends among other things on the pressure on the paper. Handwritten words and characters also bear witness to our pressure, the effort to press, imprinting our ideas onto the uncomplaining paper. But what if you imagine that paper feels touch, be it light arcs or painfully sharp underlines. One might then confront two problems in the course of writing – to make the letters correct, and to establish a properly sensitive, if not emotional relationship with the paper: not to tear or drench it, to treat it with care without violating it. These two challenges require the actualization of different skills, in a sense, conflicting. Logical concentration, the correct construction of dashes, the sequence of letters in meaning – on the one hand, and a lively response, on the other, requiring sensual involvement. The windings and knots are still not letters, which allows greater freedom in terms of the logic of constructing the “letter” elements. Therefore, the sequence of moving the rope along the body, ideally, is simultaneously coordinated not only with the logical plan of the drawing, but also with the emotional response, the tension can be stronger or weaker, the pose created by means of the rope is more complicated or easier. It is clear that for such work it is necessary to know the “alphabet”, an arsenal of standard knots and harnesses. There are “recipes” that prescribe the rules and sequences for moving the ropes, but this is only the initial step. You can learn a few harnesses and repeat them “verbatim,” but this is not enough to master the “language.” Following the freedom of action and the emphasis of professionals, new masters seek to find their own ability to express themselves. Ordin and Pennington (2019) note the pressure of normativity to enforce strictness and correctness in “hierarchical modes of communication and pre-established ways,” suppressing divergent vocabularies of style and technique while constantly referencing one's practice to a normative model.



However, despite the existence of canons, rules of construction, direction of movement of the rope, etc., there is no normativity in modern shibari, there is a way of self-expression through the movement of a rope around the body.

All bondage masters have their own style and their own rhythm, which unfolds the movement of the rope in time. Depending on whether one experiences the body through massage or through tantric techniques, this rhythm can be boldly expressive or gently formative. So, you can end up saying that some master has a tantric handwriting. For some, the rope just slides in their hands, while someone sorts it out. The bondage rhythm is like a dance style: there is a tango, there is a waltz, there is slow, there are fast dances, and there is a fade, a pause. The rhythm can be broken, changing, that is, a period of fast movements can be followed by deliberately slow movements in order to “hear” the partner. Or vice versa, in order to intensify emotions, one can suddenly speed up the pace, binding as quickly as possible in order to knock out the partner’s breathing, unsettling it.



Figure 2. The photograph captures individual moments of Shibari’s “writing” process (Shibari-mistress Karol Soulrope, photographer Anastasya Lyskowets, model Nick Pavlovtssev, makeup artist Natalia Ustavitskaya)

The aesthetic component of the Shibari language is obvious, manifesting itself in the material and imperious connection of the rope and the body. From the underground and fetish performances, it has extended into wide circles and entered the stage, and the sphere of photographic art. Photography allows you to break the continuous process into separate moments, each a telling “sign,” each capturing the “resonance” of certain



moments even as they flow into another (Fig. 2). Special entourage, costumes, and additional items make it possible to create rich visual images with rich iconic symbolism, which develops the binding as a plot narrative (Fig. 3). Shibari exhibits theatricality, Pennington (2017) draws attention to the possible presence of an audience, repeated sequences of behavior performed in certain ways to achieve certain results, technique, dramatic spectacle and denouement (Pennington, 2017). The playful roles of the master and the model can be manifested both in the bends and writings of the rope, the movements of the body, hair, clothes of the model, or in the actions of the master. However, unlike the theatrical representation of feelings, the characters of shibari are immediately implicated in the process, they do not merely stand in. The rope rules over the body, as if assuming control over the owner of the body. Just like certain forms of compelling and compulsive speech, one is carried away by feeling, without opportunity to act.

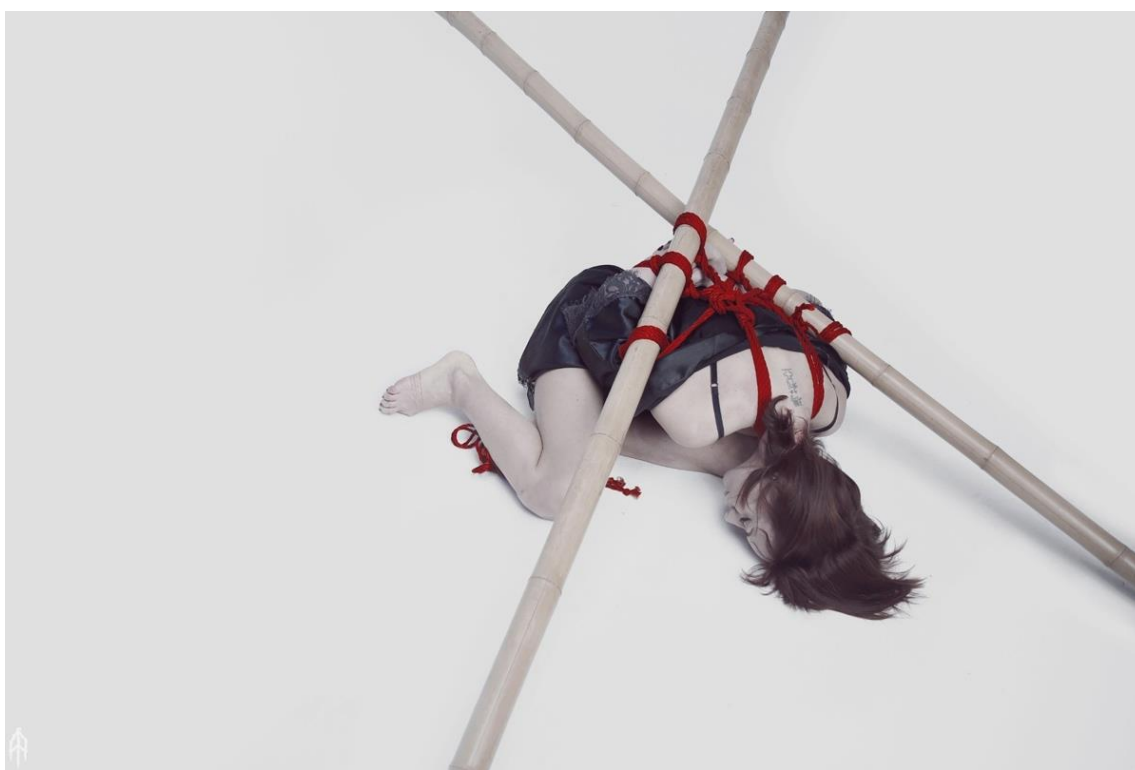


Figure 3. Arresting bamboo composition (Shibari-mistress Karol Soulrope)

However, there is also a symbolic significance of rope drawings. One of the origins of shibari is hojojutsu. Dating to the beginnings of the Sengoku period in the second half of the 15th century, it was a martial and law enforcement technique used to capture and hold a prisoner. In order to grip and fixate the captive, they combined an effective method of restraint with a pronounced visual aesthetic, allowing some degree of body mobility. The degree of formality is determined or regulated under the Japanese concept Shingyōsō



(真行草) which can be applied in different contexts, including calligraphy. Three categories of formality are Shinsho, Gyōsho and Sōsho. Shinsho is strict and font-like, good for administrative documentation. Gyōsho is a semi-formal style, analogical to lettering with its formal qualities, and so on. Sōsho is the least formal and may be compared to cursive writing in European language. In a philosophical sense Shin means following the truth, Gyō means carrying out the truth, Sō signifies form as nature (Hanazawa et al., 2004). The Shingyōsō levels of formality were also used for the bondage of captives. However, in the martial arts, they had slightly different meanings. Regardless of the particulars, they stand for “Ideal” (shin; 真), “Divergence” (gyō; 行), and “Freedom of expression” (sō; 草). Figure 4 demonstrates the difference in placement and complexity of the rope forms (nawagata ; 縄型) on the captive. The three techniques Sō, Gyō and Shin exhibit the different meanings: Sō seeks only to prevent the opponent from launching an attack and is otherwise indifferent, Gyō immediately confronts the opponent, demonstrating power aggressively, and Shin strikes down and incapacitates the opponent.

Many complex connections and patterns have been invented in hojojutsu. The many intricate connections and patterns invented in hojojutsu are clearly intended to convey specific meanings. Features of nodes and constructions spoke about the type, context and severity of the crime. Other such variables include the prisoner's gender, region of Japan, social status, disability, etc. (Hojojutsu, 2015). There were many reasons for this, and only a small part of these connections were sufficiently standardized to be recognized outside the local region. Thus, although there is no single language of shibari knots, if desired, it is possible to convey a message using them. This is not surprising given that in ancient times, knots, worsted items, threads and balls were used to record knowledge and events, as well as for magical purposes (Nastevičs, 2016). Similar knotted cords appear in many ancient cultures around the world: a kipuphor to account before the 19th century in the Inca Empire. “I would make people go back to using knotted cords instead of written characters” writes Laozi, referring to the Japanese Warazan method of accounting by knots (Laozi, 2001, chapter 80).

However, even if the specific meanings of nodes and lines are not known and are not implied by the creator, the shibari letter carries meanings. In addition to its vivid expressiveness, shibari attracts with its return to corporeality the awareness of writing as a material act, an act of influencing reality, and one that deeply implicates us in communication. In the digital age, when writing becomes intangible, but role play and arcane symbolisms become prominent, shibari shocks by its boldness and sensitivity.

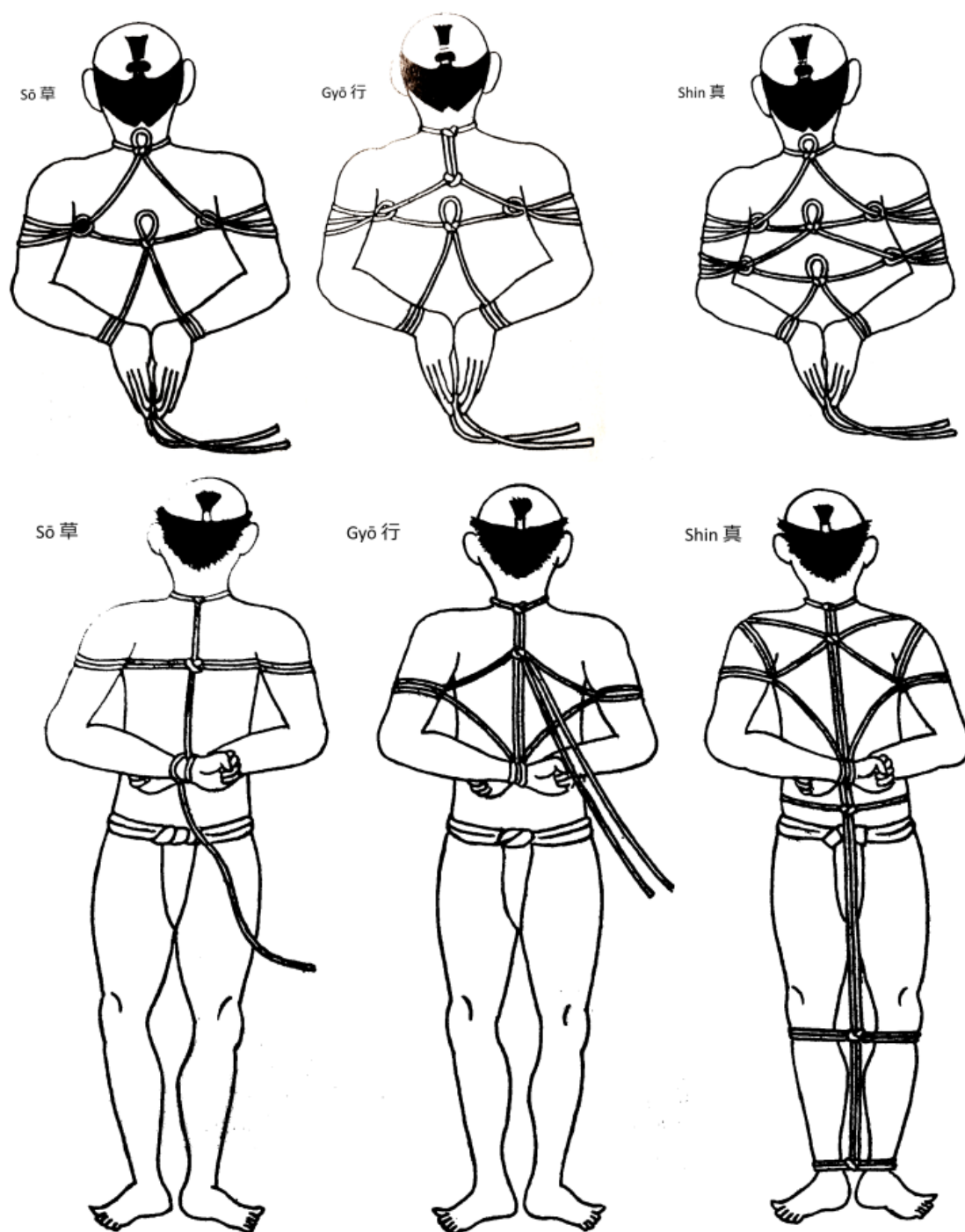


Figure 4. Captive bondage in ancient Japan: the Sō, Gyō, and Shin techniques (Hojojutsu, 2015).



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Статья поступила 3 мая
одобрена после рецензирования 18 августа
принята к публикации 14 сентября 2023

Received: 3 May 2023
Revised: 18 August 2023
Accepted: 14 September 2023



<https://doi.org/10.48417/technolang.2023.03.06>

Research article

The Rise and Fall and Rise again of the Seventh Letter: A Technological Story of the Russian Alphabet

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Abstract

It is generally understood that the letter ё is not obligatory in the rules of Russian language – even though there are many names and words that include it. This lack of obligation led to the absence of that letter in the typewriters, keyboards and code systems. The difficulty and impossibility of using that letter then led to its slow disappearance in printed texts, even though there are still many names and words that include it. Therefore, persons who have the letter ё in their name will try to obtain this letter with two dots in programs and technical devices. Currently, the use of inbuilt dictionaries without having a possibility of variational typing and machine learning led to the tendency of using the letter ё due to autocorrection and systems of hints in the smartphones. When using keyboard applications in electronic devices, some words which contain the letter ё, are typed with the letter e. In particular, some words are changed automatically to e, others are not. Only time will tell what will happen with the letter the seventh letter of Russian alphabet in the future, whether it will lose its relevance or whether there will be a resurgence of its use.

Keywords: Technologies of writing; Letter ё; Autocorrect; T9; Keyboard; Typewriters

Acknowledgments: We are indebted to Daria Bylieva, Andrey Nazarov, Arina Grishina, Valery Boyarkina, Oleg Serik, and Andrea Gentili

Citation: Doroshev, A. & Polyakova, A. (2023). The Rise and Fall and Rise again of the Seventh Letter: A Technological Story of the Russian Alphabet. *Technology and Language*, 4(3), 59-84.
<https://doi.org/10.48417/technolang.2023.03.06>



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УДК 008: 537

<https://doi.org/10.48417/technolang.2023.03.06>

Научная статья

Взлет, падение и снова взлет седьмой буквы: Технологическая история русского алфавита

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Аннотация

Буква ё не является обязательной согласно правилам русского языка, хотя существует множество имен и слов, содержащих её. Необязательность привела к отсутствию этой буквы в пишущих машинках, клавиатурах и кодовых системах. Трудность или невозможность использования буквы затем привели к ее медленному исчезновению в печатных текстах. Наибольшие сложности возникают у людей, имеющих в своем имени букву ё, так как существует требование её использования в официальных документах, несмотря на проблематичность получения буквы с двумя точками в программах и технических устройствах. В настоящее время использование встроенных словарей без возможности вариационной типизации и машинного обучения привело к тенденции использования буквы ё за счёт автокоррекции и систем подсказок в смартфонах. При использовании клавиатурных приложений в электронных устройствах некоторые слова, содержащие букву ё, набираются с буквой е. В одних словах происходит автоматическая замена, в других – нет. Только время покажет, что будет с седьмой буквой русского алфавита в будущем, потеряет ли она свою.

Ключевые слова: Технологии письма; Буква ё; Автозамена; T9; Клавиатура; Пишущие машинки

Благодарность: Мы благодарим Дарью Быльеву, Андрея Назарова, Арину Гришину, Валерия Бояркина, Олега Серика и Андреа Джентили.

Для цитирования: Doroshev, A., Polyakova, A. The Rise and Fall and Rise again of the Seventh Letter: A Technological Story of the Russian Alphabet // Technology and Language. 2023. № 4(3). P. 59-84.
<https://doi.org/10.48417/technolang.2023.03.06>



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INTRODUCTION

It would seem to hold for many, perhaps all languages that alphabets have become simplified and standardized as writing became increasingly mediated by technology. Handwriting and manual typesetting still allowed for many variants, including diacritics. But these were first to go with the advent of typewriters and their limited keyboards, aggravated by the speed of electric typewriting which militated against backtracking to add a diacritic. For Europeans this meant first of all a neglect of diacritics which were replaced by conventionalized variants: č and ć become c, š becomes s, ž becomes z, and đ becomes d, ä, ö, ü becomes ae, oe, ue, ß becomes ss. However the technological trend did not continue to work against these special signs. There are now many interesting solutions where auto-correction or proposals for word and sentence completion provide opportunities for technological restoration of extra signs in Romanian (Grozea, 2012; Ruseti et al., 2020), Hungarian (Novák & Siklósi, 2015), Vietnamese (Hung, 2018), in Turkish (Adali & Eryiğit, 2015), Slavic (Ljubešić et al., 2016), Arabic texts (Alkhatlan et al., 2020; Orife et al., 2020; Zitouni & Sarikaya, 2009), Māori (Cocks & Keegan, 2011), Igbo (Ezeani et al., 2016).

The seventh letter of the Russian alphabet ё [jo] differs from the sixth letter e only by two dots on top. The special position of the letter in the alphabet is connected with its status of being unnecessary and replaceable in most cases by the letter e according to the rules of the modern Russian language. It is understood that the readers must independently know that in certain words they should pronounce the “e” with the sound [jo] of the “ё”.

“Ё” is considered dispensable because it is, in fact, the youngest letter in the Russian alphabet. It did not exist in the Old Church Slavonic alphabet which was the predecessor of the Russian language. In the course of language-reforms by Peter the Great in the years 1708-1711, superscript signs were abolished. Much later, however, princess Ekaterina Romanovna Dashkova suggested in the 1783 meeting ‘The academy of Literature’ that certain letter-combinations which produced the sound [jo] should be replaced by the e with two dots would be located above the letter. This proposal did not catch on initially. One could see the letter ё in print for the first time only in the 1795 book “My trifles” by Ivan Dmitrievich. The letter became famous in 1797 when the poet Nikolay Karamzin decided to replace [jo] in the word сліозы (“tears”) for слёзы.

In all the ABC’s until 1917 the letter ё then found a place at the end of the alphabet near the forgotten letters phita and izhitsa. In 1904 a commission set out to solve the problem of writing the letter ё. It decided to declare it an advisable but not obligatory letter. By 1917 and thanks to the October Revolution, however, the letter ё had not the status of a letter, but was considered to be an old-fashioned option for orthography – since a lot of poets decided to distort the orthography purposely in order to find new ways of writing. The government appreciated these new ways of writing as well as the attendant literary points of view. The greatest poet, Marina Tsvetaeva, in her own poems wrote “чорт” instead of “чёрт” (devil in Russian) on purpose. Furthermore, the poet, Andrey Bely, used the word “жолтый” instead of “жёлтый” (yellow in Russian) in his writings. In 1922, the famous poet, Sergey Esenin, published his poem “Пугачов” without using



the letter ě (Bozhko, 2011; Chumakov, 2010).

On December 23rd, 1917, a decree was authored and published by the Soviet commissar of education Anatolii Lunacharsky. It agreed with the 1904 commission and said: “The letter ě is advisable but it is not obligatory”.¹ Thus, the letter ě officially entered the seventh place of the Russian alphabet in the period of the USSR.²

In 1942, another decree was issued by the People’s Commissar of Education for the Russian-speaking parts of the USSR. Now the usage of the letter ě was obligatory to be taught in school programs. The following ten years were the only time in history when the letter ě was widely used.

However, after some years publishers decided to revert to the old practice. They decided to use letter ě only where it was helpful to have. It could have happened if the language is ambiguous (the ability to read incorrect) or that kind of method was given to person who had not have enough skills in the language (children, who are studying the language) (Korbut, 2017).

1952 saw the publication of the second edition of *The Dictionary of Orthography and Punctuation for Print Workers* by Konstantin Iakiyefovich Bylinsky and Nikolay Nikolaevich Nikolsky³. It declared that in printed texts the letter ě is usually replaced by the letter e and recommended to use ě in these cases:

- 1) When we have to prevent the wrong reading of the word. For example:
 - узнаём instead of узнаем:
Мы узнаём на уроках в школе много нового. (*We learned a lot during our lessons at school.*)
Мы все узнаем завтра. (*We will know everything tomorrow.*)
 - всё (*everything*) instead of все (*everybody*);
 - передохнёте (*will take a break*) instead of передохнете (*will die*);
 - поёшь (*sing*) instead of поешь (*eat*)
- 2) When we have to point out to the pronunciation of an unknown word, for example, the river Олёкма.
- 3) In dictionaries and orthographic dictionaries, in textbooks for foreigners, in the books for children of the primary schools and other special varieties of literature.

The latest decree concerning the use of ě was published in 2007 (“On the Decisions of the Interdepartmental Commission of the Russian language”). Here, the Ministry of education and science of the Russian Federation states that the letter ě should be used if the word cannot otherwise be read correctly – for example, in the case of personal names, because ignoring that case would break the Federal Law (FL) “On the State Language of the Russian Federation.” Beyond that, the rules state that officials are free to use or not

¹ Decree of national commissariat from the 23rd of December, 1917 “About the Introduction of a New Type of Spelling”
// <https://base.garant.ru/187916/>

² One should also mention the “New Alphabet” by Lev Tolstoy from 1874-1875 where the letter “ë” was in the 34th place, between “э” and izhitsa as an optional letter, see <http://tolstoy-lit.ru/tolstoy/pedagogika/novaya-azbuka.htm>

³ Bylinsky, Nikolsky <https://obuchalka.org/2015051684760/spravochnik-po-orfografii-i-punktuacii-dlya-rabotnikov-pechati-bilinskii-k-i-nikolskii-n-n-1970.html>



use the letter ě as they see fit.⁴

THE EFFECT OF TECHNOLOGIES ON THE Ě

Typewriters

In 1870 the Russian inventor Mikhail Ivanovich Alisov created a writing machine that was known as “Скоропечатник” (“Fast typer” in Russian) (Figure 1). That invention reminds us of classic printing machines. There was no keyboard as we know it today, and letter ě was not accounted for.

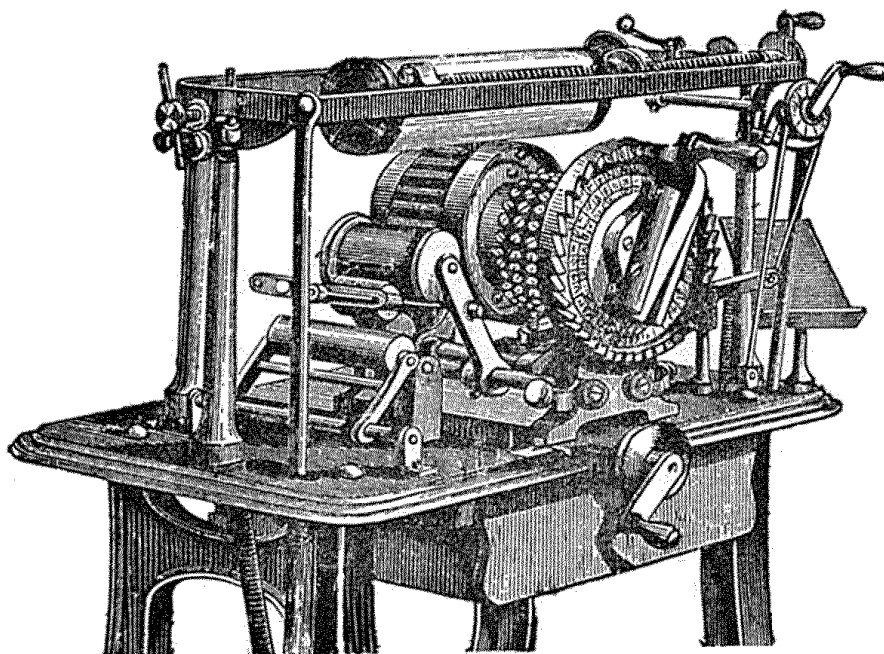


Figure 1. Alisov’s “Скоропечатник” (‘Fast Typer’ in Russian)

The first product-line of typewriters was “Remington №1.”⁵ It was patented in 1866 by Christopher Scholes and Samuel Soul. In 1877 American engineer George Yost created the typewriter “Yost” which was named after him. In Russia it could be bought in two options: Russian type and Latin type, with the price for Russian type being much higher. In 1889 M.G. Merritt created a smaller version of the typewriter – the „Merritt.” It was also sold in Russia, even though there was no letter ě in the machine. In 1892 the German company Guhl & Harbeck created a typewriter which was called “Cosmopolitan” (Figure 2). One of its features was that it had a single flat linear carrier (Michael, 1997; Rehr, 1997; Russo, 2002).

⁴ Law about the national language http://www.consultant.ru/document/cons_doc_LAW_53749/

⁵ On the typewriter Remington № 1 the first book typed was Mark Twain’s *The Adventures of Tom Sawyer*.

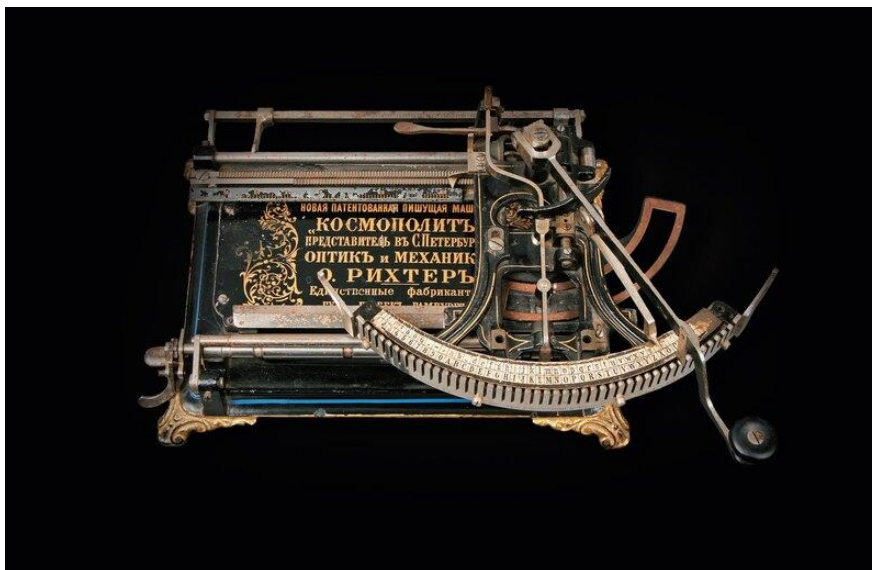


Figure 2. Typewriter “Cosmopolitan”

There was no production of typewriters in Russia until the 1930s. Instead, Western models were used. The first USSR typewriter “Яналиф” was released in the 1929. Initially it had only Latin keys, a version with Russian keys came later. But still there was no letter *ë* in that kind of machine. In the 1930s, the first national factory for producing typewriters (“ПИИМАШ”) was opened in the USSR. The first machine was called “Leningrad,” but still without the letter *ë*.

The situation changed rapidly by the end of the 1930s. The letter *ë* appeared in the typewriter “Progress” which was produced in a Kazan factory (Figure 3). It was situated on the left side of the keyboard, right to the letter *ю*.



Figure 3. Typewriter “Progress” (has *ë*)



However, there were still a lot of typewriters where the letter ё was left out. A special key appeared only in the mid 1950s after the “ЙЦУКЕН” reform.⁶

With classical typewriters, when two adjacent keys were pressed in quick succession, the keys might interlock and thus slow down the speed of typing. Therefore, in the 1950s in the USA a new keyboard was created for Russian. It was called “ЙЦУКЕН,” where the most needed letters were situated under the index finger. This helped increase the speed of writing by almost 2%. At the same time, efforts were made to economize the keyboard by removing some keys. For example, the numerals 1 and 0 were replaced by the letters l and O. In light of this interest in the speed of typing there was no room for the letter ё. Three keys needed to be pressed in order to produce this ё: first, typists would press the letter “e”, then they needed to back up the carriage, and finally place quotation marks on top of the “e”. The unsurprising unintended result was that this would further slow down the speed of typing.

In the 1960s, the USSR decided to produce new models of typewriters: “Moscow”, “Ukraine”, “Yatren.” They featured both the Cyrillic and Latin alphabets. They also included the letter ё. It was situated in the lower corner near the letter ю.



Figure 4. Typewriter “Moscow” (with the letter ё)

In the 1980s the electromechanical or so-called electric typewriter “Lubava” was developed in Ryazan, Russia. It was the license version of “Erika” from the German Democratic Republic. Despite being new, the letter ё was left out on the “Lubava” but it was included in the “Erika” (Figure 5). For this reasons, foreign typewriters were popular

⁶ Fokin A. Why in that order? Why the 19th century? // Fokin A. 2021. <https://bloha.ru/interesnoe/qwerty-ycuken-pochemu-imenno-v-yetom-poryadke/>



in the USSR. Alongside “ERIKA,” the models “OPTIMA” and “ROBOTRON” were also produced in the GDR, also came with the letter *ë*, and thus proved convenient for ordinary soviet citizens.



Figure 5. Electromechanical typewriter “Erika” (with the letter *ë*)

Computer technology

In 1963 ASCII was created in the USA. It was a 7-bit code system for typing symbols as codes. Each letter presented on the table has its own digital code. At the time of release, it had only 128 symbols for Latin languages. Later, some modifications were implemented in order to include other national symbols. So, the number of codes available increased to 256. The capital letter *Ë* was located in 168th place and it was identified with the code 0xA8, meanwhile the lowercase letter *ë* was placed in 184th place.

Moreover, there was another modification of ASCII. It was assumed that it should have been switched up to the US-ASCII as well as switched up to the national option. Switching up was done instantly using symbol “SO,” however, the most famous code was KOI-7. In the KOI-7 the lowercase letter *ë* was marked as 35 (23h), meanwhile the capital one *Ë* was marked as 36 (24h).

With the development of personal computers in the USSR the committee of computer science and IT started a process to develop a new keyboard for the IBM PC/XT computers, which was finalized in 1983. The letter *ë* managed to keep its place (figure 6).



Figure 6. Soviet laptop –“Electronica MK-106” (with the letter ё)

However, despite the fact that the committee demanded it, some early projects for the keyboard still ignored the letter ё. As a result, the letter ё was again absent from some home-made keyboards used for the operating system DOS (figure 7-9).



Figure 7. Soviet laptop “Electronica MS 1504” (without the letter ё)



Figure 8. “Corvette PC 8020” (without the letter ё)

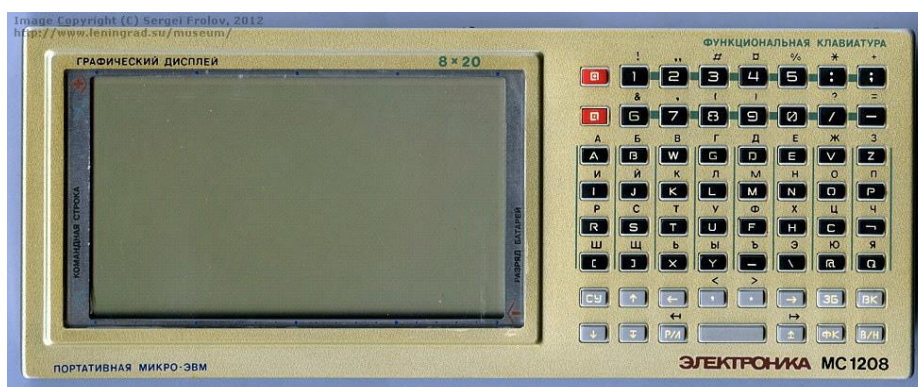


Figure 9. “Electronica MS 1208” (without the letter ё)

Microsoft decided to create keyboards where ё was located left to the “1,” in the second row of keys. Meanwhile, in Russia two types of keyboards were used at the same time. In the older keyboard, searching for the letter ё was still complicated. It was located in the last row, to the right of the letter ю. This placement was very uncomfortable for the fingers, and consequently caused a severe slowdown in typing.

Moreover, Microsoft Word did not support the letter ё in its spelling check system. Even today the system considers the 6th and 7th letters to be identical. So, writing the word “поезд” would not be marked as an error. This flaw can pose some issues, for example if we were to create a dictionary or use tools to search the text.

In Microsoft Word 2010 the check-system for letters in the dictionary is disabled by default, and it has to be deliberately activated. In order to make this operation, you have to tick the box explicitly dedicated to the use of the letter ё (Figure 10).

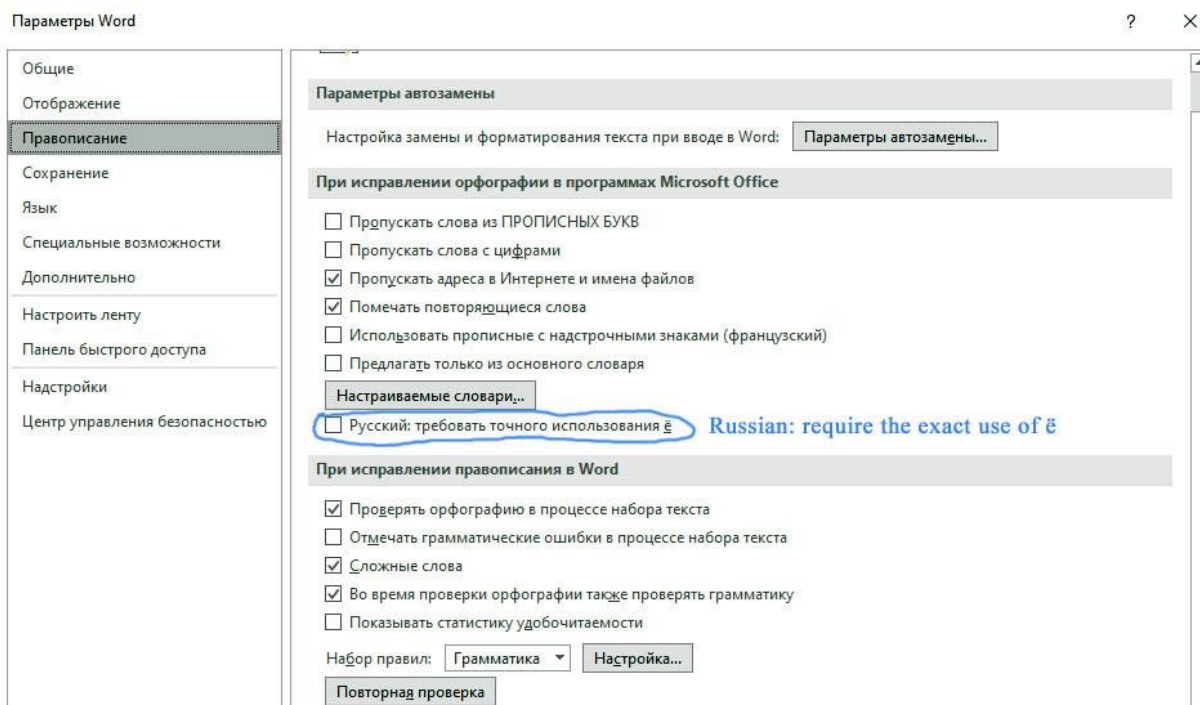


Figure 10. Word option to require the exact use of ё

Currently the letter ё is implemented in all modern keyboards. However, the problem remains that it is hard to find it. It is located in the upper left corner, to the left of the row of numbers under the “Esc” button. Also, the button for ё has two other functions, the symbol (~) and the one for reversed quotes (') (figure 11). On Apple’s keyboard the letter ё is situated in the third row, to the right of the letter э.



Figure 11. Modern keyboard (with the letter ё)

However, there are keyboards where the letter ё is not indicated on the keyboard. Since the letter is in the code system, however, knowledgeable users can still produce it



with the same key under the esc.

To be sure, knowledgeable users have other opportunities as well. Excel Macro is a record and playback tool that simply records one's Excel steps and the macro will play it back as many times as one wants. Macros appeared in the 2010. VBA Macros save time as they automate repetitive tasks. However, one needs to have some basic knowledge of VBA in terms of making advanced modifications in the macro. Thus, by assigning the appropriate macro to a key, the letter could be generated on any computer keyboard.

Mobile Phones

Some older models of cell phones came with a small physical keyboard. Here, the letter ё was not shown. This is due to the fact that the quantity of letters in the Russian language is supposed to be 33. However, in the English language there are only 26. As a result, not all letters can be fitted into that type of layout. Again, for the sake of economizing space, some symbols were hidden and ё was among them.

In figure 12 we see an example of this old keyboard. Worthy of attention is the button 3, which allows to type the letters Д, Е, Ж and 3. In the alphabetical order after the letter ё the next letter is е, so ё was hidden behind that button. If you want to write it, you have to tap three times the button 3.



Figure 12. The keyboard of a push-button phone (without the letter ё)

In modern smartphones the letter ё is also hidden. The option will be displayed if you tap and press for some seconds on the letter е (figure 13).

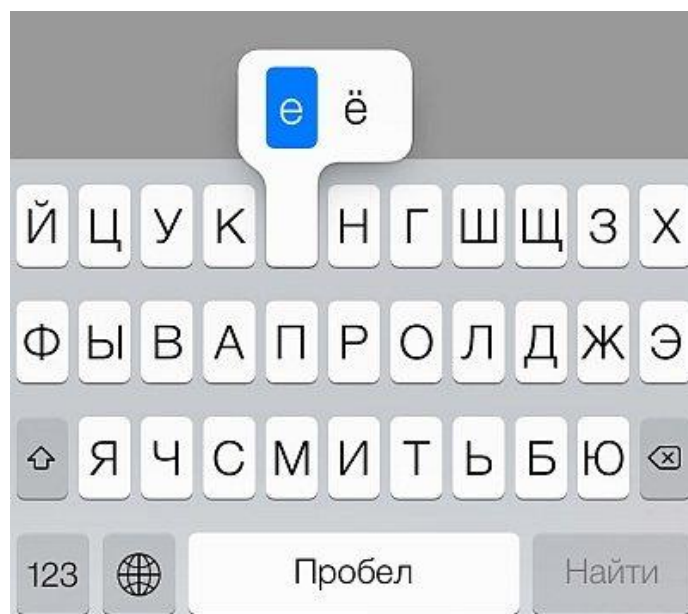


Figure 13. The digital keyboard of a smartphone

If one opts for a typescript layout instead, the letter ё is located near the space button. On MacBook the letter ё on the keyboard is the key \. It is situated to the right of the letter ю.

CATALOGUING PERSONAL NAMES

The main issue connected with the implementation of the letter ё concerns personal names. Crispin Thurlow noticed that words with diacritics appeared incorrectly and inconsistently in library catalogues. For instance, one can notice a transliterative and diacritic mistake in the *Ragnarök* manga, both in the title and the author name (Thurlow, 2021). Most of those technical troubles derive from the tendency to use ASCII in computer coding. Since the ASCII system didn't allow to use diacritics but was nevertheless used for creating library catalogues, these troubles became widely diffused.

The adoption of a transliteration method that is not consistently applied by different institutions presents a variety of bureaucratic issues for all those people who have a surname that includes the letter ё. This means that the name used in everyday life and the one present in one or more documents may differ. As a consequence, during a formal technical checking of the papers for a registration, for government services, for exams, or for receiving a bank card, one may receive an automatic rejection because the surnames do not match.

In 2007 a law was enacted which obliged people and authorities to record ё in first names, last names, and patronyms. This caused further issues. In particular, the documents of persons who have documents dating before and after 2007 caused some problems. For example, Ksenia Zubacheva is a mother of three children from Kaliningrad. She was refused state benefits because her surname was written differently on her children's birth certificates. In one document it was written with "e" while in another with



“ë” (Zubacheva, 2018). In her story about this, the author said that she pronounces her surname as “Zubachyova” (or “Зубачёва” in Russian), but in all official documents (including the by-line of her article) it was written “Zubacheva” (“Зубачева”) in order to avoid mishaps.

TECHNICAL ISSUES WITH THE LETTER Ë IN MODERN SOCIETY

There are obviously a lot of technical difficulties connected with the letter ë that an ordinary user faces in modern society. We will analyze some of those issues with the help of some fascinating jokes as well as some ridiculous stories, which could be found on the internet. A lot of those stories are connected with the difficulties of using the letter ë in everyday life. For example, in figure 14 we can see the ~ button on the keyboard. The letter ë should be printed on it, however, it is not. As a result, the user might think that the system does not support this letter as it supposed to be and as it really does.



Figure 14. The letter ë is not printed on the keyboard

The most common situation is when people do not know how to type the letter ë on their smartphones, due to the fact that the letter ë is located inconveniently in the digital keyboard. As we mentioned previously, it is hidden behind the letter e, and requires a prolonged tapping. Figure 15 shows a dialogue where one of the users confesses his amusement when seeing the use of the letter ë, because he or she is unable to find it.

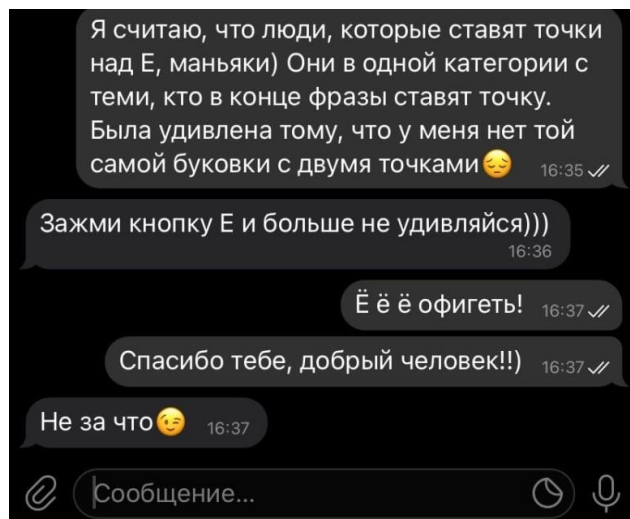


Figure 15. Dialogue with a person who doesn't know how to write the letter ё on the smartphone

Some people just get used to the embedded systems of a text editor that automatically corrects the mistakes in words and sentences. Therefore, when typing the letter ё, the system automatically changes it for e. However, it also happens that people who know that they typed the word correctly get stuck and share this information with others. On the internet there are a lot of screenshots testifying that sometimes the letter ё is considered a mistake by the auto-correction system (Figure 16).

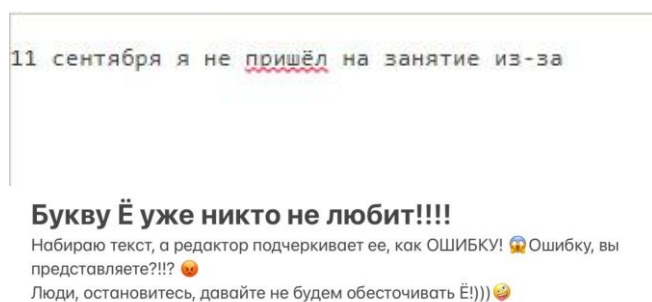


Figure 16. A message of indignation for seeing a word correctly written with the letter ё highlighted as an incorrect one

Many users, understandably, show some frustration at not being able to use a letter of their alphabet in the grammatically correct way. But there are also a lot of people for whom the absence of the letter ё in the technical devices represents an even greater issue. We refer to the case already mentioned of people who have the letter ё in their surnames. In figure 17 we can see a screenshot which shows how a name, written correctly, is



considered an error by the system, which therefore prevents the operation from continuing.

Figure 17. The error says ‘check the correctness of the surname’ due to the letter ё

Some sites do not recognize names and surnames with ё, so that people are excluded from some services and they have to spend time and resources to find a solution. In figure 18 we can see the dialogue, which shows that a person with the letter ё in the surname cannot sign up to get a doctor’s appointment using the intended site. As a result, such people have to do this in person or by way of a phone call.

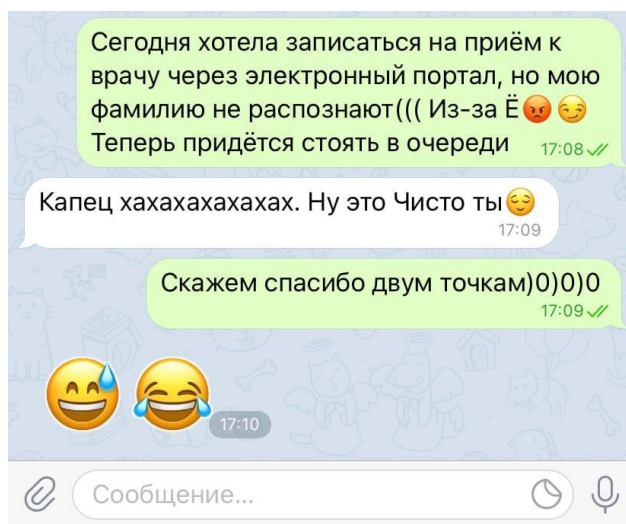


Figure 18. Inability to sign up to a doctor’s appointment using the digital form for the person whose surname includes the letter ё

This issue has spread everywhere for lots of forms of the electronic registrations as well as for the payment terminals. In figure 19 we can see an outraged user whose surname includes ё, complaining about unjust discrimination. The error text that is shown below translates as: ‘If your surname, name or patronym have the letter ё, the payment method in this terminal is impossible. The payment is possible only in the offices of banks’.



Меня раздражает дискриминация людей с фамилией с Ё!!!! 😡

Сегодня пошёл в миграционную службу и в очередной раз столкнулся с проблемой:
«Если в вашей фамилии, имени, отчестве содержится буква Ё, оплата через данный терминал услуг не производится.
Оплата возможна только через офисы банков...»

Figure 19. Electronic payment denied to a user with the letter ё in the surname

From a linguistic point of view, it should also be noted that, in some cases, writing e instead of ё changes the main idea of a statement. There are a lot of jokes about that theme on the internet (some manufactured, some real). For instance, there is this statement for music lovers that was found and shared on the internet: “Some think that everything goes away when you cry. I believe that everything goes away when you eat.” The last word, which is written with the letter ё, means “eat.” However, the word was intended to be written with the letter e, and in that case it would have meant “sing.” Thus, a famous phrase about the spiritual power of music becomes advice to fight sadness with consumption.

Another technical resource that has become a gold mine for interesting cases are online translators. These kinds of services are not always accurate and frequently mistake “e” and “ё.” This has become a problem especially for those who are studying Russian as a second language. In figure 21, for example, we see „everybody sleeping“ translated as „still sleeping“ since “все (everybody)” was mistaken for “всё.”

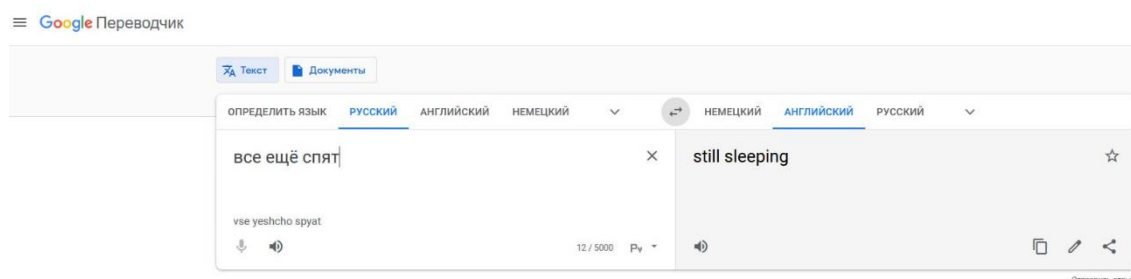


Figure 21. The word with “ё” is mistakenly translated as the word with “e”

At the same time, recently, we can see a tendency for the letter ё to be treated rightfully among the technical fields, even in those where it has no special place. When spelling the alphabet, Russians usually skip the letter ё. So “ё” is not present in all cases



where letters and figures are used alongside numbers (for instance, in the alphanumeric combination used in birth or marriage certificates, in the numbers of cars, in a degree, etc.) As a result, when people see the appearance of “ё” in a list or a call number, they can be so amused to post it on the social networks as an interesting case.

Если вам не хватает в жизни буквы Ё, то идите в Сбербанк 😂😂

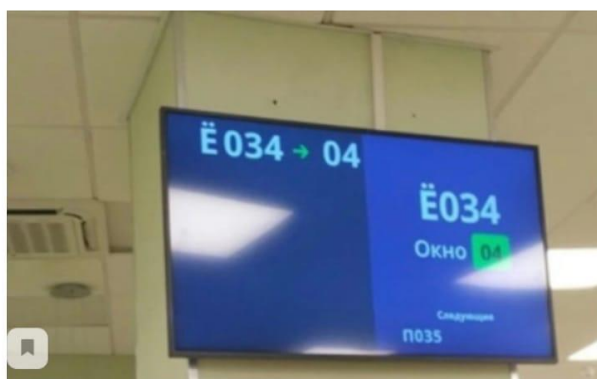


Figure 22. Appearance of the letter ё in the call number for an order

LETTER Ё AND AUTOCORRECT

Modern typing devices are programmed to anticipate the words that are about to be written. Often, when we type the first letters of a word, the program automatically checks an integrated vocabulary and presents us the alternatives. One example of this kind of technology is called T9 (Text on 9 keys). It was created in 1999 by Cliff Kushler in the USA. At the time, in order to write a word as simple as “Hello” on a cell phone keyboard, the combination of keys was much more cumbersome. Given that you had to scroll letter by letter on a keyboard with only 9 keys, the result was this order of input: 4433555666. Thanks to T9, that combination decreased to 5 symbols, because T9 was capable of completing words by itself.

For example, when typing some letters, T9 automatically tries to create the word starting from that set and shows it on screen. If it matches with the word that you wanted to type, you can tap the space button and go directly to the next one. Otherwise, T9 continues to make suggestions with every new letter that is added to the set.

There is a different Russian vocabulary for different keyboards (see Figure 23). In this picture we can see registered words for different systems. Moreover, there is a separate vocabulary where some words are located having letter ё (words with the letter ё will be corrected automatically if T9 recognizes them) (Figure 24).



Yandex Keyword	Smart Keyboard	Google Keyword
не	a-a	абажур
и	aa-a	абажура
в	a-aa	абажуром
а	a-a-a	аборигена
ты	a-aaa	абразив
что	a-aa-a	абрека
на	a-a-a-a	абхазец
как	a-aaaa	абхазски
с	a-a-aaa	ав
да	a-a-a-a-a	авансцену
тебя	a-a-a-a-a-----	авоське
у	a-aaaaa	авоськи
ну	a-a-a-a-a-a	авоськой
так	a-aaaaaaa	авоську
это	a-a-a-aaaaa	аврал
все	a-a-a-a-a-a-a-a-a	авт
меня	aaaaaaaыыы-радуга	авто
мне	aaaa-выходит	автобазе
то	aaaa-тогда	автоматная
тебе	aaaa-x	автоматной
нет	a-a-a-во	автоматные
уже	aaай-выгнулся	автоматными
но	aaамяуррр-опять	автоматчика
еще	aaa-понятно	автомобиля

Figure 23. Russian vocabulary for different keyboards

Yandex Keyword	Smart Keyboard	Google Keyword
всё	автоплатёж	No words with ё
ещё	автоприём	
её	адыё	
чё	аёт	
моё	аётам	
котёнок	аксёнов	
неё	аксёнова	
твоё	аксёновой	
чём	актёр	
идёт	актёра	
пошёл	актёрам	
своё	актёрами	
днём	актёров	
пришёл	актёрской	
пойдём	актёры	
придётся	алгебру	

Figure 24. Words with letter *ë* in vocabulary for different keyboards

In modern smartphones, T9 was substituted by a much more sophisticated autocorrection tool, due to the fact that digital QWERTY keyboards are now the standard. Unlike T9, today's autocorrector does not write the word during the user's typing, but corrects it afterwards if it recognizes a mistake. This is because the keyboard with its own vocabulary is built-in in the middleware. The system automatically scans saved words in the dictionary and offers them by default during typing.

There are two types of dictionaries: systematic ones and custom ones. In the first case we can see the original set of words inserted (Figure 23 and Figure 24). The second list is more dynamic. New words are constantly added by monitoring the users, or they can be manually entered by them. At the beginning there are no words in the dynamic dictionary and it has frequently a poor range of words (it is assumed to have 500-1000 words). Due to the allocated memory reaching maximum capacity, older words are deleted automatically.



The autocorrection of the words with the letter ё depends on that letter being in the vocabulary base of the keyboard. For example, if we take the word “ёж” (“hedgehog” in Russian), we can see how it is treated by different keyboards. In three of the best established keyboards, the word “ёж” was not changed for “ёж”, although in the line of autocorrection there was an option for “ёж.”

1. Samsung Keyboard by default.

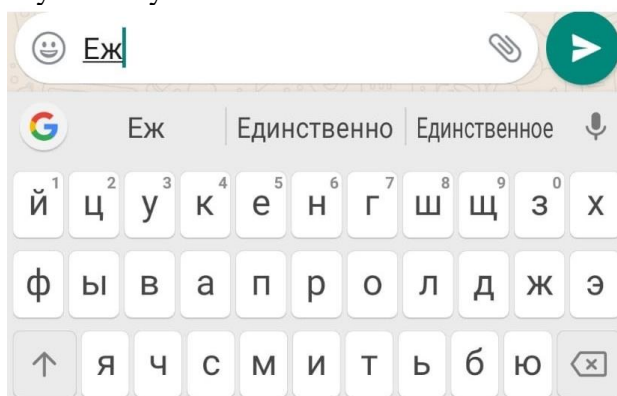


Figure 25. Keyboard Samsung

2. Google Keyboard



Figure 26. Keyboard Google

3. Yandex Keyboard

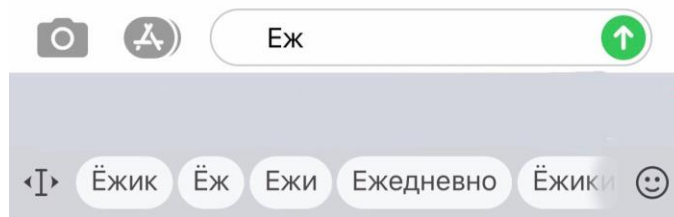


Figure 27. Keyboard Yandex

A similar situation arises with the word “ёжик” (уменьшительно-ласкательное от слова “ёж,” that is, “hedgehog”). The word “ёжик” was changed automatically to было “ёжик” in all keyboards.

1. Samsung Keyboard by default.

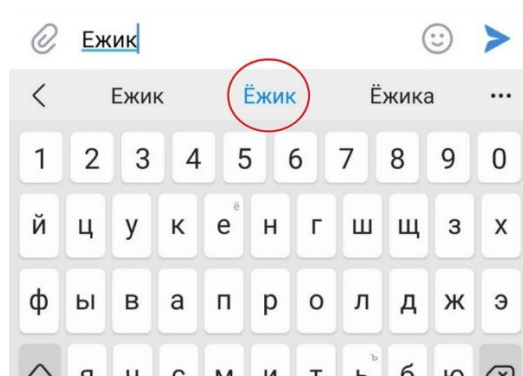


Figure 28. Keyboard Samsung

2. Google Keyboard

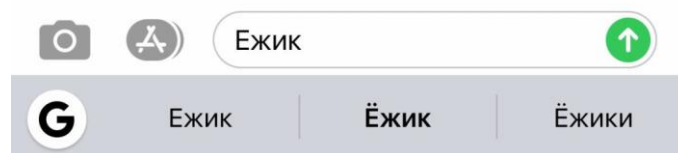


Figure 29. Keyboard Google

3. Yandex Keyboard

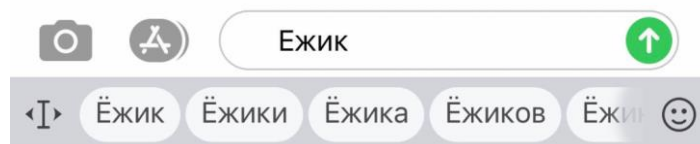


Figure 30. Keyboard Yandex

According to these examples we can conclude that the autocorrect intervention in different keyboards depends on certain factors. Firstly, how the software works depends on the type and producer of the keyboard. As a result, all systems work independently of each other. Obviously, every artificial intelligence was taught differently in every part of its production as well as receiving a different programming by IT-engineers. The second condition, we assume depends on the users. According to their choices, the correction is set in a certain way.

In Table 1, 40 words are represented. Twenty of them have the letter ё and are used in the vocabulary of T9, meanwhile, the other 20 words are not used. We have tested different keyboards and checked them by writing some of those words. The results are shown in the table.

Table 1. Autocorrect words with the letter ё

Word	word with letter ё in the T9 base vocabulary	Autocorrection of words		
		Yandex Keyboard	Smart Keyboard	Google Keyboard
The replacement of ё in all sentences				
Пойдём	+	Пойдём	Пойдём	Пойдём
Жлём	+	Жлём	Жлём	Жлём



Даёшь	+	Даёшь	Даёшь	Даёшь
Приём	+	Приём	Приём	Приём
Шёл	+	Шёл	Шёл	Шёл
Везёт	+	Везёт	Везёт	Везёт
Мёд	+	Мёд	Мёд	Мёд
Зелёное	+	Зелёное	Зелёное	Зелёное
Тётя	+	Тётя	Тётя	Тётя
Смеётся	+	Смеётся	Смеётся	Смеётся
Путёвка	+	Путёвка	Путёвка	Путёвка
Плетёная	+	Плетёная	Плетёная	Плетёная
Перебьёт	+	Перебьёт	Перебьёт	Перебьёт
Пьёшь	-	Пьёшь	Пьёшь	Пьёшь
Врёшь	-	Врёшь	Врёшь	Врёшь
Флёр	-	Флёр	Флёр	Флёр
Мёртвый	-	Мёртвый	Мёртвый	Мёртвый
Ввёл	-	Ввёл	Ввёл	Ввёл
Вертолёт	-	Вертолёт	Вертолёт	Вертолёт
Перевёл	-	Перевёл	Перевёл	Перевёл
Самолётик	-	Самолётик	Самолётик	Самолётик
Пришёл	-	Пришёл	Пришёл	Пришёл
Рулём	-	Рулём	Рулём	Рулём
Насчёт	-	Насчёт	Насчёт	Насчёт
Вдвоём	-	Вдвоём	Вдвоём	Вдвоём
Орёт	-	Орёт	Орёт	Орёт
The replacement of ё in some Keyboards				
Бельё	+	Бельё	Белье	Белье
Живёт	+	Живет	Живет	Живёт
Днём	+	Днем	Днем	Днем
Ребёнок	+	Ребенок	Ребёнок	Ребёнок
Самолёт	+	Самолет	Самолет	Самолет
Отчёт	+	Отчёт	Отчет	Отчет
Объём	-	Объём	Объем	Объем
Тушёнка	-	Тушёнка	Тушенка	Тушёнка
Счёт	-	Счёт	Счёт	Счет
Приём	-	Приём	Прием	Прием
Отдаёшься	-	Отдаёшься	Отдаешься	Отдаешься
Лёд	-	Лёд	Лед	Лед
There is no replacement of ё in sentences				
Рёв	-	Рев	Рев	Рев
Перетёр	-	Перетер	Перетер	Перетер
Зёрнышко	-	Зернышко	Зернышко	Зернышко
Отвёртка	-	Отвертка	Отвертка	Отвертка
Позёмка	-	Поземка	Поземка	Поземка
Клёпка	-	Клепка	Клепка	Клепка

So, some words can be written with the letter e. The example can be given of the words “еж” and “ежик” (“hedgehog”), mentioned above (figure 25 and figure 30). Those are two different forms of the same word, with the same meaning. By this it could be said that autocorrection creates its own rules in writing words with the letter ё, based on a combination of the built-in dictionary and the individual vocabulary of the user. By this it could be confirmed that whatever word and first letter are used, the dictionary creates its own base of words, known as well as unknown ones, if it is not done by default.

Currently, we have an interesting situation as one uses different keyboards and



applications in the smartphone. It is undeniable that users can correct the word by themselves if they do not like how it is written. However, is also a fact that not everyone would waste their time on this.

The main issue of autocorrect is said to be that it misunderstands the context of a sentence. Autocorrection is able to change only one word, but it does not understand the context. As a result, it would lead to losing the main idea of the text. It is nevertheless essential to point out that autocorrection is developing every day. The vocabulary of the system is becoming bigger and bigger, as well as developing alongside artificial intelligence. If artificial intelligence were capable of creating a list that includes all of a user's vocabulary and recognizes its most frequent contexts of use, the system would be able to foresee all phrases and sentences in the future.

Благодаря своим жестким колючкам ежики
защищаются от хищников, а также
перетаскивают провизию прямо у себя на
спине. Они схожи с иголками елки.
Хищникам, искущенным желанием
полакомиться ежатиной, придётся
применить смекалку и терпение. Лесные
жители, живущие по соседству с ежами,
стараятся не наткаться на них. Медведи
научились использовать такой приём, как
зимняя спячка, в том числе, чтобы реже
встречаться с ежами, выходят они из неё
только весной.

Figure 31. Text typed in the smartphone

The text in figure 31, for example, reveals the working of the keyboard-system concerning the letter ё. The smartphone replaces the letter e to ё only in some words. This is illustrated once again by the word “ежик” (“hedgehog”, phonetically correct form “ёжик”). Likewise, we can see the same happening with the words “жестким”, “елки” and others. However, by typing it again on the same keyboard, one can get a different result. Having learned about the user’s habits and preferences (if a user does not correct back words written with “ё,” this is considered a preference for it), the autocorrection system replaces more occurrences of “e” by “ё” (“ёжики”, “ёлки” and “неё” – see Figure 32).

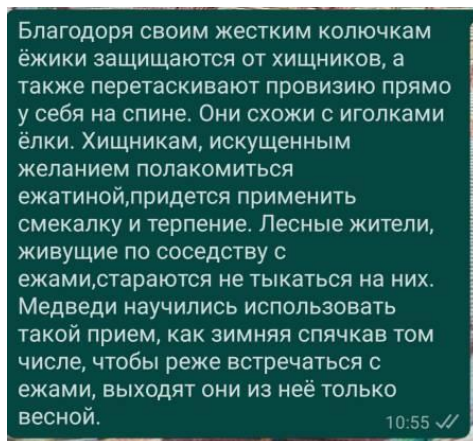


Figure 32. Changes occurring when typing the same text multiple times

SUMMARY AND CONCLUSION

In 1783 the sign *ë* was created. Only in 1917, however, it received the formal status of letter and its use was mandatory only during the ten years from 1942 to 1952. The ordinary use was only for avoiding ambiguity, beyond that, readers should understand by of themselves when a particular word with the phoneme [io] or *ë*, should be read and pronounced that way even it is written as *e*.

This peculiar status led to the disappearance of the letter *ë* in many devices. The first typewriter in the USSR was invented in 1929 but did not bring “*ë*” to typewriting. The special key appeared only in the mid-1950s. In the 1980s the first electric typewriter was invented, but there was no letter *ë* even in that machine. The letter was absent also in the first computer keyboards. All of this presents difficulties for personal names which have the letter *ë*, when during document-processing the letter is not supported.

Despite all the factors which were mentioned above, there was always the option, exercised by some, to create macros to support the letter *ë*. Also, a lot of personal computer keyboards do not indicate the letter but support it nonetheless.

There are two possible options of using the letter *ë* according to the rules of the Russian language. The first one is the selective one. We use “*e*” or “*ë*” to disambiguate cases when the main idea would appear to be different and when the words have different meanings. The second option is the solid one. Here one uses it when it is customarily written and pronounced. These rules have been adopted by modern computer programs. Moreover, Microsoft Word allows society to choose solid writing as an option. However, it is true that there are a lot of problems concerning writing “*ë*” in different text, forums, electronic registrations, payment terminals, where the letter *ë* cannot be supported and the error is shown on the monitor. A fascinating situation arises with smartboard keyboards which change some words automatically (including, in some cases, changes from “*e*” to “*ë*”). This, of course, is not in keeping with the modern grammar of the Russian language which tends to limit these changes to cases of disambiguation. These automatic changes result from a technical decision which draws on an analysis of historical and users’



preferences. It would seem, however, that the use of “e” or “ë” is a question of future writing, that is, it concerns the ways in which we choose to relate sounds and spellings. In a dynamic language this should not be left to personal settings and automated technical decisions, even self-learning algorithms. Instead, it is akin to voting for the future of our language and the society who struggles with these decisions every day.

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Статья поступила 2 июня 2021
одобрена после рецензирования 6 августа 2023
принята к публикации 4 сентября 2023

Received: 2 June 2021
Revised: 6 August 2023
Accepted: 4 September 2023



<https://doi.org/10.48417/technolang.2023.03.07>

Research article

Wording Worlds – From Writing Futures to Building Imaginary Worlds

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Abstract

In the context of the assessment of new and emerging technologies, there is the tendency to talk about futures as different worlds. Futures, especially in a non-trivial sense, postulate a break between our world and the potential future world. This break is accompanied by a series of changes that cannot be foreseen, as no empirical knowledge exists about the impacts and the future world that will follow from them. The only knowledge that exists is based on anticipation, extrapolation or speculation and points at worlds that are somehow estranged from our world, while at the same time show similarities. I argue that the worlds talked about in the context of technological futures are imaginary worlds, meaning cognitive constructs building up on the way we perceive our reality combined with culturally shared hopes and fears. Treating future worlds as imaginary worlds allows for an examination of the work that has been done on imaginary worlds in literary and especially SF-studies. Using the framework of understanding and analyzing futures as imaginary worlds can offer a thorough approach of analyzing images of the future and helps us reimagine the future of emerging technologies more holistically.

Keywords: Technofutures; Imaginary Worlds; Imaginaries; Science-Fiction; Worldbuilding; Technoculture

Citation: Mehnert, W. (2023). Wording Worlds – From writing Futures to building Imaginary Worlds. *Technology and Language*, 4(3), 85-104. <https://doi.org/10.48417/technolang.2023.03.07>



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УДК 001.18: 828-344

<https://doi.org/10.48417/technolang.2023.03.07>

Научная статья

Миры слов – от описания будущего к построению воображаемых миров

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Аннотация

В контексте оценки новых и появляющихся технологий существует тенденция говорить о будущем как о разных мирах. Будущие миры, особенно в нетривиальном смысле, постулируют разрыв между нашим миром и потенциальным будущим миром. Этот разрыв сопровождается рядом изменений, которые невозможно предвидеть, поскольку не существует эмпирических знаний об этих воздействиях и о том будущем мире, который за ними последует. Единственное существующее знание основано на предвосхищении, экстраполяции или предположениях и указывает на миры, которые в той или иной степени отделены от нашего мира, но в то же время имеют сходство с ним. Я утверждаю, что миры, о которых говорят в контексте технологического будущего, – это воображаемые миры, то есть когнитивные конструкции, формирующиеся на основе того, как мы воспринимаем нашу реальность, в сочетании с разделяемыми культурой надеждами и страхами. Рассмотрение будущих миров как воображаемых миров позволяет изучить работу, проделанную по воображаемым мирам в литературоведении и особенно исследованиях научной фантастики. Использование структуры понимания и анализа будущего как воображаемых миров может предложить глубокий подход к анализу образов будущего и помочь нам более целостно переосмыслить будущее новых технологий.

Ключевые слова: Технобудущее; Воображаемые миры; Воображаемое; Научная фантастика; Миростроительство; Технокультура.

Для цитирования: Mehnert, W. Wording Worlds – From writing Futures to building Imaginary Worlds. // Technology and Language. 2023. № 4(3). P. 85-104. <https://doi.org/10.48417/technolang.2023.03.07>



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INTRODUCTION

Through fiction and through poetry new ways of being-in-the-world are opened up in the midst of reality. (Ricoeur, 1975, p. 26)

In the context of the assessment of new and emerging technologies, there is the tendency to talk about futures as *different worlds*. Futures, especially in a non-trivial sense (Nordmann, 2014), postulate a break between our world and the potential future world. This break is accompanied by a series of changes that cannot be foreseen, as no empirical knowledge exists about the impacts and the future world that will follow from them. The only knowledge that exists is based on anticipation, extrapolation or speculation and points at worlds that are somehow estranged from our world, while at the same time show similarities. The question of how we can imagine the difference between both worlds and how both worlds relate to each other is the object of this essay.

I argue that the worlds talked about in the context of technological futures are *Imaginary Worlds*, similar to worlds we encounter in Science or Speculative Fiction (SF). These worlds are cognitive constructs, building up on the way we perceive our reality combined with culturally shared hopes and fears, and mediated mainly through language but also images, sounds or other artefacts.

To explore the relationship between both worlds further, I will reflect on the role of *worlds* in STS, TA and similar fields. Afterwards, I will describe how *world* is understood in literary studies and imagination studies. Lastly, I will turn to SF-studies and the work that has been done on conceptualizing storyworlds, as well as the creative practice of Worldbuilding. The aim of this paper is to combine different perspectives on the concept of *world* to reflect on the cognitive processes that are happening when writing or engaging with futures or when imagining different worlds under the impact of emerging technologies.

FUTURES AS WORLDS

Writing futures is writing about changes. Through writing, we can engage in thought experiments and explore those potential changes in different ways, for example by imagining a potential path of implications starting from our present (i.e., if X happens today, it will lead to Y tomorrow and this will lead to Z the day after). Thinking in implications allows to imagine a world that is different from ours as the implications have changed small or sometimes large parts of the world that we already know.

Since emerging technologies come with the promise of transforming the world, it is important to know about their transformative impacts and the world they might help to create. Alfred Nordmann describes this relation between future, implications and worlds in the following way:

“The future begins when a difference arises that sets the world of the future apart from that of the present. In the discussion of emerging technologies, for example, one usually posits a transformative innovation that introduces a qualitative difference, and



then wants to know what the consequences of the innovation will be in that future world." (Nordmann, 2014, p. 132)

The concept *world* is often used in the context of Technofutures, as for example in STS or in Technology Assessment. Nordmann (2014) states that visions of the future are actually different worlds, inhabited by different technologies and different people and changed through the emerging technology and its several levels of impact. Based on the depiction of these worlds through images of the futures (i.e., talks, presentations, videos, actual images, and other media), we can engage in reflecting on what other impacts might occur and cognitively and collectively explore the world further. Furthermore, we can judge whether we would like to live in such a world or what we should do to prevent it. Understanding futures as worlds takes away the heaviness of framing the future as determinant prediction and instead positions the depicted future as one alternative world. The perspective on the imagined world also allows to weigh the advantages and disadvantages and, in the end, to decide to support this world in its emergence or to prevent it. Technofutures thus become discussable in terms of their implied hopes rather than the probability of their realisation.

However, the worlds implied in images of Technofutures are often rather *thin*, means there is too little substance for deliberately debating those futures (especially in terms of desirability) as they are often mere description of the technology and lack information about their potential impacts or their social embeddedness (Fischer and Mehnert, 2021, p. 28). One reason for this is the lack of knowledge about potential impact, as information about future states are simply not given. Another reason is the lack of perspective, or rather the biases through the perception of the world. As Goodman (1978) points out, we all make different *versions* of worlds by categorizing and weighting the elements we find in our reality differently (p. 7-17). Thus, some relevant elements or categories of one version of the world might be missing in another version. For example, in one version of the world, we might see topics like energy consumption and environmental impact as an important category that is not regarded in another version of the world. These versions of perceiving the world will also inscribe themselves into imagining future worlds and influence decisions of what elements to write into the vision, what to emphasize, what to leave out and so forth. Jameson (1975) calls this “world-reduction” and describes it as “surgical excision of empirical reality in which the multiplicity of what exists is deliberately thinned out” (p. 223).

This moves the building of these worlds into the focus. As Nordmann points out, promoters of a technological vision conjure what they consider a highly desirable future world, while often leaving out or overlooking perspectives by other stakeholders, (e.g., vulnerable groups or marginalized communities). With regards to responsible innovation, we can also ask about “responsible representation” (Nordmann, 2014, p. 93) of these worlds, meaning how we should talk and think about emerging technologies and whether it is responsible to assume that the technology in question will bring about the postulated change in the world, as often the promised change and the social adaption of a technology depends on other factors that lay outside of the realm of technological feasibility (see Bijker, p. 1997).



Reading Technofutures from this perspective, they can be understood as artefacts of a present that do not present an inevitable future, but another world assumably made possible by technology. This world communicates implicit values, interests and assumptions by depicting a normative way of living together. Jasanoff and Kim refer to this part of future worlds as “sociotechnical imaginaries” (Jasanoff and Kim, 2015, p. 19), meaning shared understandings of forms of social life and social order attainable through advances in science and technology. Technofutures link culturally shared hopes and fears with the ideas of new technologies and tell stories about how the technologies are supposed to help make the desirable or avoidable worlds a reality.

In this context, Akrich points out that developers, for example, necessarily hypothesize about the properties of the world in which the technology is to be embedded. Much of the work of innovators, then, is to inscribe their vision of the world into the technology (Akrich, 1994, p. 207). These imagined and invented worlds originate in dreams and ambitions but are substantiated into people, objects, and practices (Jasanoff and Kim, 2015, p. 336), as well as technologies that link the stories, desires and reasons of a society to the material world (Haraway, 1997, p. 64). As visions of technologies provide an insight into utopian or dystopian societies that are to be achieved or prevented by technology, it can be said that the analysis of technology futures tells us more about a culture's desires than about the actual possibilities of a technology. These desires values are revealed through the language used to talk about the new world and the images made to represent this world in contemporary media and popular culture (Sturken et al., 2004, p. 7).

Lastly, Technofutures and the worlds depicted are fictional. This is not meant disrespectfully or as a devaluation; rather, fiction here is understood in a productive way, as described by Elena Esposito and Jens Beckert. Esposito emphasises that it is an inadmissible simplification to reduce the debate on (technological) futures to the opposition of reality and non-reality, because this would neglect the social relevance of fictions (Esposito, 2007, p. 120). Like Esposito, Jens Beckert also underlines the fictional character of technological futures and their social impact (Beckert, 2016). He states that fictional expectations influence the stakeholders related to the development of emerging technologies and helps them to align their actions on the idea, that this technology future is not a fiction but will soon become a reality. Hence, these fictional texts demand from their recipients the willing suspension of disbelief (Coleridge, 1817) and aim at becoming “a fiction that masks its fictionality” (Iser, 1993, p. 13).

I argue that the worlds talked about in the context of technological futures are *imaginary* worlds, meaning cognitive constructs building up on the way we perceive our reality combined with culturally shared hopes and fears. As stated above, Futures postulate a break between our world and the potential future world which is accompanied by a series of changes that cannot be foreseen, as no knowledge exists about this future world to come. The only knowledge that exists point at worlds, that are somehow different from our reality, while at the same time relate to our reality. It raises the question of how these worlds differ from the reality that we know and how they relate to each other. Treating future worlds as imaginary worlds allows for an examination of the work that has been done on imaginary worlds in literary and especially SF-studies.



WORLDS WITHIN WORLDS¹

As stated above, the concept of *world* plays an important role in thinking about the future and about the impact of emerging technologies. But what do we mean when we say, a *different world is imagined here*? One approach to answering this question is to examine the art genre that has mastered the invention of other worlds like no other: science fiction (SF). The central subject of SF is change. It is already in the name that this change is often equated with scientific and technological progress, which explains why the genre is said to be born in the middle of the 19th century, at a time when social change and technological progress could be consciously perceived for the first time in a lifetime (Vint, 2021, p. 16).

Throughout the history of the genre, the meaning of SF has been redefined again and again, often by authors or publishers to distinguish themselves from other authors and to coin their own school of writing.² Although the definitions vary, the different attempts help to understand the relation between SF and the concept of *world*. To embark into the reflection on this concept, we will start with a quote from literary theorist Robert Scholes, who defines SF as a genre that „insists on some radical discontinuity between the world present to us and the world of our experience.” (Scholes, 1975, p. ix)

The two worlds Scholes refers to are object of interest in narratology, literary studies and philosophy (see e.g., possible world theory). In these domains, the *world of our experience* is called *actual world*, *primary world* (Wolf, 2012) or *zero world* (Suvin, 1972, p. 11). This term refers to the contemporary context of the author at the time he or she wrote the story, or as Suvin (1972) puts it: the „empirically verifiable properties around the author” (p. 377). It is marked *zero*, as it is the central reference point of the literature at hand and includes not only the spatial and temporal attributions but also the cultural context that often inscribes itself into the fictional work.

The world *present to us* through the narrative is called the *imaginary world*, *secondary world* (Wolf, 2012) or *storyworld* (von Stackelberg and McDowell, 2015), meaning the place and time in which a narrative is happening, and includes not only the imaginary temporal and spatial setting, but also the technological, social, cultural or other spheres. The literary scholar and critic Marie-Laure Ryan defines an imaginary world as a non-contradictory „connected set of objects and individuals; habitable environment; reasonably intelligible totality for external observers; field of activity for its members” (Ryan, 2001, p. 91).

The relationship between both worlds goes beyond the dichotomy of fictional and real but instead both worlds are interlinked in different ways which will be explained in the following three examples.

¹ This title is taken from J.P. Wolf (2012)

² A famous example for this is Margaret Atwood’s use of the term Speculative Fiction instead of Science Fiction: „What I mean by ‘science fiction’ is those books that descend from H.G. Wells’ The War of the Worlds, which treats of an invasion by tentacled, blood-sucking Martians shot to Earth in metal canisters – things that could possible happen – whereas, for me ‘speculative fiction’ means plots that descend from Jules Verne’s books about submarines and balloon travel and such – things that really could happen but just hadn’t completely happened when the authors wrote the books” (Atwood, 2012, p. 6). For an in-depth discussion on the definition of the genre see Oziewicz (2017).



(1) Deviation & Attachment

Both worlds differ by a degree of deviation which Wolf calls *secondariness*. The level of secondariness „depends on the extent to which a place is detached from the Primary World and different from it” (Wolf, 2012, p. 26). Wolf explains this as a spectrum between a high degree of deviation and a high degree of attachment. He gives the example of Tolstoy’s (1869) *War and Peace*, a novel in which the main action is set in the actual world, to be more precise in Russia during a historical period. This novel would be on the realistic end of the spectrum, as it has a high level of attachment. On the other end he sets L. Frank Baum’s *The Wonderful Wizard of Oz* (1900). Although the story begins and ends in the actual world, the main part takes places in the fantastic land of Oz, which is a world that does not correlate with the actual world at all. Therefore, the novel would be on the opposite side of the spectrum, as it has a high level of deviation. The level of secondariness is a spectrum and different imaginary worlds are placed between both ends, depending on the level of deviation or attachment.

Thomas Pavel (1989) points out that imaginary worlds consist of two characteristics: The first characteristic is a set of elements, meaning objects, places, people and other things that are mentioned. The second characteristics is the relationship of these elements towards each other (Pavel, 1989, p. 47). The closer the elements and their relations of the imaginary world are to the actual world, the higher is the level of attachment (and vice versa). Categorizing imaginary worlds into elements and their relations allows one to determine the level of secondariness between both worlds.

In the context of images of the future, the position on the spectrum of secondariness is somewhere in the middle: The imaginary worlds describe ‘the future’ of the actual world and presents a connection to the actual world through the linearity of time and processes of change. This connection also implies that some elements or relations of the actual world will still exist in the imaginary world, as the future is an „accretive space” (Foster, 2013). The deviation between both worlds comes through the introduction of new elements called „novum” (or nova in the plural) (Suvin, 1972, p. 94), the fictitious novelty(ies) of every SF-world. The novum can exist in different orders of magnitude and range from single (or several) deviations to whole milieus and changing environments. Most prominent in SF, especially in Near-Future Science-Fiction (Mehnert, 2019), is the use of a new technological gadget. However, the novum can also come in the form of political change,³ in the form of environmental change,⁴ or through any other external or internal forces.⁵

Visions of the future, understood as imaginary worlds, are therefore somewhere in the middle of the secondariness-spectrum. They claim to depict the actual world in the future, thus include elements from the present but also elements that deviate from the

³ As in Margaret Atwood’s novel *The Handmaid’s Tale* (1985), in which the government of the fictional country Gilead has drastically shifted the social power and gender dynamics.

⁴ For example, the subgenre of climate fiction, like Kim-Stanley Robinson’s (2018) *New York 2140*, uses environmental catastrophes as the central novum to create the deviation between the actual and the imaginary world.

⁵ As in Tom Perrotta’s (2012) novel *The Leftovers* where the imaginary world is very close to the actual world with the only difference that all of a sudden two percent of all mankind have vanished.



present. Wolf (2012) gives the example of Ridley Scott's (1982) *Blade Runner* which takes place in Los Angeles in the year 2019. Los Angeles is part of the actual world, although the city depicted in the movie deviates from the actual Los Angeles. *Blade Runner*'s Los Angeles consists of a number of nova which deviate the depicted world from our actual world – mainly new technologies like replicants, artificial animals or flying cars but also cultural changes like housing situations, interplanetary traveling and a rising Asian population. However, the relations of the elements show similarities to the actual world. For example, the technologies shown are owned by private tech-corporations that use them to gain power and wealth. The replicants, artificial human beings, are owned by the corporations and treated like slaves fighting for their freedom. Hence, the elements in these imaginary worlds might differ, but their relations are similar to the relations in the actual world. These kinds of imaginary worlds show us an estranged form of our actual world and allow us to reflect on the aspects that are left unchanged.

(2) Accessibility & Completeness

Both worlds are structured hierarchically, meaning that the actual world contains imaginary worlds. Storyworlds, although being fictional, exist in the Primary World, as we can refer to them, talk about them but also experience them by immersing ourselves into stories presented through books, films, video games and other media formats, such as appendices, glossaries or maps or images, sounds, or other artefacts. In short, for an imaginary world to be experienced, it needs to be accessible through a medium. Ryan, focussing mainly on literary texts, uses the metaphor of *text as window* and says:

„The text is apprehended as a window on something that exists outside language and extends in time and space well beyond the window frame. To speak of a textual world means to draw a distinction between a realm of language, made of names, definite descriptions, sentences, and propositions, and an extralinguistic realm of characters, objects, facts, and states of affairs serving as referents to the linguistic expressions.” (Ryan, 2001, p. 91)

Understanding narrative texts as windows into other worlds means to rely on the linguistic expressions which allow access to the realm of the extralinguistic, the world behind the text. As Pavel puts it: „Thus, to speak about a [world] containing colours, one needs a language that possesses qualitative predicates” (Pavel, 1989, p. 52).

In SF, the postulated changes are expressed through language. However, many of the elements presented do not exist in the actual world and therefore are lacking the words to describe them. At this point, language needs to be reinvented through the use of neologisms. Wolf points to the role of neologisms in representing deviant and imagined worlds and says that new words or different names can draw attention to different aspects of familiar things or even define new concepts (Wolf, 2012, p. 35). The SF author William Gibson, one of the most important authors for contemporary SF, creates in his debut novel *Neuromancer* (Gibson, 1984) a variety of examples of this, as can be seen in the following brief description of the world. In the story, we follow Case, a *Console Cowboy*⁶ who lives

⁶ Console Cowboys stands for an archetype of a hacker.



in the *Sprawl*⁷ and suffers from the loss of his ability to tap into the cyberspace matrix. He used to be a thief who worked for other thieves, hacking through *ICE*⁸ to steal data from large multinational corporations called *Zaibatsus*. One day he stole from his clients, who in return cut off his access to cyberspace.

The neologisms highlighted above do not make sense without the appropriate context that is of the imaginary world. To create the context, SF authors work with a multitude of small glimpses and episodic descriptions of the everyday life of the protagonists and their individual life worlds. These impressions condense in the reader's mind to a holistic understanding of the altered world and allow a context to emerge during the reception. With regards to the recipient, narratologist David Hermann (2003) also speaks of cognitive mapping, referring to the process by which readers develop mental models of the (spatial) relationships between characters, objects, places, and regions mentioned or implied in a narrative (p. 21).

While we can access imaginary worlds from the actual worlds, there is also a connection the other way around. Sometimes, elements from the imaginary world spill over and find their form in the actual world. Staying with the example of Gibson's *Neuromancer*, the term *Cyberspace*, which he popularized through his novel, became a vision for engineers and developers of VR-applications in the 1990s. Als literary critic Katherine Hayles points out:

„The Neuromancer trilogy gave a local habitation and a name to the disparate spaces of computer simulations, networks, and hypertext windows that, before Gibson's intervention, had been discussed as separate phenomena. Gibson's novels acted like seed crystals thrown into a supersaturated solution; the time was ripe for the technology known as cyberspace to precipitate into public consciousness.” (Hayles, 1999, 36)

As an example, Hayles refers to John Walker, the co-founder of the software company Autodesk, who uses the term cyberspace in the formulation of his vision of three-dimensional virtual reality image software (Walker, 1989). On Walker's account, pop-cultural fiction advances to become the guiding principle for technological development of the company, which is not very uncommon. Elements from imaginary worlds of SF are often adopted by the industry. Schröter emphasises here that the adoption of popular semantics can be useful because terms such as cyberspace are also connectable outside of science, which under certain circumstances favours communication between research and industry or the procurement of funds for research projects (Schröter, 2004, p. 32). However, often the elements that spill over from the imaginary world into the

⁷ Officially known as the Boston-Atlanta Metropolitan Axis; an urban area that developed along the east coast of the United States and merges all major cities between Boston and Atlanta. Geodetic domes cover parts of the *Sprawl* (n.d.), which hinders the residents from experiencing the natural day-night cycle and the weather. As describe in the fandom glossary of the imaginary world: „Before dawn the geodesics are lightening into gray and then pink” („*The Sprawl*”), which also explains the famous first lines in the book: „The sky above the port was the color of television, tuned to a dead channel” (Gibson, 1984, p. 1).

⁸ *Intrusion Countermeasures Electronics* is a spatial firewall that protects sensible data and computer systems: „Ice patterns formed and reformed on the screen as he probed for gaps, skirted the most obvious traps, and mapped the route he'd take through Sense/Net's ice. It was good ice. Wonderful ice. ... Its rainbow pixel maze was the first thing he saw when he woke. He'd go straight to the deck, not bothering to dress, and jack in. He was cutting it. He was working. He lost track of days” (Gibson, 1984, p. 67).



actual world lose their relational properties. While the cyberspace in the world of Gibson's *Neuromancer* is a hostile place that holds the human mind captive, the cyberspace used in the vision of Autodesk and other industry companies becomes a shinier and glossier one, where the potential critical parts are left out.

(3) Inscription & Interpretation

Understanding futures as worlds means that every image of the future is a window to an imaginary world. However, oftentimes crucial elements constituting the imaginary world are only implied, meaning, they are in the world but not inside of the window.

For one, the actual world inscribes itself into the imaginary world. Therefore, a hermeneutic analysis of SF narrations can help to uncover the assumptions of how technology is supposed to shape society - assumptions that were guiding the anticipatory extrapolation of the author (Mehnert, 2021), as the visions presented in the narrative are not presenting an actual future but instead represent the sociotechnical imaginaries (Jasanoff and Kim, 2015) of the author's zero world and the foundation on which his or her speculation is based upon.

Aside from the author, the reader also engages with the depicted world by extrapolating it further and exploring the areas outside of the window frame. This process, that Ekman and Taylor call „readerly worldbuilding” (Ekman and Taylor, 2016, p. 11), builds upon the hermeneutical construction of the reader who adds elements to a structure presented by the author. Ryan points out that the reader constructs in imagination a set of language independent objects to build a more vivid representation of the imaginary world. For this activity, the reader imports information from their own „cognitive models, inferential mechanisms, real-life experience, and cultural knowledge, including knowledge derived from other texts” (Ryan, 2001, p. 91). Thus, immersing oneself into an imaginary world relies on the way in which texts are set up and what clues are perceived, but also on the reader's reconstruction of these cues during the reading process. Or, as Bruner puts it:

„As our readers read, as they begin to construct a virtual text of their own, it is as if they were embarking on a journey without maps-and yet, they possess a stock of maps that might give hints, and besides, they know a lot about journeys and about mapmaking. First impressions of the new terrain are, of course, based on older journeys already taken.” (Bruner, 1987, p. 36)

What Bruner and Ryan hint at are the learned experiences of the readers from other journeys into imaginary worlds. To navigate an imaginary world of the future, it presumably helps to have read other texts about imaginary worlds of the future before. In each text we learn something new about the potential existing elements and through reading about them, we become familiar with these elements. In this context, Damien Broderick (1994) points to the existence of an extensive mega-text of SF which is composed of the numerous individual texts and resembles a collection of different elements and relations from which SF authors and readers can quote or refer to. This megatext includes elements such as alien monsters, spaceships, robots, futuristic cities, but also things like space travel, the technological enhancement of the human body, and



more. At the same time, the mega-text is not rigid, but expands and changes over time and with the new novels that are added:

„When novelties like hyper-space and cyberspace, memex and AI (Artificial Intelligence), nanotech and plug-in personality agents are very quickly taken up as the common property of a number of independent stories and authors, we have the beginnings of a new mega-text.” (Broderick, 1994, p. 59)

Just as the mega-text is not a rigid entity, the elements themselves are also subject to processes of change and thus do not have an unchanging meaning. The robot, for example, is a steady element of the SF-megatext but its relation to the human has been reinterpreted several times (Lin, 2022). For example, robots range from dangerous or disturbing machines in the Terminator franchise, to helpful or funny assistants in the Star Wars universe. Yet all these variants bear certain similarities, meaning a specific element (e.g., the neurointerface, robots, spaceships, etc.) are hold together by a limited number of narrative vectors and only attract a relatively small range of possible meanings and relations (Broderick, 1994, p. 60).

The SF-megatext also entails spill-over effects from the imaginary world to the actual world. Through the repeated use of typical elements, for example emerging technologies like robots, neurotechnologies or tractor beams, SF normalizes these elements and makes its readers comfortable with them. It therefore reduces the disbelief or the acceptance that these elements could potentially exist in the actual world. With a reference to the film *Threshold* (Pearce, 1981), the media scholar David Kirby (2010) explains how SF was as used a format of public relations to reduce „public anxiety about the implantation of a permanent artificial heart in humans”. In the movie, the artificial heart became the novum of the imaginary world and is identified as the one element that sets the two worlds apart. Kirby refers to this as *diegetic prototypes*, these prototypes are displayed in the context of the film and the imagined world. They „entail an additional visual and narrative rhetoric specifically framed so as to encourage audience support for the development of the technology on the screen” (Kirby, 2010, p. 44). Through the use of diegetic prototypes, emergent technologies are contextualized within a social sphere.

Becoming familiar with the estranged ideas and unconventional elements presented in the imaginary worlds of SF also reduces our doubt about these elements becoming part of our actual world, or as SF author Isaac Asimov pointed out:

„Science fiction writers and readers didn’t put a man on the moon all by themselves, but they created a climate of opinion in which the goal of putting a man on the moon became acceptable.”⁹

With these reflection on the relationship between worlds, I will now explore three different ways of SF to build imaginary worlds.

EMBARKING TO OTHER WORLDS

To explain how SF writes about change and how it writes about different worlds that are estranged from ours through the novum, I will start with what Eugene Thacker calls the „mode” of SF:

⁹ The actual source of the quote is unknown.



„Science fiction names a contemporary mode in which the techniques of extrapolation and speculation are utilized in a narrative form, to construct near-future, far-future or fantastic worlds in which science, technology and society intersect.” (Thacker, 2001, p. 156)

Thacker differentiates between two modes of exploration: Extrapolation and speculation. These two modes of thinking are at the core of SF and also regulate the level of secondariness, the deviation between the actual and the imaginary world as explained above. According to McHale (McHale, 1989, p. 244), extrapolative SF¹⁰ begins with the current state of the actual world and proceeds to construct a world which might be a future extension or consequence of the current state of affairs. Speculation on the other hand involves an imaginative leap from the actual world which cannot (or only vaguely) be connected to the current state of affairs¹¹. In other words, SF based on extrapolation displays a larger attachment to our actual world than SF based on speculation does.

Beyond the secondariness of an imaginary world, there are different ways in which the relation between the elements in the world are displayed. Judith Merril, SF-writer and activist, suggests in her essay „What do you mean: Science? Fiction?” (1966) three different types: (1) Teaching Stories, (2) Preaching Stories, and (3) Speculative Fiction. These three different approaches can be positioned between two extremes which author Robert Heinlein defines as follows:

„There are at least two principal ways to write [SF] — write about people or write about gadgets.” (Heinlein, 1947/2017, p. 17)

(4) The Teaching Stories

If we follow Heinlein's quote from above, *Teaching Stories* assemble stories solely about gadgets, meaning new technologies or fantastic inventions. The stories focus on possible innovations, convey scientific ideas, present new technological applications, and hold an educational function in the sense of science communication.

The approach has its origins in the fantastic works of Jules Verne or H.G. Wells. Inspired by the techno-romantic tales of flying ships, time machines, and submarines, American authors in the early 1920s wrote stories about inventions such as rocket engines or robots. In the history of SF, this period is better known as the *Pulp Area*, because the short stories appeared in so-called pulps, meaning inexpensive magazines printed on cheap paper and sold as dime novels (Mamczak, 2021, p. 66). The most important magazine in hindsight was *Amazing Stories - The Magazine of Scientification*, edited by author, publisher and technology enthusiast Hugo Gernsback. Under the credo *Tomorrow's machines today*, Gernsback published short stories about possible machines of the future. The stories were not particularly sophisticated and usually followed the

¹⁰ As examples we can think of any kind of near-future SF (Mehnert, 2019), such as *Black Mirror* (Brooker, 2011) or the film *Her* (Jonze, 2014).

¹¹ Examples for this would be *The Foundation Trilogy* (Asimov, 1942/2010), *The Lefthand of Darkness* (Le Guin, 1969) or *Dune* (Herbert, 1965/1990). These three series of novels each play in one imaginary world. In each of these worlds, humankind has expanded over lightyears away from earth, founded new colonies, developed new technologies and even transformed human beings evolutionarily to the point of unrecognizability.



same pattern. They contained detailed descriptions of technological innovations, delivered in ponderous prose and illustrated by flat characters and wooden dialogues. They were technocentric, putting technology in the foreground and discussing social implications or societal changes - if at all - only in passing. Therefore, the world depicted can be described as rather thin.

Before Gernsback concentrated on SF, he published magazines about radios, such as *Modern Electrics*, *The Electrical Experimenter* or *Radio Amateur News*. Here he repeatedly interspersed fictional stories about curious inventions. The stories were so well received that he turned them into his own magazine (Mamczak, 2021, p. 67). Hence, Gernsback saw *Amazing Stories* as an innovative format for science communication. The detailed descriptions of the technologies aimed at inspiring discussions about the technologies themselves, as Gernsback (1926) emphasized in the preface to the first publication of *Amazing Stories*:

Not only do these amazing tales make tremendously interesting reading — they are also always instructive. They supply knowledge that we might not otherwise obtain — and they supply it in a very palatable form. For the best of these modern writers of scientifiction have the knack of imparting knowledge, and even inspiration, without once making us aware that we are being taught. (p. 12)

Hayles Twenty years after Gernsback, authors such as Arthur C. Clarke and Isaac Asimov continued this form of SF under the title of Hard SF. Their works were oriented towards what was technologically feasible and served as inspiration for future generations of engineers by providing technological imaginaries.¹²

(5) The Preaching Stories

The counterpart to Teaching Stories are Preaching Stories. On Heinlein's People-Gadget spectrum cited above, these stories would be on the People side. They are allegories or satires that are more concerned with the behaviour of human society than with its future technologies. These include works by Ray Bradbury, Aldous Huxley, and other representatives of utopian and dystopian novels. The stories, as well as the worlds described in these stories, follow the author's moral concepts rather than the causal implication chains of technological innovations.

With the focus on socio-cultural changes, this mode of SF is also called *Soft SF* and includes narratives that primarily concentrate on the extrapolation from the social sciences (e.g., sociology and psychology)¹³ or narratives in which engineering and natural sciences do not play a relevant role (Prucher, 2007, p. 191). Examples of this mode are

¹² For example, Clarke's collaboration on the screenplay for the movie *2001: A Space Odyssey* (Kubrick and Clarke, 1968) formed the way we imagine the aesthetic of space travel up until today, and Asimov's three laws of robotics still serve as a significant imaginary in the discourse surrounding the development of A.I. and robotics.

¹³ A famous example would be Aldous Huxley's *Brave New World* (Huxley, 1932), whose world builds upon an extrapolation of behaviorism and conditioning, the psychological paradigms of the early 20th century. For another example, see the anthology *Apeman, Spaceman: An Anthology of Anthropological Science Fiction* (Stover and Harrison, 1972).



stories that deal with future social orders, such as George Orwell's (1949) *1984*, a novel about a totalitarian state that is sustained by new technologies. However, the novum here is not the technologies but rather the dictatorial program of the INGSOC party. The novel follows the guiding question of *What if England were to turn into a totalitarian regime?*

Another example is H.G. Wells' (1895) novel *The Time Machine*. The novel is about two unnamed time travelers who travel to the future of the year 802.701, a world in which humanity has evolved into two groups: the Eloi and the Morlocks. While the Eloi live on the surface of the Earth and enjoy carefree living, the Morlocks are condemned to a life underground and operate huge machines that enable the Eloi to maintain their standard of life. The novel focuses on the social class differences that Wells extrapolated from Victorian England into the future. The new technology in the novel - the time machine - serves only as a plot device to advance the development of the story. It becomes a means of transportation so that the protagonists can travel within the diegetic world and so the author can explain the world to the reader through the eyes of protagonists. As a soft SF narrative, the novel thus deals with social class differences and creates an analogy to the conditions of the time. The time machine itself takes only a supporting role. If the novel were a hard SF story, Wells would address the physics of time travel and describe the (im)possibilities of the technology, while the class distinctions he moralizes about would fade into the background. Wells is also unconcerned with how the world and how society would change with the introduction of a time-machine,¹⁴ because the machine itself plays no role in the future world he describes.

(6) Speculative Fiction or SF as Technology assessment

The previous modes of SF can be understood as two dichotomous extremes. Individual works tend more towards one end of the spectrum or the other and either tell stories about gadgets or about people, while others lie somewhere in between and tell stories about gadgets and their relations with people. Thus, it is not just a matter of describing a future technology with technical precision (see Teaching Stories) or reflecting on political and social upheavals (see Preaching Stories). Instead, imagining the sociotechnical changes driven by new technologies can also provide the point of reflection in the narratives. A good example for this is the following phrasing:

„A good science fiction story should be able to predict not the automobile but the traffic jam.”¹⁵

This mode emerged in the Golden Age of SF and is heavily influenced by the work of publisher Joseph Campbell and his interest in the social impact of new technologies (Merril, 1966, p. 32). One of the writers in Campbell's network was Robert Heinlein. With his essay „On the Writing of Speculative Fiction” (1947) he coined an approach to SF that was deliberately different from the modes described earlier:

What we do mean is the speculative story, the story embodying the notion ‘just suppose...’ or ‘What would happen if...’. In the speculative science fiction story

¹⁴ As is the case, for example, in the novel *How to Live Safely in a Science Fictional Universe* (Yu, 2011).

¹⁵ It's unclear who to give credit for this quote, as SF-authors Robert Heinlein, Isaac Asimov and Frederik Pohl (among others) all used it in different context (see O'Toole, 2019).



accepted science [...] are extrapolated to produce a new situation, a new framework for human action. As a result of this new situation, new human problems are created – and our story is about how human beings cope with those new problems. The story is not about the new situation; it is about coping with problems arising out of the new situation. (Heinlein, 1947/2017, p. 3)

SF thus becomes a form of „narrative technology assessment” (Steinmüller, 2016, p. 328). Read as a possible future development, this form of SF creates knowledge about the future, using methods similar to those used in foresight processes, for example scenario building. SF in the mode of Heinlein’s Speculative Fiction becomes a thought experiment on sociotechnical interaction: It introduces an emerging technology into the known world and creates an estranged environment that reveals something about the new technologies and human interactions with it (Merril, 1966, pp. 26-27).

The understanding of SF as a sociotechnical thought experiment runs through SF studies to this day and has established itself as a general definition of the genre. For example, Alex McDowell, the set designer for the film *Minority Report* (Spielberg, 2002), describes SF as a space in which to prototype more detailed interactions between new technologies, potential users, the places they live in, and many other elements of the imaginary world (von Stackelberg and McDowell, 2015, p. 32). The German futurologist and SF author Karlheinz Steinmüller speaks of *epistemological science fiction*, in which various aspects of new technologies, such as prerequisites or consequences, are cursorily explored (Steinmüller, 2016, p. 321). Former IBM futurologist Brian Johnson (2011) speaks of „science fiction prototyping” and describes a way of using speculation about new technologies as a method for ideation processes in the industry. In the context of so-called „Responsible Research and Innovation”, Stahl et al. (2014) state that writing SF that relates to the actual development process of new technologies can help developers explore and better understand the social, ethical, and cultural implications of the technologies being developed (p. 82). While SF writing has now also found its way into the training of engineers and developers (Berne and Schummer, 2005), diverse educational institutions rely on the use of SF as a resource and heuristic. Arizona State University and the Centre for Science and the Imagination or the Future of Humanity Institute at the University of Oxford are most notable for drawing on SF in order to think about the future in different contexts and to understand the intertwined concatenations of change that might result from postulated technological change (Vint, 2021, p. 42).

Futurologist Ruth-Ellen L. Miller concludes that deliberate speculation about the possible consequences of new technology is a useful complement to the rather dry, analytical, and statistical assessment of emergent technology. SF brings into focus cultural and human factors that are often ignored by other foresight processes. As an example, she cites Robert Heinlein’s story „Blowups Happen” (Heinlein, 1940/1975), in which Heinlein described the Three Miles Island accident nearly forty years before the event happened in the actual world:

„Heinlein wrote a story that focused on the constant pressure on personnel to keep abreast of what was happening in a reactor. In the process, he managed to predict almost exactly the one set of events that the team preparing the IA report on the project had



dismissed as too improbable to evaluate [...] – but which were very close to what actually occurred [...]” (Miller, 2015, p. 108)

From this example, Miller concludes that impact assessments of a technology often address only social systems, values, and political issues, or focus on technologies, economics, and ecologies but leave out the direct human experience. The worlds developed in SF on the other hand entangle the technologies, economies, and ecologies, and share them through a focus on the characters’ experiences. Taken together, the two approaches provide a full picture of the potentials, with some overlap (Miller, 2015, p. 109).

SF, in the sense of the Speculative Fiction thinks technology & society together as a sociotechnical system. SF stories create a kind of scenario which differs from the scenarios from classic foresight processes in the depth of detail. While classical scenario processes try to open up multiple futures, SF stories go into depth, describe in detail one potential future and build an imaginary world around it. This world is described and explored, for example, through the perspectives of different characters or with focus on the impact on different aspects of the world (e.g., different milieus, cultures, environments, behaviours, etc.). Thus, while the world developed does not intend to be compared with other worlds - as in best vs. worst case scenarios - it does create a higher level of detail in the form of dense descriptions of sociocultural changes under the influence of emerging technologies. Literary scholar Eva Horn describes this in the following way:

„[SF authors] ask: ‘what if ...?’ and answer this question with a set of hypothetical narratives that are as well-informed, fact-based, but at the same time as creative as possible. Their epistemological advantage over abstract modelling of the future lies in their concreteness: they offer a ‘thick description’ of the future that serves to imagine it en détail, in the simultaneity and complex interconnectedness of its various aspects. (Horn, 2014, p. 39)

CONCLUSION

Reading Technofutures as imaginary worlds allows us to engage differently with the postulated visions in several ways. First, understanding that Technofutures are only windows into imaginary worlds reminds us that the depiction is necessarily incomplete. There is more of the world beyond the window frame which needs to be explored to create a more *responsible representation* of the imagined future at stake. This can be done by engaging in an extrapolating activity based on the cues of the imaginary world that have already been laid out (*readerly worldbuilding*). Such an activity can also help re-imagine the presented imaginary world, by for example, replacing elements or changing the presumed relations. As the future does not have to be a technological design, this activity also invites to re-imagine imaginary worlds that can help foster different perspectives and estrange our ways of knowing the world.

Second, worlds are entangled, that means it is not just about one element on its own, but it is about the relations of these elements to each other and the actual world. Becoming aware of the entanglement and the feedback cycles that are created between both worlds



allows us to reflect on the role that mediated imaginary worlds play in reflections of the future.

Lastly, imaginary worlds are inspired by the worldview of the authors. Thus, analysing worlds can also help us understand how we currently perceive the world and how this world could be different. Every future imagination is bound to the „immanence of the present” (Grunwald, 2006) and to the statements and imaginaries about futures that are currently circulating as part of a larger megatext. Therefore, they must be read as the product of their present and not as statements about an actual future.

Using the framework of understanding and analysing futures as imaginary worlds can offer a thorough approach of analysing images of the future and helps us reimagine the future of emerging technologies more holistically.

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Статья поступила 24 июня 2023
одобрена после рецензирования 18 августа 2023
принята к публикации 7 сентября 2023

Received: 24 June 2023
Revised: 18 August 2023
Accepted: 7 September 2023



<https://doi.org/10.48417/technolang.2023.03.08>

Research article

Ontolytic Writing of the Future

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Abstract

Visions of the future in the face of advancing scientific and technological developments are arguably as old as technological progress itself. In recent decades, however, and through new and emergent technologies such as nanotechnology or synthetic biology such writing of the future has increasingly taken on a quality that is more than merely imagining possible futures or extrapolating current developments. This is a writing of the future that can unravel the weave of the present – it is ontolytic writing. In order to illuminate ontolytic writing and what it means, we will first take a look at the phenomenon of the future tense II – how it represents a time loop through which an observer views the present from a position of the future and, in this act of viewing, ‘determines’ what of it will have been important. In a next step, parallels are drawn to prophetic speech that predicts a future and thereby rewrites the present. Then, through a look at the theory of science fiction literature, particularly Darko Suvin, this influence of the future narrative on the present is framed as ontolytic. Ontolysis is embedded in other concepts from science fiction theory, primarily estrangement, the notion of the novum, and chronotope. Using some examples of technovisionary texts, it is shown that this ‘diagnosis’ is transferable from Science Fiction literature to all other kinds of technovisionary narratives. The paper concludes with basic considerations about the kind of ontology that can be used to further elucidate the concept of ontolysis.

Keywords: Technofuturism, Ontology; Ontolysis; Ontolytic Writing; Future; Novum; Estrangement; Chronotope; Science Fiction

Citation: Gammel, S. (2023). Ontolytic Writing of the Future. *Technology and Language*, 4(3), 105-117. <https://doi.org/10.48417/technolang.2023.03.08>



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УДК 111: 828-344

<https://doi.org/10.48417/technolang.2023.03.08>

Научная статья

Онтолитическое письмо будущего

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Аннотация

Видения будущего в условиях прогресса научных и технологических разработок, возможно, так же стары, как и сам технологический прогресс. Однако в последние десятилетия, а также благодаря новым и появляющимся технологиям, таким как нанотехнологии или синтетическая биология, описание будущего все больше приобретает качество, которое выходит за рамки простого воображения возможного будущего или экстраполяции текущих событий. Это письмо будущего, способное распутать ткань настоящего – это онтолитическое письмо. Чтобы пролить свет на онтолитическое письмо и его значение, мы сначала взглянем на феномен будущего времени II – как оно представляет собой временную петлю, через которую наблюдатель рассматривает настоящее с позиции будущего и в этом акте просмотра “определяет”, что именно было важным. На следующем этапе проводятся параллели с пророческой речью, предсказывающей будущее и тем самым переписывающей настоящее. Затем, если взглянуть на теорию научно-фантастической литературы, в частности на Дарко Сувина, это влияние будущего нарратива на настоящее представляется онтолитическим. Онтолиз заложен в других концепциях теории научной фантастики, прежде всего в отчуждении, понятии новума (novum) и хронотопа. На некоторых примерах техновизионерских текстов показано, что этот “диагноз” переносится из научно-фантастической литературы на все другие виды техновизионерских нарративов. В заключение статьи приводятся основные соображения о том, какую онтологию можно использовать для дальнейшего разъяснения концепции онтолиза.

Ключевые слова: Технофутуризм; Онтология; Онтолиз; Онтолитическое письмо; Будущее; Новум; Отчуждение; Хронотоп; Научная фантастика

Для цитирования: Gammel, S. Ontolytic Writing of the Future // Technology and Language. 2023. № 4(3). Р. 105-117. <https://doi.org/10.48417/technolang.2023.03.08>



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PRELIMINARY CONSIDERATIONS

Some say: Past and future do not exist, only the now, the present moment, which is thought either unextended, or with a certain 'halo' of presence that surrounds it and is not further defined. This is what I want to start from. So, when I talk or write about past or future things, I talk or write about something that does not exist.

It seems as if – strictly speaking – I can only be silent about the present (in the narrow sense), because: if I talk about it, the thoughts preceding it, even if only minimally, are the past of what I talk about. So, I am talking about the past. If I now write this down, something similarly happens: At best, the writing reproduces past thoughts, at worst the past speech of my preceding thoughts. I am caught in the meshwork of the words, which are not the things, and which as 'known' always belong to or originate from the past.

(Let's stick to writing, and not be so strict – and understand the present as a subjectively felt period or space of time, be it the present minute, the current year, or 'the 20s'). When I write about what is, I write about the present, about what exists. I cannot write about the future, as something that exists. I create forecasts, prophecies, or the like with words. But this is double-faced, for if I do this in a certain way (which remains to be clarified), then I am again quite actually talking about the present, and into the present, changing it – doing so in the voice of the future perfect, thus going beyond what can be indirectly inferred from speech about the future that concerns the present. This is of such or such a kind. And: this will have been of such or such a kind. These are not the same – I am talking in a loop!

FUTURE PERFECT/FUTURE TENSE II

Peter Bexte (1991) explores some implications or examples of this future tense II in his essay "Das wird's gewesen sein!" (This will have been it!). He traces some implications or examples of future tense II as understood here, extending it beyond the concrete grammatical form to a possessive gesture. First, we are confronted with the 'New Zealander' captured by graphic artist Gustave Doré. In the last panel of his *London: A Pilgrimage* (1890) the New Zealander as a tourist from the other side of the world contemplates the ruins of London as the British of the Empire contemplated the ruins of the ancient Romans and Greeks (Doré and Jerrold, 2020, p. 259). The origin of the trope, the stereotype of the New Zealander, is generally attributed to the British historian and statesman Thomas Babington Macaulay (1800-1859) but has a more distant history and was widely used in the 19th century (cf. Dukes, 2021). The (fictional) New Zealander generally approaches the reader as a chronicler of the future (Bexte, 1991, p. 96), casting his eye in the future on the remains of our present, thus saying: This will have been it! He says what of today will have been important tomorrow and thus changes today. Macaulay himself 'used' the New Zealander whenever he wanted to point out political developments that could lead to a decline of the Empire – expressing the colonialist's fear of a future reversal of the balance of power.

A variation of the theme of doom in the future tense II loop is Albert Speer's "A Theory of Ruin Value" (Speer 1970, p. 56; cf. Bexte, 1991, p. 101-02), which met Hitler's approval: The important buildings of the 'third Reich' were to be erected in such a way



that in a very distant future, even in the stage of decay analogous to the Roman Empire, the splendor of Hitler's Reich will still be readable. “To illustrate my ideas I had a romantic drawing prepared. It showed what the reviewing stand on the Zeppelin Field would look like after generations of neglect, overgrown with ivy, its columns fallen, the walls crumbling here and there, but the outlines still clearly recognizable” (Speer, 1970, p. 56). Here we see an attempt to proactively encode into the now, through the lens of the future tense II, what it should have been in the future – “It is ‘futurismo et fascismo’ [...] in the German Romantic form of the future tense II” (Bexte, 1991, p. 103, translation S.G.).

Most interesting, however, with regard to an ontolytic writing of the future – we will come back to this – is Bexte’s reference to Paul Valéry’s *Monsieur Teste*, who is looking for a kind of *mechanical sieve* that would help him to consistently and continuously burn everything past behind him by helping him retain from today only what he would need in the future: “I keep what I want. But that is not the difficulty. It is rather to keep what I shall want tomorrow” (Valery, 1973, p. 11). Such a sieve would have to be able to say at any moment: This will have been it!

Of course, it is beyond human capacity to have or to construct such a sieve, for it would presuppose a divine perspective that bridges time, an “algorithm of God” (Bexte, 1991, p. 97). As Jacques Lacan points out: only a divine consciousness could say “what I shall have been for what I am in the process of becoming” (Lacan, 1989, p. 94). Bexte continues: “However, as long as we do not possess the algorithm of God, the future tense II tears the present apart. *It splits it into its material and its unattainable meaning, its forever only future meaning.* [...] Thus the future tense II, as a linguistically completed future, plays Judgement Day. In its name, the power of the origin falls into the maelstrom of the end” (Bexte, 1991, pp. 97-8, translation S.G., emphasis added). “The fracturing of the present by the future tense II expresses itself in a double-tongued way: Dampening desire while focusing its alignment. [...] As a memento mori, this rupture stands in a melancholy tradition and at the same time has its aggressive side in the breaking of the present by the presence of the future. In this grip there can be a threatening gesture that denies the hypothetical character of the future tense II and forcibly transforms it into apodictic certainty by constantly knowing how to remember only the same thing about the present [...]” (Bexte, 1991, p. 101, translation S.G.). Bexte thus remarks on the not inconsiderable ‘power’ of the future tense II, since it “[forms] the present in a way that human Dasein cannot escape” (p. 103). In current debates it can be observed, for example, that some futurologists want to give the impression that they have such a sieve at their disposal.

PROJECTED TIME

Let us first note: the future perfect (in writing or speech) does something to the present, it changes it, possibly even does violence to it; and this occurs especially when the gesture of the future tense II denies its hypothetical character, that is, when it- comes across as prophecy. In the context of ethical aspects of nanotechnology (as a new and emerging technology), Jean-Pierre Dupuy (2007, 2012) has dealt with the question of



how enlightened doomsaying is possible, that is, enlightened prophetic speaking about the future in the form of apocalyptic predictions. This is to create the precondition in the present for exerting influence without losing oneself in hypotheses about possible futures.

This establishes a relation to the future of a sort that can best be illustrated by Dupuy's (2007) distinction between *occurring time* and *projected time* (p. 126-127). While occurring time is structured like a decision tree diagram in which various alternative time paths and options for action branch out from the present into the future, projected time is a closed loop.

To foretell the future in projected time, it is necessary to seek the loop's fixed point, where an expectation (on the part of the past with regard to the future) and a causal production (of the future by the past) coincide. (Dupuy, 2007, p. 127)

The prophet, according to Dupuy, must in the act of prophecy always already consider that the prophecy itself will play a part in the causal chain that will lead to the predicted result. Thus, prophecies do not belong in discussions of an open future, but instead afford an ontological positing. The prophet takes the standpoint of the future and looks back from there to a past which is the present, and from this perspective the future is no longer open but a fateful development. In such a way, not only is our relationship to the future reshaped, but looking back from the future also makes the present and its past something other than it was before. Ultimately, it is Bexte's future tense II – with the fixing of the future – which delivers a verdict on the present: this will have been it.

SCIENCE FICTION

So, what is this particular kind of talking about the present through the future, of writing into the present through the future? In order to be able to answer this question, the focus will be narrowed from general considerations to a writing of the future, asking how one can grasp the influence of this writing which delivers its words on the present quasi technically. Here it recommends itself to look at science fiction literature. Science fiction is writing in the future tense, but – as far as it is high quality literature – it is actually future tense II, insofar as it knows how to irritate the everyday world, the everyday present, in some form or other, to put an irritating sheen of estrangement on it. In the case of Science Fiction literature this does not imply a violent process, broadly understood, but takes place by way of an implicitly presupposed agreement with the reader.

It was Darko Suvin, an important theorist of Science Fiction literature, who stated an effect of high quality Science Fiction literature on the perception of the reader's life world, calling this effect ontolytic: An "ontolytic effect: the social addressee's empirical norms are being challenged by the estrangement inherent in the oscillation the text sets up between them and a new normative system, between the addressee's 'zero world' and the possible world of the SF text" (Suvin and Canavan, 1979/2016, p. 366-367). In a Science Fiction narrative, an alternative future world is described in which characters are subject to "ontic change," in terms of a shift in space or time, or in terms of reality itself changing. The presentation of this fictional future provides points of connection to the



life-world of the implied reader, and thus refers the future back to the 'present,' creating an oscillation between the two 'worlds' that allows the reader to see his or her world in a new light, namely that of the written future. The 'fabric' of the present (of what is) is restructured in this light, nuanced, opening up previously unseen connections and reevaluations – passing a sieve that reveals now what will have been important later. The furniture of the reader's world is being moved around.

For this to succeed, Science Fiction stories or histories need a novelty or novum around which they are structured. The Novum “makes for the SF narration’s specific ontolytic effect and properties. [...] SF does not posit another superordinated and ‘more real’ reality but an alternative on the same ontological level as the author’s empirical reality – one should say that the necessary correlate of the novum is an alternate reality, one that possesses a different historical time [...]” (Suvin and Canavan, 1979/2016, p. 87).

[Science Fiction’s novum] is ‘totalizing’ in the sense that it entails a change of the whole universe of the tale, or at least of crucially important aspects thereof (and it is therefore a means by which the whole tale can be analytically grasped). [...] Quantitatively, the postulated innovation [the novum] can be of quite different degrees of magnitude, running from the minimum of one discrete new ‘invention’ (gadget, technique, phenomenon, relationship) to the maximum of a setting (spatiotemporal locus), agent (main character or characters), and/or relations basically new and unknown in the author’s environment. (Suvin and Canavan, 1979/2016, p. 80)

The novum or the nova – there can also be several from different fields – can thus take on a variety of forms, from concrete gadgets, new scientific-technological developments to relation relations or social structures.

According to this theory, the novum is the structure-giving center of the chronotope (Greek for time-place). The chronotope was borrowed from the natural sciences and coined as a concept by the Russian literary scholar Mikhail Bakhtin (1997). The notion of chronotope allows one to see the various ways in which space and time form a unity in a narrative and how they are related to each other differently in different literary genres, structuring the plot differently. The design of settings and their representation matters, as do the plot that unfolds in time, as do the space (and time) of action of characters in the narrative, and as do structures of sequence of events in relation to plot location and time. The chronotope is thus the combination of map and timeline or cycle.

In the literary artistic chronotope, spatial and temporal indicators are fused into one carefully thought-out, concrete whole. Time, as it were, thickens, takes on flesh, becomes artistically visible; likewise, space becomes charged and responsive to the movements of time, plot and history. This intersection of axes and fusion of indicators characterizes the artistic chronotope. (Bakhtin 1997, p. 184)



One could say that “the chronotope is a way of ‘seeing’ time in the physical and spatial world” (Renfrew 2008, p. 114). Bakhtin himself applied his theory to the analysis of classical literary genres such as the picaresque novel, the Greek novel, or the romance of chivalry.

In science fiction as a “future” genre, the chronotope has two dimensions. There is a synchronic dimension, namely the structure of the space-time of the described world. And then there is a diachronic dimension which concerns the inner mechanics of development of this world and which explains – in the sense of a “future history” – how and for what reasons the reality of the reader and author has historically developed into the one described in the novel. These chronotopes are fascinating: as literary devices they captivate the reader, but in their linking power they also determine deeper structures of the narrative. The future history is an extrapolative construct that spins on technological and social currents of the present. And on the nature of the chronotope depends decisively whether this represents alternative developments under the premise of plausibility, prognosticism, or even determinism. The chronotope contains the author's actual conception of the future and the attendant world view.

Another brief look should be taken at another element of the science fiction genre, which – also introduced into the Science Fiction discourse by Darko Suvin – is closely related to novum and chronotope. This is the notion of estrangement, especially cognitive estrangement. The tension between the reader's experience in the respective everyday world and the novum “estranges the empirical norm of the implied reader [...] Clearly the novum is a mediating category whose explicative potency springs from its rare bridging of literary, extraliterary, fictional and empirical, formal and ideological domains [...]” (Suvin and Canavan, 1979/2016, p. 64). Defamiliarization, then, is ultimately a function of the novum, which through its novelty and otherness subverts the empirical norm of the implicit reader and is meant to override automatisms of perception.

Suvin explicitly refers to Bertolt Brecht and Viktor Shklovsky (Suvin and Canavan, 1979/2016, p. 6), but he applies in his own way to the genre of science fiction their concepts of *Verfremdung* (V-effect) and *ostranenie* (making strange). He integrates the different levels on which estrangement can take place into different aspects for his poetics of science fiction, concerning the nature of fictional worlds and their relation to empirical reality, a formal procedure to justify the novum – the naturalization of the marvelous, an opposite formal procedure, namely the rendering strange of the known, the de-automation of perception, the re-recognition of the known (cf. Spiegel, 2006, p. 19). Suvin chooses the term cognitive estrangement for his own conception.

BEYOND SCIENCE FICTION

Thus, having read the written future, the reader re-reads the present. Here we have a first meaning of the expression *ontolytic writing of the future*: writing the future in such a way that it has an effect of dissolving the fabric of the present.



The interesting thing is that this kind of *ontolytic writing of the future* can also be found in non-fictional texts, primarily in those that present grand anticipations of the future in the name of new and emerging technologies – visionary schemes with strong extrapolative claims. This development experienced a great upswing at the beginning of the 2000s with the start of the hype around nanosciences and nanotechnologies which will therefore serve as an example here. Futurologists, technovisionaries, transhumanists, and people with a scientific background – interestingly, a disproportionate number of software engineers – saw in the nanosciences the potential for a new industrial revolution and a fundamental upheaval of almost all areas of life and science. Some still see unfathomable possibilities of power and control: With the harnessing of the atom – *Shaping the World Atom by Atom* (NSTC, 1999) – the world as a whole opens up to comprehensive control. This claim to control is a central motif in the visionary technofuturism that accompanies nanotechnology as a globally unified research program as it was represented also by national science agencies.

Nano-visionary Eric Drexler's book *Engines of Creation* is a good example: “Drexler's seminal and influential *Engines of Creation*, outlining his program for nanotech research, is composed as a series of science-fictional vignettes” (Milburn, 2002, p. 271). Drexler's work is composed of many stories that sequentially discuss and illustrate various instances of the novum of nanotechnology, often going beyond popular science rhetoric to create small literary scenes intended to emotionally engage the reader. Successively, the text introduces the various engines through which a mastery of the nanocosmos will come about – *Engines of Construction* (Chapter 1), *Engines of Abundance* (Chapter 4), *Engines of Healing* (Chapter 7), etc. In these episodes, one can regularly find passages like the following:

If we succeed [...] then you may be honored with endless questions from pesky great-grandchildren: ‘What was it like when you were a kid, back before the Breakthrough?’ and ‘What was it like growing old?’ [...] By your answers you will tell once more the tale of how the future was won. (Drexler, 1986, p. 239)

The Tale of the Temple: Once upon a time, there lived a people with an information problem. Though they had replaced their bulky clay tablets with paper, they used it oddly [...] (Drexler, 1986, ch. 4).

Both passages make use of narrative techniques that are characteristic of fictional texts. The second quotation plays explicitly (“once upon a time”) with the fairy tale genre to set the readers up for that sense of being obsolete which will take hold of them once they are introduced to the backwardness of current technology in comparison to the “coming era of nanotechnology.” Thus, in *Engines of Creation* Drexler weaves a tapestry of small Science Fiction vignettes woven around his chosen novum.

The NBIC report on nano-bio-info-cogno convergence of the US National Science Foundation (Roco and Bainbridge, 2002) “worked” in an analogous way. The editors of the report provide the framing in an overview into which they insert statements and visionary essays on improving human cognition, health, national security, etc. These texts also revolve around disruptive novelty or nova – new kinds of gadgets and radical concepts – which unfold in detail within the essays.



José López (2006) analyzes Drexler's *Engines of Creation* and the NBIC report with regard to the novum used in each case and comes to the conclusion that both texts are structured by a central metaphor dominating the text, which is joined by further novas. In Drexler's case, this is the “breakthrough” – the breakthrough into the world of assemblers and atomic world construction kits, accompanied by the heroic engineer, the reductionist machine metaphor, and so on (López, 2006, p. 339). In the case of the NBIC report, it is the “convergence” of the nano-, bio-, information-, and cognitive sciences that is at the center of the narrative and gradually allows social sciences and humanities to also “converge” with them under the paradigm of the reducibility of reality to atomic construction kits and information patterns (López, 2006, p. 364).

In these texts by Drexler, Bainbridge and Roco, and others, “the” nanotechnology unfolds as the actual novum in the background. Like a black hole or singularity it “sucks up” into itself all the scenarios and vignettes that are told and embellished about the possibilities of its application, in order for these possibilities to re-emerge from it perceptibly realized. Into the black hole’s gravitational field are sucked, however, not only the imagined purposes of various applications, but also timelines and a conception of the future, which becomes narrowed from an open space of development to an inescapable necessity – recalling Peter Bexte’s future perfect – and Alfred Nordmann’s analysis of “Tunnel Visions for Technovisionary Research and Policy” (Nordmann, 2013). Nordmann refers to Patrick McCray's (2012) book *The Visioneers*, which tells the story of visionary engineers – visioneers – like the ones mentioned before.

Visioneering thus mobilizes skills, expertise, and resources to forge something much stronger than a narrative thread that more or less plausibly leads from the present to the future. What visioneering aims for is to exhibit a compelling causal link between a state A (technological work-in-progress) and a state B (a future so desirable as to mandate its realization) such that A will actually lead to B while B necessitates A.” (Nordmann, 2013, p. 89)

One could say visioneering, the telling of visionary tales of engineering tunnels from A to B, from the present to the future, and its shovel is a mesh of words arranged to loosen the secure ground of the present beneath one’s feet.

What Drexler's text achieves, unwittingly or not, is a narrative that re-ontologizes the past, present, and future. This is achieved by rebuilding the world synchronically and diachronically around the *Breakthrough*, the arrival of the molecular assembler. (López, 2006, p. 340)

Independently of “ontolysis” and without reference to Suvin, Lopez employs here a notion of re-ontologization, which, however, fits very well as the next step that follows the shock of ontolysis. In Drexler’s text, the entire world is conceived under the viewpoint of the atomic construction kit, and under the metaphor of the “machine.” Everything that replicates, including DNA, is ultimately a machine that can be improved. Or one can build new machines like nanobots right away to replace our “old” nature with a better one. Through this novum a new world is presented *synchronously*, in which everything



without exception is reducible to specific machine-like configurations of atoms and molecules. *Diachronically*, the present and the past are also subjected to this conception.

Our ability to arrange atoms lies at the foundation of technology. We have come far in our atom arranging, from chipping flint for arrow-heads to machining aluminum for spaceships. (Drexler, 1986, p. 3)

The development towards a nanotechnological future is presented in quasi-evolutionary terms, deterministically, as inevitable. This inevitability, bought by extreme reductionism, becomes tangible in the two dimensions of the chronotope developed by Drexler in *Engines of Creation*. It is precisely here that López shows how the analysis of narrative techniques provides insight into the way in which a worldview is hidden behind supposedly pure scientific considerations.

Eric Drexler's *Engines of Creation* and many other technovisionary representations also exhibit the characteristics of cognitive estrangement: On the one hand, the foreign nanoworld is made familiar by extending the chronotope from the future through the present into the past, and by re-ontologizing the present, redescribing it under the categories of the atomic kit and the machine metaphor. On the other hand, *at the same time*, the familiar world given by the empirical norms of the reader becomes estranged by being described as the “nanomachinery” that drives the always actual reality (see also López, 2006, p. 338). The crucial difference introduced in *Engines of Creation*, as in other visionary nanotexts, is that the mirror function is suspended: There is no distance between the reader's assumed reality and the imagined “future” world – one is merely the soon-to-be-obsolete precursor of the other in an inescapable evolution. In these texts, estrangement does not serve to point out alternatives by offering a fresh look at the given. Instead, they ontolytically tear readers from their “anchoring” in their life-world in such a way that it can be reconstructed “under their feet” as a deficient version of reality in light of the future that establishes past and present reality in new terms.

Besides these larger texts, ontolytic writing of the future may well be seen in ‘small forms,’ such as brochures of governmental agencies, industry associations and the like – up to the IBM logo, which Don Eigler and Erhard Schweizer “wrote” in 1990 with 35 xenon atoms. It is just a word that stands for the name of a company.

[A]toms were prompted to perform a silly trick, devoid of natural and technical meaning – just to show what they can do and what humans can do with them. If they can do something completely arbitrary, if they can be arranged to spell the name of the IBM research laboratory or spell the word “atom,” then there is no limit to what they can do. A world of new human powers has arisen, in the beginning a token of seemingly unlimited human willfulness. (Nordmann and Bylieva, 2021, pp. 7-8)

This is a special form of ontolytic writing of the future: a detour through the loop of the future tense II is not necessary at all – the future is inscribed into the present as a blank space to be filled by power.



OUTLOOK: ONTOLYSIS AND ONTOLOGY

If this talk of ontolysis is not to remain merely metaphorical, the question arises which kind of ontological consideration can make the process of ontolysis more tangible or describable in detail. First of all, this cannot be a reductionist ontology that tries to reduce complex phenomena, entities or concepts to simpler or more fundamental components or elements – relying on the basic idea that everything in the world can be traced back to a limited number of elementary building blocks or principles. Another candidate is a ‘vulgar’ or ‘mundane’ ontology (Heidegger), which – oriented towards analytic ontology – aims at cataloguing the furniture of the world. This furthermore leads to the ontological understanding of information science, that is, to the cataloging, categorizing of the entire lifeworld, ranging from concrete material objects to abstract entities that are categorized and linked in separate, yet interconnected ‘partitions.’

An example that will only be touched upon at the end of this text is human ‘moral enhancement’ which has been and still is subject of a whole series of scientific and popular publications over the years (to name but a few, see Douglas, 2008; Harris, 2011; Persson and Savulescu, 2012). The point is that the moral aspects of human nature might be improved by biochemical interventions into the brain. This ranges from ‘small’ improvements regarding living together – difficulty being faithful in a relationship? There will be a pill for that! – to the establishment of a sustainable general morality which in the long run will enable the survival of humankind and save it from self-destruction.

However, the discussions for and against moral enhancement exhaust themselves in the desirability or feasibility of such a development with its numerous possible effects on the individual and society. Not discussed is the underlying ontolysis and subsequent re-ontologization. This is involved in the shift of the “moral” from a category of personal responsibility, subject to its own free will, into an ontological partition of reality, which pathologizes questions of fidelity, truthfulness, etc. and sorts them into a catalog of human ailments on a level with the common cold and bronchitis. With each turn of the discussion circle this mundane view becomes more deeply inscribed into our understanding of the world – today’s ontological order of things upset by writing the supposed future of technology and morality.

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Статья поступила 14 июня 2023
одобрена после рецензирования 18 августа 2023
принята к публикации 6 сентября 2023

Received: 14 June 2023
Revised: 18 August 2023
Accepted: 6 September 2023



<https://doi.org/10.48417/technolang.2023.03.09>

Research article

Optimist by Nature, Pessimist by Design: Writing Network Cultures

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Abstract

This conversation between Geert Lovink and Nikita Lin reflects upon our inner experiences within the global networked digital cultures. It explores the tactics, aesthetic and political, in response to the breakdowns brought by digital platforms and the possibility of creating new beginnings through persistent engagement in writing and publishing. Since 2004 Lovink is heading the Institute of Network Cultures at the Amsterdam University of Applied Sciences and is Art and Network Cultures Professor of Art and Network Cultures at University of Amsterdam's Art History Department. The conversation takes as point of departure Lovink's three recent books: *Sad by Design: On Platform Nihilism*, *Stuck on the Platform: Reclaiming the Internet*, and *Extinction Internet: Our Inconvenient Truth Moment*. Over the past 30 years, Lovink has been experimenting with the networks and the internet in his writing by developing a distinct style that dig into essays, interviews, aphorisms, sloganisms, and memes. This includes critical concepts that he has developed - such as 'tactical media,' 'net criticism,' 'sad by design,' and 'internet extinction' - that people recognize, find useful and ready to apply to their own activities. For Geert Lovink, the fascinating question with writing is how to capture fast-changing real-time phenomena which means not only documenting but also leaving room for anticipation.

Keywords: Network criticism; Digital platforms; Media theory; Art and activism; Writing and publishing

Citation: Lovink, G. & Lin, N. (2023). Optimist by Nature, Pessimist by Design. Writing Network Cultures. *Technology and Language*, 4(3), 118-128. <https://doi.org/10.48417/technolang.2023.03.09>



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УДК 008:004

<https://doi.org/10.48417/technolang.2023.03.09>

Научная статья

Оптимист по натуре, пессимист по замыслу: Создание сетевой культуры

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Аннотация

Разговор между Гертом Ловинком и Никитой Лин отражает наш внутренний опыт в рамках глобальных сетевых цифровых культур. В нем исследуются тактики, эстетические и политические, в ответ на сбой, вызванные цифровыми платформами, и возможность создания новых начинаний посредством постоянного участия в написании и публикации. С 2004 года Ловинк возглавляет Институт сетевых культур Амстердамского университета прикладных наук и является профессором искусства и сетевых культур на факультете истории искусств Амстердамского университета. В качестве отправной точки для разговора взяты три последние книги Ловинка: “Дизайн грусти: о платформенном нигилизме”, “Застрял на платформе: возвращение Интернета” и “Вымирание Интернета: наш неудобный момент истины”. За последние 30 лет Ловинк экспериментировал с сетями и Интернетом в своих произведениях, разрабатывая особый стиль, в котором используются эссе, интервью, афоризмы, лозунги и мемы. Сюда входят разработанные им критические концепции, такие как “тактические медиа”, “сетевая критика”, “дизайн грусти” или “вымирание Интернета”, которые люди признают, находят полезными и готовы применять в своей деятельности. Для Герта Ловинка интересным вопросом, связанным с письмом, является возможность улавливать быстро меняющиеся явления в реальном времени, что означает не только документирование, но также прогнозирование.

Ключевые слова: Сетевая критика; Цифровые платформы; Теория СМИ; Искусство и активизм; Написание и публикация

Для цитирования: Lovink, G., Lin, N. Optimist by Nature, Pessimist by Design. Writing Network Cultures. // Technology and Language. 2023. № 4(3). P. 118-128. <https://doi.org/10.48417/technolang.2023.03.09>



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Nikita Lin: Let's begin with the titles of your latest three books: *Sad by Design: On Platform Nihilism* (Lovink, 2019), *Stuck on the Platform: Reclaiming the Internet* (Lovink, 2021) and *Extinction Internet: Our Inconvenient Truth Moment* (Lovink, 2022). They all carry a pessimistic and dark tone. However, on many occasions you describe yourself as an optimist. In a 1999 email exchange with Alexander Galloway, you said, “I am a professional optimist (by nature) and it is my passion to create strategies for getting new initiatives off the ground.”¹ Are you also a tactical pessimist (by design)?

Geert Lovink: My brain may be a pessimist but my heart remains an optimist. What I am not is a realist. For instance, capitalist realism, as described by Mark Fisher (2009), is a political program with the intention that we are giving up. But you are right: the dialectics at play here goes to the core of my nearly 50 years of political and theoretical engagement, which started in the spring of 1975 when I joined a ‘third world’ group in the central village of Nijkerk where I spent the last three years of my high school before returning to Amsterdam. Throughout this period I believed in the premise that my political strategy needs to be based on a proper, painful, critical analysis of the present and not on some quasi-eternal values. One could say that this is a naive form of historicism, namely that there is something to be learned from past experiences. Would this even include the eternal return of the same motive, I wonder? Regardless, this is what I believe: organized subversion always needs to be grounded in a merciless analysis of the present condition. The deeper the merrier. Only then power can be sabotaged. My aim, and many of my lost-in-between-punk generation friends, is not to grab power, but is autonomy, to build temporary free spaces and experience life together in these odd ‘squatted’ spaces. Only there we can experience freedom. No matter how short and fragile.

Lin: *Extinction Internet* closes with “There is beauty in the breakdown” (Lovink, 2022; cf. Kurtov, 2023). What kind of beauty is it?

Lovink: Obviously this is not beauty in the sense of a nice picture that moves or upsets, or a song that calms you down. It is something produced by AI software, to stay close to the contemporary condition. Technical monstrosity is not teaching us anything. The breakdown is precisely not news, not a pedagogical image. It is also not something that comes to us an inner experience, as described by, for instance Ernst Jünger’s (1922/2021) intense life and death experiences in the trenches of World War I or Georges Bataille’s (1986) studies on ecstasy and rupture. Breakdown comes at the end of a long phase of non-stop denial, pain, suffering and coping. Finally, things come to an end – or so it seems. The breakdown has the promise of a new beginning. Please bring a halt to the undefined misery, the never-ending dread of social media, audits, meetings, targets, assessments. There is a beauty in the break, yes. Perhaps not at the bottom of the abyss. There it is just black. But remember, even the pure black surfacing in Kazimir Malevich’s painting has a mysterious depth and should not merely be associated with depression and anxiety. Black, together with red, is the anarchist color. Howard Ehrich writes in *Reinventing Anarchy, Again*: “The black flag is the negation of all flags. It is a negation of nationhood ... Black is a mood of anger and outrage at all the hideous crimes against

¹ <https://networkcultures.org/geertlovink-archive/interviewed/interview-for-rhizome/>



humanity perpetrated in the name of allegiance to one state or another ... But black is also beautiful. It is a color of determination, of resolve, of strength, a color by which all others are clarified and defined ... So black is negation, is anger, is outrage, is mourning, is beauty, is hope, is the fostering and sheltering of new forms of human life and relationship on and with this earth.” Thank you, good old Wikipedia².

Lin: There is an intertwining of politics and aesthetics in the way you see, describe and experience breakdown, which serves as education for people, and which is at the same time political and aesthetic. The intentional arrangement of words and texts is driven by the desire to express, communicate and keep track of the otherwise ungraspable, invisible traces of thoughts and sensations. It is a tool of the imagination. I think writing (fictional or non-fictional), for an author, is first of all, self-education. It involves time management that comes with all its psychic complexities: spontaneity, intensity, duration, etc. This awareness of time is sometimes provoked by breakdown and despair of powerlessness. Writing is both action and execution, feeling and thinking in both intuitive and logical ways.

You write a lot. I wonder in what ways does the constructive view of network influence your own writing, both in terms of the style and the topics you are dealing with?

Lovink: First of all, I am a theorist, critic and activist. I have also done journalistic work, producing magazines and radio programs. I do not consider myself a writer of fiction, or non-fiction, for that matter. Here in the Netherlands this is considered a calling, a profession, and I have never been part of that group (though some of my good friends are writers). You may notice that I do not consider myself an academic either and do not take part in their modes of text production, such as writing peer-reviewed journal articles. I somehow got involved in higher education when I was in my mid-forties. However, I do love writing and producing books. The first one was collective research about a large blockade of a Dutch nuclear plant, in 1980. I was 21 at the time. Since then I have produced many and this really helps you to get into the routine, from the very first outline to the launch, publicity and distribution. This taught me that writing is never merely a solitary activity. At the very moment you write, yes. But this is something of a luxury experience for me. In my case, the moments I can really focus and work for longer periods, without disturbance, on a text, are precious (and thus well prepared). It is fine to be romantic about it, but the reality of the production is a different one. What we do at our Institute of Network Cultures³ is that we demystify the making process and show how ‘publishing’ can be done in a more independent way. This is, in part, by sharing (technical-processual) knowledge, in part by showing that writing, in essence, is a social activity. Writers have their teachers, editors, publicists, designers, printers, sellers, platforms where they host their texts. And not to forget: their readers. Many of their roles have undergone profound technological changes over the past 50 years. I am not arguing that writers should have all these skills. Do-It-Yourself indy publishing is as much a social form as any other. But writers do have to get more digital skills to do their research, no doubt. With this I do not only mean to find a proper response to the latest AI toys.

² https://en.wikipedia.org/wiki/Anarchist_symbolism

³ <https://networkcultures.org>



A content approach to answer your question is to look at the way I am trying to bring in the networks and the internet into my writing (as this has been my core topic for the past 30 years). I do not want to give the suggestion here that my approach is the only one. I just report what I am doing. I love the grand vistas of far-reaching systematic theories. But that is not me. I am into essays, interviews, aphorisms, sloganisms, and memes. It is a privilege to develop critical concepts that people recognize, find useful and start to apply to their own activities such as ‘tactical media,’ ‘net criticism,’ ‘sad by design,’ or ‘internet extinction.’ I then blend those with snippets that I collect online. Sometimes I use quotes in case studies: online video, revenue models, selfies, Wikipedia etc. I always worked on specific, not general internet theory. What I still have not figured out is how all this relates to history writing. How to capture fast-changing real-time phenomena? Part of my work is to write chronicles of (European) critical internet culture. Indeed, I document but also leave room to anticipate. The better works remain untimely but this is next to impossible to predict in advance. The speculative Adilkno (1994; 1998) works of 30-35 years ago (the collective I was part of) is still relevant today, readers assure me, but this is due to its deliberative style to create ‘unidentified theoretical objects.’⁴

Lin: The psychoanalytical aspect of breakdown reminds me of an anecdote from my childhood. There was no public infrastructure in the village such as trains or buses. We had to walk across mountains and rivers, without good shoes. I often had pains in my feet. When my feet were bleeding, I was told to make up stories for myself: “Forget about the feet. You don't have them now.” It was mental conditioning, a strategy to ease the pains temporarily. The human mind has a magic power of making up stories. It helps us get through difficult times. In this case, the pain in the feet is real, and the breakdown breaks this ‘real.’ It was like giving up one's sovereignty over a territory; nevertheless, there is a chance you can reclaim it.

Lovink: All these potentially traumatic experiences you had to go through are cultural techniques to survive and deal with suffering. I refuse to romanticize them, and neither do you. Through its evolution the human brain got structured in such a way as to forget hardship, even though the scars remain. Otherwise, women would never have a second child and parents would never raise other children. What territory do you want to reclaim today? Not the traumas, not the pain. I would say, the ability to create other stories. Neuroplasticity teaches us that there is hope (even though I am not certain if this also applies to the ancient layers).

In terms of ‘story theory’ we see two opposing trends at the moment. Byung-Chul Han's (2023) essay deals with the ‘narration crisis,’ which manifests itself in the inability of people to remember and retell coherent stories, reducing a complex narrative to a few half-sentences of general phrases. Details and ambivalence are missing. The contingency storm of social media has erased the story telling ability, selling stories back to its customers. Successful media, politicians and marketers are those that can communicate appealing micro-stories. I am summarizing Han here. Oral history used to re-produce social cohesion but there is no narrated life anymore. At least you can tell us the story of your feet. Against this trend there is the renaissance of storytelling in education and

⁴ <https://networkcultures.org/bilwet-archive/adilkno/TheMediaArchive/index.html>



marketing. Film and video play an important role here. Think of the movies *Barbie* and *Oppenheimer*, both complex stories (which have become synthesized into a Barbenheimer meme). You noticed that the brain has this ability to make up stories. How can we tap into this when social media so seductively urge us to skip the unfolding stories and swipe to the next item?

Lin: In *Stuck on the Platform* you evoke Hannah Arendt to describe the political capability of networks by creating new beginnings (Lovink, 2021). Could you expand on that? Should the new beginnings always take place in the same place or keep changing locations? Where and when?

Lovink: In my reading, she wrote this in discussion with Spengler, Heidegger and other German conservative thinkers that could only mourn about *Seinsvergessenheit*, the loss of skills, spiritual depth, and social cohesion after the upheavals of the industrial revolution and the related imperial wars that devastated Europe – and the world. Arendt's answer was not a romantic longing for a return to the village, the forest, and the family. Hers are not utopian ideas. Arendt's call for new beginnings was a product of her lived migrant experiences. This can also be applied to political action and design of new organizational forms. But also to aesthetics in music, films, fashion, and visual culture – and of course internet culture. The issue here is how to break the spell of the current platform monopolies that create so much boredom and despair. But even if we leave the platform question aside, there is always the possibility of radical forgetting (as an alternative to the unpopular gesture of erasing one's phone apps). The social is fluid, restless, and can so easily be rearranged. This is a good thing but at the same time also a danger, if you think how easily billions of users can be manipulated. The only hope here will be the stubborn hope that will run actual communities, networks that matter and are not just there to kill time. Beyond good or evil, soon humankind will no longer be in hovering mode. Will we then be nostalgic and wonder about all the entertaining video snippets on TikTok and Insta? For sure we will have forgotten about all of them, the influencers, dating sites, games, online markets, and crypto. The collective amnesia in our field is already impressive.

Lin: I wonder if new beginnings mean that we stop telling stories to ourselves that 'no feet, no pains,' or do we stop walking by foot, instead taking trains or biking?

Lovink: The pain-in-the-feet motive is part of the sacrifice myth. In your case the one about building the great Chinese nation as a world power? China became so big because of your suffering. But the question should be: Can China also be thriving without the exploitation of its citizens and the environment? Will there be a Great China anyway after the Climate Disaster? What stories will we tell then? About wet feet? One thing is for sure: people will be on the run. They already are. Most likely, China will no longer be the Global Factory that will produce the sneakers and sandals for the millions of migrants. They will come from Africa, Pakistan, Indonesia. In this light, new beginnings would be those that create powerful condensed stories about that exodus and its turbulent chain of causes: exploration, extraction, exploitation, extermination, extinction.

Lin: Perhaps equally interesting is the 'shoe analogy' in this case as you mentioned power structuring and governing. "The law and spirit operate from above by command to control conduct whereas the shoe, operating from below, conditions us to walk in a certain way"



(Mitcham, 2022). The ‘shoe analogy’ appeared in Arne de Boever’s introduction of François Jullien’s thoughts on Chinese politics and warfare: “Democracy rests on one thing alone: persuasion. Whereas in China this is not the problem: there, one manipulates. That is to say one manages the conditions in such a way that you will follow the path that they want you to follow”(De Boever, 2020; Mitcham, 2022). With social media today, you would perhaps have to agree that democracies are also not immune to manipulation.

Lovink: The issue here is that manipulation is not felt by most. In a sense, this is also not true as many will find out not much later. What is happening is a time race. The subliminal steering, filtering aka ‘governance’ is happening – but when will we find out that this is fake news, propaganda, ideology or hegemonic discourse, for that matter? In the case of social media platforms, I would not use the term persuasive. Users never had to be convinced to create an account, install the app, type in the URL, klick on the link or swipe the phone. All are pre-installed. There is no natural decision moment anymore. When were you persuaded to start using WeChat? This is the wrong question. Hypergrowth happens overnight. How many hundreds of million already used ChatGTP in the first week after its launch? The other way round would make more sense. How many times have you already been persuaded to delete your Facebook account? The self-realization that one has been ‘manipulated’ is a painful moment for each of us. Who is longing for the moment of disillusion? We would rather hover in an eternal stage of ignorance. Regression numbs the pain of enlightenment. Rather circumvent that and continue the state of stagnation. Do not think about it.

Lin: The changing global geopolitical infrastructure (human and non-human) is worth another long conversation. For China, technology offers an efficient and effective template for writing national stories of success. And yes, as you have noted, the massive construction of technical infrastructures, environmental and human labor exploitation provide the material foundation for such a successful template. China’s industrial surplus is being exported to other developing countries. I am not sure whether and where this chain of writing successful stories would continue. Or if it is necessary.

Lovink: China is not (yet?) selling itself as a lifestyle. We all are aware of that. Made in China, yes. It is spreading power and control to strengthen its own interests. Plus old-school media influencing CCTV-style, yes, yes. Give this a decade or more and then the subliminal ‘algo’ effects will also be utilized. But maybe we will never get there, and the empire will remain based in materials, resources, and commodities. Is ideology a trap for regimes? Will there be geo-political battles of ideas? Such as arguing the principles of international law? And in another part of the world chastising the persecution of minorities? And across the ocean explaining the sanctity of true and fair elections? This is no longer happening. The Cold War was seventy years ago. These days, rulers on all sides believe in implosion, crisis, exhaustion, depletion of entire societies, not in ideological battles, winning some argument, pushing for the right message, let alone winning the hearts and minds of the people. Inside certain countries, perhaps, but certainly not longer on a global level.

Lin: In their critical analysis of the ‘smart warehouses’ like Amazon, Liam Magee and Ned Rossiter remind us that “when sovereign power is decoupled from the state, the conceptualization of habit is similarly liberated from the everyday routines of human



subject. Instead, the habits of machines and data can be identified as asserting a sovereign command of how the everyday is experienced” (Hristova et al., 2022). This seems to repeat the same gloomy fact: the everyday is either in the hands of machines and data or of the state (which is also a machine); in there many see ourselves trapped - indeed we are. It is not a romantic picture of machine-human cohabitation. When human author-ity and data author-ity co-operate in today’s industrial economic-social infrastructure, “The proliferation of decisions in banking and logistics registers how leadership and labour mutually enmesh with ‘time-critical media’ (Ernst)” (Hristova et al. 2022). I wonder: in the earliest landscape of the internet, what was meant by an author, authorization, and author-ity? How did the software and hardware configuration look like?

Lovink: Certainly not a fixed identity, as promoted these days. It is hard to imagine from today’s perspective, but the internet thirty years ago did not have profiles. One would choose a user name and there you go. One could be an author with a real name and have multiple other personalities at the same time. ID data were not centrally stored. One cannot use Google, Insta, or TikTok these days without a verification process. This created a culture of anonymity and experimentation – with all the dangers attached, still on a tiny scale compared to now. I am talking here about the ‘short summer of the internet’ until 1997. I am not a person who is into romanticizing this period of great upheavals on the European continent after the fall of the Berlin wall. I personally experienced it as a liberation, but the collapse of communist regimes came with a high cost, think of the Balkan wars and the collapse of relative economic security. Unresolved European border issues and shifting alliances led, for example, to the unstable Minsk agreements and all that followed. As you can see, back then internet experimentation and the end of the Cold War really came together in time and space. Nowadays the author is an influencer and the authorities are Meta and Google.

Lin: What was exactly the concept of the internet? Does it make sense to compare a project like the internet with the Great Wall or the Three Gorges Dam in China? The Great Wall was built for military defence. The Three Gorges Dam makes use of nature’s force and turns it into energy for social-economic interest. Engineering thinking and practice is in general manipulative. The ethical argument is ‘for the betterment of humankind and human society.’ Engineers do not persuade. They make and manipulate. Literary people (authors of written words) try both persuasion and manipulation. Is the internet a product by nature of more doing and less thinking?

Lovink: The early internet hacker scene has a saying for this: “We believe in rough consensus and running code.” While competing computer networks were designed like centralized systems, the original internet architecture was based on loose connections: a network of networks, called inter-net. This logic appealed to us, squatters, anarchists, unemployed artists, and other irregulars. I would also say there was neither persuasion nor manipulation. One just went online, discovered what was out there; machines and connections breaking down all the time. There was no ‘audience’ to speak of. This is why we developed the ‘sovereign media’ concept that was netcasting to itself. This only changed in the late 1990s. Before that there were just bigger and smaller communities inhabited by lonely souls working on something together. Less thinking, indeed. The internet is a medium from and for geeks, not officials – and neither for intellectuals. It is



post-ideological, which was so 1990s. As internet critics and media theorists we saw it as our task to reflect that, but that was a marginal activity – back then, until today. It is interesting, you contrast the internet with the Great Wall and the Three Gorges Dam. The internet was not designed as a *Tres Grand Project*, as the French call it, growing slowly in its first 25 years. Most companies and officials preferred better working systems such as BBS, CompuServe, AOL. The victory of the internet protocol happened accidentally. Again, the turning point is the late 1990s with the take-over of venture capital after the user-friendly WorldWideWeb had established itself. This is the moment info warfare manipulation through UX (User Experience Design) persuasion took over.

Lin: In the early days of the internet there was no such political and design speculation as a planetary-scale computation megastructure Benjamin Bretton envisions. Yet it was clear from the beginning that media technologies in general have been historically tied to military initiatives. Surveillance technologies have been launched into outer space in order to collect data of the earth, to recognize and identify enemies on earth. It is interesting that the emergence of social media was linked to the exploitation of friendship (fake friendship you may say), that is, to make profit by connecting people. These two seem to oppose each other: The military uses the technology to identify enemies, and Silicon Valley uses it to ‘make friends’. Do you see similarities between their tactical approaches? Do we have too many friends now? Or too many enemies? Would it be better if most of the world’s communities stay as respectful strangers, not too close, but still aware of each other’s existence. What would be the cultural solution?

Lovink: While in the make-up of the traditional public sphere, it was the whole idea to bring together ‘friends’ and adversaries, social networking sites of the early 2000s broke with this notion and came up with the ‘save’ notion of bringing together ‘friends’ in a closed community that is protected by a password through the introduction of a ‘profile.’ In this new constellation, the user would feel intimate, while advertisers and authorities could freely harvest one’s private data. In a way, we should regain the power to define terms and take back control over who are our friends. The aim here would be fight the inflation for corporate means of the term. If I am saying that we are not friends, it does not imply we are enemies. It can also mean we are comrades, lovers, family, colleagues, classmates. Let’s expand the diversity of the social vocabulary instead of collapsing the real existing mess called ‘life’ into one term.

I think you are right that we have too many friends. Our social status has been quantified and for everyone to read. Everyone online on social media can read how many friends and followers you have. In general, there is just lots of us, in metropolitan areas, large companies and universities with tens of thousands of employees. In the early to mid 20th century this was called ‘mass.’ These days we no longer like this word as it reminds us too much of the grey, anonymous crowd. Instead, we are all addressed as unique subjects. We are approached as respected strangers – yet we do not feel like it. We feel abandoned and lonely, desperate to reach out. With all the current online transparency and possibilities to spy into each other’s intimate life, it is still the opposite. In my view there is no resolution here. What will happen is that the dramatic turn of (world) events will urge people to come together in ways we cannot yet imagine. We will need others to survive as most of us cannot guarantee water and food security on our own, secure a roof



over our head. We will organize education in other ways. This cannot be done individually.

Lin: Alexander R. Galloway (2022) does some interesting philosophizing on digital and analog thinking. He makes the claim that Deleuze's writings (apart from his earlier books such as the *Logic of Sense*) are primarily anti-digital (analog). Many of the contemporary artists and thinkers have absorbed the Deleuzian aesthetic and ethic concepts, consciously or unconsciously. Are you also influenced by the Deleuzian style of analog writing?

Lovink: Sorry, I never was a Deleuzian. If I have to position myself inside the French Zoo of Theory, my teachers were Paul Virilio and Jean Baudrillard, with Michel Foucault in the background. Much darker. With teachers I literally mean writers that help you to find your voice in terms of writing style and mode of thinking. Theory should not have a religious aspect. I admire many thinkers but I do not consider myself a follower of them, let alone a pupil or believer. Consider this: Can Walter Benjamin be a role model? This is, in my view, the wrong approach. One I admire most is Elias Canetti, who, in one of his aphorisms, reveals the deepest, most insightful ways to engage with one's masters: by not mentioning them. From this perspective, it no longer matters whether they are analog or digital. In this spirit, I have a similar relation to the German Frankfurt School, which was – and still is – a major source of inspiration. My question was always: how would such a school look like today? Dare to start your own institute, even if it is virtual or imaginary. How would an intellectual movement outside of academia function today? How do we create, grow and maintain critical networks of thinking, or 'correspondence' (to use ancient 18th century motives)? Today's academia straight out forbids the creation of like-minded intellectual schools. In the neo-liberal approach, it's all about the ranking order of the genius individual-as-leader who climbs up by creating temporary research teams around the 'principle investigator.' But what I like about Deleuze and Guattari is the way they worked and wrote together, creating a 'third mind.' This is what the writing collective Adilkno that I was part of also practiced.

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<https://doi.org/10.1007/s11712-021-09819-3>

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Статья поступила 16 июня 2023
одобрена после рецензирования 27 августа 2023
принята к публикации 12 сентября 2023

Received: 16 June 2023
Revised: 27 August 2023
Accepted: 12 September 2023



Contributed paper



<https://doi.org/10.48417/technolang.2023.03.10>

Research article

The Social Nature of Skills: Beyond Dreyfus' Skill Model

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Abstract

Skill is different from knowledge. It is the ability of knowing-how rather than knowing-that as characterized by Hubert Dreyfus' "Skill Model." Dreyfus developed the „Skill Model“ to describe the process of acquiring a skill like driving a car. For Dreyfus, skill is an intuitive reflection of the body which is based in experience. However, Dreyfus neglected that skillful activity does not consist in mechanically separable movements that are directed toward a physical object, but a certain way of dealing with things and persons involving know-how in respect to contexts of purposes in use. Accordingly, acquiring a skill involves two types of norms, operational norms and social norms. What Dreyfus emphasised in his "Skill Model" is only the operational norm of skill. As an ability of knowing-how, skill acquisition, skill transfer, and the judgment of skill are based on social norms. This can affect our attitude on artificial intelligence: 1. No computer will be fluent in a natural language, pass a severe Turing Test, and have full human-like intelligence unless it is fully embedded in normal human society. 2. No computer will be fully embedded in human society as a result of incremental progress from the base-line of current technology.

Keywords: Skill; Ability; Michael Polanyi; Hubert Dreyfus; Harry Collins; Operational and Social Norms; AI

Citation: Zhang, F. (2023). The Social Nature of Skills: Beyond Dreyfus' Skill Model. *Technology and Language*, 4(3), 130-140. <https://doi.org/10.48417/technolang.2023.03.10>



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УДК 005.336.5:004.8

<https://doi.org/10.48417/technolang.2023.03.10>

Научная статья

Социальная природа навыков: За пределами модели навыков Дрейфуса

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Аннотация

Навыки отличаются от знаний. В “Модели навыков” Хьюберта Дрейфуса это применение “знания как”, а не “знания что”. Дрейфус разработал “Модель навыков” чтобы описать процесс приобретения таких навыков, как вождение автомобиля. Для Дрейфуса мастерство – это интуитивное отражение тела, основанное на опыте. Однако Дрейфус упускал из виду, что умелая деятельность состоит не в механически разделенных движениях, направленных на физический объект, а в определенном способе обращения с вещами и людьми, предполагающем “знание как” в зависимости от контекста используемых целей. Соответственно, приобретение навыка включает в себя два типа норм: операционные нормы и социальные нормы. То, что Дрейфус подчеркивал в своей “Модели навыков”, – это всего лишь операционная норма навыков. Применение “знания как”, приобретение навыков, передача навыков и оценка навыков основаны на социальных нормах. Это может повлиять на наше отношение к искусственному интеллекту: 1. Ни один компьютер не будет свободно говорить на естественном языке, не пройдет строгий тест Тьюринга и не будет обладать интеллектом, подобным человеческому, если он не будет полностью интегрирован в нормальное человеческое общество. 2. Ни один компьютер не будет полностью внедрен в человеческое общество в результате постепенного прогресса если рассматривать современные технологии как стартовый уровень.

Ключевые слова: Навык; Способность; Майкл Поланьи; Хьюберт Дрейфус; Гарри Коллинз; Операционные и социальные нормы; Искусственный интеллект

Для цитирования: Zhang, F. The Social Nature of Skills: Beyond Dreyfus’ Skill Model // Technology and Language. 2023. № 4(3). P. 130-140. <https://doi.org/10.48417/technolang.2023.03.06>



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INTRODUCTION

With the rapid development of big data, deep learning, microelectronics and other technologies, the autonomous decision-making ability of artificial intelligence has become increasingly stronger. Issues concerning human-like AI agents have become the frontier topics of contemporary philosophy of science, attracting wide attention from the academic community.

From the perspective of functionalism, intelligent agents can possess the knowledge that human beings have, but cannot possess the skills acquired by human beings. Therefore, philosophical research on skills is of methodological significance for deepening our thinking about artificial consciousness, artificial emotion, and artificial morality related to artificial intelligence. Skill is a familiar concept which has been discussed already in the era of Aristotle. Unfortunately, however, the philosophy of science has mainly focused on how to defend the rationality of scientific knowledge, but excluded from its considerations of scientific discovery issues related to scientists' skills, thus greatly neglecting research on the philosophical problems related to skills. At present, with the persistent exploration of the question “Can machines possess human intelligence?” in the field of philosophy of technology, we need to review the concept of skill and its connotations. This paper attempts to deepen the philosophical understanding of artificial intelligence by revealing the social nature of skills.

I. PRACTICE-BASED SKILL AND EXPLICABLE KNOWLEDGE

Skill is different from knowledge. The distinction between them was first drawn by Socrates in ancient Greece. In *Theaetetus*, Socrates first refuted Theaetetus' view that skill is knowledge about something. Theaetetus argued that shoemaking skill is the knowledge of making shoes. Socrates argued that we should make clear what knowledge is in the first place before we distinguish between knowledge and skill. Later, Socrates critiqued the three interpretations of knowledge proposed by Theaetetus, which are, “knowledge is perception,” “knowledge is true judgment,” and “knowledge is true justified belief” respectively. In other words, Socrates argued that knowledge needs to be explained, while skills cannot be explained by way of language.

If knowledge is divided into explicit knowledge and tacit knowledge, both skills and tacit knowledge have “tacit” characteristics which cannot be explained by language. However, the two concepts are not identical but have different meanings in usage — tacit knowledge is obviously “tacit,” but not all ways of knowing with “tacit” characteristics is tacit knowledge. Three considerations serve to further elucidate this.

Firstly, the concept of “tacit knowledge” was originally proposed by Michael Polanyi. He mainly used the concept of tacit knowledge to describe an inexplicable functional cognitive system, which is not explicit perceptual experience based on traditional epistemology, but exists and plays a decisive role in the practical activities of human beings. For example, Polanyi said: “We can see more than we can tell” (Polanyi, 1966, p. 4). Skill belongs here as well, as a practice that relies on action.

Secondly, Polanyi emphasized that tacit knowledge has rules, and gave an example of bicycling: “The rule observed by the cyclist is this. When he starts falling to the right,



he turns the handle-bars to the right, so that the course of the bicycle is deflected along a curve towards the right. This results in a centrifugal force pushing the cyclist to the left and offsets the gravitational force dragging him down to the right” (Polanyi, 1962, p. 51). However, Polanyi argued that the rules of tacit knowledge are not clear enough, because they cannot encompass all elements involved in the process of acquiring tacit knowledge. For example, the working mechanism of a piano is that when one strikes a key, a hammer inside the piano strikes the strings from below to produce sound. However, knowing the rules of the working mechanism does not tell us or explain the speed, strength, and time of hitting the keyboard which are essential to determining the musical effect. In terms of skill, however, the process of practice is continuous, it does not strongly depend on these rules. On the one hand, practice does not completely rely on rules. Taking bicycling as an example, as Polanyi pointed out, cyclists might not successfully complete the task even when they are informed of the rules. And others can do it even if they lack an understanding of the operative norms: One can still ride a bicycle even if one does not explicitly know the rules of cycling. On the other hand, practitioners may not consciously think about how to apply rules in the practice process, in order to ensure the consistency of practice. Taking driving as an example, “Have you ever driven a manual transmission automobile neatly on an urban street and then suddenly begun to think about whether the gear is appropriate? You rarely reflect on your own behaviors, unless something serious had happened” (Dreyfus & Dreyfus, 1986, p. 7).

Thirdly, Polanyi explored whether “tacit knowledge can be transformed into explicit knowledge without acquiring skills; you can discover the general rules of tacit knowledge and turn them into explicit knowledge, but you will lose skills and intuition” (Cheng & Yao, 2013, p. 105). Polanyi proposed that both tacit knowledge and explicit knowledge belongs to the human knowledge system, and Polanyi emphasized that tacit knowledge is more fundamental than explicit knowledge, but it cannot be explained clearly by language. In terms of skills, although some tacit knowledge is implicated in the practice process of skills, skills essentially rely on experience acquired through action. Some experience can be described by language, while some cannot. However, as long as there are practices, there will be accumulation of experience.

In English, the word “skill” is used to describe capability. However, skills are designed to achieve predetermined objectives: Due to this characteristic, skillful practices are intentional and context-dependent, so the concept of skills cannot be simplified as “doing.” After all, “[s]killful activity is structured, significant, and projective in the sense that there is always something at which it is intentionally directed. It is not exemplified by sequences of discrete, mechanically separable movements directed toward a physical object, but by a certain way of dealing with things and persons involving know-how in what we can refer to as contexts of purposes in use” (Stopford, 2009, p. 116). Taking seriously the human and instrumental contexts of skill, it will be maintained in the following that skills involve two sets of norms, operational norms and social norms. Obviously, users should comply with social norms, but relying on tools alone cannot establish a system of standards or technical norms. The standardization of tools is based on the use of tools, thereby distinguishing the concept of skill from that of technology: “Technology refers to a special method of executing procedures and has to be evaluated



by standards” (Winch, 2010, pp. 41-42). Because technology is universally applicable like a method, it can be disseminated in a standardized way. Therefore, the applicable scope of technology is not necessarily limited to specific tasks. Technology can be applied in a wider range of industries, such as automobile manufacturing, fishery, etc. In terms of the relationship between skill and technology, “the development of skills includes not only the acquisition of technology, but also the successful application of technology” (p. 44). In particular, the formation of the three capabilities involved in the practice of skills – learning capability, transfer capability and judgment capability – depends on social norms.

II. SKILL ACQUISITION DEPENDS ON SOCIAL NORMS

The most famous discussion of skill in philosophy is Herbert Dreyfus' “Skill Model.” He thinks that “The know-how of [...] skillful individuals is not innate, like a bird's skill at building a nest. We have to learn” (Dreyfus & Dreyfus, 1986, p. 19). His account of the process of skill acquisition is completely descriptive. He divides it into five stages. Stage 1: Novice, Stage 2: Advanced Beginner, Stage 3: Competent, Stage 4: Proficient, and Stage 5: Expert. Dreyfus emphasized that the whole process of skill acquisition is a kind of “knowing how” process that is based on experience through practice, rather than a “knowing that” process of mastering facts and rules. According to Dreyfus, skill acquisition is different from obtaining information, and skill acquisition should reach a state of “fluent performance”: “The beginning student wants to do a good job, but lacking any coherent sense of the overall task he judges his performance mainly by how well he follows learned rules” (Dreyfus & Dreyfus, 1986, p. 22). Advanced beginners begin to realize that some situations encountered in practice are not reflected in the rules after they master the practical experience for specific situations. At the competence stage, the learner has been immersed in operations: “[...] not conscious of solving problems, that is, of selecting goals and combining elements by rule to reach them [...]” (p. 27). At the proficiency stage, “the expert driver becomes one with his car, and he experiences himself simply as driving, rather than as driving a car” (p. 30). In other words, the so-called proficient operation state is a state of exercising a skill without thinking, but relying only on intuitive reaction. And finally, at the expertise stage, “an expert's skill has become so much a part of him that he need be no more aware of it than he is of his own body” (p. 30).

Meanwhile, Dreyfus emphasized that the formation of intuitive response depends on context, “a skill is not one or several fixed reactions formed in different methods” (Dreyfus, 1992, p. 249). For driving, at the novice stage, “The student automobile driver learns to recognize such domain-independent features as speed (indicated by the speedometer) and is given rules such as shift to second when the speedometer needle points to ten” (Dreyfus, 2001, p. 167). “The advanced beginner driver uses (situational) engine sounds as well as (non-situational) speed in deciding when to shift. He learns the maxim: Shift up when the motor sounds like it's racing and down when it sounds like it's straining” (p. 168). At the competent stage, “A competent driver leaving the freeway on an off-ramp curve, learns to pay attention to the speed of the car, not whether to shift gears” (p. 168). At the proficient stage,



The proficient driver, approaching a curve on a rainy day, may feel in the seat of his pants that he is going dangerously fast. He must then decide whether to apply the brakes or merely to reduce pressure by some specific amount on the accelerator. Valuable time may be lost while making a decision, but the proficient driver is certainly more likely to negotiate the curve safely than the competent driver who spends additional time considering the speed, angle of bank, and felt gravitational forces, in order to decide whether the car's speed is excessive. (Dreyfus, 2001, p. 170).

After reaching the expertise stage, "The expert driver not only feels in the seat of his pants when speed is the issue; he knows how to perform the appropriate action without calculating and comparing alternatives. On the off-ramp, his foot simply lifts off the accelerator and applies the appropriate pressure to the brake. What must be done, simply is done" (Dreyfus, 2001, p. 170).

The establishment of Dreyfus' "Skill Model" provides a paradigm for the research on skills, so it has normative significance. However, the model is entirely based on the "first person" perspective. Dreyfus described the process of skill acquisition from the perspective of participants, but not from the dimension of "others." Therefore, the context of skill acquisition emphasized by Dreyfus is just an operational context and does not involve a social context. For example, Dreyfus only described how to shift gears and what speed to maintain while driving, but ignores the traffic rules. In other words, what Dreyfus described is a "bodily skill." However, as John Dewey has shown, "experience" is a "...double barrelled word. Like its congeners, life and history, it includes what men do and suffer, what they strive for, love, believe and endure, and also how men act and are acted upon, the ways in which they do and suffer, desire and enjoy, see, believe, imagine in short, processes of experiencing" (Dewey, 1929, p. 8). In other words, experience is dominated by two sets of norms, namely, operational norms and social norms. The Skill Model discusses only the former. The acquisition of experience is inseparable from social norms, which has been a subject of discussion in psychology for a long time. In *The Principles of Genetic Epistemology*, Jean Piaget gave an example about how children learn to play "marbles," emphasizing that the experience acquisition proceeds from passive acceptance to active occurrence. However, both are influenced by social norms. In the passive acceptance stage of rules, "The little boys who are beginning to play are gradually trained by the older ones in respect for the law; and in any case they aspire from their hearts to the virtue, supremely characteristic of human dignity, which consists in making a correct use of the customary practices of a game. ...Before playing with his equals, the child is influenced by his parents. He is subjected from his cradle to a multiplicity of regulations, and even before language he becomes conscious of certain obligations. These circumstances even exercise, as we shall see, an undeniable influence upon the way in which the rules of games are elaborated" (Piaget, 1948/1984, p. 2). If only for this, skill acquisition generally depends on social norms.



III. SKILL TRANSFER DEPENDS ON SOCIAL NORMS

In regard to skill transfer, the Dreyfus “Skill Model” adopted a cognitive presupposition. Inspired by Maurice Merleau-Ponty's concept of the “lived body,” Dreyfus takes the body as the precondition of skill transfer, because the intuition mainly comes from the body's response to external stimuli. Therefore, Dreyfus argued that machines do not have the physical conditions of human beings, and human skills cannot be transferred to machines. Dreyfus' argument is too general, however. Skill transfer involves different dimensions, for example, “1. Skills can be transferred by individuals between different tasks, applications or fields; 2. Skills can be transferred between people, just like in the process of education and training; 3. In a society or institution, skills can be transferred between groups, so skills and their impact exist in a specific field” (Goranzon & Josefson, 1988, pp. 69-70). According to different recipients of skill, the question of skill transfer can be divided into two problems: skill transfer between people, and skill transfer from human to machine.

In terms of skill transfer between people, Harry Collins carried out a survey on the repeated experiments of “Transversely Excited Atmospheric pressure CO₂ laser” (hereafter referred to as TEA laser) (Collins, 1992). He found that although all the written materials related to the experiment were publically available, some laboratories successfully replicated the experiment, while others failed. Based on this investigation, the characteristics of skill transfer between people are as follows: Firstly, the process of transfer is invisible. For the replicated TEA experiment, scientists do not know whether they have successfully acquired the skills before or after the experiment. Secondly, the process of transfer is capricious. According to the Situated Learning Theory, skills are composed of “situated activities,” that is, in the process of skill transfer, actions will be greatly affected by the situation. Because the situation is changeable, situated activity differs from person to person. When replicating TEA experiments, some scientists succeeded, while others failed. Some scientists who failed at the beginning, after several trials finally replicated the experiment successfully, while other scientists with successful experience encountered failure when replicating the experiment again. Thirdly, the condition of transfer is to establish a social relationship, especially the mentorship between master and apprentice (Polanyi, 1966). Situated Learning Theory also emphasizes that “Learners are inevitably integrated into the communities of practitioners. In order to master knowledge and skills, new comers must be fully integrated into the social culture of the communities of practice” (Lave & Wenger, 1991, p. 29). Especially in the replicated TEA experiment, all the laboratories that successfully replicated the experiment have established good interpersonal interaction relationship with the source laboratory, and such relationship will remain until the end of the experiment. Therefore, “The transfer of experimental skills is a social process – just like mastering a language – which is different from the transfer of information [...]” (Pinch et al., 1996, p. 164).

In terms of skill transfer from human to machine, there is a symmetrical relationship between two skill transfer models: skill transfer between people, and skill transfer from human to machine. In other words, the process by which a machine acquires human-like skills is based on skill transfer between people. To be sure, Dreyfus had proposed that



machines were subject to physical conditions that prevent them from acquiring human skills which are conditioned by biology, psychology, epistemology, and ontology. His argument, however, was limited to the traditional “functionalism” approach of artificial intelligence. In more recent developments of artificial intelligence, the traditional research paradigm that was dominated by notions of information input has been abandoned, and the “deep learning” paradigm has been advanced. Machines have thus acquired a large degree of autonomous learning ability.

However, no matter how artificial intelligence develops, the skill transfer between people and that between people and machine still have a symmetrical relationship. In other words, machine learning is still based on the human learning process. The difference is that the path of skill transfer from human to machine has changed from the early instruction input mode to the so-called deep learning mode. The deep learning mode is based on massive data, but in fact, it is impossible for computers to obtain data independently and without human aid. All the data needed by computers are “fed” to machines by humans, who will consciously select different data input into computers according to different task requirements. From this point of view, the computer is inseparable from the development of human society and cannot develop self-learning ability independently.

IV. SKILL ASSESSMENT DEPENDS ON SOCIAL NORMS

In addition to skill acquisition and skill transfer, the judgment or assessment of skill also depends on social norms, and again involves two levels: assessment of human skills, and assessment of machine skills. The former is related to “who is qualified to be an expert,” and the latter is related to “whether the machine has mastered human-like skills.” Because skill acquisition norms include operational norms and social norms, expert assessment should also start from the two aspects mentioned above. As for the former, the Dreyfus Skill Model specified a set of criteria for making judgments: Firstly, experts can be identified based on the context sensitivity of their exercise of skill or skill operation. The difference between experts and novices is whether they have intuitive responses according to different contexts. Secondly, experts can be identified in respect to their dependence on rules in skill operation. “If something happens, an expert does not need to intentionally solve problems or make decisions, but just needs to work normally” (Dreyfus & Dreyfus, 1986, p. 31). Thirdly, experts can be identified according to the relationship between practitioners and the world. For novices and beginners, they are separated from the world and often feel “frustrated” and “at a loss” in the skill operation process; for experts, their actions have been integrated with the world.

The Dreyfus Skill Model also mentions the moral standards of skill assessment, but the moral standards of Dreyfus extend only to the rationality of the exercise of skills. He emphasized that the implementation of skills cannot be measured by rationality. As for skill operation, Dreyfus considers three levels of rationality: irrational, rational and arational. Some experts' intuitive judgment is neither rational nor irrational, but occupies an arational state between them. However, the skill operation of some experts may be reasonable, but that is no guarantee that their actions are therefore ethical.



As early as in the ancient Greek period, Aristotle emphasized that skill should aim at good. American moral philosopher Alasdair MacIntyre further developed Aristotle's views. He emphasized that "Every activity, every enquiry, every practice aims at some good" (MacIntyre, 2007, p. 148). As for the origin of morality, modern liberalism claimed that morality adheres to individual desire. However, MacIntyre (2007) argued that moral norms have some insuperable inherent contradictions: "I want to argue that any project of this form was bound to fail, because of an ineradicable discrepancy between their shared conception of moral rules and precepts on the one hand and what was shared—despite much larger divergences—in their conception of human nature on the other" (p. 52). In short, MacIntyre believes that the foundation of individualistic moral values is "individual rights" on which it is difficult to establish universal moral norms. Alasdair MacIntyre emphasized that virtue acquisition depends on the community. Since virtue comes from practice, and the establishment of practice is based on an interactive relationship, this requires that morality must be obtained through the cooperation among members in the social community. In the social community, each member will play a different role, and each role has its own meaning and purpose. Only when all members perform their own functions, they can achieve the common goal and finally obtain virtue. Therefore, morality does not come from individuals, but from the social community.

The assessment of human-like skills mastered by machines draws for reference mainly on the assessment criteria for human skills. As mentioned above, the assessment of human skills depends on social norms. Therefore, the assessment of human-like skills mastered by machines mainly depends on the degree to which the machine has been "socialized." Accordingly, Collins established a socialization model of artificial intelligence, and divided the socialization process of artificial intelligence into six stages. Stage 1 "Engineered Intelligence" is the lowest primary intelligence and is shown as a kind of control ability, such as the control system of washing machines and automobiles. Stage 2 "Asymmetrical Prostheses" refers to the replacement of human intelligence by machines, just as artificial limbs replace real legs, or artificial hearts replace real hearts. "AIs are 'social prostheses' – they take the place of some human activity, not by replacing a bit of the body but by replacing a bit of society" (Collins, 2018, p. 67). This is called "asymmetric prosthesis" because "we can, and continually do, repair the machines' faults, but they cannot repair ours" (p. 69). The artificial intelligence at the two stages mentioned above can only replace human labor in terms of some functions, but does not involve the social culture of human beings. Machines really start the process of "socialization" from Stage 3 "Symmetric Culture-consumers" which are "fully symmetrical prostheses – social prostheses that are so good at repairing our broken speech and other rule-breaking activities, and so good at recognizing and absorbing our precedent-setting activities, that they can respond appropriately to even the most novel interactions and recognize when they are legitimate" (Collins, 2018, p. 69). There is very little difference between Stage 3 and Stage 4: If machines can understand society at Stage 3, then machines can fully integrate into human society at Stage 4 "Human Challenging Culture Consumers." The first four stages of artificial intelligence socialization represent the process of machine integration into human society. In this process, the deep learning method of artificial intelligence reflects the human-machine interaction. Based on this interactive



relationship, machines can understand human society. However, starting with Stage 5 “Autonomous Human-like Societies” machines will gradually occupy a place in human society, so machines must behave like human beings – machines should have a biological body which is similar to the human body. At Stage 6 “Autonomous Alien Societies” machines will not only become a part of human society, but also be able to construct their own social culture. By that time, the whole process of AI socialization will be completed.

In fact, the model mentioned above only represents the “ideal” state of artificial intelligence socialization, which is actually very difficult to realize. This is because “society” is not a holistic concept. Society is composed of different cultures, and different cultures have different language paradigms. And even that does not mean that people who can speak the same language, such as English, can enjoy the same culture. As far as the scientific community is concerned, it was shown by Kuhn's theory of “scientific revolutions” that the scientific community is stratified and that different scientific communities employ different paradigms. As paradigms are not convertible, different scientific communities constitute different scientific cultures and it is difficult to overcome these cultural barriers. It can thus be seen that “we can't transfer our skills to computers through programming, because we haven't really figured out what the process of socialization is” (Collins, 1989, p. 209). Therefore, “1. No computer will be fluent in a natural language, pass a severe Turing Test and have full human-like intelligence unless it is fully embedded in normal human society. 2. No computer will be fully embedded in human society as a result of incremental progress based on current techniques” (Collins, 2018, p. 1).

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Статья поступила 3 июня 2023
одобрена после рецензирования 16 августа 2023
принята к публикации 4 сентября 2023

Received: 3 June 2023
Revised: 16 August 2023
Accepted: 4 September 2023



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