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Research article

Crystallographic Resonances: Rewriting Novalis

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aka 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-enchanting 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

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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

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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.“

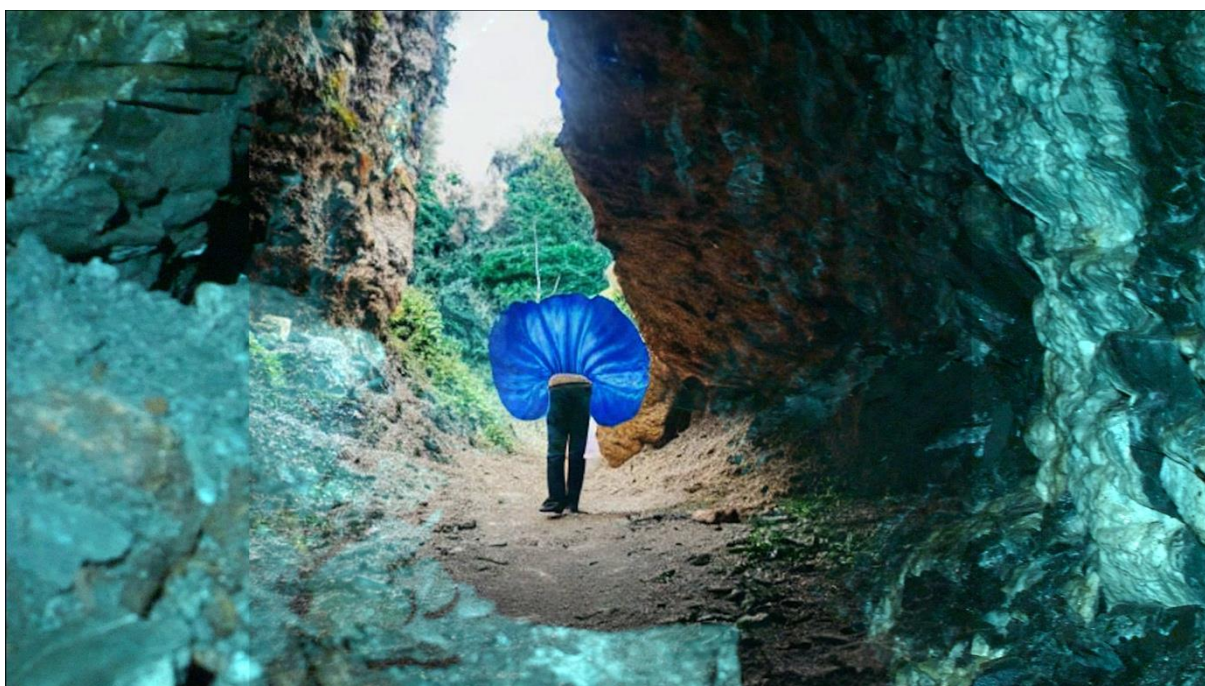


Figure 1. Juliane Henrich, *Dendrites* (2023), photograph of the former mine with superimposed images: The Blue Flower, courtesy of the artist (all rights reserved).

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 – abbrechen 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.

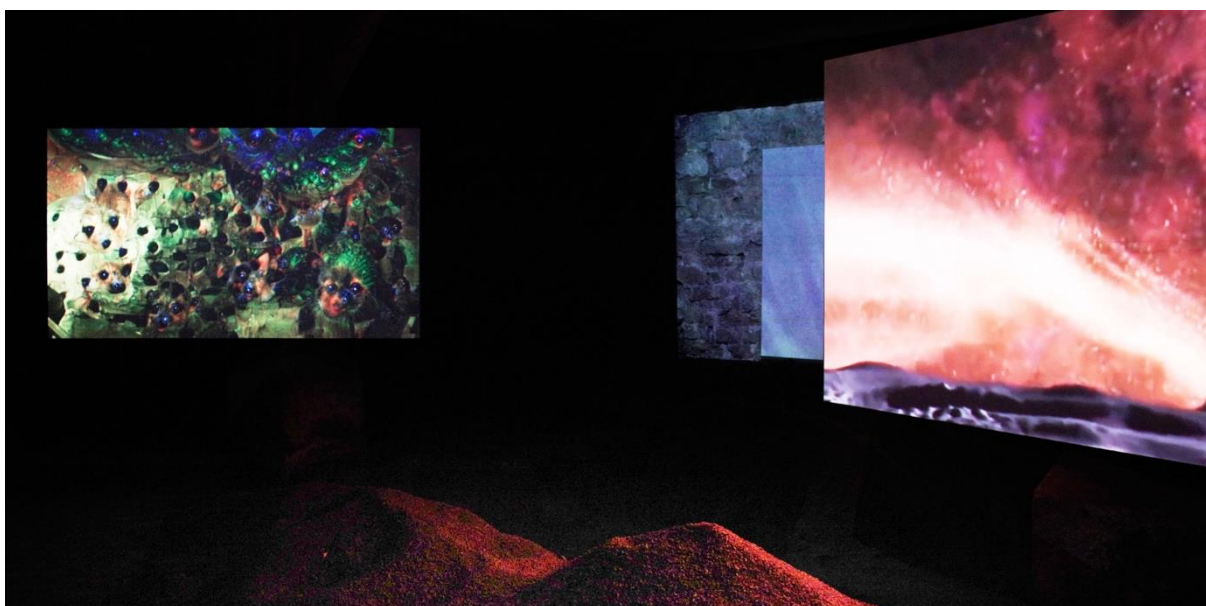


Figure 2. Juliane Henrich, *Dendrites* (2023), installation view, courtesy of the artist (all rights reserved).



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? Personificirte 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.

REFERENCES

- Bajohr, H. (2023, April 24). Schreiben nach KI: Artificielle und postartificielle Texte [Writing after AI – Artificial and post-artificial Texts]. [Audio Recording]. *Deutschlandfunk*. www.deutschlandfunk.de/schreiben-nach-ki-artificielle-und-postartificielle-texte-100.html
- Bök, C. (2003). *Crystallography*. Coach House.
- Novalis (Friedrich von Hardenberg). (1903). *The Disciples at Sais and Other Fragments*. Methuen.
- Novalis. (1976-1999). *Schriften. Die Werke Friedrich von Hardenbergs* [Writings. The Works of Friedrich von Hardenberg] [P. Kluckhohn and R. Samuel, Eds.]. [Four vols., plus one material and one supplementary vol.]. Kohlhammer.
- Rosa, H. (2021). *Resonance: A Sociology of Our Relationship to the World*. Polity.
- von Schubert, G. H. (1808). *Ansichten von der Nachtseite der Naturwissenschaft* [Views from the Nightside of Natural Science]. Arnoldischen Buchhandlung.



- Wittgenstein, L. (1922). *Tractatus Logico-Philosophicus*. Kegan Paul.
Zielinski, S. (2006). *Deep Time of the Media. Toward an Archaeology of Hearing and Seeing by Technical Means*. MIT Press.
Zuboff, S. (2019). *The Age of Surveillance Capitalism*. Profile Books.

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