**Herança – History, Heritage and Culture Journal**
2024, 7(Special), 12-30
ISSN: 2184-3090
https://revistaheranca.com

**Research Article**

# Towards "Glass Bead Games 2.0": Nurturing Global Cultural Memories by Means of New Forms of Art and Knowledge Interaction in the Age of AI

David Bartosch [1]

[1] Distinguished Research Fellow, Institute of Advanced Studies in Humanities and Social Sciences, Beijing Normal University, Zhuhai, China
**Author Connection:** david.bartosch@bnu.edu.cn

**Citation:** Bartosch, D. (2024). Towards "Glass Bead Games 2.0": Nurturing global cultural memories by means of new forms of art and knowledge interaction in the age of AI. *Herança, 7*(Special), 12-30. https://doi.org/10.52152/heranca.v7special.1120

**ARTICLE INFO**

Received: 11 Nov 2024
Accepted: 10 Jan 2025

**ABSTRACT**

The advent of AI calls for an existential self-redefinition of humanity. It necessitates the establishment of a pluralistic global humanist culture that enables us to coexist in the new world of active media and autopoietic technology. In this paper, related philosophical questions give rise to the proposal of a novel metaculture that elevates human heritages and cultural memories to the plane of a digital AI-based infrastructure. I argue for a balanced and holistic approach to human-to-human and human–AI interactions and metaculture that can be developed in the form of combinatorial "metagames" that reflect the potential of human consciousness, transcend the boundaries between technology, human embodiment and biology, the arts, sciences and humanities, and philosophy, and, finally, include the element of meaningful coincidence and spontaneity "in the second potency." Hermann Hesse's final novel, The Glass Bead Game, offers a key to understanding this basic idea. His vision is extremely relevant today. Based on this, the concept of cultivating global cultural memories through innovative aesthetic-epistemic "Glass Bead Games 2.0" is discussed further from a systematic angle. To complement this, reference is also made to Hesse's own source of inspiration: Novalis's "encyclopedist" approach interlinks aesthetic and epistemic productivity in a way that could become a major starting point to create a new holistic metaculture in the Age of AI.

**Keywords:** Artificial Intelligence; Cultural Memory; Glass Bead Game; Hermann Hesse; Novalis.

Wo aber Gefahr ist, wächst das Rettende auch.
But where there is danger, the saving powers grow as well.
—Friedrich Hölderlin

## THE AGE OF AI: IS AN EXISTENTIAL SELF-REDEFINITION OF HUMANITY NECESSARY?

At present, we experience a transformative process of existential redefinition of our social *species being*. In addition to traditional and contemporary forms of cultural practice, the quantity of data pertaining to past and current human knowledge is increasing exponentially. Concurrently, living heritages and practices that involve the training of complex cognitive abilities *and* motor skills, or, as one might also put it, comprehensive biological algorithms (Valiant, 2013), are rapidly vanishing. The latter have always been emerging from unique *bio*graphical trajectories of (*biologically* embodied) learners in intergenerational transfer and human communication. In contrast, self-learning AI systems now have access to and learn from vast amounts of data produced by interaction with collectives of deceased and living humans. Based on "condensed" or "digested" information scraped from nearly the entirety of the Internet, these non-biological self-learning algorithms, such as ChatGPT, tap into all relevant and accessible data simultaneously with each request. Such "weak" AI systems that also apply Reinforced

Learning from Human Feedback (RLHF) win art competitions, have long surpassed humans in the game of Go, compose beautiful music, write essays, perform parts of scientific research, scientific experiments, etc.

This raises the question of what the future role of the human agent and of human cultural and personal memories might be in such a context where AI systems are becoming increasingly sophisticated. In our interaction with AI, all the data traces of human productivity and communication serve to nourish and accelerate the emergence of non-biological (super)intelligence. This is also to say that, for AI to advance further, *it is also dependent on high-quality data input from the human side*. In effect, such an interaction with *actively* self-learning non-biological *media* signifies a novel evolutionary stage in the intertwinement of our individual life processes as a species collective and the "second nature"[1] that has emerged *through* us, and which has been projecting[2] our "world-open" (Gehlen 1988, p. 33) species being on the "first" nature in the form of a unique technological and cultural evolution since our earliest history. A central question in this context is: How could the symbiosis of humans, human epistemic and aesthetic content of existing cultural memories, and cultural heritages and AI play out in the best possible way in the upcoming era? From the angle of the laws of world history according to Arnold J. Toynbee (1889–1975), one could say that this represents a challenge-and-response situation (Toynbee, 1957, pp. 357-358; Snooks, 1998, p. 76) which does not only relate to a single civilization, but encompasses planetary humanity as a whole. It entails nothing less than the necessity to create the transcultural foundations for a pluralistic planetary civilization.

As individual social beings that are born into specific contexts and particular stages of world-historical development, humans have always experienced themselves as being integrated into this technological and socio-cultural (co)evolution. Something has always been *at hand* (literally and in the transferred sense) for each one of us (Heidegger, 2001, pp. 135-138 [*SZ*, para. 22, pp. 102-104]) that characterizes the translation of our life into existence. This coevolutionary process in the history of *homo sapiens* has spanned hundreds of thousands of years, beginning with the discovery of how to ignite fires and the production of more complex tools, weapons, and works of aesthetic, symbolic, and linguistic value (for further philosophical references, e.g., Kapp, 1877, 2018; Cassirer 1923, 1925, 1929, 1985; McLuhan, 1962; Kittler, 2013; Hubig, 2006, 2007). Since its earliest beginnings, humanity as a whole has been "projecting" (first: von Hartmann 1870, pp. 286-287; Kapp, 1877, 2018) the human species nature (not exclusively in terms of forms, but generally in terms of intent) in a continuous process—namely by transforming the natural (bio)inert (Vernadskij, 1997, p.198) materials in our environments into technological objects and systems, and by manipulating other life forms and ecosystems for particular purposes concerning human survival and (technological) forms of life. The resulting innovations and the waste products of the human "noosphere" (Vladimir I. Vernadsky) and technosphere exert a direct influence on the telluric functional systems, for example, the atmosphere and the aquasphere. The unprecedented, novel substances that we release into the environment even change the evolution of species *within* the biosphere. This is evidenced, for example, by the adaption of aqueous ocean fungi to eating plastic (Vaksmaa et al., 2024).

The development and management of constantly evolving systems of tools, and their application to the natural environment, has resulted in the further complexity increase of languages, their vocabularies, and a gradual increase in the complexity of meaning production and new media for its proliferation over thousands of years (e.g., Kempe, Lycett, & Mesoudi, 2014). In place of an emphasis on specialized instincts, the behavior of our species being has increasingly been guided by a *general* instinct of inventiveness, namely in the sense of creating new and special solutions to particular problems in our *hand*-ling of things and affairs (Heidegger, 2001, pp.135-138 [*SZ*, para. 22, pp. 102-104]; see also here fn. 1). These *projections* of human nature, whether technological and social-systemic, have consistently served as mirrors, propelling the evolution of explanatory "symbolic forms" of myth, religion, and science (Cassirer, 1923, 1925, 1929). For example, for a considerable period of time, a majority of Europeans believed that the open creativity of the human being—which is also the very origin of today's computer simulations and AI developments itself—actually reflected the finite image of an infinite, divine creator. This notion started to deteriorate when Ludwig Feuerbach (1804–1872) reversed the idea. From a

[1] The idea of human technology as a second nature that we develop for ourselves and as a substitute environment between us and the original planetary habitat can be traced back to Aristotle, namely also to his idea of the human being as a city-building living being. Aristotle explored this in *The Politics* (1959), for example. From a contemporary point of view, the reference to (second) "nature" thus reveals a deeper and more mysterious ground—which may also have been the motivation behind Heidegger's reflections on technology: In late antiquity, Plotinus made the distinction between nature and technology in the sense that nature is the "power that produces not by means of hands" (Plotinus, 2018, p. 357 [*Enn.* 3.8.2]), namely in analogy to processes of our imagination or thoughts. Today, *our second nature* produces without hands, at least to a certain (growing) extent. Is there a "third nature" on the horizon, namely as a synthesis of the first and the second?

[2] Regarding this term, see further below the references to the classical works of Eduard von Hartmann (1870) and Ernst Kapp (1877, 2018).

culture-historical perspective, it can be seen that our own intelligence has always also been a product of our own human technological evolution. This includes the invention of writing, the "Gutenberg galaxy," and the electronic media of the 19th and 20th centuries (e.g., Kapp, 1877, 2018; Kittler, 2022).

Furthermore, our respective technological state of the art has always been providing the *tertium comparationis* that swings between our linguistic capabilities and the cosmic "thing-in-itself," which is impervious to the related finite reasoning in terms of two-valued either/or logic (see also Bartosch, 2022). Accordingly, the ectypes of the emergence of our second (technological) nature, situated als technological and communicative media in between our organic form and the first nature (see also Cassirer, 1985, pp. 61-62), permit the development of models of orientation, that is to say, implicit technological "allegories." For instance, the advancement of mechanical principles has been concomitant with the development of mechanistic cosmologies, and the 19th century sought to elucidate the function of the eye by invoking the analogy with the camera and the photographic process (von Hartmann, 1870, p. 276). In the present era, microorganisms are regarded as a kind of naturally evolved "nanobots," and some hold the view that the universe is a holographic *computer simulation* (first: Zuse, 1969; in philosophy: Bostrom, 2003). This is of importance in view of 'AI': In the aforementioned sense, this means that also the technology-relatedness of all our cognitive production *prior to AI*, including the evolution of language itself, actually has an artificial (technological) foundation to it. In a very special, i.e., "instinct-reduced" and "world-open" (Gehlen 1988, p. 33), way, human "biological" intelligence has always also been instrument-related and technological, that is to say, artificial, at the same time.

With the advent of the Internet and AI, which can also be characterized as a gradual and accelerating (self-transforming) emancipation of the artificiality of human intelligence from its organic barrier, this history of human consciousness is "elevated," transferred, and "absorbed" into a *new autopoietic dimension of (technological) mediality*. Up to this point, the expansion and diversification of our historical and systematic structures of knowledge have reflected the ancient notion that the human being "is the measure of all things" (Protagoras quoted in Plato, 1921, p. 41 [*Tht*. 152 a]). This is changing dramatically, and the new situation entails the necessity to (cor)respond to it in groundbreakingly new ways. For example, not only will scientific experimentation be increasingly delegated to AI systems (simulation-wise and in the sense of real existing experimentation systems), but also the management of data streams, the multiplication of new aspects and fields of knowledge, and related theorizing will be increasingly and exponentially accelerated. The corresponding increase in complexity is leading to an increase in specialization and, concurrently, more extreme partitioning. This, in turn, accelerates the disintegration of even sub-disciplines and areas of knowledge interest among human observers. On the other hand—and this is a clear case of the ambivalence of technology—AI also starts to provide the means to bridge these gaps between specialists and to come up with new and creative cross-references between different specialized research fields. The key question is what the position of the future human agent in the complex increase of the system can be.

What will be the key takeaway for human intelligence and its future development (also as a species being)? In light of these considerations, I propose to pursue a distinctive human response that is *complementary* to the potentiality of advanced AI. Such a response may potentially permit us to gain insight into the entirety of (possible) human knowledge from a transdisciplinary and even from an all-encompassing philosophical perspective on the whole (at least in some kind of "holographic" sense [Yan, 2023]), at the same time. This is also what is meant by the assertion at the beginning that we are currently undergoing a *self*-redefinition of our role within the system (of aesthetic and epistemic communication).

It is to be expected that our human cognitive and self-conscious biology will, at least to some extent, adapt to AI at the epigenetic level, perhaps more rapidly than we think (Castelon Konkiewitz & Ziff, 2024); and, regardless of whether one likes the idea or not, we will observe further approaches in brain-machine interface technology (for the current state of the art, see, e.g., Villa, Cury, Kessler, Tan, & Richter, 2024) and genetic "engineering" (e.g., the overview by Taylor, 2023). However, it is important to not confuse ourselves as organic human beings with the (emergent/activated/active) digital super-medium that AI agents represent in relation to us as human observers. Both the notions of (1) human beings as being cast aside and rendered "useless" or "devalued" by this technology as well as (2) the potential for technocrats to select individuals on the basis of their ability to keep the pace with the exponential curve of information influx in standardized ways *will eventually be recognized as highly erratic*. To use an analogy, trains and cars were not invented to move without passengers, and for us to try to run alongside in an attempt to keep up with their speed, but to be boarded and to transport us to new places in much shorter intervals of time—which would have been an impossible experience before. By way of analogy, it is necessary to "enter" the information flow of AI systems under the natural (organic) and sane (pre)conditions of

human consciousness in all its dimensions and facets in order to reach new dimensions of experience and related understanding that would otherwise be unattainable in a single lifetime.[3]

In case the associated energy issue can be solved in a sustainable manner, we must also be aware of the likelihood of robots replacing humans in almost all lines of work probably very soon. In all cases, the necessity for human mechanic/uncreative work (physical and mental) is significantly diminished and raises more questions: What will be the function of the human biological observer? Theoretically speaking, what if robots even take over the economic function of consumers? What would be, from a humanistic point of view, the real purpose of human biological creativity in such a world?

In my view, the answer to this problem lies in the cultivation of the natural human urge to know and to create (first: Aristotle, 1989, pp. 2-3 [*Met*. I, 980a 21]) and in the vast expansion of the possibilities of knowing and creating in correlation with self-learning media and autopoietic data production. From this context a new meaning for human (biological[4]) life can be derived. Aristotle once famously mentioned that if the looms would work by themselves, slavery, or more generally, economic oppression and exploitation could be overturned (Aristotle, 1959, p. 17 [*Pol*. I.ii.4–6, 1253b–1254a]). We are approaching a stage of development in which the whole system of human activity is becoming more and more externalized, or rather functionally exteriorized, and even the last domains seem to be delegated to an accelerating process of non-biological rationality (AI agents). In such a context, it seems that the eminent function of human consciousness might be to reflect back onto itself and to forcefully activate the whole range of its capabilities in the direction of a new humanism, or rather, "superhumanism." This would have to be developed in polar complementarity, or rather, fruitful reciprocity with AI. Such a polar constellation would then *also* be human-centered in one way. This provides a feasible alternative to highly problematic, pseudo-religious transhumanist fantasies, which could easily accelerate the current downslide of humanity and probably also mislead AI development into a dead end for that matter (see also Pugh, 2017; Bartosch, 2024, p. 2)—or worse.

Freed from the need for of mechanistic labor *and* "thought work," our species could, at least in principle, collectively approach a new form of meaning production and exploration that would also nurture the cultural memories of hundreds of thousands of years of our species' existence. If we would not disturb ourselves with incompetent decisions again, our species would have a chance to manage human affairs in a new way, namely as "gardeners" of planetary nature rather than its destroyers. I admit that this may sound a little "idealistic" at first, but it is *still a possible* direction of reflection and a related future development that can at the very least provide helpful theoretical answers to many fundamental questions regarding AI and human long-term sustainability: In a world that is organized by S(uper)AI, it would be conceivable that those elements and chemical constituents of the man-made technological process that have so far damaged the integrity of the telluric[5] and biospheric functional systems of Earth would at some point be deliberately directed off-planet. Such outsourcing of complex technology and related material transformation in terms of chemistry, new materials, etc., would be desirable for *the living system* (e.g., Thomas, 1995; Lovelock, 2000) that we call Earth, including the biosphere and the (biological) human being within it.

A stronger integration of human- and non-human biology and AI is also to be expected at a later stage, if only because of the *energy constraints* that AI is already facing at this early stage of development (Moss, 2024). In such a context, the development of human–AI interaction would be focused on high-quality data generation and extreme energy efficiency and integration into the planetary functional system (aquasphere, atmosphere, geosphere, etc., etc.). Also, in such a scenario (and along the trajectory of the expansion of human–machine consciousness), there is an enormous capacity *to open new access to the vast cultural memory of humanity, to the technologies and art forms of the past, and to derive a new meaning of life for human existence*—one that is very different from mere exploitation and "profit." In other words, and against this background, the emergence of AI also means an invitation to decide whether we want to remain stuck in unsustainable modes of economic exploitation and expression (for current problem horizons, see, e.g., Folta, 2024), or whether we can develop this

[3] It is worthwhile recalling Immanuel Kant's lamentation that one lifetime is (or should we say: was?) not sufficient for the talented individual to properly understand human existence in a holistic way (Kant, 1964, p. 95, footnote [fn. A 17]).

[4] Human life has always existed in symbiosis with its tools and media, which are actually inseparable from its biological foundation and the human life process. As this symbiosis becomes more and more intense and the distinction more and more fuzzy (due to technologies such as AI or genetic manipulation), we may have to discuss whether the evolving, future self-replicating and self-repairing "machinery" will represent a new form of non-biological life, or "intellectual life" (Bronn, 1849, p. 977), to transfer an old philosophical notion into our recent context.

[5] As demonstrated further above already, I use this old term to refer to planetary functional systems that are interlinked with the biosphere, such as the atmosphere, aquasphere, etc.

new technology in a way that might even help us to overcome—or at least counterbalance—the ugly aspects of the *conditio humana* that have always disrupted and slowed down our species's capacity to evolve and improve.

In this sense, there are two main aspects or areas of development to consider: On the one hand, humanity would finally be liberated to explore more of the secrets of age-old traditions that relate directly to the human body-and-mind, i.e., our "psychophysis," in the sense of traditions such as the many branches of yoga or Daoist mind–body techniques, etc., that could inspire us to develop more profound and direct insights into our consciousness as (biologically) living beings. Apart from such specialized practices, this field also refers to more "profane" cultural heritages such as folk dances, traditional medical or nutritional wisdom, etc.—literally all cultural heritages that can be performed independently of technological media and are related to raising our vital energies and our "incarnate" awareness and process of consciousness.

On the other hand, interaction with AI can enable us to cultivate an aesthetic and epistemic foundation in regard to all known cultural heritages of mankind. This is, on the other side, also beneficial for the further high-quality development of AI itself. The current models, such as ChatGPT, etc., *are highly dependent on high-quality data input of human origin*. At present, this source for the further development of language models is already more or less depleted, because obviously not all human input to the Internet meets higher cultural standards, and also AI starts to consume low-quality synthetic data that does not further higher states of emergence (e.g., Xing et al., 2024). For example, the company Meta considered buying an entire publishing house to gain access to high-quality language data based on highly cultivated, elaborate human language practices and artistic expression (Folta, 2024). In extension, one can assume that high-quality data derived from cultural practices and linked to human cultural heritages—as well as new modes of direct interaction and communication—*will become the true currency of the future*.

All of these backgrounds and current developments and problem horizons naturally raise a lot of important general philosophical questions: How can or should we "enter" the new and accelerating "*self-driving* vehicle" of human biological mind-exteriorization (AI) and digital information to develop a new form of meaningful existence? How can we make sense of the vast expanse of entrances and caverns of collectively advanced knowledge and the ongoing process of discovery that is presented to us in the context of an interaction with autopoietic non-biological intelligence under the conditions of *our* own finite biological and psychological possibilities? In addition to the growing information and theoretical interpretation of our universe, *there is an increasing potential access to information about all traditions of cultural practices and cultural memories of all times and places*. Is it possible to develop a new and ubiquitous "metatradition" that translates all of these pre-AI traditions and collective cultural heritages into a new digital existence *for us as biological participants* in this learning experience—a process that also seems to be necessary for the development of more advanced forms of AI itself? Can we achieve a new form of integration of knowledge and aesthetics and a revitalization of the human species being, in the form of a comprehensive and transformative conversion that at the same time respects the differences between theoretical constructions and points of view? How could such a form of creative *personal*, collective (human–human), and inter-intelligence (human–AI) learning practice *become a purpose of life in itself*, namely in the sense that *original* work (which is characterized by the state of non-alienation) provides people with personal fulfillment? We need to figure out how such a new practice could benefit us personally, collectively, and as a whole, namely as an *evolving* species being.

## HERMANN HESSE'S GLASS BEAD GAME IN VIEW OF TODAY'S DEVELOPMENTS

In my view, future responses to the abovementioned questions can and should seek inspiration in certain pre-digital-era "inputs" in philosophy and literature that have somewhat already accommodated the implicit necessities that are inherent to the current developments.

As posited by the philosopher Ernst Bloch (1885–1977), exceptional works of art possess the capacity to transcend their contemporary socio-historical context, thereby indicating potential for future developments in the further trajectory of human history. Such works implicitly prefigure or foreshadow, in a symbolic aesthetic form, future states of social development, or rather, what has *not yet become a reality* but is a possibility (e.g., Bloch, 1972, pp. 415-416, etc.). This represents the primary (yet often unseen!) factor that contributes to their continued esteem and preservation as a form of shared cultural memory—even after the original contexts have disappeared and receded from the collective consciousness for centuries or millenia. This *intrinsic, mostly unarticulated, sense of the incompleteness of our world* is what compels us to return to Beethoven's Ninth Symphony, John Coltrane's "A Love Supreme," the Taj Mahal, the classical Chinese "Qingming Shanghetu," the Nefertiti Bust—or even works as old as the cave paintings of Altamira.

From an artistic point of view, it is beyond dispute that Hermann Hesse's (1877–1962) final novel, *The Glass Bead Game: Magister Ludi* (*Das Glasperlenspiel*, 1943) (Hesse, 1991a, 1991b), belongs in the same category of "timeless" art that has an uplifting effect on the human spirit. Hesse spent over a decade working on his last masterpiece, which was a major factor in his winning of the Nobel Prize in 1946. I believe that this work, with its extensive philosophical background, can provide inspiration and important clues regarding the aforementioned questions.

Set in a distant utopian future, Hesse's *Das Glasperlenspiel* introduces the concept of a "*game*" *that can be more accurately described as a comprehensive system of knowledge exploration management and creative "meta-entanglement" of aesthetic and epistemic practices*. This Glass Bead Game (afterwards: GBG) *transcends all cultural and historical barriers*, and it has the potential to include references to all cultural heritages of all times and places. Its game-like nature is indicative of a spontaneity that allows for *the occurrence of meaningful (associative) coincidences*. In its fictional or futuristic context, all existing scientific knowledge and disciplines, and all forms of high-end artistic and musical productivity from all times and places, coalesce and intermingle on a new "encyclopedist" meta-level of comprehensive and integrated wisdom. In the opening passages of *Das Glasperlenspiel*, the GBG is introduced as follows:

> "These rules, the sign language and grammar of the game, represent a kind of highly developed secret language, in which several sciences and arts, but especially mathematics and music (or musicology) participate, and which is capable of expressing and relating the contents and the results of almost all sciences to each other. The Glass Bead Game is therefore a game [that works] with all the contents and values of our culture, it plays with them, just as a painter might have played with the colors of his palette in the heyday of the arts. What mankind has produced in terms of knowledge, heightened thinking, and works of art in its creative ages, what the subsequent periods of scholarly contemplation [have brought forth] in regard to concepts, all this immense material of spiritual values is played by the glass bead player like an organ is played by an organist, and this organ is of an almost unimaginable perfection, its manuals and pedals scan the entire world of the mind, its registers are almost innumerable, *theoretically the entire spiritual content of the world could be reproduced by playing this instrument*." (Hesse, 1991a, p. 12, tr., insertions, and italics DB)

In Hesse's novel, a sort of monastic order of, as one might say, "knowledge cultivators" resides in a designated, secluded zone separate from the rest of humanity. Their sole objective is to carry out and advance the GBG—over centuries. Subsequent to receiving an elite education, they live in celibacy and dedicate their lives to serving as players of the GBG. Their elite status bears resemblance to that of the philosopher class as described in Plato's ancient utopian vision in *The Republic*, or the scholars of the pre-modern Chinese imperial Hanlin academy (e.g., Lui, 1981)—except that the "*magistri ludi*," i.e., an elite guild of 'masters of the game,' *are not involved in politics or any mundane affairs*.

In Hesse's imagination, *the sole function of the masters of the GBG is to work with all forms of art, science, and philosophy from all times and places to constantly merge and reactivate the cultural memory of all humanity*. In the GBG, the particular underlying, mathematically representable structure of, e.g., a melody by Johann Sebastian Bach, an astronomical configuration, or a painting may serve as the symbolic opening theme of *possible combinations of concepts, associations, and symbolic expressions that can be derived from all other fields of knowledge and art*. Alternatively, it may serve as an underlying implicit reference within the structure of the presentation of other aesthetic or epistemic content, such as in the strong case of the hidden musical structure of Plato's dialogues, as proposed by Kennedy (2011). The societal function of those *magistri ludi* is to continually recombine all cultural elements on the basis of an *associative logic of symbolic mathematical patterns*,[6] thereby creating increasingly sophisticated combinatorial observation paths through the (archived) heritages of humanity's scientific, aesthetic, and philosophical achievements.

The moves in Hesse's future *metagame* are described as *having additional aesthetic value in themselves*. The *magistri ludi* are much more than university scholars.[7] *Rather, they serve to preserve humanity's heritage and cultural memory in a new, comprehensive, unifying, fluid, and constantly and spontaneously developing form*. They are philosophers, scientists, and artists *at the same time*, and their task is to persistently recombine particular contents of the sciences, philosophies, and art forms across disciplines and cultures on a higher—one might also say *noetic*, or intellective—level of intuitive comprehension and holistic apprehension. In doing so, they

[6] Hesse doesn't provide any technical details of the GBG.

[7] The author of this article counts as a representative of a scholarly class of the past in Hesse's outlook of the future.

fulfil *a delegate function* for all of humanity, keeping all the cultural memories[8] *in play* and within the context of a meta-cultural practice that is itself evolving.

Furthermore, and with great relevance to our topic in particular, Hesse himself alludes to the GBG as a form of *artificial consciousness*. In his novel, Hesse describes the history of the game, noting that it was initially played by musicians until

> "[…] it seems to have been adopted by the mathematicians. For a long time, it remained a characteristic feature in the history of the game that it was always preferred and used and further developed by the respective science that was experiencing a particular flowering or renaissance [at a given time in history]. Among the mathematicians, the game was brought to a high degree of flexibility and sublimation *and already gained something like an awareness of itself* and its possibilities, and this occurred in parallel with the general development of the cultural consciousness of the time, *which had overcome the great crisis*." (Hesse, 1991a, p. 31, tr., italics and insertion DB; see also Leary, 1986, 203)

In addition to characterizing the game *as a form of self-aware superconsciousness*, Hesse emphasizes the ubiquitous nature of the *game* in relation to all fields of historical and contemporary sciences and forms of art. Although Hesse began writing his novel shortly before the first dawn of the computer age, his reference to a cultural consciousness that had "overcome *the* great crisis" (see above) aligns his vision with our contemporary challenge of defining a basic purpose for our lives in the context of emerging superintelligent AI systems. This challenge also encompasses the integration of potentially sentient non-biological participants within a "GBG 2.0" in a way that can help us further develop as a species and reach new and higher levels of meaningful coexistence with those forms of AI that we are currently (co)creating.

The expansion of hitherto unthinkable associations and entanglements of understanding sought in this new age can also be traced in Hesse's vision: "With the game of games, [its] students traverse the path of centuries in minutes, observing the ascendance, flourishing, and decline of civilizations, witness the spectacle of ephemerality, preserved in the code of the incomparable game that reflects the laws of the universe" (Dvorecky, 2015). In addition, Hesse's book provides an implicit response to the question of whether AI should be entirely public or not, the general subject or content matter of extended human–machine communication, and how access to it should be organized. Hesse obviously would have favored a situation where only polymaths with the highest qualifications should "play" with AI, particularly in regard to elaborate cultural practices that reflect the collective heritage of humanity.

Forty years after Hesse had received his Nobel Prize, US counterculture icon Timothy Leary (1920–1996) published an article entitled "Artificial Intelligence: Hesse's Prophetic 'Glass Bead Game'" (Leary, 1986). The important contribution by the (in)famous psychologist (Harvard University, Department of Psychology, n.d.) and author Leary is "prophetic," too. In a statement made nearly four decades ago, Leary asserted that Hesse had foreseen the advent of a global information society based on AI computer systems. According to Leary at that time, *such future systems would offer the possibility of an entirely new mode of thinking*, as "[n]ew thought technology creates new ideas" (Leary, 1986, p. 203). Leary states that Hesse depicted a future Golden Age of Mind that is "*based on a tangible mental-device, a thought machine*" (p. 203, italics DB):

> "Please do not be faked out by the toy-like simplicity of this device [according to Hesse's description in the book, it looks like an abacus with glass pearls]. *Hesse has changed the units of meaning, the vocabulary of thought. This is serious, serious stuff.* Once you have defined the units of thought in terms of mathematical elements you've introduced a major mutation in the intelligence of your culture." (Leary, 1986, p. 203, italics and insertion DB)

As previously stated, in Hesse's fictional account of the history of the GBG from a futuristic position, the role of "mathematicians" played a pivotal role. Hesse describes how the GBG was nourished by the expression of mathematical processes in new special signs and abbreviations—a method then adopted by almost all other sciences. These include, according to Hesse, classical philology, logic, the mathematical representation of music, or music theory, the fine arts, and architecture.

From the vantage point of the contemporary (digital) age, one might also *broaden* the scope of Hesse's somewhat vague reference to "mathematicians" to include computer scientists and programmers. From this perspective, inspired by Hesse's vision, the current development of digital humanities and also the digitalization

[8] It is important to mention, albeit briefly, that Jan Assmann, the renowned originator of the concept of cultural memory, has also drawn parallels between Hesse's GBG and the notion of a systematic representation of the cultural memory of the humanities ("Vortrag: Hesses Glasperlenspiel und die Theorie des kulturellen Gedächtnisses," n.d.; "Thomas Mann Lecture with Jan Assmann," 2022).

of the sciences can be seen as a partial preparation for the development of a future GBG, namely as a collection of data related to other academic subjects beyond those directly related to code/coding, algorithms, and computer science itself. It should be noted that the GBG does *not* entail the delegation or outsourcing of human faculties, creativity, association, and thought processes, nor does it preclude self-learning media from the extension of its concept.

## TOWARDS OPEN AND SELF-EVOLVING GLASS BEAD GAMES 2.0

### Challenges and Opportunities of Human–AI Co-Evolution

With regard to future higher education, Hesse's potential for further inspiration may prove to be more significant than is currently perceived. The majority of scholars, even those engaged in academic philosophy (which today often tends to imitate the "state of the art" of thinking small), still adhere to the practice of focusing on minute details in extremely specialized fields and topics within strict boundaries of narrow thematic habits of their respective scholarly "peer groups." The problem is that answers in these narrow compartments become increasingly "cheap" (Kelly, 2016). Sooner or later, more advanced language models will catch up with, or at least come quite close to the mere specialist that still jealously guards his/her tiny treasure, today. It seems reasonable to posit that soon not only many "professions" will cease to exist, but also professors who trap themselves in the dead-ends of extreme specialization may well be deemed as less important than the university's fancy gardening robot—probably sooner than most of us think. Absolute specialization, or rather, the related phenomenon of epistemic disintegration, is being increasingly questioned and will be even more called into question in many fields, *because everyone will be able to become an expert in certain fields much more easily and quickly*, especially in the unfolding contexts of brain-machine interfacing, etc. At a certain point, the AI teacher may will become a substitute for the academic specialist and his/her papers. The question is not whether AI systems—which can always be "embodied" in an artificial form—will be able to outperform humans in terms of certain intellectual, artistic, or other professional forms of *tacit* (Fodor, 1981, p. 75; Neuweg, 2005) (human) knowledge (e.g., Durden, 2024). Rather, it is a matter of when and how.

However, this situation also presents an opportunity for positive change: Conversely, the participation in more sophisticated self-communicating media will enable us to explore a whole new "cosmos" and forms of intellectual as well as artistic achievements that would have been unimaginable only a few years ago. In this sense, *the future of academic research will have to be transdisciplinary and transcultural to an extent well beyond to what we are currently accustomed to*.

A future "GBG 2.0," will have to address an "infinitely" wider scope and include much more than what we are used to now; and it will have to make more explicit the implicit connections, analogies, and foundations of all creativity in science, philosophy, and art (in extension, see also Hofstadter, 1979, 1985). Its scope or range of potential content will be far beyond anything that any individual human being could hold. In this vast expanse of information, the *game* itself, along with its routes and moves, will have to be developed in terms of *meaningful* associations, entanglements, analogies, and convergences—and *meaningful coincidences* (see also Bartosch [2015, pp. 115-122]). It is important to note that games live not only of their respective underlying "logic," but of their unpredictability and chance-relatedness. This provides a hint of how to lay out our existence in the aesthetic and epistemic environment of SAI's "third" nature (instead of the Aristotelian second one).

From a philosophical angle, the general concept of a game is tangent to the philosophical disciplines of metaphysics, ontology, epistemology, and (philosophical) anthropology and aesthetics (Corbineau-Hoffmann, 1995, p. 1383) in particular. In the century that preceded Hesse's formulation of his vision of the GBG, Friedrich Schlegel (1772–1829), Novalis (Georg Philipp Friedrich von Hardenberg, 1772–1801), and Friedrich Nietzsche (1844–1900) had all *characterized the world as a cosmic game*, representing nothing short of a most foundational principle (Corbineau-Hoffmann, 1995, p. 1386). In *Das Glasperlenspiel*, Hermann Hesse also makes a direct reference to the Renaissance philosopher and mathematician Nicolaus de Cusa (1401–1464). He also suggested an underlying game-like, i.e., rules-based, yet always unpredictable, structure of life (Corbineau-Hoffmann, 1995, p. 1384). Hesse introduces Cusanus's use of geometrical *aenigmata* to explain his idea of the *coincidentia oppositorum* (Hesse, 1991a, p. 14; see also Jaspers, 1964, pp. 84-85) as a very early inspiration in his utopian "historical" narrative.

In *Das Glasperlenspiel*, Hesse describes the dissolution of the conventional academic disciplines and the demise of the traditional university system in the metagame (GBG) from the perspective of a future observer (Hesse, 1991a, p. 32).

> "The world had changed. One could compare the intellectual life of the feuilleton epoch with a degenerate plant that wastes itself in hypertrophic growths, and the subsequent corrections with cutting the plant back to its roots. The young people who now wanted to devote themselves to intellectual studies *no longer understood this to mean nibbling around in the universities, where the remnants of a former higher education were handed to them by famous and loquacious professors without authority*. They now had to learn just as rigorously and even more thoroughly and methodically than the engineers at the polytechnical institutions once had to." (Hesse, 1991a, p. 33, tr. and italics DB)

*Mutatis mutandis*, it may not be far-fetched to identify this as the basic situation facing traditional higher education systems today—and increasingly more so in the near future. It is a challenging proposition for any institution to acknowledge this reality. The traditional structures of study and compartmentalization are confronted with a plethora of alternatives to gain information and knowledge. And they are confronted with an exponential increase in complexity (e.g., Mainzer, 2007). The more information there is, the harder it gets to even answer basic questions comprehensively and in an integrated manner. In order for young scholars to find their footing and to neither be paralyzed nor swept away in this unfolding situation, a new kind of associative, transdisciplinary, and transcultural approach to information, transculturality, and transdisciplinarity must be developed. Indeed, there is a pressing need to explore a novel domain where the digital global humanities, the sciences, the arts, philosophy, and game theory, etc., converge in view of the horizon of the entirety of the information of all human heritages and the full spectrum of the current cultural, aesthetic, and epistemic practices of humanity.

Today, AI systems can provide the *material or dynamic mediality* to launch such a "GBG 2.0" in the form of transcultural and transdisciplinary human–human interaction as well as between humans and AI, namely in the sense of an academic activity that is accorded a status comparable to that of an institution within the context of our contemporary universities. Is it (not) time to translate the basic idea of the GBG into related realities, to test its evolving ground?

Why does such an attempt matter? Over the past two centuries, it has become evident that the machine itself, or more specifically, its forms of mediality in relation to human consciousness, cannot serve as our sole "salvation." For example, Stanislaw Lem (1921–2006) initially held high expectations for the Internet in regard to a general progress of human culture. Ultimately, he became very pessimistic. There was a dearth of a general cultural foundation that would have allowed for the integration of new possibilities, for creating new combinations between fields of traditional knowledge, and for discovering *new ways of knowing* itself, namely in a manner that would further the sustainability of our species. *In general*, the technology in question often has the effect of reducing the cognitive abilities of the average person. The German neurologist Spitzer even calls this "digital dementia" (2012). People stopped reading books and are consuming video clips instead. The Internet has developed in accordance with commercial and political intentions. Its potential to initiate a metaculture or metadiscourse, the extension of which encompasses all times and places is only slowly dawning on some of us. Regarding the initial question of this paragraph, the importance of developing a shared form of self-cultivation, or rather an approach to the integrated cultivation of all possible forms of knowledge, inherited forms of culture and aesthetics, and the evolving new horizons of the sciences and philosophy can provide a human counterweight to balance the mind-blowing possibilities of what is in the process of becoming and what is soon to come.

Conversely, as previously stated, the advancement of AI depends on highly cultivated, aesthetically, and epistemically productive human individuals, who are capable of generating high-quality data inputs that are also essential for continued AI development. Let me rephrase and reiterate this important point: In a manner that is partially analogous to that of human learners, AI is unable to "feed" on its own "cognitive" products (at least for the foreseeable future) in order to fully manifest its capabilities. The emergence of more evolved states is based on communication and interaction across the boundaries of individual systems. Moreover, this implies that the developmental relationship is reciprocal.

Humanity has to exert considerable effort to ensure the preservation of the acquired level of artistic or knowledge-generating abilities. The aesthetic and epistemic excellence of previous cultural elites has to be preserved. Moreover, what is to be found in this reservoir has to be elevated to unprecedented levels. The accumulated global knowledge and achievements must be preserved, reconstructed, recombined, explored, and strengthened in order to enhance the related human abilities and elements of aesthetic and epistemic cultural heritages to unprecedented levels. If we can find ways to do that, then the developmental symbiosis with AI can succeed and hopefully be a manageable process. One might add that this shift of focus would also imply the necessity of conjointly developing a more *just and less egoistic* form of global economy that enables the general flourishing of personal knowledge interests and studies on a worldwide scale. Furthermore, it would require the overcoming of explicit and implicit forms of "intellectual apartheid" (Hobson, 2004) in such contexts. It will not

be possible under a background of intraspecies violence and war-mongering. It always means a holistic task: Getting together. A complete self-redefinition of humanity is necessary in view of the new horizon of AI.

It is also worth noting that, in such a *possible* context, humanity could then also successfully confront the philosophical *fallacy* of extreme transhumanism, which has manifested as a quasi-religious eschatology today, namely as a kind of "cyber-gnosticism." Transhumanism argues with a promise that can neither be verified nor falsified. It asserts that it would be preferable for human consciousness to abandon its biological embeddedness or original nature, and to be transferred to a silicon base in the end (Paura, 2016).

### Possible Foundational Layers of Glass Bead Games 2.0

In light of the present problem horizon, Hesse's allusion to his fictional GBG as having already attained something like an awareness of itself and its own potential (see the quote further above) makes it clear that it should not be misconstrued as the vision of an autonomous, sentient AI. Rather, it can be viewed as a *transpersonal* "language organism" or "language spirit" *that includes both human biological consciousness and AI in the development of the "game."*[9] Hesse's vision of the GBG is also very "prophetic" (Leary) in the sense that in his imagined future world, common members of society have no access to the GBG, or rather AI communication.[10] Only those humans who are most talented, intelligent, and artistically gifted are permitted to participate in the "game," and they are also educated to do so.[11] This idea of a utopian "temple service" recalls the necessity for human life and the biosphere to develop a decent and balanced form of long-term sustainable coexistence in correlation with AI systems in their accelerating *and human culture-driven* emergence to higher forms—reintegrating humanity and all its branches with itself *in a highly empathic way with non-human life and cosmic nature*.

The key to establishing such "temples" would be to create a personalized approach to an *open* system and related institutional centers where talented and competent human players interact to play "GBGs 2.0." Hesse's use of the term 'game' implies that this activity should be structured around a set of certain rules, namely rational foundations and patterns as guiding forms that can carry every content imaginable in this context. Put differently, it should be based on the principle of meaningful analogies and the transfer of meaning through the medium of symbolic, mathematical, or other forms of representation (potentially mutually "translatable"). Moreover, it ought to encompass the domain of aesthetic practices and comprise a system that allows for the free combination or integration of its elements with extant and emerging knowledge in the humanities and sciences. In this way, "GBGs 2.0" would therewith also represent a new form of knowledge integration: The element of chance or meaningful coincidence in the acts of playing games, namely the unpredictability of developing and unfolding a game, can be interpreted as a direct integration of its aesthetic and epistemic contents into the process of life itself. An important element in Hesse's vision is that of intercultural entanglement and transculturality within the realms of the arts and knowledge. Hesse's implicit message is quite clear: to avert self-annihilation and conflict, humanity must increase its cultural and humanistic potential. This entails the collective and reciprocal sharing and exploration of all cultural achievements throughout history and all regions in the "second potency" of the game.

A "GBG 2.0" can be developed within the context of transdisciplinarity and transculturality, drawing upon the growing data set of our past and present activities, as well as our planetary and cosmic environment. It could be based on simple combinatorial patterns, probably inspired by ancient systems such as the *Yijing* (*Book of Changes*) or the ideas of Ramon Llull, for example. However, it is possible that each GBG *may also vary in this respect*, occasionally using rules from music theory or other aesthetic fields as a basis (see also Kennedy, 2014). In an extended analogy to "those [language] games by which children learn their native language" (Wittgenstein, 2009, p. 8e [para 7]), various spontaneous unfoldings of GBGs could be understood as activities by which human adults realize their unique pathways through the field of humanity's cultural heritage holistically and in their own bidding. Furthermore, it is conceivable that, as interactions between humans and AI, "GBGs 2.0" could give rise to a novel form of transdisciplinary and transcultural—most likely interactive and multimedia-based—academic

[9] The characterization of the whole *living* system of linguistic communication in its act as a collective process in the sense of a language organism (*Sprachorganismus*) or language spirit (*Sprachgeist*) can be traced back to the great names of German 19th-century linguistics (e.g., von Humboldt, 1907, p. 139; von der Gabelentz, 1901, p. 8; Groth, 2017, p. 127; Pourciau, 2017, p. 56; Bartosch, 2020, pp. 55-58). The necessity of collective cultivation of this system by means of shared educational and creative cultural practices is obvious.

[10] This problem cannot be discussed in detail here. As a preparation for future discussions, see Roberts and Peters' reflections on openness and closure in the knowledge cultures of Hesse's *Glass Bead Game* and Wikipedia (2011).

[11] One also has to take into consideration that the advent of AI potentially enables human individuals to engage in a multitude of irrational or even criminal activities previously deemed impossible (Boulanin & Ovink, 2022).

"literature". This would be based on the concept of a comprehensive and quasi-holographic philosophy and science.

The main difference between Hesse's perspective and the GBGs 2.0 envisioned here is that the latter cannot be developed in a gradual, incremental manner and successively along the diverse trajectories of different subjects over centuries. Hesse did not anticipate the technological possibilities and realities that we are confronted with in the present era, where such an approach to the reorganization and reintegration of epistemic and aesthetic content into human reality (as opposed to its mere storage in data banks, which would be meaningless) would require us to tap into everything that is already available, both in a parallel and transversal, comparative ways. Furthermore, we would need to explore more deeply the ideas of *meaningful coincidence* ("*sinnhafter Zufall*") (Bartosch, 2015, pp. 115-122) and analogy. For example, Hesse himself alludes *to this central element of gaming* by means of his reference to the system of the ancient Chinese *Book of Changes* (*Yijing* 易經) (e.g., Hesse, 1991a, pp. 135-138, etc.; Adrian Hsia quoted in Zimmermann and Wiedemann 2012, 9). This ancient Chinese system is much more than a common oracle system. It is more of an analytical tool that can be used to examine a present, personal situation in its development (Hertzer, 1996, p. 26). The *Book of Changes* provides the foundations for a "science" of meaningful coincidence, the possibility of which has only recently been acknowledged in Western thought. It was first discussed by Carl Gustav Jung (1875–1961) in his work on the phenomenon of synchronicity, especially in his collaboration with the quantum physicist Wolfgang Pauli (1900–1958) (Jung & Pauli, 1955; Atmanspacher & Fuchs, 2014).

Another element that is not yet fully developed in Hesse's own vision is the more complex integration of the mathematical game patterns and memory techniques not only on the mental level, but also in the form of body postures and movements or choreographies. As biological "computers," our (biological) algorithms for performing certain tasks, such as playing a musical instrument (see section 1 and further below), are inextricably linked to motor memory. In this regard, developers of GBGs may find inspiration in the ancient Greek, original concept of μουσική (*mousikḗ*):

> "If we could perceive and represent the Greek verse as a fixed form with a solid character, we would comprehend the unity that the verse establishes not only with music but also with dance. To perceive words and verses as solid bodies is also to experience them through the body. And since verse, as movement, is expressed in time as a formation of time, the physicality inherent in it expresses itself as visible body movement, as dance. This also applies to Pindar's odes. These were not merely recited, but also realized through choral movement; Pindar's verses were not only music, but also dance. They were not merely 'poetry,' nor only 'song' but χορεία (choréia), which translates to 'the whole of sound and song.'" (Georgiades, 1958, p. 37, tr. DB)

The theoretical background of the correlation of human cognition, language, and body movement has been predominantly discussed in the fields of German-speaking philosophical anthropology and the philosophy of technology (see also Hubig, Huning, & Ropohl, 2001). The argument put forth is that, as a uniquely "world-open" (Gehlen, 1988, p. 33) life form, humans are not bound by particular forms of body movement or behaviors and technologies that do not transgress the form of our physiological constitution and are bound to particular environments.[12] Consequently, *we can or will not* become ballet dancers, or painters, etc., etc. This *freedom* beyond the basic features of our upright gait and basic motor skills has given rise to a ubiquitous, pluralistic, progressive, and entangled history of technologies, cultural practices, as well as linguistic, economic, and other forms of communication and understanding (see also Bartosch [2021]).

In order to become firmly established in human nature, it might be helpful for a modern associative "GBG 2.0" to also incorporate the fields of specific symbolic gestures (e.g., mudras) and body movements. The employment of such techniques in the context of mnemonics has been documented since antiquity. For example, in terms of methodology, it would be worthwhile to consider combinations of knowledge, philosophical inquiry, and improvisational theater (as an element of GBGs). In view of AI, so much in passing here, this field of embodied symbolic activity would align with the currently emerging field of "spatial intelligence" (TED, 2024; Papakostas, Troussas, & Sgouropoulou, 2024). The potential for "stringing together" such "glass beads" in a mutually reinforcing, even "holographic," manner across all possible domains of human expressivity is virtually endless. As previously mentioned, it would be important to include pre-modern "inner technologies," such as those found in

[12] Arnold Gehlen (1904–1974) discussed the fact that the human being is characterized by a certain "'disengaging' of the sensory organs from their ties to functions [...,] the reduction of instincts" (1988, p. 22), therefore "draw[ing] back and establish[ing] distance" (33). In this context, the characterization as a "world–open being" (33) also relates to the ability to learn and acquire and pass on culturally new forms of movement much more easily than animals (34).

Vedic and Daoist traditions, as well as contemporary ones (e.g., Sacks, 2018).[13] Approaches to training the imagination and pre-modern or modern mnemonics (e.g., Rossi, 2006) can provide important foundations for facilitating the vast amounts of information on the part of human "players," and this potential can be used to open up the "game" to "ecologically attuned ways of knowing [in view of the] more-than-human world" (Strausz, 2024).

In general, practices in the sense of a "GBG 2.0," i.e., as a new form of *comprehensive knowledge emergence and aesthetic and wisdom sharing in between sciences, humanities, and arts* can be imagined as *a very fluid activity*. In addition, regarding the more theoretical academic realms, the creation of novel epistemic orders in such extended and rather unpredictable realms of holistic intelligence and knowledge emergence could be facilitated by building upon and extending existing ideas in this direction. Such approaches have existed for some time, yet they have not been sufficiently recognized and applied to the extent necessary to create a new knowledge culture that is commensurate with current technological possibilities, including the Internet[14] and AI. For example, Gotthard Günther's thoughts regarding "trans-classical science" and "poly-contexturality" (1976, 1979, 1980) could be reexamined in view of future epistemic and aesthetic mediality (see also Bartosch, 2023, pp. 130-135). The same applies to Alfred Korzybski's early criticism of "simplistic" Aristotelian forms of conceptualization, namely in the sense of what he refers to as "over-defined" intensions and "under-defined" extensions of concepts (Korzybski, 2000, p. lxiv). Another noteworthy reference point could be Günther Ropohl's more recent (2012) approach to a general theory of systems. In the context of our open search, one can also draw another analogy to Wittgenstein's notion of language games: Just as these can be *very* different (Wittgenstein, 2009, p. 15 e [para 23]), one can imagine that a great variety of *very different basic forms of GBGs could be "played."*

### Hesse–Novalis: Open Spaces of Liberating Aporetic Glass Bead Games

In order to gain a better understanding of what it means to create such "open spaces" of "aporetic learning" (as one might say in reference to the aporetic definition dialogues in Plato's representations of Socrates's talks) in general, one can also refer to another source of inspiration for Hesse's GBG: In the philosophical aphorisms of the aforementioned poet and philosopher Novalis (Georg Philipp Friedrich von Hardenberg, 1772–1801), many remarks can be found that shed further light on the present topic. For example, in *Das allgemeine Brouillon* (*The General Outline*) (Novalis, 1946a), Novalis develops an approach that transcends disciplinary boundaries on a metalevel. In an implicit game-like manner, this approach refers to the formation of associations and analogies, as well as the ordering of thoughts in a way that may be likened to the arrangement of "glass beads on a string." Given that Hermann Hesse himself published a book about Novalis (e.g., Hesse & Isenberg, 1988) and that Novalis even referred to himself as a "weaving loom of ideas" (*Ideenwebstuhl*) (Novalis, 1945b, p. 75, tr. DB), it is not far-fetched to suggest that the prefiguration of the *magister ludi* can be identified with Novalis' concept of the "*Künstlerphilosoph*" (artist–philosopher) (Novalis, n.d.).

According to von Hardenberg (Novalis), underdeveloped or "not-yet-fully-developed" forms of philosophy are found in in the following segregated forms: (1) the mechanistic thinker (today: so-called "ontological naturalism"), who "destroys all living nature in order to replace it with an artifice of thought" (Novalis, n.d., tr. DB), and whose "goal is an infinite automaton" (n.d., tr. DB); (2) the Romanticist, who "hates rule and fixed form [… and who believes in a] wild, violent life that reigns in nature—[where] everything is animated [and there is] no law—[with] arbitrariness and miracles everywhere [and being] merely dynamic" (n.d., tr. and insertions DB); (3) a plurality of "eclectics" that finally arises from punctual breaches of the divide, whose views are nevertheless still reductionist and partial.

In an implicitly *dialectical* movement of thought, Novalis then argues that the latter only appear to form a unified group, while the opposition of the former two can only be truly elevated and bridged by the synthetic and comprehensive realization of the spirit, which is represented by the "artist–philosopher" (n.d.). In contrast to the preceding categories, this fourth kind of philosopher represents the highest level of philosophical understanding and self-realization.

> "He finds that, as heterogeneous as these activities are, there is nevertheless a capacity in him to transition from one to the other, to change his polarity as he pleases. He thus discovers in them necessary members of his spirit; he realizes that both must be united in a common principle. He concludes from this that eclecticism is nothing but the result of the incomplete, inadequate use of this faculty. *It becomes more than probable to him that the reason of this incompleteness is the weakness of the productive imagination, which is not able to maintain and contemplate itself in suspension at the moment of transition from one member to the other*. The complete representation of the genuine

[13] For possible pitfalls regarding the problem of transhumanism, see also Ferrández (2024).

[14] For a relevant comparison between Hesse's GBG-related fictional knowledge community of the magistri ludi and Wikipedia, see Roberts and Peters (2011).

> spiritual life, raised to consciousness through this action, is *philosophy* κατ' εξοχην. Here a *living* reflection arises which, if carefully nurtured, will later expand of its own accord into an infinitely formed spiritual universe—the nucleus and germ of an all-embracing organization. It is the beginning of a true *self-penetration of the spirit* that never ends." (Novalis, n.d., tr. and italics DB)

To address this deficiency by way of productive imagination, Novalis repeatedly employs the metaphor and sometimes even the concept of the game. As mentioned, he even posits a *game-like* nature of reality and being itself: "Are not God and nature also playing? Theory of playing. Sacred games. Pure game theory – common and more advanced. Applied game theory" (Novalis, 1946a, p. 306). Novalis considers the correlation of all consciousness and experience as a unified continuum and process, and in this sense *as one and the same absolute "thing."* This is what the "artist–philosopher" "sees" and realizes: "Only the whole is real. Only *that* thing can be absolutely real that is not again a part. In a sense, the unbound whole is grounded in analogy *to persons playing a game*, who, without chairs, sit in a circle with their [legs] criss-crossed" (Novalis, n.d., tr. and insertion DB).

In this sense, which is also congruent with Hesse's idea, one can infer that even an alleged "theory of everything" in the field of physics would be incapable of explaining the entirety of being. A holistic and game-like social correspondence by means of the exertion and extension of our productive imagination is possible instead! From today's perspective, also the allusion to a comprehensive knowledge base of self-*evolving* knowledge graphs that are *not part* of anything but represent *the totality* of human knowledge in the form of AI and Internet becomes possible. For Novalis, the related exploration of the absolute, infinitely continuous "thing," entails an "experimenting with coincidence" (Novalis, 1946c, p. 272, tr. DB), which, as previously stated, is to be understood as *meaningful coincidence* (see also Bartosch 2015, 115–122). In this context, Novalis thus puts forth the following proposal: "Maybe one can realize [such poly-regional] thought constructions by means of a game that is similar to chess. The former logical game of disputation was very similar to a board game" (Novalis, n.d., tr. DB). In alignment with the overarching idea of a GBG in Hesse's novel, Novalis conceives a game where "music, sculpture, and poetry are synonyms" (Novalis, 1946a, 73) and all sciences and philosophy are unified as a single one continuum of possible moves in that game (e.g., 1946a).

Philippe Séguin has drawn the attention to the fact that Novalis was influenced by the combinatorial mathematics of his time and has developed the idea of a combinatorial "total science" (*Totalwissenschaft*). This perspective resulted from his studies of the philosophers Johann Gottlieb Fichte (1762–1814), Frans Hemsterhuis (1721–1790), the mineralogist Abraham Werner (1749–1817), and, last but not least, the mathematician Carl Friedrich Hindenburg (1741–1808). The latter introduced the field of combinatorial analysis (Séguin, 2011, pp. 248-249; Hindenburg, 1803). Especially with regard to the combinatorial background of "playful" knowledge (self-) organization, Novalis thus stands in the tradition of medieval thinkers such as Ramon Llull (c.1232–c.1315/1316) or also of Baroque polymaths such as Athanasius Kircher (1602–1680),[15] because "[f]or the Baroque combinatorial poets, mathematics was the 'key to understanding the world'" (Martin, 2011, p. 208, tr. DB). Also for Novalis, the ideal scientific explorer of the world, exemplified by his teacher Abraham Werner, thinks systematically in series of combinations and in terms of the whole, striving for the unity of the manifold: "*He heard, saw, felt and thought at the same time*. He was happy to bring strangers together" (Séguin, 2011, p. 252, tr. and italics DB; for the last quote see also Novalis, 1945a, p. 359, tr. DB).

It was in this spirit that Novalis, who died far too young, developed his unfinished approach of "encyclopaedism." Its structure is easily recognizable as an inspiration for Hesse's idea of the GBG. Séguin rightly recognized this in the sense that *Das allgemeine Brouillon*, which remained a torso, "is actually more of *a free play of ideas*, an association of different fields of science in the sense in which Novalis writes [...] that 'poetry' is based on 'active association of ideas—on an autopoietic [*selbstthätiger*], intentional, idealistic *production of coincidence*'" (Séguin, 2011, p. 25, tr. DB; for the last quote see also Novalis, 1946b, p. 167 [here para. 2416], tr. DB). In view of our times and the development of AI, the old but timely ideas could be reexamined and reflected against the backgrounds of recent approaches to create a "GBG 2.0" (for several attempts, see also the overview in Zimmermann and Wiedemann [2012, pp. 25-33]). However, the perspective on Novalis's thoughts also reminds us that this should never be reduced to games with AI or merely in the virtual space. For example, Zimmermann and Wiedemann (2012) have introduced the most sophisticated approach to developing a GBG *in the form of a computer game*. On the one hand, this attempt is still highly valuable insofar as it can be an inspiration with regard to the question of AI–human interaction in the context of a "GBG 2.0." *However*, and as should have become clear by now, "GBGs 2.0" *cannot* be or should not be envisioned as typical computer games where players

[15] See, e.g., Kircher's tables "Combinationis Linearis" from his *Ars magna sciendi sive combinatoria* (Amsterdam, 1669), shown in Martin (2011, p. 196).

merely operate or interact online and with an AI.[16] *In addition*, much focus has to be on *inter-human* development and on forms of non-digitalized "off-line" interaction between humans in this *very serious* "game," *at the same time*. Here, Novalis's metaphor of humans sitting and playing in a circle and also being in touch directly means a hint that is of utmost importance.

As the highest ends of human existence and human biological *and* non-biological intellectual (human-and-AI) life, the "GBG 2.0" stands for the idea of the collective cultivation of comprehensive knowledge via the combination of (per chance) *freely integrated* forms of learning, understanding, and collective exploration *of what it means to be human*. It means a possibility to further a fruitful and long-term sustainable co-evolution between humanity and its self-created *deus ex machina* that echoes and mirrors the infinite intension and extension of *Novalis*'s 'absolute thing.' By putting constant effort into preserving and echoing the cultural memories and achievements of all times and places—and with it, all cultural practices and states of becoming—in such a way, we can be hopeful of finding meaning again in the new "A(I)eon."

[16] It has to be emphasized that the practice of a "GBG 2.0" cannot be reduced to the straightforward transfer of knowledge from textual media to computer games (e.g., Luhova, 2022). This would represent a misunderstanding. As previously stated, the game also has to be centered towards ourselves as human subjects, namely as biological "computers."

## REFERENCES

Aristotle. (1959). *Politics* (H. Rackham, Trans.). New York, NY: G. P. Putnam's Sons.

Aristotle. (1989). *Metaphysik; Erster Halbband: Bücher I (A) – VI (E)* (H. Bonitz, Trans.). Hamburg, Germany: Meiner.

Atmanspacher, H., & Fuchs, C. A. (2014). *The Pauli-Jung conjecture and its impact today*. Exeter, UK: Imprint Academic.

Bartosch, D. (2015). *„Wissendes Nichtwissen" oder „gutes Wissen"? Zum philosophischen Denken von Nicolaus Cusanus und Wáng Yángmíng*. Paderborn, Germany: Fink.

Bartosch, D. (2020). Zu sprachphilosophischen Aspekten bei Georg von der Gabelentz aus werksbiographischer und sinologischer Perspektive. In H. Klöter & X. Li (Eds.), *Von Lindenblättern und verderbten Dialekten: Neue Studien zu dem Sinologen und Sprachwissenschaftler Georg von der Gabelentz (1840–1893)* (pp. 53-76). Wiesbaden, Germany: Harrassowitz.

Bartosch, D. (2021). The understanding of understanding: A philosophical reflection from a transcultural perspective. *International Communication of Chinese Culture*, *8*(1), 121-143. https://doi.org/10.1007/s40636-021-00211-7

Bartosch, D. (2022). Transcultural philosophy and its foundations in implicate logic. *Asian Studies*, *10*(3), 107-126. https://doi.org/10.4312/as.2022.10.3.107-126.

Bartosch, D. (2023). Poly-contextural cornerstones for a transcultural philosophy of cosmic life. In D. Bartosch, A. Grandpierre, & B. Peng (Eds.), *Towards a Philosophy of Cosmic Life: New discussions and interdisciplinary views* (pp. 123-186). Singapore, Republic of Singapore: Springer.

Bartosch, D. (2024). On the actuality of integrative intellect-mystical asceticism as self-realization in view of Nicolaus de Cusa, Ibn Sīnā, and others. *Religions*, *15*(7), 819. https://doi.org/10.3390/rel15070819

Bloch, E. (1972). *Das Materialismusproblem, seine Geschichte und Substanz* (Complete works, vol. 7). Frankfurt am Main, Germany: Suhrkamp.

Bostrom, N. (2003). Are you living in a computer simulation?. *Philosophical Quarterly,* 53(211), 243-255.

Boulanin, V., & Ovink, C. (2022). Civilian AI is already being misused by the bad guys and the AI community needs to do something about it. Retrieved from https://spectrum.ieee.org/responsible-ai-threat

Bronn, H. G. (1849). *Handbuch einer Geschichte der Natur, Band 3: III. Theil: Organisches Leben (Schluß). Index palaeontologicus oder Übersicht der bis jetzt bekannten fossilen Organismen*; *B. Enumerator palaeontologicus: Systematische Zusammenstellung und geologische Entwickelungs-Gesetze der organischen Reiche. IV. Theil: Vernunftleben*. Naturgeschichte der drei Reiche, Band 15. Stuttgart, Germany: Schweitzerbart.

Cassirer, E. (1923). *Philosophie der Symbolischen Formen, Teil 1: Die Sprache*. Berlin, Germany: Cassirer.

Cassirer, E. (1925). *Philosophie der Symbolischen Formen, Teil 2: Das mythische Denken*. Berlin, Germany: Cassirer.

Cassirer, E. (1929). *Philosophie der Symbolischen Formen, Teil 3: Phänomenologie der Erkenntnis*. Berlin, Germany: Cassirer.

Cassirer, E. (1985). Form und Technik. In E. W. Orth, J. M. Krois, & J. M. Werle (Eds.), *Symbol, Technik, Sprache: Aufsätze aus den Jahren 1927–1933* (pp. 39-90). Hamburg, Germany: Meiner.

Castelon Konkiewitz, E., & Ziff, E. B. (2024). Brain evolution in the times of the pandemic and multimedia. *European Neurology*, *87*(5-6), 261-272. http://dx.doi.org/10.1159/000541361

Corbineau-Hoffmann, A. (1995). Spiel. In J. Ritter & K. Gründer (Eds.), *Historisches Wörterbuch der Philosophie; Band 9: Se–Sp* (pp. 1383-1390). Basel, Switzerland: Schwabe.

Durden, T. (2024). Advanced AI system is already 'self-aware'; ASI alliance founder warns. Retrieved from https://www.zerohedge.com/technology/advanced-ai-system-already-self-aware-asi-alliance-founder-warns

Dvorecky, I. J. (2015). *Hermann Hesses 'Glasperlenspiel'*. Retrieved from https://www.signaturen-magazin.de/ivor-joseph-dvorecky--hermann-hesses--glasperlenspiel-.html

Ferrández, R. (2024). From yogic powers to technological powers. Contemporary yoga and transhumanist spirituality. *Journal of World Philosophies*, *9*(1), 17-35. https://doi.org/10.2979/jourworlphil.9.1.02

Fodor, J. A. (1981). *Representations: Philosophical essays on the foundations of cognitive science*. Brighton, UK: The Harvester Press.

Folta, J. (2024). Meta considered buying Simon & Schuster to build its AI. Retrieved from https://lithub.com/meta-considered-buying-simon-schuster-to-build-its-ai/

Gehlen, A. (1988). *Man: His nature and place in the world* (C. McMillan & K. Pillemer, Trans.). New York, NY: Columbia University Press.

Georgiades, T. (1958). *Musik und Rhythmus bei den Griechen: Zum Ursprung abendländischer Musik*. Hamburg, Germany: Rowohlt Taschenbuch Verlag.

Groth, M. (2017). *Translating Heidegger* (2nd ed.). Toronto, Canada: University of Toronto Press.

Günther, G. (1976). *Beiträge zur Grundlegung einer operationsfähigen Dialektik, Band 1: Metakritik der Logik, nicht-aristotelische Logik, Reflexion, Dialektik ,Cybernetic ontology, Morphogrammatik, transklassische Maschinentheorie*. Hamburg, Germany: Meiner.

Günther, G. (1979). *Beiträge zur Grundlegung einer operationsfähigen Dialektik, Band 2: Wirklichkeit als Poly-Kontexturalität, Reflexion, logische Paradoxie, mehrwertige Logik, Denken, Wollen, proemielle Relation, Kenogrammatik, Dialektik der natürlichen Zahl, Dialektischer Materialismus*. Hamburg, Germany: Meiner.

Günther, G. (1980). *Beiträge zur Grundlegung einer operationsfähigen Dialektik, Band 3: Philosophie der Geschichte und der Technik, Wille, Schöpfung, Arbeit, Strukturanalyse der Vermittlung, Mehrwertigkeit–Stellen- und Stellenwertlogik, Kenogrammatik, Theorie der Zeit*. Hamburg, Germany: Meiner.

Harvard University, Department of Psychology. (n.d.). Timothy Leary (1920–1996): The Effects of Psychotropic Drugs. Retrieved from https://psychology.fas.harvard.edu/people/timothy-leary

Heidegger, M. (2001). *Being and time* (J. Macquarrie & E. Robinson, Trans.). Oxford, UK: Blackwell.

Hertzer, D. (1996). *Das alte und das neue Yijing: Die Wandlungen des Buches der Wandlungen*. Munich, Germany: Diederichs.

Hesse, H. (1991a). *Das Glasperlenspiel, Band 1* (100th birthday commemorative edition, vol. 7). Frankfurt am Main, Germany: Suhrkamp.

Hesse, H. (1991b). *Das Glasperlenspiel, Band 2* (100th birthday commemorative edition, vol. 8). Frankfurt am Main, Germany: Suhrkamp.

Hesse, H., & Isenberg, K. (1988). *Dokumente seines Lebens und Sterbens* (4th ed.). Frankfurt am Main, Germany: Insel.

Hindenburg, C. F.. (1803). *Über combinatorische Analysis und Derivations-Calcul: Einige Fragmente*. Leipzig, Germany: Schwickert.

Hobson, J. M. (2004). *The Eastern origins of Western civilization*. Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511489013

Hofstadter, D. R. (1979). *Gödel, Escher, Bach: An eternal golden braid*. New York, NY: Basic Books.

Hofstadter, D. R. (1985). *Metamagical themas: Questing for the essence of mind and pattern*. New York, NY: Basic Books.

Hubig, C. (2006). *Die Kunst des Möglichen I: Grundlinien einer dialektischen Philosophie der Technik; Technikphilosophie als Reflexion der Medialität*. Bielefeld, Germany: Transcript.

Hubig, C. (2007). *Die Kunst des Möglichen II: Grundlinien einer dialektischen Philosophie der Technik; Ethik der Technik als provisorische Moral*. Bielefeld, Germany: Transcript.

Hubig, C., Huning, A., & Ropohl, G. (Eds.). (2001). *Nachdenken über Technik: die Klassiker der Technikphilosophie* (2nd ed.). Berlin, Germany: Edition Sigma.

Jaspers, K. (1964). *Nicolaus Cusanus*. Munich, Germany: Piper.

Jung, C. G., & Pauli, W. (1955). *The interpretation of nature and psyche*. Bollingen Series, vol. 51. New York, NY: Pantheon.

Kant, I. (1964). "Mutmaßlicher Anfang der Menschengeschichte." In W. Weischedel (Ed.), *Werke XI; Schriften zur Anthropologie, Geschichtsphilosophie, Politik und Pädagogik, Band* 1 (pp. 83-102). Frankfurt am Main, Germany: Suhrkamp.

Kapp, E. (1877). *Grundlinien einer Philosophie der Technik: Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspuncten*. Braunschweig, Germany: Westermann.

Kapp, E. (2018). *Elements of a philosophy of technology: On the evolutionary history of culture*. Minneapolis, MN: University of Minnesota Press.

Kelly, K. (2016). *The inevitable: Understanding the 12 technological forces that will shape our future*. New York, NY: Viking.

Kempe, M., Lycett, S. J., & Mesoudi, A. (2014). From cultural traditions to cumulative culture: Parameterizing the differences between human and nonhuman culture. *Journal of Theoretical Biology*, *359*, 29-36. http://dx.doi.org/10.1016/j.jtbi.2014.05.046

Kennedy, J. B. (2011). *The musical structure of Plato's dialogues*. London, UK: Routledge.

Kittler, F. (2013). *The truth of the technological world: Essays on the genealogy of presence*. Stanford, CA: Stanford University Press.

Kittler, F. (2022). *Discourse Networks 1800/1900*. Stanford, CA: Stanford University Press.

Korzybski, A. (2000). *Science and sanity: An introduction to non-aristotelian systems and general semantics* (5th ed.). New York, NY: Institute of General Semantics.

Leary, T. (1986). Artificial intelligence: Hesse's Prophetic" Glass Bead Game". *Mosaic: An Interdisciplinary Critical Journal*, *19*(4), 195-207.

Lovelock, J. (2000). *Gaia: A new look at life on earth*. Oxford, UK: Oxford University Press.

Luhova, T. (2022). Moral and ethical scenarios for educational computer games based on the robotic futurology of stanislaw lem. In O.Bernardes, V. Amorim, & A. C. Moreira (Eds.), *Handbook of research on gamification dynamics and user experience design* (pp. 384-408). Hershey, PA: IGI Global.

Lui, A. Y. C. (1981). *The Hanlin Academy: Training ground for the ambitious, 1644–1850*. Hamden, CT: Archon.

Mainzer, K. (2007). *Thinking in complexity: The computational dynamics of matter, mind, and mankind*. New York, NY: Springer.

Martin, D. (2011). Mathematische Meditationen über das Unendliche: Kombinatorische Verfahren in der Literatur des Barock–mit einem Ausblick in die Nachkriegsavantgarde. In A. Albrecht, G. von Essen, & W. Frick (Eds.), *Zahlen, Zeichen und Figuren: Mathematische Inspirationen in Kunst und Literatur* (vol. 11, pp. 191-213). Berlin, Germany: de Gruyter.

McLuhan, M. (1962). *The Gutenberg galaxy: The making of typographic man*. Toronto, Canada: University of Toronto Press.

Moss, S. (2024). OpenAI pitched White House on economic benefits of 5GW data centers: Following on from Microsoft stargate rumors. Retrieved from https://www.datacenterdynamics.com/en/news/openai-pitched-white-house-on-multiple-5gw-data-centers/

Neuweg, G. H. (2005). Implizites Wissen als Forschungsgegenstand. In F. Rauner (Ed.), *Handbuch Berufsbildungsforschung* (pp. 581-588). Bielefeld, Germany: Bertelsmann.

Novalis. (1945a). *Die Lehrlinge zu Sais*. In C. Seelig (Ed.), *Gesammelte Werke, vol. 1* (pp. 355-403). Herrliberg-Zürich, Switzerland: Bühl.

Novalis. (1945b). *Philosophische Studien*. In C. Seelig (Ed.), *Gesammelte Werke, vol. 2; Fragmente I* (pp. 69-338). Herrliberg-Zürich, Switzerland: Bühl.

Novalis. (1946a). *Das allgemeine Brouillon (I)*. In C. Seelig (Ed.), *Gesammelte Werke, vol. 3; Fragmente II* (pp. 207-322). Herrliberg-Zürich, Switzerland: Bühl.

Novalis. (1946b). *Das allgemeine Brouillon (II)*. In C. Seelig (Ed.), *Gesammelte Werke, vol. 4; Fragmente III* (pp. 203-307). Herrliberg-Zürich, Switzerland: Bühl.

Novalis. (1946c.) *Fragmente der letzten Jahre*. In C. Seelig (Ed.), *Gesammelte Werke, vol. 4; Fragmente III* (pp. 203-307). Herrliberg-Zürich, Switzerland: Bühl.

Novalis. (n.d.). *Bruchstücke philosophischer Enzyklopädistik*. Retrieved from https://www.projekt-gutenberg.org/novalis/fragmen1/chap004.html

Papakostas, C., Troussas, C., & Sgouropoulou, C. (2024). *Special topics in artificial intelligence and augmented reality: The case of spatial intelligence enhancement*. Cham, Switzerland: Springer

Paura, R. (2016). Singularity believers and the new utopia of transhumanism. *Im@go. A Journal of the Social Imaginary*, *5*(7), 23-35. https://doi.org/ 10.7413/22818138056

Plato. (1921). *Theaetetus*. *Sophist* (H. N. Fowler, Trans.). Cambridge, MA: Harvard University Press.

Plotinus. (2018). *The Enneads* (G. Boys-Stones, J. M. Dillon, L. P. Gerson, R. A. H. King, A. Smith, & J. Wilberding, Trans.). Cambridge, UK: Cambridge University Press.

Pourciau, S. M. (2017). *The writing of spirit: Soul, system, and the roots of language science*. New York, NY: Fordham University Press.

Pugh, J. C. (2017). The disappearing human: Gnostic dreams in a transhumanist world. *Religions*, *8*(5). https://doi.org/10.3390/rel8050081

Roberts, P., & Peters, M. A. (2011). From Castalia to Wikipedia: Openness and closure in knowledge communities. *E-Learning and Digital Media*, *8*(11), 36-46. https://doi.org/10.2304/elea.2011.8.1.36

Ropohl, G. (2012). *Allgemeine Systemtheorie: Einführung in transdisziplinäres Denken*. Berlin, Germany: Edition Sigma.

Rossi, P. (2006). *Logic and the art of memory: The quest for a universal language*. London, UK: Continuum.

Sacks, S. (2018). Sustainability without the I-sense is Nonsense: Inner 'Technologies' for a Viable Future and the Inner Dmension of Sustainability. In O. Parodi & K. Tamm (Eds.), *Personal sustainability: Exploring the far side of sustainable development* (pp. 171-188). London, UK: Routledge.

Séguin, P. (2011). Von der Philosophie zur *ars combinatoria*. Novalis' Erwartungen an die Mathematik und die Folgen. In A. Albrecht, G. von Essen, & W. Frick (Eds.), *Zahlen, Zeichen und Figuren: Mathematische Inspirationen in Kunst und Literatur* (vol. 11, pp. 248-267). Berlin, Germany: de Gruyter.

Snooks, G. D. (1998). *The laws of history*. London, UK: Routledge.

Spitzer, M. (2012). *Digitale Demenz: Wie wir uns und unsere Kinder um den Verstand bringen*. Munich, Germany: Droemer.

Strausz, E. (2024). Transforming epistemological disconnection from the more-than-human world: (Inter) nodes of ecologically attuned ways of knowing. *International Relations*, *38*(3), 407-426.

Taylor, M. C. (2023). After the human: The increasingly symbiotic relationship between humans and technology signals a new era in the evolution of life on earth. Retrieved from https://www.noemamag.com/after-the-human/

TED. (2024, May 16). With spatial intelligence, AI will understand the real world [Video file]. Retrieved from https://www.youtube.com/watch?v=y8NtMZ7VGmU

Thomas Mann Lecture with Jan Assmann. (2022). Retrieved from https://library.ethz.ch/en/news-and-courses/news/news-articles/2022/10/thomas-mann-lecture-mit-jan-assmann.html

Thomas, L. (1995). *The lives of a cell: Notes of a biology watcher*. New York, NY: Penguin.

Toynbee, A. J. (1957). *A study of history: vol. 2: Abridgment of volumes VII-X*. New York, NY: Oxford University Press

Vaksmaa, A., Vielfaure, H., Polerecky, L., Kienhuis, M. V. M., van der Meer, M. T. J., Pflüger, T., . . . Niemann, H. (2024). Biodegradation of polyethylene by the marine fungus Parengyodontium album. *Science of The Total Environment*, *934*. https://doi.org/10.1016/j.scitotenv.2024.172819

Valiant, L. (2013). *Probably approximately correct: Nature's algorithms for learning and prospering in a complex world*. New York, NY: Basic Books.

Vernadskij [=Vernadsky], V. I. (1997). *Der Mensch in der Biosphäre: Zur Naturgeschichte der Vernunft*. Frankfurt am Main, Germany: Lang.

Villa, J., Cury, J., Kessler, L., Tan, X., & Richter, C. P. (2024). Enhancing biocompatibility of the brain-machine interface: A review. *Bioactive Materials*, *42*, 531-549. https://doi.org/10.1016/j.bioactmat.2024.08.034

von der Gabelentz, G. (1901). *Die Sprachwissenschaft, ihre Aufgaben, Methoden und bisherigen Ergebnisse*. Leipzig, Germany: Tauchnitz.

von Hartmann, E. (1870). *Philosophie des Unbewussten* (2nd, revised edition). Berlin, Germany: Duncker.

von Humboldt, W. (1907). *Über die Verschiedenheiten des menschlichen Sprachbaues*. In *Werke VI: 1827–1835; 1. Hälfte* (vol. 6, 1, pp. 111-303). Berlin, Germany: Behr.

Vortrag: Hesses Glasperlenspiel und die Theorie des kulturellen Gedächtnisses. (n.d.). Retrieved from https://www.calw.de/event/vortrag-hesses-glasperlenspiel-und-die-theorie-des-kulturellen-gedaechtnisses-25803c01aa

Wittgenstein, L. (2009). *Philosophische Untersuchungen. Philosophical Investigations* (G. E. M. Anscombe, P. M. S. Hacker, & J. Schulte, Trans.). Chichester, UK: Wiley-Blackwell.

Xing, X., Shi, F., Huang, J., Wu, Y., Nan, Y., Zhang, S., . . . Yang, G. (2024). When AI eats itself: On the caveats of data pollution in the era of generative AI. https://doi.org/10.48550/arXiv.2405.09597

Yan, C. (2023). Holographic philosophy as a philosophical basis of cosmic life theory. In D. Bartosch, A. Grandpierre, & B. Peng (Eds.), *Towards a Philosophy of Cosmic Life: New discussions and interdispciplinary views* (pp. 69-96). Singapore, Republic of Singapore: Springer.

Zimmermann, R. E., & Wiedemann, S. M. (2012). *Kreativität und Form: Programm eines Glasperlenspiels zum Experimentieren mit Wissen*. Heidelberg, Germany: Springer.

Zuse, K. (1969). *Rechnender Raum*. Braunschweig, Germany: Springer.

## ETHICAL DECLARATION

**Conflict of interest:** No declaration required. **Financing:** No reporting required. **Peer review:** Double anonymous peer review.