What are the Drivers in Cultural Development

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Abstract. To understand the nature of driving forces for cultural development, we must distinguish between a physical and an ideal realm. However, the ontological status of the ideal realm in relation to the physical realm is heavily debated. We argue for the necessity and relevance of both realms; both are connected through the actions of agents based on their mental concepts. The dynamic forces for the actions of the ideal realm are drivers for cultural development.

Keywords: action · agency · culture · development · energy · information · matter

1 Introduction

Cultural development needs actors and agency [1]. But before discussing the cultural agency's metaphysical foundation, we must address the mind-body problem (MBP). We follow Wiener [2] and try to resolve this MBP by claiming a third quality next to 'matter' and 'energy' called 'information.' Wiener clearly distinguished: "information is information, not matter or energy" [2, p. 132]. It is now the time to acknowledge that the concept of 'information' is a new quality that can not be reduced to energy or matter [3].

Historically 'matter' was the first concept developed and investigated long before we could understand the concept of 'energy' [4]. We are now in a similar situation as we have been with 'energy' centuries ago, to define and understand 'information.' The concept of information is relevant for actors and agencies based on learning and adapting [5, 6]. All living systems are adapting, humans in particular [7]. Following Kahneman [8], we can separate the human mind into three major building blocks: perception, system-1 (intuition), and system-2 (reasoning). While perception and intuition operate in the natural world's presence, reasoning operates in a representational and symbolic space [9].

One of the tragedies in metaphysics is the common category mistake of confusing the natural world with symbols from this representational space [10]. So often, we confuse the map with the territory [11]. For example, in art, a significant part of the work of Rene Magritte is dedicated to this confusion. "The most important thing to look for in these paintings is the way Magritte questions our understanding of the relationship between

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objects and images and between words and things. Using the interplay between language and images, he seeks to shake up our bourgeois acceptance of the status quo, and of the unquestioning importance or meaning we give to everyday objects and events" [10, p. 62, 64]. Or, as Maxwell puts it, "the only real entities are the good old familiar ones which we sense directly every day" [12, p. 27].

However, many modern disciplines are entirely dependent on abstract concepts. Consequently, these disciplines treat all those abstract concepts as ontological essentials. For example, in information and data science, the concepts of information, knowledge, and data are unavoidable [13]. In law and jurisdiction, the abstract concept of a juridical person is used [14]. And physics is full of not observables [4]. Lastly, philosophy and mathematics are entirely based on representational language and symbols, while most other disciplines also include some practices in dealing with perceivable physical entities (i.e., objects and subjects). Hence, we must distinguish between a physical and an ideal realm (see Fig. 1). Although most people have no problem capturing the physical realm as *real* (based on matter and energy), we must accept that the ideal realm is as *real* as the physical one. The physical realm we can experience directly through our *perception*, but the ideal realm we can get in touch with through *apperception* [15]. People do not get information only through their senses; human mental representations entail non-perceivable concepts. People can think about *tomorrow,* but they cannot perceive it. They cannot directly perceive entities like infinity, eternity, possibility, redness, or thoughts of Allah either. Yet, they can experience them and construct non-perceivable content in their mental representations. Such information contents cannot be represented in human sensory-neural surfaces such as the retina. Thus, it makes sense to assume that mental concepts of abstract entities are *apperceived* rather than *perceived*.

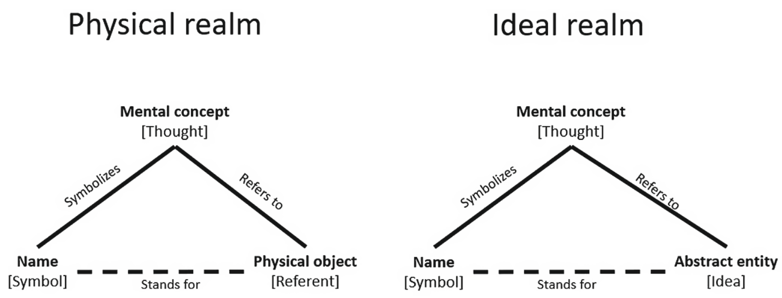

Fig. 1. The semiotic triangles for the physical (l) and the ideal realm (r) [16].

The ideal realm is the space for all abstract entities, like *information.* Nowadays, we cannot deny that information is as real and important as anything from the physical realm [17]. It is generally acknowledged that we live in the "information age." However, the ideal realm is only linked to the physical realm through the agency and action of a learning system.

Theleffsen, Theleffsen, and Sorensen [18] argue that understanding information as objective or subjective discursive leads to objective reductionism and signal processing, which has severe difficulties explaining how information could become meaningful.

Conversely, information is understood only relative to personal discursive intentions, agendas, etc. To overcome the limitations of defining information as either objective or subjective discursive, a semiotic analysis shows that information, understood as signs, is consistently sensitive to objective and subjective discursive characteristics of information (see Fig. 1). They argued that information should be defined with ontological conditions and inevitable epistemological consequences.

Meaning is the most critical problem in cognitive psychology because it controls memory and perception [19]. Moreover, meaning is the goal of communication and underlies social activities and culture. Harnad [20] described the *symbol grounding problem*: How can a formal symbol system's semantics be intrinsic to such a system rather than just parasitic on our mental concepts? To understand the new quality of the idea of meaningful information, we introduce the first-, second-, and third-person view [21]. Although the third-person view is the standard view in science, we also need the first-person view to understand ourselves as actors in the natural world. Our representational space of ideas and symbolic thoughts is the central mechanism for voluntary actions to reach into the world of the physical realm [22]. This teleological dimension [23] allows us – and any other symbolically controlled actors, too - to become drivers for cultural development.

2 The Mind-Body Problem (MBP)

For a long time, the MBP was and still is the subject of an intensive metaphysical debate. One of the main reasons why the MBP is still unresolved lies probably in the insufficient understanding of adequate metaphysical concepts to capture our world.

Bunge [24] examines the MBP from a psychobiological perspective. He intends to show that the idea of a separate mental entity is not only unwarranted by the available data and the existing psychological models but collides directly with the most fundamental concepts of all modern science. Bunge abandons ordinary language in favor of the *state space language*, which is mathematically precise and shared by science and philosophy. He overviews the MBP and its leading proposed solutions, classified into (1) psychophysical *monism* and (2) psychophysical *dualism*. Ten different theories of the MBP are analyzed, along with three main varieties of materialism concerning the problem: eliminative, reductive (or leveling), and emergentist. Finally, he turns to the notion of a concrete or material system based on the assumption that behavior is an external manifestation of neural processes and explores the specific functions of the central nervous system. In this respect, Bunge can be seen as a reductionistic materialist. Stoerig [25] added the *trialism* theories, like the three-world concept of Popper and Eccles [26]. Popper and Eccles tried to avoid a pure reductionistic outcome with this three-world approach. They call the collection of all physical objects *world-1*, all possible mental concepts *world-2*, and all likely abstract entities as outcomes from thought processes *world-3* (see Fig. 1).

3 Ontological Foundations

We follow a foundational approach [27]. Intelligent technologies are based on *information* and its processing [28]. Pure mechanical systems are determined, and they can hardly say to have any intelligence though they make sense as technical systems. One can expect a new technology revolution related to intelligent information systems because information and its processing open new possibilities for creating new kinds of technologies [e.g., ChatGPT is a variant of the Generative Pre-trained Transformer 3 'GPT-3' [29, 30]. These technologies can be multipurpose, and they can control their own actions in task-relevant situations. This capacity is unique in the history of technology design and innovation [31].

Before our times' technical artifacts had been renovated and innovated by means of finding a new solution based either on matter or energy [32]; stone and copper axes are examples of matter-grounded innovations wind, electricity, or nuclear power exemplify energy-based innovations [33]. Both means of advancing technologies are still relevant, but information makes creating new kinds of technologies possible. Because information is neither matter nor energy [32], innovations are based on renewing information processing in technical artifacts by making new utilizations possible for these technologies. Artificial Intelligence and other intelligent technologies are built on information. Davies and Gregersen [34, p. 3] find the "conceptual hierarchy: information → laws of physics → matter."

Information has referred initially to a picture or representation [35]. Much of the recent discourse has been devoted to measuring the amount of information and complexity [5, 36]. Paradoxically, this influential theory which underlies, for example, capacity-oriented cognitive psychology, does not discuss information contents and meaning at all; thus, it sets the contents of information outside the discussion [37–39]. Nevertheless, information refers to something, and thus it also means something [40]. The meaning can be called *information contents* and *mind mental contents* [41–45]. "Mental information includes the key quality of semantics; that is, human beings derive an understanding of their world from sense data and can communicate meaning to each other. The question here is what can and what cannot be explained merely by digital information, which is formulated in terms of bits without regard to meaning" [34, p. 4].

Pawlowski et al. [46] go a step further and discuss the idea of 'information causality' as a fundamental law in nature. "We suggest that information causality—a generalization of the no-signalling condition— might be one of the foundational properties of nature." [46, p. 1101].

4 Determination Through Action

According to Rauterberg [22], there is a fundamental and still largely unsolved problem in recognizing and naming unknown patterns in the totality of our perception. The perception of meaningful units in the visual world depends on complex operations that are not consciously accessible and can only be proven indirectly [47, 48]. This may be based on the still unsolved problem of universals: Do universals (in the sense of objective concepts) even have an independent existence outside of the mind of a cognitive and perceiving subject? If there is such a thing as universals – they do not exist as static entities (e.g., concepts) but as dynamic processes (e.g., actions).

From the abundance of differentiation possibilities that are made available by reality, those differences that are considered to be necessary for the constitution are defined by the determination process. The determination process is to be understood as a broad category of any cognitive system's actions. According to Neisser [49], the relationship between percipience and taking action is an irreversible, cyclical process: the exploration of perception as an action selects the relevant aspects from the quantity of all potentially available differentiation criteria, which in turn changes the individual knowledge structure of existing interpretation schemata and invariants.

As we have already argued before, symbols should be grounded. But we insist that they should be grounded in subsymbolic activities and the interaction between the agent and the world [48, 50]. The point is that concepts are not formed in isolation (from the world), in abstraction, or "objectively." Instead, they are created concerning the experience of agents, through their perceptual and motor apparatuses, in their world and linked to their goals and actions. A famous example is the French revolution [51], but any [scientific] discovery would cout as well [52], where actions based on ideals turned into fundamental changes in reality. Sun [53] takes a detailed look at this relatively old issue with a new perspective, supported by his work on computational cognitive model development.

In the work of Olier, Barakova [54], the problems of knowledge acquisition and information processing are explored concerning the definitions of concepts and conceptual processing and their implications for artificial agents. The discussion focuses on views of cognition as a dynamic property in which the world is actively represented in grounded mental states which only have meaning in the action context. Reasoning is an emerging property consequence of actions-environment couplings achieved through experience and concepts as situated and dynamic phenomena enabling behaviors. Re-framing concepts' characteristics is crucial to overcoming settled beliefs and reinterpreting new understandings of artificial systems.

Olier, Barakova [54] found support for grounded and embodied cognition views, describing concepts as dynamic, flexible, context-dependent, and distributedly coded. They argue to contrast with many technical implementations assuming concepts as categories while explaining limitations when grounding amodal symbols or unifying learning, perception, and reasoning. The characteristics of mental concepts are linked to methods of active inference, self-organization, and deep learning to address challenges posed and to reinterpret emerging techniques. In addition, an architecture based on deep generative models is presented to illustrate the arguments elaborated. This new architecture is evaluated in a navigation task, showing that good representations are created regarding situated behaviors with no semantics imposed on data beforehand. Moreover, adequate behaviors are achieved through a dynamic integration of perception and action in a single symbolic domain and process.

5 Conclusions

Living in an information age means taking abstract entities (e.g., information, knowledge, etc.) as *real* as any other physical object that can be experienced directly through our perception. However, these abstract entities need a physical carrier to unfold their relevance in the physical realm. These carriers are passive (e.g., written text, etc.) or active (e.g., mental concepts of agents). Any learning and adapting system can become those agents to link the ideal realm with the physical realm through their actions. Primarily the ideal realm contains the driving forces for cultural development!

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