



The Evolutionary Origin(s) of the Umwelt

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Received: 15 September 2022 / Accepted: 5 October 2022 / Published online: 3 November 2022
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Abstract

Although Jakob von Uexküll’s Umwelt theory is not mentioned in Jablonka and Ginsburg’s Target article, von Uexküll’s theory is clearly relevant in the context of the article, with the authors’ emphasis on the origin of “subjective experiencing”. I relate some of Jablonka and Ginsburg’s main claims to an evolutionary perspective on Umwelt theory. As it turns out, the Umwelt has multiple evolutionary origins depending on our exact definition(s) of Umwelt.

Keywords Umwelt theory · Evolution · Subjective experience · Consciousness · Cambrian explosion

Background

Jablonka and Ginsburg’s article “Learning and the evolution of conscious agents” (Jablonka & Ginsburg, 2022) presents a quite comprehensive view on the evolutionary origin of consciousness which I am largely sympathetic to. However, one of its basic premises, namely that it is justified to “use the terms *consciousness* and *subjective experiencing* as synonyms” (p. 2), can be questioned. While this is a common stand in more mainstream forms of biology, it is more problematic to base theorizing on such a premise in a biosemiotic setting, where subjecthood and subjectivity are typically seen as graded phenomena.

In this Commentary, my main focus is on an evolutionary perspective on Jakob von Uexküll’s Umwelt theory. This is informative both with regard to an Uexküllian

Commentary to the Target article “Learning and the Evolution of Conscious Agents”.

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reading of the Target article, and with regard to making use of some of Jablonka and Ginsburg's interesting claims and hypotheses in the context of Umwelt theory.

As Kalevi Kull (2004, 2020) describes, the distinction between the terms 'Anpassung' (fitting) and 'Einpassung' (matching) was central to Jakob von Uexküll's views of evolution (von Uexküll, 1922, 1927, 1928, 1931). Rather than seeing organisms as adapting to a physical environment, von Uexküll suggested that we should study how organisms interact. In this view, evolution always has an aspect of evolving *relations*, and of the different ways in which the Umwelt of one organism can match the Umwelt of another organism – i.e., interact with it in some specific function, for instance in a predator/prey relation. This perspective entails that any Umwelt is always complimentary to certain other Umwelten, and that Umwelten and organisms evolve in conjunction with each other in ever new variations of ecological complexes. No Umwelt – except, perhaps, for the very first one – has ever evolved in isolation from other lifeworlds.

Subjective Experience, Consciousness, and Umwelt

It is not clear why Jablonka & Ginsburg (2022) equate consciousness with subjective experiencing – or subjective experience, as I will refer to in the following. As they point out, even limited associative learning (LAL), which is seen in e.g. flatworms and sea slugs, “requires a centralized nervous system” (p. 20). And yet the capacity for such learning does not qualify for subjective experience, in the authors' view.

In a biosemiotic perspective, being an organism is already reminiscent of being endowed with subjecthood, in that any organism acts, in one way or another, as a coherent whole. This involves agency, more specifically semiotic agency, since all organisms relate to signs and specialize on certain kinds of sign use (Sharov & Tønnessen, 2021). Sign use by organisms involves the application of interpretative capacities. From a biosemiotic point of view, it is logical to see action and some form of experience, in a wide sense, as interrelated, since any action based on interpretative capacities presupposes that something is experienced and thereby evaluated by the organism. However, distinctions must be made between different grades of subjecthood and subjectivity, and thus also different grades of interpretative capacities and experience. It furthermore makes sense to distinguish between *proper* subjects above a specified threshold of semiotic complexity and integration, and proto- or quasi-subjects, or whatever we should call organisms that display less coherence and integration for the organism as a whole.

One obvious candidate for such a threshold relates to being endowed with consciousness. This is often equated with having a nervous system, or to having a central nervous system, the latter of which indicates a high level of “centralization” or integration of the experience and action of an organism. As Jablonka & Ginsburg (2022, p. 10) note, however, neural organisms *with* nerves but *without* a central nervous system are non-conscious. So the presence and activity of nerves is not in itself a clear-cut indication of proper subjecthood. Having consciousness, and a central nervous system, is a better indication of proper subjecthood, but consciousness, too, comes in many different forms, and indicate different grades of subjecthood and subjectivity.

It is useful to consider subjecthood in light of objecthood – the degree to which an organism is capable of relating to objects in its Umwelt. On this topic, there is no consensus among biosemioticians. Hoffmeyer (2004: 90) refers to a “lack of true intermodality in the snake”, arguing that a snake “apparently cannot integrate its sense modalities to form a central construct.” In Hoffmeyer’s view, although snakes have a central nervous system, they are incapable of relating to dynamic objects. While he did not take this to necessarily imply that snakes do not have any subjective experience, he stressed that “if indeed they have experiences, these must be lacking in inner coherence” (Hoffmeyer, 2004: 91). In Hoffmeyer’s view, then, even having a central nervous system is not sufficient evidence for establishing that an organism is capable of relating to objects in an integrated, coherent and dynamic way.

In Tønnessen (2009: 49), I defined an Umwelt transition as “a lasting, systematic change, within the life cycle of a being, considered from an ontogenetic (individual), phylogenetic (population-, species-) or cultural perspective, from one typical appearance of its Umwelt to another”, noting that an Umwelt transition “can be regular, irregular or a singular, extraordinary event”. The latter qualify as historical events, and among these we find the emergence of new types of Umwelten. In Tønnessen 2014, I distinguished between the embryonic Umwelt of human beings and the sense-saturated Umwelt that emerges as the senses of a human organism develop in the womb. This distinction, applied in the context of human beings, can easily be generalized to other species endowed with an Umwelt as well: The Umwelt of an organism typically first emerges as a very simple Umwelt and then gradually develops into a more complex form of Umwelt. This applies to all sentient organisms.

In the context of evolution, it is likely that simple Umwelten emerged at first, before more complex Umwelten later evolved. The Cambrian explosion represents a unique historical event which involved a vast expansion of complexity and variation in Umwelten. While the Umwelt as such, in simpler forms, emerged much earlier, the rapid evolution of senses, and thus sense-saturated Umwelten, in the Cambrian explosion, represented a great leap in semiotic complexity.

Jablonka & Ginsburg (2022, p. 22) interestingly raise the question: “What was special about the Cambrian and what drove the enormous diversification of animals during this geologically-short era?” Referring to global warming, increased nutrient cycles flooding of continental margins and other environmental changes, the authors observe:

It was in these permissive conditions that animals could grow in size and engage in productive burrowing and swimming. Movement and coordination of movement became important and the larger nervous systems and muscle sheets of the larger Cambrian animals enabled this. Predation exerted intense continuous selection for sensory organs’ sophistication and movement coordination.

Given what I have presented as Uexküll’s perspective on evolution, with his emphasis on evolution of relations and complementarity between organisms endowed with an Umwelt, we can observe that massive changes in the physical and chemical environment enabled organisms to evolve in novel ways. As more species evolved, there

was a cascade effect in Umwelt transitions over time, as ever more constellations of new relations became possible.

In line with what I have claimed earlier in this text, while the Cambrian explosion involved an explosive growth in the diversity and complexity of Umwelten, it does not represent the emergence of Umwelten as such. The origin of the Umwelt did not coincide with the origin of sentience or consciousness. Nor did subjecthood, or subjective experience, emerge during the Cambrian explosion, though more complex forms of subjective experience evolved at this time.

Examining the evolutionary origin of the Umwelt, a basic question to ask is what constitutes the “minimal Umwelt” – in other words, how the simplest Umwelt looks like, and thus what the most fundamental features of an Umwelt are. It is arguably the case that any organism endowed with an Umwelt relates to something specific in its environment as nutrition, by foraging and consuming food, and that it relates to something specific as its medium, by navigating in its environment. This implies that the minimal Umwelt is constituted by the functional cycle of nutrition and the functional cycle of the medium (Tønnessen, 2019: 414). According to von Uexküll, a majority of Umwelten furthermore include the functional cycle of the enemy, and the functional cycle of the partner (Tønnessen, 2019: 414, von Uexküll 1928).

If this applies to all Umwelten whatsoever, then it also applies to the Umwelten of all conscious animals, which are generally capable of enmity and sexual reproduction. Such capacities evolved rapidly as senses (becoming central for complex Umwelten) and feelings (becoming central for complex Innenwelten) evolved in line with Jablonka and Ginsburg’s portrayal of evolution during the Cambrian explosion.

Conclusion

While I am generally sympathetic to Jablonka and Ginsburg’s description and interpretation of the evolutionary origin of consciousness, I am critical towards their premise that we can “use the terms *consciousness* and *subjective experiencing* as synonyms” (2022, p. 2). Subjective experience is a graded phenomenon, and evolved gradually to more complex forms as organisms evolved from simple organisms to more complex organisms. For Umwelt theory, this implies that the Umwelt first emerged in a very simple form, while more complex forms of Umwelten evolved over time. The emergence of sense-saturated Umwelten occurred during the Cambrian explosion. This represented a major evolutionary Umwelt transition in the history of life on Earth, and resulted in a vastly greater diversity of more complex Umwelten.

Funding Declaration No funding was received for conducting this study.

Declarations

Conflict of Interest The author has no competing interests to declare that are relevant to the content of this article.

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