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COMMENT

Learning as Becoming Conscious: A note on Jablonka and Ginsburg's Notion of Learning

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Abstract
This commentary addresses the concept of learning stemming from Eva Jablonka and Simona Ginsburg's theory of the emergence of consciousness. Jablonka and Ginsburg find strong support in biosemiotics for their argument that learning offers an evolutionary transition marker for the emergence of consciousness. Indeed, biosemiotics embraces a view on evolution that integrates both phylogeny and ontogeny. It does not polarize learning and evolving. At the same time, Jablonka and Ginsburg's argument gives both biosemiotics and learning theory a shake, forcing scholarship in these fields to tackle difficult questions on agency, selfhood, consciousness and anthropological difference. I explore some of the main questions that arise from this theoretical development, particularly in reference to Andrew Stables' semiotic learning theory, which has been easily nested in a biosemiotic framework.

Keywords Learning · Consciousness · Evolution · Anthropological difference · Semiotic scaffolding

Life and Learning: A Semiotic Continuity

Jablonka and Ginsburg's (2022) excellent article tackles head-on one of the most complex topics for both the natural sciences and humanities, namely consciousness. In this commentary, I discuss the salience, for semiotics broadly, of their notion of *learning*, which is intimately connected with consciousness. Semiotic theory in general, and the semiotics of learning and education in particular, were both granted renewed scope through Andrew Stables' (2005, 2006; see also Stables et al., 2018) argument that.

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> If all living is semiotic engagement, then learning is semiotic engagement. (Stables, 2006: 376).

This view aligns learning theory with biosemiotics (see also Gough & Stables 2012; Olteanu, 2015; Olteanu & Stables, 2018), as it entrenches learning within Thomas Sebeok's (1991) main hypothesis for the latter, namely that life and meaning are coextensive. It also suggests that there can hardly be living that does not result in learning. At least, it is very difficult to imagine organic activity that does not involve learning in some form. As such, a biosemiotic view on learning always implies a close relation between consciousness and learning. Jablonka and Ginsburg's (2022) paper is a first attempt to scrutinize this conceptual relation closely.

If, following Peirce, learning is the tendency of experience to form habits, learning is coextensive with life, as "habit-taking is intimately connected with nutrition. Protoplasm grows […] by chemically transforming other substances into its own chemical kind." (CP 6.283) For Peirce, the capacity to take habits characterizes life, which is the same with what characterizes *mind*, thus conceived in a non-Cartesian way. Habit-taking is not contrasted only to irregularity but also to the strict mechanical laws that govern non-living matter. The emergence of life, according to Peirce, destabilizes previously fixed laws, which allows for growth. To use Peirce's (CP 2.266) words, atoms of protoplasm *emancipate* from law or *relax* the rule of law. Very simple organic matter has a high degree of instability but as it becomes more complex it gains in regularity in the form of habits (or tendencies), as it also maintains chance spontaneity. Peirce's (CP 2.267) view on consciousness is thus an equation of chance, necessity and habit:

> […] diversification is the vestige of chance spontaneity; and wherever diversity is increasing, there chance must be operative. On the other hand, wherever uniformity is increasing, habit must be operative. But wherever actions take place under an established uniformity, there, so much feeling as there may be, takes the mode of a sense of reaction. That is the manner in which I am led to define the relation between the fundamental elements of consciousness and their physical equivalents.

While this notion can be taken to support a contested pansemiotic view of reality, where everything is and anything can be a conscious semiotic agent, in a more subtle reading it offers a view of inorganic and organic matter as continuous, thus avoiding vitalist explanations of the emergence of the latter. In this view, not only natural evolution (phylogenetic) but also cognitive development (phylogenetic) can be explained as habit-taking (CP 7.381):

> Uncertain tendencies, unstable states of equilibrium are conditions *sine qua non* for the manifestation of Mind.

What life does is also what Mind does, namely it diversifies (pluralizes). As minds become better at habit-taking through the evolution of biological and cognitive complexity, their capacity to generate diversity increases. In brief, learning capac-

ity increases through this process. Peirce's notions of life and learning are aligned because of a pluralism prism: "protoplasm is essentially alive. Hence, it is not too much to suppose that protoplasm, even of a low order, has several thousands of atoms in each molecule: and any high order of protoplasm probably has ten thousand. Such a molecule must be excessively unstable […]. The peripheral stimulus deranges one or more molecules (which must be imagined as something like little solar systems, only vastly more complex) and an errant fragment from one of these enters another such system and perturbs that." (CP 6.283) Peirce's argument can be interpreted as equating life with the catalysis of plurality, as the former upsets the fixed stability of non-living matter, a notion which biosemiotics did not shy away from incorporating (Kull, 2007, 2011). Agency, from this perspective, is identified with the enhancement of plurality (see Sharov & Tønnessen 2021: 119). Likely, Peirce's pluralism also inspired Dewey and Bentley's (1949: 137–138) criticism of the originally atomistic understanding of cell theory and its implied organic holism. In this line, Dewey and Bentley advocated a notion of *individual* as ecological, namely situated and relational. This view, which has been highly influential for educational philosophy and is a cornerstone of Stables' theory, too, construes learning as situated.

Consciousness

As expected from a biosemiotic perspective, Jablonka and Ginsburg (2019, 2022) equate consciousness with subjective experiencing. More insightfully, they argue that the emergence of consciousness is linked to the evolution of learning, as a feature and capacity of organisms. They propose an evolutionary transition marker (ETM) of what would be minimal consciousness, which they term Unlimited Associative Learning (UAL). This reveals a very important biosemiotic prism for understanding the phenomenon of learning, with implications for the foundational concept of *modeling* (Sebeok, 1991) herein. In such an interrogation, biosemiotics can provide important insights to many disciplines concerned with learning, from general philosophy to phenomenology, sociology and education studies.

Having previously identified consciousness with subjective experiencing and advocated, in consideration of various biological and neurological perspectives, that "consciousness emerged in the context of the evolution of learning" (Ginsburg & Jablonka, 2019: ix), Jablonka and Ginsburg find support for their thesis in biosemiotics. This is the scope of their (2022) article. Indeed, one of the trademarks of biosemiotics is its consideration of evolution as driven by the interplay of phylogenetic and ontogenetic processes, as organisms are mutually constructed by the subjective environments (Umwelten) they construct themselves. Cobley (2016) remarked that, particularly for studying culture but also in general, biosemiotics is concerned with collapsing certain dichotomies, such as, of interest here, the individual/collective dichotomy. This feeds into the biosemiotic consideration of learning, where the dichotomy of (group, phylogenetic) adaptation and (individual, ontogenetic) learning must be, as well, at least seriously blurred if not undermined (Olteanu & Stables, 2018; Gough & Stables, 2012).

Consciousness and Semiotic Learning Theory

Danesi et al. (2019, 2022) notion of learning, developed in the investigation of consciousness, presents important linkages with Stables' semiotic theory of learning. Not without tensions or controversial arguments, they point to important questions and open new research avenues for biosemiotics. They (Jablonka & Ginsburg, 2022) define learning as "a process leading to an experience-dependent behavioral response of a system." In Stables' (e.g., 2008, 2012) work, too, drawing inspiration from Peirce, Whitehead and Dewey, learning is seen as a process and is always considered in relation to a rich notion of experience (see Stables in Stables & Semetsky 2015: p. 91). In this conception, learning is open-ended. It does not come down to acquiring a finite and fixed amount of information about a predefined object. That in learning there is experience-dependency at play is one way of claiming that learning is always interpretative (semiosic). *Response* is an important aspect of learning for Stables, too, particularly in light of situationalism. Stables (2012: p. 98) undermines essentialist (*a priori*) notions of responsibility, which are mutual with holism, in favor of *response-ability* as open-ended process, which "implies interaction. This in turn implies the precluding of fixed borders, as interaction inevitably brings together beings that are different but not entirely distinct. As argued elsewhere (Stables, 2005), a fully semiotic account […] sees all systems as open even where they at first appear closed." Jablonka and Ginsburg's explanation of the emergence of consciousness also relies on a processual construal of learning, defined in terms of ability. In brief, they propose (Ginsburg & Jablonka, 2019: 3) that capacity for UAL is the ETM for consciousness. UAL is "the phylogenetically earliest manifestation and driver of the evolution of sustainable minimal consciousness" and it "refers to an organism's ability to attach motivational value to a compound, multifeatured stimulus and a new action pattern and to use it as the basis for future learning." Open-endedness and the claim that learning is future-oriented are crucial for semiotics. In this view, learning always results in change, which led Stables (in Olteanu & Stables 2018: 415) to construe learning as "change that is seen as significant." Learning, then, evokes (more) learning, increasing an organism's semiotic competences and, implicitly, freedom (see Hoffmeyer 1992, 2015; Stjernfelt, 2007: p. 271; Campbell et al., 2019). The crux of the semiotic approach to learning is that the object of learning, what in Peirce' terms (CP 4.536) is the *Interpretant*, is always located in the future. This is one of the starting points for Stables' (2012: p. 65) view that

> We all are human insofar as we are becoming human, or attempting to do so. No group of people has the legitimation, on this account, to assume their humanity as a touchstone for that of others, or to impose it on them.

Rather than avoiding philosophical controversy, Jablonka & Ginsburg (2022) employ biosemiotic theory to offer a possible path forward in the study of consciousness. A semiotic notion of learning, albeit without reference to Stables' or related theories, is instrumental in identifying the ETM for consciousness. They point out that biosemiotics is one of several disciplines that, during the twentieth century, while engaged with evolution theory, neglected "the origins and evolution of different varieties and levels

of consciousness". Of course, many disciplines did not neglect but explicitly avoided addressing this topic. This is particularly the case of learning (and education) theory, where important insights, often with a practical orientation (e.g., for teaching), have been produced without regard for what may be *consciousness*. It seems that learning theory cannot forever avoid questions on consciousness and agency, problematic as they may be. One of the main reasons for this is technological transformation. Indeed, UAL opens new perspectives on robot consciousness. It brings suggestions both for the type of materials to be used and for computational modeling in the engineering of robots, while maintaining a (healthy) skepticism as to whether an artificial simulation of UAL would be anything like the cognitive autopoiesis entailed in the consciousness of living organisms.

Learning and Evolution

The restructuring of human societies and the biosphere that digital technology and artificial intelligence are producing is shedding new light on the concept of *mind*, as observed, for example by Danesi (2002: p. 177) in his semiotic approach to media. This has profound implications for how humans learn and think of learning. More than merely changing what the classroom and educational protocols may look like, the fast recent technological progress inspired the undermining of the Cartesian notion of mind by replacing mind-matter ontological duality with a mind-technology problem (Clowes et al., 2021) instead of asking how the supposedly different ontologies of mind and matter interact, digital technology ushered the more insightful question of how is the mind extended through technology. Steve Fuller (2022: p. 251) explains that, from this point of view technology is broadly "understood to mean the mind's outworking in nature. From this standpoint, carbon and silicon are simply alternative natural elements out of which minds might be constituted, each with its own strengths and weaknesses as expressive media."

In this view, the work of protoplasm to pluralize can be further enhanced by silicon extensions. To properly understand the work of technology to expand (human) cognition, a problematization of the notions of *self*, *agency* and, eventually, *consciousness* is necessary. Simplifying, to understand learning in these newly emerging technological societies, we need to ask who (or what) is being extended. What is revealed by reverse-engineering the mind's outworking in nature (i.e., technology)? It would be misleading to aim to arrive at an un-extended self-consciousness, as Peirce explained (CP 4.87), in questions of outwardness and inwardness, "you can no more get at the heart of it, than you can get at the heart of an onion". The important question, that sheds light on learning, is how do organisms extend, how do new modeling systems emerge? The biosemiotic gateway to this exploration lies in the notion of semiotic scaffolding (Hoffmeyer, 2015; more below). Ginsburg & Jablonka (2019: pp. 138–140) pursue this question as guided by Damasio's (2010) theory that while the basic levels of proto- and core consciousness are determined by the genome, *extended consciousness* as "the capacity to connect the remembered past and the anticipated future to the present" (Ginsburg & Jablonka, 2019: p. 139) is proper subjective expe-

riencing. This is in agreement with Stables' (2012: p. 45) view on learning as enabled through "the sense that experience is present while it is always in flux".

Adopting Dor's (2015) view on "language as communication technology" Jablonka and Ginsburg's (2019: p. 474) proposal allows biosemiotics to tap into the continuity of organic life and its (technological) extensions. Their theory offers better footing to the biosemiotic hypothesis that semiosis is continuous throughout the biosphere, as it traverses media from corporeal to technological enhancements. I note that in a semiotic approach to media, Elleström (2018) recently proposed such a notion of medium, encompassing nature broadly and erasing the dichotomy between supposedly unmediated ('natural') and technologically enhanced ('artificial') representation. These considerations point to the success of semiotics to avoid both vitalism and (mechanic) reductionism in its approach to biological life.

Learning and Development

While tending to avoid the topic of *consciousness*, learning and educational philosophy and theory have always been shaped in regard to evolution theories. To begin with, Jean Piaget's (2005 [1926]) cognitive development theory rests on assumptions about species specific cognitive capabilities of human children. It also carries assumptions about human learning inherited from modern philosophy and Enlightenment, before any notion of natural evolution, such as about the sociability of humans, (e.g., Hobbes 1965 [1651], Locke 1997 [1690], Rousseau 1921 [1762]), and a supposed intimate intricacy of language and thought (Humboldt, 1999 [1836]). More recently, in light of state-of-the-art evolution theory and cognitive science, Michael Tomasello (1999, 2014) rethought Piaget's theory, positing the capacity of human infants for joint attention (indexicality) as a coevolution of cognitive, linguistic and cultural features. Jablonka & Ginsburg (2022; see Ginsburg & Jablonka 2019: pp. 472–473, pp. 475–476) agree with Tomasello's coevolution argument. This places their argument within a certain evolutionary approach which, to be seriously taken up in biosemiotics, requires working around two distinct explanations for anthropological difference. These two explanations are displayed in the tension between Tomasello's account of anthropological difference as *transformation* and Sebeok's more evolutionary continuous (1986, 2001) *pluralism*, inherited from Peirce (see Jaroš & Maran 2019). For example, writing within a specific biosemiotic orientation, Jaroš and Pudil (2020: p. 167) contradict Tomasello, finding that his theory supposes "individualistic concepts of mind and cognition". Rather, in consideration of Merleau-Ponty's concept of interanimality, they (Jaroš & Pudil 2020: p. 167) argue that "[t]he shape of intraspecific communication is closely linked to the organization of a society of the given species and is often derived from relationships between individual members". This biosemiotic standpoint is aligned with Stables' (2006, 2012) theory of learning, as he, too, was critical of the distinction between sign, as attributed to humans or the mind, and signal, as attributed to non-human animals or the body, in a crude materialistic construal. In contrast, Jablonka and Ginsburg attribute "symbolic consciousness" to the *Homo* genus alone. In this regard, they are taking the argumentation line of Deacon (1997, 2012), which is far from easy to dismiss from biosemiotics.

However, in alignment with the *status quo* in ethology, most biosemiotic scholarship tends to see the anthropological difference as much more subtle. To begin with, this is the case because of the many examples of behaviors and rituals involving symbols (in a Peircean understanding) in non-human animals (Martinelli, 2010: pp. 72–77). Of course, such observations have to answer to the skeptic argument that humans observe symbols in the worlds of non-humans because humans know symbols while, actually, the non-human animals observed are not performing a symbolic activity.

Semiotic Evolution and Dualism

Stjernfelt (2012, 2014) unravels an alternative biosemiotic account of anthropological difference as a high degree of self-control, which he explains by employing Peirce's notion of hypostatic abstraction. According to Peirce (CP 4.235), hypostatic abstraction

> consists in taking a feature of a percept […] so as to take propositional form in a judgement […], and in conceiving this fact to consist in the relation between the subject of that judgement and another subject, which has a mode of being that merely consists in the truth of propositions of which the corresponding concrete term is the predicate. Thus, we transform the proposition, "honey is sweet," into "honey possesses sweetness". […] I have selected sweetness as an instance of one of the least useful of abstractions. Yet even this is convenient. It facilitates such thoughts as that the sweetness of honey is particularly cloying; that the sweetness of honey is something like the sweetness of a honeymoon; etc. Abstractions are particularly congenial to mathematics.

.According to Stjernfelt (2012, 2014), the capacity for this type of abstraction, as a very high level of cognitive self-control, is rather appropriate to account for anthropological difference. It implies a particular view on evolution, which biosemiotics can unfurl, according to which complexity of cognition does not correspond to complexity of semiosis (Olteanu et al., 2020; Campbell et al., 2021). Namely, as Stjernfelt (2012: p. 39) explains, "instead of an ongoing construction from building-blocks, semiotic evolution is the ongoing subdivision and autonomization of a reasoning process having its first proto-form in metabolism." Metabolic processes can be semiotically very complex, as suggested by Peirce's considerations on protoplasm. Peirce's observation that, as specific to organic life, "protoplasm grows" (CP 6.283) brings to mind what he also found to be the specific characteristic of symbols (CP 2.302), namely that

> Symbols grow. They come into being by development out of other signs, particularly from icons, or from mixed signs partaking of the nature of icons and symbols.

.The ontogenesis of protoplasm has the semiotic complexity of symbols. The reason for which protoplasm stands out as, so to say, biologically primitive is that it is not in

control of its growth. Of course, all signs grow, as symbols develop out of other signs the rationale of signs is to grow. Growth, though, is characteristic of symbols because symbols that grow remain symbols, while for simpler signs growth means emergence, namely increase of semiosic complexity. The rationale of representation is fulfilled in the symbol, like the rationale of interpretation is fulfilled in the argument.

Like evolution, learning is sign growth. Stjernfelt's (2012) criticism of thinking semiotic evolution in terms of phases of representation (iconic, indexical, symbolic) has the same theoretical consequence as Stables' (2006) refusal to admit a distinction between sign and signal. Namely, they both reject a human/non-human ontological distinction. For learning theory, Stables (Olteanu & Stables, 2018: p. 424) considered that there is a "need of expanding the sense of the terms 'adaptation' and 'learning', in view of eliminating the dichotomy." Jablonka and Ginsburg's (2019, 2022) theory of consciousness, too, is founded on the interplay of ontogenesis and phylogenesis. However, their consideration of symbolic consciousness as the marker of anthropological difference contradicts the main lines of argumentation in what has so far been a (bio)semiotic theory of learning. This invites yet more consideration in biosemiotics, from various angles, on learning.

If Jablonka and Ginsburg's (2022) argument is to become programmatic for the development of biosemiotics, it either requires a reconsideration of anthropological difference or it will set this discipline on a certain research path that sets a stronger distinction between human and non-human than usually supposed.

Conclusion: On Semiotic Scaffolding

Jablonka & Ginsburg (2022) offer a complex and intricate discussion on consciousness in reference to learning. In this investigation, their concept of learning is thoroughly semiotic learning is simultaneous with subjective experiencing and, as such, it is interpretative. This is in agreement with the crux of semiotic learning theory that learning channels further learning (Stables 2012; Kull 2015; Campbell et al., 2019). As such, Jablonka and Ginsburg unearth one of the most important contributions that (bio)semiotics can bring to learning theory: namely that (active) forgetting is a part of learning. This is underpinned by Peirce's notion life as diversifying through destabilizing the equilibria of non-living matter. In a world of perfectly crystalized and fixed rules, learning would not be possible. On the other hand, life not only learns but, also, it cannot bring its learning to a halt (except through its total self-annihilation). Arguably, even the death of an individual organism, conceived as the termination of a consciousness, of a form of subjective experiencing, may contribute to learning on a greater, environmental dimension. From the modeling-centered perspective of biosemiotics, this is explained in terms of scaffolding, a term inherited from learning theory to begin with. Conceiving *learning* in terms of *scaffolding* supports Jablonka and Ginsburg's (2022) as it implies that learning, in all instances, in a restructuring of subjective, phenomenal worlds (see Olteanu et al., 2016).

The starting point and justification of biosemiotic theory, following Sebeok (1986, 1991), lies in the observation that if language as a modelling system emerged adaptively, speech emerged as an exaptation. Further, in humans, the evolution (and/or

development) of modelling systems has been shaped by the employment of speech on ontogenetic levels and as cross-generationally passed on. In this view, modelling systems are seen to offer possibilities for scaffolding ever more detailed notions and environments (Hoffmeyer, 2015). As such, understanding one's surroundings and constructing an environment are not dissociated: the scope of learning is modeling, that is, constructing environments that, for the organism, are more semiotically enabling. The knowledge of the organism is displayed in its environment, instead of being removed once an outcome is achieved, as semiotic scaffoldings become part of the open-ended outcome (Cobley & Stjernfelt 2015). Learning increases semiotic freedom (Hoffmeyer, 2015), which means that removing (e.g., forgetting) obsolete scaffoldings is also a form of learning. It is remarkable that, not in a semiotic conceptualization, Ginsburg and Jablonka's original thesis (2019: pp. 402–403, p. 405, p. 417) also acknowledges that subjective experiencing leaves traces that remain parts of an organism's world and, therefore, (active) forgetting is an important part of subjective experiencing and of learning. This opens a manifold of research programs on learning as semiosic.

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