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Transhumanism, Society and Education: An Edusemiotic Approach

Susana Gómez Redondo[1,6] · **Claudio J. Rodríguez Higuera**[2,3] · **Juan R. Coca**[4,6] · **Alin Olteanu**[5]

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Abstract
We propose a semiotic framework to underpin a posthumanist philosophy of education, as contrasted to technological determinism. A recent approach to educational processes as semiotic phenomena lends itself as a philosophy to understand the current interplay between education and technology. This view is aligned with the transhumanist movement to defend techno-scientific progress as fundamental to human development. Particularly, we adopt a semiotic approach to education to tackle certain tensions in current debates on the *human*. Transhumanism scholars share the optimistic belief that there is no limit to how the ethical use of technology can help alleviate suffering and increase our health and wisdom. From this perspective, it appears possible to acquire capacities that require rethinking the notion of human altogether. For others, this undermining of essentialist concepts of humanity entails serious risks, especially related to ethical egalitarianism. We adopte the perspective of edusemiotics, a framework that brings together semiotics, educational theory and philosophy of education. As a theoretical-practical framework, edusemiotics affords a hermeneutic and semiotic method for our approach. Peirce's logic of signs is used to analyze socio- educational interactions as environmental. We observe two lines of thought. On the one hand, technological transhumanism enhances Cartesian mind–body dualism. On the other hand, philosophical posthumanism seeks to overcome this dichotomy. The former proposal construes human transformation as an artifactualization derived from techno-scientific enhancements. The latter position proposes an integrative posthumanism, capable not only to include edusemiotic theory but also to rethink the concept of learning as mutual to that of *human*.

Keywords Transhumanism · Edusemiotics · Posthumanism · Socioeducative · Umwelt · Education

Introduction

The current technological revolution brings new challenges and opportunities for education (Boyd 2014; Jandrić et al. 2019) that urges reconsidering. As mind–body dualism has become undermined and replaced by a construal of mind-technology continuity (Hipólito

Extended author information available on the last page of the article

et al. 2021; Fuller 2022), studying learning in terms of disembodied mental processes is at a deadlock. We propose a way forward for educational and larning theories based on Charles S. Peirce's semiotics. This allows for a concept of *learning* as *interpretation*. The crux of contemporary semiotic approaches to education, as Andrew Stables (2006) proposed, stands in the argument that if living is semiotic engagement, then learning is always semiotic engagement. Far from an idle truism, this keen observation reveals the intimate relation between learning and being alive, as observed more recently in attempts to overcome dualism in evolution theory (Ginsburg and Jablonka 2019; Jablonka and Ginsburg 2022). As Stables (2016, 48) explains, "if all living is semiotic engagement with aspects of the environment, and if all living resuts in change, then all learning also entails such semiotic engagement that results in change". This view implies a very broad notion of learning, as "(inter)subjective judgement on significant change, where 'significant change' means 'change worth mentioning'" (STables 2016, 48). Far from a constraining definition, this conceptualization acknowledges that learning cannot be clearly formalized. It reveals the goal of establishing educational system on a formalized notion of learning as a fallacy of Enlightenment, stemming from both empiricism and rationalism. Notwithstanding the improvement of human life that modern education produced, the naïve optimism towards formalizing learning has led to sterile educational views and policies that reward '*learning*' as socially predefined and expressed in metrics.

In this paper, we explore the importance of Stables' observation for the current debates on education *vis-à-vis* the transhuman view on cognition as technological expansion. We explain that it invites a view on all learning (and even behaviour) as technological, avoiding the dichotomization of *natural* and *technological*, while also positing that learning is contextual. Because learning takes place through engagement with and within a context, techno-scientific progress cannot produce unlimited wellbeing.

Semiotics of Learning: A Future Orientation

According to Peirce, the world "is perfused with signs, if it is not composed exclusively of signs" (CP 5.448). On this account, the *sign* concept transgresses the ontological boundaries of the modern concepts of *mind* and *matter*. For Peirce (CP 8.177), a sign is "a Cognizable that, on the one hand, is so determined […] by something other than itself, called its Object, while, on the other hand, it so determines some actual or potential Mind, the determination whereof […] the Interpretant created by the Sign, that that Interpreting Mind is therein determined mediately by the Object."

This naturalization of meaning and the high relevance of meaning-making for understanding nature implies that human beings and their experiences can be construed as signs. Thinking the human subject in terms of sign-relations instead of (monadic) ideas challenges modern philosophy of education, having profound consequences for construing society. Namely, not only are social experiences (which include educational experiences) semiotic processes but *we* are altogether interpretable through and as signs.

This undermines solipsistic views of the (human) mind: instead of supposing that the knowing subject has access only to the productions of her mind as non-material ideas, subjects co-constiute each other through signs that partially overlap. The (semiotic) process involving these three interrelated notions is called *semiosis* (CP 5.484), or, in common parlance, interpretation.

Seeing *reality* as semiotic implies a continuity between what is biological and what is sociocultural: the latter is part of the former. From a semiotic perspective then, social

processes can be grouped under the moniker of socio-educational *semiosis*. We consider that the transformation of the human subject, as an encompassing concept of *learning*, should be a core interest of educational research (following Kukkola and Pikkarainen 2017).

Edusemiotics (Stables and Semetsky 2017) is framework that brings together semiotics, educational theory and philosophy of education. It is distinctive by its understanding of the the socio-educative world under integrative, transformative and relational perspectives. It focuses on learning experiences, comprising processes of growth and the transformation of signs in which teachers and students can find significance and meaning (Semetsky 2017a). Philosophical and cultural views on human existence and evolution are some of its objects of study. Edusemiotics is future-oriented. It pays special attention, as one may expect, to processes of *becoming*, both from a theoretical and a practical perspective (Semetsky 2015, 2017a, b; Stables 2012; Kukkola and Pikkarainen 2017). In this way, it builds on Peirce's view of the *self* as an evolving sign (CP 5.462, 8.125; Colapietro 1989). As such, edusemiotics carries out educational research through the transhumanist prism of construing the human not only in light of what defines it because of its evolutionary past, but of what it can become in the future. This is a promising line of research for contemporary education, given that change, existential threats and an apparent lack of stability have become the (social) norm. Current and future educational processes are thus investigated under the question of where *semiosis* is taking human societies and, also, how to employ the capacity to *interpret* as an educational resource (Gough and STables 2012).

Transhuman Development

The transhumanist movement (e.g. Bostrom 2005a; Fuller 2016; MacFarlane 2020; Adorno 2021) focuses on techno-scientific progress as a fundamental path of human development. In this sense, we can consider transhumanism as a philosophy on the nature of techno-scientific relationalities. The intended bio-improvement of transhumanism unravels a futurist dimension of human activity, comprising ethical and philosophical discussions around the subject. Edusemiotics can contribute to this endeavour. Particularly, it can lead the way to aligning educational practices with transhumanism or, in general, a future-oriented philosophy. This is a much needed perspective in a moment when all life on Earth is threatened by an historically unprecedented environmental crisis.

To unfurl these linkages between (edu)semiotics and transhumanism, as relevant for education, we employ a hermeneutic methodology, based on the author-text-reader triad. According to this point of view, society, understood as producer or author of socio- educational meanings and signs, will be analyzed systemically through the prism of Niklas Luhmann. We try to comprehend transhumanism as a philosophical and cultural trend as related to the idea of human development and the way we relate to our environments and, finally, we ponder on how agency is situated within a cyborg society, particularly in regard to the socio-educational field. For this, we take as instrumental the biosemiotic concept of *Umwelt*, namely understanding environments as the subjective constructions of embodied organisms (Sebeok 2001). We note that, while Stables did not agree with Peircean philosophy in all regards, he found Peirce's uptake in semiotics and the Sebeokean understanding of *Umwelt* particularly salient for education (Gough and Stables 2012; Stables 2012; Olteanu and Stables 2018; Stables and Olteanu 2023).

Methodology

Our analysis pursues a semiotic and hermeneutic methodology based on a level division. Namely, several levels for interpretation lend themselves to a layered analysis (Seebohm 2004). A lower hermeneutics lies in the level of grammar rules (focused on authorship). The second level corresponds to the explanation of acts and technical terms (focused on the text). At the higher level there are two types of hermeneutics: (a) the interpretation of style; (b) generic interpretation and critique (focused on the reader). Accordingly, we follow MacKenzie (1990) in that any spoken or written locution is the expression and product of social interation between speaker, listener and speech. Therefore, we defend a hermeneutics based on the social context that encompasses the author of the text, the text itself and its readers. At the same time, texts are created within contexts.

This heremenutic view of hermeneutics as a pan-interpretative process has a clear relationship with semiotics, particularly in a pragmatic view (Peirce 1902; Feil and Olteanu 2018) and is related to the phenomenological concept of *Life-World* (Schutz and Luckman 1973; Srubar 2014) as well as interpretative sociologies (Endress 2014). Therefore, Peircean semiotics appears in a similar fashion and extension to the hermeneutic method we employ. It overcomes the understanding of signs as linguistic elements, commonly attributed to the classical Saussurean model of the sign (1959), and thus develops the idea of sign systems independently of language. In this sense, a sign is anything that may potentially provide information of some sort. As Umberto Eco (1976, 7) famously defined the object of semiotics, a sign is anything "that can be used to lie",

> arguing that "[i]f something cannot be used to tel a lie, conversely it cannot be used to tell the truth: it cannot in fact be used 'to tell' at all." Though beyond Eco's scope and expectations, signs span throughout the whole biosphere, as Paolucci's (2021) recent reinterpretation of Eco's definition, from an embodied an enacted cognition perspective, shows. From this perspective, the hermeneutic act serves to understand all experiences in their linguistic, extra-linguistic and non-linguistic aspects as well as human, non-human and more-than-human dimensions. Also, this view allows for regarding language as one communication technology among others, as currently salient views on evolution, cognition and communication concur (see Dor 2015).

In summary, by adopting the lens of the hermeneutic triad—namely, the relation between author, text and reader—, we consider the relevance of transhumanism for education in an edusemiotic perusal. Thus, we understand nature and sociality (broadly construed) as *loci* of meaning and significance. Pragmatically, we leave aside sign- creating agents that are not directly related to educational processes. We take the transhumanist scholarship as text and, furthermore, as the object to be interpretatively studied, focusing on its elementary stances. In this endeavour, the edusemiotic perspective transpires as a strongly suitable approach.

Results and Discussion

The Author of the Text: Systemic and Semiotic Entanglements of Society

The social system in which we are immersed, as Luhmann (1995) indicates, is complex, in the sense that a multitude of interconnectred factors contibute to its development.

These factors stem from the various subsystems of one shared social system. Here, we are concerned with the interaction between three specific subsystems: the techno-scientific, socio-educational and psychic/emotional, which subsist within the.

larger social system. In this pursuit, it is crucial to be aware of the differentiation inherent to any system based on the interrelation between the system itself and its surroundings. Interacting systems are co-dependent. Pikkarainen (2021) considers that a view on causality as circular (contrasted to linear, dyadic and unidirectional) implicitly posits circular causality as a prerequisite for life. Moreover, Pikkarainen (2021, 2) explains how this evolutionary perspective is insightful for social and educational processes.

This idea finds support in Peirce's relational logic and its implications for an evolutionary perspective on learning (Fuller 2022, 248). While Saussure's more popular semiology limited the concept of the sign to its linguistic manifestations, Peirce considered that signs are at work in nature broadly. Following Peirce, signs grow and change in *semiosis*. As such, meanings co-evolve. In this semiotic purview, "the human mind is not separate from the environing physical world but is engaged in a continual participation with it, thus forming a holistic process-structure, a network, encompassing socio-cultural and natural aspects" (Semetsky 2017a, 5). This perspective can shed light on Luhmann's (1995) theory on the possibility of four major systems in the world inhabited by humans: the social, the psychic, the natural and the technical. The question is whether an ontological dimension of a techno-scientific nature has a place in semiotic theory. Following Luhmann (1995), we limit ourselves to using three systems in our exploration: the psychic, the natural and the social systems.

We start from the conception that the human being (that is, the psychic system), as well as different elements of the natural system together with parts of the social- educational system steadily co-evolve in a way that leaves a profound mark and dependence on each other. Translating this in semiotic terms, the emergence of systems is explained as the infinite chain of semiosis: sign systems stem from the dynamic and relational process of one sign giving rise to another (for an evolutionary discussion see.

Hoffmeyer and Stjernfelt 2016). Like everything else, society itself can be taken as a sign. Society is also the author of sets of signs in uninterrupted creation, interdependence and co-evolution.

In agreement also with Luhmann (1995), we affirm that the psychic system (of consciousness), the natural system and the great system of communication (the social system) are linked to each other through semiotic phenomena. In this view, natural and communication systems co-evolve; that is, they are respective.

Therefore, the respectivities of a *reality* can be asserted in relation to the new realities generated by a given natural process. Arguably, this comes close to Peirce's method of *prescission*, which he also reffered to as *abstraction* (e.g., CP 1.548, 2.428, 4.235). The abductive type of inference termed *prescission* works by asserting entities that are essentially relational. For example, in Peirce's philosophy, the three elements of the sign are observed by prescinding them from the triadic sign-relation, of which they are simultaneously co-constitutive. More generally, while phenomenological categories (in Peirce's terms, Firstness, Secondness and Thirdness, see CP 1.347, 5.66) cannot be distinguished one from the other, they can be prescinded from reality and, as such, discussed on their own, without supposing their independence one from the other. Herein transpires the utility of Peirce's semiotics to underpin a compex ontology that transcends the old polarization of methodology between reductivism and holism.

Complementary to this external respectivity, of a biological and morphological kind, we add a second kind of respectivity, namely, *internal*. Internal respectivity refers to the

relationality (that is, an onto-biological characteristic that consists in a phenomenon of stimulus for most organisms and which is transformed, in humans, into a reciprocal reality) of a given reality with the remaining notes (characteristics) of the previous one.

From a semiotic perspective, (social) systems depend on the interaction between co-localized elements (Stjernfelt 2014). Often, semiotic theories are employed as cultural criticism (Eco 1979; Lotman 1990), by considering sign systems formed of elements in proximity within culture. We draw attention to a problem that persists in such approaches. Lotman's seminal work on sign systems and the semiosphere (2001) provides a functional account of how cultural objects are vehicles for cultural change, stating the necessary connection between culture and non-culture. The semiosphere is a representation of the configuration of elements within an area of signification (in general referring to cultures), where center, periphery and non-culture become interrelated and significative for the cognitive life of individuals within this area. Sign system theory, on the other hand, provides an account of the systems of signification in human cognition (2011) and the interplay between them, where the infrastructure provided by language is built upon to develop more complex forms of signification (as in art, for instance). In a strict reading, Lotman's cultural semiotics theory perpetuated the common 20th Century dualism between cognitive and cultural approaches to language and behaviour, by sharpy distinguishing between culture and non-culture. We note that the Saussurean dyadic and dualist model of the sign and the implied strict distinction between (collective) language and (individual) speech is one of the main sources for this epistemological split (seeGeeraerts and Cuykens 2007, 2016; Olteanu 2021).

In this regard, Peirce's semiotics can offer a way forward for a semiotic systems theory approach to culture. This is evident in the uptake of Peirce's theory in biosemiotics. In a thorough consideration of state-of-the-art natural sciences, starting with the late 1960s, Sebeok (e.g., 1965, 2001) found that Peirce's semiotics can support a modeling theory that acknowledges the continuity of meaning across nature/culture distinctions. This scope of biosemiotics, as contrasted to anthropocentric views on culture, is nicely captured in Petrilli and Ponzio's (2005) suggestion to replace the Lotmanian term of *semiosphere* with *semiobiosphere*. The Lotmanian notion of semiosphere is stipulated as a cultural analogy to the notion of biosphere as the geological "envelope of the Earth, which is the only place where life can exist" (Vernadsky 2005 [1943]: 17). Lotman (1990, 123) posited that there is an analogical semiosphere, "as the semiotic space necessary for the existence and functioning of languages, not the sum total of different languages; in a sense the semiosphere has a prior existence and is in constant interaction with languages. […] Outside the semiosphere there can be neither communication, nor language." The first observation is that the semiosphere notion implies a language-centered notion of meaning and, further, an anthropocentric notion of culture. Instead of paralleling the cultural with the geological dimension, following Sebeok (2001), Petrilli and Ponzio offer a view of culture as a part of and continuous with natural evolution. As such, cultural and natural phenomena are not deemed to mirror each other. Rather, the emergence of culture on evolutionary timescales is a leap to greater level of complexity (Hoffmeyer 2015). From this point of view, it is rather correct to posit that the semiobiosphere "forms the habitat of humankind—the matrix whence we sprang and the stage on which we are destined to act." (Petrilli and Ponzio 2005, 548) In brief, this is implied by the important realization brought to light by considering evolution theory in a Peircean key that "[t]he evolution of semiosis thus coincides with the evolution of life." (Petrilli and Ponzio 2005, xxii).

Overall, biosemiotics opens the perspsective of tackling "questions about human affairs […] in the interrogation of modelling." (Cobley 2016, 28) Here, modelling is the operation

of organisms to construct meaningful environments (*Umwelten*) through signs. This is the perspective we propose for education.

In the *semiobiosphere*, which does not suffer interruptions caused by polarizing dualities, the internal and the external, the *inner* and *outer*, are part of the same reality, as inseparable from each other. Semiotics overcomes the difference between *ens reale* and *ens rations*; in Cartesian terms, *res extensa* and *res cogitans* or, since an analogical perspective, subject and object. This is supported by Deely (2009), who saw semiotics as breaking with dualism by positing that humans are both users of signs and knowers of the fact that they use signs. Deely would not deny that non-human animals engage in relations of knowledge, e.g., the wolf knows that it wants to eat the rabbit, the rabbit knows that the wolf wants to eat it. Semiotic activity is not solely part of human experience, it is the interaction between environmental signs, physical constitution and the presence of previous (human) signs being enabled by relations that are subject to a material correspondence between percept and concept (229–244). Recent research in semiotics displalys a focus on this matter, rethinking the problematization of self and the other, inner and outer worlds and such oppositions, which are displaced by an understanding of semiotic capabilities as enabled by the interplay between environment and organism (Petrilli 2013; Ilyin 2020; Gal and Irvine 2019; Olteanu 2021).

The Text: Transhumanism, Posthumanism and Cyborg Society

Porter (2017) sees transhumanism as a "technoprogressive" socio-political and intellectual movement, concerned with a range of bioethical issues, particularly those related to the use of technology to radically transform the human organism. The core of transhumanism is to promote the use of bio-transformative technologies, which are aimed at improving the human organism. Its objective is to overcome fundamental human capacities or, in other words, to become 'posthumans' (H+). Sometimes, transhumanism is defined as 'the death of death', because, in its most optimistic (or radical) form, it pursues the ancient dream of immortality.

The Transhumanism Declaration (2009 version) states that the movement envisions the possibility of expanding human potential by overcoming aging, cognitive deficiencies, involuntary suffering and our confinement to Earth: "We believe that humanity's potential is still mostly unrealized. There are possible scenarios that lead to wonderful and exceedingly worthwhile enhanced human conditions" (n. p.).

To this goal, transhumanists believe in the use and development of current and emerging technologies, such as genetic engineering, information technologies, molecular nanotechnology, brain-machine interfaces or, in a broad sense, medical advances.

This conception of human progress may resemble the Nietzschean notion of *Übermensch* (Sorgner 2009). In opposition to this idea, transhumanist Nick Bostrom (2005b) argues that, despite some surface-level similarities with the Nietzschean vision, transhumanism probably has as much or more in common with Nietzsche's contemporary,

J.S. Mill. This is because Bostrom, like most transhumanists, claims transhumanism's roots in the Enlightenment, with its emphasis on individual freedoms and its humanistic concern for the welfare of all humans (and other sentient beings). He holds that human beings must harness the potential of technological inventions that enhance, expand and possibly change the lives of humankind.

Transhumanism affirms that the human species can and must transcend itself (Hauskeller 2012). This implies the assumption of a modern utopia, based on the

transformative and salutary belief in the power of science and technology (Hauskeller 2012). Such an idea entails a rather blind belief in the positive possibilities of scientific-technological progress (Evans 2014).

However, such a scenario is considered by some thinkers (bio-conservative) as a deep risk of a dehumanized and dangerous and inequitable dystopia. One of the clearest example of such a position is Francis Fukuyama (2002), who has written numerous objections to the transhumanist project, particularly in the concerns of ethical egalitarianism, poverty and political development.

Transhumanists recognize that serious risks may stem from misusing new technologies. This is made clear in the programmatic transhumanist declaration by pointing out that "there are possible realistic scenarios that lead to the loss of most or even all, of what we hold valuable. Some of these scenarios are drastic, others are subtle. Although all progress is change, not all change is progress" (Transhumanism Dcelaration, 2009 version, n. p.), they conclude. This echoes Stables' (2016, 46) observation that "all learning is change but not all change is learning".

According to transhumanists, good, responsible and moral use of technology will reduce existential risks and help preserve life and health; it will relieve our species of the severe sufferings that afflict it and improve human foresight and wisdom. Such goals must be pursued as urgent priorities and funded accordingly. In synthesis, technoscience will upgrade the human species and, therefore, it is in this transformation that lies not only the most desirable horizon, but, according to technological determinism, the only possible one.

Human obsolescence, physical and cognitive deterioration, vulnerability in short, is despicable. It must be overcome. Human beings will see their dream of transcending illness and death come true if transhumanist beliefs materialize. In this direction, the body, as a faulty vehicle, is unimportant. The mind can be turned into a machine, that is, less fragile and, therefore, a close to perfect support for human life. Once this is achieved, we will be able to abandon the 'prison' which, as Plato and different spiritual traditions are interpreted by modernity to have claimed, is the body.

Transhumanism is not satisfied with merely improving the human being. It will continue to urge for the creation of something different still, such as a new species: the posthuman. Techno-scientific posthumanism is not content with the gradual improvement of moderate transhumanism. On the contrary, it argues that if the body is the problem, there is no reason not to leave it behind, either by replacing it with a mechanical body or by uploading our mind on computer memories. It does not matter that in the bid for the imperishable we leave the human behind. It may not even matter if individual consciousness is trumped in the process and what used to be several self-aware individuals are fused into a greater agency, the personhood of which is unclear.

Thus understood, transhumanism rejects the idea of a human nature as inherited through an evolutionary process, as well as any ontological or axiological conception that associates such a nature with the dignity or morality of the human being:

> We should not fear a change to transhumans or posthumans even if we ceased to be members of the species *H. sapiens* […] the most urgent change that should be made is a moral improvement of human nature […] if human civilization is to avoid destruction or deterioration, human beings need to become more human in the moral sense. Such morally enhanced humans may be called transhumans or posthumans. We do not see that, if this change has to be brought about partly by biomedical means, this would necessarily result in beings that are no longer human in

> the biological sense. But even if that were to be the outcome, this would be of no significance, since species membership is unimportant […] There is nothing special or valuable about human beings in the biological sense. To be more "human" in the normative sense of the term, in terms of those capacities that afford members of our species moral status and value, may require an evolution to posthumanism (Persson and Savulescu, 2010, 13).

According to this, the loss of the species' filiation does not mean the loss of the status of existence: *post homo sapiens* can be *posthuman* or even *non-human*, but not *post-existential*. It is a question of continuing to be, a *desideratum* that raises profound questions, not only ethical but also ontological.

In short, a *transhuman* could be defined as a *transitional human* who aspires to become *posthuman* and takes the appropriate steps (through technological enhancement) towards that end. Hence, a *posthuman* would entail a being so radically different in physical, cognitive and emotional capabilities from modern *Homo sapiens* as to cease to be unequivocally human (Porter 2017).

This particular advocacy of the transhuman or post-human grounds the idea of enhancement on the augmentation of human capabilities: first through medicines, then through genetic engineering and computation enhancements and, finally, through the union of the human being with the machine.

Such acts of augmentation or amplification of human abilities and capacities will necessarily have an impact on the gnoseological processes and mechanisms of human beings, as well as on the relational and pedagogical ones. Their influence may shape the teaching–learning processes in very different ways from those known, a fact that will considerably change the socio-cultural and educational landscape.

Seen in this way, transhumanism would entail, likewise, an interdependence of the human being with technological and scientific advances while also overcoming human cognitive limits and processes. By breaking through these limits, a new human being would emerge, more 'capable' of acquiring new knowledge, though also under the influence of more sophisticated techno-scientific mechanisms within the socio-

educational sphere. This view inherits the mechanistic and linear notion of learning handed down since the Enlightenment, which Stables (2016) criticized. That some are 'better' at learning than others, then *learning* refers to a process with predefined outcomes. It overlooks interpretation and creativity as a matter of authorship, of *subjective judgement*.

The acquisition of knowledge requires, even from the most radical constructivist and heuristic perspectives, an experienced guide (a 'donor' of sorts) to regulate the process and decision-making leading to shortening the distance between the Vygotskyan zones of proximal development. We already see in some contexts, such as contemporary Japanese society, the existence of figures like the humanoid robot, which among other functions serves as a teacher (Europe has had some experiences in countries such as Belgium and the United Kingdom). Recent research on robotics shows not only that it is extremely difficult for humans to design robots non-anthropomorphically and that humans tend to suppose agency and human-like attributes to anthropomorphic designs (see Becker 2022), but also that what may be deemed "non-anthropomorphic robotic artefacts" are often interpreted by humans as expressive and imbued with anthropomorphic "cues" (Bianchini et al. 2016, 1).

As such, the fundamental idea would be the materialization of what we could call the *fictional human*. This materialization supposes transgressing the limits of our nature, giving rise to processes of hypertrophy of some of our characteristics and environments (natural, socio-cultural and educational).

It is in this transgression where some of the fundamental questions on the processes of cultural and gnoseological transmission arise. Beyond the biogenetic debate (which goes beyond the scope of this paper), the modification of the ecosystems of knowledge acquisition and its pathways leads us to reconsider both the current and potential teaching- learning processes, as well as the itineraries of cultural transmission.

The Lector: An Edusemiotic Gaze—The Umwelt Question

Following in Foucault's footsteps, central ontological points raised by our reflection can be extended through Peirce's notion of the sign. That is, the human being is a sign of itself (Colapietro 1989) and, therefore, we as individuals become and develop as signs among signs (i.e., people in society).

As a semiosic subject and a relational and modifiable entity, the human being is permanently subject to the possibility of growth. The opportunity of evolution, or perhaps *incompleteness* (e.g., Deacon 2012), reveals itself to be the driving force of sign processes. Short (2007, 3) illustrates through a simple and compeling example that Peirce's view on signs as *incomplete* ushers a theory of learning that eschews modern solipsism:

> My idea of an elephant is not the elephant itself. My idea may embody some error and is in any case incomplete; nor does it weigh as much. But is not my idea, for all of its defects, precisely how the elephant is 'present to [my] understanding'? Locke wrote as if I contemplated my idea, and not the elephant, and then inferred the elephant from it, much as I might infer an elephant from its footprint. But that is not how we employ ideas.

Simplifying, because signs are relations and, as such, incomplete, we, as knowing subjects have space (where) to grow. This supposes that knowing subjects are signs in a complex reality of semiotic systems. Human beings appeal to novelty, creativity and connectivity to grow and give rise to new signs. Arguably biologically less constrained than other animals, we turn to our 'second nature', namely, our socio-cultural skin, to contextualize ourselves and develop pedagogical processes aimed at survival and optimization. Obviously, the socio-educational environment plays a dominant role in the construction of the person (in society).

In this sense, the environment needs to be understood in terms of (von Uexküll's) *Umwelt*. This fundamental biosemotic idea holds that "as signs signify differently in different contexts, the same species evolve differently in different environments" (Olteanu 2017, 196). In turn, environments co-evolve with species. In this way, a philosophical milieu and a socio-educational repose are interactive and co-dependent.

In the educational dimension of semiosis, a basic feature of our cognitive design is activated: the ability to know what we know and ignore and, at the same time, the reasoning and intuition to imagine what others know and ignore. That is to say, we suppose what the other needs to know and, based on this, the pedagogical game is set in motion. Thus understood, such a pedagogical dimension is specifically human: *Homo sapiens sapiens* (the human who knows that she knows) and whose meta-representational capacity makes her *homo 'pedagogical'*. This capacity denotes the human disposition to elaborate representations and signs, which not only explain, but also predict the other person. Pedagogy should develop into the systematization of this capacity (and need).

Humans, being signs among signs, and inhabiting socio-cultural contexts, survive and evolve thanks to a delicate balance between preceding signs (inheritance) and their natural

propensity to innovate (the search for new signs). That process implies a co- evolution and co-dependence between natural and socio-cultural environments, which include education.

Transhumanism implies a technical redefinition of the evolution of *human* and introduces the category of cyborg. That is, humans arrive onto a new stage of evolution (Klichowsky 2015) and will necessarily have a renewed relationship and interaction with the signs that surround them and the environment which they inhabit: their *Umwelt.* Such a vision brings to light issues related to the union between body and mind and, consequently, the connection between mind, nature and environment.

Techno-science shapes the relationship between humans and their environment (Hottois 1990, 1999). These changes in *Umwelt* bring with along the perception of the environment of the system of consciousness, i.e., the person, in a more operative way. As a basic example, artificial intelligence and robots "appear as a good mean to represent how nautral processes work [but] also convey representations about how humans think these processes, which redefines the relations between science, technology, and natures by shifting the boundaries separating living bodies from their mechanical imitations" (Becker 2022, 107).

The search for improvement is a classical vision of the goal of education. Much like society, or democracy, it is a system in place to make human beings better. As Klichowsky (2015) states, the perspective of transhumanist philosophy is based on a quasi-Aristotelian, teleological understanding of nature, according to which everything naturally aims at perfection. However, and as the author points, transhumanism adopts engineering thoughtfulness, where everything is designed and evaluated from the perspective of *effectiveness*. In other words, being perfect means being effective. From this point of view, the axiological dimension loses primacy over effectiveness. This being the case, education ceases to be problematized, in order to become operationalized, an assumption that has been arguably guiding the institutionalization of education since Enlightenment.

This idea lies together with several teaching trends, in which pedagogical progress is dangerously assimilated to an ideological notion of technological progress, up to the point where innovation and the use of new technologies appear to be one and the same. As Bayne observes (2018, n. p.), contemporary education (and its implicated digital drifts) is considered by several education agents "as a way of stepping back from the still widely-held assumption that the value of digital technology in education is largely instrumental, with digital technology seen as a 'tool' to be used to make education 'better' (more efficient, more effective, more available". In this sense, education can be deprecated in modern philosophies, which are technologically oriented (Klichowski 2015).

Gadamer (2018), who warned of the dangers that techno-scientific irresponsibility can lead to, asserted that the thread on which the fate of Western civilization hangs is suspended between people's subjective experience of their own bodies and the increasing objectification of the human body by science and culture. The knowledge of oneself and one's environment, which educational curricula contemplate from primary school stages, will have to be reflected upon not only from pedagogical, but also from theoretical and philosophical perspectives. *Umwelt* as the locus of education must be thought of and problematized in light of new technological and cultural movements:

> Nobody knows what technological possibilities will emerge for human self- modification. But we can already see the stirrings of Promethean desires in how we prescribe drugs to alter the behavior and personalities of our children. The environmental movement has taught us humility and respect for the integrity of nonhuman nature. We need a similar humility concerning our human nature. If we do not develop it soon, we may unwittingly invite the transhumanists to deface humanity

> with their genetic bulldozers and psychotropic shopping malls (Fukuyama, 2004, 43).

In this light, we observe an instrumentalist and teleological conception of nature in the interpenetration of the techno-scientific system and the psychic system (the sign- person):

> Hayles (2006) uses the notion of the 'cognosphere' as a way of re-thinking the humanistic educational privileging of agency and cognition. Seeing the cognisphere as the huge, global 'pyramid of data flows', of which human awareness can only ever encompass a tiny fraction, she proposes a 'benign' form of posthumanism […] (Bayne 2018, 3).

Transhumanists vindicate common points with different traditions of thought: from Plato and Aristotle to the postmodern philosophy of Nietzsche. Scholars of transhumanism often position themselves as heir of the humanist tradition. Much like classic humanists, they believe that human nature can be corrected, promote the supremacy of *raison*, and defend the idea of using science to overcome human limitations (Klichowski 2015). Transhumanism is, hence, a project of transgressing the human. However, in our opinion, it must be directed not anthropocentrically but as progress- centric.

From these points of view, the transhumanist faith in progress would not reside in pedagogy: "Humanism tends to rely exclusively on educational and cultural refinement to improve human nature whereas transhumanists want to apply technology to overcome limits imposed by our biological and genetic heritage" (More 2013, 4). It can be said that transhumanism does not share humanism's devotion to education. Or in other words: "transhumanism is a thoroughly non-/anti- pedagogical idea" (Klichowski 2015, 431).

However, and insofar as education starts from an anthropological conception in order to support its foundations, philosophical posthumanism shows other options. This kind of posthumanism ensures transcending the reductionist postulates of technological transhumanism. Thus understood, the post-humanist movement aims to question human exceptionalism and the role that modernity has given to human beings. By rejecting any separation between nature and culture, it opposes the Cartesian dichotomy between *res extensa* and *res cogitans*, subject and object, mind and body and so on, in order to redefine what it means to be human. In this sense posthumanism would be precisely a characteristic of edusemiotics, in conjunction with an existential dimension, a relational logic that includes a third party observation, process-ontology, relational ethics and future-oriented epistemology, etc. (STables 2012; Semetsky 2017a, b).

Conversely, the more reductionist and technological varieties of transhumanism espouse a kind of Cartesian dualistic thinking, according to which body and mind—that is, the human mind and the natural world—are separate entities. Nothing is further from the heart of the edusemiotic framework than this binary vision. Semetsky (2015, 2017a, b), insisted on overcoming habitual dualism as a distinguishing feature of edusemiotics:

> […] edusemiotics can be also described as the Tao of education that the Chinese called the Way […]. This metaphorical way is the ever-evolving and ever-ending process enabled by, an enabling in turn, harmonious relations that cross the divide between culture and nature […] In the semiotic universe, the human mind is not separate from the environing physical world but is engaged in a continual participation with it, thus forming a holistic process-structure, a network, encompassing socio-cultural and natural aspects (Semetsky 2017a, 5).

Once again, the question of the *Umwelt* returns to the center of reflection. The different views brought to the forefront in the debate between post-humanists and transhumanists have consequences for the socio-educational environment. Approaching this debate from an edusemiotic perspective, the tools and theories of semiotics open up various philosophical avenues to consider what it means to educate and how this shines a light on the idea of progress-centrism in human beings. In a historical and semiotic overview, Gare (2021), though lacking a distinction between the trans- and the posthuman, sees important problems of what we characterize as reductionist transhumanism. Noting the "debased view of life" of this perspective and the treatment of humans as disposable objects, Gare relies on the treatment of the individual in relation to their environment, i.e., the existence of *Umwelten*, as part of a non-reductive opposition to this trend.

The Building Blocks of a Biosemiotic Education

An edusemiotic view can drive technoscientific progress in a way that does not reduce the organism to its functionalized constitution as a reductive transhumanist account would. Instead, we argue that in the incorporation of an extended sense of the mind, both as cognitive offloading and externalism (Clark and Chalmers 1998) and as a relational process between sign systems (Semenenko 2016), the posthumanist does not need to rely *solely* on replacement or enhancement of biological elements. Instead, a posthumanism that can include semiotic theory will be capable of reframing the concept of *learning* itself. Stables (2012) has indicated this path by thinking education in terms of semiosis instead of *Reason.* Besides avoiding the common dualisms of modern philosophy, this leads to a notion of literacy not merely as linguistic competence or ability to manipulate texts or abstract symbolic notations, but as the capacity to become, to change, that is, to adapt by interpreting. From this perspective, education cannot set to merely deliver a predefined set of skills. To avoid the language-centered and logocentric conotations of the term *literacy*, Stables (2012, 84) proposed the term "semiosy", as:

> a reminder that there is much more to living and learning than the acquisition of a set of clearly defined skills. While certain skills clearly are important in the adult communities of given societies, there is no case for basing education simply around their acquisition via purely top-down systems. […] The end result of any education system is the sense students come to make of the world and their place in it. This is a matter of constant negotiation and interpretation.

Similarly, Kull (2018) thinks of *semiotic learning* as non-algorithmic and as "a process that starts with behavioural indeterminacy […] where there are options to choose from" (457), and these options are grounded on the present, lived space, where incompatibility is real and not a logical impossibility.

Biosemiotics, as one of the central areas of research of current semiotics, tries to make previous semiotic theories compatible with a biological understanding of organisms. Thus, Lotman's theory, as we have mentioned, has also been reworked into a theory of cognition that does not rely on linguistic capabilities. Modelling systems theory (e.g., Sebeok and Danesi 2000), seen in a biosemiotic light, relies on the *Umwelt* itself to give an account of how interaction between organisms and their environments is a key piece in cognition and the evolution of meaning (Kull 2010). Learning is, thus, not only linguistic, but the meaning-making competences of organisms in general (Olteanu and STables 2018, 419).

This leads to a definition of semiotic learning as environmental, interactive, relational and cognitively multifaceted.

If posthumanism argues that what makes us human depends on many factors that are not traditionally considered 'human' (Rattasepp 2018) and semiotics reframes how we understand cognition, perception, our relation to nature and the subjectivity of organisms, edusemiotics can build on these precepts to investigate both practical matters of *artifactual* cognition and learning, and ask philosophical questions about the nature of learning when ontology shifts paradigms.

Conclusions

New technologies create new socio-pedagogical environments, which must be thought of and discussed in both theoretical and practical approaches. To express this more sharply, the transhumanist vision can have an influence on educational semiosis.

The question of the emergence of an *Umwelt* and its relation to posthumanist and transhumanist thought is at the center of much of the edusemiotic debate, insofar as it invites problematizing the relationship between subject and environment (in this case, the socio-educational environment). Likewise, we claim that it problematizes this relationship because the philosophical movement of transhumanism tends to participate in a conceptual complexity derived from the main debate of modernity: the overcoming of Cartesian duality.

While technological and reductionist transhumanism potentiates mind–body dualism by accepting the separation of the mind from the body (understood as an integral part of nature), philosophical posthumanism claims to be committed to overcoming this binomial. The concrete 'artifactualization' of teaching and learning leads to a systematic association between educative innovation and ITC that overlooks the semiotic, that is, interpretative dimension of learning. This equation can be reproblematized through an interrogation of the meaning processes derived from the relationship between education and technology.

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Authors and Affiliations

Susana Gómez Redondo[1,6] · Claudio J. Rodríguez Higuera[2,3] · Juan R. Coca[4,6] · Alin Olteanu[5]

✉ Susana Gómez Redondo
susana.gomezr@uva.es

1 Department of Pedagogy, University of Valladolid, Soria, Spain

2 Palacký University, Olomouc, Olomouc, Czechia

3 University of Tartu, Tartu, Estonia

4 Department of Sociology and Social Work, University of Valladolid, Soria, Spain

5 Institute of Corpus Studies and Applications, Shanghai International Studies University, Shanghai, China

6 Present Address: Social Research Unit on Health and Rare Diseases, University of Valladolid, Soria, Spain