



## BIOSEMIOTICS IN THE POSTCLASSICAL PARADIGM: COMPLEMENTARITIES OF LOCAL VE NONLOCAL RELATING

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**Resumo:** Os estudos da linguagem e da comunicação, quando fundamentados no paradigma holístico do século XXI (cf. WALACH 2019b), definem e exploram os processos de comunicação não apenas do ângulo (neuro)cognitivista ou formal/estrutural. Uma comunidade crescente de estudiosos da linguística é pródiga na proposta de modelos e em buscar métodos de teste para que a comunicação seja um processo vital; tanto um processo (neuro)cognitivo quanto um tipo de mecanismo orgânico de vinculação/ligação em todas as camadas de organização do mundo vivo. Esta função vinculativa e integradora da comunicação ocorre (i) no sentido biológico e químico, sendo o organismo vivo um subsistema biológico e ecológico (na macrorrede de sistemas de vida no planeta); na perspectiva adotada pela biossemiótica clássica. O que gostaríamos de indicar nesta breve apresentação teórica, a linguística interdisciplinar pós-clássica, também está interessada na comunicação que abrange (ii) mecanismos não locais (intraorganísmicos, interorganísmicos, ecossistêmicos). Os fenômenos comunicacionais não locais não dependem de signos e significações em sentido estrito. No sentido semiótico pós-clássico, os signos podem atuar como gatilhos na autorregulação não local ou nos fenômenos crescentes em organismos vivos humanos e não humanos. Assim, a significação nos modelos semióticos pós-clássicos é utilizada como medida de intervenção externa e concretiza o paradoxo da causalidade sem causa (cf. WALACH,

2015b; BOGUSŁAWSKA, 2022). Expandiremos os pressupostos padrão da biossemiótica com afirmações pós-semióticas, aumentando assim o seu novo potencial e o potencial do modelo biossemiótico em geral. Tanto a biossemiótica expandida quanto a (eco)linguística expandida se unem em uma teoria coerente de que a comunicação é um processo vital.

**Palavras-chave:** Biossemiótica; Edussemiótica; Ecolinguística; Modelos pós-clássicos; Sinergia.

**Abstract:** Language and communication studies, when grounded in the 21st-century holistic paradigm (cf. WALACH 2019b), define and explore communication processes not only from the (neuro)cognitivist or formal/structural angle. A growing community of linguistic scholars are voracious to write models and seek testing methods for communication being *a life process*; both a (neuro)cognitive process and a type of organic linking/binding mechanism on all the layers of the organisation of the living world. This binding, integrating function of communication is occurring **(i)** in the biological and chemical sense, within the living organism being a biological and ecological subsystem (in the macro web of life systems on the planet); in the perspective adopted by classical biosemiotics. What we would like to indicate in this brief theoretical presentation, post-classical interdisciplinary linguistics is also interested in communication which embraces **(ii)** nonlocal mechanisms (intraorganismic, interorganismic, ecosystemic). Nonlocal communicational phenomena *do not rely on sign and signification in the strict sense*. In the postclassical semiotic sense, signs *can* act as triggers in the nonlocal self-regulatory or growing phenomena in human and nonhuman living organisms. Thus, signification in the post classical semiotic models, is used as external intervention measure and realizes the paradox of causeless causality (cf. WALACH, 2015b; BOGUSŁAWSKA, 2022). We will expand the standard assumptions of biosemiotics with post semiotic claims, enhancing thus their novel potential, and the potential of the biosemiotic model overall. Both expanded biosemiotics and expanded (eco) linguistics unite into one coherent theory of communication being a life process.

**Key-words:** Biosemiotics; Edusemiotics; Ecolinguistics; Postclassical models; synergy.

### 1. Introduction

In this moment of the evolution of the human species, members of the western cultural zone still use their (neuro)cognitive filters as the primary mental (interpreting and creative) appliance.

Modern western people perceive and can accept these elements and processes of reality to which they have some mental theoretical reference already incoded in their cognitive representations (minds). We can see what we are able to see. Our minds are our primary filters to contact our reality (inner reality and outer reality). Human language which is a cognitive/mental phenomenon – is naturally functioning as a filter, as well.

As Wittgenstein has pointed out: we cannot overcome the horizon of our language, and the concepts we are dealing with (...). The postmodern insight is that there is no absolute vantage point or view from nowhere, where we can decide about the truth or falsehood of those absolute presuppositions or assumptions about reality we make. Not even science can offer such a view from nowhere. But we can discover what consequences they allow, what horizons they open or close, what methods they entail or foreclose, and thus we can debate the usefulness of the particular set of assumptions (WALACH 2019b: 35).

Pure perception and direct cognitive-intellectual interaction with reality is not possible. Hence, any educational or intervention program to be successfully implemented needs to provide the theory first, before applicants to the new knowledge are able to notice and understand real-life benefits of what they are to learn about. ‘A paradigm and a theory are always stronger than data. (...) humans are predictive, theoretical animals’ (WALACH, 2015a: 75). Applicational programs in different domains of modern life will be implementable and acceptable by the larger public only when the theoretical, cognitive substratum is built and standardised. This is why, when scholars or educators aim to propose new models, intervention programs etc. first, they need to work out and present the theoretical/paradigmatic framework. Hence, in the present paper, we will be working towards a coherent theory rather than an empirical corpus-based study. Empirical and applicational aspects can be addressed in the subsequent stages of the research. Theory needs to go first.

The objective of the present analysis is to delineate two theoretical-applicational planes on which biosemiotic/communicational phenomena occur in living systems in the planet ecosystem. The one plane is the materialistic plane of physical objects and forms, of living systems governed by the laws of standard biology, chemistry, classical physics, and also standard communication theory. This plane of processes is scientifically scrutinised by standard biosemiotics. We outline the main tenets of biosemiotics and enumerate leading biosemioticians in section 2 of this paper, enhancing its ecumenical scope.

In addition, there is another, complementary plane that modern science recognises and investigates which is the nonmaterial plane of nonlocally related phenomena, values, potentialities and subexisting qualities. On this plane of life, communication equates *relating* and allows ‘a

binding effect’ to happen within the living matter on the planet (BOGUSŁAWSKA-TAFELSKA 2020; BOGUSŁAWSKA-TAFELSKA et al. 2021). Furthermore, communication mechanisms are hypothesised to constitute the link between the local and nonlocal levels of life systems; and the material and nonmaterial levels (ibid.). Intangible realms of nonlocality of life are identified by the postclassical physics, and for several decades now have become the focus of physical and mathematical research (cf. Walach et al. 2011a; 2011b; Plotnitsky, 2004; Penrose, 1995; 2005; Vitiello, 2001).

In this text, we look at both planes of life processes and disclose biosemiotic and communicational phenomena there. Standard biosemiotics deals mainly with the biological and chemical aspects, treating nonlocal aspects very inspecifically, although as will be shown below, (e.g. Uexküll, T.: 2001: 105; Favoreau 2007), non-local, relational aspects feature prominently in some strands of biosemiotics achievements.<sup>1</sup> In this paper we opt for comprehensive comprising both in the biosemiotic model. A concise presentation of classical biosemiotics is undertaken first. Subsequently, in the section 3 we stretch out the analytical scope by adding the post-classical layer. In our preliminary conclusions we point to possible applicational benefits of expanded biosemiotics (as co-working with expanded linguistics).

### **2. Standard biosemiotics. Biosemiotic vicissitudes: ‘A look from afar’**

Favoreau notices that

‘the resistance to studying subjective experience qua subjective experience (and not just studying the interactions of its material substrate) has a long and principled history in science – and it is precisely this history that we need to understand first if we are ever to understand how something so oddly named as biosemiotics is not only not an ‘anti-science’ nor a ‘pseudo-science’ but is genuinely a proto-science aimed at scientifically distinguishing and explaining the use of sign relations, both within and between organisms’ (FAVOREAU 2007: 4).

Each research paradigm (even the most ‘holistic’ one) is based on the adoption of certain basic epistemological assumptions. In the case of biosemiotics as well as zoosemiotics or phytosemiotics, such a broad methodological assumption is the distinction between the nature of semiosis and communication, a distinction that contributes to a broad or more restricted view on semiosis or communication. In other words, a key ontological question at stake here is what constitutes the core subject of semiotics. On the assumption that semiotics only studies

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<sup>1</sup> E.g. “all processes that take place in animate nature at whatever level, from the single cell to the ecosystem’, as ‘concerned with the sign aspects of the processes of life itself, not with the sign character of the theoretical structure of life sciences” (Hoffmeyer 1998: 82 as cited in Sebeok 2001: 63).

(human) communication, it is indeed possible to question research avenues such as biosemiotics of zoosemiotics. Nonetheless, assuming that both communication and semiosis are defined broadly (as e.g. semiosis by Charles Morris – that is, as a process in which something appears a sign for an organism,<sup>2</sup> or communication by Hoffmeyer 2014:11), as ability of living systems to read and interpret relevant signs in their environment”, then indeed, the field of biosemiotics and zoosemiotics finds its full validation (MARTINELLI 2007: 20).<sup>3</sup> In this section we propose a general outlook on some of the issues related to the biosemiotics perspective. The elaboration cannot be exhaustive within a restricted scope of an academic research paper. We will focus but on some landmark characteristics, which will be important for the rest of the discussion.

### 2.1 *Ecumenical encounters*

Biosemiotics grew out of the dissatisfaction of scholars from all walks of life with the anthropocentric and logocentric thrust of mainstream semiotics (Sebeok 2001: 61). It did not originate as a mere encounter between biology and semiotics, though, but was envisaged as “an inevitable point of arrival, on one hand for studies in biology, which are ever more aware that life consists in communication and therefore in signs; on the other, for semiotics, which, at a certain point, realizes that signs and communication belong to the whole of the organic world” (Petrilli, Ponzio 2013: 374). Hence, it is usually viewed as an emerging platform of encounter, where advances in biology could enrich the advances in research into signing activities, and *vice-versa*. Jasper’s Hoffmeyer’s definition is usually cited to bring to the fore the holistic and synergic aspect of that research school. Biosemiotics thus embraces

all processes that take place in animate nature at whatever level, from the single cell to the ecosystem', as 'concerned with the sign aspects of the processes of life itself, not with the sign character of the theoretical structure of life sciences' (Hoffmeyer 1998: 82 as cited in Sebeok 2001: 63).

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2 “In semiotics proper, the term semiosis simply means “sign action,” i.e., a process whereby a sign induces a receptive system to make an interpretation” (Hoffmeyer 2014:14).

3 We might mention here a Springer *Journal of Biosemiotics*, founded in 2008 and led by Marcello Barbieri, which is devoted to issues in the field of biosemiotics. See also thematic issues of the journal *Semiotica* [(42 (1), 89 (4), 120 (3/4), 127 (1/4)) devoted to biosemiotics and zoosemiotics.

Bearing in mind that wide foundation, as well as the assumption of going against established views, retrospective studies on the development of biosemiotics abound, contributing to continuous fine gradual elaboration of its epistemological power.<sup>4</sup>

There is general agreement that it was the student of Charles Morris, Thomas Albert Sebeok, who, being familiar both with the oeuvre of his mentor, and with that of the Baltic German biologist Jakob Johann von Uexküll, trailblazed the new path of research into signing activities, embedded within Peircean theory of signs, which he initially dubbed “global semiotics” or “semiotics of life” (Petrilli, Ponzio 2013: 376; FAVOREAU 2007: 29 ff). Admittedly, in his earlier works on zoosemiotics, as Timo Maran (2014: 3) notes, there are echoes of behavioral methodologies of e.g., Julian Huxley, Konrad Lorenz, and other etiologists focusing on studying the ritualistic behavior of animals. Yet, upon ‘rediscovering’ the work of Jakob von Uexküll, Sebeok’s research transformed into a burgeoning synergy for hosting work spanning beyond Cartesian dualism, subsuming also iatric semiotics (that is, related to the art of healing, cf. Sebeok 2001: 61).<sup>5</sup> The epistemological rotor, which has frequently been scientifically addressed from a variety of perspectives, was the dissemination and refinement of the Jakob Uexküll’s notion of *Umweltlehre* (Uexküll 1920) as Umwelt(en).<sup>6</sup>

Favareau captures that inclusive teleology concisely in his ‘personal stroll’ through that paradigm, observing that what brought together a vast array of neuroscientists, molecular

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4 Among such retrospectives we can cite in particular Favareau (2007, 2010), Martinelli (2007), Hoffmeyer, (2007), BARBERI (2008, 2010), Sebeok (e.g., 2001).

5 The latter avenue subsumes for example work of Thure von Uexküll, in which he develops a holistic model of medicine. For example, in Uexküll, T. (2001) the scholar discusses problems related to doing analytic research, especially acute in the realm of medicine. In particular, discussing the movements patterns of sea urchins (a creature that does not have a central nervous system, instead, which every spine possesses its own nerve nexus), Thure observes that the environment in which a sea urchin moves and subsists, that is, the sea bottom, becomes the integrating factor in its organization: “It seems to it (as *res communis*) that the mutual supplementary contributions of individual spines [of urchin’s body] are pooled into the total contribution of the animal, i.e., the animal and the sea bottom, ‘fit in with each other’ as parts of a whole. Both the organism and Umwelt are joined into a ‘unit of survival’ (Bateson 1985), as an aspect of the meaning-relationship ‘movement’.” (Uexküll, T. (2001: 104). Moreover, in the context of clinical patients, Uexküll, T. elaborates on the phenomena which he calls bipersonality, which can be comprehended as non-local personality. The example was two partners engaging in the activity of sawing a log. As Uexküll, T. observes, “the partners develop a sensation of ‘togetherness’, which mediates the meaning of his own activity to each partner **as part of the shared whole** [emphasis ours, M.B., M. H.-G.J]. The activities of the individuals and the resistance that the log offers as a meaning-intermediator create a unit that they call ‘bipersonality’ (Uexküll, T.: 2001: 105).

6 Sebeok’s and Jakob von Uexküll’s impact for biosemiotics is possibly the most frequently cited and the notion of ‘Umwelt’ became already a domain specific lexeme, hence this aspect will be omitted from discussion here. We might mention here a special thematic issue of *Semiotica* devoted to the oeuvre of Jakob von Uexküll - <https://www.degruyter.com/journal/key/semi/2001/134/html> , featuring 42 papers on Umwelt contributed by of major specialists in that field.

biologists, anthropologists or zoologists was “a growing disappointment with what was being offered as (or in lieu of) explanations regarding the nature of empirically observed, real word sign processes in their respective fields” (Favareau 2007: 21).<sup>7</sup> Similarly, Kalevi Kull observes that semiosis being the sign process, appears as concomitant to life. This also implies that apart from the genetic code there are many more codes already in each cell (Kull 2003: 597).

Here we arrive at perhaps the most salient feature of that paradigm, the feature which Sebeok (1979 as cited in Petrilli, Ponzio (2013: 394) called “the ecumenical scope of global semiotics”. In particular, in that version semiotics is to embrace the planetary biosphere in its entirety, while binarism is not excluded yet recognized. It implies that binarism is not assumed to be a unique characteristic feature of semiosis but a possible one, neither is it constrained to the human cultural world (Petrilli et al. 2013: 394). A comment from Favareau wraps up this thread concisely. Biosemiotics has the potential to offer to research “a flavor of the interdisciplinary convergences – and divergences – of approach to articulate a true comprehensive science *of life and sign processes*” (Favareau 2007: 41).

In the preface to the publication collecting the main achievements of biosemiotics till early 2000s, Barberi (2007) lists four schools within this semiotic paradigm and emphasizes that this field of research is based mainly on Peircean triadic relations, with the concomitant rebuttal of Saussure dyadic one. The first two schools: the Copenhagen-Tartu school (subsuming scholars such as e.g., Claus Emmeche, Jesper Hoffmeyer and Kalevi Kull) and the Prague school (Antoni Markoš) are epistemologically grounded on the Sebeok-Peirce triadic model.<sup>8</sup> The third school, developed in the 1980s in works of Barbieri himself, assumes a triad consisting of sign, meaning and *code* as the simplest semiotic system. It was elaborated basing on a substantial nano-level, so to speak, that is, clamping the cell itself is a triad (comprised by genotype, phenotype and

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<sup>7</sup> In particular, he states that “If biosemiotics has any one single constructive message to give the mainstream scientific community, surely it is precisely this: a semiotic process is not ghostly, mental, human thought process. Rather it is in the first instance, nothing more nor less mysterious than that natural interface by which an organism actively negotiates the present demands of its internal biological organization with the present demands of the organization of its external surround. And the fact that it is done incessantly – by all organisms and by us – should not blind us to the significant fact that such moment-to moment activity is always and perpetually an *enacted accomplishment* – and thus one that has to be explained if we are ever to understand the *bio-logical* side of living organisms’ material interactions” (Favareau 2007: 24). A canonical linguistic retrospective of biosemiotics from the point of view of language faculty is provided in CHOMSKY

<sup>8</sup> Sebeok enriched the Peircean semiotics model. Starting from the canonical assumption that any semiosis entails a triadic, not dyadic relationship, he insisted that interpretability is a *sin equa non* for semiosis (Barberi 2007: ix)

ribotype). The beginning of semiosis (the semiotic threshold) in that perspective does not correspond to the beginning of the interpretation (the hermeneutic threshold). (Barberi 2007: x).

The fourth approach, singled out by Barberi, is represented by Howard Patee, and is based on the concept of the *epistemic threshold*, conceived of as a border area, where local matter not only has its idiosyncratic physical properties, which are governed by universal laws, but where it also relates to ‘something else’. Epistemic matter, in Patee’s understanding, is thus a proxy for something beyond it and this relation of “standing for”, as an emergent process, inevitably leads to “a triadic Peircean relation of ‘matter, interpretant and referent” (Barberi 2014: x).

There are also other classification depending on the object of the study. For example, *endosemiotics* would focus on semiosis taking place inside a living being (intra-organic) while if the focus is on processes occurring between an organism and other beings (inter-organic) the scope is related to *exosemiotics*.<sup>9</sup> Zoosemiotics naturally would imply focusing on animal world and phytosemiotics (see e.g., Krampen 2010). Within this category we might notice a broad take represented e.g. by LINS-NETO (2022), who point out

com base em pesquisas sobre a sensibilidade e a comunicação das plantas entre as plantas —ou seja, a fitossemiótica—, que elas não somente possuem sua própria linguagem, ou seja, são capazes de comunicar seus “pensamentos”, como também dominam mecanismos para o exercício de atributos hoje em dia valorizados, como solidariedade, integração, comunicação eficiente, aceitação, resiliência e também a expansão da consciência (LINS, Neto 2022: 101).

## 2.2 Avenues for edu-semiotics

Let us now focus on implications for education. Here we might focus by means of illustrative tokens, on several aspects, as enhanced by biosemioticians. We have already seen Hoffmeyer’s thought in this section as a general epistemological support. The Danish biologist has also elaborated a refined biosemiotics theory of his own, of which stretches will be discussed below. The grounding notions which we would like to focus on are concepts of ‘agency’ and ‘scaffolding’. Assuming the agency to canonically imply “the capacity of an agent to act in the world”

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<sup>9</sup> The latter subsumes also semiotic processes ‘connected to the interpretation of abiotic markers, such as migratory birds making use of stellar configurations to trace their way. That the endo- and exo- prefixes have thus come to refer to the organismic level, i.e., the borderline around bodies, is strictly a matter of technical terminology and should not be taken to signify any privileged role in biosemiotics of this particular boundary (Hoffmeyer 2014:24). As Couto puts it, “Trata-se de uma espécie de contrato tácito. Esse compartilhamento de um sistema linguístico é um caso de macrocomunhão” (COUTO, 2013, p. 304).



(Hoffmeyer 2014: 12), the scholar pursues a question of what it means that an organism is ‘striving’. Elaborating on Darwin’s usage of ‘striving’, he points out that in the geno-centric versions of Darwinism the question of striving “is naturally absent since nobody would claim that genes, as fragments of DNA-molecules, are capable of “striving”” (Hoffmeyer 2014: 12.) Following that thought, if organisms are seen as machines programmed by genes, they cannot be striving, either, since the teleology of any machine is not inherent but built in by their constructor (like a lawnmower serves to cut the grass). So if organisms seen as machines are constructed by genes, then genes themselves must somehow be capable of agency, which is contradictory to the canonical view on genes. Hoffmeyer’s conclusion is that if we admit that natural selection is a valid factor in evolutionary process, the issue of agency can introduce additional explanatory power. Adducing examples from biology, indeed proves that agency can be attributed to organisms but only if they are defined semiotically (Hoffmeyer 2014: 12 ff). To wit,

Organismic agency implies that the activity of organisms does interfere in non-predictive ways in the outcome of evolutionary events. And since organismic activity is largely controlled and regulated by semiosis, i.e., by sign processes, then phytosemiotics, fungal semiotics, cytosemiotics, and zoosemiotics – in short, biosemiotics – should be taken as major explanatory tools in modern evolutionary theory. Indeed, it may often be the case that natural selection acts by stabilizing and fine-tuning scenarios that were already pre-established through the formation of eco-semiotic interaction structures (Hoffmeyer 2014: 13).

Another concept crucial for expanding biosemiotics into educational scope is that of the ‘scaffolding’, which Hoffmeyer actually adapts from educational theories. The term was introduced to the realm of psychology in the 1950s by a cognitive psychologist Jerome Bruner, who started to use ‘scaffolding’ referring “to any temporary framework that is put up for support and access to meaning as needed, and then taken away when the child secures control of success with a task” (Hoffmeyer 2014: 15). For the Danish biologist, scaffoldings are semiotic tools used to support children in their development (as props). For example,

The stick is a sign that means horse for the toddler and the signs on the paper refer to numerical information. Stick and characters on paper now appear in lieu of something else in reality (the horse and the figures, respectively) – and by this “translation” to another medium, we are more easily able to manipulate them. Through the appropriate motoric expressions, the stick may enter into the child’s inner story of riding, fencing, fight, etc.; while paper signs placed in a certain manner by vertical addition lead the person doing the calculation to the correct answer. The significance of things or events in this way becomes palpable – and thus “grasped” (Hoffmeyer 2014: 15).

Hoffmeyer's theory incorporates scaffolding in the semiotic perspective in the form of 'pseudogenes', which he defines as "areas of the genome that are *nonfunctional* in the sense that they are not available to the transcription process – but that nevertheless exhibit remarkable similarity to known *functional* genes in their base sequences. Unlike functional genes, pseudogenes are not expressed and, therefore, are not subject to natural selection" (Hoffmeyer 2014: 16). That move helps him reach the definition of the 'semiome' which in analogy to genomes is seen as "the entirety of an organism's semiotic tool set: i.e. the means by which the organisms of this species may extract significantly meaningful content from their surroundings and engage in intra- or interspecific communicative behavior. The semiome thus defines the scope of the organism's cognitive and communicative activity" (Hoffmeyer 2014: 16).

Final aspect which finds its relevance for the educational process is the focus on dialogical nature of semiosis, in particular bio-semiosis. As Petrilli and Ponzio point out, the phenomenon of dialogue does not get initiated by signaling sender's willingness to communicate a message. Far beyond that, they assume that the semiotic process *per se* is dialogic. Specifically, "[d]ialogic" may be understood as dia-logic. The logic of semiosis is a dia-logic, ultimately a bio-logic. The interpretant as such is "a disposition to respond," an expression that not only describes the dialogic interaction between a sender and receiver, but also between the interpretant sign and the interpreted sign" (Petrilli and Ponzio 2013: 390). On the one hand, thus a dialogue can be envisaged as semiosis, but on the other, the reverse is true, that is, semiosis is dialogue. In Thure von Uexküll's taxonomy, there are three types of semioses: i) semiosis of or signification or information, ii) semiosis of symptomatization, and iii) semiosis of communication. Each of those types, as the scholars claim, "presupposes life, a large organism of some type, or even just a simple cell, a living being, though not necessarily a human being" (Petrilli, Ponzio 2013: 390).

Now we can adduce general theory of edusemiotics, which is broadly defined as "an interface between theoretical semiotics and philosophy of education" (Yu 2017: 367), basing on the assumption that semiosis and learning (as a life-long process) are "as complementary and as co-occurring as life and semiosis are converging" (Yu 2017: 367). The meta objective of that framework is moreover aiming to reach beyond "the persistent Cartesian pedagogy, which juxtaposes mind to body, art to science, man to nature, and separates "subjective" mental processes

from “objective” forms of social organization and knowledge” (Peterson 2016: 7).<sup>10</sup> Specifically, Semetsky et al. (2016 2-3) as distinguishing features of edusemiotics, enumerate: i) the priority of process over product (important where there is focus on measurable educational outcomes); ii) capability to merge dualisms such as e.g., the afore mentioned consciousness and the unconscious, nature and nurture or mind and body, etc.; iii) embodied cognition and importance of self-formation or relational ethics; iv) attention to experiential and posthuman dimensions. We can thus see a broad epistemological formulation, aiming to reach beyond mainstream dualisms and which is meta-compliant with the exposed above biosemiotic framework.

There is another key ontological parallel to biosemiotics: just as biosemiotics, as we recall, bourgeoned as a plateau for exchange and liaising advances in biology with those of semiotics, edusemiotics also emerged to foster a community of those pursuing work within educational theories, praxis and processes “as forms of semiotic engagement, and who ask the question ‘What does semiotics tell us about education?’ alongside its reverse, ‘What does education tell us about semiotics?’” (Semetsky et al. 2016: 2–3).

Thomas Sebeok and Marcel Danesi in particular appear as a ‘bonding personalities’ so to speak, not only between biology and semiotics, but also between edusemiotics and biosemiotics. This is brought to the fore in particular by the elaboration adduced in Hongbin Yu (2017). The scholar addresses the evaluation of Modelling System Theory by Seboek and Danesi (2000) and observes that models, in a broad formulation can be conceived of as “innate ability to produce forms to stand for objects, events, feelings, situations and ideas perceived to have some meaning or purpose or useful function” (Yu 2017: 366). What follows:

the ability to make models is actually a derivative of semiosis. Defined simply as the capacity of a species, to produce and comprehend the specific types of models it requires for processing and codifying perceptual input in its own way. Semiosis is a capacity of all life forms; representation, on the other hand, is a unique capacity of the human’s species, which develops during the neonate and childhood periods (Sebeok, Danesi 2000: 5) as cited in Yu 2017: 367)

We can doubtlessly see again a parallel with the *scaffolding theory* as propounded by Hoffmeyer: *models* in that understanding, would have the function of a *scaffolding*, a tool, acting as proxy to facilitate apprehension and semiosis at a given stage.

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<sup>10</sup> It might be observed that Peterson elaborate what he calls ‘a process pedagogy’ that is envisaged as “a ternary option in order to mediate holistically between these dichotomies” (Peterson 2016: 7)

The transverse paths across bio- and edusemiotics are also evident in the aspect of dialogue, crisscross by the ‘agency’ as discussed earlier on. In a propaedeutic vein, it can be illustrated in the work of Kukkola Pikkarainen (e.g., 2016). The scholars point out that “dialogue learning, i. e., a transformation or development of the learner’s competences, takes place only in consequence or rather as an effect of learner’s own action” (Kukkola, Pikkarainen 2016: 2015). They also draft their own model of modal learning “that could lead from the biosemiotic to the anthroposemiotic sphere, and thus realize the Bildung process” (Kukkola, Pikkarainen 2016: 214). In its elaboration, the problematic is precisely the actant aspect ( agency). To wit, in the case of education theories it entails a paradox that Kant stated “How can we reconcile freedom as an aim of education and coercion as its necessary means” (Kukkola, Pikkarainen 2016: 212). Put differently, canonically we should assume the learner’s freedom in proceeding to new levels of knowledge but this is done through agency of external bodies (teachers), framed drastically here as coercion.

Resorting to biosemiotics aspect, the scholars propose to resolve that paradox assuming that the aim of education is to elevate the person being educated to the anthroposemiotic level, while developing his or her anthroposemiotic competences. Nonetheless, they emphasize that “the means of education (usually used by a more experienced person) must largely be biosemiotic” (Kukkola, Pikkarainen 2016: 214) . This led to the assumption that while learning at first takes place in the biosemiotic milieu, “pursuing Life – whatever it consists of for the specific subject – and avoiding Death is raised by education to the cultural and thus anthroposemiotic level” (Kukkola, Pikkarainen 2016: 213).

Within that briefly sketched background we could see the importance of some of the concepts canonically developed in biosemiotics as *agency*, *semiosis* and ‘*scaffoldings* in education / learning, which might lead to possibility to define learning bio-semiotically. The only epistemological divergent seem to be that while biosemiotics focusses on convergences between all forms of life in their communicative activities, edusemiotics actually explores, on the basis on convergences, the divergences, that is the question of what is actually specific about human learning processes and how can it be upgraded, taking into account insights from biosemiotics.

As can be seen from the preceding discussion, standard biosemiotics embraces a wide array of approaches. While in general scholars are in agreement in rejecting the Saussurean dyadic model for sign and instead, opting for Peircean triadic interpretation of semiosis, the exact modes and scope of relating either to semiotics or biology differ. Thus, biosemiotic studies can focus on

elaborating the compliance with Peircean theory, which seems to occupy the most prominent place nowadays, or study particular aspects of biology, etiology zoology focusing on semiosis (e.g. Farina et al. 2014). Although there is a consilient movement in the mainstream biosemiotics to reach for non-local and broad methodological assumption (as exemplified in particular, but not limited to, e.g., Kalevi Kull, Thure von Uexkull, Jesper Hoffmeier), this potential seems not to be availed of to its merited scope.

### **3. Signs that facilitate self-regulating mechanisms in living systems: one of the postclassical paradoxes**

#### *3.1 21c. holistic paradigm*

The onset of the 21st century witnesses a gradual, collective recognition of the postclassical paradigm being an expanded meta filter to reality. Strong domination of the materialistic Cartesian-Newtonian paradigm is challenged by a larger-in-scope and more effective in dealing with reception of life post-classical, post-Newtonian paradigm, which we alternatively label as 21st century holism. Both paradigms, the ascending one and the one releasing its dominance, co-build our cognitive-intellectual lens. They remain in a complementary position to each other. The Newtonian paradigm is proposed to be the special case within the newparadigmatic framework of modern holism. The upcoming postclassical paradigm starts to be present both in the way people conceptualise life; and in the methodological proposals of theoreticians of science. This study only introduces these paradigmatic topics. An in-depth, more systematic analysis of the present-day paradigmatic shift can be found i.e. in Harald Walach's *Galileo Commission Report* (2019b).

For now, the fundamental assumption in our analysis is that we treat *paradigm* not as a set of 'obvious facts of life' or 'scientific truths', but as another research parameter to be specified in the research methodology (BOGUSŁAWSKA-TAFELSKA, 2021).

'The history of semiotics in the 20th century has been influenced deeply by structuralism in linguistics, and this "semiology" is related to a similar structuralist movement in the theoretical biology (...)' (Kull, et al., 2011: 3). We notice that both mainstream linguistics, parented by F. de Saussure, and standard biosemiotics are installed within the classical paradigm of materialism, Newtonian physicalism and Darwinian biologism. Signification is the active mechanism of life on the planet and operates on forms and processes of matter. As K. Kull notices 'in biology, the

introduction of a semiotic approach has had its predecessors, among which we would like to point here to the structuralist trend. Linguistic structuralism has prepared the rise of semiotics, as biological structuralism has prepared biosemiotics. And as it seems, these two types of structuralism have had some mutual influence (...) (2011: 5).

### *3.2 (Bio) semiotics and signification in living systems of the planet Earth: a newparadigmatic extension of the theoretical model*

When a contemporary biosemiotician decides to change the basal paradigmatic ground in his/her intellectual/research work, and locate the research in the postclassical paradigm, standard definitions and understandings of signs and semiosis remain relevant. Signification involves any element of reality which acts as a sign for an organism. The prefix ‘bio’ in biosemiosis indicates that we expand the classical logocentric and anthropocentric semiosis and embrace all noncognitive chemo-biological mechanisms, falling into the general pattern of reception and response to a sign (see LINS-NETO 2022). Furthermore, bio-signification occurs at various (if not all) of the structural levels of the organism; and up and down across the structure of the living matter.

What we opt for in this concise study is the paradigmatic extension in this biosemiotic research and including the nonmaterial, nonlocal phenomena into the model. We claim that assuming that only matter matters brings serious consequences to both the scientific theory itself (it becomes incomplete with holes and inevitable tautologies); and to the applications of the theory (ineffective or low-efficacy intervention programs, i.e. in the medical domain). When considering western allopathic medicine and processes of health regulation (cf. Goli, 2016; Ofner and Walach, 2020), it is well-visible that intervention models which are based only on the proposals of the classical paradigm and analytically/theoretically located there, are suffering from disturbances and unstable effects due to the complementary (i.e. nonlocal) plane of life being neglected out of the picture but always present and actively co-participating in life systems nevertheless (cf. BOGUSŁAWSKA-TAFELSKA and Lecko, 2022). The (meta) cognitive filters which allow in certain data and block other data do not eliminate natural/life phenomena; the filters only set the limits to our perception of them.

So, once the postclassical, newholistic paradigm becomes the frame of reference in the *newsemiotic* research, it does not eliminate the standard biosemiotic models. What it does instead

is extending them by acknowledging another plane in the natural design of the living world. It adds more to the overall picture of how semiosis manifests itself, what are its objectives and effects.

A systematic analysis of how this extension of the theory/model can proceed will require a larger text format. In the present discussion we will reduce our theoretical analysis to several compact arguments, listed in the following way:

### *The classical/materialist paradigm and biosemiotics*

1. The classical materialist paradigm, operating on forms of life (mental, biological, chemical, ect.) was the ground on which (neo) structural linguistics was created in the language studies; in a similar way, it was the ground on which (bio) semiotics was born in structural biology. Both research domains study information/sign transfers and meaning making processes.
2. Classical biosemiotics involves signs of various possible forms, which operate according to the classical axes of (i) cause - effect, (ii) message - response, (iii) action - reaction.
3. In the classical model, signification is causative and even more importantly – through its activeness - signification becomes a mechanism which holds together material objects and navigates the living matter in the ecosystem of the planet. Selected models of standard biosemiotics have been presented in the section 2 of this study.

### *The postclassical/newholistic paradigm and biosemiotics*

4. In the post-classical model, what is hypothesised to hold the living world and bind all living substance at the deep, basal plane - is *communication defined as relating* (BOGUSŁAWSKA-TAFELSKA, 2016; 2020; 2021). This relating on the nonlocal plane has no formal links, does not require activation of signs, or any other communication form or structure.
5. When the analysis is carried on in the postclassical framework of the nonlocal, the function of a biosemiotic sign is not conductive or tributary to living systems. Rather, signs and signification are hypothesised to be used as triggers which can incite self-regulation of a living system (Walach, 2019a; 2015b). Signs, of any type, are external interventions (of the system itself or man as agent) to assist self-sufficiency of living systems. Thus, signs realise the paradox of causeless causation. When we consider experimental testing of this

model, the main challenge to face is the inapplicability of the standard scientific method of observation-algorithm– experimentation. In other words, the standard scientific method is based on the assumption of replicability of the processes under observation. In the meantime, postclassical semiotic interventions which trigger self-regulation, occur nonlocally; involve nonlocally correlated phenomena. Nonlocal phenomena in the research process are not replicable by nature (Walach et al. 2009: 294-296). In brief, nonlocal phenomena constitute the natural dimension of life; they occur in the living world. Their nature may be described as communicative nature. They realise the paradoxical model of causeless causation. In order to further the research into these communication realms, we need revised scientific methodology, because the classical scientific method cannot be applied here; is not suitable/applicable. It will not notice these subtle yet powerful life modes.

6. Nonlocal phenomena in the living matter of the planet, are noticed and studied by currently active scholars exploring such research themes and topics as: nonlocal mechanisms in the healing process and health regulation as studied by CAM research and integrative medical research; neurocognitive research into mirror neurons; cell biology and the research into inter-cellular, inter-tissue and facial communication; ecolinguistic communication model in the language studies; and modern holistic paradigm in the philosophy of science, to give but these selected examples.

#### **4. Towards conclusion: awaited applicational benefits in the medical domain, in education, in language and communication studies**

The recent decade in the western science has accumulated enough research into the postclassical paradigm, both theoretical and experimental, to do the scientific work within this methodological meta-frame. We notice at least three large application domains where this expanded research holds potential for the future research advancements. The expanded biosemiotic model/theory finds its natural place in these applicational domains.

##### *4.1 From allopathic, pharmacological medicine towards the integrated, holistic medicine*

The standard western-medical assumption according to which the human body is a biological machine composed of constituting parts, is seriously challenged by modern medical research.



Research and practice domains as CAM (Complementary-Alternative Medicine), the integrated medicine, holistic medical approaches, and also selected mainstream medical research approaches – adopt altogether different starting-point definitions and models of the human organism, health and the healing process (cf. Goli, 2016; Walleczek, 2000). Biosemiotic models hold central position in them, as in many of these current medical proposals signification takes part in meaning-making and, as a result, in the healing process itself. One of the proposed theoretical models in CAM is based on the idea that all signs and biosemiotic communication are activating/facilitating self-healing. Living systems are by design self-regulatory; being linear and nonlinear; local and nonlocal (WALACH, 2015b; 2019a). In such proposals, the sign gains the key role of self-regulatory enhancer.

### *4.2 Extended educational paradigm*

Teaching-learning processes, based on passing on information, on processes of giving and taking, are replaced by relating processes, where all the primary actors of the educational dyad (teacher and student) are active in their own life-long educational processes. Students whose educational history is limited as compared to their teachers’ – benefit from this shared educational experience. In the extended educational paradigm the teacher continually focuses on his/her own self-development, while for his/her students being in the role of a by-standing, helpful expert, guide and more experienced, knowledgeable advisor. Educational processes happening here are linear and nonlinear; local and nonlocal. Message exchange through signification becomes the triggering mechanism to initialize self-education processes. The school based on this expanded model becomes a mindful school (BOGUSŁAWSKA-TAFELSKA, 2015).

### *4.3 Communication as a life process*

In the ecolinguistic multimodality model of communication (BOGUSŁAWSKA-TAFELSKA, 2016; 2021; 2022) communication is defined as *a mechanism of relating in living systems*. In this proposal, communication is human and nonhuman, cognitive and noncognitive, transpersonal, situationally-derived, multilevel. This perspective installs the supralinguistic field of research, where (eco)linguistic models partner concomitantly with modern physics, cell biology, and biosemiotics. Traditional linguistic research, focused on linguistic forms (material, cognitive, sociolinguistic, etc.), reduces too much vital processing going on in communication. Apart from formal processes of sign exchange, communication processes also occur at nonlocal layers, where

there are communicational effects but no formal causes. On these nonlocal layers processes are acausal. Such a wide scope of reference naturally implies a synergistic and collaborative effort of multidisciplinary researchers working in joint research projects, which we predict will be a scientific practice in the years to come. And due to these studies many reoccurring communicational dilemmas may get unblocked and receive effective intervention models, i.e. manipulation in communication, misunderstandings and language ambiguity, interpersonal or mass communication conflicts, and other.

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