



Educating Semiosis: Foundational Concepts for an Ecological Edusemiotic

Cary Campbell¹ 

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Abstract

Many edusemiotic writers have begun to closely align edusemitoics to biosemiotics; the basic logic being that, if the life process can be defined through the criterion of semiotic engagement, so can the learning process (Stables in *J Curr Stud* 38(4):373–387, 2006). Thus, the ecological concept of *umwelt* has come to be a central area of investigation for edusemiotics; allowing theorists to address learning and living concurrently, from the perspective of meaning and significance. To address the conceptual *and* experiential foundations of the edusemiotic perspective, this paper will focus its attention on the basic semiotic processes that sustain the learner's *primary modelling system* or *umwelt*—the world of meaning and sensory engagement that the organism is immersed in. This focus enables us to identify and explore four basic principles that an ecologically concerned edusemiotic perspective can be said to rest upon; the *Iconicity Hypothesis*, the *Principle of Suprasubjective Relation*, the *Natural Learning Flow Principle*, and the *Continuity Principle*. The identification and elaboration of these basic philosophical orientations will help establish the importance and relevance of the edusemiotic perspective for educational philosophy and theory in general. This task requires the methodological framework of Sebeok and Danesi's (The forms of meaning: modeling systems theory and semiotic analysis, vol 1, Walter de Gruyter, Berlin, 2000) *Modelling Systems Theory* (MST), which; (a) provides a biosemiotically grounded approach to understanding the diversity of modelling phenomena across all species, and; (b) contextualizes the specific focus of this study within the broader forms of learning and knowing encompassed by a semiotic theory of learning. Hopefully such attention to the foundational *doctrina* of this new perspective will encourage more educational research to take what Semetsky (*J Philos Educ* 48:490–506, 2014) has called the edusemiotic turn.

Keywords Edusemitoics · Umwelt · Semiotics · Primary iconism · Indexicality · Modeling · CS. Peirce · Umberto Eco · Sebeok · Danesi

✉ Cary Campbell
clc25@sfu.ca

¹ Simon Fraser University, Vancouver, Canada

Introduction

Peircean Edusemiotics: What is It? What Does It Do?

Let it be clear from the outset, signs are not our focus here but rather; the action between signs, that is, *semiosis*. Donald Cunningham in his introductory essay to *Semiotica's* special issue on *Semiotics and Education* (2007, p. 3) made the same point: “so signs are everywhere, but they only impact us if we take notice of them in some way. Learning to take notice is the key component of an education semiotic”.¹

Edusemiotics is a growing interdisciplinary research project that explores the relevance and possibilities behind understanding the doctrine of signs as the philosophical foundation for learning theory and educational philosophy (Stables and Semetsky 2015; Stables et al. 2018). People who study edusemiotics are joined by one central orientation: *they conceptualize learning as semiosis*, that is, as a signification process mediating learner and environment, and thus use this understanding of learning-as-semiosis to think about and practice education. Edusemiotics provides an integrated and “transdisciplinary” (Deely and Semetsky 2017) theoretical approach that can help educators and researchers ‘take notice’ of important aspects of learning that are difficult to express in our dominant explanatory systems. But take notice of *what* exactly?

In a nutshell, many theories of learning cannot account for the role of: *un-actualized potential*, nor; anticipatory *teleological* processes. Thus, learning often gets reduced to either; (a) the attainment of psychological states *inside* the mind-brain of the learner, or; (b) in the processing or *computing* of (conventionalized) symbolic representations. Often, both these orientations are present simultaneously, and what we end up with is a confusing mix of constructivism and behaviourism, interpretism and positivism.² Such a cocktail of contradictory forces has been detrimental to the pragmatic contributions of educational philosophy generally (cf. Carr 1997; Stables and Semetsky 2015, Ch. 3; Campbell 2018c).

A growing body of educational research that looks to CS. Peirce’s categorical semiotic philosophy has emerged to address some of these conceptual deficiencies. The strength in Peirce’s semiotic philosophy is precisely that it is triadic and non-duelist. It sets out to explain and conceptualize relation itself as an ontological modality. That is to say, that the theory of learning implicit in Peirce’s semiotic (see Olteanu 2015) will not locate learning within *ens rationis* (mind dependent reality), nor in a learner’s ‘competence’ in ‘processing’ an external *ens reale* (mind independent reality). No. The event of learning always occurs in the complementarity and interaction of the learner to their environment; in the specifically triadic mediation of observer, the observing, and the observed. This interaction

¹ For some recent introductions to edusemiotics, see Noth’s (2010) thorough literature review; Semetsky’s (2010) edited anthology outlining various approaches to edusemiotics from leading authors (of which Noth’s article is included); see also (Strand 2013; Olteanu 2015; Campbell 2016, 2017, 2018a, b, c) for the relevance of Peirce’s categories for philosophy of education; as well as the recent handbook (Semetsky 2017). The term edusemiotics was coined by Danesi (2010) in the forward to the above-mentioned volume edited by Semetsky. The co-authored book “Edusemiotics: Semiotic Philosophy as Educational Foundation” (Stables and Semetsky 2015) has quickly emerged as a foundational text for this new research project. For more on the essential points of edusemiotics see the recent interview with Inna Semetsky (Semetsky and Campbell 2018) and “A Short Introduction to Edusemiotics” (Olteanu and Campbell 2018).

² Cf. Cunningham (1988, 1998), and Shank (2008), for more on the implications of this methodological confusion for educational research, and the role semiotics can play in addressing this confusion. See also the special issue on “Data” from the journal *Cultural Studies* (Vol 13, issue 4, 2013).

constitutes the *pedagogical event* that edusemiotic pedagogy orients itself toward. This is a step beyond substance dualism and the principle of non-contradiction (*this* is this because it is not *that*), to recognize the logic of the included (rather than excluded) middle (*this* is always becoming *that*), and its implied ontology. This perpetual emergence and unlimited growth potential that is characteristic of educational processes, is conceptualized through the action and growth of signs (semiosis), presented to us in terms of a theory of unlimited semiosis (cf. Eco 1979).

At the centre of this conceptualization, is the enlarged *tripartite* conception of experience as offered to us by Peirce's categories of firstness, secondness, and thirdness.

First is the conception of being or existing independent of anything else. Second is the conception of being relative to, the conception of reaction with, something else. Third is the conception of *mediation*, whereby a first and second are brought into relation... Feeling is First, sense of reaction Second... the tendency to take habits is Third. Mind is First, Matter is second, Evolution is Third (CP 6.32 1891; emphasis added).³

Much of the (Peircean oriented) Edusemiotic research of the last two decades suggests that one of the main applications of these categories for education is that they offer the ability to describe and understand learning without operationalizing it and reifying it from its experiential origins. Learning-as-semiosis is a form of conceptualizing *continual emergence*, and thus goes beyond what is reducible and describable through philosophical or mathematical reductions. Learning-as semiosis, must account for the reality of:

1. "a domain of mental structures and processes which influence experience, thought, and action outside of phenomenal awareness and voluntary control" (Stables and Semetsky 2015, p. 21), hence the focus on Peircean concepts like abduction and firstness (cf. Semetsky 2005; Stables and Semetsky 2015, pp. 16–30; Campbell 2018a, c);
2. The "forceful, dyadic consciousness of 'resistance'" (Strand 2013, p. 754; Colapietro 2013; West 2015; Campbell 2016; Noth in Stables et al. 2018, Ch. 5) to new learning (secondness), as well as;
- 3) The growth and generativity that results through mediation; a first coming into relation with a second—this is the growth of habits that beget future habits. This is what underlines pedagogical growth (in the Deweyian sense) and learning itself (Strand 2013; Affifi 2014; Campbell 2017; Noth in Stables et al. 2018, Ch. 4) representative of the category of thirdness and the process of semiosis in its full estimation.

Finding Our Foundations

Many edusemiotic writers have begun to closely align edusemiotics to the biosemiotic research project; the basic logic being that if living biological processes can be defined and understood through semiosis, so can learning (cf. Stables 2006; Olteanu 2015; Campbell 2017). As more and more Edusemiotic research connects its agenda to biosemiotics, and because biosemiotics has followed in recent years a predominantly Peircean orientation, much edusemiotic research follows or adheres to a Peircean triadic philosophy. However,

³ The abbreviation "CP", as per convention, refers to the 8 volume *Collected Papers of Charles Sanders Peirce* (1931–1966). The numerals represent volume and paragraph, respectively.

it would be misguided to assume that *all* edusemiotic research is inherently Peircean, nor necessarily seeks its philosophical guidance from the Peircean canon. In fact, much research in edusemiotics (including some of the work of the two main edusemiotic scholars Andrew Stables and Inna Semetsky) seeks and explores many non-Peircean perspectives. Just a look at the new Routledge volume *Semiotic Theories of Learning* (Stables et al. 2018), presents a diverse and rich field of influence, with at least two of its five authors presenting semiotic conceptions that draw prominently on non-Peircean ideas (Eetu Pikkarainen and Sébastien Pesce).

In this article, we will be more specifically treating the conceptual foundations of Peircean edusemiotics *in particular*, not assuming in the least that all edusemiotics is inherently Peircean. More specifically, we will be following Olteanu's (2015) approach of extracting and developing the *philosophy of learning* that is implicit in Peirce's semiotic.⁴ Taking seriously Biesta's (2016 [2013]) important caution about not reducing *philosophy of education* to a *philosophy of learning* (something much edusemiotic research could potentially be charged of) we must remember that this orientation towards understanding the dynamics of learning on a bio-semiotic level, is always performed in the service of imagining future possibilities for informal and formal educational networks and programs. Understanding all learning and living as semiotic engagement presents us with

the possibility for “liberating the concept of learning from the domain of education, and rethinking education as a system or a program that works in the service of learning” (Olteanu and Campbell 2018). This orientation suggests a more ecologically and biologically minded approach to education that resists separating humans from animals, culture from nature, recognizing that because “[l]earning is continuous, occurring in every life form... any Umwelt has educational potential” (Olteanu 2016, p. 586). (Olteanu and Campbell 2018, p. 254)

We can say then more specifically, that this article is also a study into the dominant conceptual frameworks of a *biosemiotics informed edusemiotic*, and not solely a Peircean one.

Perhaps the most important non-Peircean idea explored in this study is the ecological and biosemiotic concept of *Umwelt* (the organism's phenomenal world, as opposed to the more static designation, environment). Umwelt philosophy has come to be a central area of investigation for edusemiotics; allowing theorists to address learning and living concurrently, from the perspective of how an organism *discovers* (not constructs!) meaning and significance in a dynamic and changing environment. This article will focus primarily on the basic semiotic processes that sustain the learner's *primary modelling system* (or *umwelt*). This is the world of meaning and sensory experience that the organism is immersed in. Not the world as it is, the hypothesized *ens reale*, but rather, the ontologically *real* phenomenal world of the learner.

This focus enables us to identify and explore four basic hypotheses' (all previously explored and elaborated upon) that a Peircean informed edusemiotic perspective can be claimed to rest upon. These are:

- a. The *iconicity hypothesis (IH)*;
- b. The *natural learning flow principle (NLFP)*.
- c. The *continuity principle (CP)*

⁴ For more see the conversation between Campbell and Olteanu; <https://philosophasters.org/blog/2017/11/8/an-interview-with-alin-olteanu-education-signs-and-the-history-of-ideas>.

d. The *principle of suprasubjective relation (PSR)*;

The identification and elaboration of these basic philosophical orientations will hopefully help further establish the importance and relevance of the intertwined bio-semiotic/edusemiotic perspective for both educational theory and practice.

I will argue that this task requires the methodological framework of Sebeok and Danesi's (2000) *Modelling Systems Theory* (MST), which: (a) provides a biologically grounded methodology to understanding the diversity of modelling processes across all species, and; (b) contextualizes the specific focus of this study within the broader forms of learning and knowing encompassed by a general semiotic theory of learning.⁵ This reach across species is important, for it is emblematic of the continuity principle (CP), which rejects on pragmatic grounds, essentialist distinctions between humans and non-humans; but also mind from matter, and body from mind.

Hopefully such attention to the conceptual foundations of this new edusemiotic perspective will encourage more educational research to take what Semetsky (2014) has tongue in cheek referred to as 'the edusemiotic turn'.

Alignment with Modelling Systems Theory and Peirce's Categories

Peirce hypothesized that forces in the universe progress from states of chance indeterminacy (firstness), to states of total generalization and interconnectedness (law, thirdness). He concurrently described this as the growth of relation itself, and thus a form of evolutionary and cosmological love (Rose 2016; Campbell 2017, pp. 9–12). Although his grand cosmology is not verifiable a priori, this categorical progression has shown to possess relevance in recent studies into human development and cognition.⁶

In a series of recent papers (2016, 2017, 2018a, b, c) I have attempted to show the usefulness Peirce's categories can have for re-conceptualizing educational praxis and theory. The experiential basis of these studies comes from my work over the last 10 years as both a music teacher and educational researcher. Following these experiences and reflection, it is my belief that education, to: (1) align itself with the way we actually learn in the world, and; (2) to create ethical and responsible humans who carry *pragmatic beliefs*—"that upon which a [hu]man is prepared to act" (Peirce, CP 5.12)—must come to embrace what Danesi (1998: 61) calls the *Natural Learning Flow Principle (NLFP)*.

This principle refers to the flow of semiosis within ontogeny, and rests upon the recognition that human sign use begins with the senses and in the body—hence Danesi's (1998) apt title *The Body in the Sign*. This principle rests upon a central tenet of MST called the *Sense-implication Hypothesis* (SIH); the "view that all modelling is initially guided by sensory processes" (Sebeok and Danesi 2000, p. 199).

The *sense-implication hypothesis* (SIH) posits that all sign-making efforts are initially grounded in the experiential realm of the senses. In this conceptual framework,

⁵ Cf. Eco (1984, pp. 1–13) for the distinction between general and specific semiotics. See Stables et al. (2018) for more on semiotic theories of learning.

⁶ See, for example, the cognitive/ontogenetic perspectives of Zlatev (2009, 2013), Zlatev and Andrén (2009) and West (2015, 2018). Noted is how this research in cognitive semiotics and cognitive linguistics generally notices and observes a consistent developmental progression from firstness to secondness to thirdness, or iconic modelling to indexical modelling to symbolic modelling. These more empirical (clinical) studies continue to deeply inform edusemiotic conceptualizations.

semiosis is considered to constitute a transformation of bodily experience, converting the external world of the senses into an internal one of representation (Danesi 1998, p. 17).

The NLF principle follows from the acknowledged sensory beginnings of semiosis, asserting that the child proceeds from a stage of:

- *iconically* modelling their environment (that is, simulating the referential domain *internally*: forming “mental images” of a referential domain that is *isomorphic* with pre-existing internal structures and processes); to a stage of
- *indexical* modelling: *extending* this basic iconic competence into the environment through acts of deixis and ‘indicative’ mimesis—visual, gestural, and aural); to finally,
- a stage of *symbolic* modelling: using socially-verified (and thus conventionalized and stipulated from specific contexts of occurrence) sign systems to cognize referential domains).

This flow from **iconicity–indexicality–symbolicity** mirrors the progression, within the human use of signs (anthroposemiosis) of **primary modelling–secondary modelling–tertiary modelling**:

Primary modelling, for instance, is “knowing through simulation”. Secondary modelling is “knowing through extension and indication”. This implies that the SMS does its handiwork, by and large, after the PMS has completed its own, in a manner of speaking. Further extensions of forms lead eventually to highly abstract, symbolic (tertiary) systems of representation. The PMS is the default system, while the SMS and TMS respectively are extensional systems... (Sebeok and Danesi, p. 167)

Modelling Systems Theory is applied not only to human ontogenesis, but also towards species-specific modelling behaviour generally; the *forms of knowledge* that determine how an animal knows something, and the ways in which these forms are represented (internally and externally). As we will discuss further in Sect. 3, this approach to learning finds its origins in ethology and the “Umwelt theory” initially developed by Jacob von Uexkull (1957[1934], 1982[1940]). In terms of Peirce’s categories, this is equivalent to the progression from Firstness (indeterminate sense impressions/qualia, as yet atemporal and unrelated to anything) to Secondness (the dynamic ‘imprinting’ of these impressions acting/resisting upon an organism’s sense perception, in space and time) to finally, habitual modes of perceptual action and reaction with the environment (thirdness).⁷

We can in fact say that Modelling Systems Theory corresponds *grosso modo* to Peirce’s categorical outline, enriching the significance of this theoretical alignment for edusemiotics:

The child’s earliest strategy for knowing an object with his or her senses is, in fact, a *firstness* strategy. The modeling system that translates firstness sensory forms

⁷ The following outline from Sheriff (1994, p. 2) is useful in conceptualizing some of the prominent dimensions of each category:

Firstness, Secondness, Thirdness;
Possibility, fact, law;
Quality, reaction, symbol (representation);
Feeling, effort, habit.

into models is the *primary modeling system* (PMS). The PMS can be defined as the instinctive ability to model the sensory or perceptual properties of referents. Needless to say, Peirce referred to this process as iconicity. The child's subsequent attempts to refer to the object through vocal imitation and/or manual indication constitute a secondness knowing strategy. The modeling system that guides these attempts is the *secondary modeling system* (SMS). The SMS can be defined as the capacity to refer to objects with extended primary forms and with indexical (indicational) forms. Finally, in learning to use a culture-specific name to refer to an object, the child is engaging in a thirdness form of knowing. His or her ability to do so is dependent upon the *tertiary modeling system* (TMS), which can be defined as the capacity to acquire and utilize the symbolic resources of culture-specific abstract systems of representation (Sebeok and Danesi 2000, p. 10).

Peirce's categories, and his general theory of signs, give educators and educational researchers the means to talk about and conceptualize aspects of the learning process that our not easily addressed, for they occur existentially prior to full intentional/(cognitive) awareness. However, to consider the categories *experientially*, and not metaphysically, involves recognizing that firstness is by its nature inaccessible to our conscious awareness (once we cognize it, it is gone). In fact, firstness is the pure possibility of the cognitive process (cf. Eco 2000). To *learn from* our unknowable first impressions is to realize these impressions as acting upon our senses (and thus already within the realm of secondness) and to relate these impressions to the continuity of our experience in the unfolding present. This is because all conscious awareness takes place necessarily within the realm of thirdness—our established ways of inhabiting (or being in-habit with) an *umwelt*.

This is to say, that although the PMS can be considered a firstness 'strategy', it is not strictly equivalent to that singular atemporal totality that constitutes firstness on an experiential level. What is generally called 'cognition' seems to occur exclusively in the realm of thirdness, however, it is only through mindful attention to what I have previously called the *palimpsest-nature* of experience (cf. 2016, 2017, 2018a, c)—to the aesthetic bedrock of firstness and its embodied realization in secondness—that we can create students receptive not to subject matter or knowledge content, but rather, to the various shades and dimensions of the learning process itself. Strand makes this same point by saying authoritatively that "(t)hirdness is learning" (2013, p. 795). She quotes Peirce who explains that:

'Thirdness essentially involves the production of effects in the world of existence,—not by furnishing energy, but by the gradual development of Law' [(Peirce 1903[1998], p. 271)]... So, in addition to the immediate, incommunicable perception of the qualities of 'pure presence' (firstness) and the forceful, dyadic consciousness of 'resistance' (secondness), thirdness entails 'learning', or 'the felt sense of personal transformation (of acquiring a new habit or at least of having one's present habits strengthened, refined, or in some other way modified)' (Colapietro 1999, p. 23). Thirdness contains firstness and secondness, but it is by no way reducible to the two.

Because of this non-reducibility, we must replicate this tripartite nature of experience in educational settings, for it is this progression that encapsulates the natural flow of learning-as-semiosis, and thus [informed by Sebeok's (2001) 'global' semiotic perspective] the progression and flourishing of life generally (Fig. 1).

As noted by many (cf. Danesi 1998; Ponzio 2002; Petrilli and Ponzio 2005, pp. 223–230; Campbell 2016; Yu 2017) one of the main offerings Sebeok's MST brings to education is the understanding that "the semiotic capacities of the learner...—rather than

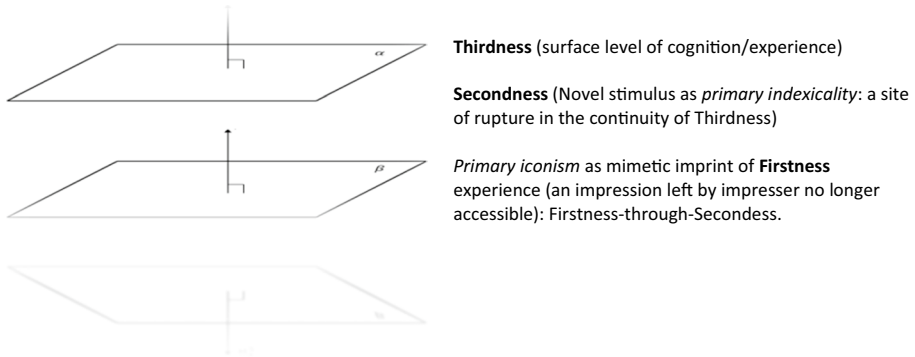


Fig. 1 The *palimpsest* nature of the categories (we will be directly and indirectly referencing this schema throughout)

the subject matter to be learned—should be the focus of education” (Danesi as cited in Petrilli and Ponzio 2005, p. 229). It is in this sense that we can understand Petrilli and Ponzio’s (2005, p. 229) assessment that “the main implications of Sebeok’s modelling theory for education is of a *methodological nature*”. I would also add, following Yu (2017), that this is also one of the central contributions that edusemitotics (as a new research program) brings to educational philosophy: a re-orientation and re-considering of the philosophical foundations of education.⁸

Learning is, in some sense, always being deferred and never occurring in a single moment of space and time. It is this constant deferral (and an inability to conceptualize it) that leaves the concept vulnerable to obfuscation by political or ideological interests (as Beista (2016[2013]) argued persuasively). This failure to locate learning, or rather to reduce learning to a set of repeatable circumstances and structures, functions to operationalize the concept; turning it into little more than an accountability tool. Peirce’s triadic account of consciousness does allow us to, in some sense, ‘locate’ learning in the perpetual ‘opening up’ of virtual potentialities (Firstness’); for its capacity to account for *emergence*.⁹ Such a relational account, recognizes an “ontology that asserts the reality of potentialities not yet actualized, as Firstness” (Stables and Semetsky 2015, p. 24). This allows us to explore an aspect of learning consistent with what Dewey associated with pedagogical growth (see Dewey 1916); as the growth of habits that enable future habit making. In Peirce’s phenomenology (which he called *phaneroscopy*) this is expressed by the emergence of Firstness (the possible) through a rupture in our habitual modes of being-in-relation to the environment (Thirdness). This rupture is ‘felt’ by the learner through the encounter with resistance (the ‘*indexical rub*’, cf. Campbell 2016), where anticipated models fail to fully account for the fullness of experience; this constitutes a ‘Firstness event’ (Campbell 2018a).¹⁰ All in all, category theory approached phenomenologically (and not metaphysically), presents

⁸ As noted in particular by Olteanu (2015), there is a strong historical case for the connecting of educational philosophy and semiotics, which is evidenced quite clearly, by the fact that the book that is often considered the foundational text of liberal education and the foundational text of semiotics are shared in Augustine’s *De Doctrina Christiana*. The first lines in this ancient text reveal this deep historical tie: “learning concerns either things or signs, but it is through signs that we learn what things are” ([397AD], book 1, line 2).

⁹ Cf. Rose (2016) for more on the Peircean notion of emergence.

¹⁰ Eco (2014, p. 514) explains this aspect of Peirce’s categories: “The emergence of Firstnesses through their being opposed to one another (Secondness) starting from the regularity of the habit (Thirdness) for Peirce is an event (CP 6.200), i.e. a singularity, a point at which something occurs... In this way the spon-

us with non-reductionist learning theory that can account for indeterminacy, riskiness, uncertainty, and openness; all of those essential educational qualities as argued by Beista (2016[2013]) in his important book “The Beautiful Risk of Education”.

Structure and Method

Now with our basic theoretical orientation of edusemiotics clarified with its alignments to biosemiotics and MST expressed, we can explain more directly the objectives for this study. My task is twofold:

First, to address how signification processes emerge on what anthropologist Michael Ling (personal correspondence) refers to as the *bio-existential* level. The focus of this first line of inquiry is the basic components and processes involved in the *emergence* of the perceptual process; that is, the *terminus a quo* of finite semiosis (semiosis in the organism) and thus also the emergence of embodied sense-based learning. These are (proto¹¹) semiotic process that help to explain how our initial sensory impressions (firstness) are realized through a process of *adaptive fallibilism*; their resistance and impression upon an organism’s perceptual system. This is fallibilism as expressed by the coming-into-being indexical interaction of secondness: how a primary iconism is only realized through a primary indexicality (that takes the form of a ‘*shock*’ towards sign re-collection and re-cognizing). This self-sustaining (and auto-poeitic) process of realizing the iconic properties of the environment through indexicality, forms the basis of *pre-conceptual sensorimotor perception*, that is, the organisms processing of its *umwelt* through its internal structures (*innenwelt*) in a circular feedback loop (see Fig. 3).

My **secondary** task will be to draw out several fundamental principles from this analysis that a Peircean theory of learning necessitates (the above mentioned **IH**, **PSR**, **CP**, and **NLFP**). To reiterate, my goal will be, not to explain the extensional modelling systems in any significant detail (the SMS and TMS respectively), but rather to address the main concepts and principles that can help educational researchers address the fundamental aspects of perceptual engagement, representative of what we are here calling the *proto-semiotic sustinment of umwelt*.¹²

By narrowing our focus to the basic conditions *that make perceptual learning possible*, we can hopefully gain insight into some of the central claims of edusemiotics. Only through such careful attention to *beginnings* can we, as Danesi (2010) says, help create “a veritable edusemiotics for the future” (see also Campbell 2018c).

Footnote 10 (continued)

taneity of Firstness, whose irregular and singular nature Peirce underlines (CP 6.54) turns out to be nothing other than an infinitesimal deviation from the law and from the regularity on whose basis it is produced (CP 6.59)”.

¹¹ “Proto”, as this is not yet a genuine triadic interaction, we are still at the footholds of genuine thirdness; there is only the *possibility* of future mediation. Cf. Eco (2000, 2014, pp. 508–530).

¹² This model is in several ways a synthesis of Neshier’s (2001) model of abductive perception and learning, and the Vichean model of mind presented in Danesi (1993).

Proto-semiotic Sustainment of PMS

The Primacy of Iconicity in Learning

Many edusemiotic writers (myself included) have followed what has been called the iconic turn in semiotics, largely following a new reading of Peircean ideas presented in Eco's (2000) *Kant and the Platypus*. Olteanu (2015, p. 76) has articulated this orientation cogently, saying "icons are the signs that afford learning, all signification having an iconic ground." This is obvious in everyday teaching and learning situations. No two people learn something in the same way: A trumpet student who knows basic piano will possess a very different relationship to harmony, then one who does not; a physics student learning about the concept of *force* who knows how to swim, will have a very different relationship to this knowledge than another student who doesn't, etc. Olteanu (2015, p. 75) clarifies:

What happens when learning, is that structures of signification (what needs be apprehended) have to settle on already existing structures of signification: a learner. In their interaction, these signs will find their own compatibility and the probability for this to happen in the same manner in two different cases is too small to be considered.

Within a Peircean informed edusemiotic, both individuals and generals are admitted to have causal efficacy. The 'general' idea of some-*thing* is recognized as real, in the sense that this materially absent idea impacts upon our actions and responses in the phenomenologically 'real' present. This is to assert the reality (and in fact the *causality*) of teleology itself (or what Aristotle called final cause). From this we can better understand our nominalist leanings in popular learning theory, which whatever (more or less) materialist or (more or less) behaviorist, are distinctly dyadic, thus giving way to determinist explanatory frameworks. Thirdness—or the growth of interpretants and thus the growth of action-possibilities—occurs in perceptual learning to mediate between the processes of qualification (firstness) and sense-impression (secondness): *to mediate the potential becoming actual* in our experience.¹³ It is in this sense that we can understand learning in the Deweyian sense (1916) as "the formation of habits that will engender a [future] receptiveness to novelty" (Campbell 2017, p. 17).¹⁴ Learning in this understanding is expressed in an *anticipatory dynamic* (Nadin 2009, 2010, 2014, 2017), where the anticipation of a future state changes and mediates the learner's relation to the present as well as the past.¹⁵ Education understood through

¹³ "We only know the potential through the actual, and only infer qualities by generalization from what we perceive in matter" (CP 1:429).

¹⁴ Affifi (2014, p. 76) explains in the context of his "biological pedagogy": "For Dewey, growth occurs when possibilities open up for an organism, thereby "enhancing its ability to participate in its environment" (Gouinlock 1972, p. 238). It is the process of developing habits that allow the organism to interact more spiritedly, responsively, and openly to arising circumstances. By contrast, a lack of growth limits possibilities of encounter, as the organism relies on preformed habits that stultify, ossify, and close it off to novelty... growth is predicated on habits that enable future habit-forming, whereas the restriction of growth occurs when existing habits monopolize the operational domain" (see also Dewey 2004[1916], pp. 44–48). Aligning this understanding with Eco's (1962[1989] pre-semiotic poetics of openness, we can say that this is an aesthetic-oriented philosophy of education, in the sense that we locate learning in the aesthetic pleasure and sensibility involved in this perpetual *opening* to future semiotic unraveling (cf. Campbell 2018b).

¹⁵ I have aligned the science of anticipation to edusemiotics in depth elsewhere (Campbell 2017).

such a triadic philosophy, consists in the deliberate cultivation of this anticipatory response and mindset. Such an account of learning involves the ability to conceptualize oneself as a semiotic entity, as a sign in a process of continual unfolding (cf. Olteanu 2015, p. 74), undergoing continuous growth simply as being part of the life-process. Teaching then from an edusemiotic perspective is not about finishing things off, or closing and solidifying a worldview, but rather about a continual opening-up to a future not yet determined; and the *school* itself can be imagined as a place of continual and sustained suspension, where this form of semiotic emergence can occur (Masschelein 2010; Stables et al. 2014).

What we can call the primary modelling capacity in the organism/learner, is, in its most basic description: *a basic iconic/mimetic attention to the environmental surround* as expressed in perceptual action and emergent patterning. This has been referred to simply as the iconicity hypothesis (Danesi 1994, 1998). This is the process by which an organism, through continuous acts of semi-instinctual and mostly pre-conceptual inference produces and emits models (in the form of meaning-bearing sign vehicles) to adapt to dynamic environmental conditions. Edusemiotic analysis has shown that this basic level of receptivity can be expressed in educational discourses by adopting *abductive models of learning* (Nesher 2001; Shank and Cunningham 1996; Shank 2008; Semetsky 2005; Stables and Semetsky 2015, pp. 16–30; Campbell 2018a), in place of common (in theory and practice) deductive and inductive models, which are generally characteristic of information processing (as well as banking) models of learning.¹⁶

How Mind Emerges from Matter¹⁷

Iconicity provides the very foundation for understanding how semiosis and learning can be conceived as co-extensive and is thus one of the central concerns of edusemiotics. All my examples so far have focused on how iconicity functions through organisms. This is in line with the broadly ethnological and zoological aims and history of MST. However, I want to argue that we can better understand the educational significance behind the *iconicity hypothesis*¹⁸ by understanding how and in what ways these processes are first operative in the physical world. To demonstrate this, I will adopt the approach to Iconicity outlined by Thom (1973) and elaborated further by Sebeok (2001[1994]).

First, let's consider how icons frequently occur in the natural world: the result of an effector system *imprinting* a replica of itself upon a receptor system. Consider the following examples, all first presented by Thom:

a person's shadow,
a shape reflected in water,
a footprint in sand.

¹⁶ Abduction is, at its basis, a process that *extends* iconic forms outwards into the environment; “abduction transforms overall iconic structure into overall symbolic structure” (Pearson 2017, Sect. 1.5).

¹⁷ I am of course referencing the subtitle of Deacon's (2011) seminal (bio-semiotic informed) work *Incomplete Nature*.

¹⁸ The IH rests on the NLFP; the understanding that all indicational (indexical), and extensional (symbolic) modelling is rooted in primary (iconic) forms that stem from the organism's sensorimotor perception.

In the first two examples the image is impermanent, based on a temporally fleeting specular model. It is a copy that is dependent upon the immediate presence of the effector under specific environmental conditions. However, in the third example, the receptor system possesses a degree of (what Thom calls) *plasticity*, which enables the footprint to not simply disappear once the impresser as come and gone. We can say, that the stimulus has *transformed* the receptive system in some way. "The formative stimulus alters the equilibrium of the receptor system when impressing the shape of the model; here the image becomes a memory trace (Sakitt 1975)" (Sebeok 2001 [1994], p. 112). The dynamic process involved in the imprinting of this iconic *caste* from effector to receptor is what Thom refers to as *competence*. Competence requires models to make a "irreversible temporal interaction"; without such an ability to persist through time there is little or no possibility of the future attribution of semiotic value. And Peirce frequently emphasised, Semiosis always requires time.

These examples of dyadic (or mechanical) iconicity provide a proto-semiosis window into the thoroughly triadic (teleological) processes displayed by living biological systems. According to a Sebeokian/Thomian view, life itself is the result of such *primary iconism*:

A living being L fabricates at some temporal remove, another living being L[^], L[^] will soon supplant L. Thom claims that this feature of plasticity activates the genetic code, giving rise to a self-replicating, mutable molecular system that is also environment-sensitive... It becomes particularly plain in embryological development, which may be among the most dramatic forms of iconization: it is nature's design for unfolding the growth and differentiation of a structure isomorphic with the parent by virtue of a spatial-temporal translating operation (Sebeok 2001[1994], p. 113).

As explained in the introduction, largely thanks to the bridging and pioneering work of Thomas Sebeok, the edusemiotic project and the biosemiotic project are coming together. Considering instances of primary iconism in both physical and biological processes *alike* brings us closer to understanding the enormous implications of this theoretical alignment for educational philosophy, specifically in orienting us towards a more pansemiotic and philosophically *synechist* perspective, discussed in this study as the Continuity Principle (CP).¹⁹

¹⁹ Peirce's *synechism* is the doctrine that mind and matter cannot be logically considered distinct from one another. It has emerged as central to the edusemiotic orientation. Esposito (2007) has summarized the essential points of synechism, with reference to the Peircean corpus:

- (1) "the doctrine that all that exists is continuous" (CP 1.172);
- (2) the rejection of atomism and the existence of ultimate elements;
- (3) the view that continuity of being is a condition for communication (CP 7.572);
- (4) the view that to exist in some respect is also to not exist in that respect (CP 7.569);
- (5) the view that "all phenomena are of one character" consisting of a mixture of freedom and constraint that tends in a teleological manner to increase the reasonableness in the universe (CP 7.570);
- (6) the view that consciousness has a bodily and social dimension, the latter originating outside the individual self (7.575);
- (7) "the doctrine... that elements of Thirdness cannot entirely be escaped" (CP7.653);
- (8) a theoretical synthesis of pragmatism and tychism (the doctrine that chance events occur);
- (9) the fallibilist view that our scientific facts are continually subject to revision;
- (10) "a purely scientific philosophy [that] may play a part in the onement of religion and Science" (CP 7.578).

Iconicity in Perception and Development

To illustrate and motivate the foundational orientations of edusemiotics, we may carry Thom's theories of iconicity to the other end of the ontogenetic ladder; to the phenomenon of perception. At this level of analysis, we can form a more adequate account of the basic requirements of perceptual-learning, here "regarded as a modification of dynamic competence by the sensory impact of external reality...". Sebeok (2001[1994], p. 113) offers further clarification of this definition, reiterating the *Sense Implication Hypothesis*:

Any competent system, for example, the mechanical and hydrodynamic components of cochlear partition and the acoustic cortex, or the retina and the visual cortex, etc., rapidly recovers its percipient virginity, indispensable for total and permanent competence, while its plastic faculty guarantees that the sense impressions remain stored in [some form of] memory.

Following this account of iconic competence, we can now say that, for a minimal threshold of learning (as transformative growth) to occur *the receptor system must in some way be transformed by the effector system. This transformation occurs through the receptor systems plasticity and dynamic competence, which is essentially the learner's basic capacity to adapt to and assimilate novel stimulus-patterns.* As I have shown elsewhere this can be understood as a re-iteration of a central Piagetian axiom, expressed here by John McManus, that, "For transformation to occur dis-adaptation in some form must occur in the attempted match between internal structure and its environment" (in d'Aquili et al. 1979, p. 196). This is almost paradoxical when made to conform to current materialist frameworks, as it implicitly says, that for learning as semiotic growth to occur, the modelling relation must *not* be completely determined, but rather involve a minimal threshold of dissimilarity, or isomorphism, as Sebeok specified above.

What is additionally made clear and emphasized by Thom's descriptions of iconicity, is that this transformation occurs *only* to such a degree that the organism is *capable* (that is competent) enough to absorb and integrate the iconic imprinting with its existing internal structures (innenwelt). Thus, such primary iconicity is deeply tethered and dependent upon forces of indexicality (the effector cue) and is in fact only realized through the dynamical imprinting of iconic forms *upon* a receptor system. It is in this sense that we can follow Sebeok and Ayer in insisting that "there are no pure iconic signs; in fact, 'no actual sign is an icon' (Ayer 1968, p. 140)" (Sebeok 2001[1994], p. 110), another prominent reminder of that central aspect of Peirce's categories we just mentioned, that "firstness can be precinded (logically) from secondness but cannot occur in its absence" (Eco 2000, p. 190).²⁰ Iconicity and Indexicality are deeply tethered in sense perception; and it is only the synthesis of their interaction that ensures the conditions for the subsequent creation of habits of perceptual action that form the basis for symbolic forms.²¹

²⁰ See also Ransdell (1979, p. 59).

²¹ Within the domains of neuro-anthropology this has been referred to as the *symbolic function* (cf. Laughlin et al. 1990; Laughlin 1992) which put simply refers to "the property of the nervous system by which partial information about the operational environment derived from the senses is associated neurologically with a far greater field of cognitive associations" (Laughlin 1998).

Primary Iconism and Abduction

Primary iconism is distinct from relative forms of iconicity, as it is merely the presupposition to correspond, and not yet an established relationship of similarity; “and therefore the icon is a likeness, not in the sense that it is like something else, but because it is the phenomenon that founds any possible judgement of similarity, without being founded by it” (Eco 2014, p. 512). It is a pure Firstness and therefore not something that can ever be intentionally realized in awareness, yet however still profoundly impacts upon perception and cognition in the form of the semi-automatic and sub-conscious inferential process known as abduction.

In *Kant and the Platypus* (2000), Eco, in a brilliantly detailed study, addresses this hypothesized firstness of experience and how we may come to learn of it, concluding that all knowledge (even knowledge of primary iconism) must be attained through resource to a text, “an organizing principle whereby an element can be identified insofar as it is not the other, which by evoking it, it excludes” (2000, p. 111). This is to say that learning—in its most simple form—cannot occur without this encounter with the *other*, a minimal level of primary indexicality, and that it is through this responsibility to meet this ‘other’ that unrealized potential is realized and ‘educative’ encounters (in the Deweyan understanding) are created. Abduction represents this “move from what is known to the unknown” (Stables and Semetsky 2015 p. 25). Unlike deduction or induction, abduction merely tries to realize what is possible. Abduction reflects a tri-relative sign-model that paradoxically, through its constant *closing in* on itself (its circularity and self-reference), always *opens* new (virtual) possibilities. Kull (2009, p. 82) explains this reaching into the possible that constitutes the semiotic event:

The sign vehicle, or representamen (or sign, *sensu stricto*), stands for an object. This is the relation that is created by semiosis. The object, thus, has an interesting duality—it is both there and is not there—because it is both connected and anticipated. The relation of *standing for* is possible owing to the absence of what is referred to (the object) and, concurrently, there cannot be semiosis without the existence of a reference (an object)... Semiosis is what makes anything plural.

What we realize through Peirce’s semiotic is that potential states weigh upon learning just as much as actual or future states do; these virtual ‘absentia phenomenon’ (Deacon 2011) are very *present* and ontologically ‘real’ in both biology and experience, despite their semiotic immateriality. Eco’s (2000, 2014) in depth explorations of primary iconism remind educational philosophy that what we in fact uncover through the fallibility of indexicality, is that there was something inside us (yes, a pure potential to react and respond) that called out for us to attend to and learn about the world. The ‘will to carry on living’ is here co-dependent with the ‘will to learn’ (cf. Dewey 1934/2005). Conceptualizing this metaphysical concept of Firstness allows a vantage point from which to envision a beginning, a *terminus a quo* of learning (a beginning that precedes cognitive awareness), or more precisely, **to an imprint**; an impression left by an impresser that is no longer accessible to us.²²

²² These ideas are expanded upon in my article “In Search of Our Beginnings: Locating Firstness in Arts Education in the Service of Advocacy” (2018c).

Meeting the Unknown

Thus, realizing an “implicit philosophy of education” (Chiasson 2005; Olteanu 2015) in the Peircean corpus, involves in large part cultivating what I have previously called “a pedagogy of novelty” (2016, 2018a). This stems from the understanding that all learning-growth is the result first and foremost of a student’s willingness and ability to rise and meet the unknown; to find, through an *abductive leap*, the familiar in the new: “If A is B, and C can be signified by B, then maybe A is a sign of C. As a hypothesis-bearing statement, abduction asserts its conclusion only conjecturally...” (Stables and Semetsky 2015, p. 20). Within this pedagogical orientation, a teacher’s primary role is to develop an attention and receptiveness to the *indexical rub* of learning; “that initial friction or resistance felt when meeting a new experience” (Campbell 2016, p. 17). Peirce’s philosophy reminds us that the art of teaching involves, not the transmitting of knowledge, but fostering this basic receptivity in learners. Learners who are receptive to novelty, to ambiguity, to risk, will continue learning their entire lives.²³

MST posits that the way organisms model their *innenwelt* (inner model) after the *umwelt* (outside model) is iconic, in the sense that a model is “essentially a reductive analogy, and therefore ultimately a kind of icon” (Sebeok 2001[1994], p. 140). Petrilli (2003, p.71) explains this notion of ‘diagrammatic reasoning’ that was so central to Peirce’s (post 1890s) thought:

[T]he model is an icon, a kind of diagram, where the most pertinent relations are of a spatial and temporal order. These relations are not fixed once and for all but can be mixed and modified and fixed again, in correspondence (a resemblance relation) with the *innenwelt*... of the human organism.²⁴

It is through this impression-caste *metaform*²⁵ (cf. Danesi 2013) outlined above that we can understand semiosis as the modelling competence of a species, that is, “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” (Sebeok and Danesi 2000, p. 5).²⁶ I have shown elsewhere (2016) through the specific examples of ‘learning music by ear’ and ‘learning new words’ (building from Noth 2010), that the goal of a *pedagogy of novelty*, is in large part to encourage and guide students to reflect deeply on their own resistances to novel experiences and feelings, by honing their creative powers of abduction, the capacity to imaginatively infer a frame of reference to account for the new learning. As represented by Fig. 2 below, this involves finding, through continual attention and ‘dwelling in’ this resistance, points of similarity (or *iconic imprints*):

After a space and state of mind is created that enables the student to live in and tolerate this indexical rub they must raise themselves to the challenge of meeting it. This

²³ Cf. Yu (2017, p. 374), for more on how edusemitoics when coupled with MST strongly suggests the “inevitability of life-long education”.

²⁴ See also Legg (2017) for more on diagrammatic teaching and learning.

²⁵ A metaform is essentially the non-verbal component of a conceptual metaphor: “A “metaform” can be defined as the form that is connected interpretively (semiotically) to a conceptual metaphor as a consequence of the metaphor being distributed throughout the cultural network of meaning” (Danesi 2013, p. 35).

²⁶ This is concurrently the general picture that emerges from Piagetian approaches to development, which purport that “all stimuli in the external world are defined and given meaning in terms of their relationship to existing internal structures” (McManus cited in d’Aquila et al. 1979, p. 188).

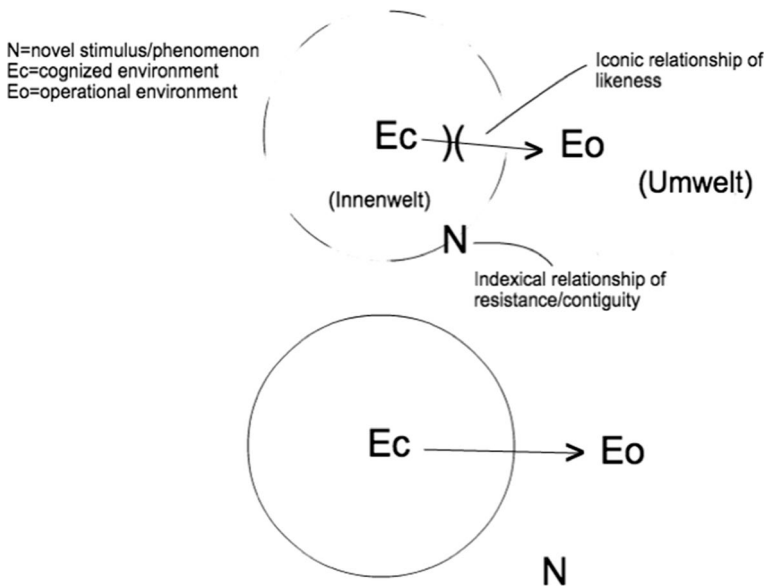


Fig. 2 How learners adapt to novelty (adapted from Campbell 2016, p. 26)

type of education requires us, student and teacher, to reach into the entirety of our personal acquired experiences for similarities and resemblances to what we are experiencing (Campbell 2016, p. 27).

The bottom-bounded circle (in contrast to the porous top one) represents how novelty will remain on the outside, and unrelated to an organism's internal world of experience (innenwelt) unless this basic receptivity to novelty is cultivated. This receptiveness is educated, not through detached observation, but through collectively (teacher and student) acting upon the environment/umwelt and being acted upon by it. In line with Peirce and Dewey, learning in this understanding emerges through the principle of habit. It is in this sense that we may follow Dewey and locate learning and education in the emergent growth of habits that enable future habit taking; "the result of the educative process", he says, can only ever be a "capacity for further education" (1966, p. 68), and Semetsky replies "The more an organism learns the more it still has to learn: education means more education and becoming more developed signs" (Stables and Semetsky 2015, p. 81).²⁷

The learner *tunes* her perceptual-action to her surroundings through a process of being *in-habit*, through active *doing-undergoing* (to use another Deweyian concept). As we will be further elaborating, we can only realise the impact of firstness upon our learning and life through a *rupture* in the regularity of habit, and such rupture can only contribute to the growth of future habits (to learning) through a perpetual attunement to the unknown. It is quite directly, the creation of habits that enable future semiotic unfurling; the opening of possibilities and variations in our umwelt.

²⁷ See Noth in Stables et al. (2018, pp. 80–81) for a treatment and elaboration of my theory of indexical learning.

The basic orientation of *umwelt*, reflects what anthropologist Tim Ingold's calls an '*ontology of dwelling*' (2000, p. 42, 2009, 2017).²⁸ A 'dwelling perspective' takes as its starting point for understanding the human condition direct perceptual engagement within an historically specific environment. This approach represents a swift in thinking about learning as is often expressed in both constructivist and behaviorist accounts, which generally explain that a learner's perceptual engagement is mediated through representations or schematic/formal reductions. The mind processes and constructs sense data into schemas or 'ideas'. According to Ingold, these approaches reproduce an implicit Nature/culture (and corollary Mind/Body dichotomy); the idea of a depersonalized environment which presents the raw materials that learners use to construct meaning out of. A theory of *umwelt* in contrast reminds us that learning occurs through co-participation in a shared environment; by 'pointing out' (indexing) significant events and possibilities in a shared *umwelten*.

The Principle of Assumed Similarity

What we are in fact describing through these basic accounts of how iconicity and indexicality function within perceptual learning is another foundational aspect of edusemiotic pedagogy: *to assume fundamental similarity instead of difference* (see footnote 16). This is presented here as the **Continuity Principle (CP)**. This orientation can only be explained through a relational (triadic) ontology, where emphasis is placed on the relations that bind people to the world around them. What is important in such iconic accounts of learning is "not the thisness of a that", as in the western (/Aristotelian) notion of metaphor, but rather "that this *is* that" (Jackson cited in Ingold 2000, p. 50). The continuity principle has major implications for how we as humans engage with the world around us. Ingold (2000, p. 50) explains how such a relational philosophy is especially present for those people anthropologists have traditionally called 'hunter-gatherers' and specifically within the Cree life-world, clearly perceptible in their relation to animals:

Whereas Western thought sets out from an assumed dichotomy between the human and the animal and then searches about for possible analogies or homologies, the Cree trajectory... 'seems rather the opposite: to assume fundamental similarity while exploring the differences between humans and animals' (1989, p. 195)... The move, if you will, is not from the literal to the figurative, but from the actual to the potential—for personhood, at root, is the potential to become a man, a goose, or any other of the innumerable forms of animate being.

This assumed similarity is concurrently the dissolution of a prevalent Culture/Nature dichotomy in Western approaches to understanding cognition and learning. As Deely (2001, 2009) extensively tracked through the history of western philosophy, this results from an idealist denial of relation (semiosis) as a modality of being in itself 'over and above' reductions to mind-dependent (*ens rationis*) or mind-independent being (*ens reale*). Such idealist and constructivist leanings implicitly suggest "that meaning does not lie in the relational contexts of the perceiver's involvement in the world, but is rather laid over the world by the mind" (Ingold 2000, p. 51). To recognize the role of mediation (thirdness), is to concurrently recognize how potential (firstness') continually impact upon the

²⁸ Ingold himself has drawn significantly on the work von Uexküll (1957[1934]) as well as the ecological psychology of James Gibson (cf. 1979).

present as a *field of possibility* (cf. Eco 1979; Campbell 2018b). In terms of the science of anticipation, this is the recognition that “the external world and the internal reality of integrated mental and physiological activity go into what is expressed in the anticipatory action—a realization from the large space of the possible” (Nadin 2017, p. 156). Such a philosophical orientation has deep implications for pedagogy: helping to reveal an understanding of learning that doesn’t take as its foundation an “initial separation between human persons, (as meaning-makers) and the physical environment as raw material for construction” (Ingold 2000, p. 55). Such a philosophy of learning and teaching, suggests that knowledge of the world is not learnt through systematically building up and transmitting representations in the mind to account for sensory information, but rather through *direct perceptual engagement with others in a shared world*. That is, it is through the processes and habits of *en-skillment* that learners establish their basic perceptual relationships to their environment. It is these *action-relationships* that form the basis for the way we see and feel and move in the world. Ingold explains further: “knowledge of the world is gained by moving about in it, exploring it, attending to it, ever alert to the signs by which it is revealed. Learning to see then, is a matter not of acquiring schemata for mentally constructing the environment but of acquiring the skills for direct perceptual engagement with its constituents, human and non-human, animate and inanimate” (2000, p. 55).

Thus, it is essential for edusemiotics to take seriously the reality of this world of direct relational entanglements, which is precisely what is presented to us in the rich concept of *umwelt*.

Umwelt

As I have argued so far, the most fundamental place a Peircean edusemiotic can begin its search for foundations is with the phenomenal world that is sensibly and experientially available to the learner, the *umwelt*. Umwelt was a concept developed for ethnology in the early part of the twentieth century by the Estonian-German scientist Jacob Von Uexkull.²⁹ As Sebeok (2001[1994], p. 144) notes the term *umwelt* itself “is notoriously recalcitrant to translation, although ‘subjective universes,’ phenomenal world,’ and ‘self-world’ variously approximate the author’s intent. However, ‘model’ renders it more incisively, especially in view of his credo that ‘every subject is the constructor of its Umwelt’ (Von Uexkull 1982, p. 87)”. The *umwelt* is the world that is *actually* available to an organism, with its own unique species-specific modelling competences.

Correcting Subject-Object Duality

Applying John Deely’s “*umwelt* philosophy” (1990, 2001, 2004, 2010) to education, allows us to conceptualize learning—not solely as something *subjective* happening within the mind or skull of the learner, nor solely in the verification of *objective* truths radiating from some hypothetical operational environment—but rather, as relational signification processes radiating *between* the environment and organism. Such an orientation calls for an inversion of the modern dichotomy of subject-object relations. In this late Latin perspective, what is ‘subjective’ are the *things* that ‘are what they are regardless of what anyone

²⁹ Cf. von Uexkull (1957[1934]). See Olteanu (2015, Ch. 1), Cunningham (1988) and Shank (1998) for a review of the concept’s relevance to education.

thinks them to be', while the term 'objective' here refers to the process by which "things" become objects within an organism's *umwelt*. That is, *objects are only objects if they enter within the objective awareness of the learner*; if they have significance and meaning to him or her. This helps to elucidate how edusemiotics is decidedly a rejection of nominalist leanings in contemporary scholarship. Learning theory must come to account for more than the 'particular' (and more than the mechanical universe of cause and effect, or secondness) to embrace the ontology of unactualized potential (firstness), and how potential is realized differently by different organisms, but is yet still generalizable in the form of habits (thirdness). Thus, edusemiotics purports to study, not psychological states, not subjective mind-independent states, but rather, the *relations* that mediate learner and world:

On the contrary, there are no such thing as psychological states disconnected from objectivity. Objectivity precisely depends upon psychological states which give the subjective foundation or ground for the relations which terminate in the publicly experienced interpretations that are precisely what we call objects. The key to the whole thing is relation in its unique being as irreducible to its subjective source always terminating at something over and above the being in which the relation is grounded (Deely 2004, p. 19–20).

Signs constitute a mode of ontology, that is per the scholastic semiotic of Poinot (1985[1632]), not solely subjective, nor solely objective. They are *supra-subjective*, dependent on subjective mind-independent 'things' as fundamentals for their signifying relationships, but in no way reducible to any dyadic order. Thus we have the *principle of suprasubjective relation* (for more on the **PSR** and its relevance for education see Campbell 2017; Olteanu 2015).

Of course, sustaining these relations underlying the learner's *umwelt*, is the protosemiotic interaction of *Primary iconicity* and *primary indexicality*. This coupling of iconicity and indexicality is already suggested by von Uexküll's functional cycle: An animal perceives its *umwelt* (and thus renders it meaningful) by acting, moving and reacting within it. It is through this circularity of action and reaction that the animal continuously attunes its internal perceptual systems to the outside environment (its *innenwelt* to its *umwelt*).³⁰

Figuratively speaking, every animal grasps its object with two arms of a forceps, receptor and effector. With the one it invests the object with a receptor cue or perceptual meaning, with the other, an effector cue or operational meaning. But since all of the traits of an object are structurally interconnected, the traits given operational meaning must affect those bearing perceptual meaning through the object, and so change the object itself" (von Uexküll 1957[1934], p. 10)

Ecological approaches, as informed by *umwelt* theory, maintain the general understanding that perception is a process not strictly of *detection*, but rather of *attuning* to objects, and more specifically, of engaging in processes of *semiotic objectification*. "Every action that consists of perception and operation imprints its meaning on the meaningless object and thereby makes it into a subject-related meaning-carrier in the respective *Umwelt*" (von Uexküll 1982, p. 31). Dewey (1934/2005, p. 108) expresses it poetically

³⁰ This reoccurring circular feedback loop of *umwelt* becoming *innenwelt*, is explained through what von Uexküll called the functional cycle. Although there will be no time to explain the enormous intellectual wealth of this model, the functional cycle can be understood as a particular incarnation of the proto-semiotic cycle of primary iconism realized through primary indexicality explored in this study, and the corollary notion of Deweyian 'doing-undergoing'.

in *Art-as-Experience*: “In their physical occurrence, things and events experienced pass and are gone. But something of their meaning and value is retained as an integral part of the self. Through habits formed in intercourse with the world, we also in-habit the world.” Unlike the directness of perception stressed by Gibson (1979), which could never fully account for symbolic or extensional forms of semiosis, an *ecosemitic* (cf. Noth 1998, 2001) approach maintains the primacy of the organism’s continuous involvement in the environment through the constant ‘reading’, anticipating, and use of meaning-bearing sign vehicles. Edusemiotics is ecological in the same orientation.

Abducing Significance?

An umwelt-model of learning, requires a concept that accounts for the process by which an organism anticipates, both intuitively and deliberately, the world around it. Yes, we are again talking about *abduction*:

As already explained, abduction is at its root an adaptive perceptual process by which an organism infers (subconsciously *or* consciously) a *frame of reference*, in the form of an action-possibility to account for *both* virtual (potential) as well as actual novelty. Failure to account for abduction in many dominant models of learning and cognition has resulted in the proliferation of an ill-informed pedagogical assumption: that one cannot educate for or teach these processes of subconscious intuitive cognition. This has, as I’ve argued elsewhere (cf. 2018c), seriously reduced the impact and relevance of educational research and arts education in particular. We know from ordinary experience, that our ability to respond intuitively and instinctively to the surprising events and experiences we are presented with is constantly being developed (or *tuned*) by our active perceptual activity in the world. That is to say, that although abduction is largely sub-conscious and automatic, it is still alterable through conscious reflection and action (cf. Paavola 2005). This is an important point, for the neglect of such primary (non-representational, non-conceptual) forms of semiosis (the kind represented by abductive inference) have resulted in the systematic devaluing of learning processes associated with the arts: processes like creativity, imagination and intuition. This devaluing has resulted in a diminishing emphasis on arts education in the design of curriculum and educational national standards (cf. Jorgensen 2003, Ch. 2)

Peirce explains that Abduction is the process of exploratory and creative hypothesis and the only way to account for the growth of new knowledge:

It is the only logical operation which introduces any new idea; for induction does nothing but determine a value, and deduction merely evolves the necessary consequences of a pure hypothesis. Deduction proves that something must be; Induction shows that something actually is operative; Abduction merely suggests that something may be. (CP 5.172)

It is this distinction from deduction and induction that allows authors like Nesher (2001) to show that abduction is the only inferential process that properly accounts for *learning as growth*. A neglect of abduction in educational research leads to *commutationalism* (see Danesi 1994 for more on the *commutationalist fallacy*), where learning is considered the result of entailing information from baseline algorithms, often presumed to be implanted in the brain. This is the idea that there are basic inherent schematic structures that orient learning, like, to use a popular example, Chomsky’s theory of universal grammar. As abduction also produces new information, it is inherently creative; *it begins with an imaginative act*. However, this creativity is a matter of degree, depending on the level of

innovation or riskiness behind the inference, for abduction is also the very “ground state of cognition” (Shank 1991, 1998), of coming to terms with environmental novelty in the broadest possible sense. That is to suggest that, at its most primary level, abduction is the very process that enables us to cognize the environment: to structure and perceive patterns and affordances from the amorphous continuum of sense experience.

Abduction is exercised in action and movement, in a constant dynamic of reaction and anticipation (cf. Campbell 2017). Edusemiotics maintains that this abductive capacity is not passive, and therefore cognition and learning are not passive activities, even when not explicitly conscious or *intentional*. And although this basic level of *attentionality* (cf. Ingold 2017) may be what we could call subconscious, it is not fundamentally insusceptible to being transformed and developed in subsequent experience. This *already there-ness* of our consciousness may not be explicitly learned at all, in the sense that it is *neu-rognostic* and present prior to birth (cf. Laughlin et al. 1990; Laughlin 1992, 1996), but being ‘already there’ does not exclude it from the fact that it is constantly being refined and adjusted through a constant engagement (a dialogue) with the *umwelt* we inhabit.

What we are in fact talking about, is the *very readiness to learn* that an *umwelt* approach reveals, and the general importance of understanding and conceptualizing this for philosophy of education. It corrects ‘bottom-up’ approaches to learning that maintain the sequential transition from sense impression to concept, by emphasizing instead *the essential circularity of the functional cycle*. “It means that every stimulus presupposes a readiness to react, and it is this readiness that ‘selects’ as a stimulus a phenomenon of the environment which had been neutral up to that point” (Reybrouck 2012). Hence, behind even the simplest stimulus response events are actually complex anticipatory dynamics. In more explicitly Peircean terms, we can speak of a dormant thirdness in what is seemingly an entirely pre-inferential process of stimulus–response sensory engagement (cf. Campbell 2018c).

Concluding Remarks

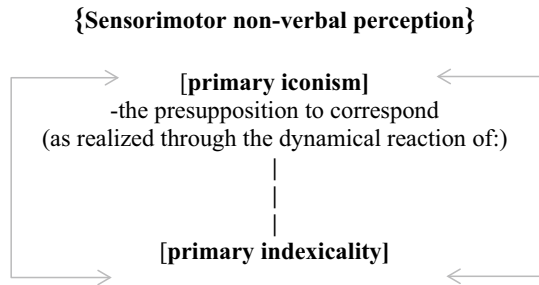
Recapitulation and Future Research

We have now sketched the interaction of primary iconism and primary indexicality, demonstrating that (1) a sub-conscious and automatic level of attention and response (explained through the concepts of primary iconism and abductive inference) is essential to explain the fullness of ‘what happens in learning’, and (2) that mal-adaptation (indexical rubs) are necessary to develop and refine this basic perceptual capacity in learners. Attention to this primary stage, may help to bring nuance to many debates within learning theory, which as mentioned, often pit disembodied computational approaches against overtly idealist and constructivist approaches.

The following schemas track the theory I have elaborated, demonstrating how these foundational pre-intentional semiotic processes form the basis for primary, secondary, and tertiary modelling systems (which, at least in the human use of signs, come under the purview of *existential* thirdness as they concern representational phenomenon). This is how largely sensorimotor processes form the embodied foundation for concept formation and abstractive, analogical thinking (Fig. 3).³¹

³¹ Expressed by the general degree of *sign stipulation* (see Deely 1990)—that is, signs being stipulated from their context of occurrence, and to this extent, more symbolic/conventional.

Fig. 3 The circularity of iconic and indexical learning



These two processes (underlying iconic forms being realized through indexical ‘dynamical’ reactions which constitute a circular feedback loop) constitute the *Proto-semiotic sustainment of umwelt*.

The organism, interprets/processes these initial proto-semiotic interactions through a process of perceptual *habitualization*. This is the process of how the organism adapts to environmental complexity by drawing upon previous cognition and perceptual activity (the generalizing tendency of Thirdness), thus forming what we can here, for simplicity, call the *surface level of cognition*.³²

To reflect upon initial sensory impressions and the role of automatic pre-intentional consciousness involves realizing the *imprint* of primary iconism upon the surface level of cognition. Applied to a Peircean theory of learning this constitutes:

- an **[abductive]** inferential movement, which is fundamentally an act of attending to our;
- **primary modelling system (PMS)**. This abductive learning is a process of consciously shaping our largely automatic/instinctual perceptual activity through reflective and contemplative practice; this is how the organism discovers and shapes its *umwelt*. From here it is a logical (and pedagogical) task to study how these primary (iconic) modelling processes are extended into the environment through the;
- **[Secondary modelling system (SMS)]**. And finally, how these indexical and iconic signs are gradually stipulated from their context of occurrence, through habitualized social conventions, and form the basis for abstract symbolic thought, or the;
- **[Tertiary modelling system (TMS)]**

Semiotic analysis allows us to understand how primary perceptual processes form the basis for all forms of learning and modelling behaviour, and, in alignment with MST, conceptualize how these primary processes become extended into more abstracted forms of learning and knowing.

³² As informed by Danesi (1993), while fully recognizing that cognition, and indeed consciousness, has varying levels of awareness/absorption, warps and phases. See Laughlin (1992) for a summary of a neuro-anthropological account of consciousness.

Conclusion

Education is a *shared* human endeavour (as Ingold, advances in his 2017 book *Anthropology and/as Education*).³³ The process and rituals that determine how knowledge is passed down within a human community concern the discovery of shared meaning between generations. This meaning is expressed in *objective relations* that mediate the observer, the observing, and the observed, according to a triadic (semiotic) logic. Orienting around the notion of *umwelt*, edusemiotics as a research agenda is not concerned with understanding learning as/through internal psychological states, but rather learning as/through semiosis, as an ‘objective’ relation of *complementarity*, and continual emergence. Edusemiotians focus on how signs, as *suprasubjective* relations, mediate learner’s relations to the world (PSR). Signs are not just considered here for their referential function –how they refer to things –because signs don’t only refer to things, but rather, a way of *being in relation* with an *umwelt*. Modernist philosophy (culminating in Kant) located *being* within the mind of the subject. A semiotic perspective locates being in *relation* itself.

This basic consideration of *umwelt* and supra-subjectivity, as educational scholar Shank (1998) tells us, takes us right to the basic philosophical orientation necessary for edusemiotics:

When we consider the world not as a compendium of facts but as a web of meanings... then we go beyond concepts like environments and settings, to concepts like the world as an *umwelt* (Von Uexkull 1982). An *umwelt* is a “lived world,” where the things we observe take on significance. It is our job to read those observations in order to determine their significances. This act of reading consists of treating observations not for themselves, but as signs of other things. Since we don’t know for sure what they signify, we can only guess. Therefore, if we live in a world of signs, our most basic actions consist in reading those signs. Therefore, the process of abduction runs through our very act of living in a world that makes sense. Where that sense breaks down, our abductions need to be explicit and reflective.

It is clear, that through this emphasis on the reality and ontology of relation, edusemiotics purports an embodied and inquiry-driven approach to education. Although this article has focused primarily on the basic conceptual and philosophical frameworks of this new research movement, edusemiotics has tremendous implications for ‘actual’ educational practice, outside of the world of theory. In my own career and life this semiotic perspective has provided me with endless new ways of making sense of my own educational experiences as a teacher and student. Unlike analytic philosophy, the tradition from which the modern professional/academic incarnation of philosophy of education derives from, we are assuming no **dichotomy** of concept from image. (Hirst and Peters say this outright in their seminal text: “What is a concept? It obviously is not the same thing as an image” (2012[1970], p. 3). As we have been discussing, the image (or icon) is primal and foundational to edusemiotics, for semiosis always stems from such sensory-imagistic beginnings. It is from a place of primary iconism that learners establish their modes of habitual responsiveness to the world. Of course, sign systems, as they become extended beyond these primary forms of modelling, becoming more abstracted and symbolic, can increasingly lead to error. “Semiosis explains itself through itself” Eco (1979) reminds us.

³³ See also my interview with Tim Ingold here: <https://philosophasters.org/blog/2018/4/15/tim-ingold-on-improv-writing-and-the-future-of-education>.

This is essentially what has occurred in much formal schooling and educational theory, which, in the interest of operationalizing learning and exercising standardised control over educational processes, have essentially removed the embodied (iconic and indexical) aspects of learning. This means quite practically that embodied forms of learning and knowing, often associated with arts education in particular, have been increasingly devalued in favour of instilling competence in deductive forms of commutation and inductive measurement. Through this lens, the teaching and curriculum of formal music education (as one example) has greatly suffered, often reducing complex and deeply layered musical experiences to a form of symbolic processing (i.e. standardized musical methods, such as the Royal Conservatory of Music in Canada). If the reader has taken anything away from this study it is hopefully that, from a biologically rooted Peircean edusemiotic perspective, symbols do not spring up out of nowhere and therefore cannot simply be shuttled around between mind and world. Rather, they emerge from a place of direct perceptual engagement in a historically situated environment. When we privilege the concept over the image we effectively divorce the body from the sign, perpetuating our Cartesian heritage and stripping learning of its experiential import. It is in this sense that edusemiotics represents a comprehensive anthropology; a return to holism in how we ‘do’ and ‘undergo’ both life and education alike.

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