

Indexical Ways of Knowing: An Inquiry Into the Indexical Sign and How to Educate for Novelty

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Article abstract

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Indexical Ways of Knowing: An Inquiry Into the Indexical Sign and How to Educate for Novelty

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Abstract: In this paper, I propose that the indexical sign can be used to derive a model for active (touching-and-feeling) learning. The implicit processes involved in the subtle reading of indices contain explanatory possibilities for understanding how students adapt to novelty in the learning process. Besides looking at how indexicality functions in human ontogeny and cognition, I will also examine the human capacity for modeling our world through aggregations of systems of representations (Sebeok, 1994). Modeling systems (with their implicit recognition that the human is a semiotic animal) help us to conceptualize how novelty is assimilated in the learning process. I posit that how we come to terms with new experiences (and new stimuli generally) is of an indexical nature. I am specifically referring to the site where “the new” comes from the outside (like a rain cloud signaling the coming storm) and acts upon us. We can recognize the rain cloud as an experiential pattern (as a semiotic entity) or not; the rain is still going to bear down on us regardless of the success of our interpretations. This existential realness of indexical signs is precisely their power to function as a pedagogical tool, to help us assimilate and accommodate to novel stimulus. The concept of modeling helps us conceptualize the process in which the new stimulus is absorbed and integrated into our cultural/semiotic systems. In short, this paper aims to explore what I call the indexical rub of learning; that initial friction or resistance felt when meeting a new experience. My hope is that this exploration can aid in the cultivation of a mindset in teachers, students and researchers that does not fear this resistance, but can use it to propel positive absorption (in the Deweyian sense) and engaged learning.

As to things invisible and things mortal, the gods have certainties, but as far as men may infer ... men must proceed by clues.

—Alcmaeon (Eco, as cited in Sebeok, 1994, p. 51)¹

1. Clues, Clouds and Conjecture

Alcmaeon, the Greek fifth century B.C. doctor, describes humankind’s most foundational form of knowing—the primordial epistemological unit written into footprints, stars, droppings, soil, fingerprints, clouds, texts, our bodies—the books of nature and culture in their multifarious

¹ This citation I couldn’t help but call attention to; a beautiful intertextual meshwork of three of the world’s great men of signs.

manifestations. This refers to the procedure of obtaining knowledge by way of provisional conjecture, the reading of what C. S. Peirce called “indexical signs,” and what Sherlock Holmes called “clues.” As Carlo Ginzberg (1980) suggested in his essay “Clues: Morelli, Freud, and Sherlock Holmes,” it is this simple and innate epistemological model that we see embodied in humankind’s prehistory; “lurking behind the symptomatic model is the gesture which is the oldest, perhaps, of the intellectual history of the human race: the hunter crouched in the mud, examining a quarry’s tracks” (as cited in Bondanella, 1997, p. 110).

Indexicality, as I present it in this discussion, is the modality of actuality, of cause and effect, of physical force. An index is something that indicates (literally indexes) through a contiguous relationship a particular experiential pattern. Indexicality marks the contextual domain of meaning construction that relies on actual existential relationships between objects and signs that exist apart from any sort of interpretative convention. According to the American philosopher C. S. Peirce’s (1868) doctrine of categories, the indexical sign is the domain of *secondness* (of resistance, action, contiguity, volition) and thus the domain where subjectivity and consciousness are established. Much mainstream education (to speak generally) enters learning from what Peirce refers to as *thirdness* or the symbolic realm. We bypass attention to the activities and contexts out of which knowledge emerges (*secondness*) and often outright ignore the aesthetic (pre-conceptual) dimension of experience (*firstness*).

Throughout this discussion, I will use Peirce’s doctrine of categories to provide a conceptual lens from which to understand the learning process. This “way of knowing” centered on the indexical sign is very much in line with ideas from research in situated cognition (Brown, Collins, & Duguid, 1989). Common to both these approaches is the understanding that education cannot begin with the dissemination of determined and conventionalized conceptual knowledge.

All knowledge is ... like language. Its constituent parts index the world and so are inextricably a product of the activity and situations in which they are produced. A concept, for example, will continually evolve with each new occasion of use, because new situations, negotiations, and activities inevitably recast it in a new, more densely textured form. So a concept, like the meaning of a word, is always under construction. (Brown et al., 1989, p. 33)

Peirce described secondness or the coming into consciousness through indexicality as a “brute force” (CP 1.24)²; a confrontation with the organism that it must *struggle* to come to terms with. Like Donna West (2015), I see this resistance, characteristic of secondness, as key to cognitive development and learning.

As such, struggle and the “confrontational,” incorporate the sudden and even startling physical experience so characteristic of Secondness. Struggle, effort and resistance materialize upon exertion in the physical surround, especially prominent in the child’s early investigative endeavors. (p. 2)

This viewpoint finds strong parallels in the cognitive and neuro sciences: through structuring our *cognized environments* (the way a particular organism makes sense of its surroundings through its senses and culture), we realize the fallibility of our actions and beliefs felt through *dis*-adaptation from our operational environments (the more or less “real”/objective reality we hypothesize). We are thus forced

² The abbreviation “CP” as per convention refers to the 8 volume *Collected Papers of Charles Sanders Peirce* (1935–1966). The numerals represent volume and paragraph, respectively.

to “suppose a self” to auto-regulate between our internal systems and these external resistances (see for example, d’Aquila, Laughlin, & McManus, 1979, pp. 183–215). Because the index has the “being of present experience” (CP 4.447), it is a potent tool from which to understand our relationship to our bodies and the worlds, both semiotic and physical, that we navigate. It is in terms of our actions in the world that our relationship to our body is achieved and the indexical sign, being a sign that is directly affected by its object, is the site where this embodiment is received and understood.

In this discussion, I propose that the indexical sign can be used to derive a model for active (touching-and-feeling) learning. The implicit processes involved in the subtle reading of indices can help us to understand how students adapt to novelty in the learning process. I will begin by surveying different iterations of this paradigm in a variety of incarnations, showing how *indexicality* emerges in many faces and guises. I suggest that by recognizing the indexical understanding implicit in all acts of semiosis, we might encourage a pedagogy focused on the openness inherent in the interpretative act, as outlined in Umberto Eco’s poetic’s of openness (1979; 1962/1989). Through recognition of the inferential and situated nature of signs, it is possible to view every sign as a matter of interpretation that demands the active participation of the addressee. It is this inferential model of sign functions (where a sign is seen as an instruction for further interpretation, $p \supset q$) that Eco says reflects the inherent openness of sign processes and textual interpretation. This inferential understanding of semiosis presents a challenge to the modern dominance of a “degenerate notion of linguistic sign” (1984, p. 24) related by a reciprocal model of equivalence ($p \equiv q$). It is this understanding of the sign, based on identity and verisimilitude, where a word is simply equivocated with its meaning (human equals rational animal), that I argue perpetuates a widespread commitment to univocal and quantifiable approaches to education and interpretation. This is the belief, characteristic of Western society, that we can know the world from a God’s-eye vantage point—the myth of the knowing subject.

Besides looking at how indexicality functions in human ontogeny and cognition, I will also examine the human capacity for modeling our world through aggregations of systems of representations (Sebeok, 1994). Modeling systems (with their implicit recognition that the human is a semiotic animal) help us to conceptualize how novelty is assimilated in the learning process. I posit that how we come to terms with new experiences (and new stimuli generally) is of an indexical nature. I am specifically referring to the site (marked by contiguity, resistance, actuality) where “the new” comes from the outside (like a rain cloud signaling the coming storm) and acts upon us. We can recognize the rain cloud as an experiential pattern (as a semiotic entity) or not; the rain is still going to bear down on us regardless of the success of our interpretations. This *existential realness* of indexical signs is precisely their power to function as a pedagogical tool, to help us deal with (to assimilate and accommodate to) novel stimulus. The concept of modeling helps us conceptualize the process in which the new stimulus is absorbed and integrated into our cultural/semiotic systems. In short, this paper explores what I call the *indexical rub* of learning, that initial friction or resistance felt when meeting a new experience. My hope is that this exploration can aid in the cultivation of a mindset in teachers, students and researchers that does not fear this resistance; rather, it uses it to propel positive absorption (in the Deweyian sense) and engaged learning. The nature of these explorations will not be systematic, but rather meandering and driven by curiosity. Through these examinations, I do not wish to present indexical learning with any architectonic or systematic ambitions. I aim to elucidate its educational value; a reminder of an alternative way of knowing that is implicit (although perhaps dormant) in any interpretative process.

2. The Various Faces of the Index

2.1 The Index and Human Ontogenesis

There is undoubtedly an indexical element to all acts of communication. This is the index of a pointing figure, a shout or a cry, any proclamation that suggests “look here,” any act of *ostension*. These are our personal pronouns when we lack the same language as our interlocutor. It is this *primary indexicality* that lies behind every act of semiosis and is lurking in the gestural origins of language, in terms of both humankind’s prehistory and her ontogenetic development. For example, according to Jean Piaget’s (1951, p. 270–286) theory of the pre-operational period, primary indexicality marks our entrance into language and the realm of semiotic experience.³

As fashionable as it is to burn the bridges that Piaget built for us, his pioneering work still offers us a way of conceptualizing a child’s development into a meaning-making semiotic animal. His stages of development, as much as they have been reworked and elaborated upon (especially in showing how a child does not necessarily obtain these skills in the neat temporal sequence that Piaget envisioned), do make visible how a child progresses into the semiotic realm. My aim here is to synthesize these fundamental Piagetian principles with Peirce’s ontological sequencing of firstness–secondness–thirdness (or, in terms of how signs signify their objects, icon–index–symbol)—each theory a mirror that may illuminate aspects of the other. The relevance and usefulness of Piaget’s conceptualizations of how the child makes the “transition from predominantly non-conventional to conventional (normative) signs” (Zlatev, 2009, p. 194), is evidenced by many recent studies in the language acquisition of children and primates (see, for example, Nelson, 1996; Tomasello, 2003; Zlatev & Andr  n, 2009).

One of the basic principles of Piagetian theory is the conviction that, throughout all periods of human development, as McManus (as cited in d’Aquila et al., 1979) states, “all stimuli in the external world are defined and given meaning in terms of their relationship to existing internal structures” (p. 188). According to Piaget (1971), the human cognitive apparatus’ unique ability to contend with rapidly expanding possible worlds—the complexity of our semiotic processes—is rooted in our “organic autoregulation⁴.”

Cognitive processes seem to be at once and the same time the outcome of organic autoregulation, reflecting its essential mechanisms, and the most highly differentiated organs of this regulation at the core of interactions with the environment, so much so that, in the case of man, these processes are being extended into the universe itself. (p. 34)

This is to assert that the higher cognitive and semiotic processes are extensions of basic and fundamental biological functions. But what are these basic internal structures that form the foundation for a newborn’s signifying potential? If, as Piaget asserts, all cognition is the result of building upon

³ I am not denying, as Piaget did to a certain extent, that the young child does not yet possess a developed sense of self; I am just saying this subjectivity is not fully immersed in semiosis (or thirdness as Peirce would say).

⁴ “Organic autoregulation” refers to the internal adaptive mechanism that allows biological systems to adjust to outside stimuli.

existing internal structures, then a newborn cannot be a *tabula rasa*. In short, what constitutes our human signifying capacity?

The answer lies in the first stage of ontogenetic development; the *sensorimotor period*: a newborn baby endowed with only her basic sensorimotor ability (essentially bodily reflexes and simple movements) constructs, or rather reconstructs, her structures of intelligence in response to her environment. Through an auto-regulative process of assimilation and adaptation, the human child achieves a certain level of mastery with her own sensorimotor apparatus and gradually transitions to the second stage of human development, the *pre-operational stage*. In this stage, the child, having fully assimilated an entire range of simple movements, is able to begin replicating gestures she sees in other organisms. These replicated movements and gestures eventually become “detached from specific contexts and form the basis for representation” (McManus, as cited in d’Aquila et al., 1979, p. 190). The child begins to communicate, not in any indexical or symbolic manner, but rather through “likeness,” through imitation; what Peircean semiotics would call an example of (relative) iconicity (see section 2.2).⁵

The imitation of physical acts—as movement gradually becomes significant gesture—constitutes the first instance of the “semiotic act.” With the advent of language comes the dissolution of the embodied self into a sea of preexisting and exterior structures; “(d)uring this process reality is progressively de-centered from the phenomenological perspective of the child and constructed as a system separate and outside him” (McManus, as cited in d’Aquila et al., 1979, p. 190). This is the growing understanding in the child that they exist in a signifying and communicating world, where an outstretched arm is endowed with an infinite degree of meaning relating to context and a particular universe of discourse. Implicit in these first understandings is the indexical sign, a sign that contains a contiguous relationship between its signifier and its signified; a sign that is directly affected by its object (Sebeok, 1994, p. 53). Iconicity (firstness) may pave the way, but our first entry into semiosis is realized in the touching-and-feeling corporeality of indexicality. Here, signs are not conventional like they are in natural languages; they are entirely motivated by the power of contiguity. This is but another potent reminder of the active subject: “What are encoded in the child’s internal organization are not the characteristics of the objects he encounters, but the effects of his actions on these objects” (McManus, as cited in d’Aquila et al., 1979, p. 189).⁶

These Piagetian principles, synthesized by McManus, concur with Peirce’s assertion that we possess no powers of intuition and that cognition is only achieved through previous cognition as detailed by the first three points of Peirce’s “four incapacities”:

1. We have no power of Introspection, but all knowledge of the internal world is derived by hypothetical reasoning from our knowledge of external facts.
2. We have no power of Intuition, but every cognition is determined logically by previous cognitions.
3. We have no power of thinking without signs. (CP 5.265)

I will be returning to these three points frequently throughout this paper. Both these schools of thought (Peirce’s and Piaget’s) insist that we construct and model our (real and possible) worlds not out

⁵ I should specify that this form of comparative similarity is not the same as primary iconism, that moment of atemporal singularity (firstness) hypothesized to be the *terminus a quo* of the cognitive process.

⁶ Because I do not have space to give a detailed literature review of semiosis in human ontogeny, I direct the reader to Zlatev (2009) who gives a detailed review of recent research that explores consciousness’ relationship to sign function.

of nothing, but through our unique species-specific sensory and cognitive abilities as well as the *grains of resistance*—the push back from our environments (Eco, 2000).

2.2 The Index as an Object Semiotic

The indexical sign is one of Peirce's three classes of how signs signify their objects (the other classes being the icon, and the symbol), which is part of his larger tripartition of all experience into three categories of being: Firstness, the *possible*, defined by atemporal singularity; Secondness, the *is*, the existentially real; and Thirdness, the *would be*, the conventional and generalized world of semiotic determinations (Merrel, 1997, p. 27).

The indexes' most palpable incarnations are natural signs (if smoke then fire) and physical symptoms (red spots on the skin being symptomatic of measles). Indeed, it was the study of medical symptoms that birthed the formal study of semiotics with Hippocrates in the ancient world; an origin that cannot be overemphasized. Peirce states that "an index ... is a sign which refers to the object it denotes by virtue of being really affected by that object (CP 2.248). Because of this "direct dual relation of the sign and its object independent of the mind using the sign" (CP 3:361), indexical signs constitute the first realization of semiosis in the subject.⁷ Unlike the icon, which refers to its object through similarity and resemblance, and the symbol, which signifies through convention (and therefore only to general classes of object), the index is how we refer to actual states of the world. It is in this sense that "indexicality is an essential requirement for representation" (Lefebvre, 2007, p. 5), including the representation of our own self in relation to the world (as we shall see in the next section).

Thomas Sebeok, in a lecture at the Imatra Summer School of Semiotics, demonstrated these three classes of signs by describing the following hypothetical environments. In this lecture, paraphrased by Juha Ojala (2009), Sebeok tells us to imagine a fast road going over a hill. Behind the hill, there is a school on one side of the road, and houses on the other. Children have the habit of crossing the road just under the top of the hill. This is dangerous, because car drivers cannot easily notice them when driving up the hill from the other side. Therefore, a traffic sign is set at the foot of the hill warning the drivers. Consider three options:

1. The sign is a picture of children walking right to left, hand in hand (as is customary in many European countries), with the commonly agreed-on framing and colors for warning. The desired effect is, of course, that the sign warns about the children and, hopefully, triggers the action (as an interpretation of the Sign) of the driver slowing the car down. It works for all those drivers who make the connection from the (not-so-illustrative) picture of children in a triangle (which form is arbitrarily chosen) to the predicted risk of hitting the children crossing the road. The drivers need to have the habit of action of slowing down and paying attention to children when perceiving the sign. In this case, the road sign is a Sign as an Icon, emphasizing the iconic aspect of the Sign and the category of Firstness.
2. The sign—be warned, this is the morbid part—is not a road sign, as regulated by traffic legislation. Instead, brake marks, wrecks of smashed cars and victims of the accidents are left by the road side to indicate the risk, pointing at the importance of watching out for children. In this case, the sign is a Sign as an Index, emphasizing the indexical aspect of the Sign and the category of Secondness.

⁷ As Eco says, referencing a central aspect of Peirce's categories, "firstness can be precinded (logically) from secondness but cannot occur in its absence" (Eco, 2000, p.190). See also Ransdell (1979, p. 59).

3. In the third option, the sign says: “Look out! Children at play!” For those who understand written English, it warns about the children, and hopefully, again, prompts the action of slowing the car down. Those who cannot read or do not understand English probably keep speeding. The road sign in this case is a Sign as a Symbol, i.e. in it, the symbolic aspect of the Sign and the category of Thirdness are emphasized. (p. 273-274)

In this example, the different ways signs signify their objects is illustrated cogently. It also becomes clear that it is possible (and indeed probable) for one class of sign to contain elements of other classes to varying degrees. Ojala elaborates this gradient effect as it occurs in the above scene:

Namely, the Symbol (of the category of Thirdness) includes aspects of Secondness (it has an actual existence as a sign, and assumed causal effects on other objects, etc.), and Firstness (it manifests qualities, such as the colors of the letters versus background, etc.). The Index (Secondness) includes aspects of Firstness (qualities of the marks, wrecks, and bodies), and also Thirdness (the representation of danger, the intended mediation between actual accidents of the past and prediction of the risk of future accident, etc.). Likewise, the Icon (Firstness) includes aspects of Secondness (actual existence as a sign, as above), and Thirdness (the negotiated representation of danger and the connection between past and predicted future, as above). (p. 274)

This explanation reflects Eco’s (1976) approach in his *A Theory of Semiotics* when he rejects the project of creating a typology of *signs* in favor of a typology of *sign functions*, the idea being that a particular act of communication activates certain aspects of a sign while repressing others. “We classify aspects of signs not sign themselves, because “a given sign may –more often than not does – exhibit more than one aspect, so that one must recognize differences in gradation” (as cited in Sebeok, 1994, p. 43).

Inherent in this emphasis on sign functions is the implicit understanding that meaning is never frozen but always activated through a particular universe of discourse; a belief that obviously carries much educational relevance. It also reminds us of Peirce’s insistence that the sign is irreducibly triadic. As Mihai Nadin (2015) said, in a lecture at the Tartu International Semiotics Summer School, “a sign cannot be anything less than all three components; the relationship between what is represented (Object), how it is represented (Representatmen), and what is the process of interpretation (Interpretant).” This leads him to insist that in this regard there is no such thing as indexical signs, for they are only index to something else. Nadin recognizes signs as *constructs* that help us to deal with the constant dynamism of the universe; they present us with generalities as a means of capturing distinctions in the world.⁸ This is what this paper attempts to do; not to reduce complex relationships to either indices, icons, or symbols (to fall into the trap of vicious Peircean traidism like many well-intentioned semiotic studies) but rather to remind the reader of a potent indexical element in how these multifaceted relationships manifest themselves through us (the interpreters). Recognizing sign relationships as predominantly indexical, iconic or symbolic is really just a way to capture common experiential patterns, distinctions that help us better contend with our semiotic interactions.

3. Coping With the New

⁸ A perspective, it should be noted, at odds with the biosemiotic one, which sees signs as existentially existent entities and not conceptions of mind.

Jean Piaget and his many disciples have long insisted on the need for novelty in ontogenetic development. We have already established that human thought is auto-regulative, that is a result of the organism's constant actions on and reactions to its environment: "human knowledge is a construction rooted in the most basic biological functions and out of which the structures of intelligence are constructed by man himself" (McManus, as cited in d'Aquil et al., 1979, p. 185). The organism adapts to and organizes its environment through an equilibration process of assimilation and accommodation. In order to create and update internal structures that better contend with an environment that is often in flux and presenting new challenges, the ability to process and contend with novelty is a necessity. Again McManus: "For transformation to occur dis-adaptation in some form must occur in the attempted match between internal structure and its environment" (p. 196).

3.1. The Active Subject

Anthropologists and cognitive scientists (Lancy, Bock, & Gaskins., 2009; d'Aquili et al., 1979) have shown how low stimulation and low complexity environments can cause phylogenic and ontogenetic stagnation. When an environment becomes overly homogeneous and no longer presents its inhabitants with dis-adaptation, the society is forced to either generate the lost complexity—to redraw its cognitive schemas in a new light—or to reinforce its existing societal structures in an attempt to better insulate itself against the unknown.⁹ Often, the individual organism or society takes this later route when it is overtly saturated with new stimuli. When faced with an over abundance of novelty, the organism shuts down—realizing that it can't possibly process such a surplus of new information, it reverts into itself and simply reasserts its existing internal structures—reinforcing the boundaries of its world. The educational significance of this is clear: one of the principle roles of the educator is to be constantly striving to determine how much novelty the student can process before he or she hits this saturation point.

One of the central tenets of this paper is that subjectivity and learning are established in an active (touching and feeling) subject. Through a Peircean lens, as we transition out of the indeterminacy of firstness—of singular and ungeneralized percepts to fully formed perceptual judgments, from initial sensation to the culturally determined conceptualizations inherent in the domain of thirdness—we experience the indexical core of secondness; here, at the footholds of thirdness (the exclusive realm of semiosis), there is a transitory state where we recognize the sensation, the *dynamical object*, as acting upon us, as resisting upon our being. This is the brute force Peirce spoke of; it is the wall we walk into and, through the shock of hitting our nose, realize that there is indeed a wall where we thought there was none (see Eco, 2000). This paper attempts to return attention to this particular domain of being, the site where we experience our first awareness of ourselves as those separate phenomenal beings called *I*, but also the site of what Ranciere (1991) calls *universal learning*; the groping in the unknown process that characterizes the child's first knowledge and interactions.

This type of indexical subject *I* am elaborating can be elucidated through what Damasio (1999) calls the neural self—the type of representation "of the person in the act of perceiving and responding

⁹ Although it may seem rash I feel these two options are general enough to categorize all the phylogenic possibilities of cultural/environmental stagnation.

to what is perceived” (Benson, 2001, p. 36). This is the “third party” representation of the organism interacting with objects in a dynamic and changing environment. According to Damasio (as cited in Benson, 2001), “[o]ur individual identity ... is anchored on this island of illusory living sameness against which we can be aware of myriad other things that manifestly change around the organism” (p. 36). When our conception/representations of self are static and unchanging (as they are for victims of anosognosia) we lose our ability to engage with and *model* our lifeworlds. Without this capacity for mentally envisioning active engagement with the world, the learning faculty is effectively destroyed. So, if it is out of this active dynamic subject that we construct and feel our way through the world, why should educational practice be established around the designation of static and determined knowledge? If, according to Damasio, our sense of self depends upon dynamic and malleable mental representations, why would the learning process be any different? What I am attempting to unravel gradually through this discussion, as we travel across disciplines and ideas, is that the ability to contend with novelty is a necessity for general human flourishing and central to educational praxis. Despite illusions of knowledge being something out there to be decoded (providing one can find the code)—something to be taken on authority (from somebody who already possesses it)—it is actually something *felt* through the corporeal physicality inherent in indexicality.

3.2 Modeling Systems

As warned in my introduction, we now embark on what may appear to be a digression from our main topic, but as my friend and mentor Michael Ling frequently says “the shortest path between two points is often a digression.” Maybe this isn’t the shortest, but I do feel it reveals something important about indexicality not yet explored.

We accommodate and assimilate “the new” by expanding or redrawing our cognized environments—by redefining our *lifeworlds* to incorporate new phenomena. This can be understood as a process of modeling.¹⁰ Modeling, in very general terms, is a way to establish relationships (congruencies and similarities) between two different systems.

Interpretative semiotics informs us that the human being is a semiotic animal—that is an animal who can only know the “outer world” through a patchwork of constructed representations. Indeed, the mathematician Felix Hausdorff made this assertion in the late nineteenth century:

The human being is a semiotic animal; his humanness consists of the fact that instead of a natural expression of his needs and gratification, he acquired a conventional symbolic language that is understandable only through the intermediary of signs. He pays in nominal values, in paper, while the animal in real, direct values.... The animal acts in Yes and No. The human being says Yes and No and

¹⁰ Modeling is a term that, these days, carries many negative connotations. These criticisms, I feel, are rightly attributed to a rigid understanding of modeling as the solidification of experience and environments (how they become operational). This understanding does not convey the complexity and dynamism evident in the foundational work of Robert Rosen and Thomas Sebeok. Since such a detailed study is not possible here, I direct the reader to Rosen’s seminal books on the subject: *Life Itself* (1991) and *Anticipatory Systems* (1985). In particular, see his distinction between Natural and Formal systems. For more of Sebeok’s theory of modelling, see his paper “In What Sense Is Language a ‘Primary Modelling System?’” included in his 1994 book.

thus attains his happiness or unhappiness abstractly and bathetically. Ratio and Oratio are a tremendous simplification of life. (as cited in Nadin, 2014, p. 80)

This insistence on the *zoon semiotikon* is better understood by looking at the mathematician Gödel's definition of complex systems through the criteria of decidability. Nadin (2014) unpacks Gödel's definition: "[A] complex system cannot be fully and consistently described. All other systems (those that can be unequivocally specified) qualify either as simple, or at most, complicated" (p. 78). In his paper "Semiotic Is Fundamental Science," Nadin spells out how the living is characterized by complexity and dynamism. The world of the living is one that we can never know in its entirety. We observe a world in flux—just as I change through this observation, the world changes me. So we formulate representations (semiotic entities) to account for this change; these representations are predictive and anticipatory in nature. There is an assumption (rooted in Galilean Physics; see Ginzberg, 1980) that the non-living is subject to law, that it can be completely described and predicted. This is what Windelband called the *nomothetic*. There is no geometry in nature (no triangles or geometric planes) but this does not mean geometrical constructs cannot help us contend with reality. Nadin shows that the world of physics is no different:

The non-living is subject to prediction. Indeed, the knowledge acquired over time and expressed in scientific laws supports a broad spectrum of successful predictive activities: the entire exploration of outer space is based on such activities; so are the most common uses of machines (cars, TV sets, computers, refrigerators, etc.). The laws of physics and chemistry underlie such practical endeavors. Prediction applied to the living, in the form of medical assessments, for example, corresponds to the misguided notion that since the laws of physics apply to everything material, they apply just as well to life. Some are successful, some are not. (2014, p. 78)

Thus we come to construct our world through representations, selected patterns of experience of which signs are the media. This understanding of truth as construct is the *idiothetic*. The interactions we construct meaning out of are complex: "[S]ince the living is characterized by complexity it follows that any formal representation, including the modeling of the natural system, can only be a reduction" (Nadin, 2014, p. 78). Semiotics provides us with the realization that we can only know the world through semiotic descriptions—this is the domain of meaning, and "(m)eanings do not have to be consistent" (Nadin, 2014, p. 78). We aggregate various systems of representations (those of chemistry, physics, and mathematics, for example) to contend with the constantly transforming complexity of the living. But these representations can only ever be partial. The living constantly exceeds our reach; it is changed the instant we try to pin it down. As Eco says "semiosis explains itself by itself" (1976, p. 71).

Since we can only know and navigate our lifeworlds through these aggregated representations (models), the representations we construct must be flexible and porous enough to accommodate to the dynamism of our environments. In line with research from situated cognition, I believe that in order for this to properly occur (especially in an educational setting), attention and primacy must be returned to indexical representations.

A theory of situated cognition suggests that activity and perception are importantly and epistemologically prior—at a nonconceptual level—to conceptualization and that it is on them that more attention needs to be focused. An epistemology that begins with activity and perception, which are

first and foremost embedded in the world, may simply bypass the classical problem of reference—of mediating conceptual representations. (Brown et al., 1989, p. 41)

Despite some common reductive interpretations, our models (natural rather than formal, see Rosen, 1985) are not primarily constructed on the conceptual level of thirdness. Rather, they emerge through “our fundamental awareness of sensory impressions” (Rosen, 1985, p.45) or percepts (firstness), and our actions in the external world (secondness).

And now that we have our feet wet in modeling theory, we return our attention to education and learning.

3.3 Indexical Learning

In what follows, I present a formalization of indexical learning (building on the pioneering work of Jordan Zlatev in cognitive semiotics) that I feel can be useful for teachers and researchers to conceptualize how students adapt to novelty. To do this, I feel it’s necessary to reduce this complex process to its simplest semiotic components.

Zlatev (2009) has created a formula for conceptualizing the “barebones” conditions for meaning creation across all levels of life; from the single celled organism to the encultured human being. This conceptualization can be understood as a modeling relation:

Extending the analysis presented by Zlatev (2003), where meaning was defined as “the relationship between an organism and its environment, determined by [...] value” (ibid: 258) the concept of meaning in the present theory presupposes (a) subject *S*, (b) a subject-internal value system *V* and (c) a world in which the subject (as being-in-the-world) is embedded, *W*. Thus a particular phenomenon within the world (*p*), which will necessarily transcend (i.e. go beyond) the subject, will have a given meaning *M* for *S*, according to the “formula” given in (1) and illustrated in Figure 1. In other words, the meaning of a given phenomenon, for a given subject, will be determined by the “type” of world (see below) in which both are embedded AND the value of the phenomenon for the subject. If either *p* falls “outside” *W*, or its value for *S* is nil, *p* will be meaningless for *S*.

$$(1) M(p, S) = W(p) * V(p, S) \dots$$

Subject S, world W (the borders of which are determined by the value-system of the subject, V), with phenomenon p, whose meaning is determined by its (type of) value for S. (p. 179–180)

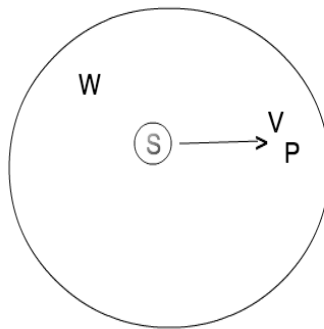


Figure 1. Adapted from Zlatev, 2009, p. 179–180.

Building on Zlatev's (2009) formalization and our previous discussion of modeling theories, it is possible to construct a conceptualization of how organisms (and communities) adapt to novelty:

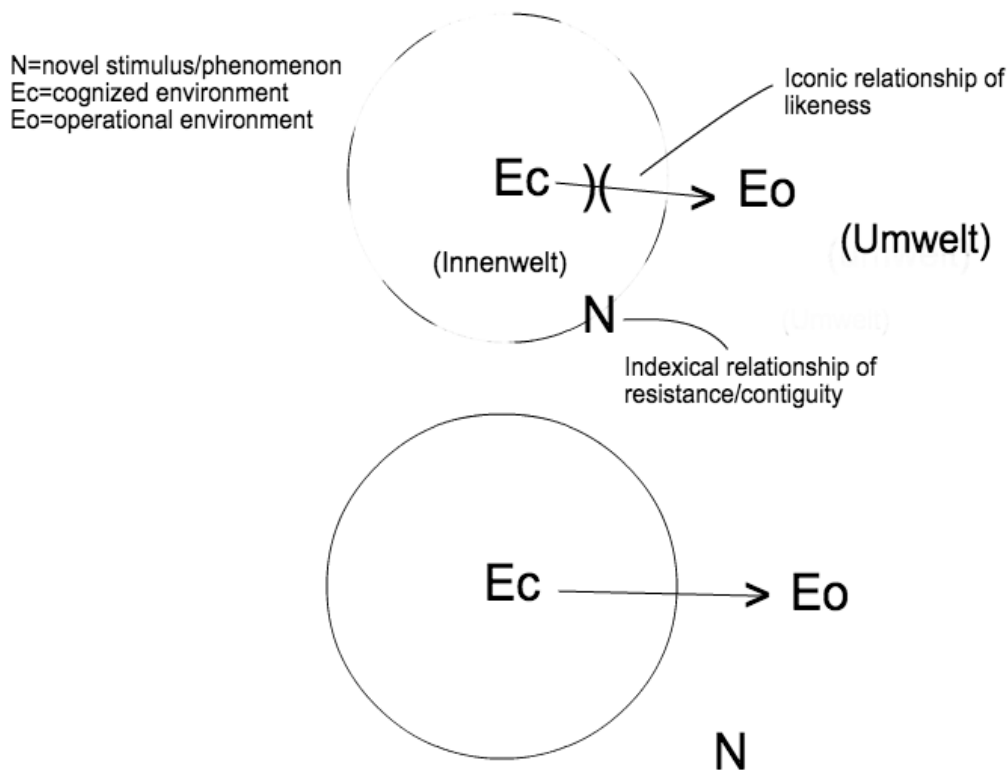


Figure 2. How organisms adapt to novelty.

As stated above, the organism constructs its cognized environment following the principles of *fallibilism*: through the grains of resistance experienced from the operational environment. It must be remembered that we have no direct powers of intuition (Peirce, 1868) and that our modeling of the world is necessarily species specific (Sebeok, 1994). For these reasons, our modeled cognized environments (Ec's) can never be in direct correspondence with our operational environments (Eo's) but are rather bound in an *asymptotic* relationship. To assert that we can ever fully know our Eo's is to be seduced by the great myth of the knowing subject—the idea that we can (with complete decidability) know the infinite complexity of the world of the living. To believe in such a final truth is to imagine that these asymptotic lines can converge. What we learn from Peirce's pragmatism is that belief in an *ultimate final interpretant*, as he called it, is a regulative (almost religious) ideal to drive inquiry and truth seeking, quite regardless of whether or not this truth can ever be reached.

Sebeok has posited that the way a human organism structures/models its *innenwelt* (inner model) after the *umwelt* (outside model) is iconic in saying a model is “essentially a reductive analogy, and therefore ultimately a kind of icon” (Sebeok, 1994, p. 140).

[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. (Petrilli, 2003, p.71)¹¹

The novel stimulus radiating from the organism’s environment calls out to be dealt with—to be either absorbed or rejected. This is a relationship of contiguity and resistance upon our being. It is a relationship that if not directly physical is of a physical nature and thus can be understood as an indexical relationship (even if we cannot detect the object of this stimulus). Recognizing and calling attention towards this primary indexicality is the first step of education; realizing that there is something kicking us, bludgeoning us to react, something out there to adapt to and learn about (Eco, 2000). I see one of the principle goals of semiotics-informed pedagogy as fostering students’ ability to tolerate this space of ambiguity and indeterminacy felt when experiencing something new.

So to reiterate: indexical ways of knowing as an educational process is centered on two main processes, the first dominated by iconicity, and the second dominated by indexicality:

1) Cultivating Indexical Spaces (or spaces sensitive to indexicality). Recognizing the *indexical rub* and not shying away from it. Recognizing that it is through this resistance, this dis-adaptation, that growing occurs. Just as it is through the tension inherent in the literary metaphor which bridges together seemingly disparate fields of discourses that language itself grows and transforms.

2) Gathering 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 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.

So, building on Peirce’s foundational categories, learning must begin in secondness, return to the aesthetic primacy of firstness, and finally use this to inform the symbolic and cultural realm of thirdness.

3.4 Indexicality Towards Intellectual Emancipation

Following Haulseldorf’s recognition that the human is a semiotic animal, we construct and search for vehicles of representations in order to process our changing environment. These representations

¹¹ The zoologist Jacob Van Uexkill’s concepts of *Umwelt* and *Innenwelt* (used extensively in semiotic modeling theory (Danesi and Sebeok, 2000) *in this study* can be understood as mostly corresponding to the concepts of *Eo* and *Ec* (from the pioneering work of biogenetic structuralism; d’Aquila et al., 1979) respectively. It may seem odd to link together a concept of *Umwelt*—which Danesi and Sebeok (2000, p. 202) explain as “the domain that a species is capable of modeling (the external world of experience to which a species has access)” —with a concept of operational environment. Suffice it to say in the limited space afforded me that, according to Sebeok’s (1994) concept of primary and secondary modeling systems, a notion of operational environment is only possible as a regulative hypothesis within a species specifically *human* *Umwelt*. These concepts are linked so the reader may reflect on the connections between semiotics and neuro-anthropology.

can be culturally or personally rooted constructs. In fact, in Pragmatic education (following Peirce's three gradients of clearness; see his 1878/2012 paper "How to Make our Ideas Clear") they should be both, with the objective to instill beliefs in students that they are prepared to act upon. Through this process students find a way of capturing for themselves a particular "pattern of experience" they can return to for reflection. In *The Ignorant School Master* (1991), Ranciere, through his examination of the life of the revolutionary pedagogue Joseph Jacotot, reminds us that this process of "revealing intelligence to itself" (1991, p. 28) is always possible: "There is always something the ignorant one knows that can be used as a point of comparison, something to which a new thing to be learned can be related" (1991, p. 28)¹². A semiotic approach to education is not overtly focused on instilling in students a specific form of competence or literacy, such as math or reading comprehension. Rather, it is about first and foremost nurturing students who possess an aptitude for dwelling in novelty, who are inquisitive and engaged learners; in achieving what Ranciere calls *intellectual emancipation*. When this sort of emancipated learning is achieved, the student will be receptive to new knowledge including the sets of competencies society deems necessary. However, when a student's resistance to novelty is too strong—when it is too insular, when it is too bent on updating its existing internal structures—learning cannot occur, just as meaning cannot be constructed if the organism does not recognize the phenomenon as occurring within their world as in Zlatev's diagram. This is exemplified by the contrasting circles of bounded and porous lines around the Ec in Figure 2. A student's worldview must be porous enough for him or her to see the transformative potential the new stimulus has to offer. This is why Danesi (as cited in Petrilli & Ponzio, 2005) states that the "semiotic capacities of the learner and the determination of his semiotic stage—rather than the subject matter to be learned—should be the focus of education" (p. 229).¹³

As Ranciere (1991) demonstrates, the teacher's role is not to implant a static and preformed knowledge into an empty vessel, the ignorant pupil. To do this would simply perpetuate a hierarchy of intelligences: the teacher's against the student's. Rather, the educator must constantly "read" where the student is situated in her learning process, and from this determine how much direction and support she needs, all the while fostering in her the *will* and the belief that she has the capabilities of learning on her own (without the aid of a master explicator) as naturally as she acquired her first language. The only way to gauge this effectively is to join students actively in the learning process, and not stand idly by as a detached observer; to share in their struggles and tribulations, their successes and breakthroughs. Despite obvious differences in aptitudes and knowledge the teacher and student must start from a place of *equality*. The teacher must leave his or her intelligence "out of the picture" in order to allow the student's intelligence to grapple with the new learning (Ranciere, 1991, p. 13). This process is exemplified by Ranciere's dichotomy of stultification and emancipation, a useful conceptualization for any educator to hold in mind.

There is stultification whenever one intelligence is subordinated to another. A person—and a child in particular—may need a master when his own will is not strong enough to keep him on track and keep

¹² I have shown in my paper "Educating Firstness" (Campbell, 2015) that the art object is particularly well suited for capturing these experiential patterns as it preserves an imprint of our initial aesthetic experience (our firstness moment) before it has been generalized through conventional language systems.

¹³ For a brief summary of the implications of Sebeok's modelling theory for education see; (Petrilli & Ponzio, 2005, pp. 223-230).

him there. But that subjection is purely one of will over will. It becomes stultification when it links an intelligence to another intelligence. (1991, p. 13)

3.5 Finding a Place in the Literature

It is important to emphasize that Peirce himself was experimenting with his ideas of the categories of firstness, secondness and thirdness throughout his career. In this study, I am most focusing on Peirce's later period of thought—what Torill Strand (2013) aptly calls his *rhetorical turn*—where, after abandoning the impossible project of a complete typology of sign types, Peirce turned his focus away from signs as such, towards the *action between signs*, or *semiosis* (Peirce first introduced this concept in his *Johns Hopkins Logic Seminar* of 1883). Semiosis, as many scholars have shown, is the object of Peircean edusemiotic (for more on conceptualizing semiosis as learning, see Cunningham, 1987; Strand, 2013; Semetsky, 2007, p. 209; Noth, 2010). Such a focus on semiosis recognizes that knowledge is “a process, not a static structure to be learned and remembered” (Cunningham, 1987, p. 214). Such an orientation guides us away from reductionist and behaviourist conceptions of education and “sensitizes us to the notion that cognition always involves an interaction between the physical world and the cognizing organism” (Cunningham, as cited in Noth, 2010, p. 3).

But how does this present study fit in with competing educational interpretations of Peirce's ideas? While admittedly in recent edusemiotic literature there has been disagreement about exactly how to treat the category of firstness¹⁴ we can see consensus emerge around the connectedness of firstness to aesthetic experience; a connection, it should be noted, that Peirce stressed throughout his career.¹⁵ Similarly, we can see such congruencies emerge in recent edusemiotic and developmental treatments of secondness; where despite important theoretical distinctions there is notably more agreement than disagreement about what indexicality represents for learning; mainly the recognition that secondness and indexicality offer us insights into a not yet actualized “pedagogy of surprise” (Strand, 2013, p. 801) that places lived experience in a central role (Strand, 2013; McCarthey, 2010; Noth, 2010, p. 2–3; West, 2015). Notably, Colapietro (2013) recognizes the role of secondness and experiential learning through the Peircean notion of contrite fallibilism, quite synonymous with the Piagetian developmental recognition that learning occurs through dis-adaptation. Perhaps the reason for such agreement is that Peirce himself frequently emphasized the educational aspect of secondness:

The idea of second must be reckoned as an easy one to comprehend. That of first is so tender that you cannot touch it without spoiling it; but that of second is eminently hard and tangible. It is very familiar, too; it is forced upon us daily; it is the main lesson of life. In youth, the world is fresh and we seem free; but limitation, conflict, constraint, and secondness generally, make up the teaching of experience (CP 1.358).

I follow Sebeok (and indeed Peirce himself, see CP 2.305) in insisting that iconicity and indexicality are closely related, while other authors (see Sebeok, 1994, p. 88 for some examples of this) have

¹⁴ One need only look at the differences between Semetsky's (2005) study of how *sub-doxastic aboutness*—essentially pre-interpretative cognition—can help address problems of intentionality in education and philosophy of mind, and my paper “Eductaing Firstness” (2015) with its focus on firstness' relatedness to aesthetic experience and the art object.

¹⁵ See Campbell, 2015 for the relevant Peircean passages with analysis.

sometimes polarized them. This is represented in Figure 2 of this paper, where the processes of modelling are seen to contain both iconic and indexical components.

We know that as early as *On a New List of Categories* (1868) that Peirce was stressing the complementarity of the categories. No doubt, Peirce has confused this complementarity at times even saying such loose statements as a sign is “is either an icon, an index or a symbol” (CP 2:304). Following Peirce's swift in focus away from understanding signs as ontological containers towards the processes of semiosis, he would weed out any such thinking, and insist authoritatively on the impossibility of a pure sign: “[I]t would be difficult if not impossible, to instance an absolutely pure index, or to find any sign absolutely devoid of the indexical quality” (CP 2:306).

3.6 But What's New?

But what, the reader may ask, is new in the approach to indexicality I am presenting in this paper? Like the scholars I have surveyed, I too recognize the pedagogy of surprise characteristic of the brute force of secondness. The novelty of my pedagogy of novelty can be summarized in three points:

a) Emphasizing indexical learning's place within three successive and intertwined stages of learning. It is common throughout Peircean edusemiotic scholarship to look at specific Peircean ideas in relative isolation, in order to explore what in each of them can be relevant and applicable to educational discourses. Unfortunately, many of these studies often fail to properly emphasize what I feel to be the richest theoretical understanding Peirce's categories can bring: *their inextricable and fuzzy nature*. In my paper “Educating Semiosis” (in press), I survey the learning processes involved in each of the categories. This is what I have attempted to show through my exploration of Piagetian conceptualizations of ontogeny in Section 2.1: indexical learning's role in the child's formative encounters with the world, displayed alongside iconic and symbolic processes. West (2015) has also explored indexicality from a similar ontogenetic standpoint. As Noth (2010, p. 3–4) does well to demonstrate, Zellmer (1979) pursued a similar approach to Peircean edusemiotics that emphasized the successive and intertwined nature of the categories, and even drew a connection to Piaget's developmental stages, as I have done.

Despite notable differences (specifically in what we emphasize in each category but also in how we present them linearly), Zellmer's early study validates my own insistence that a Peircean edusemiotic should focus on what I have previously referred to as *the palimpsest nature* of the categories as they are involved in conceptualizing the learning process. This is what Noth (2014) demonstrates in his paper “The Semiotics of Learning New Words,” through a careful analysis of a hypothetical lesson from Peirce about a child learning the meaning of the word “balloon”.¹⁶ Peirce demonstrates in this passage that the learning of any new word, and indeed by extension any new learning generally, necessarily involves all three categories.

In sum, Peirce concludes that the proper method of teaching new words requires three signs in one. First, we must learn the symbol as a symbol, that is, as a law whose rules become habits which allow us to use and interpret the symbol in the future. Second, we must learn it indexically, that is, learn to identify individual

¹⁶ “A man walking with a child points his arm up into the air and says, ‘There is a balloon.’ The pointing arm is an essential part of the symbol without which the latter would convey no information” (CP 2.293).

objects which it denotes generally. Third, we must learn it iconically so that the symbol can evoke a mental image of it which conveys information about its qualities, its form, its materiality, how it functions, etc.

It is well known that some methods of language teaching have failed because they focus only on one of the three modes of language competence involved. The method of pattern drill had its focus on the symbolic aspect of words only, the so-called direct method has its focus on the indexical aspect of words, and the audiovisual method has its focus on their iconic aspects. (Noth, 2014, p. 243)

Although I agree with Noth's analysis of Peirce's pedagogical example, I would also insist that there is a more primal level of indexicality, or brute secondness, involved in the child's very receptiveness to the new concept of balloon that many edusemiotic inquiries (Noth's included) do not properly account for. To conceptualize this *primary indexicality* involves, I argue, a biological reduction (hence my reference to literature from theoretical biology and Van Uexkull's concept of *Umwelt*), for it takes us to the very core of issues in sensory perception.

As an aside and a bridge to my next point: Zellmer also validates my use of what many will consider outdated Piagetian theory to conceptualize the processes of semiosis in the organism. Piaget's biological approach to development, as (West, 2015) has more recently demonstrated, in many respects parallels the Peircean triadic understanding that forces in the universe progress from states of pure potentiality (firstness) to complete generalization (thirdness). Following in the wake of these studies, I believe that Peirce's categorical schema can in fact supplement certain inadequacies in the Piagetian framework, specifically Piaget's sometimes determinist tendency to present communication as a secondary process in development. Although it is common in educational discourses to pit Vygotskian ideas against Piagetian ones, I agree with DeVries (2000) that Piaget is often *mislabelled* specifically in the judgement that his theory does not properly account for the role of social and semiotic factors. DeVries (2000, p. 6) insists that it is necessary to separate Piaget the epistemologist from Piaget the child psychologist, and that critics' inability to distinguish these different roles leads to critical misreadings (DeVries, 2000, p. 40).

b) By drawing connections to modelling theory and theoretical biology (Nadin, 2009, 2014; Rosen, 1991; Zlatev, 2009; Danesi & Sebeok, 2000), I attempt to create a barebones formula for indexical learning—a *primary indexicality* that marks the organism's first encounters with the world—useful for pedagogical theorists. Incorporating a Piagetian biological approach to development enables me, in the spirit of thirdness, to find new relationships. Piaget's ontogenetic framework has allowed me to connect these Peircean ideas of indexicality to biologically-oriented theories of modelling. My decision to explore the possibilities of a reduced model of how the organism assimilates and adapts to novel stimulus can be seen as part of a *biosemiotic turn* in recent semiotic scholarship (Kull, 1999). I think edusemiotic scholars can learn much from these new understandings. As Kull (1999) points out, the biosemiotic perspective has the potential to simplify biological processes that remain overly complex and convoluted in a classical determinist framework. Similarly, the biosemiotic perspective has the potential to reimagine certain aspects of the learning process that are not properly expressed under current constructivist or determinist frameworks. In short, Piaget has allowed me to build these bridges.

c) And finally, by unshackling the index from the abstract domain of secondness, I attempt to address more directly the site of experiential learning; the recognition of indexical processes at work in larger semioses. Through my research and teaching, I have come to view indexicality itself

more useful for conceptualizing the learning process than the broader domain of secondness. As expressed in Figure 2, by doing this we can see indexical processes at work in even the largely iconic processes associated with primary modelling (or the construction of an Umwelt), just as we can see indexicality at play in the more abstract and symbolic process of learning new words (as Peirce's above *balloon* example attests). The type of indexical learning I put forward in this paper is found in all these processes, and thus cuts across each of Peirce's categories. *Indexical learning* as I present it here is about recognizing and treating indexicality in all signification processes.

3.7 Indexical Learning in Practice

A student learning a melody by ear can serve as a great example of this educational outline. The student is presented with a melody they have never heard. The melody is longer and more complex than the student is used to. This is a crucial moment for the educator, as the student can easily be overwhelmed and resist the new learning, building up the walls of their world to block out the new stimulus. The educator's *task* at this point is in preparing the grounds so that a student will be receptive and ready to tackle the new learning. Such a receptiveness involves students who are ecologically sensitive to their environments—who can read the subtle indexical markers of their environment and are secure and comfortable in the space of learning: the intellectual and physical environment/culture of the lesson.

The teacher, being a master pedagogue like Jacotot, will have been incrementally increasing the student's receptiveness to the *indexical rub* of new learning throughout their entire relationship. The student, through an *iconic modelling process*, will know how to break down the long melody into recognizable forms they have encountered previously, such as recognizing a particular sequence of intervals, or even just a familiar melodic shape (i.e. ascending stepwise motion followed by a descending leap) they recognize from a piece they've studied previously. By gathering enough *iconic imprints* in the new melody the student will gradually feel comfortable *creatively inferring* (a process of abduction) the unfamiliar parts of the melody; the stepping into the unknown process of indexical learning. Through a continual process of fallibilism (their mistakes in recreating the melody), the student will learn how to recognize the brute force of indexicality as an important pedagogical strategy. By reflecting on the *qualities-of-feeling* of particular mistakes (the sensory dimensions of learning characteristic of firstness), they will learn to recognize in these errors iconic similarities; for example, a particular feeling of playing a third away from a melody (something young children do frequently when trying to sing unison lines) or singing flat or sharp in terms of intonation. As I have repeatedly said, and as Peirce himself frequently emphasizes (see section 3.5), iconicity and indexicality are closely intertwined in the learning processes; the student only realizes indexicality through iconic imprints.

Once these indexical resistances (secondness) are modelled iconically (firstness), they can be conventionalized into general *habits* the student can return to in future learning opportunities (representative of the tendency of all things to take habits, characteristic of the category of thirdness [CP 6.262]). This final step is the process of recognizing what John Poinsett called the *stipulable sign* in his *Tractatus de Signis* (1631–1635/1985); that is, the processes of signification themselves outside of their emergent contexts. To realize the process of semiosis at work in the universe is what defines the *zoon semiotikon*, “the animal that not only uses signs, but knows that there are signs” (Deely, 2000, p. 21), and to realize this potential is the goal of semiotic education, broadly. Thus, just as in Peirce's example

developed by Noth (2014) (see section 3.6 above), all three categories are present. A teacher/learner who is receptive to these intertwined stages of learning can view the learning process in multifaceted ways and see how *all* categories are always present (for in the pure possibility of firstness, secondness and thirdness are always dormant), thus escaping a static and syllogized conception of linear learning stages represented by many developmental approaches (Piaget's included).

4. Concluding Thoughts

What I have presented in this paper is nothing but a reminder of something we all implicitly realize: the site where learning occurs is messy, not easily determined, and entirely tied to the person doing the learning. This site is context dependent, marked by resistance, and realized through action, through doing, through establishing relationships to the knowledge we already possess—not through the passive consumption of preformed ideas. Learning is a natural progression from firstness (the aesthetic and sensory core to experience) to secondness (realization in space and time) to symbolic generalization (inter-subjective representation and communication). But since firstness is not accessible directly (see Campbell, 2015), we must begin with the touching-and-feeling *realness* of indexicality and work our way backwards to uncover imprints of the qualities of feeling that form the bedrock of our perception. Only after this is realized can we return our attention to the conceptual realm (the general and conventionalized domain of thirdness). Although reflection on firstness is in itself unattainable, education must always try to mimic this progression as it represents our own immersion and entry into the world of semiosis.

These learning processes based on the subtle reading of indices are necessarily context related. *The indexical sign is not conventional or symbolic*, and although these patterns of experience can be captured in sign processes to inform future interpretations, they are still at their core born through our engagement with the world and not something culturally induced. Similarly, education informed by these indexical ways of knowing cannot be overtly based on a plan or archetype. My own teaching practice has taught me as much; often learning cannot fit into pre-established forms or follow determined trajectories.

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