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2. SIGNS AS EDUCATORS: PEIRCEAN INSIGHTS

Semiosis defines our essence, and so
we learn, and our learning is itself an
emanation of the universe's own learning.

Its eternal verities [...] never finish
shaping themselves out [...]. And as
we read, we keep turning the pages of a
book of which we all share the authorship,
though not the ultimate one.

De Tienne (2003, p. 52)

LEARNING FROM SIGNS: SEMIOTIC PREMISES

In a weak sense, it should be indisputable that signs are educators. This is the sense in which one can say that we learn from signs, whether from words or numbers, drawings or pictures, gestures or sense data conveyed by “our great teacher Experience,” as C. S. Peirce (1839–1914) calls her (CP 5.51, 1903).

Some will accept the idea that signs are educators only in a metaphorical sense but object to the idea that signs are educators in any stronger sense. Constructivists will object that learners are their own teachers because only they are the ones who construct the development of their knowledge (see Turrisi, 2002, Nöth, 2011). Educators will object that they are the teachers, and the signs they use in class are nothing but their instruments, and among the semioticians we can expect three kinds of objection. The first is the one of those who defended the instrumental theory of the sign, for reasons similar to the ones given by the pedagogues (see Nöth, 2009a). The second is the one of the phenomenologists who, in the tradition of Husserl, are convinced that our experience does not only come from signs but also from sense data perceived immediately, which are hence no signs. The third is the one of the structuralists, who will object that only the sign system can be our great teacher since everything that signs may be able to teach us derives from the system which determines the value of its signs.

The non-metaphorical sense in which we learn from signs is already implicit in the ancient Socratic method of teaching through dialogue, for learning by the maieutic principle is evidently learning from signs. John Dewey went a step further

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when he argued that we learn from communication in general. In his *Pedagogic Creed* (dated 1897, cf. Turrisi, 2002), he writes that

all communication [...] is educative. To be a recipient of a communication is to have an enlarged and changed experience. One shares in what another has thought and felt and in so far, meagerly or amply, has his own attitude modified. Nor is the one who communicates left unaffected. [...] Except in dealing with commonplaces and catch phrases one has to assimilate, imaginatively, something of another's experience in order to tell him intelligently of one's own experience. (Dewey, 1897, p. 6)

To say that we learn from communication is to restrict learning to the acquisition of knowledge from signs communicated in dialogues. The still stronger argument is that we learn from all signs, including those that are only observed and not communicated. This is Peirce's strong argument. Experience that is not communicated comes to us through external signs as well as through internal ones, in thoughts or "mental experience" (CP 4.561, fn 1, ca. 1906). The semiotic premises of this Peircean pedagogy are the following:

1. First, the *definition of the sign*: signs occur in processes of *semiosis*, in which they represent an *object*, a term which includes mental images and ideas, and they create an *interpretant*, an idea, a feeling, or an action resulting from the sign.
2. Second, the *cognitive premises* that "all knowledge comes to us by observation" (CP 2.444, 1903) and that "all our thought and knowledge is by signs" (CP 8.332, 1904), and:
3. Third, and probably the major premise of the following, the premise of the *agency of the sign*, at least of verbal signs, according to which "every symbol is a living thing, in a very strict sense that is no mere figure of speech" (CP 2.222, 1901).

SIGNS AS LIVING SEMIOTIC AGENTS

The premise of the agency of the sign is controversial since it is incompatible with other theories which attribute semiotic agency exclusively to human beings as subjects acting in sign processes. It is this premise of the sign as a "living thing" that makes the thesis of the sign as an educator a strong argument. Let us examine its validity in three steps: first, to clarify why the sign is a semiotic agent at all; second, why and how it is an educator; and third, which signs can educate in which way.

Signs, Life, and Learning as Phenomena of Thirdness

Life, semiosis, and learning are phenomena of Thirdness, the "third universe" of being, according to Peirce's system of categories, which contrasts with the second universe, which "is that of the Brute Actuality of things and facts" whose "Being consists in reactions against Brute forces" (CP 6.455, 1908):

The third Universe comprises everything whose being consists in active power to establish connections between different objects, especially between objects in different Universes. Such is everything which is essentially a Sign – not the mere body of the Sign, which is not essentially such, but, so to speak, the Sign’s Soul, which has its Being in its power of serving as intermediary between its Object and a Mind. Such, too, is a living consciousness, and such the life, the power of growth. (CP 6.455, 1908)

When Peirce says that signs have life in the “very strict sense that is no mere figure of speech” (CP 2.222, 1901; see above), he is actually substituting one figure of speech for another, the metaphor, which he finds too weak, for the hyperbole, which he uses to emphasize his argument that the number of characteristics which signs have in common with life is greater than most scholars assume. Evidently, the argument cannot be that signs are of flesh and blood. Thus, the question that needs to be examined is rather: What are the characteristics according to which signs can be said to have life?

Peirce did not believe that all signs need to be communicated, nor would he think that the ideas which we have result solely from individual human agency, being “mere creations of this or that mind”. In contrast to anthropologists who define symbols as exclusively human inventions, he argued that these signs are endowed with the capacity “of finding or creating their [own] vehicles” of propagation (CP 2.217, 1901). “In a certain sense”, symbols are living organisms. Among the characteristics which qualify them as living beings are: purposive and autonomous (but in a sense vicarious) agency, “the power of bringing things to pass” (CP 2.217, 1901), self- and metareference (Nöth, 2007, 2009b), procreation and self-replication, survival, and death. Let us briefly comment on four of these characteristics, purposiveness, self-replication, autopoiesis, and self-control.

Purposiveness and Intentionality

Peirce writes about the purpose of the symbol: “The symbol, by the very definition of it, has an interpretant in view. Its very meaning is intended. Indeed, a purpose is precisely the interpretant of a symbol” (EP 2: 308, 1904), and more generally of the sign: “The whole purpose of a sign is that it shall be interpreted in another sign” (CP 8.191). With *purpose*, Peirce does not mean the sign user’s intention, but the sign’s intention to represent its object and to create an interpretant, i.e., to “be interpreted in another sign” (MS 1476, 1904). Purpose is thus a semiotic teleology inherent in the sign. Not only uttered or written signs have purposes, but also thought-signs. Their purpose is to act in a mental dialogue in which one thought-sign is “translated or interpreted in a subsequent one” (CP 5.284, 1868). More recently, and in a different context, the argument that signs have purposes has been defended in the framework of cognitive philosophy under the designation of *teleosemantics* (see Nöth, 2009a).

Self-replication and Autopoiesis

A symbol is self-replicative because it only exists in its replication in the form of a replica or token; whereas, insofar as symbols are *legisigns*, they are “a general type or law” (CP 2.249, 1903) acting as “general rules” (CP 4.447, 1903), which do not exist materially. The relevance of Peirce’s type-token dichotomy to the theory of the symbol as a habit becomes evident in the following passage in which Peirce argues:

Take, for example, the word “man”. [...] If the word “man” occurs hundreds of times in a book of which myriads of copies are printed, all those millions of triplets of patches of ink are embodiments of one and the same word. I call each of those embodiments a replica of the symbol (*ibid.*).

The self-replicative power of the symbol *man* thus consists “in the fact that a habit, or acquired law, will cause replicas of it to be interpreted as meaning a man or men” (CP 2.292, 1902). In sum, the symbol is self-replicative since it has “the power of reproducing itself, and that essentially, since it is constituted as a symbol only by the interpretation” (EP 2: 322, 1904, see above).

Symbols are needed to create new symbols: “It is only out of symbols that a new symbol can grow. *Omne symbolum de symbolo*”, writes Peirce (CP 2.302, 1898), who describes this autopoietic potential of symbols with the following example: “Perhaps the most marvelous faculty of humanity is one which it possesses in common with all animals and in one sense with all plants, I mean that of procreation. [...] If I write ‘Let *Kax* denote a gas furnace’, this sentence is a symbol which is creating another within itself” (CP 3.590, c. 1867). The argument is likely to provoke the objection that it is not the symbol itself which creates the new symbol, but the symbol maker. However, symbol makers cannot create symbols independently from the semiotic systems, the syntax, semantics, and pragmatics of symbolic systems which dictate their rules of symbol making. Hence, to the degree that the human mind and its symbolic expressions are molded by the laws of its underlying semiotic systems, symbol makers are restricted and thus determined by the symbols they believe to be creating. In this sense, symbols are their co-authors, and their creators are only semi-autonomous agents when they believe to express “themselves” by means of symbols.

Self-control and Self-correction

Self-control is one of the essential characteristics of life, as Dewey reminds us in the first sentence of his *Pedagogic Creed* where he opposes life and the lifeless as follows:

A stone when struck resists. [...] Never does the stone attempt to react in such a way that it may maintain itself against the blow [...] As long as it is growing [...], a living being is one that subjugates and controls for its own continued

activity the energies that would otherwise use it up. Life is a self-renewing process through action upon the environment. Continuity of life means continual readaptation of the environment to the needs of living organisms. (Dewey, 1897, p. 1)

Signs evince a potential of self-correction, which Peirce interprets as their “vital power of self-control” (CP 5.582, 1898). Self-correction is the form of self-control which takes place through feedback, as it is called in cybernetic terminology (cf. Holmes, 1966). Symbols correct themselves through their resistance against errors and other deviations from the norm of the system which makes them symbols (Nöth, 1979). Furthermore, they have the tendency of resisting against false and other erroneous interpretations, which, in the long run, tend to be corrected. Arguments, for example, are signs whose form tends “to act upon the Interpreter through his own self-control, representing a process of change in thoughts or signs, as if to induce this change in the Interpreter” (CP 4.538, 1906). Language exerts self-control through meta-language, normative grammars, through language about language and logical criticism, which makes language a distinctively human sign system, as Peirce points out, for:

All thinking is by signs; and the brutes use signs. But they perhaps rarely think of them as signs. To do so is manifestly a second step in the use of language. Brutes use language, and seem to exercise some little control over it. But they certainly do not carry this control to anything like the same grade that we do. They do not criticize their thought logically. (CP 5.534, 1905)

The Agency of Signs in Thought

Since thinking is a sign process and “all our thought and knowledge is by signs” (CP 8.332, 1904; see above), the premise of the semiotic autonomy of signs is not only valid for external but also for internal signs, i.e., for thought. This premise is a radical anticipation of an idea, which became central to the structuralists of the second half of the 20th century: we can only think what the signs, which are not our own, allow us to think (see Nöth, 2000, p. 51). For Peirce, this means that it is in some sense wrong to say that we *use* signs; signs are not our tools but the condition of our thinking (Nöth, 2009a). De Tienne (2003, p. 40) comments: “When Peirce made the fundamental discovery that all thoughts were in signs, it was a realization that it was not the mind that authored representations, but representations that authored the mind. Signs are the condition of possibility of the mental phenomenon. To understand the life of the mind, one must first understand the life of signs.”

Adapting a remark which Peirce makes on the illusion of thoughts being in us instead of us being in thoughts, the autonomy thesis of signs can be formulated as follows: “Just as we say that a body is in motion, and not that motion is in a body we ought to say that we are in *signs* and not that *signs* are in us” (CP 5.289, fnP1; “thought” substituted for “signs”).

THE SELF-LEARNING SIGN AND THE GROWTH OF SYMBOLS

Self-correction from errors or for the purpose of adapting to the semiotic environment is a form of autonomous learning. By acquiring new and changing old meanings, signs and sign systems become better adapted to their purpose of creating interpretants. Through learning, signs and semiotic systems grow: “Once in being, [the symbol] spreads among the peoples. In use and in experience, its meaning grows” (CP 2.302, 1898): “How much more the word *electricity* means now than it did in the days of Franklin; how much more the term planet means now than it did in the time [of] Hipparchus. These words have acquired information; just as a man’s thought does by further perception” (CP 7.587, 1866), and against the objection that symbols do not teach us but, at most, learn from us, Peirce objects that

Words might turn round and say, You mean nothing which we have not taught you [...]. In fact, therefore, men and words reciprocally educate each other; each increase of a man’s information is at the same time the increase of a word’s information and vice versa. (CP 7.587, 1866)

If the symbols we use are thus semi-autonomous learners of new information, they are third agents in human communication. They do not act in flesh and blood but by influencing our thoughts, and this agency of growing is virus-like since symbols cannot grow on their own but need human minds to spread and grow. Semiotic agency is “distributed” and the sign producers’ minds become “embodied” outside their bodies. This insight of cognitive scientists subscribing to the current paradigm of “embodied cognition” (Clark, 1997) has its largely unacknowledged foundation in Peirce’s semiotics. In reply to the questions whether we are “shut up in a box of flesh and blood” Peirce answers that the nature of a human being is to become embodied outside of their own bodies: “When I communicate my thought and my sentiments to a friend [...] do I not live in his brain as well as in my own – most literally? True, my animal life is not there but my soul, my feeling, thought, and attention are” (CP 7.591 1866).

The premise of the autonomous semiotic agency of signs is neglected by conventional models of communication, which recognize only two agents, the sender and the receiver. The terms message and code under which the sign is subsumed in these models fail to acknowledge the agency of the third participant in semiosis. Scholars in historical linguistics know better when they recognize the agency of the sign system by saying that languages change instead of saying that languages are being changed by their speakers.

Not only verbal signs and sign systems learn by self-correction in use and evolution (see Nöth, 1979); self-correction also occurs in complex systems and even in mathematical computation (CP 5.575, 1898). Interpretation (CP 7.536, ca. 1899) means learning, and the essence of cognition is one of “mental growth” (CP 1.381, 1890).

Semi-autonomous self-corrective learning is also characteristic of scientific inquiry. “Fully carried out” research evinces “the vital power of self-correction and of growth” since “no matter how erroneous your ideas of the method may be at first, you will be forced at length to correct them” (CP 5.582, 1898). What is true of scientific inquiry is equally true of any reasoning in general. Reasoning by “common sense corrects itself [and] improves its conclusions” (CP 6.573, 1905), and learning is its “preeminent ingredient and quintessence” (CP 1.390, 1899). In fact, “all learning is virtually reasoning” (CP 7.536, ca. 1899).

SURPRISING EXPERIENCE: THE AGENCY OF SECONDNESS IN THIRDNESS

It is a truism that we learn from experience, but it is less trivial to attribute agency to experience in learning and to call it a teacher in “more than a metaphorical sense”; but this is what Peirce does when he attributes the words “Open your mouth and shut your eyes / And I’ll give you something to make you wise” (CP 5.51, 1903) from the traditional children’s game (Figure 1) to “our great teacher, Experience” instead of to a co-player. Does this way of speaking mean that Peirce attributes agency to experience in more than a rhetorical sense?



Figure 1. *Open your mouth and shut your eyes in a 1917 advertisement.*
(Source: <http://etudemagazine.us/2011/06/open-your-mouth-and-shut-your-eyes-and-ill-give-you-something-to-make-you-wise.html>)

In fact, experience and symbols differ in their teaching methods. Whereas symbols teach by genuine thirdness, i. e., by mediating between their object and the interpretant they create, experience begins its lesson with phenomena of secondness, which pertain to the category of the object of the sign and to the “hard facts” of reality. Experience, according to Peirce, is not “made” by us. Instead of “to make an experience”, as the Germans say (*eine Erfahrung machen*), Peirce would prefer the

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English expression “to have an experience”, but his assumptions concerning the role of experience in our lives are still stronger. Knowledge “comes to us by observation” (CP 2.444, 1893), and experience comes to us “from the cognitions which the history of our lives forces upon us” (CP 2.784, 1902):

For what is observation? What is experience? It is the enforced element in the history of our lives. It is that which we are constrained to be conscious of by an occult force residing in an object which we contemplate. The act of observation is the deliberate yielding of ourselves to that force majeure – an early surrender at discretion, due to our foreseeing that we must, whatever we do, be borne down by that power, at last. (CP 5.581, 1898)

The didactic effect of experience is thus one of opposition and shock: “The only way in which any force can be learned is by something like trying to oppose it. That we do something like this is shown by the shock we receive from any unexpected experience” (CP 1.334, 1901). The new information we gather from experience has a kind of compulsive effect, which testifies to its being a phenomenon of secondness:

We are continually bumping up against hard fact. We expected one thing, or passively took it for granted, and had the image of it in our minds, but experience forces that idea into the background, and compels us to think quite differently. You get this kind of consciousness in some approach to purity when you put your shoulder against a door and try to force it open. You have a sense of resistance and at the same time a sense of effort. [...] The idea of other, of not, becomes a very pivot of thought. To this element I give the name of Secondness. (CP 1.324, 1903)

Phenomena of secondness are also addressed when Peirce describes experience as “resisting” the experiencing subject, who reacts, in turn, by surprise.

However, secondness in the form of resistance is only the first step towards learning through experience. In order to be learnt, experience must become transformed into a phenomenon of thirdness since it needs to be interpreted, to involve reasoning. Peirce holds that we cannot learn from sense impressions alone: “In order to convince ourselves that all learning is virtually reasoning, we have only to reflect that the mere experience of a sense-reaction is not learning. That is only something from which something can be learned, by interpreting it. The interpretation is the learning” (CP 7.536, undated).

Returning to the question of agency in the process of knowledge acquisition through observation, we can now conclude that in comparison to symbolic cognition, experience exerts both a stronger and a weaker effect in learning processes. The educational effect of experience is stronger since experience resists against being questioned with the same power by which reality resists against being ignored. The educational effect is weaker than the one of symbols insofar as secondness is predominant in learning through experience, for secondness acts by brute efficient

causality, whereas the causality of thirdness is the more intelligent causality of final causes (see Santaella, 1999).

Strictly speaking, only processes in which final causality is involved can be said to evince agency because efficient causality is blind causality without purpose, but since learning by experience is no longer restricted to secondness when experience is interpreted, Dame Experience can nevertheless be said to be a teacher in more than a metaphorical sense. Peirce's radical anti-constructivist conclusion is that the power of external experience on our mind calls the assumption of its autonomy into question. To call the mind by which we act in semiosis our mind is a self-illusive anacoluthon:

All knowledge comes to us by observation. A part is forced upon us from without and seems to result from Nature's mind; a part comes from the depths of the mind as seen from within, which by an egotistical anacoluthon we call our mind. (CP 2.444, 1893)

HOW SIGNS TEACH NEW INFORMATION

Learning is the acquisition of new knowledge; we only can be said to learn whatever we did not know before. This is another link between learning and experience: "That consciousness of the action of a new feeling in destroying the old feeling is what I call an experience" (CP 8.330, 1904). The same holds true for the process of semiosis in general. The purpose of the sign is to represent its object and "to convey some further information concerning it" (CP 2.231, 1910):

Nothing can appear as definitely new without being contrasted with a background of the old. At this, the [...] infantile scientific impulse must strive to reconcile the new to the old. [...] All knowledge begins by the discovery that there has been an erroneous expectation of which we had before hardly been conscious. Each branch of science begins with a new phenomenon which violates a sort of negative subconscious expectation. (CP 7.188, ca. 1901)

The contrast between the old and the new is also inherent in reasoning in general, and the progress from the old to the new in reasoning explains why we learn while reasoning: "Every reasoning connects something that has just been learned with knowledge already acquired so that we thereby learn what has been unknown. [...] Reasoning is a new experience which involves something old and something hitherto unknown" (CP 7.536, ca. 1899).

The insight that we can only learn whatever we do not yet know makes learning more promising if we have the meta-knowledge of knowing that we do not know. This is why "the first condition of learning is to know that we are ignorant" and why "real inquiry begins when genuine doubt begins and ends when this doubt ends" (CP 7. 322, 1873).

LEARNING FROM ICONS, INDICES, AND SYMBOLS

Insights into the teaching potential of signs can also be derived from Peirce's typologies of the sign in relation to its interpretant (*rheme, dicent, argument*) and its object (*icon, index, symbol*). When Peirce speaks of the sign that conveys "further information" concerning its object, he cannot mean rhematic signs, such as words like "mountain" or "rock". Such signs, which Peirce defines as *rhemes*, cannot teach new information since they cannot affirm, deny, or question anything. Words, as symbolic rhemes, are always vague. "Rock" may mean an almost infinite number of objects. The referent of such a rhematic symbol (rock, mountain...) is only a possible object amongst many others, not an actually existent one. Such signs only represent possible and never really existing objects.

Rhemes, being single words in isolation, do not convey any information. It is logically impossible for a rhematic sign to be also informative. When we want to communicate the information that "this rock is grey" we need to combine the rhematic symbol with indices (this, present tense) and icons (the mental image of color grey), and this combination results in a sign (as a sentence) that is not a rheme anymore but a *dicent*. We can only learn from signs that are at least propositions (dicents) since only they can convey information at all (see Stjernfeldt, 2011, p. 47). For the same reason, icons, indices, and symbols occurring in the form of mere rhematic signs cannot teach anything. Only when they are part of a dicent can they convey information, but even when they are thus combined, their didactic potential differs. We would need to know what a symbol means – by habit -- in order to be able to understand it at all.

Symbols, defined as signs which refer to their objects "by virtue of a law, usually an association of general ideas", teach badly; they are unable to teach new knowledge about the objects they represent since they are only related to their objects because of habits (see Nöth, 2010a). To a learner who does not have the habit which associates the unknown symbol to its object, the new sign is at first incomprehensible; it must be learned by a habit change. Mere words and other abstract conventional signs have no didactic potential. In almost Deweyan words, Peirce has the insight that "thinking in general terms is not enough. It is necessary that something should be DONE" (CP 4.233, 1903).

It is true that educational discourse, to the degree that it consists of verbal discourse, uses symbols as instruments of teaching, but in any verbal and even more so in educational discourse, symbols can only be understood if they become icons and indices in dicents (propositions) and arguments, in the form of which they create mental images indexically related to the experiential world to which they refer. It might be objected that in vocabulary learning students acquire the knowledge of single words, but this is not true because we can learn unknown words only in association with previously known words, which makes the information acquired in vocabulary learning a dicent or proposition of the type *A means B* where *A* functions as a subject and *means B* as the predicate of the lesson taught (see Nöth, 2010b).

Nor can indices alone teach anything; they are uninformative since they can only show without informing. Peirce describes the didactic power of a pure index as follows: “The index asserts nothing; it only says ‘There!’ It takes hold of our eyes, as it were, and forcibly directs them to a particular object, and there it stops” (CP 3.361). In combination with symbols and icons, however, this characteristic of the index makes indices very powerful didactic instruments. Indices serve to relate signs to the learner’s sphere of experience (see Bergman, 2013, p. 15), but to make this experience come alive, symbols and especially icons are needed. As De Tienne (2003, p. 49) puts it: “An index without an icon is blind, a symbol without an index is empty. Pure indexes and pure symbols do not occur, except within the abstract classification of semiotic theory, where their isolation is of course most convenient.”

Icons alone are incapable of teaching because they are inherently vague. A pure rhematic icon has only aesthetic qualities and does not even represent anything in specific (Nöth, p. 2002). On its incapacity to convey meaning, Peirce writes: “The idea embodied by an icon [...] cannot of itself convey any information, being applicable to everything or to nothing” (CP 3.433, 1896). Diagrams and metaphors, by contrast, are great teachers, especially the diagram, which is an “icon of relations [...] aided to be so by conventions” (CP 4.418, 1903), i.e., by symbols. In fact, diagrams are the only signs from which *new* information can be learned.

Maps, e.g., are diagrams by the observation of whose details we can discover relations “which before seemed to have no necessary connection” (CP 1.383, 1890; see Nöth, 2012). This heuristic potential is also apparent in the mental diagrams of deductive reasoning since any syllogism represents its argument by “constructing an icon [...] the relations of whose parts [...] present a complete analogy with those of the parts of the object of reasoning”, and such a mental diagram allows the learner to “discover unnoticed and hidden relations among the parts” (CP 3.363, 1885).

In sum, Peirce’s teaching methodology is based on the advice that those signs teach best which he calls “the most perfect of signs” and about which he says that they “are those in which the iconic, indicative, and symbolic characters are blended as equally as possible” (CP 4.448, 1903). This insight is quite in accordance with the principles of holistic education to which current pedagogy is giving much attention, but instead of restricting itself to the didactics of learning “with all senses” its didactics is one of teaching with signs which do not only relate to the present moment of classroom activity but to experience related to the past and to the future, in a holistic triad inscribed into the typology of signs in the following way:

An icon has such being as belongs to past experience. It exists only as an image in the mind. An index has the being of present experience. The being of a symbol consists in the real fact that something surely will be experienced if certain conditions be satisfied. (CP 4.447, ca. 1903)

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