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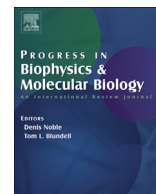


Sungchul Ji

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Neo-semiotics: Introducing zeroness into Peircean semiotics may bridge the knowable and the unknowable



Sungchul Ji

Department of Pharmacology and Toxicology, Ernest Mario School of Pharmacy, Rutgers University, Piscataway, NJ, 08854, USA

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1. Introduction

The Irish author McCann recently wrote as quoted above in his “Letters to a Young Writer” (McCann, 2017). Creative writing differs from scientific writing in that scientists are expected to write *what they know*. However, scientists and creative writers share a common motivation – the *desire to know and write what is yet unknown but knowable*. The main purpose of this article is to present a scientific theory that addresses not only *the unknown* but also *the unknowable*. Traditionally, writing about *the unknowable* has been regarded as belonging to metaphysics, art, religions, or the spiritual science. I, as a chemist-turned-theoretical cell biologist, was ‘forced’ to address *the unknowable* around 2013 (Ji, 2013) as a logical consequence of extending the semiotics (the science of signs) and

“Don’t write what you know,
write toward what you want to know.”

– Colum McCann, 2017

E-mail address: Sji.conformon@gmail.com.

metaphysics of Charles S. Peirce (1839–1914) to include the new category called “Zerone” (and its associated sign referred to as ‘Signless’ or ‘Nilsign’). This new category (which goes beyond Peirce’s famous categories of Firstness, Secondness, and Thirdness) was inferred to exist based on the so-called ‘quark model of Peircean signs’ proposed in 2004 (Ji, 2004; 2017b, Section 6.6). To me, a natural scientist, the notions of the “Zerone” and the “Nilsign” so derived immediately reminded me of the *Unknowable* of Hinduism (Hindu beliefs include a god who is ultimate but unknowable...), the Ineffable of the Daoist philosophy (Cleary, 2017), and the unknowables in quantum physics (e.g., the Heisenberg Uncertainty Principle), mathematics (e.g., the Gödel’s Incompleteness Theorem) and complexity theory (Boxer, 1998).

The theory of everything to be described in this paper is referred to as the *neo-semiotics* whose novel feature is the notion of Zerone or Zero (as an extension of Peirce’s semiotics), from which everything is thought to have originated as outlined in Fig. 1, in agreement with the Zero Totality Theory of Rowlands (2007). The notion of complementarity as first articulated by N. Bohr (1885–1962) (Plotnitsky, 2013) and later generalized as complementarism and applied to biology in (Ji, 2012c, 1993, 1995a) plays a prominent role in the diagram, since it appears in the diagram three times – (i) the Zero as the complementary union of the

knowable and the unknowable, (ii) the knowable as the complementary union of the matter and form, and (iii) the matter as the complementary union of particles and waves. These three different levels of complementarity embedded in Fig. 1 may be viewed as an example of the *irreducible triadic relation* (ITR) that characterizes the semiotics and metaphysics of Peirce (see 1ns, 2ns and 3ns in the center of Fig. 1) (Sheriff, 1994) and has been suggested to be a universal principle manifested in physics, chemistry, biology, mathematics, philosophy, semiotics, and religions (Ji, 2017a,b, Chapter 9). This may be referred to as the “trichotomy of complementarities” in analogy to the “trichotomy of trichotomies” (see Table 5). In this sense, the concepts of trichotomy is common to both Peirce’s semiotics and Bohr’s complementarity (and hence to complementarism (Ji, 1995a)). An anonymous reviewer raised a provocative question:

“... whether the principle of the irreducible triadic relation (ITR) is a principle related to the description of phenomena, or whether it applies directly to the phenomena, irrespective of their description in a theoretical model.”

One possible answer to this question is suggested by ITR itself:

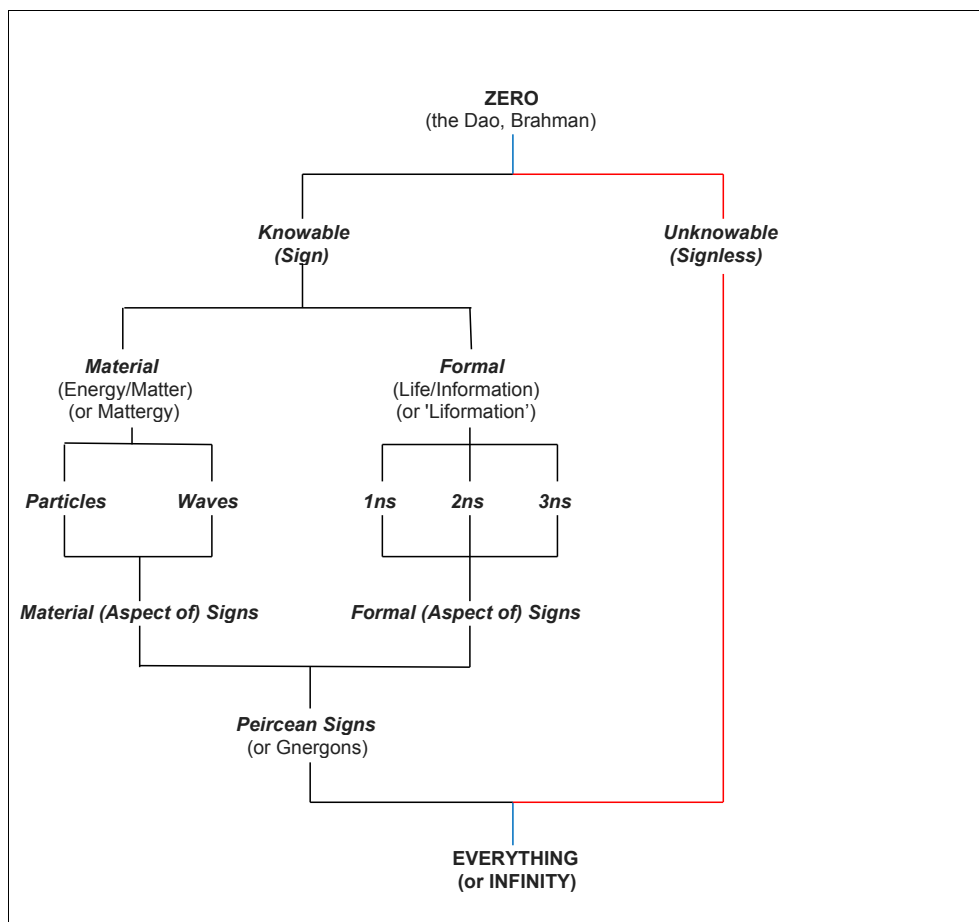


Fig. 1. A Theory of Everything (TOE) that integrates the zero-totality theory of Rowlands (Rowlands, 2007), an expanded version of the Peircean semiotics (Ji, 2013), and the gnergy theory of life (Ji, 2017a) and semiotics (Hindu beliefs include a god who is ultimate but unknowable...). 1ns = Firstness, 2ns = Secondness, and 3ns = Thirdness, adopting the symbolism introduced by Gary Richmond in (Trikonik). ‘Signless’ is also called ‘Nilsign’ (see Section 4). The concept of the Unknowable is the logical consequence of the simple fact that the knowing (or cognitive) capacity of the *Homo sapiens* is limited just as its visual capacity and muscular capability are limited. Since we think in signs, according to Peirce and, since when faced with the Unknowable, our thinking must come to a halt, there must be no sign in our mind to represent the Unknowable. I am assuming that the *Homo sapiens* is endowed with the capacity to experience even the Unknowable. In other words, the Unknowable can be experienced but cannot be represented using Peircean signs and hence must be identified with ‘Signless’ or ‘Nilsign’.

“The principle of Irreducible Triadic Relation (ITR) is irreducibly triadic in that it cannot be reduced to a sign (i.e., ITR, a means of description), or an object (i.e., the physical principle intrinsic to the phenomenon or reality), or an interpretant (i.e., the regularity perceived by the human brain), since these are all the different aspects of the same entity, ITR.”

My intellectual journey starting from chemistry in 1970 and arriving at the theory of everything that admits of the existence of the unknowable around 2013, after passing through various disciplines in the intervening years, is schematically outlined in Fig. 2. Probably the most unusual feature of Fig. 2 is Step 5 which was added in order to ensure the closure of the scheme. If Step 5 is interpreted based on the same semantics of the arrows of the other steps, we are led to conclude that “Without the unknowable, no knowable” or that “The knowable and the unknowable are the complementary aspects of the ultimate reality, which is consistent with the structure of the diagram shown in Fig. 1.

2. The Peircean theory of signs

The American chemist, logician and philosopher, Charles Sanders Peirce, is widely recognized as one of the greatest philosophers ever to emerge in North America. His theory of signs (Buchler, 1955; Goudge, 1969; Hausman, 1997; de Waal, 2001; Sheriff, 1994b; Feibleman, 1946) has been attracting the interest

(Each of the above three aspects) “... serves to bring before the mind objects of a different kind than those revealed by the other species of signs.

of molecular biologists in recent decades (Ji et al., 2001; Hoffmeyer, 2008; Pattee et al., 1996; Umerez, 2001; Stjernfelt, 2014; Brier, 2011).

2.1. The Peircean definition of signs

The study of signs can be traced back to the beginning of the human history. The investigation of signs as a fundamental science did not begin until the Portuguese monk John Poinot (1589–1644) and C. S. Peirce (apparently independently of Poinot) undertook their comprehensive and systematic studies of signs (Deely, 2001). Peirce made a major contribution to philosophy by constructing his *triadic theory of signs*:

“A sign..., is something which stands to somebody for something in some respect or capacity.” (1)

Peirce recognized three major classes of signs.

- a) *Iconic signs* (e.g., portraits, diagrams, tables),
- b) *Indexical signs* (e.g., smoke as a sign of fire, a finger pointing to an apple), and
- c) *Symbolic signs* (e.g., words, sentences, texts).

This division of signs is based on Peirce's realization that *signs* (also called sign vehicles or representamens) exhibit three distinct relations with respect to their *object* (or referent) – *iconic*, *indexical*, and *symbolic* relations. This fact is often interpreted by many as there being three “kinds” of signs, namely, “iconic signs”, “indexical signs”, and “symbolic signs”, but the term “kinds” of signs can be misleading if one takes them to mean separate and independent entities. A more accurate statement is that “there are three aspects to a sign”, so that a sign can exhibit one or more of these three aspects, depending on the context of discourse. I cite below three authors, including Peirce himself, whose quotations support such an interpretation:

- 1) C. S. Peirce cited in (Colapietro, 1996):

...the most perfect of signs are those in which the iconic, indicative [or indexical], and symbolic characters are blended as equally as possible”.

- 2) M. H. Fisch (Fisch, 1983; Fisch, 1986):

“...there are no absolutely pure symbols, indexes, or icons, but that these are elements or aspects that vary greatly in their relative prominence from sign to sign.” (3)

- 3) V. M. Colapietro (Colapietro, 1996):

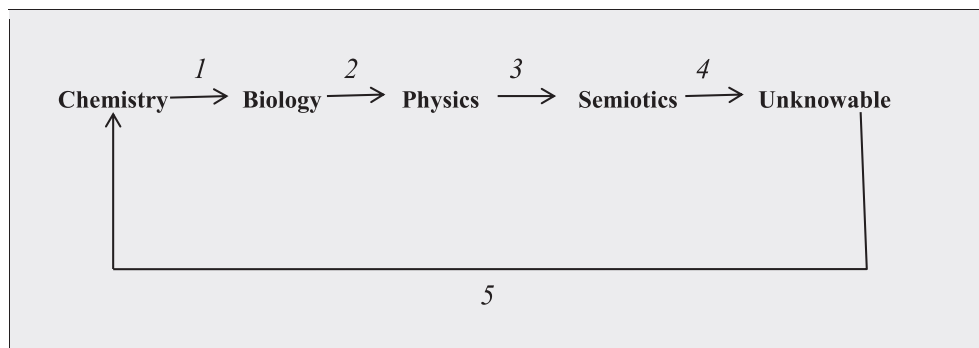


Fig. 2. The intellectual journey from *chemistry* to the *unknowable*, through *biology*, *physics*, and *semiotics*. The symbol, “A → B”, can be read as “without A, no B” or “A leads to B”. Thus the key ideas of the diagram are: 1 = Without chemistry, no life; 2 = Biology and physics may be the complementary aspects of life; 3 = Quarks and signs are isomorphic (i.e., obey a common set of principles); 4 = The unknowable can be inferred from the knowable; 5 = Without the unknowable, no knowable including chemistry.

“...the relation of sign to object may be based on a possible resemblance, an actual reaction, or a habitual connection. Insofar as a sign is related to its object by virtue of a possible resemblance, it functions *iconically*; insofar as this relationship depends on an actual reaction or set of such reactions, it functions *indexically*; and insofar as this relationship results from a habitual connection it functions *symbolically*. The fact that a sign functions in one of these ways does not preclude it from functioning in one or both of the other ways; in fact, the most perfect signs function in all three of these ways.” (4)

In other words, according to Peirce, a sign has an *irreducibly triadic* nature and hence cannot be reduced to any one or pair of its *iconic*, *indexical* and *symbolic* functions. It may be that this *irreducibly triadic nature* of signs ultimately results from the *irreducibly triadic nature* of reality exhibiting the aspects of *Firstness*, *Secondness*, and *Thirdness*. For convenience, we may refer to this doctrine of sign as “*the icon/index/symbol triadicity*” of signs and represent it diagrammatically as shown in Fig. 3:

The essential point of Fig. 3 is that a Peircean sign exhibits *iconic*, *indexical* and *symbolic* functions simultaneously, although the degree of prominence of each aspect may vary from one sign to another.

Three corollaries may be drawn from the *icon/index/symbol triadicity* of Peircean signs:

- 1) Even linguistic marks such as English or Chinese words and sentences, possess, in addition to symbolic functions, their iconic and indexical functions.
- 2) Molecular signs such as hormones, RNA and DNA segments possess symbolic functions in addition to their iconic (e.g., structural complementarity between hormones and their

receptors) and indexical functions (e.g, free energy of interactions between DNA and DNA-binding proteins during gene expression).

- 3) Elementary particles of physics may be regarded as Peircean signs with iconic and indexical functions predominating and their symbolic functions suppressed, waiting to be reified or instantiated when a right set of environmental conditions presents itself.

Finally, it should be pointed out that the triadic definition of a sign given by Peirce and that of a mathematical category are almost identical (see Fig. 5 and Section 2.1 in (Ji, 2017a)), and that some mathematicians and theoretical physicists believe that physics and mathematics can be unified under the framework of the category theory (Burgin, 2011; Spivak, 2013).

2.2. Peircean categories: Firstness, Secondness and Thirdness

Peirce maintained that everything or every phenomenon in the Universe comprises three basic “irreducible” categories or elements called *Firstness*, *Secondness*, and *Thirdness*. One way to get a feel for

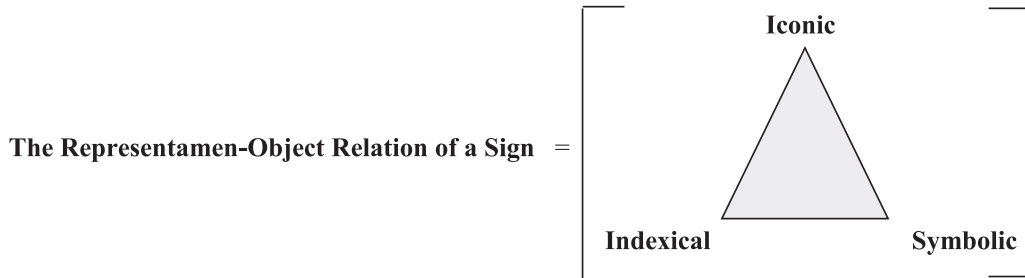


Fig. 3. A schematic representation of the *icon/index/symbol triadicity* of the Peircean sign. The square bracket symbolizes the irreducibility of the triad, i.e., none of the three vertices can be removed or replaced by other vertices.

Table 1
The evolution of Peirce's definitions of categories. Reproduced from (Debrock, 1998) except items #8 and #9.

Year (Peirce's age)	Firstness	Secondness	Thirdness
1867 (28)	1. quality	relation	representation
1891 (52)	2. first	second	Third
	3. spontaneity	dependence	mediation
	4. mind	matter	evolution
	5. chance	law	tendency to take habits
	6. sporting	heredity	fixation of character
	7. feeling	reaction	mediation
1894 (55)	8.		learning
	9.		government
1896 (57)	10. quality	fact	law
1897 (58)	11. ideas of feelings	acts of reaction	habits
	12. quality	shock/vividness	
	13. feeling	reaction	thought
1898 (59)	14. quality	reaction	mediation
	15. first qualities/ideas	existence/reaction	potential/continuity

the meaning of these categories is through some of the examples that Peirce gave of these categories throughout his career. These are collected in Table 1, which was adopted from (Debrock, 1998). It is evident that the examples are not logically rigorous (indeed they are “vague” and even seemingly contradictory in some cases), having some overlaps here and there and missing some examples. Nevertheless, it is possible to recognize (i) the unmistakable family resemblances among most of the items listed within each category (or column), and (ii) distinct family characteristics present among the three categories within each row.

2.3. Peircean signs as gnergons – complementary union of information and energy

Peirce explains how signs can be divided into a total of nine classes (Sheriff, 1994a):

“Signs are divisible by three trichotomies; first, according to as the sign itself is a mere quality (*‘qualisign’*; my addition), is an actual existent (*‘sin sign’*), or is a general law (*‘legisign’*); secondly, according as the relation of the sign to its object consists in the sign’s having some character in itself (*‘icon’*), or in some existential relation to the object (*‘index’*), or in its relation to an interpretant (*‘symbol’*); thirdly, according as its interpretant represents it as a sign of possibility (*‘rheme’*) or as a sign of fact (*‘dicent sign’*) or a sign of reason (*‘argument’*).”

(5)

The above classification of signs by Peirce is summarized in Table 2.

There are a total of nine types of signs in Table 2. I suggest the following ideas for the possible connection between Peircean signs and the concept of the complementarity proposed by Niels Bohr (as generalized in 1993–5 (Ji, 1993, 1995a)) (see Statement (11)):

- 1) Each of the nine types of signs appearing in Table 2 has a dual aspect (reminiscent of the wave/particle duality of light) – the ontological (or material) and the phenomenological (or formal) aspects.
- 2) The ontological/material aspect of a sign can be identified with energy/matter properties, while the phenomenological/formal aspect with informational properties.
- 3) Therefore, Peircean signs given in Table 2 can be viewed as examples of what I called “gnergons” in (Ji, 1991a), defined as discrete units of **gnergy**, the complementary union of energy (*‘ergons’*) and information (*‘gnons’*) that is postulated to be the ultimate cause of, or ground for, all self-organizing (or pattern-forming) processes in the Universe (Ji, 1995a). It should be pointed out that the energy aspect of **gnergy** includes free energy which in turn includes energy and thermodynamic entropy (different from information-theoretic entropy). Hence gnergy can be viewed as the **irreducible triad** of energy, entropy, and information.
- 4) Since all sign processes (or *semiosis*) can be viewed as species of self-organizing processes, ultimately driven by the free

Table 2

The classification of signs according to the ontological/material trichotomy (first row) and the phenomenological/formal trichotomy (first column). Adopted from (Sheriff, 1994a).

	Firstness (<i>Potentiality</i>)	Secondness (<i>Facts, Actuality</i>)	Thirdness (<i>Law, Habits</i>)
Firstness (<i>Sign</i>)	Qualisign	Sinsign	Legisign
Secondness (<i>Object</i>)	Icon	Index	Symbol
Thirdness (<i>Interpretant</i>)	Rheme	Dicent Sign (or <i>Dicisign</i>)	Reason (or <i>Argument</i>)

Table 3

A comparison between the physical dimensions of the macroscopic and microscopic sign processors. Notice that the linear dimension of the human body is about five orders of magnitude greater than that of the cell. Adapted from (Ji et al., 2001).

Parameters	Human Body	Cell
1. Size	Macroscopic	Microscopic
Linear size (m)	~1	~10 ⁻⁵
Volume (m ³)	~1	~10 ⁻¹⁵
2. Number of cells involved	~10 ¹³	1
3. Signs used for communication	Words & sentences	Molecules
Linear size (m)	~10 ⁻³	~10 ⁻⁸
Volume (m ³)	~10 ⁻⁹	~10 ⁻²⁴
4. Mechanics obeyed	Classical	Classical and quantum
5. Thermally stable at ~25° C	Yes (i.e., rigid)	No (i.e., deformable)
6. Powered (or driven) by	Chemical reactions	Chemical reactions

energy of exergonic chemical reactions (e.g., ATP hydrolysis or oxidation of NADH) or physical processes (e.g., solar radiation, the Big Bang, etc.), it would follow that gnergons are the ultimate causes (or drivers) of semiosis (Ji, 1995a).

5) According to complementarity (Ji, 1995a), a scientific metaphysics rooted in both contemporary biology and Bohr’s philosophy of complementarity (Plotnitsky, 2013), the ultimate reality is a complementary union of information and energy, i.e., *gnergy*, a new word formed by combining “gn-” from gnosis (meaning knowledge) and “-ergy” from ergon (meaning work or energy). Discrete units of gnergy are referred to as “gnergons”. Since signs are examples of gnergons, it may be concluded that Peirce’s semiotics falls within the domain of the application of complementarity. This claim may be supported by the following arguments:

- (a) Peirce’s semiotics deals mainly with macroscopic signs, i.e., signs with macroscopic dimensions. The birth of molecular biology was about four decades away when Peirce died in 1914 (Brent, 1993).
- (b) Complementarity can be applied not only to Peirce’s semiotics (as suggested above) but also to molecular and cell biology, as evident in the formulation of theory of “micro-semiotics” based on the gnergy concept (Ji et al., 2001; Hoffmeyer, 2008). Microsemiotics can be regarded as synonymous with the twin theories of the living cell known as *biocybernetics* and *cell language theory* (Ji, 1997, 2017a; Ji et al., 2001) as indicated by Eq. (6). It is also possible to refer to the combination of biocybernetics and cell language theory as ‘molecular information theory’ (Ji et al., 2004a). In other words, ‘microsemiotics’ and ‘molecular information theory’ are synonymous.
- (c) Thus the following relations suggest themselves, i.e., Eq. (6) through (9):

- A = Complementarity
- B = Macrosemiotics
- C = Microsemiotics
- D = Peirce’s semiotics
- E = Biocybernetics/Cell Language Theory
- F = Molecular Information Theory

$$\begin{aligned}
 A &= B + C \\
 &= D + E \\
 &= D + F
 \end{aligned}
 \tag{6}$$

Secondness = Complementarity in physics (e.g., the wave/particle duality of light)

Thirdness = Complementarity in psychology (e.g., hysterical anesthesia of William James (Stephenson, 1986)), physiology (i.e., the left/right hemispheric specialization (Cook, 1986)), and molecular and cell biology (e.g., the information/energy complementarity of gnergy (Ji, 1995a))

Consistent with Peirce's triadic ontology, the principle of complementarity itself may be manifested in the Universe in three distinct modes:

Firstness = Complementarity in metaphysics (e.g., Yin and Yang as complementary aspects of the Dao of Lao-tzu (Henricks, 1989); Extension and Thought as complementary aspect of Substance of Spinoza (Scruton, 1999); Body and Mind as complementary aspects of Flesh of Merleau-Ponty (Dillon, 1997))

These ideas are schematically represented in Fig. 4. If the ideas expressed in Fig. 4 turn out to be valid, the divergence of physics and metaphysics that has been going on since Galileo's experiments with falling bodies in the 17th century may be reversed through the mediating role of the life sciences of the 21st century. In other words, the principle of information/energy complementarity manifest in biology (Ji, 1995a) may provide the

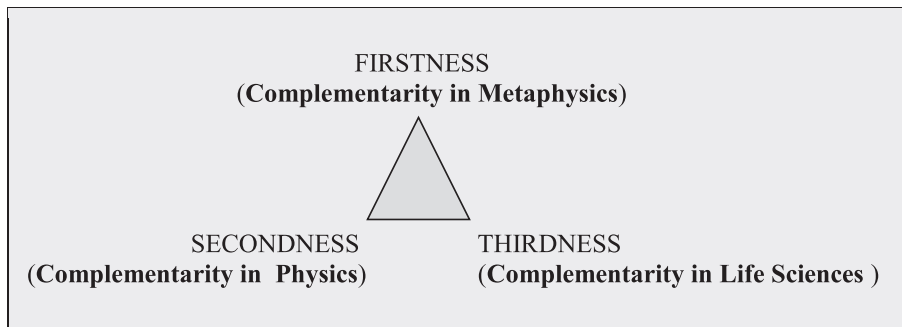


Fig. 4. The three modes of manifestations of the principle of complementarity also called “general complementarity” (Ji, 1995a)). Life sciences as Thirdness, may serve as the mediator between metaphysics and physics.

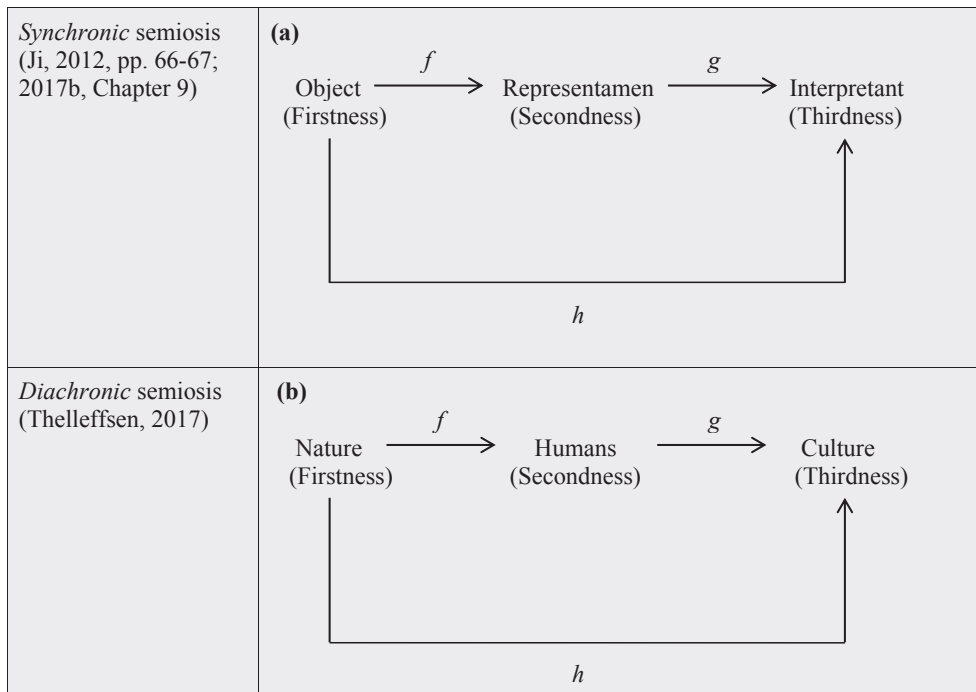


Fig. 5. The synchronic and diachronic aspects of semiosis represented as irreducible triads (Ji, 2015a, 2017b, Chapter 9). (a) f = sign production; g = sign interpretation; h = information flow or grounding. It should be pointed out that Steps f and g are energy-dependent while Step h is code- or information-dependent (Ji, 2012b, Table 4.1). Hence, since semiosis is driven by both energy and information, it can self-organize [Ji, 2012b, Section 3.1]. (b) f = biological evolution; g = cultural evolution; h = information flow or grounding. The three-node network is irreducible and synonymous with the commutative triangle in category theory (Brown and Porter, 1989; Spivak, 2013). That is, operations f followed by g leads to the same result as operation h , i.e., $f \times g = h$.

theoretical framework to integrate metaphysics (science of information ?) and physics (science of energy).

2.4. Macrosemiotics vs. microsemiotics

Peirce did not have access to the empirical evidence that came to light only in the mid-20th century, indicating that semiotic processes are not confined to the macroscopic human world but also occur in nature at the molecular level (Ji et al., 2001; Hoffmeyer, 2008; Pattee et al., 1996; Umerez, 2001; Stjernfelt, 2014; Brier, 2011). Despite the huge difference in the size of the sign processors involved (see Table 3), it is surprising to find that there appears to be a set of principles that is common to the semiotic processes on both the human linguistic and the molecular biological levels (Ji et al., 2001; Hoffmeyer, 2008; Pattee et al., 1996; Umerez, 2001; Stjernfelt, 2014; Brier, 2011).

2.5. Diachronic vs. synchronic aspects of semiosis

The father of modern linguistics, Ferdinand de Saussure, distinguished between *synchronic* and *diachronic* aspects of linguistics (Saussure, 2001). Since linguistics is a specialized branch of semiotics, it is likely that semiotics embodies these concepts as well, which are described in (Synchrony and Diachrony) as follows:

As shown in Table 5, Peirce divides signs into 9 types based on

“Synchrony and diachrony are two different and complementary viewpoints in linguistic analysis. A synchronic approach (from Greek *συν* – “together” and *χρόνος* “time”) considers a language at a moment in time without taking its history into account. Synchronic linguistics aims at describing a language at a specific point of time, usually the present. By contrast, a diachronic approach (from *δια* – “through” and *χρόνος* “time”) considers the development and evolution of a language through history...”

(10)

the so-called “three trichotomies”, namely, (i) Qualisign-Sinsign-Legisign, (ii) Icon-Index-Symbol, and (iii) Rheme-Dicent sign-Argument (Sheriff, 1994; Thellefsen, 2017). It is proposed here that Table 5 can be read in two complementary ways – *synchronically* and *diachronically* and these readings can be diagrammatically represented as shown in Fig. 5. The symbol, “A → B”, can be read as “A determines B”, or “B presupposes A”. Although the names of the nodes are dramatically different, both diagrams share the same structure or relation referred to as the *Irreducible Triadic Relation* (ITR) (Ji, 2017b, Chapter 9) which is postulated to be a universal principle (Ji, 2015b).

2.6. Schelling, Peirce, and Bohr: philosophers of complementarity

According to Gare (2007), Peirce belongs to the Schellingian tradition of natural philosophy which is “committed to doing full justice to both mathematical physics and free human agency while overcoming Cartesian dualism.”

It appears to me that the Schellingian tradition (Friedrich Wilhelm Joseph Schelling) shares a common ground with Bohr's complementarity philosophy. To the extent that this assumption is true, Peircean metaphysics may also embody complementarity, for example, as shown by the two complementary ways of reading the *three trichotomies* depicted in Fig. 5 and by the *formal-ontological complementarity* embodied in the synchronic aspect of semiosis as mentioned in Table 5.

The concept of complementarity emerged in 1926–7 from the intense discussions that transpired between Bohr and his then-assistant Heisenberg in the wake of the latter's discovery of the *matrix mechanics* and *uncertainty relations*. Bohr discussed his philosophy of *complementarity* in public for the first time at a meeting held in Como, Italy, in 1927 and published the first paper on complementarity in 1928 (Bohr, 1928; Camillieri, 2007). In 1958, Bohr summarized the concepts of *supplementarity* and *complementarity* as follows (Bohr and Klibansky, 1958):

“...Within the scope of classical physics, all characteristic properties of a given object can in principle be ascertained by a single experimental arrangement, although in practice various arrangements are often convenient for the study of different aspects of the phenomenon. In fact, data obtained in such away simply supplement each other and *can be combined* into a consistent picture of the behavior of the object under investigation. In quantum mechanics, however, evidence about atomic objects obtained by different experimental arrangements exhibits a novel kind of *complementary relationship*.”

(11)

Indeed, it must be recognized that such evidence which appears contradictory when combination into a single picture is attempted, exhausts all conceivable knowledge about the object. Far from restricting our efforts to put questions to nature in the form of experiments, the notion of *complementarity* simply characterizes the answers we can receive by such inquiry, whenever *the interaction between the measuring instruments and the objects forms an integral part of the phenomenon.* (my italics)”

3. The quark model of the peircean sign (Ji, 2004)

There is a striking family resemblance between particle physics and Peircean semiotics. There are at least 11 instances in physics where the number 3 plays an essential role as in Peircean semiotics, as pointed out by Christiansen (2003):

- (1) 3 generations of elementary particles – quarks (2nd row in Table 4) and leptons (3rd row). The electric charges of the elementary particles are given on the left-hand side of the first column, which applies to the second and the third columns as well. The mass of each quark is given in the angled brackets in the unit of 10^6 electron Volts.
- (2) Heavy nuclear particles, or baryons, consist of 3 quarks.
- (3) Quarks have 3 colors – red, green, and blue.

Table 4

3 generations of elementary particles. The mass of the elementary particles belonging to each generation increases in the order $1 < 2 < 3$, which reflects the order of discovery: The accelerators measuring light particles were developed before those able to detect heavier ones.

Generation 1	Generation 2	Generation 3
+2/3e: up (u) [5]	charm (c) [350]	top (t) [>80]
-1/3e: down (d) [9]	strange (s) [160]	bottom (b) [4800]
-1e: electron	Muon	Tauon
0: electron neutrino	muon neutrino	taun neutrino

- (4) Quarks have strange electric charges, each being $1/3$ of the electron's charge, e.
- (5) Particles have 3 internal properties – spin, mass, and charge.
- (6) Particles undergo 3 kinds of interactions – strong, electro-weak, and gravitational.
- (7) Strong interactions are mediated by $2^3 = 8$ gluons.
- (8) Quarks and leptons interact weakly mediated by 3 intermediate vector-bosons.
- (9) Space has 3 dimensions.
- (10) There are 3 types of units - length, mass, and time.
- (11) There are 3 *fundamental constants* of nature – the Planck constant (h), the speed of light (c), and the gravitational constant (G).

In addition, the number three appears in the following contexts:

- 1) The smallest unit of all networks or mathematical categories comprises three elements – the *initial* and *final nodes* and the *arrow* connecting them (Burgin, 2011).
- 2) The probability theory of Kolmogorov comprises *three and only three* axioms; (1) $0 < p < 1$, (2) $p + p' = 1$, where p' is the complement of p , and (3) $p(A + B) = p(A) + p(B)$.
- 3) Most of chemistry and biology can be accounted for in terms of the interactions among 3 *particles* – *photons, electrons, and protons*.
- 4) There are only *three major classes of polymers* in living systems – nucleic acids, proteins, and carbohydrates.

“We have already defined *Firstness, Secondness, and Thirdness* as *ontological modes of being* (possibility, fact, and law) and as *experienced in consciousness* (feeling, reaction – sensation, and general conception). When Peirce analyzed his definition of a sign (as *representamen – object – interpretant*) in relation to each of these categories, he concluded that a sign or representamen is one of three kinds (*Qualisign, Sinsign, or Legisign*); it relates to its object in one of three ways (as *Icon, Index, or Symbol*); and it has an interpretant that represents the sign as a sign of possibility, fact, or reason, i.e., as *Rheme, Dicient Sign, or Argument*. These three sets of three terms are the '*trichotomies*' in Peirce's semiotic. The strange words in this paragraph have evoked much confusion and disgust and have been obstacles to the influence of Peirce's thought. But if we keep the following in mind, these terms become quickly understandable : the first term in each trichotomy describes the *Firstness* of the sign, object, and interpretant; the second term in each trichotomy describes the *Secondness* of the sign, object, and interpretant; and the third term in each trichotomy describes the *Thirdness* of a sign, object, and interpretant.”

- 5) The human brain is constructed out of the *three main functional structures* – the right and left hemispheres, and the corpus callosum that connect them (Cook, 1986).

These examples strongly support the notion that there is

something fundamental about the number 3 in particle physics and semiotics as well as in other fields, perhaps because all material entities and processes in the Universe (including the human brain) are derived from *energy*, defined as the complementary union of *information* and *energy* (Ji, 2012a) and the concept of *complementarity* itself may be *irreducibly triadic* in a certain sense.

3.1. The 9 types of signs

Peirce defined 9 types of signs (see Table 5) and 10 classes of signs based on these 9 types (Sheriff, 1994a) (see Table 6). For convenience, I will refer to the former as e-signs (“e” standing for “elementary”) and the latter as c-signs (“c” standing for “compound” or “composite”). But it is not clear to me how Peirce derived the 10 classes of what are here called c-signs from the 9 types of e-signs. Sheriff provides a clear rationale for deriving 9 types of signs in (Sheriff, 1994a). Before quoting Sheriff, the following preliminary information is provided to facilitate understanding what Sheriff has to say:

- 1) According to the metaphysics of Peirce, there are three and only three modes of being in the Universe, *Firstness, Secondness, and Thirdness* (Buchler, 1955, pp. 75–76).
- 2) The term “sign” is used in two ways – as a triadic entity, i.e., as the “representamen-object-interpretant” triad, or as a monadic entity, i.e., as “representamen”. Representamen is also called “sign vehicle”, and “interpretant” is the effect a sign has on the mind of the interpreter.
- 3) Peircean “trichotomies” (i.e., the action or results of cutting something into three) refer to the following three sets of three terms (see Table 5):
 - i) qualisign, sinsign, legisign (called the *Firstness trichotomy* (Thellefsen, 2017))
 - ii) icon, index, symbol (called the *Secondness trichotomy* (Thellefsen, 2017))
 - iii) rheme, dicient sign, argument (called the *Thirdness trichotomy* (Thellefsen, 2017))

(12)

The following quote from Sheriff (1994a) describes how Peirce arrived at his 9 types of signs:

The content of the above paragraph is summarized in Table 5, which shows the *formal* (see the left-most column) and *ontological*

Table 5

The three trichotomies of Peirce or the 9 types of signs (e-signs). The parentheses symbolize the synchronic aspect of the sign while the square brackets symbolize the diachronic aspect as defined in Section 2.5.

	Firstness (1) (Quality, Possibility)	Secondness (2) (Actuality, Reaction)	Thirdness (3) (Law, Habit, Representation)
Firstness (1) (Representamen) [Sign of Nature] (Thellefsen, 2017)	Qualisign (S _{1,1})	Sinsign (S _{1,2})	Legisign (S _{1,3})
Secondness (2) (Object) [Sign of Humans] (Thellefsen, 2017)	Icon (S _{2,1})	Index (S _{2,2})	Symbol (S _{2,3})
Thirdness (3) (Interpretant) [Sign of Culture] (Thellefsen, 2017)	Rheme (S _{3,1})	Dicent sign (S _{3,2})	Argument (S _{3,3})

(the upper-most row) characters of e-signs. This table also proposes a new system of notation of e-signs.

Each of the 9 signs in Table 5 can be represented as S_{i,j}, where S indicates ‘sign’, the first running index i refers to the formal category (i.e., the rows), and the second running index j refers to the ontological category of S, an elementary sign (i.e., the columns). Both i and j run from 1 to 3. For example, e-S_{1,3} denotes Legisign, and e-S_{2,1} refers to Icon, etc. The traditional names of the e-signs are given above the systematic names.

3.2. The 10 classes of signs

According to Peirce, an embodied sign is composed of 3 elementary signs. That is,

$$c\text{-Sign} = 3 \text{ e-Signs} \tag{13}$$

Unlike baryons which are unordered sets of 3 quarks, c-signs are ordered (and hence ‘informed’) sets of three e-signs:

$$c\text{-Sign} = \{(S_{3,j}), (S_{2,j}), (S_{1,j})\} \tag{14}$$

The 10 classes of signs defined by Peirce in the form of Eq. (14) are listed in Table 6.

Two features of the 10 c-signs given in Table 6 are noteworthy:

- 1) The epistemological categories (i.e., the i values) of the e-signs in a c-sign decreases as 3, 2, and 1 in conformity with Eq. (14)
- 2) The ontological categories (i.e., the j values) of the 3 e-signs constituting a c-sign obey the following rules:

$$\begin{aligned} & \text{“The } j \text{ value of } (S_{1,j}) \text{ cannot be lower than the } j \text{ value of } (S_{2,j}), \\ & \text{which in turn cannot be lower than the } j \text{ value of } (S_{3,j}).\text{”} \end{aligned} \tag{15}$$

Alternatively, since a c-sign can be represented as S_{i,j,k}, with 3 sub-indexes, i, j, k, each representing interpretant, object, or representamen (see the symbols in red in Table 6), all of the 10 c-signs in Table 6 can be represented simply as S_{i,j,k} with the sub-indexes obeying the following rule:

$$i \leq j \leq k \tag{16}$$

Table 6

The 10 classes of c-signs. The new codes (one in black and the other in red) for each class is given below the traditional designation.

Class	Compound Sign (c-Sign)	Example
First	Rheme-icon-qualisign (S _{3,1})-(S _{2,1})-(S _{1,1}) or S _{1,1,1}	Feeling of red
Second	Rheme-icon-sinsign (S _{3,1})-(S _{2,1})-(S _{1,2}) or S _{1,1,2}	An individual diagram
Third	Rheme-index-sinsign (S _{3,1})-(S _{2,2})-(S _{1,2}) or S _{1,2,2}	A spontaneous cry
Fourth	Dicent sign-index-sinsign (S _{3,2})-(S _{2,2})-(S _{1,2}) or S _{2,2,2}	Pointer position of a meter
Fifth	Rheme-icon-legisign (S _{3,1})-(S _{2,1})-(S _{1,3}) or S _{1,1,3}	Circuit diagram Computer icon
Sixth	Rheme-index-legisign (S _{3,1})-(S _{2,2})-(S _{1,3}) or S _{1,2,3}	A demonstrative pronoun
Seventh	Dicent sign-index-legisign (S _{3,2})-(S _{2,2})-(S _{1,3}) or S _{2,2,3}	A street vendor’s cry
Eighth	Rheme-symbol-legisign (S _{3,1})-(S _{2,3})-(S _{1,3}) or S _{1,3,3}	A common noun
Ninth	Dicent sign-symbol-legisign (S _{3,2})-(S _{2,3})-(S _{1,3}) or S _{2,2,3}	A proposition
Tenth	Argument-symbol-legisign (S _{3,3})-(S _{2,3})-(S _{1,3}) or S _{3,3,3}	Inference (abduction, induction, deduction)

where the symbol “≤” reads “less than or equal to” or “not greater than”. The rules given in (15) and (16), which are equivalent, is referred to as the “Peircean selection rule” (PSR).

3.3. The derivation of the 10 classes of signs from 9 types of signs based on the analogy between e-signs and quarks

To the best of my knowledge, Peirce did not provide any justification as to why three (and not some other numbers) of e-signs constitute a c-sign. This gap may be filled by the postulated ‘isomorphism’ between quarks and e-signs as explained in Table 7. Please note that the isomorphism claimed in Table 7 is not logically rigorous but fuzzy and loose. Perhaps the more accurate term to use is “family resemblance” rather than “isomorphism”.

If the “isomorphism” between elementary particles and Peircean signs is real, not in every detail but in some aspects, especially with respect to the Syntactic Rules and Semantic Constraints as claimed in Table 7, we can infer the following qualitative predictions:

- 1) Just as baryons form atoms in interaction with electrons, so may c-signs form higher-order signs in interaction with the electron analogs of semiotics, which may well turn out to be the sign processor, leading to a tetrahedron (the usual triangle with an extra node above it) as a geometric representation. This sign tetrahedron (in contrast to the traditional sign triad) may be called the “atomic signs.”
- 2) Atoms form molecules through covalent (or strong) bonds. Similarly, “atomic signs” may form “molecular signs” through “strong bonds” (defined as the connections between atomic signs that are relatively unbreakable due to a strong convention or a habit).
- 3) Just as molecules form molecular complexes (e.g., enzyme-substrate complexes) through weak non-covalent bonds, so “molecular signs” may interact through weak bonds (defined as the connections between ‘molecular signs’ that can be readily altered depending on the context) to form “sign complexes”. The

“semions” proposed by R. R. Gudwin (Goodwin, 2004) may be viewed as an example of “sign complexes” defined here.

4) Inside the living cell, molecular complexes interact selectively forming dynamic networks of molecular complexes. Likewise, “sign complexes” may interact selectively in space and time to form dynamic “sign networks” realizing or executing some complex tasks, similar to the “semiotic networks” of Gudwin (Goodwin, 2004).

As already alluded to in Table 6, the triadic structure of Peircean composite signs can be denoted as S_{ijk} , where S indicates “sign”, and the subscripts i, j and k indicate, respectively, *interpretant*, *object*, and *representamen*. Representamen is often replaced by (or used synonymously with) “sign” so that the term “sign” has dual meanings – “elementary sign” and “composite sign”, which can cause confusions unless due care is exercised. Semioticians not distinguishing these two types of signs would be akin to physicists conflating quarks and baryons. Since each of the three subscripts can assume any one of the three possible numerical values – i as one of the three values in the third row in Table 5, j one of the three values in the second row, and k one of the three values in the first row – there can be in principle $3 \times 3 \times 3 = 27$ possible composite signs. However Pierce chose only 10 out of these possibilities apparently based on what is here referred to as the Peircean selection rule, Inequality (16), given above.

Inequality (16) can be viewed as an example of “rule-governed creativity (RGC)” (Saussure, 2001), a well-established principle in linguistics. RGC may be alternatively called the “rule-governed freedom” (RGF) to avoid giving any impression of anthropocentrism. RGF is also exhibited by quarks, since the three quarks in a baryon can change their colors “freely”, from red to blue to green, as long as the sum of their colors remain white (“rule-governedness”).

4. The derivation of 'nilsign' and its associated category called 'zeroness' based on the quark model of the Peircean sign

According to Sheriff (1994a),

Table 7
The family resemblance (to be called the “isomorphism” loosely) between elementary particles and Peirce's sign types. The most important family resemblances are highlighted in red.

Parameters	Particle Physics	Semiotics
<i>Elementary Units</i>	6 quarks (u, d, c, s, t, b) 6 leptons	9 e-signs (or sign types): (S _{1,1}), (S _{1,2}), (S _{1,3}), (S _{2,1}), (S _{2,2}), (S _{2,3}), (S _{3,1}), (S _{3,2}), (S _{3,3}) (see Table 5)
<i>Compound Units</i>	~ 60 baryons	10 classes of c-signs (or embodied signs) (see Table 6)
<i>Syntactic Rules</i>	3 quarks in a baryon	3 e-signs in a c-sign
<i>Order Parameters</i>	mass (5 - 5,000 MeV) electric charge (+2/3, -1/3) color charge (r, g, b)	1) The <i>epistemic</i> categories of e-signs are denoted by their first subindexes 1, 2, & 3. 2) The <i>ontological</i> categories of e-signs are denoted by their second subindexes 1, 2, & 3.
<i>Semantic Constraints</i>	3 quarks in a baryon must color white.	1) The <i>epistemic</i> categories of the 3 e-signs constituting a c-sign must increase from right to left ("the right-to-left parity") 2) The <i>ontological</i> categories of the 3 e-signs constituting a c-sign must obey the “Peircean selection rule” given in (15) or (16) above.

Legisign is “a sign which would lose the character which renders it a sign if there were no interpretant.”

Sinsign is “a sign which would, at once, lose the character which makes it a sign if its object were removed, but would not lose that character if there were no interpretant.” (17)

Qualisign “can only be an icon.” (19)

It is based on Statement (18) that I regard *sinsign* as 'interpretant-less sign', meaning that it can be a sign without its interpretant. We can represent this idea algebraically thus:

sign” based on the principle of synechism (*Synechism*) and I propose “nilsign' or 'sign-less' as the name of the “representamen-less sign”:

$$S_{i,j,k} \xrightarrow{k=0} S = \text{'Nilsign' or 'Sign - less'} \quad (24)$$

Process (24) can be read as

“A nilsign is the sign that can function as a sign even when there is no representamen, i.e., when $k = 0$.” (25)

And the new category to which 'nilsign' belongs, I elected to call 'Zerones' (Ji, 2013, 2017a), leading to Table 8.

In September 2016, S. Brier brought to my attention the following paragraph cited in one of his papers (Brier et al., 2014) wherein Peirce describes the concept of *Pure Zero* which seems almost identical with that of Zerones developed above:

“If we are to proceed in a logical and scientific manner, we must, in order to account for the whole universe, suppose an initial condition in which the whole universe was non – existent, and therefore a state of absolute nothing...We start, then, with nothing, pure zero. But this is not the nothing of negation. For not means other than, and other is merely a synonym of the ordinal numeral second. As such it implies a first; while **the present pure zero is prior to even first**. The nothing of negation is the nothing of death, which comes second to, or after, everything. But this pure zero is the nothing of not having been born. There is no individual thing, no compulsion outward nor inward, no law. **It is the germinal nothing, in which the whole universe is involved or foreshadowed**. As such, it is absolutely undefined and unlimited possibility – boundless possibility. There is no compulsion and no law. It is boundless freedom.” (Peirce et al., 1931) (Highlight is mine.) (26)

$$S_{i,j,k} \xrightarrow{i=0} S_{j,k} = \text{Sinsign} \quad (20)$$

Process (20) can be read as

“A sinsign is the sign that can function as a sign even when there is no interpretant, i.e., when $i = 0$ ” (21)

It is based on Statement (19) that I regard qualisign as 'object-less sign', meaning that it can be a sign without its object. We can represent this idea algebraically as

$$S_{i,j,k} \xrightarrow{j=0} S_k = \text{Qualisign} \quad (22)$$

Since $i \leq j$ according to the Peircean selection rule, (16), when $j = 0$, i must automatically be zero and hence both sub-indexes i and j drop out, leaving behind the sub-index k only.

Process (22) can be read as

“A qualisign is the sign that can function as a sign even when there is no object, i.e., when $j = 0$.” (23)

Since there are “interpretant-less sign”, (20), and “object-less sign”, (22), I am assuming that there can be the “representamen-less

As evident, Peirce already thought about what I call Zerones in his concept of Pure Zero, but he apparently did not consider the sign associated with his Pure Zero comparable to my 'signless' or 'nilsign' (Table 8) that can be logically associated with Zerones based on the quark model of the Peircean sign. It would be challenging for interested Peircean semioticians to find out whether or not Peirce discussed ideas similar to 'nilsign' or 'signless' in his extensive writings in connection with his concept of Pure Zero.

The same anonymous reviewer mentioned above criticized as violating Peirce's definition of signs my definition of 'nilsign', Statement (25), citing the following paragraph from Peirce's statement published in the Baldwin Dictionary of Philosophy and Psychology (1902) under the entry of Sign:

“... Anything which determines something else (its interpretant) to refer to an object to which itself refers (its object) in the same way, the interpretant becoming in turn a sign, and so on ad infinitum. . . . A sign is either an icon, an index or a symbol. An icon is a sign that would possess the character which renders it significant, even though its object had no existence (**hence I elected to refer to an icon as an 'object-less sign'**; my addition); such as a lead-pencil streak representing a geometrical

Table 8

Zerones as the new category invoked to accommodate 'nilsign' inferred to exist based on the quark model of the Peircean sign.

Category	'Zerones'	Firstness	Secondness	Thirdness
Characteristics	Transcendentality Ineffability	Quality Potentiality	Fact Actuality	Habit Laws
Sign	'Nilsign'	Qualisign	Sinsign	Legisign

Table 9
The “**periodic table of philosophy**” (PTP) that classifies human knowledge and experiences based on the principles of ITR (Irreducible Triadic Relation (Ji, 2015a)), self-organization, and yin-yang complementarity. ITR can be represented diagrammatically as a 4-node network and applied to many scientific, philosophical and religious systems and hence can be viewed as one of the “simple concepts applicable to every subject” articulated by Peirce in 1898 (Hartshore and Weiss, 1931).

ONTOLOGY	V World		Z World	Ultimate Reality
EPISTEMOLOGY	A (1)	B (2)	C (3)	ABC (4)
1. Lao-tze	Yin	Yang	Taiji ^a	Dao (or Tao) ^b
2. Vedanta ^c	Matter	Brain	Mind	Brahman (?)
3. Aristotle	Matter	Form	Hylomorph	?
4. Christianity	Father	Son (Jesus)	Holy Spirit	God
5. Islam (Difference between God and Allah)	?	?	?	Allah
6. Spinoza	Extension	Thought	Substance	?
7. Merleau-Ponty (Dillon, 1997)	Body	Mind	Flesh	?
8. Seoulator ^d (Fig. 6)	Matter	Mind	Spirit	Ultimate Reality
9. Peircean Metaphysics	Firstness	Secondness	Thirdness	Pure Zero (Brier et al., 2014; Peirce et al., 1931)
10. Peircean semiotics (Sheriff, 1994a)	Object	Representamen	Interpretant	Sign
11. neo-Semiotics	Firstness	Secondness	Thirdness	Zerone (Section 4)
12. Bohr's Complementarity (Christiansen, 2003)	Wave	Particle	Quon ^e	Reality (?)

^a “A Chinese cosmological term for the ‘Supreme Ultimate’ state of undifferentiated absolute and infinite potential, the oneness before duality, from which *Yin and Yang* originate”. Reproduced from [https://en.wikipedia.org/wiki/Taiji_\(philosophy\)](https://en.wikipedia.org/wiki/Taiji_(philosophy)).

^b “A Chinese word signifying ‘way’, ‘path’, ‘route’, ‘doctrine’ or ‘principle’ indicating the intuitive knowing of “life” that cannot be grasped full-heartedly as just a concept but is known nonetheless through actual living experience of one’s everyday being. The Tao differs from conventional (Western) *ontology* in that it is an active and holistic practice of the natural order of Nature and its universal awakening, rather than a static, atomistic one.” Reproduced from <https://en.wikipedia.org/wiki/Tao>.

^c The A, B and C terms were suggested by Vinod Kumar Sehgal on the [Sadhu Sanga] list on September 20, 2016 and the ABC term is my addition.

^d A cosmological model (Ji, 1995b) that was constructed on the basis of the principle of self-organization and complementarity (Ji, 1995b; 2017b, Appendix) and includes the triad of matter, mind, and spirit.

^e A quantum object exhibiting the wave-particle duality (Herbert, 1987).

line. An index is a sign which would, at once, lose the character which makes it a sign if its object were removed, but would not lose that character if there were no interpretant (**hence I elected to call an index as an ‘interpretant-less sign’**; my addition). Such, for example, is a piece of mold with a bullet hole in it as sign of a shot; for without the shot there would have been no hole; but there is a hole there, whether anybody has the sense to attribute it to a shot or not. A symbol is a sign which would lose the character which renders it a sign if there were no interpretant. Such is any utterance of speech which signifies what it does only by virtue of its being understood to have that signification.”

Whether the concept of ‘nilsign’ defined as the “representant-less sign” violates the definition of signs given by Peirce here (as

September 24, 2016, by adding the **Zero** as a part of the *Invisible World* to reflect the **Zerone** discussed in Section 4, the **Pure Zero** of C. S. Peirce (Brier et al., 2014; Peirce et al., 1931), the **Zero** of P. Rowlands who derived fundamental equations in physics based on the mathematics of zero (Rowlands, 2007), and the **Zero** of L. Krauss who marshaled recent astrophysical evidence that the Universe arose from zero (Krauss, 2012). When I chose the letter **Z** in 1995 (Ji, 1995a) to represent the *Invisible World*, I did not anticipate that, two decades later, in 2016, it would be assigned the role of representing so many different kinds of Zeros in natural and human sciences, all of which may be viewed as the *tokens* of the *type*, **Z**.

In 1898 (Hartshore and Weiss, 1931), Peirce discussed “*simple concepts applicable to every subject*” that would be needed to construct

“...a philosophy like that of Aristotle, that is to say, to outline a theory so comprehensive that, for a long time to come, the entire work of human reason, in psychology, in physical science, in history, in sociology, and in whatever other department there may be, shall appear as the filling up of its details. The first step toward this is to find simple concepts applicable to every subject.” (emphasis added)

(27)

pointed out by the anonymous reviewer cited above) or represents a genuinely novel class of signs Peirce glimpsed (as evident in Statement (26)) but did not fully articulate and develop (as I believe) remains to be determined by further research.

5. The neo-semiotics and the possible meanings of zerone

The version of the Peircean semiotics that is extended to encompass *Zerone* and its associated *nilsign* as described in Section 4 will be referred to as the *neo-semiotics* for convenience, as already alluded to. The *Zerone* embodied in the *neo-semiotics* appears to belong to the Z World in the model of the Universe depicted in Fig. 6 (Ji, 1995a, 1995b) This figure was updated on

Such concepts may be referred to as the “Peirce’s simple concepts applicable to every subject” or ‘P-SCATES’. One of the key concepts belonging to P-SCATES is ITR (Irreversible Triadic Relation) discussed in (Ji, 2017b; Chapter 9). ITR can be diagrammatically represented as a 4-node network as shown in the second row in Table 10. The four nodes are labeled **A**, **B**, **C**, and **ABC**, with the first three nodes radiating out from the center occupied by **ABC**, viewed as the complementary union of **A**, **B** and **C**. It was during the writing of this section that the author realized the possible connection (or isomorphism) between Fig. 6 formulated in 1995 (Ji, 1995a) and ITR first articulated in 2015 (Fisch, 1983), a connection that took the author over two decades to recognize. (see Table 9).

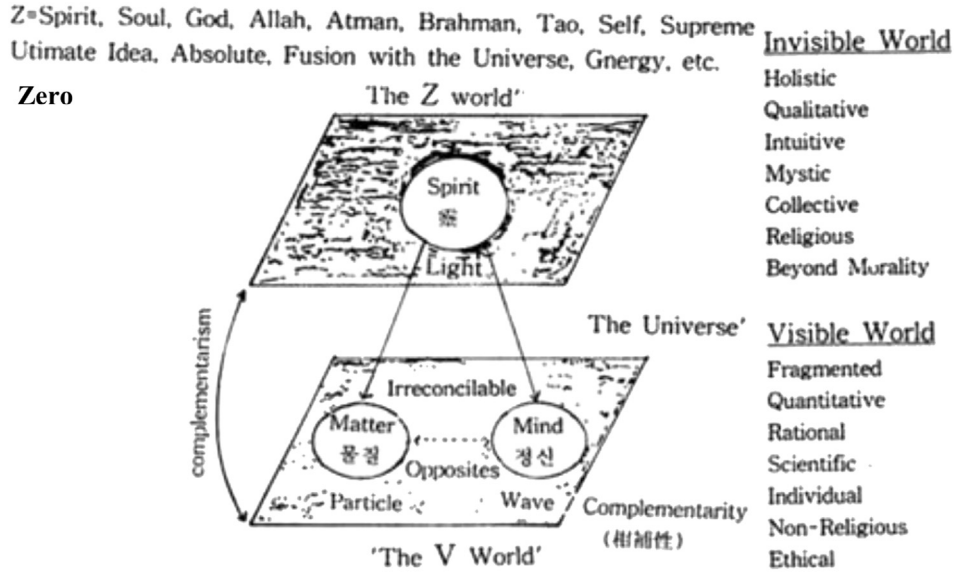


Figure 1. A schematic representation of the Universe according to complementarity.

Fig. 6. *The Seoulator*. The model of the cosmos and the ultimate reality that is based on the principles of complementarity and self-organization and includes *Spirituality* as an intrinsic aspect of reality (Ji, 1995a, p. 209). *The Shillongator* described in (Ji, 1991a, pp. 152-163, 230-237) can be viewed as a physical model of the Universe in contrast to *the Seoulator* which is a metaphysical model. This figure, first published in 1995 (Ji, 1995a), was updated by adding the symbol “Zero” in the Z World in September 2016, in order to make it compatible with Table 8.

Table 10

The dichotomous reading of the 4-node network representing ITR (Irreducible Triadic Relation) as suggested by the dichotomy of the Ultimate Reality into the Visible and the Invisible Worlds as visualized in Fig. 6.

Geometry	4-Node Network	ABC located in
2-Dimesnional		Visible World
3-Dimensional		Invisible World

The isomorphism between *ITR* and the *Seoulator* is not obvious but can be discerned by noting that the elements of **ITR** are embedded in Fig. 6, as can be seen by the 4-node structure of Row 8 (representing Fig. 6). Rows 10 and 11, i.e., Peircean semiotics and neo-semiotics, also fit the 4-node structure, but Rows 3, 5, 6 and 7 appear to fit the 4-node structure only partially, although they too can be made to fit the 4-node structure completely, if we can assign “Ultimate Reality” as their 4th node.

It is interesting to note that Rows 9 and 11 are almost identical, since Peirce's concept of “Pure Zero” is almost synonymous with what I call “Zeroneess” (Section 4), the only difference is that, whereas “Pure Zero” was the product of pure thought, “Zeroneess” was derived logically from the definition of the triadic sign given by Peirce himself by extending the numerical range of the sub-indexes of the Peircean sign, $S_{i,j,k}$, from (1, 2, 3) to (0, 1, 2, 3), i.e., by introducing Zero into the Peircean semiotics, as explained in Processes

(20), (22) and (24). In other words, it may be said that Peirce introduced Zero into semiotics primarily by an intuitive insight, whereas I was led to introduce Zero into semiotics based on an algebraic reasoning.

6. Conclusions

By representing the 10 classes of Peircean signs algebraically as $S_{i,j,k}$, with three subindexes, i , j , and k , assuming the numerical values ranging from 0 to 3 obeying the so-called the Peircean selection rule, (16), it can be logically inferred that a new category of sign exists here called *Nilsign* or *Signless* with its associated category referred to as *Zerone*. The *Zerone* is thought to be the complementary union of the Knowable and the Unknowable and postulated to be the ontological type to which the Dao, the Ineffable, Brahman, and Gnergy, etc. belong, thus possibly bridging the gap between natural and human sciences on the one hand and between science and art on the other.

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