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Triangle or tripod? Neither. A diagrammatic investigation into a sign's visual representation

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Abstract. This paper takes a look at the morphological structure of the two dominant diagrams (the triangle and the tripod) used in semiotic literature to represent the irreducible triadic sign of C. S. Peirce in order to evaluate their diagrammatic aptitude, i.e. allowing of deductive discoveries. Concluding that neither fully translates the properties attributed to the irreducible triadic sign on a visual level, an alternative diagram is proposed. This is a visual representation of the irreducible triadic sign that is directly connected with other fields of research, such as mathematics, but also with the work of Floyd Merrell and Paul Ryan and, most importantly, has the ability to bring both the pattern of a sign and the process of semiosis into one easily drawn diagram, the triquetra.

Keywords: diagram triadicity; triangle; tripod; triquetra; irreducible triadic sign

1. Introduction

"[...] utterly overlooking the construction of a diagram, the mental experimentation, and the surprising novelty of many deductive discoveries" (CP 4.91), there is ground for discord and disappointment about the diagrams used in semiotic literature to represent C. S. Peirce's irreducible triadic sign (ITS). Or, as Wendy Wheeler (2006: 24) has stated, "[...] our models and descriptions [...] for understanding something at one point may actually prove later to have been not quite right, or actually constraining [...]."

Similarly to the wave–particle duality in physics, the irreducible triadic sign may be described either as a pattern or as a process in semiotics, dividing approaches into *static (pattern)* and *dynamic (process)* views. The former uses diagrams of the triadic sign as a static representation to refer to, and the latter works with diagrams to try and distil the process embedded in the visualized forms and shapes.

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Before proposing a diagram that can represent both pattern and process, the article takes a look at the two dominant diagrams used today, the triangle and the tripod diagrams, and investigates how these visually represent the properties attributed to the irreducible triadic sign.

The aim of proposing a new diagram is to weld both pattern and process properties of the sign together and, in addition, to achieve a direct entry into adjacent fields, e.g. mathematics, logic, archaeology, etc., which could prove to be an even greater advantage.

2. Properties attributed to the irreducible triadic sign of C. S. Peirce (ITS)

Before looking at the diagrammatic visualizations we need to list the properties that have been attributed to the ITS. The ITS is:

- irreducible: the sign cannot be simplified or reduced in any way, as such it is one single, delimited, and distinct whole, a monad, **1**;
- triadic: the sign has three distinctly identifiable parts, **3**;
- irreducibly triadic:[2] not only is the sign irreducible as a whole, its triadicity is irreducible, i.e. the triadic nature of the sign cannot be reduced and the monadic irreducibility is generated from the triadic connection, **3**;[3]
- equal: there is no ascribed nor accepted hierarchy between the three parts that make up the triadic sign, object–representamen–interpretant, pure heterarchy;
- atomic: signs grow[4] from one sign into another in a concatenation *ad infinitum*;
- 3-dimensional.[5]

[2] In *Peirce's Theory of Signs* T. L. Short (2007: 18) formulates triadicity by stating, "All three items are triadic in the sense that none is what it is – a sign, an object, or an interpretant – except by virtue of its relation to the other two."

[3] At the Semiofest conference in Barcelona in 2012, I presented a new numeral called the 'unitri', a 'semiotic 3' of sorts, that could represent '1' and '3' at the same time.

[4] I refer to the work of Merrell who has gone to great lengths to delve into the 'signs grow' and 'signs becoming' nature of signs as developed in *Semiosis in the Postmodern Age* (1995), *Signs Grow: Semiosis and Life Processes* (1996), *Entangling Forms* (2010), etc.

[5] "All signs exist in three dimensions of space, of which our entire experienced universe consists. To expect any less of our signs would be taken by them as an insult, I'm sure. Signs require three dimensionality for their proper development, hence the tripod, that allows them." (Merrell, Floyd. Comments. *Digital Companion to C. S. Peirce*; accessed at http://www.digitalpeirce.fee.unicamp.br/floyd/p-peiflo.htm.) See also: Merrell, Floyd 2000. Peirce's basic

The graphic figures[6] used to visualize diagrams entail a translation of an *ideal entity* onto a medium that brings in medium-specific properties that need to be considered in our evaluation. Next to the above properties, any diagram trying to represent the ITS needs to be:

- distinct: as a whole, it needs to be distinguishable from the rest of the visual plane. Compare this to a sep or cut in C. S. Peirce's existential graphs: the line drawn separates itself from the rest of the sheet of assertion (visual plane, piece of paper) and establishes an identity or a line of identity;[7]
- non-directional: hierarchies presuppose directionality, up/down, or sequence, first/last, as they are defined by comparison, evaluation, and scale. In order to represent an equal relation in a visual representation it consequently cannot have a directionality;

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classes of signs in a somewhat different vein. In: Bergman, Mats; Queiroz, João (eds.), *The Commens Encyclopedia: The Digital Encyclopedia of Peirce Studies.* (New ed.), available at http://www.commens.org/encyclopedia/article/merrel-floyd-peirces-basic-classes-signs-somewhat-different-vein

6 Frederik Stjernfelt (2007: 96) states in *Diagrammatology*, "The diagram in itself is not the graphic figures on the sheet before us or before our inner gaze, as we might spontaneously believe." and differentiates between a diagram-type and a diagram-token: "a diagram is itself a type. [...] communicated through particular diagram tokens." Although this valuable distinction is at the heart of the present investigation, for reasons of simplicity I will use the unspecified diagram label to denote both the visual representation via graphic figures and/or the ideal entity of a diagram for two reasons: (1) the evaluation of the diagrams under investigation is to determine which one succeeds best in bringing the diagram-token as close as possible to its diagram-type and, consequently, (2) as close as possible in similarity to the object of the icon under investigation here. "The diagram is an icon [...] Being an icon, the diagram is characterized by its similarity to its object" (Stjernfelt 2007: 96), which is quite particular as the object is the irreducible triadic sign-type.

7 Distinction and identity touch upon the importance of using the most appropriate diagrams for which I turn to Louis H. Kauffman and his exposé of the visual logic of George Spencer-Brown's Laws of form. Kauffmann (2022: 7) states that Spencer-Brown's definition of distinction can be read as a one-on-one mapping to a sign: "At this nexus Spencer-Brown indicates the essential identity of sign, representamen and interpretant. The three coalesce into the form that is the form of distinction." Kauffman (2022: 7) continues, "We take the form of distinction for the form. And in this saying 'the form' becomes a noun as elusive as it seems to be concrete, just as is the nature of the sign in Peirce. The form of a distinction drawn as a circle in the plane is geometrical form, the circle. But the form of distinction, the form of the idea of distinction, what is this form? The echo from Peirce is clear as a bell. The form of distinction calls up a sign in the mind of some person." This last is, I believe, the essential point; when we draw out "some visual representation". It will represent what we want to understand. It is up to us to make sure our representations and diagrams are up to the task.

- atomic: can it grow, can the visual representation be repeated and/or manipulated to grow a visual concatenation into a network of diagrams?
- 3D: can the two-dimensional visualization on a sheet of paper evince three-dimensionality?

The above list are *formal properties*, i.e. properties to be translated into *formal characteristics* of the diagrams under evaluation.[8]

It is obvious, but nonetheless relevant, that these properties apply to a fully *formed (static)* sign, e.g. an analogue photograph that has captured and frozen an image on paper. The properties listed above do not take into account *formation (dynamic)* over time, similar to the process of actually developing an analogue photograph in a dark room.[9]

3. Evaluating the triangle and tripod diagrams

There are two dominant diagrams[10] used in semiotic literature to represent the ITS visually: the triangle and the tripod. Both diagrams have visual strengths and

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8 The list of formal properties is our baseline criterion for distinguishing between the "fertile and less fertile formalizations" described by Frederik Stjernfelt (2007: 92): "This, in turn, implies that we, in the operational icon definition, find a useful criterion to distinguish fertile from less fertile formalization: the good formalization is one which permits manipulation in order to reveal new truths about its object; formalizations which only permit this to a small extent or not at all may be discarded."

9 A note on the instantaneous and simultaneous nature of the ITS. At the Biosemiotic Gatherings of 2020 (see Lacková *et al.* 2020), Kalevi Kull explained that an immediate consequence of the axiomatic definition of the ITS is that, when observed, the ITS is simultaneous and, consequently, instantaneous – there is no time progression, i.e. no sequence and consequently no hierarchy, and it is one, i.e. a monad. Similarly, a diagram that is fully drawn on a sheet of paper is seemingly instantaneous and simultaneous upon viewing. In real life, however, only a stamp can make a complex diagram appear on a visual plane in one instant – when drawn by hand it will take time to complete a complex diagram. It is Stjernfelt's distinction between diagram-type and diagram-token (see Fn. 6) or that of Kauffmann's between the form and the form of distinction (see Fn. 7). The visual representation of a triangle can easily be imagined in the mind instantaneously, while materializing that same visual representation on paper will require a sequence of lines to be drawn, constituting a tangible difference inherent to the medium.

10 In his paper "Naturalizing semiotics: The triadic sign of Charles Sanders Peirce as a systems property" Mogen Kilstrup mentions the fact that Peirce did not draw a conclusive diagram to represent the irreducible triadic sign, which has left the semiotic community to deal with a plethora of representation: "Unfortunately he [Peirce - ed.] does not discuss whether the letters represent a total sign or a sign element, so followers of Peirce have been free to interpret his model with a variety of sign renderings." (Kilstrup 2015: 567)

weaknesses when it comes to their mode of representation. In semiotic literature, the main objection to the triangle in favour of the tripod is that "the triangular form 'evinces no genuine triadicity, but merely three-way dyadicity' (Merrell 1997, 133)" (Chandler 2002: 30). Merrell built upon that argument to state that the triangle cannot represent the three-dimensional nature of the sign.[11] Both the original formulation and the three-dimensional aspect will be the primary evaluation for all diagrams discussed here.

3.1. The triangle

The triangle diagram is generally attributed to Ogden and Richards (as found in Eco, Chandler and Nöth)[12] and is labelled 'the semiotic' or 'Peircean' triangle. As a diagram, the triangle is best known as one of the basic shapes in geometry, where it is commonly described as *a polygon with three edges and three vertices* i.e. three sides and three (angle) points respectively. The geometry definition states an irreducible triadicity (in Euclidean geometry), which should actually debunk the main objection to using the triangle in semiotics: it is *defined as a triadicity*. There is, however, truth to not "evincing a genuine triadicity" when taking into account the multiple visual ways to execute a triangle on a visual plane, not in the least the one that was used by Ogden and Richards. The issue stated by Merrell was not *precise enough* and is primarily an issue of execution.

The archetypical triangle under evaluation (Fig. 1) is one continuous line diagram that is hollow inside.

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11 "One problem with the triangle is that it is two-dimensional, as if on a Cartesian plane, hence severely limited, as we shall note. The chief problem, however, lies in the form of the triangle itself. It models no more than three binary relations. The 'sign' is related to the 'object', the 'object' to the 'concept', and the 'concept' to the 'sign,' and vice versa. There is no legitimate set of interrelations among all three terms such that one of them is interrelated to the other two in the same way that each of them is in turn interrelated to each of its pair of partners." (Merrell, Floyd. Comments. Digital Companion to C.S. Peirce. Accessed at http://www.digitalpeirce.fee.unicamp.br/floyd/p-peiflo.htm.)

12 Umberto Eco (1979: 59) writes in *A Theory of Semiotics*: "The semiotic study of content is often complicated by recourse to an over-simplified diagram which has rigidified the problem in an unfortunate way. The diagram in question is the well-known triangle, diffused in its most common form by Ogden and Richards (1923)". In the online version of his *Semiotics for Beginners*, Daniel Chandler does not attribute the triangle visualization to Peirce but states that the "fairly well-known semiotic triangle is that of Ogden and Richards" (https://www.cs.princeton.edu/~chazelle/courses/BIB/semio2.htm). This can also be found in Winfried Nöth's handbook of semiotics: "Ogden & Richards (1923: 11) have represented the triadic structure of the sign by means of a triangle." (Nöth 1990: 89)

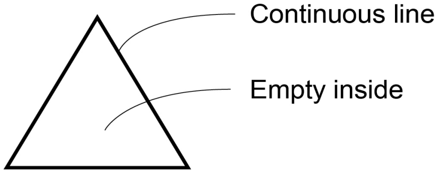

Figure 1. Archetypical triangle.

It is *monadic* through its continuous line, has *three individually identifiable* angles, and cannot be reduced or drawn with fewer elements (Fig. 2).

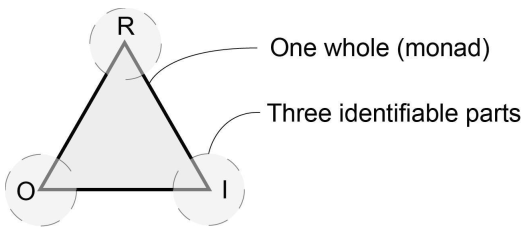

Figure 2. Triangle as one whole with three identifiable parts.

Through the continuous line, the diagram closes itself off from the rest of the visual plane, making it self-contained and distinct. There is an outside and an inside to the diagram. The triangle does imply directionality, pointing up, down, left or right, and hierarchy (Fig. 3). Both direction and hierarchy readings are, however, culturally habituated readings of the diagram, i.e. the attributed meaning of directionality has been culturally installed: the pointing triangle is used as a conventional symbol, e.g. the play or fast-forward buttons on a remote control, and a triangular composition in visuals, from ancient paintings to contemporary advertising posters, has been established to signal hierarchy (Fig. 4).[13]

[13] If the triangle is always used pointing upwards and the upper angle is always labelled Representamen, this would – over time – install the inherent reading that Representamen is first. Similarly, always writing R–O–I implies Representamen is first and that there is an implied hierarchy in the three constituent components of the ITS, which goes against the idea of equality of the triadic sign components.

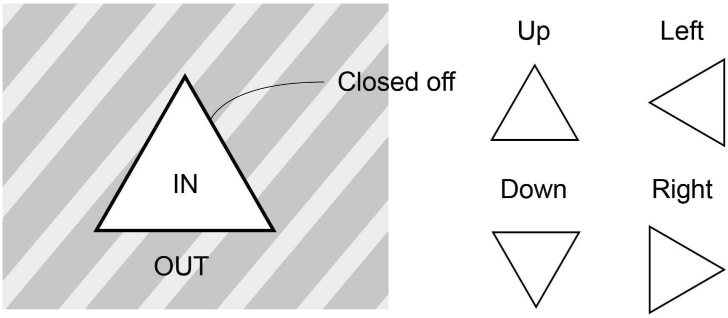

Figure 3. Closed-off triangle with an inside and outside, next to implied directionality of a triangle.

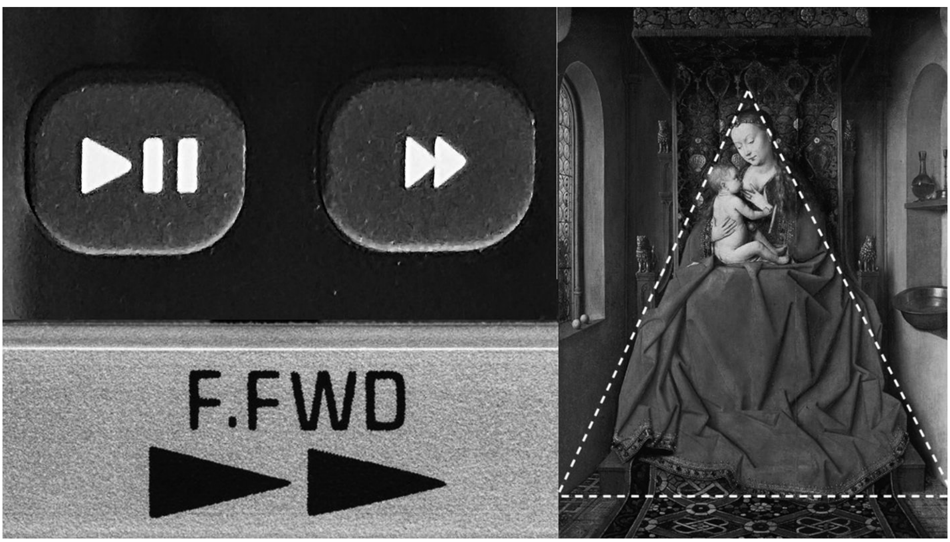

Figure 4. Conventional symbolic use of a triangle on a remote control, hierarchy through triangular compositions in painting and advertising.

As an atomic diagram, the triangle easily builds a network of connected triangles, e.g. Peirce's own use to illustrate the classes of signs (Fig. 5). Not only does it allow a depiction of semiosis *ad infinitum*; one sign gives birth to another in an endless progression, it even allows a fractal construction, where the whole has the same properties as the parts (see the shaded parts in Fig. 5).

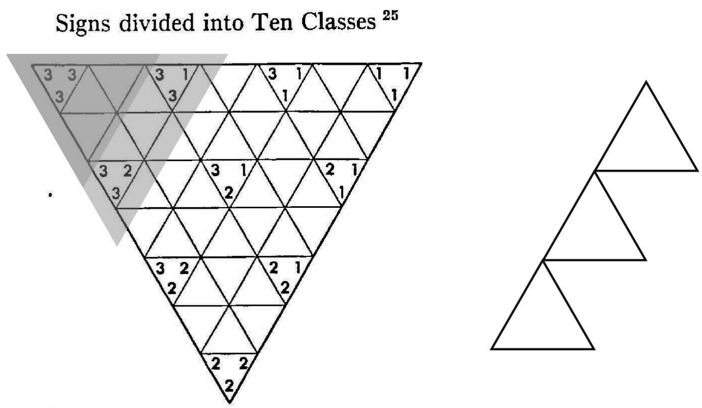

Figure 5. Peirce's signs divided into ten classes (left), common visualization of semiosis *ad infinitum* with triangles. The shaded triangles on the left show the fractal growth of triangles, where a certain number of equilateral triangles in a certain set-up again produce an equilateral triangle.

There are numerous variations on this archetypical triangle found in semiotic literature, ranging from closed, open and half-open triangles to merely implied triangular shapes (Fig. 6).

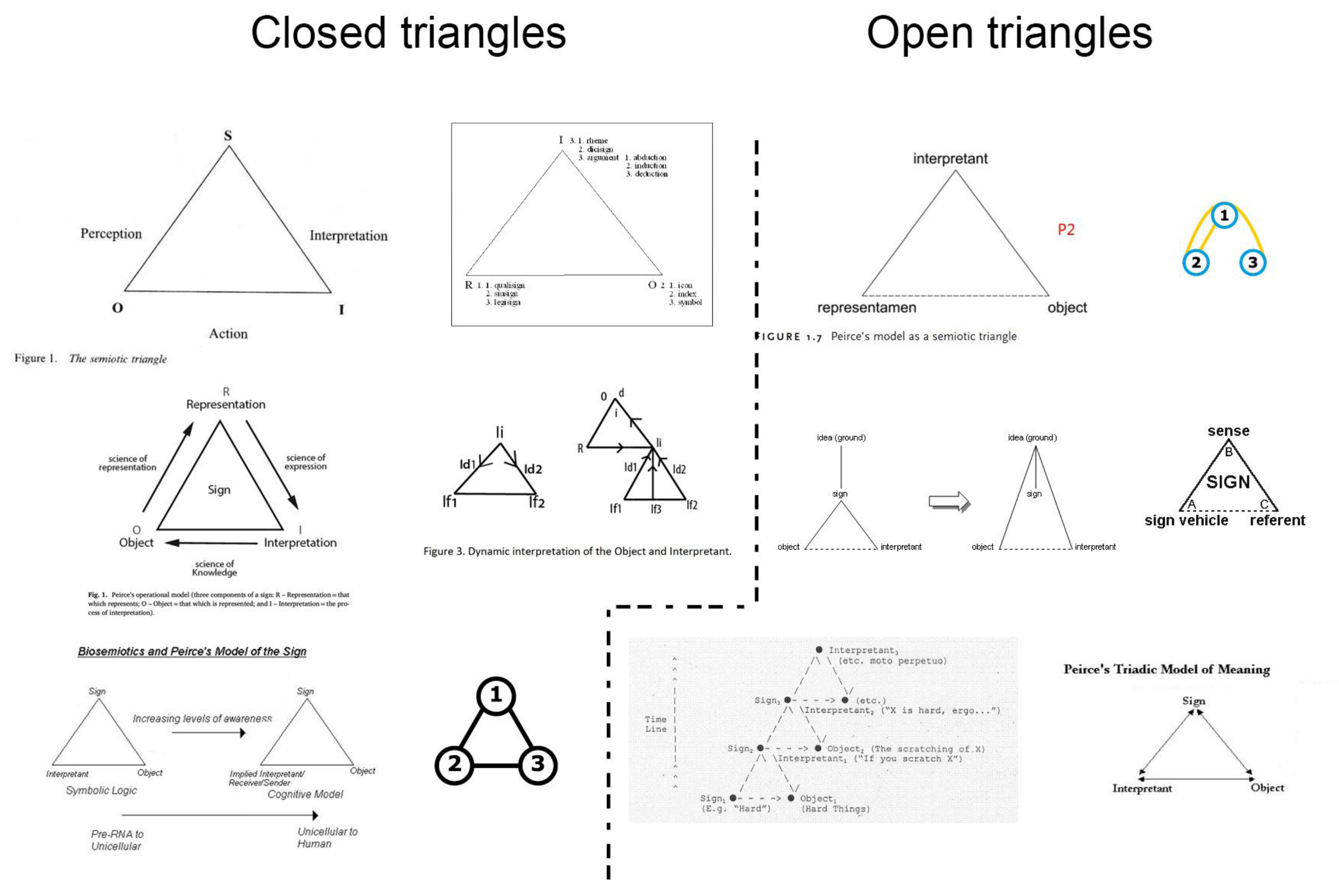

Figure 6. A collection of closed and open triangles and triangular-shaped diagrams representing the ITS.

The Ogden and Richards "semiotic" triangle is one of those variations (Fig. 7). Every variation changes the formal characteristics of the diagram. When the line is a partial or completely dotted line then it no longer separates the diagram from the visual plane but lets the visual plane come into the triangle and undermines reading the triangle as a separate, distinct whole, which is a key property of the ITS (Fig. 8).

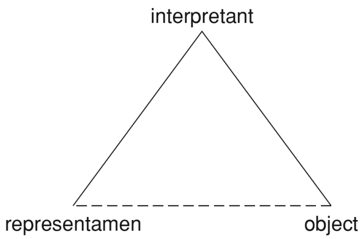

Figure 7. Ogden and Richards' semiotic triangle with a dotted line between Representamen and object.

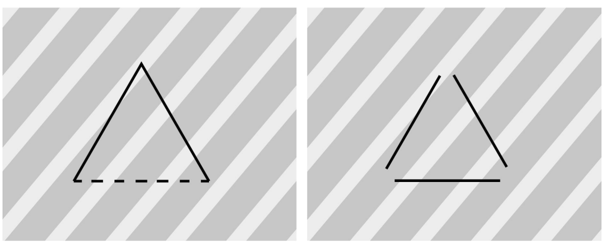

Figure 8. Two open triangles that open up to the visual plane, losing the reading as a separate entity.

The same applies to any implied triangular shape with the angles missing. It opens up to the rest of the visual plane, and since it is an implied shape it becomes very ambiguous, as the visual reading of three unconnected lines in a triangular shape is literally the following: three *unconnected* lines – at best implying a form, but hardly a diagram that visually needs to be read as *irreducible triadicity*.

In terms of evaluating the triangle as an appropriate representation of the ITS: the geometry definition of the diagram opposes the main objection of not evincing triadicity; it does not, however, evince any three-dimensionality of the sign and, most importantly, the visual execution of the diagram is paramount to its evaluation.

3.2. The tripod

As a diagram, the tripod is the visual opposite of the triangle, with one important difference, namely that it has *four* and not three vertices (points) (Fig. 9).

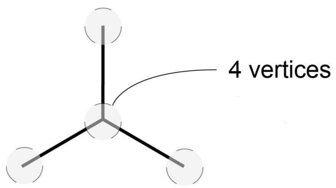

Figure 9. Tripod with four vertices.

Based solely on the number of identifiable vertices it feels counterintuitive to even consider the tripod as a representation of the ITS. The fact that it is described in semiotic literature as "[t]he form of the triadic relation used in the diagram (like a Mercedes star)[14] is justified by Peirce, NEM IV 307 ff. (c. 1893), and Peirce, SEM II, 137 (1903)" (Bakker Hoffman 2005: 354, Fn 7) implies that other characteristics are being prioritized or considered.[15] Merrell mentions that it has a better ability to represent the three-dimensional character of the sign,[16] which it does, both as

[14] The inverted (equiangular) Y is often referred to as the Mercedes visual, i.e. the Mercedes logo, which is a circle with a three-point star inside. The reason why this is an erroneous comparison is that (1) the circle is being excluded and (2) only the forked road representation in the middle of the three-point star inside the circle is being referred to. These are not minor, but quite essential visual differences, i.e. there is a faint iconic similarity to be found visually but the differences outweigh the similarities. A far better label is the tripod label used by Merrell.

[15] An educated guess could point at Peirce's inclination for the well-known ball and stick models used to visualize chemical bonds coming from Peirce's background in chemistry (Kilstrup 2015: 567), especially when connected to Peirce's own textual explanations of the triadic sign as a forked road, "A road with a fork in it is the analogue of a triple fact, because it brings three termini into relation with one another. A dual fact is like a road without a fork; it only connects two termini. Now, no combination of roads without forks can have more than two termini; but any number of termini can be connected by roads which nowhere have a knot of more than three ways" (CP 1.371), which would again result in a tripod visual when drawn out.

[16] All diagrams treated here are popularly perceived as two-dimensional regardless of the number of dimensions they try to represent as a sign. When the need to incorporate the three-dimensionality of the sign is taken into consideration, it is necessary to note that 2 points define a line, 3 points define a plane and 4 points are needed to represent a space on paper. The latter hints at another possible explanation for why a diagram with four points is considered adequate to represent the ITS. I refrain from writing that the diagrams genuinely are two-dimensional, especially on a diagram-token level, since every materialization even on paper requires three dimensions, no matter how infinitely small the depth of a pencil line is. Still, countering that popular perception would lead us too far from the point at hand.

an iconic and a conventional, symbolic sign: as an icon, it mimics the corner of a cube (inside or outside corner) and as a symbol, we are taught to draw space with a similar looking x–y–z axis. This means that the three-dimensionality is not something that is present in the diagram itself, but is an *attributed* reading of the diagram, i.e. it is not a property we distil from the diagram but one that we are taught to read.

The archetypical tripod under evaluation (Fig. 10) is an equilateral and equiangular, inverted Y shape. It is *monadic* through its continuous shape, has *four* individually identifiable elements (*three* endpoints and *one* centre node), and cannot be reduced or drawn with fewer elements.

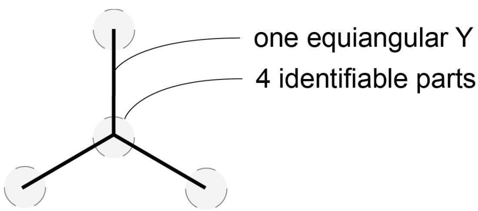

Figure 10. Archetypical tripod.

Unlike the triangle, the tripod does not separate itself on the visual plane; it divides the visual plane and lets the planes come together in its centre (Fig. 11).

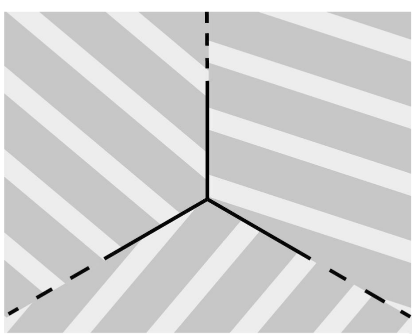

Figure 11. Tripod dividing the visual plane.

It is distinct and does not have an inside. Similarly to the triangle, depending on how the tripod is drawn it can imply a directionality but this is not an evident reading, i.e. it is ambiguous and unclear: for instance, the tripod with one horizontal leg to the left could imply a directional pointing to the left, but it could equally be interpreted as pointing diagonally up or down to the right, which means that there is no conclusive directionality in the diagram (Fig. 12).

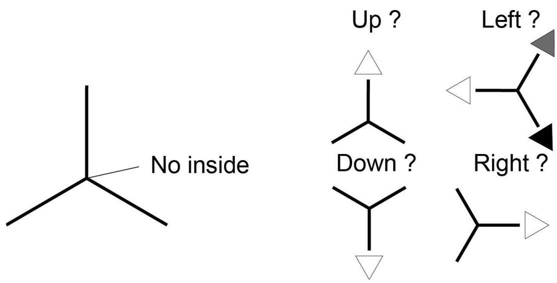

Figure 12. A tripod does not separate itself from the visual plane, and reads directionality in an ambiguous manner.

As an atomic diagram, the tripod easily builds a network of connected tripods to show semiosis *ad infinitum* (Fig. 13). Notice the beehive structure that can be built up using the equiangular tripod. Unlike the triangle, which can be used to build larger triangles that will have the same properties of its building blocks (the shaded fractal visualization in Fig. 6), bringing fractal properties to its network diagram, the tripod in the beehive network diagram creates a visual form that does not resemble its building blocks, making the tripod an element of a network diagram that does not have the same properties – a tripod has very different properties than a hexagon.

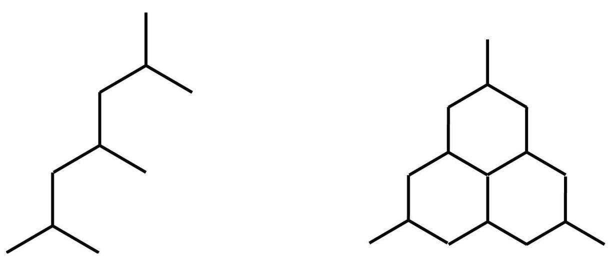

Figure 13. Networks of connected tripods.

The tripod can be found in just as many variations as the triangle: tripods with nodes at the outer edges (empty or full), a node in the centre, nodes at the ends and in the centre, unconnected lines implying the tripod, etc. (Fig. 14).

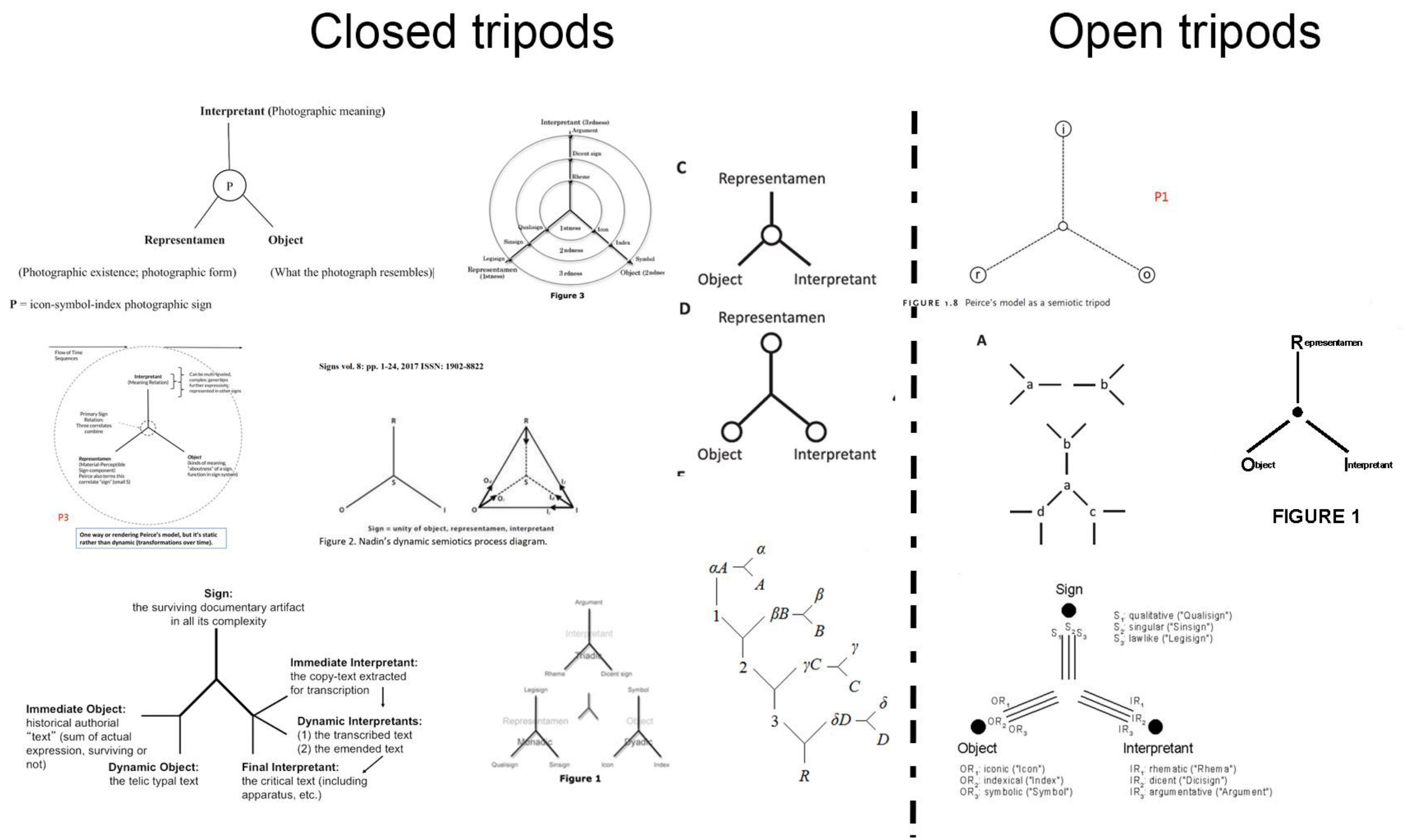

Figure 14. Collection of tripod and tripod-shaped diagrams used to represent the ITS.

Each variation changes the formal characteristics of the diagram. When the three lines are connected in the centre, like the letter Y, it forms one whole. As soon as the lines are disconnected it is difficult to even imply that we are looking at a monad (Fig. 15).

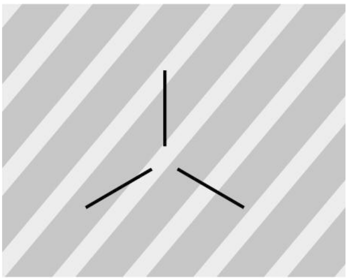

Figure 15. Disconnected tripod opens up to the visual plane.

Some variations add circles at the endpoints of the tripod,[17] which adds a layer of visual precision that is shared with the archetypical triangle since the circles enclose the limits of R–O–I, making them easier to be identified visually and force a reading of only three identifiable elements (Fig. 16).

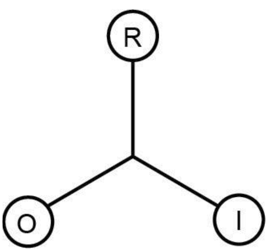

Figure 16. A tripod with circle endings.

17 "In the well-known ball and stick model of chemical atoms, the atom is shown as a ball, while the bonds are shown as sticks. This works fine in chemistry where atoms are absolutely symmetrical. In sharp contrast, a sign consists of three elements with very different functions; Object (O), Representamen (R) and Interpretant (I), linked together with bonds. When a sign is defined in this way and is shown in a ball and stick model, there are numerous ways these elements can be assigned. In a type-set rendering (Peirce,1931a), Peirce shows a graph with a central letter 'a' connected with the letters 'b', 'c', and 'd' through lines. Each of these letters has two additional lines pointing out into an emerging network (see Fig. 1A). Unfortunately, he does not discuss whether the letters represent a total sign or a sign element, so followers of Peirce have been free to interpret his model with a variety of sign renderings." (Kilstrup 2015: 567)

Other variations have a circle in the centre, changing the basic tripod into three lines that end in a circle. This variation allows the diagram to have an inside similar to the triangle. Multiple reasons can be found for seeing added value to this inside, e.g. it could be used to represent the *ground* of the Peircean sign, but it unmistakably forms a diagram with four identifiable elements (Fig. 17).

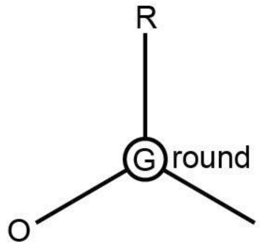

Figure 17. A tripod with a circle as the connecting node.

The triangle can also be read in similar ways to the tripods shown in Figs. 16 and 17 (Fig. 18), labelling the vertices R–O–I outside of the triangle can leave the hollow inside to represent the ground, or, alternatively, R–O–I can be seen as areas inside the triangle and the ground in between. However, those readings need to be made explicit and are not apparent at face value.

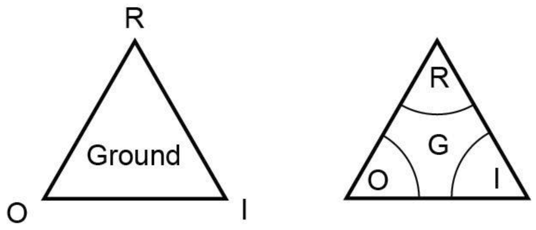

Figure 18. Triangles showing R–O–I and the Ground of the sign.

In terms of evaluating the tripod as an appropriate representation of the ITS, although considered as the definite visual representation of the ITS, the tripod has actually more difficulties than the triangle in its visual representation, not in the least because the tripod has four vertices to represent triadicity. Also, it does not close itself off on the visual plane and relies heavily on prior knowledge that is not actually present in the diagram.

4. A new (ancient) diagram: the triquetra

The triquetra is an ancient diagram that has been discovered and reinvented over and over again throughout human history. Consequently, it is known under many different names: trefoil knot (mathematics)**,** Trinity knot, Celtic knot, triquetra, Germanic valknut (archeology, anthropology), Tripod of Life (archeology, mysticism), spherical octahedron intersection (Venn diagrams), the sweet spot (marketing) (Fig. 19).

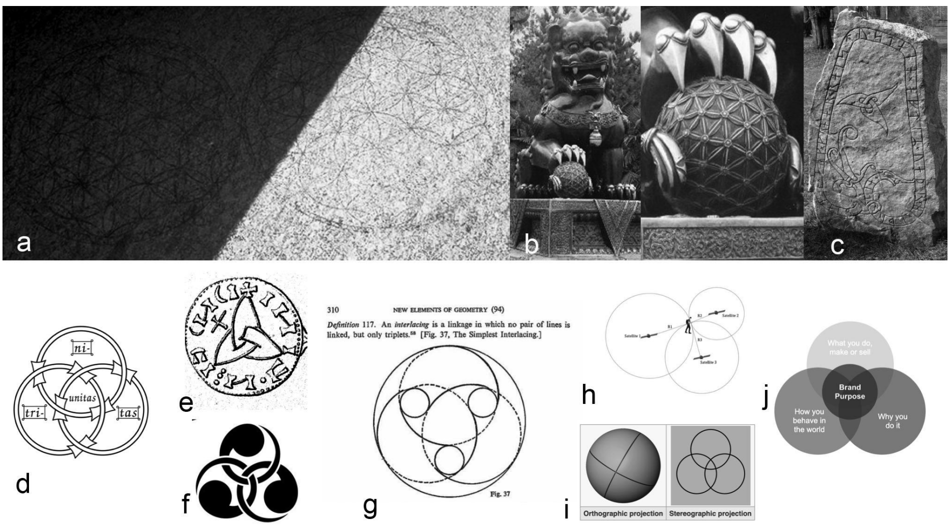

Figure 19. Multitude of triquetra throughout history: (a) temple of Osiris (Egypt); (b) Chinese sculpture decoration; (c) rune stones; (d) Christian symbolism of the Holy Trinity; (e) ancient coins; (f) Asian family crests; (g) Knot theory (C. S.Peirce); (h) satellite trilateration; (i) Venn diagram; (j) marketing visualization.

As a formal description, the triquetra is *a triangular figure composed of three interlaced and overlapping arches*[18] – essentially, a three-cornered knot without a beginning or end. This gives us three vertices – similar to the triangle and different from the tripod that has at least four – and, unlike the triangle, the vertices are connected by three overlapping spherically curved edges (lines). The difference that makes a difference is *the overlap*, as we will see further down.

18 An arc is an imaginary mathematical shape defined by a segment of a circle, while an arch is an architectural solid. Here the triquetra is said to be composed of arches to emphasize the tangible characteristics of the ITS.

The archetypical triquetra under evaluation (Fig. 20) is one continuous line diagram that encloses four hollow areas inside. It is *monadic* through its continuous line, has *three individually identifiable* vertices, and cannot be reduced or drawn with fewer elements – the elements being three vertices and three curved lines, i.e. the hollow areas are not elements of construction, they are obtained through the structure...

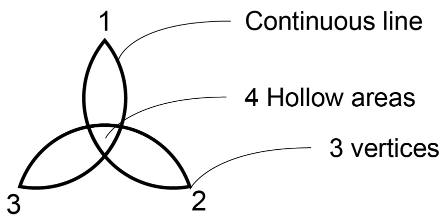

Figure 20. Archetypical triquetra.

...but, it can also be drawn without the fourth hollow area (Fig. 21).

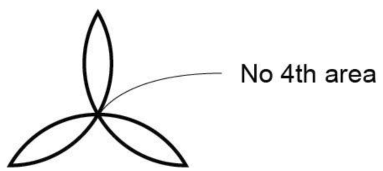

Figure 21. Triquetra without a fourth hollow area in the centre.

Quite significantly, the triquetra can be drawn as the intersection of three Venn diagrams, which conceptually adds a lot of sense to the diagrammatic representation of an irreducible triadic relation as an intersection, a first *overlap* (Fig. 22). Any element in the intersection of three spheres, A, B and C, has the properties ABC, i.e. it is *triadic by definition*.

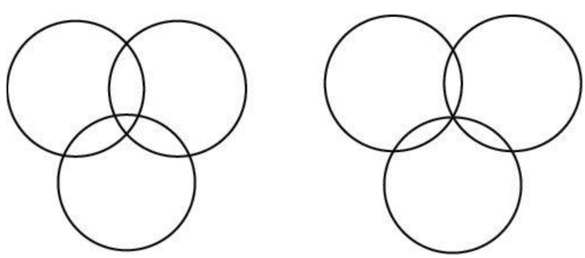

Figure 22. Triquetra as the intersection of three Venn diagrams.

The triquetra separates itself on the page in a similar manner as the triangle. Through the continuous line, the diagram is closed off from the rest of the visual plane, making it self-contained and distinct. Similarly to the tripod, the directionality is not clear: one could see a dominant direction, but focusing on one of the other vertices actually changes the perceived directionality (Fig. 23).

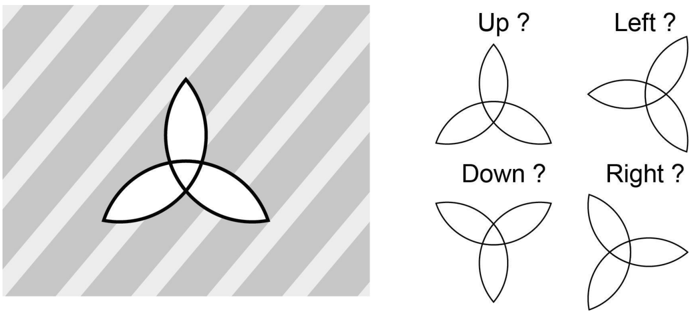

Figure 23. The triquetra separates itself from the rest of the visual field, with an ambiguous, unclear directionality.

As an atomic diagram, the triquetra easily builds a network of connected triquetra. Similarly to the tripod-beehive network, the triquetra network introduces a new layer of visuals not inherently present in the atomic building block, e.g. three triquetra make a circle appear (Fig. 24), which is quite noteworthy as the triquetra itself is the intersection of three circles (Fig. 22).

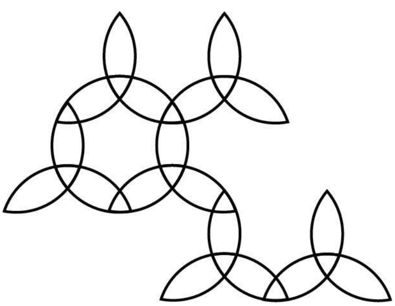

Figure 24. Concatenation of triquetra into a network visual, where circles appear inside three joined triquetra.

Since the triquetra is not used as a representation of the ITS in semiotic literature – as far as I have been able to find – there are no variations to discuss, except those where the triquetra can be seen as a part of a diagram; e.g. Merrell has published several diagrams where the triquetra shape can be discovered (Fig. 25). A variation that can be found outside of the field of semiotics is one that does not show the hollow area in the centre of the diagram (Fig. 21), but the variation has no impact on how it reads on the visual plane, nor how it deals with directionality or any of the other fundamental properties to represent the ITS. Two reasons for not choosing the variation without a fourth hollow centre as the archetypical form of the diagram are the following: (1) the triquetra can easily be manipulated to give this variation without losing its essential characteristics, and (2) the diagram with four hollow areas is the most common occurrence in other disciplines, such as mathematics, logic, etc., which brings in an undeniable (potential) added value as a shared diagram across disciplines, i.e. a direct link between fields of knowledge research (see Section 6 below).

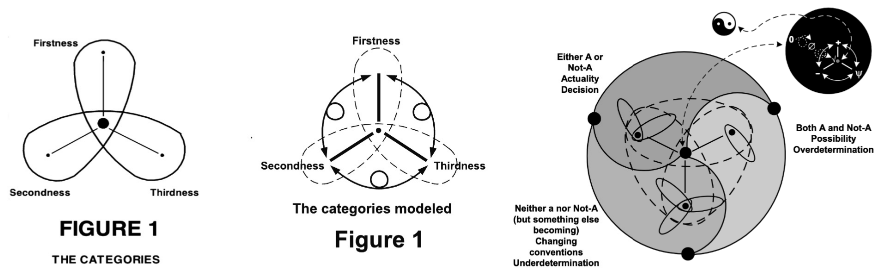

Figure 25. Triquetra shapes inside diagrams by Floyd Merrell.

5. Transformations, manipulations and comparison

The triangle, tripod, and triquetra diagrams all try to represent the same object: the irreducible triadic sign; consequently, it can be assumed that these three shapes are morphologically connected. In Fig. 26 two transformations executed on the triangle result in the triquetra and the tripod, respectively. The first transformation (triangle into triquetra) is an organic transformation that keeps all the features of the triangle intact, whereas the second transformation (triangle into tripod) does not: it loses the area enclosed inside the triangle completely, whereas the triquetra maintains it, and adds visual specification.[19] The first transformation

[19] The triquetra can either be executed with a fourth area or not. And, at one point the transformation from triangle to tripod results in an actual three-pointed star, which would indeed merit the "Mercedes star" comparison, but, at that point, this would keep the triangle area intact and no longer merit the label of tripod.

is called organic as it does not need to add or remove anything from the original edges, it only pushes the middle of the edges inward to make the straight edges into arches, until the three arches *overlap* with each other. The second transformation makes an indentation into the middle of the three edges, which constitutes a change, and pushes these indentations towards the centre until they meet and every edge overlaps with half of the other two edges making the inside area disappear completely.

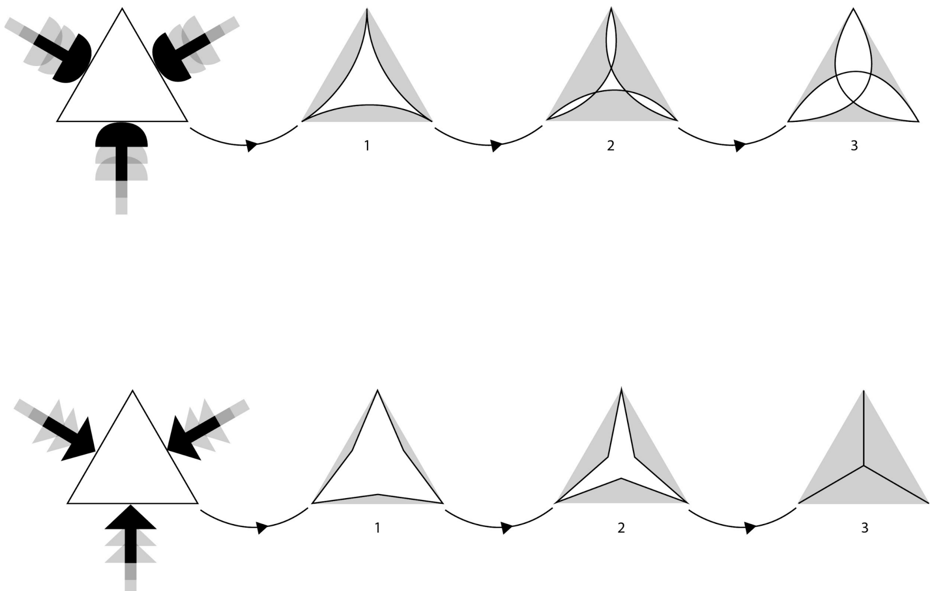

Figure 26. Morphological connection between triangle, tripod, and triquetra.

Interestingly, if we push the transformations a step further and take the triquetra and tripod edges and flip them outward, then the triquetra results in a circle and the tripod in a hexagon – which coincidentally appeared earlier when the diagrams were used as atomic building blocks for their respective network visualizations (Fig. 27).

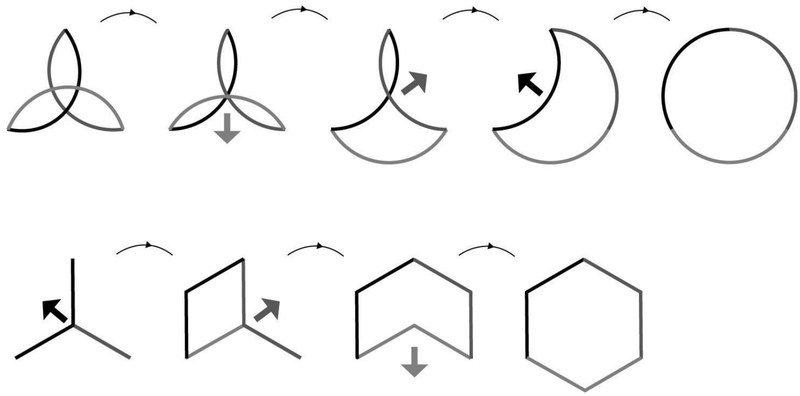

Figure 27. Transforming the triquetra into a circle and the tripod into a hexagon.

These last diagrammatic manipulations investigated the inherent features of the diagrams; the next manipulation investigates how to build and add on to the diagrams: Pentti Määttänen has added a second triad on top of the ITS, which he called Perception–Interpretation–Action (Määttänen 2007). In Fig. 28, the Määttänen triad is added to the three diagrams.

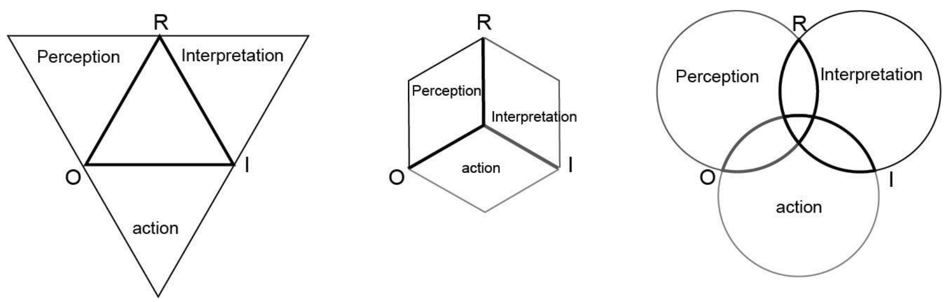

Figure 28. Adding the Määttänen triad to the ITS diagrams in triangle, tripod/hexagon and triquetra/three circle intersection.

6. Triquetra connections

In knot theory (mathematics), the triquetra is known under the name 'trefoil knot',[20] with very specific properties that connect seamlessly with the basic char-

[20] In mathematical knot theory a knot is a closed entity, an embedding of a topological circle in three-dimensional Euclidean space, i.e. different from the conventional notion of a knot that ties an open-ended string.

acteristics of the ITS. The trefoil knot is *the first non-trivial knot*, which means that *it is not possible to untie it in three dimensions without cutting it*, which translates to irreducibility.

The trefoil knot is often rendered colour-coded (Fig. 29), with tricolourability being a proof in knot theory that visually highlights the three-dimensional character: a knot is a three-dimensional entity, and when drawn in a two-dimensional manner, the *overlapping* arches become apparent when they have different colours. Note also the use of arches, not arcs, in knot theory (see Footnote 9 for the difference between the two). Where the overlap of an intersection was the first significant overlap to make a difference, the three-dimensional character of overlapping arches is the second significant *overlap* that merits favouring the triquetra over both the triangle and tripod. When a three-dimensional entity is rendered in two dimensions, the overlaps are the proof of its three-dimensionality.

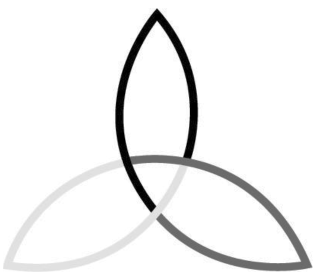

Figure 29. Tricolourability proof of the trefoil knot, a.k.a. triquetra.

The three-dimensionality of the trefoil knot (triquetra) is a defining characteristic of what the trefoil knot is and it answers Merrell's search for a three-dimensional representation of the ITS. In Fig. 30 the trefoil knot is rendered as a three-dimensional object in space.

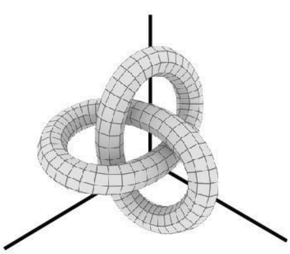

Figure 30. Trefoil knot in 3D rendering. Notice the tripod that appears at the edges of the three planes implying the cube-shaped space.

An important note is that in a knot-theoretic sense the torus (or unknot) is *not* knot-*equivalent* to the trefoil knot, but as topological spaces the torus and the (triquetra-shaped) knotted torus *are homeomorphic* (Fig. 31), i.e. geometric figures that can be transformed into each other via elastic deformations.[21] The fact that the torus and knotted torus are the same topologically is highly relevant for semiotics and the current investigation. Peter Harries-Jones (2009: 203) remarked that "The torus is heterarchical in form, thus fulfilling one of Bateson's primary conditions; it displays 'relative being,' a condition that Hoffmeyer argues is fundamental to semiosis", and which was one of the attributed properties of the ITS that our diagrams need to fulfil as listed in Section 2. Harries-Jones referred to the findings of Don McNeil, whose formal insights are touched upon further down in Section 7.

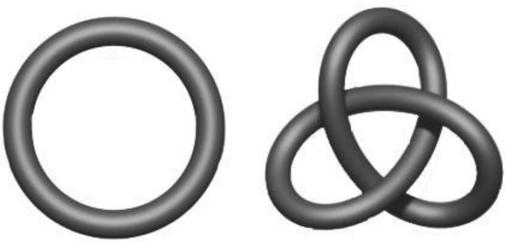

Figure 31. Torus or unknot on the left and trefoil knot or knotted torus on the right as topological homeomorphic spaces.

Continuing in mathematics the triquetra is at the heart of the Borromean rings (Fig. 32), where three (topological) rings are interconnected in a manner that relates directly to the properties of the ITS. The Borromean rings are defined as three connected rings where *any two rings are disconnected from one another, but together they cannot be separated* – which is to say that there are *no dyadic connections, only a triadic bond*: cutting one connection releases all three rings – similar to the trefoil knot that is non-trivial and can only be unknotted by cutting it. In the same manner that the triquetra appears in a plethora of disciplines, the Borromean rings have appeared in an equally large number of different contexts from coats of arms to representations of the Trinity in religious contexts.

[21] The deformation requires cutting the knotted torus and then reattaching the two cut ends to complete the transformation which is a valid transformation in topology, but of course not in knot theory as the fact that one needs to cut the trefoil knot to untie it is the defining characteristic which makes the trefoil knot the first non-trivial knot of the field.

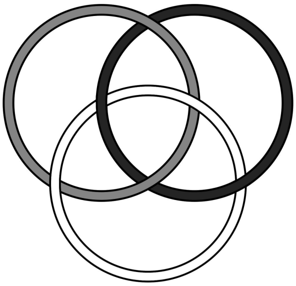

Figure 32. Colour-coded Borromean rings.

More triquetra connections to other disciplines include, as mentioned above, the intersection of three Venn diagram circles, which is known as the intersection of a stereographic projection (in geometry). This particular mapping projects a sphere onto a plane (Fig. 33).

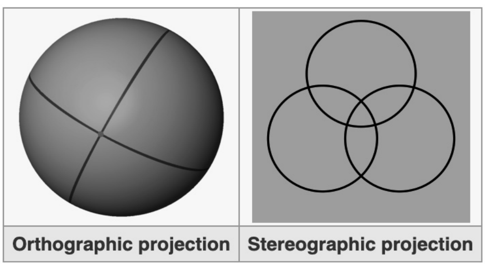

Figure 33. Stereographic projection.

In connection with the Venn diagram intersection of three circles the triquetra can also be found in commercial disciplines such as marketing and business strategy, where its centre is commonly referred to as the 'sweet spot'[22] (Fig. 34).

[22] This last connection might not be as trivial as it appears at first glance, taking into account that a theoretical model that can map onto an applied one can have great potential in bridging the divide between the theoretical and applied semiotics fields.

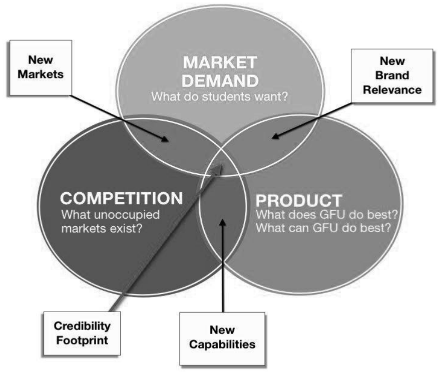

Figure 34. A random marketing diagram.

Outside of the registers of the alpha and beta sciences, it is also known as 'the seed of life', which can grow into 'the flower of life' in the sacred geometries of mysticism (Fig. 35), which have been found in the temple of Osiris (Egypt), but also on sculptures in China as shown in Fig. 19 above.

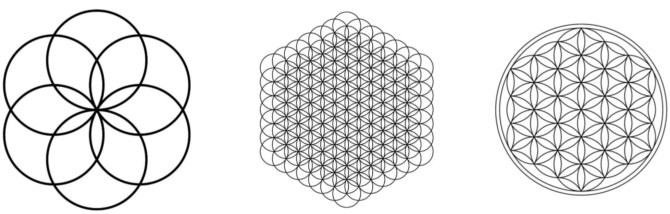

Figure 35. Seed of life; flower of life.

And, finally, there is the intersection of three spheres: *trilateration*. Fig. 36 shows how GPS functions through trilateration, which works with distances, in contrast to triangulation which works with angles. Trilateration is the only way to locate a point in relative space, which is a compelling formulation of describing what semiotics is about: *the trilateration of signs in the process of semiosis*. Since trilateration works in three-dimensional space where three satellites mark three spheres around the respective satellites as their centre and the distance as their radius, the triquetra appears when rendered in two dimensions.

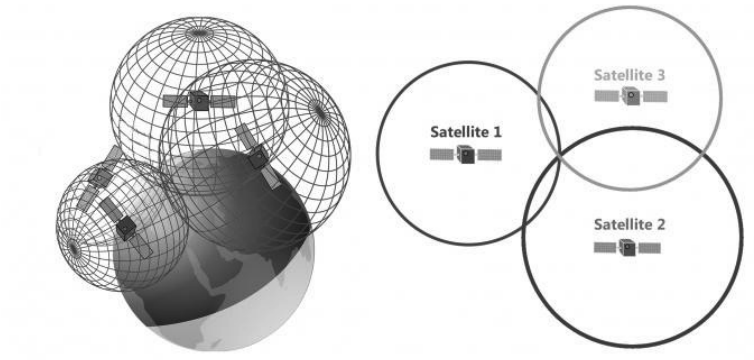

Figure 36. Trilateration with satellites and its 2D rendering.

Apart from these connections to other disciplines, as a visual diagram, the triquetra has all the qualities of the triangle and the tripod to represent the key features of the ITS, yet fewer of their shortcomings.[23] It very directly *meets the need*, stated by Merrell, *to take into account the three-dimensionality of signs* by acknowledging the topological features of the triquetra as a trefoil knot, and it goes even further as

[23] I have stated that both the triangle and tripod diagrams rely on attributed meanings in opposition to meanings that can be distilled from the diagrams themselves. There is the valid objection that all diagrams require a certain literacy to be able to be read and interacted with: as Stjernfelt (2007: 97) explained in *Diagrammatology*, a diagram has both an iconic and a symbolic element that come with conventional rules, i.e. attributed meanings: "[...] the diagram type consists of two parts: a diagram token and a set of reading rules for the understanding of it as a type (which may, in many cases, be implicit)." The triquetra is no exception. Only, compared to the triangle and tripod, the level of required conventional, symbolic interpretation is lower and can be said to be more iconic, even empirical. For the triangle, I highlighted the taught reading of directionality, which is conventional. In the case of the tripod I emphasized the spatial reading of the x–y–z axes, which is already less conventional and more iconic, in terms of the x–y–z axes' visual similarity to the corner of two walls meeting a ceiling or floor. For the triquetra, we could interpret the tricolourability rule of the trefoil knot as a taught, conventional reading, which I believe differs significantly from the other two examples. The tricolourability rule visually marks what is present. When drawing the triquetra with a carbon pencil on a piece of paper the overlaps of the lines are not representations, they are genuine, tangible overlaps of carbon on top of each other. The issue is that those tangible overlaps are invisible to the naked eye requiring a conventional rule to mimic, with colours, the iconic similarity present. As such, not only does the triquetra represent three-dimensionality better than the triangle and tripod, it is the only one of the three that requires three-dimensionality itself to be drawn or envisaged: it is impossible to have an overlap in fewer dimensions than three. In this respect the triquetra comes closer to Stjernfelt's example of an empirical diagram, "a drawing of a circle as a diagram for the concept circle" (Stjernfelt 2007: 99), than either a triangle or tripod.

the visualization of three intersecting spheres. Fig. 37 visualizes three intersecting spheres and shows the inner shape of the intersection.[24]

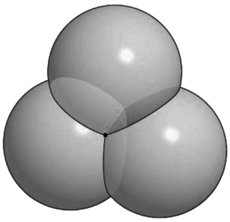

Figure 37. Three intersecting spheres.

7. Deductive discoveries connected with Floyd Merrell's 'entangling forms', Don McNeil's 'topology of recursion', Paul Ryan's 'relational circuit', and an ancient visual conundrum

When considering the triquetra as the intersection of three Venn diagrams (flat, two-dimensional) it is tempting to identify the intersection arches as representing but one of three, i.e. an intersection of perception, interpretation or action, after Määttänen (Fig. 38).

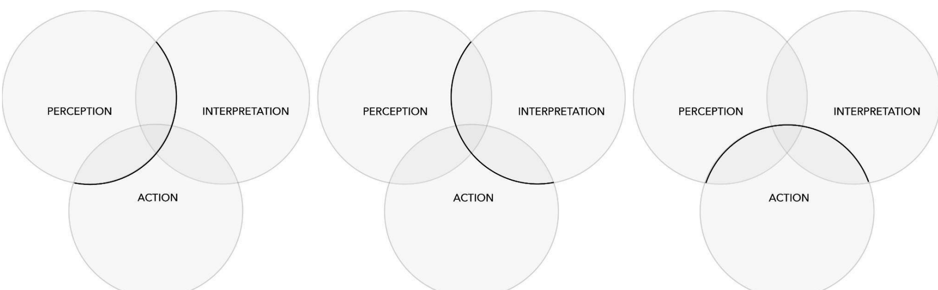

Figure 38. Looking at the intersection arch as singles.

[24] Note that the intersection "edges", that can be seen from the outside, look like a tripod shape, which fits the morphological connection between the tripod, triangle and triquetra, and I argue that this tripod-appearance actually, at least on a visual level, proves that the tripod is an abstracted and depleted diagram not allowing us the riches of diagrammatic discovery, i.e. it does not show what it hides.

However, as demonstrated above, the triquetra is a *two-dimensional rendering* of a three-dimensional intersection of three spheres, which means that one intersection arch automatically intersects *all three* spheres, without exception, clearly illustrating Short's definition of triadicity where "[a]ll three items are triadic in the sense that none is what it is – a sign, an object, or an interpretant – except by virtue of its relation to the other two." (Short 2007: 18) as well as Peirce's description of genuine triads: "A monadically degenerate triad is one which results from the essence of three monads, its subjects. A dyadically degenerate triad is one which results from dyads. A genuine triad is one which cannot be resolved in any such way." (CP 1.473) – see Fig. 39.

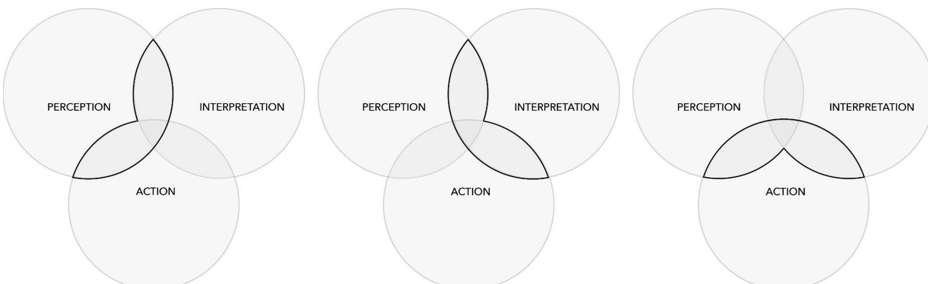

Figure 39. Looking at the intersection arch as triads.

As stated in the introduction, the goal of this investigation is to bring pattern and process views together, taking into account the specificity as well as the limits of visual representation. As we delve deeper into the diagrammatic findings from the triquetra, it is opportune to bring in the visual dynamics between macro- and micro-perspectives. Fig. 40 is a rendering of an ancient visual conundrum that shows us three hares and three ears when we look at it as a whole (macro, static, pattern, sign), yet when we look at each hare individually, they *magically* seem to have a *set of ears* each (micro, dynamic, inside process view, semiosis).

Looking at the whole figure we take a macro-perspective, only counting three ears. We take up an observer perspective outside of the visual to see it in its entirety. The visual is frozen and static. This represents the pattern or the fully formed sign. Focussing on one single hare and letting our eyes move up to its head we see two ears appear. However, we cannot see the ears of the other hares unless we move our visual focal point to one of the other hares. We are inside the visual, at a micro-level, where we can see all the details of one hare and spot in our peripheral vision that the other hares are there but not seeing all their details with precision. This is an inside-the-process view or inside semiosis-view, sign formation.

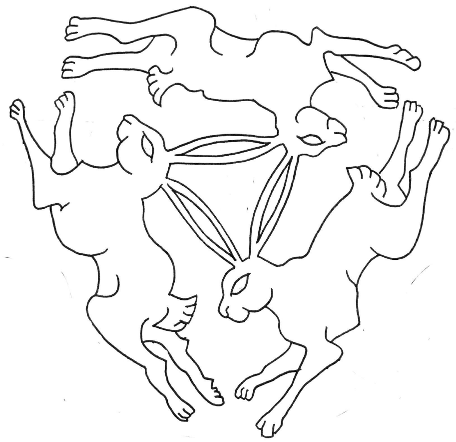

Figure 40. Ancient three hares conundrum.

The uncertainty principle in physics states that it is not possible to observe both the position and the speed of an object at the same time with precision. The same happens here: when a sign is fully formed as an irreducible triadic bond between R–O–I, all time aspects are abstracted (frozen state, static view) and the bond is seen as a static pattern, i.e. the positions within the pattern can be observed without it being possible to observe their movement. When Merrell's (1996) perspective that 'signs are becoming' is adopted, then no single state is fixed, they are moving towards the next state, and only the irreducible structure is fixed (or known with precision), i.e. the trajectory is being observed without it being possible to position the states with precision.

If we bring this back to the diagrammatic representation of the ITS, we can add a relevant diagram property to the list, namely, *allowing both static and dynamic views*.

The construction of the intersection arches in Fig. 39 indisputably counters the original three-way dyadicity objection and gives us actual three-way *triadicity*. In Fig. 41 we can see how a triadic intersection arch can be rendered in an alternative manner that mirrors an essential element of Merrell's diagram (Merrell 2010).

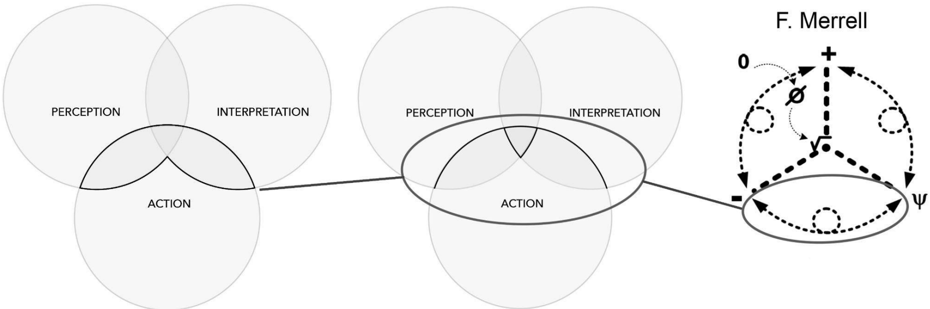

Fig. 41. Triadic arch intersection rendered with a loop in the middle, which is also found in Merrell's diagrams.

As a result, the triquetra, visualized as three triadic intersections, is morphologically the same diagram as Merrell's diagram (Fig. 42).

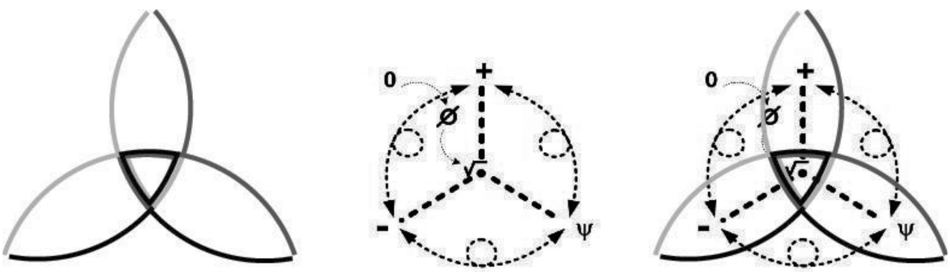

Figure 42. Triquetra as an equivalent diagram to Floyd Merrell's diagram form 'Entangling Forms'. The diagram in black dotted lines is the original Merrell diagram, the grayscale triquetra is the mirror image on top.

In Fig. 27 in Section 4 we transformed the triquetra diagram into a circle by flipping the arches outward. If the same transformation is executed on the triadic intersection arches, we uncover Merrell's diagram minus the dotted tripod in the middle (Fig. 43).

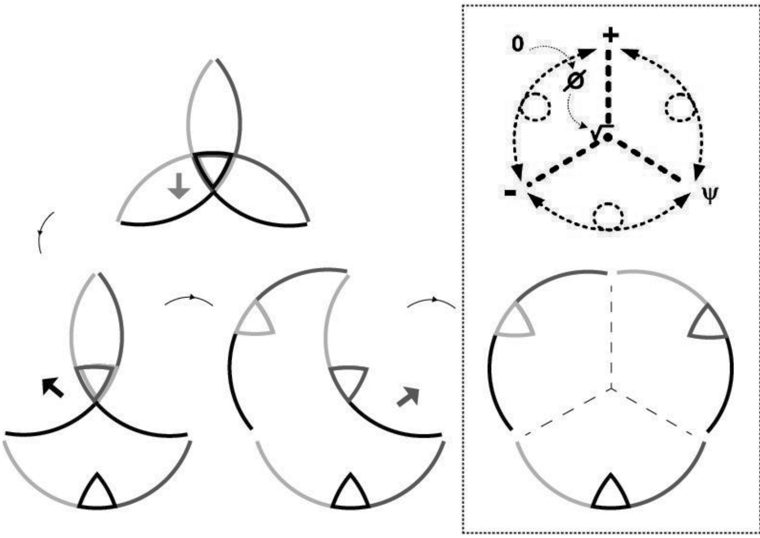

Figure 43. Transforming the triquetra diagram to reveal Merrell's entangling forms diagram.

As stated above, triquetra shapes have been part of quite a number of Merrell's visualizations, always as a kind of background, a dotted line, with the one distinction that Merrell uses these "swirling lines" to add specification to the tripod diagram that takes centre stage. This essentially captures the objection to the tripod as a diagram: when a diagram needs things to be added to offer us the deductive discoveries Peirce talked about, then that diagram has been depleted of its diagrammatic richness. All the deductive richness is, however, in Merrell's writing explaining the tripod, e.g. in Merrell 2008 which offers slightly different diagrams than the ones used in Merrell 2010, where the triquetra "swirl" (see Fig. 41 above) had disappeared:

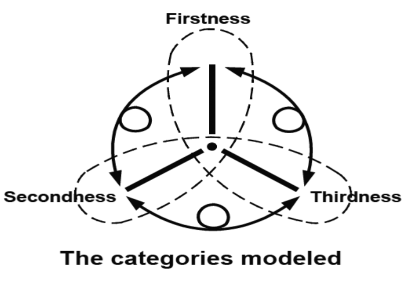

Figure 43a. The categories modelled (Merrell 2008: 102).

> We have the categories depicting their interdependent, interactive interrelatedness in Figure 1 [here Fig. 43a, T. M.] Notice how they are *'democratic', since each one is interrelated with the other two in the same way they are interrelated with each other.* Notice that the model is not 'triangular', but rather, there are three lines meeting at a point in the form of a 'tripod' such that there cannot be merely a binary relation between one category and another, for the *interrelations between any two categories are possible solely by means of interrelations between all three categories*. Notice also that *the swirling lines illustrating the processual character* of these interrelations essentially *make up a 'Borromean knot'* (the dotted lines). The Borromean knot exercises a move, from the two-dimensional sheet toward *three-dimensionality, with the overlapping lines.* This is significant, I would submit. For, the three lines making up the categorical interrelations are not simply two-dimensional. They are more properly conceived as a 'tripod' as seen from either above or below, that, as a result of the swiveling lines of the Borromean knot, oscillates forward and backward as the lines swirl and gyrate. Thus the three-dimensionality of 'semiotic space', which, along with a temporal dimension, makes up a nonlinear timespace manifold. (Merrell 2008: 103; my emphases, T. M.)

I have used italics to show Merrell's explanation checking off the properties we are looking for in a diagram to represent the ITS, including the connection with the trefoil knot, the Borromean rings, as well as the emphasis on the overlap as an indication of three-dimensionality, and the processual character. All the characteristics are explained, but they are attributed to the tripod, which does not possess those characteristics in its visual execution, not to the "swirling (triquetra ed.) lines" in the background.

In his article "What's going on with the topology of recursion?" Don McNeil (2004: 31) concludes that the torus richly embodies semiosis: "Although many interesting and useful meanings may be associated with other topologies such as the Klein bottle and the projective plane, we need look no farther than the torus to find recursion fully represented, invariances well established, and semiosis richly embodied." McNeil (2004: 18) defines a simple torus as "the envelope around a recurring path of movement, which path does not necessarily repeat itself exactly on every revolution".

Investigating the connection between iterative and recursive algorithms, McNeil (2004: 5) explains the significance of this for semiotics:

> Among the semiotic implications of all this are that, first, the specification of an "entity" in terms of "itself" can work perfectly well without contradiction or infinite regress under the proper conditions and, second, that there may be a way in general to respecify recursivity as iterativity and vice versa. This latter, if true, would suggest that either a self-referential recursive or a constitutive iterative approach is equally effective throughout semiotics and systems.

Throughout this look at the dominant and alternative diagrams to represent the ITS, all of McNeil's insights are highly relevant when we try to represent both process and pattern. Not only does he conclude that the torus is an appropriate topology to embody semiosis, he describes a "topology of relative invariance" (McNeil 2004: 4, 24, 31), which is precisely what the triquetra as a three-cornered knot without a beginning or end represents, both visually and conceptually, especially when taken as the three-dimensional trefoil knotted torus. McNeil's definition of a simple torus can be further developed to describe the triquetra and what it represents, i.e. the ITS as an envelope around a recurring, knotted path of movement at the intersection of three spheres, which path does not necessarily repeat itself exactly on every revolution, but always intersects each of the three spheres at every revolution.

A final connection can be made to Paul Ryan's work on his relational 'circuit', which he described as a six-part *Kleinform* with six unambiguous positions: firstness, secondness, thirdness, and three additional in-between positions (Ryan 1991). Note that the in-between positions are equally labelled as 'unambiguous'. Fig. 44 shows three of Ryan's visualizations: the relational circuit (a) used in his relational yoga called Threeing, the circuit as a *Kleinform* (b), as well as a 3D rendering (c) of the *Kleinform*. Note how the 3D render has three tunnel arms that contain the inner part, which can easily describe the triquetra, i.e. the triquetra is a more abstract, less detailed 2D rendering of the *Kleinform*, equally functioning to represent Ryan's extraordinary plastic thinking.

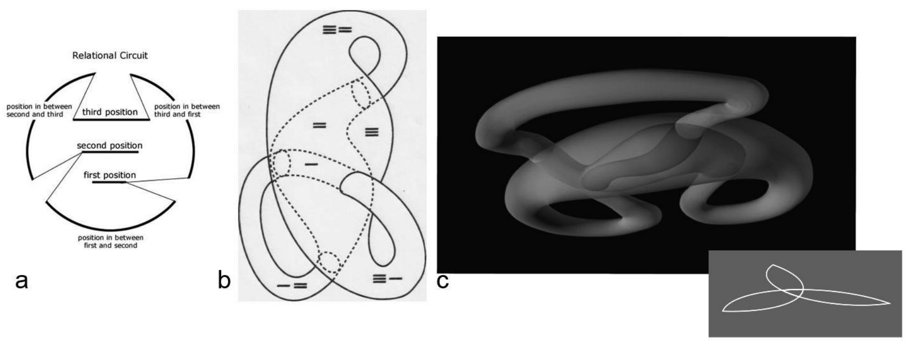

Figure 44. Paul Ryan's relational circuit, *Kleinform*, and triquetra.

In the triquetra diagram as the intersection of three spheres, we can easily plot Ryan's six unambiguous positions and add a seventh at the absolute core of the triquetra where every point is undeniably triadic itself (Fig. 45).

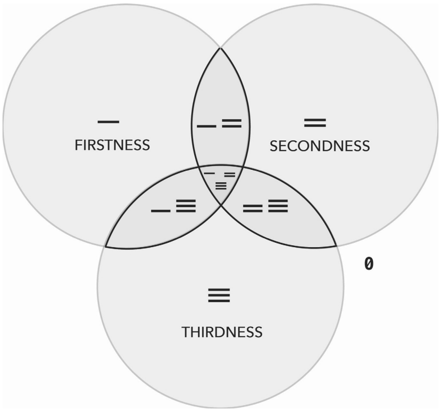

Figure 45. Seven unambiguous positions inside the construction of the triquetra as the intersection of three spheres, and eight positions if we add the nothingness or absolute zero (of both Peirce and Merrell) outside of the intersecting spheres.

Note the fractal-like recursion that appears when we look at the whole from an outside perspective, where the three intersecting spheres *together* contain '— = ≡' outside of the triquetra intersection and '— = ≡' appears again at the absolute core of the triquetra itself.

8. Triquetra as a process-pattern duality diagram

Fig. 46 illustrates how the triquetra can be seen as a frontal view, pattern view, of a never-ending process of triadic connections made across space-time. As such the triquetra diagram visually captures both the static, fixed triadic pattern of the ITS, as well as its *becoming*-nature explored and explained by Merrell.

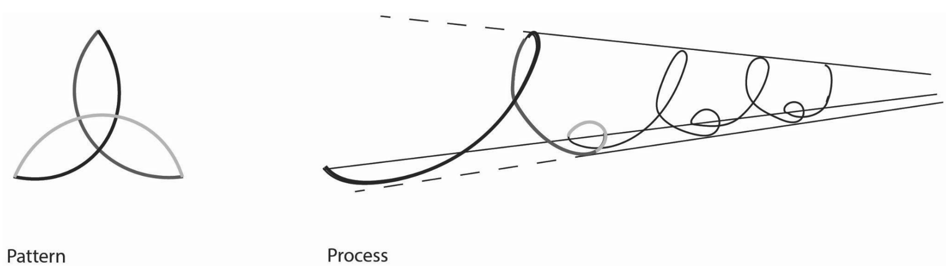

Figure 46. Triquetra as a process-pattern diagram.

Building on the last visual of the previous section (Fig. 45), where, from the outside of the diagram, we could see the onset of recursion '⚊ ⚌ ☰' repeated at the core of the triquetra, it is easy to visualize and imagine how '⚊ ⚌ ☰' generates '⚊ ⚌ ☰' over and over again (Fig. 47). This keeps going deeper and deeper into the core, which, in terms of visualization, is nothing else than a frontal view of a progression over time, always repeating itself at the next step *ad infinitum*.

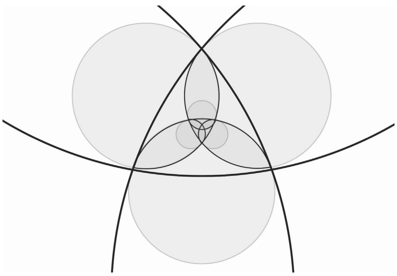

Figure 47. Recursion inside of the triquetra.

The process view over time is perfectly connected to John Deely's (2001) diagram where Deely offers the visual showing how abduction, deduction and induction follow each other in an endless spiral (Fig. 48). The similarity with the triquetra diagram as a process view over time is obvious, and it is not surprising that we can easily map Deely's concatenation of abduction–deduction–induction onto the endless three-cornered knot as shown in Fig. 49.[25]

[25] Terrence Deacon's close collaborator Jeremy Sherman (2018) states that "Life is narrowing, not arrowing. Even the past wasn't single arrows." (accessible at https://www.psychologytoday.com/sg/blog/ambigamy/201812/the-arrowing-illusion-psychologys-misleading-intuition) – a dictum that can be evaluated as both being correct and not. Arrows have no real place in diagrams as an intrinsic part of a diagram; they serve another purpose. Peirce's example of a map as a diagram implicitly tells us that we use tools to get at diagrammatic insights; in the case of a map, using a ruler to figure out distances between two points is an example of such tool use. Arrows have the same function. There is no objection to using arrows in diagrams and sharing one's use of a diagram as a pedagogical aid. The infinite possibilities of Firstness can easily be represented by an infinitude of arrows, which can get narrowed down first in a species-specific manner, e.g. the arrows that apply for a certain species, and be once more narrowed down to a species specimen's agency. Sherman's statement is too broadly general to refute and lacks specification to be applicable. With the triquetra as the intersection of three spheres, in an endless concatenation in all possible directions, all possible connections from Firstness to Secondness to Thirdness are determined by infinite possibilities and branching. A chosen path, regardless of prediction or hindsight bias, is indeed a narrowing of arrows, when we take into account that the arrows can turn any possible way at every possible branch, i.e. determination is not connected to arrows, but to the pre-existing possibilities an arrow can take.

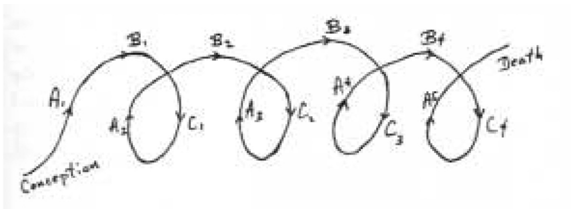

Figure 48. John Deely's abduction–deduction–induction diagram.

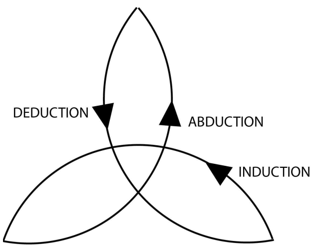

Figure 49. John Deely's abduction–deduction–induction mapped on the triquetra.

9. Additional musing

Unsurprisingly, the triquetra as the intersection of three spheres allows multiple labellings of Representamen–Object–Interpretant for the simple fact that they show different visual readings, e.g. placing R–O–I at the outer end points reads as a classic, two-dimensional approach that is reminiscent of the three-way dyadic view, whereas placing R–O–I at triadic intersection points labels three-way triadicity, bringing in the knowledge that each of the three can only be labelled by connecting them to the other two. This, again, emphasizes the uncertainty principle, as we cannot pinpoint the position with certainty when looking at the movement. Mark that placing Representamen in the Action sphere really gives a new, plastic meaning to the dictum that 'signs are only signs *in actu*'. The plasticity of the diagram opens up to more such dictums and reformulations, e.g. that objects are only objects in perception, or that an object is the intersection of interpretation and action in perception, or a representamen is the intersection of perception and interpretation in action, etc. (Fig. 50).

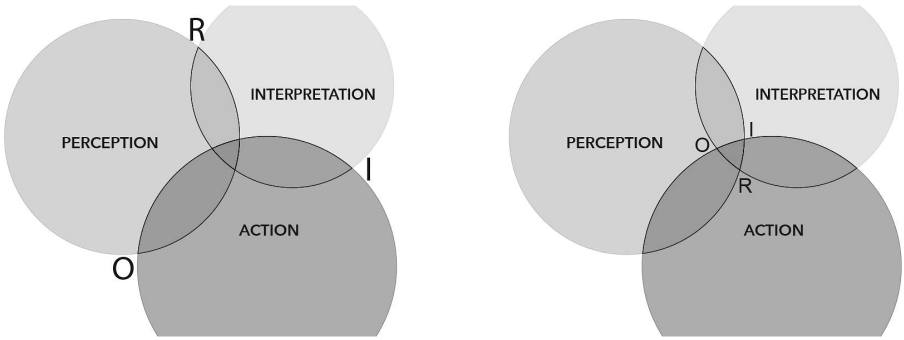

Figure 50. Different placements of R–O–I on the triquetra.

The most important takeaway is that any label that focuses on only one part of the triad is counterproductive to our understanding that, e.g. an object of a sign is not just "an object" but "an OBJECT–interpretant–representamen".[26]

Drawing the triquetra without the hollow centre makes this clear when the intersection of the three spheres becomes a single point, not R–O–I but ROI collated as one entity (Fig. 51).

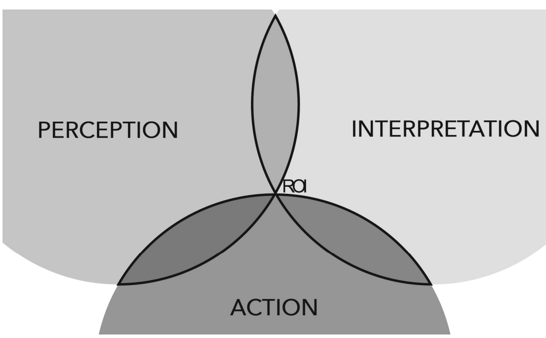

Figure 51. Triquetra intersection as a point.

Although I could be persuaded that the *ultimate* visual representation of the ITS is nothing more than a single point, as a diagram it would constitute an even higher

[26] Ji Sungchul's (2017: 389) description of the irreducible triadic relation is a much better formulation of this: "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."

abstraction than the tripod and no longer allow any diagrammatic manipulation whatsoever – an abstraction *ad absurdum* that closes off any possibility of diagrammatic discoveries – consequently adding another reason to prefer the triquetra with a hollow centre, next to the ones stated in Section 3.

It does, however, merit a moment of reflection – namely, a single point is a degenerate circle with a radius of 0, and in Section 4 we saw how the triquetra could easily be transformed into a circle by flipping the arches outward, and in Section 5 how the torus and knotted torus are topological homeomorphic spaces, which gives us three equivalent visualizations in Fig. 52: a point, a circle and a triquetra.

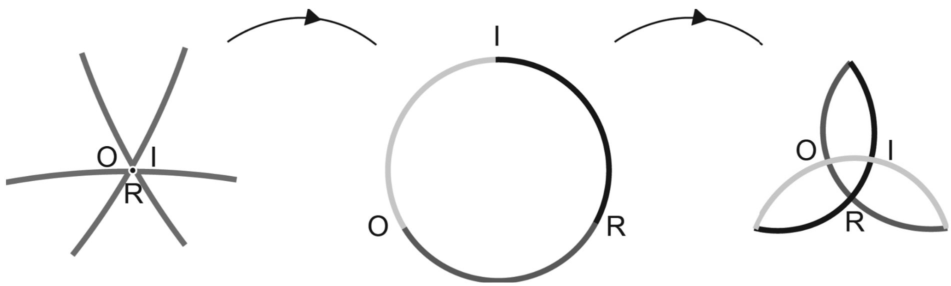

Figure 52. Triquetra intersection as a point, circle and triquetra.

If we return to the beginning of this musing, labelling R–O–I as 'components' or 'elements' of the sign relation is misleading in terms of formulation, in a similar manner to interpreting the three Venn diagrams or spheres as autonomous, self-contained, pre-existing entities that can exist separate from the others. Perception–Interpretation–Action is as equally irreducible a relation as Representamen–Object–Interpretant. They are not self-contained components or elements in their own right that enter into a triadic relation, they are different labels of one and the same relation, identifying three distinct, for lack of a better word, type-*properties* of that relation: an object-, representamen- and interpretant-property. This, I believe, is most apparent in the circle or torus representation in Fig. 52, and strengthens the case for the triquetra, where the three property labels of the irreducible triadic relation (object, interpretant and representamen) are visualized as equal parts of *one* closed loop.

With the irreducible triadic sign as a point (degenerate circle/transformed triquetra) we can revisit Fig. 47 (showing recursion in the triquetra diagram – with a hollow centre) and offer Fig. 53 as an alternative visualization for the triquetra (without a hollow centre), where the intersection point can be replaced with another triquetra.

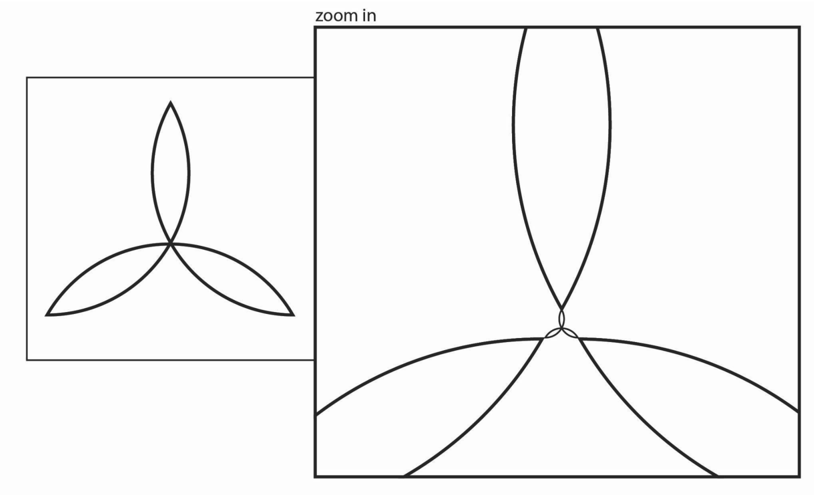

Figure 53. Triquetra recursion.

10. Peirce

In Chapter 4 entitled “Knots” of *The New Elements of Mathematics. Vol. II: Algebra and Geometry*, a figure shows three circles intersecting, with a triquetra diagram appearing in the centre (Fig. 54), illustrating Peirce’s Definition 117: “An interlacing is a linkage in which no pair of lines is linked, but only triplets.” (Peirce 1976: 310) After his definition and illustration, Peirce (1976: 310) added “The theory of knots is not in its present imperfect condition a particularly important study”, indicating that he was familiar with the knot theory discipline developing in mathematics, but at that time did not connect his own topological definitions of knots with his irreducible triadic sign.

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Definition 117. An *interlacing* is a linkage in which no pair of lines is linked, but only triplets.[58] [Fig. 37, The Simplest Interlacing.]

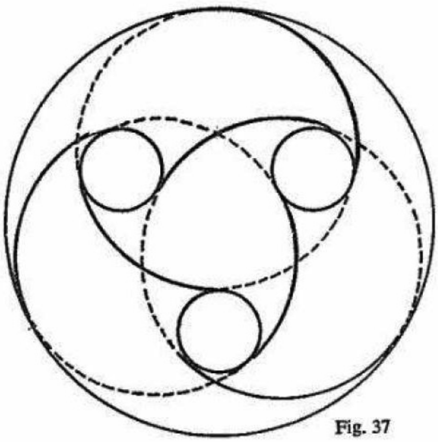


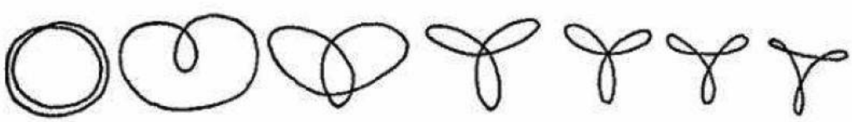
Fig. 37

The theory of knots is not in its present imperfect condition a particularly important study. Hundreds of knots have been delineated, but few

Figure 54. Peirce's drawing of interlacing knots in *The New Elements of Mathematics.*

As Kilstrup (2015) mentions, Peirce did not designate a conclusive diagram to represent the irreducible triadic sign; still, we can find triangles, tripods (or forked road diagrams) as well as triquetra in his work, e.g. the triquetra drawings illustrating his definition of a crunode (Fig. 55).

Definition 124. A *crunode* is a point where a line cuts itself [Fig. 41].



A series of Crunodes
Fig. 41

Figure 55. Peirce's drawings of triquetra to illustrate his definition of a crunode in *The New Elements of Mathematics.*

Conclusion

Peirce stated that diagrams aid deductive discoveries. Although there is much to say for the tripod visualization of the ITS and there is no doubt that it merits a place in semiotic thinking, evaluated solely on the merits of a diagram *to aid deductive discoveries* it is a rather poor visual diagram, i.e. the level of visual abstraction applied to hit the essence of what it tries to represent means that what was lost in abstraction can no longer be extracted from the diagram, and as such it is depleted of its diagrammatic richness and aptitude.

In contrast, the triquetra diagram opens up to so much "surprising novelty of many deductive discoveries" that it can easily replace the tripod on the ground of *possibly more appropriate* to quote Merrell (2010: 58): "[...] focal signs that have been endowed description, explanation and interpretation as signs of *generality*, are invariably *incomplete*, and they are largely *underdetermined* [...] they may eventually reveal their *incompleteness* and they may be replaced with signs deemed possibly more appropriate."

The triquetra represents the intersection of three spheres. It is a proven two-dimensional rendering of a three-dimensional entity: stereographic projection, tricoloured non-trivial trefoil knot, intersection of Borromean rings, etc. Via trilateration, it can pinpoint with precision in relative space. In its three-dimensional rendering of the trefoil knot it is a (knotted) torus or, in the formulation of McNeil, "a topology of relative invariance" (McNeil 2004: 4, 24, 31). And, as this investigation set out to demonstrate, it functions as a visual representation of the process-pattern duality, bringing together both static and dynamic approaches of semiotic thinking.

The close connection to the work of Merrell was not present at the start of this investigation of the dominant diagrams to represent the ITS. The diagrammatic richness of the triquetra diagram led it into becoming a mirror of the work Merrell had already done, with the many instances of triquetra shapes in Merrell's diagrams as proof. The only part where I differ with Merrell is on the conclusion that it is the most abstract shape, i.e. the tripod, that is best suited to diagrammatically represent the ITS. I believe Merrell's "swirling lines" are much more suited for this purpose.

An arc is an imaginary mathematical shape defined by a segment of a circle, while an arch is an architectural solid, built with one or more arcs. Merrell's solid account in *Entangling Forms* (2010) describes all the *arc* relations generated in the process of semiosis and sign-becomings, and the triquetra diagram is but the solid architectural arch that can visually represent or manifest those arcs on paper.

It is a pattern that shows the process that both generated the pattern and operates within its confines. A process-pattern diagram that follows the wave-particle duality, a third that mediates the process and the pattern into an irreducible, entangled diagram, i.e. it is the space between a difference.

Acknowledgements. Many thanks to Kalevi Kull for references and adding diagrams I had not found myself, such as the John Deely spiral.

References

Bakker, Arthur; Hoffmann, Michael H. G. 2005. Diagrammatic reasoning as the basis for developing concepts. *Educational Studies in Mathematics* 60: 333–358. https://doi.org/10.1007/s10649-005-5536-8

Chandler, Daniel 2002. *Semiotics: The Basics*. Abingdon: Routledge. https://doi.org/10.4324/9780203166277

Deely, John 2001. Physiosemiosis in the semiotic spiral: A play of musement. *Sign Systems Studies* 29(1): 27–48. https://doi.org/10.12697/SSS.2001.29.1.03

Eco, Umberto 1979. *A Theory of Semiotics*. Bloomington: Indiana University Press.

Harries-Jones, Peter 2009. Honeybees, communicative order, and the collapse of ecosystems. *Biosemiotics* 2: 193–204. https://doi.org/10.1007/s12304-009-9044-6

Kauffman, Louis H. 2022. The semiotics of laws of form. In: Boi, Luciano; Lobo, Carlos (eds.), *When Form Becomes Substance: Power of Gestures, Diagrammatical Intuition and Phenomenology of Space*. Cham: Springer, 3–26. https://doi.org/10.1007/978-3-030-83125-7_1

Kilstrup, Mogen 2015. Naturalizing semiotics: The triadic sign of Charles Sanders Peirce as a systems property. *Progress in Biophysics and Molecular Biology* 119(3): 563–575. https://doi.org/10.1016/j.pbiomolbio.2015.08.013

Lacková, Ľudmila; Rodríguez Higuera, Claudio J.; Kull, Kalevi (eds.) 2020. *Gatherings in Biosemiotics XX*. (Tartu Semiotics Library 20.) Tartu: University of Tartu Press.

McNeil, Don 2004. What's going on with the topology of recursion? *SEED Journal* 4(1): 2–37.

Määttänen, Pentti 2007. Semiotics of space: Peirce and Lefebvre. *Semiotica* 166: 453–461. https://doi.org/10.1515/SEM.2007.067

Merrell, Floyd 1995. *Semiosis in the Postmodern Age*. West Lafayette: Purdue University Press.

Merrell, Floyd 1996. *Signs Grow: Semiosis and Life Processes*. Toronto: University of Toronto Press. https://doi.org/10.3138/9781442679931

Merrell, Floyd 2001. Lotman's semiosphere, Peirce's categories, and cultural forms of life. *Sign Systems Studies* 29(2): 385–415. https://doi.org/10.12697/SSS.2001.29.2.01

Merrell, Floyd 2008. Life before matter, possible signification before tangible signs: Toward a Mediating View. *Cosmos and History: The Journal of Natural and Social Philosophy* 4(1/2): 99–113.

Merrell, Floyd 2010. *Entangling Forms: Within Semiosic Processes*. Berlin: De Gruyter Mouton. https://doi.org/10.1515/9783110245585

Peirce, Charles S. 1994 [1866–1913]. *The Collected Papers of Charles Sanders Peirce*. (Vols. 1–6, Hartshorne, Charles; Weiss, Paul, eds.; vols. 7–8, Burks, Arthur W., ed.) Charlottesville: Intelex Corporation. [In-text references are to CP, followed by volume and paragraph numbers.]

Peirce, Charles S. 1976. *The New Elements of Mathematics. Vol. II: Algebra and Geometry.* (Eisele, Carolyn, ed.) The Hague, Paris: Mouton Publishers.

Ryan, Paul 1991. "A Sign of itself". In: Anderson, Myrdene; Merrell, Floyd (eds.), *On Semiotic Modeling*. Berlin: De Gruyter Mouton, 509–524. https://doi.org/10.1515/9783110849875.509

Ryan, Paul 2002. Gender and Threeing. *Semiotica* 138: 371–392. https://doi.org/10.1515/semi.2002.013

Ryan, Paul 2009. *The Three Person Solution: Creating Sustainable Collaborative Relationships*. West Lafayette: Purdue University Press.

Short, Thomas L. 2007. *Peirce's Theory of Signs*. New York: Cambridge University Press.

Stjernfelt, Frederik 2007. *Diagrammatology: An Investigation on the Borderlines of Phenomenology, Ontology, and Semiotics*. Dordrecht: Kluwer Academic Publishers. https://doi.org/10.1007/978-1-4020-5652-9

Sungchul, Ji 2017. Neo-semiotics: Introducing zeroness into Peircean semiotics may bridge the knowable and the unknowable. *Progress in Biophysics and Molecular Biology* 131: 387–401. https://doi.org/10.1016/j.pbiomolbio.2017.09.012

Wheeler, Wendy 2006. *The Whole Creature: Complexity, Biosemiotics and the Evolution of Culture*. London: Lawrence & Wishart.

Triangle ou tripode ? Ni l'un ni l'autre. Une enquête diagrammatique sur la représentation visuelle d'un signe

Dans cet article, nous examinons la structure morphologique des deux diagrammes dominants (le triangle et le tripode) utilisés dans la littérature sémiotique pour représenter le signe triadique irréductible de C.S. Peirce afin d'évaluer leur aptitude diagrammatique, c'est-à-dire leur capacité à permettre des découvertes déductives. Concluant qu'aucun des deux ne traduit pleinement les propriétés attribuées au signe triadique irréductible au niveau visuel, un diagramme alternatif est proposé. Une représentation visuelle du signe triadique irréductible qui se rattache directement à d'autres domaines de recherche, tels que les mathématiques, mais aussi aux travaux de F. Merrell et de P. Ryan et, surtout, qui a la capacité de réunir à la fois le modèle d'un signe et le processus de sémiose en un seul diagramme facile à dessiner, la triquetra.

Kolmnurk või kolmjalg? Ei kumbki. Diagrammatiline sissevaade märgi visuaalsesse representeerimisse

Artiklis heidetakse pilk kahe semiootlises kirjanduses C. S. Peirce'i taandamatu kolmetise märgi kujutamisel ülekaalukalt kasutatava diagrammi (kolmnurga ja kolmjala) morfoloogilisse struktuuri, et hinnata nende diagrammatilist suutlikkust, s.t deduktiivsete avastuste võimaldamist. Järeldades, et kumbki ei kanna taandamatule kolmetisele märgile

omistatavaid omadusi visuaalsel tasandil täielikult üle, pakutakse välja alternatiivne diagramn. Selleks on taandamatu kolmetise märgi visuaalne kujutis, mis on otseselt seotud teiste teadusvaldkondade, näiteks matemaatikaga, ent ka Floyd Merrelli ja Paul Ryani töödega ja, mis kõige olulisem, millel on võime liita nii märgi muster kui ka semioosiprotsess üheks hõlpsasti joonistatavaks diagrammiks, kolmsõlmeks.