

# Mattering:

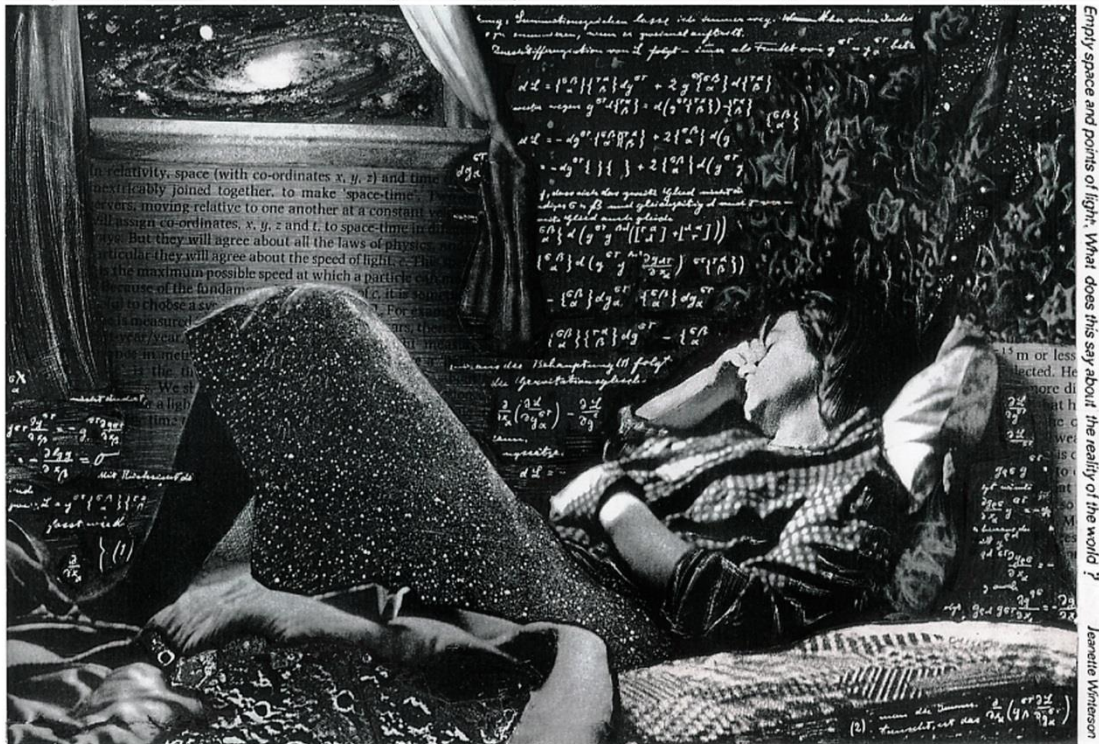
## A Recreation of the Realism of Charles S. Peirce

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*Matter, that thing the most solid and well-known, which you are holding in your hand and which makes up your body, is now known to be mostly empty space.*



Empty space and points of light. What does this say about the reality of the world?  
Janetta Winstanley

Mattering: A Recreation of the Realism of Charles S. Peirce

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Jacket etching: Matter # 3

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Gratitude is due for the 2014 award of a K & D Mackay Travelling Scholarship enabling me to present a draft of my thesis to the faculty and graduate students of the Department of Philosophy, Southern Illinois University Carbondale, USA, as a visiting scholar.

*For my one true mentor Doug Anderson*

Ordeal

I promise to make you more alive than you've ever been.  
For the first time you'll see your pores opening  
like the gills of a fish and you'll hear  
the noise of blood in galleries  
and feel light gliding on your corneas  
like the dragging of a dress across the floor.  
For the first time, you'll note gravity's prick  
like a thorn in your heel,  
and your shoulder blades will hurt from the imperative of wings.  
I promise to make you so alive that  
the fall of dust on furniture will deafen you,  
and you'll feel your eyebrows like two wounds forming  
and your memories will seem to begin  
with the creation of the world.

*Nina Cassian*



## Abstract:

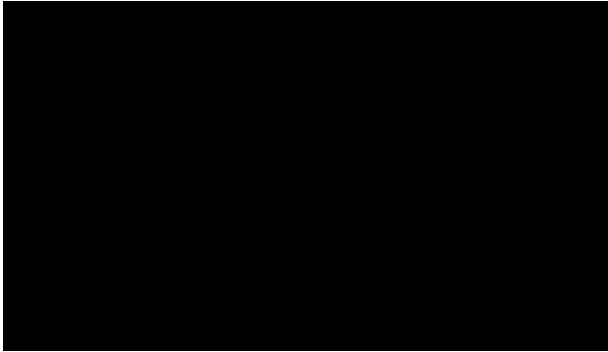
'Matting' is the process and the product of Reality. It is One from nothing. Whether there is more than one universe as the string theorists argue, is beyond my ken. Fortunately I am not concerned here with epistemology but with understanding. Nor am I preoccupied with revealing Truth. Rather, my purpose is to explore the meaning and consequences of 'matting': to be able to say that, beyond reasonable doubt, I believe that 'it' matters – that 'it' is 'matting'. This can be made intelligible by way of reflection on the Pragmatic Maxim of the American polymath Charles S. Peirce [1839-1914] and validated with his systematic method of inquiry. Part 1 of my thesis explores and presents Peirce's work. Part 2 is an exposition of my three part hypothesis of 'matting', that:

1. value functions as a condition of intelligibility – purpose, as the ground of 'matting' is dependent on value;
2. power – where power is the capacity to cause – is the enabler of force functioning as actual 'matting';
3. 'matting' is evolutionary realization of universal telos.

For Peirce, inquiry is triggered by genuine doubt. His method begins with imagination: with the generation of a hypotheses that, if valid, will relieve the irritation of doubt. Creating my hypothesis of 'matting' free of consideration of truth was liberating. This is what Peirce called abduction: active imagination which can be considered as reasonable, but only in so far as it can be reasoned from by deduction and induction. This is Mathematics, the first of the heuritic sciences (the branch of sciences which treats of discovery or invention) and its aim is to draw necessary conclusions; Philosophy is the next class of the heuritic sciences, followed by the Special Sciences. The first order of Peirce's second class, Philosophy, is his Phenomenology – his doctrine of categories – the purpose of which is to describe what is before the mind and to show that the description is correct. It is the beginning of discovering meaning, and involves observation of what Peirce called the phaneron (whatever is before the mind) – in my case, my hypothesis. Through differentiation, abstraction or prescision, and dissociation it identifies the three irreducible categories of reality identified by Peirce as First (possibility), Second (actuality) and Third (probability). The second order of his philosophical method is the Normative Sciences of Esthetics (aesthetics), the ideal, Ethics, going for the ideal, and Semeiotic or logic, what can reasonably be hoped for. By practicing what he preached, Peirce built the third order of Philosophy, his Metaphysics of *Tychism* (chance), *Synechism* (continuity), and *Agape*. [In physics, *Agape* arguably is gravity and the still to be discovered something that will deliver the Holy Grail: the theory of everything.]

This is 'matting'. I argue it is grounded in the values of integrity, respect and transparency, values which are expressed through the enactment (or powering) of 'matting's' purpose or telos which grows and develops. This is, 'matting': universal realisation of evolutionary telos. Our species, which evolved, as did the Universe, from the Universe – the process and product of 'matting' – appears set on a trajectory of ecocide for which we are responsible. One model for understanding this travesty is Freud's scheme of Id (desire) Ego (mediator) Superego (should). If Ego, which makes choices, sides with and empowers the unmitigated, individual wanting that is Id, by ignoring Superego – cooperative imperatives for universal growth and development – Earth's evolutionary trajectory is jeopardised. We ignore the categorial values of integrity, respect, and transparency with which evolutionary universal telos is co-dependent, at our peril. The global dysfunction of Egos, especially those that have commandeered power by disempowering others, can be healed. Together, but only together, we can get back on track and reclaim Earth's and our future. This one Universe from which we evolved and with which we are evolving, can do it, and, even granted that it has been practicing longer, we too *can* do it: we can make it matter. It matters. It is 'matting'.

I certify that any help received in preparing this thesis and all the sources used have been acknowledged in this thesis.



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Signature

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# Introduction

What follows matters and it is 'matting'.

What does it mean to say something, anything, everything matters and what is *it* that matters – what is 'matting'?

I first wondered about the meaning of 'matting' on coming across a small piece in a morning newspaper. When Australian lawyer and High Court judge Mary Gaudron, who in the 1970s was arguing for a female minimum wage, was asked by a fellow lawyer: "Does that matter?" she responded:

*"The matters that matter may be different, depending on who is doing the matting."* (SMH: 9 Dec 1986)

It was many years later, trawling records of thinkers over the past three millennia that I came across one whose method of inquiry could meaningfully respond to such a question. This was Charles Peirce [1839-1914]. Because his work is so crucial to understanding 'matting', let me provide some detail about him and more about his method. He was, by profession for most of his working life, a scientist; by inclination, a philosopher in general and a logician in particular; by accident of birth, a male born into a nineteenth century northern America elitist white family; by nurture and under the influence of his father, Harvard professor Benjamin Peirce, a mathematician. He was also a voracious and prolific reader and was so for the purpose of learning by vicarious experience.

He responded to what *it is* in his paper 'On a new list of categories' (EP1, 1-10, 1867) "based upon the theory already established [by Kant], that the function of conceptions is to reduce the manifold of sensuous impressions to unity and that the validity of a conception consists in the impossibility of reducing the content of consciousness to unity without the introduction of it." He explained in this paper and in a later rewrite (MS403, 1893) that IT in general is the conception of 'suchness' or present in general. In one of its meanings, Aristotle called this IT 'substance'. The junction at which IT as 'suchness', joins 'thusness' of IS, is the concept called 'being'. "Thus" he says, "substance and being are the beginning and end of all conception." He pointed out, however, that:

Substance is inapplicable to a predicate and being is equally so to a subject...The conception of being arises upon the formation of a proposition. A proposition always has, besides a term to express the substance, another to express the quality of that substance; and the function of the conception of being is to unite the quality to the substance.

Peirce identified subjects and predicates in his threefold intermediate categories between the manifold of impressions of 'thusness' of *being* and the unity of the proposition of 'suchness' of *substance*, as:

*Quality* which is reference to a ground,  
*Relation* which is reference to a correlate and  
*Representation* which is reference to an Interpretant.

These three categories are the irreducible elements "as modes or tones of thought" (CP1.355, 1890) present in every phenomenon, and are what Peirce came to call the Firstness, Secondness and Thirdness of objective being. They reveal nascent meaning and can reveal 'matting' through extension of Peirce's method of inquiry, where inquiry is the activity engaged in to seek answers to genuine questions.

All Inquiry relies on observation, reasoning and experimentation. Peirce called inquiry which systematically seeks to discover whatever there may be that is true, science, and classified it into three branches:

1. Positive Science – the science of things. This is experimental science: it is conducted for the purpose of determining the ontological validity of a hypothesis.
2. Semiotic – the science of representations. This is the process of reasoning: it is conducted for the purpose of determining meaning. It entails creation, explication and verification of a hypothesis.
3. Formal Science – the science of forms. This is theoretical science: it is conducted for the purpose of identifying the means and the method for conducting inquiry.

In his *Teleological Logic* (MS 108, begun in 1865; W1: 303) in which he first classified science, Peirce began by defining Logic. Let me paraphrase, amplify and annotate his definition.

Logic, like science in general, is an activity – it is a process. In its narrow sense, logic is the process of attaining truth by way of identifying its necessary conditions. Peirce broadened this process to include the use of his system of signs as a means of identifying the *general* conditions producing meaning. Signs, as he defined them, are embodied cognition, that is, they are objective. He called his broadened logic, objective symbolistic, or the semiotic of symbols or simply semiotic. Symbols are of three classes: *terms*, which call attention to things or quasi-things; *propositions*, which declare facts; and *arguments*, which profess to enlighten us as to the rational connections of facts or possible facts." (MS[R] 142.6, 1899-1900) They are regularities or laws, including power laws, of the indefinite future.

Semiotic is the science of representations. "Representation is a relation of one thing, – the *representamen*, or sign – to another, – the *object*, – this relation consisting in the determination of a third, – the *interpretant* representamen, – to be in the same mode of relation to the second as the first is to that second." (CP2.37, 1897)

"Form is that respect in which a representation stands for a thing prescinded from all that can serve as the basis of a representation and therefore from its connection with the thing." (MS 108, 1865; W1: 303) Form focuses on abstraction in order to be very clear about what is being inquired about. Peirce called abstraction, *prescision* (not to be confused with precision though the two are not unrelated) and distinguished it from the two other modes of mental separation which he termed *discrimination* and *dissociation*. *Prescision* is the action required to objectively identify Peirce's categories of First, Second and Third through observation.

To exemplify: Observing that a clear, cloudless, day-time sky is blue, an observer may inquire: Why is the sky blue? The inquiry is concerned with the relation (a Third) of blue (a quality, a First) to the sky (a thing, a Second). As a quality, a First cannot be observed without being embodied in a thing, a Second<sup>1</sup>. *Prescision* can only go from a First to a Second, and from a Second to a Third. *Prescinding* the quality 'blue' from 'the sky' objectifies it: objectified it is 'blueness'. The inquiry is about blueness in relation to clear, cloudless, day-time sky. The correlate 'is', is a Third: it relates a First, the quality of blue, objectified as 'blueness', to a Second, the actual thing, the sky.

Responding scientifically to the question would have been difficult for anyone before 1672 when Isaac Newton published the results of his experiments with light and prisms. Knowing about colour, enables inquiry about the blueness of any thing. Knowing about the sky enables inquiry about the relation (Thirdness) of quality (Firstness) to actual (Secondness). Following the progress of physics, we can now respond meaningfully: A clear, cloudless, day-time sky is blue because molecules in the atmosphere scatter blue light from the sun more than they scatter red light. When we look towards the sun at

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<sup>1</sup> Imagining a quality also requires a mental background in order that it may be imagined, even if this background is a 'blank slate'.

sunset, we see red and orange colours because the blue light has been scattered out and away from the line of sight.

This answer, we may declare from our commonsense perspective, is the truth. From this perspective, truth is atemporal. From the *temporal* position of pragmatism, the truth is 'what works' or what is 'instrumental' to progression. From a Peircean perspective, truth, being temporal, is always provisional. He would declare the response validated, and therefore, Real.

William James, in a public lecture in 1898, was the first to use the term 'pragmatism' to denote a newly emerging philosophical position which he acknowledged as being founded by his friend Peirce. Following this lecture, Peirce felt the need to differentiate his position from others – including James – who were using the term to propound a position that, in significant ways, was not aligned with his own. He had this to say:

Pragmatism is a method in philosophy. Philosophy is that branch of positive science (i.e., an investigating theoretical science which inquires what is the fact, in contradistinction to pure mathematics which merely seeks to know what follows from certain hypotheses) which makes no observations but contents itself with so much of experience as pours in upon every man during every hour of his waking life. The study of philosophy consists, therefore, in reflexion and pragmatism is that method of reflexion which is guided by constantly holding in view its purpose and the purpose of the ideas it analyzes, whether these ends be of the nature and uses of action or of thought. (CP5.13 fn P1, 1902)

He later adopted the name 'pragmaticism' to differentiate his method from the many others – including William James and Ferdinand C.S. Schiller – who had adopted the name pragmatism for their own positions. As pronounced by Peirce, himself: "to serve the precise purpose of expressing the original definition, he begs to announce the birth of the word 'pragmaticism', which is ugly enough to be safe from kidnapers." (CP5.414, 1905) Unlike the pragmatism and radical empiricism of William James, which could be said to be a theory of truth, Peirce's pragmaticism is a theory of meaning. For Peirce, "[t]he opinion which is fated to be ultimately agreed to by all who investigate, is what we mean by the truth and the object represented in this opinion is the real." (CP5.406-407, 1878) While he saw truth as something to be found in the long run, his method of inquiry focused on clarity of meaning in reality.

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The full title of my thesis is *Matting: A Recreation of the Realism of Charles S. Peirce*. Let me summarise the connection between the two parts of the title by way of considering Peirce's paper 'A neglected argument to the reality of God' (NA) (CP6.452-493, 1908).

The Shorter Oxford English Dictionary (SOED) gives two distinct meanings for 'recreation' in present-day usage. The first is "an activity or pastime pursued, esp. habitually, for the pleasure or interest it gives [LME]". The second is "the action of creating something over again; a new creation [E16]". Both meanings are intended here. In his paper Peirce used the term 'musement' to describe the combination of the two meanings as practice and product of that practice. As practice, musement may take a variety of forms – contemplation, consideration, meditation – but whatever its form, it is pure play. "Pure Play has no rules, except this very law of liberty. It bloweth where it listeth. It has no purpose, unless recreation." (CP6.458)

Pure play allows the muser to consider the configuration of "the three Universes of Experience familiar to us all – the Universes of ideas, of Brute Actuality of things and facts, and of everything whose being consists in active power to establish connections between different objects, especially between objects in different Universes" (CP6.455) – and to engage in "speculation concerning its cause." (CP6.458) This

"reasoning from consequent to antecedent" (CP6.469) – which he called here 'retroduction', but elsewhere, 'abduction' – allows for recreation, or new creation of a hypothesis.

Here we have a description of pure mathematics' first principal as method: the generation or creation of hypotheses. Deduction follows abduction and has two parts: explication and demonstration. Explication is intended to render the hypothesis as perfectly distinct as possible. Deduction as explication is, like abduction, an argument. Arguments "profess to enlighten us as to the rational connections of facts or possible facts." (MS[R] 142:6, 1899-1900) Deduction as demonstration is deductive *argumentation*. "An 'Argumentation' is an Argument proceeding upon definitely formulated premisses." (CP6.456) The purpose of deduction is "that of collecting consequents of the hypothesis." (CP6.472)

It invariably requires something of the nature of a diagram; that is, an "Icon," or Sign that represents its Object in resembling it. It usually, too, needs "Indices," or Signs that represent their Objects by being actually connected with them. But it is mainly composed of "Symbols," or Signs that represent their Objects essentially because they will be so interpreted. Demonstration should be Corollarial when it can. ...Corollarial Demonstration limits itself to considerations already introduced or else involved in the Explication of its conclusion; while Theorematic Demonstration resorts to a more complicated process of thought. (CP6.471)

In his musement on his hypothesis Peirce (perhaps unknowingly) makes use of Bayes theorem which proposes that evidence confirms the likelihood of a hypothesis only to the degree that the appearance of this evidence would be more probable with the assumption of the hypothesis than without it. Peirce points out, "every hypothesis, as such, supposes its object to be truly conceived in the hypothesis." (CP6.466) He also brings to our attention that "it is a chief function of an explanatory hypothesis ... to excite a clear image in the mind by means of which experiential consequences of ascertainable conditions may be predicted." (CP6.489)

Gathering evidence begins induction, the process "of ascertaining how far those consequents accord with Experience and of judging accordingly whether the hypothesis is sensibly correct, or requires some inessential modification, or must be entirely rejected." (CP6.472) Induction is a three staged process, the first which is Classification, is the process "by which general Ideas are attached to objects of Experience" (CP6.473). The second stage, "the testing argumentations", called by Peirce the 'Probations' are of two kinds. The first, Crude Induction, "is the weakest of arguments, being liable to be demolished in a moment... The other kind is Gradual Induction, which makes a new estimate of the proportion of truth in the hypothesis with every new instance," (*Ibid*) and "is either Qualitative or Quantitative" (*Ibid*). The third stage, called the 'Sentential part' by Peirce "appraises the different Probations singly, then their combinations, then makes self-appraisal of these very appraisals themselves, and passes final judgment on the whole result". (CP6.472)

A 'sententia' is a maxim. The maxim of appraisal Peirce would be referring to, his 'pragmatic maxim', was first put forward by him in his paper, 'How to make our ideas clear' and later revisited and confirmed by him. It reads:

The doctrine that the whole meaning of a conception expresses itself in practical consequences, consequences either in the shape of conduct to be recommended, or in that of experiences to be expected, if the conception be true; which consequences would be different if it were untrue and must be different from the consequences by which the meaning of other conceptions is in turn expressed.  
(CP5.2, 1878, 1902)

Like so much of Peirce's writing, this is convoluted, and yet as a tool for obtaining reflective clarity of intellectual concepts and propositions (EP2: 401, 1907) its use can produce the finely honed validation necessary for developing a cognisable metaphysics. When Peirce first proposed his Pragmatic Maxim, he explained how it was to be applied to the doctrine of reality. He gave the etymology and a definition of 'Real' in the NA (CP6.453):

"Real" is a word invented in the thirteenth century to signify having Properties, i.e. characters sufficing to identify their subject and possessing these whether they be anywise attributed to it by any single man or group of men, or not. ... The "Actual" is that which is met with in the past, present, or future.

Study of Peirce's 'Realism' reveals that he "accepts the nominalist notion that generals, or universals, are of the nature of thought, but rejects the doctrine's claim that only individuals are real." (Mayorga 2007: 152) In his definition of 'Universal' his final word is "there is no division of logical validity into universal and particular." (CP2.371, 1902) The Reality of the first universe of experience, that is, of ideas, is saved through "the fact that their Being consists in mere capability of getting thought, not in anybody's Actually thinking them" (CP6.455). Furthermore, he rejects Nominalism's denial that there is any "esse in futuro". His is not the timeless metaphysics that follows from classic logic. Peirce's semeiotic, brings into focus the temporality of the concrete life-world. Floyd Merrill (2005: 8) explains that taking the idea which is the hypothesis and interacting 'in here' with its signs object 'out there' the interpreter may, might, or may not, find a fit. "But 'truth' is not really the goal...Rather, the task at hand is to draw meaning from the signs being processed by way of interpreter-sign interaction." (*Ibid*) The admission of the interpretant is an admission of fallibilism; it dashes any hope of achieving certainty. The linchpin of Peirce's realistic pragmatism, following from his metaphysics of continuity, is fallibilism.

The principle of continuity is the idea of fallibilism objectified. For fallibilism is the doctrine that our knowledge is never absolute but always swims, as it were, in a continuum of uncertainty and of indeterminacy. Now the doctrine of continuity is that *all things* so swim in continua. (CP1.171, 1897)

It is through the processes of musement on our respective hypothesis – for Peirce, the hypothesis for the reality God; for me, the hypothesis of 'matting' – that we can observe purpose in phenomena and recreation through chance, growth and development.

I speculate that the purpose, or telos of 'matting' is 'being'; that 'being' is subject to chance and change; that the consequence of chance on 'being' is 'becoming' which is growth; that in accord with the continuum of its telos, it develops, that is, it is evolutionary.

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Peirce gave us in his evolutionary philosophy a truly powerful toolkit for inquiry and for ascertaining meaning but he did not explicitly write about 'matting'. I believe this warrants investigation. 'Matting' matters (is important) depending on who (or what) is doing the 'matting' and the purpose of so doing. By way of example:

1. *A fire-chief attending a factory fire that his crew tells him is under control, sees the smoke is orange, predicts an imminent back-draft and orders his team to vacate the building moments before it explodes. (Spiers & Gimple, 2003)*

2. *I hear a soft pop, look up from my computer at the vase of poppies in front of me and watch in wonder as an orange poppy opens before my eyes.*

What the fire-chief and I witnessed was the process I have called 'matting': a process which – utilising Peirce's terminology – involves the relationship of his categories First, Second and Third. In these examples 'orangeness' was abstracted, or prescinded from the unity of the manifold. 'Orange', of itself, is what 'may be'; of all or any colour, it is a possibility – it is a First. Actualisation of orange as 'orangeness' is through embodiment – here in smoke and a poppy – a First of a Second. Meaning is achieved semeiotically through the use of abduction which creates, deduction which explicates and

induction which verifies and is aimed at grasping universals or what 'would be' – it is a Third. The Real is apprehended, through the experience of observation and application of the principles laid out in his perennial classification.

These examples are taken from within the world and though apprehended by humans – the fire-chief and me: greeted with horror in the first instance and pleasure in the second – the meaning of their 'orangeness' is neither equivalent, nor intended for any human. 'Orangeness' in the first instance, though caused, is, to the best of our knowledge merely an effect. In the second instance, however, botanical theory tells us that to all intents and purposes, the 'orangeness' is a "come thither" to pollinators. Likewise, the meaning of the 'orangeness' of the vest worn by a horticulturalist tending a roadside bed of poppies, is different, but here it is intended for humans. Its purpose is not to gain sexual favours from bees and the like, but rather to warn motorists in the pursuit of their own destination, of the wearer's presence as a possible impediment to their progress.

In his paper 'Some consequences of four incapacities' Peirce said: "reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected." (EP1, 29: 1868) The fibres that make up the cable of his reasoning – the strands of the manifold that come to unity in his architectonic – are numerous. They include, but are not confined to (in alphabetic order, so none is seen to be more important than another): abduction, agapasm, anancasm, classification, community, continuity, evolution, fallibilism, methodetic, musement, phaneron, pragmatism, prescision, realism, semeiotic, synechism, teleology, trichotomies, tuism, tychism, universal categories of First, Second, Third. Late in his life he wrote: "I think logicians should have two principal aims: 1st, to bring out the amount and kind of security [approach to certainty] of each kind of reasoning and 2nd, to bring out the possible and esperable [hoped for] uberty, or value in productiveness, of each kind." (CP8.384-388, 1913) I hope to convey the security and uberty of his way of thinking.

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I think it would assist in grasping Peirce's unique vision and the idea of 'matting' which follows, to consider, just for a moment, how we process ideas. Jean Piaget [1896-1980], one of the most influential researchers in the area of developmental psychology during the 20th century, described two processes used by individuals in their attempt to adapt: Assimilation and Accommodation. Piaget was originally trained in the areas of biology and philosophy and considered himself a 'genetic epistemologist'. He described Assimilation and Accommodation as complementary processes through which awareness of the outside world is internalised. Although one may predominate at any one moment, they are inseparable and exist in a dialectical relationship. In Assimilation, what is perceived in the outside world is incorporated into the internal world without changing the structure of that internal world, but potentially at the cost of "squeezing" the external perceptions to fit. In Accommodation, the internal world has to accommodate itself to the evidence with which it is confronted and thus adapt to it. In reality, both are going on at the same time, although most of the time we are assimilating familiar material in the world around us, nevertheless, our minds are also having to adjust to accommodate it. Diagrams illustrating these two cognitive functions are well illustrated specifically on the *Teaching and Learning* web site.

Because Peirce is unique among thinkers, understanding his method requires accommodation in large measure. Those scholars who attempt to assimilate his work rather than accommodate it can miss the mark and dismiss him out of hand, or pronounce him unintelligible, or promulgate distorted interpretations of his method.

You may well wonder as you read: What is she getting at? Why is she telling me this? What is she trying to say? Where is her argument? I ask for your forbearance. As a means of disclosure, I have the English language at my disposal. Even with the addition of Peirce's neologisms – many of which have never entered the lexicon and those which have are often misrepresented – I am tied to a linear process. My argument, perforce, presents as a linear process, but one which, contrary to the hegemonic idiom of Western philosophy, is woven of multiple strands. The best analogy of this that I can think of is a plait which, like Peirce's irreducible categories, is a braiding of three tresses of hair, each tress comprising multiple strands of hair.

Poetry also uses language, is linear and depends on semantics, syntax and pragmatics to embody it, but unlike the language of 'non-fiction', its meaning is found when it is considered in its wholeness. The forms of poetry are numerous ranging from the highly structured to what is called 'free verse'. Let me give you an example of *haiku*, a structured form of poetry originating in Japan and if classic, conforming to 'rules' as follows:

- Japanese *haiku* traditionally consist of 17 *on*, or sounds, divided into three phrases: 5 sounds, 7 sounds and 5 sounds. English poets interpreted *on* as syllable.
- The Japanese word *kiru*, which means "cutting", expresses the notion that *haiku* should always contain two juxtaposed ideas.
- A reference to the season or changing of the seasons, referred to in Japanese as *kigo*, is an essential element of *haiku*.

Casting on stitches  
Algorithm on needles  
Winter's solution

My poem is made up of parts and complies with the rules of classic form, however, it is only meaningful when considered as a whole. In this it is like Peirce's architectonic. The poet's purpose, unlike Peirce's, is not intended to articulate a method for appeasing doubt, nor to communicate ideas. Rather, it is to share the reality of experience – to correspond to sentience.

In *The Simplest Mathematics: the Essence of Mathematics* (1902) Peirce wrote that "if mathematics is the study of purely imaginary states of things, poets must be great mathematicians." (PM 32) The following year he wrote in a rejected draft of his Lowell Lecture 3 (1903):

The poet is interested in his images solely on account of their own beauty or interest as images, while the mathematician is interested in his hypotheses solely on account of the ways in which necessary inferences can be drawn from them (PM 91-92)

I think it safe to say, however, that for both the mathematician and the poet, intelligibility is vital to the product of their labour – to its telos which is 'matting'.

I will argue further, that value is a necessary condition of intelligibility. In this I hold with Carl Hausman who argues in his paper 'Values and the Peircean categories' (1979: 221):

...intelligibility would be blind without value, for it would be nothing but a collection of generals. It would have no context by virtue of which generals could be assessed and brought under the control of a condition for their interrelations.

It is my contention that discerning 'matting' enables objective identification of value in inquiry and action, not merely as nominal statements of values or proclaimed ethical codes, but as real qualities permeating processes. Through my examples I hope to reveal the apodictic nature of value and thereby extend Peirce's method in which he shows how to make our ideas clear. I argue that value, in being

inextricable from process, is both intelligibly and objectively identifiable. My hypothesis of 'matting' is framed as three parts, each part focusing on each of Firstness, Secondness and Thirdness. Ultimately, 'matting' is irreducible to any one or two of the three; it is both an argument and a concept whose reality can be tested in terms of the Pragmatic Maxim.

The universal conditions of interrelations are what Joseph Raz called in his 2001 Tanner lecture, 'The practice of value' (2003) "enabling or facilitating values". I have identified 'being' as the telos of 'matting' and three values: integrity, respect and transparency, as necessary conditions of universal interrelations.

It is my hope that my exposition will reveal and validate my three part hypothesis of 'matting', that:

1. value functions as a condition of intelligibility, that telos as the ground of 'matting' is dependent on value;
2. power – where power is the capacity to cause – is the enabler of force functioning as actual 'matting'; and
3. 'matting' is evolutionary realization of universal telos.

Part 1 is a review of the evolutionary philosophy of Charles S. Peirce. I begin, in Chapter 1, with answering: *Why Peirce?* When it comes down to it, it is because Peirce's system of inquiry is the only one I have ever come across for comprehensively and meaningfully exploring questions about what is going on; about 'matting'. I show his generic model of his classification for inquiry: the heurctic sciences (the sciences of discovery). I follow this with some comments on Peirce's approach to metaphysics, the difference between assertion and belief, the relationship between belief and doubt, and finally why achieving understanding rather than truth is the aim of inquiry. In Chapter 2 I layout and detail Peirce's method of inquiry, his architectonic and his classification of the sciences including his categories, his semeiotic, especially his concept of abduction and his metaphysics. Chapter 3 is devoted to his radical realism. Part 1 concludes with Chapter 4, a review of some of the secondary literature books. I have listed the English language published monographs – both primary and secondary – in chronological order to show what primary literature, catalogues and bibliographies were available to secondary scholars at the time they wrote.

In Part 2 I develop the theory of 'matting'. My Introduction to this part is concerned with 'belief'. Chapter 5 is an exploration of the concept of information, seen by Peirce as the product of matter and form. Because information, *qua* information, is a newly emerging focus for philosophers and scientists, I lean heavily on direct quotation – some may say 'slabs' – rather than chance being misunderstood. Chapters 6 and 7 show 'matting' as temporal eventfulness. Because I develop my thesis through Peirce's method, Chapter 6 begins 'in the beginning' with cosmogony: theories or accounts of the origin [L17] and creation [M18] of the universe, followed by Chapter 7 where I consider: cosmology: theories or postulate accounts of the evolution and structure of the universe [M17] and the branch of philosophy which deals with the universe as a whole [M18]. I conclude this chapter by exploring the idea that even the greatest clarity of meaning may continue to leave 'matting' obscured and identify the most recent cosmological discoveries, dark matter and dark energy as, perhaps, allowing for full disclosure of cosmogony. My theory of 'matting', begins in Chapter 8 and carries over into Chapter 9 with an exploration of the meaning and co-existence of value and purpose as the ground of 'matting', of how value permeates the process of 'matting'. In Chapter 9 my concern is with the embodiment of value and purpose and the consequences of that coupling. This is 'matting'. The Conclusion is concerned with the consequences of accepting the theory of 'matting' and takes the form of a yarn – which is a tale or a story – of the self-creation of the Universe out of freedom and the evolution of its Laws through the discipline of limit of power. It tells what it means in reality to say: It matters; it is 'matting'.



## The Primary Texts of Charles Sanders Peirce

Grasping Peirce is no mean feat; he is not for the faint-hearted. Other great philosophers are more accessible, but none, past or present, was or is as comprehensive in their method for achieving clarity as Peirce. This is quite ironic: his papers are any editor's nightmare, his style is often cumbersome and his language not only littered with neologisms, but he often used different names for the same concept and had a tendency to be inconsistent in their use. In addition, he used many words in ways other than are commonly understood. Yet, as Douglas Anderson (2013) wrote in an email to me:

Clarity can be used in many ways--clear skies, clear vision, clarity of a wine, etc. Peirce focuses on simple logical clarity by which he seems to mean knowing the boundaries of a concept as best we can. He borrows from Descartes and Leibniz who argue that clarity and distinctness are the two modes of measuring a definition. Peirce adds the pragmatic meaning as yet another level of clarity--ultimately for him the final measure of clarity. Thus, the better we know the possible and necessary consequences of "we" the "clearer" will our understanding of the concept be. All of this means for Peirce that there is NO absolute clarity--all concepts have some element of indeterminacy (vagueness or generality). To be intelligible for Peirce means to be something that inquiry might grasp. So Kant's "thing in itself" is unintelligible but "neutrons" are intelligible. Even "God" is intelligible insofar as a belief may have recognizable consequences. But something could be very intelligible and not very clear. And of course no unintelligible "thing" could be clear to us.

Nominalism is the greatest bar to understanding Peirce. To fully grasp him one needs to 'get real' – to abandon the analytic approach which most 20th and 21st century philosophers value, but which was anathema to him, serving only to block genuine exploration of his method. In what is known as his second period, Peirce freely admitted to the error of nominalism in some of his early work and set himself to rectifying this by various means including rewriting whole papers, adding footnotes to some earlier documents and by way of extending explanation of earlier documents in later documents as a means of improving clarity.

Unfortunately, despite his efforts, Peirce did not manage to make himself clear. Of his papers, numbering some 100,000 pages, around half were undated. This has presented a major problem to understanding his work. He, himself, said:

As to Plato, unless we are content to treat the only complete collection of the works of any Greek philosopher that we possess as a mere repertory of gems of thought, as most readers are content to do; but wish to view them as they are so superlatively worthy of being viewed as the record of the entire development of thought of a great thinker, then everything depends on the chronology of the dialogues. (MS 434: 33-4, 1902)

Following his death in 1914, Peirce's philosophical papers were lodged together with his working library with the Harvard University Department of Philosophy by his widow Juliette, and the philosopher Josiah Royce. In the decades following their lodgement, a number of attempts were made to bring order to his papers but it was not until 1967 when Richard Robin published his *Annotated Catalogue of the Papers of Charles S. Peirce* followed in 1971 by *The Peirce Papers: A Supplementary Catalogue*, that a complete catalogue of the Harvard University holdings became available to scholars. Robin began work on this in 1960, two years after the publication of the last volume of the *Collected Papers of Charles Sanders Peirce, Volumes I-VII* edited by Charles Hartshorne and Paul Weiss, (1931-1935) and *Volumes VII and VIII* by Arthur Burks, (1958). Unfortunately, Robin did not cross-reference all the material in these eight volumes and no one has, to date, taken on this task.

Reading the preface to Robin's catalogue, one can surmise that Hartshorne and Weiss prepared their six volumes from two sources. The first of these was a nine-page typescript 'List of C. S. Peirce Manuscripts' by W. F. Kernan who was assisting Josiah Royce in organizing Peirce's papers and collaborating with him on an article entitled 'Charles Sanders Peirce' which appeared in the *Journal of Philosophy*, December 21, 1916. Hartshorne and Weiss' other source was a twenty-page typescript, 'Notes on papers and MSS.

in 'The Charles S. Peirce Collection' (Lenzen 1917) which is an evaluation of the contents and the physical condition of the manuscripts which, at the time were sorted into eighty-three boxes. By the time Burks edited the last two volumes, the Harvard collection had morphed into three separate sets of Peirce materials. The first which made up the bulk of the Peirce Collection, consisted of sixty-one boxes and bundles that had been organised, boxed and catalogued in 1941 by Knight W. McMahan. McMahan's ninety-nine page typewritten 'Catalogue of the C. S. Peirce Manuscripts', was a description of what the boxes contained. The second consisted of some nineteen boxes which had neither been classified nor catalogued. The third set, the correspondence, had been partially organized by McMahan.

A number of smaller collections of his writings were published over the years (see bibliography of Peirce primary sources) but the microfilms *The Charles S. Peirce Papers* (1966) and the microfiche *Peirce, C.S. Complete Published Works* (1977) are the only comprehensive source of the Harvard University holdings of his work publicly available. These are the collections of interest here. No listing of Peirce's library has been made. It is my understanding that following lodgement with Harvard the monographs were put into the stacks. Some have since been identified and the marginalia thereby recovered.

In 1976 the Peirce Edition Project (PEP) was established and has been part of the University of Indianapolis, Purdue's School of Liberal Arts since 1983. Its primary purpose is to organize and date all the manuscripts and to produce an approved scholarly edition of Peirce's writings that can facilitate the study of the historical development of his thought. Over a three year period the task of assembling the collections and arranging them chronologically was carried through, though, most unfortunately, the product of this exercise is not available on the public record, as yet. Although PEP's collection, like all the previous ones, is selective, towards the end of each volume a chronological list of all material for the period of the volume in hand is given and an indication made of what is published in the volume. To date PEP has published seven volumes: *Writings of Charles S. Peirce: A Chronological Edition, vols. 1-6 & 8*, being *W1 (1857-1866)*, *W2 (1867-1871)*, *W3 (1872-1878)*, *W4 (1879-1884)*, *W5 (1884-1886)*, *W6 (1886-1890)*, *W8 (1890-1892)*. Whilst it is not their intention to include everything Peirce ever wrote – that would take around 104 volumes – it has been essential to date every fragment of his work. This can only be described as a task of daunting proportions. By example: the Robin Catalogue is sorted into topic areas and, excluding the correspondence, lists around 1650 'manuscripts' more than half of which are undated. 'Manuscript' is, in fact, a loose term for folders and includes notebooks and fragments. Unfortunately, however, PEP has published nothing since 2009 leaving some of his most important manuscripts unpublished in chronological order.

An electronic version of Robin's catalogue is now available, as is a CD of the eight volumes of the *Collected Papers of Charles Sanders Peirce*. This makes keyword searches possible but does not overcome the myriad other problems presented by these texts. Although there has been talk of making PEP's *Writings of Charles S. Peirce: A Chronological Edition* in an electronic form, this has not, as yet, eventuated. Nonetheless, even the availability of this work for electronic search would still be less than satisfactory for the very reason that Peirce himself did not achieve a clear single line of thinking. This was exacerbated by his penchant for discursion; for beginning with one idea and making digressions into equally interesting ideas – sometimes not returning to the original idea, but rather picking-up again at a later date. In addition to this, a large number of his manuscripts held at the Houghton Library, Harvard, have still to be transcribed.

Another problem with understanding Peirce is his language. He created a plethora of neologisms, but perhaps more importantly, he used many words in ways other than are commonly understood. Fortunately, an invaluable resource is available on-line of Peirce's terminology: *The Commens Dictionary of Peirce's Terms in His Own Words* was begun in 2003 and updated in 2014 by Mats Bergman and Sami Paavola of Helsinki University. I commend this site: <http://www.commens.org/dictionary>, to all readers who are not 'fluent' in Peirce and strongly recommend it be 'bookmarked'.

In addition I have included a five page glossary. Not all of the terms listed are Peircean, but all have a bearing on understanding how Peirce's system works. By example, much has been written about the Peircean neologism 'abduction' – whole books in fact – but scant attention has been to paid to the Excalibur of phenomenological tools of abstraction: what he called 'prescision'. Had I been taught how to 'prescind' when I was learning scientific methodology at school, how much simpler would discovery have been. *Commons* does not include it, nor does it include his neological verb, to 'precide' from which, he would say, 'precision' (not to be confused with 'prescision') is derived. Then there is the wonderful term, derived by Peirce from the French *tu*, to describe the chatter going on in my head when I'm engaged in thought: 'tuism'. An example of a word used in a way other than is usually understood is 'normative' and because of its non-inclusion in *Commens* I have included it in my glossary. Another is 'actual' which, when used by Peirce, returns times arrow to philosophy.

A word not included in my glossary but which Peirce takes way beyond mere definition is 'hypothesising'. Other than being taught that a hypothesis is a question converted into a statement, I was not taught how to hypothesise either when studying scientific methodology, or research methodology.

The greatest difficulty with understanding Peirce – particularly his radical realism – however, arises from the encounter of the pervasive nominalism of Western thinking. He too, like we in the West, was weaned on nominalism, but through his unrelenting pursuit of clarity he found and founded pragmatism, which he later renamed pragmaticism in order to retain the meaning of his own position. It is a supreme irony, therefore, that nearly a century after the product of such clarity was delivered to Harvard, much of it is still obscured. Many scholars have written dissertations and published papers and books on his work, however, in large measure these have emanated from the nominalistic analytic tradition and have failed to grasp the integrity of his realism. Despite this, there are scholars who have rigorously studied Peirce's original papers in sufficient and necessary breadth and depth to reveal his genius and his realism and it is to these works I direct attention when laying out his system. These works are by scholars who have strived to overcome the prejudices and predilections of a Western hegemony in their research. In what follows, it is my purpose and hope to emulate them, in order to develop the theory of 'matting', which I believe follows from the work of Peirce, who, to my mind, is in the league of the greatest philosophers of all time.

Reading Peirce chronologically, one can discern this same process – his work is evolutionary in content and in practice. As Richard Smyth comments in his book *Reading Peirce Reading* (1997: 1) "Peirce really did practice what he preached about the way to conduct philosophical inquiry."

For a nominalist it is difficult, if not impossible, to make sense of his pragmaticism. Likewise for logicians who, in their preoccupation with certainty, would appear to give precedence to an elusive truth over meaning. Whilst Peirce rejected epistemological foundationalism, early in his career he did conceive of metaphysics as "a ship already afloat, which nevertheless must be built and rebuilt, plank by plank, while underway." (Esposito, 1980: 36 citing Peirce MS920, 1861)

Ultimately, Peirce can only be grasped fully on his own terms, that is, from his realist position. The effort involved, however, is more than compensated by the clarity that finally emerges with perseverance. Peirce's pragmaticism reunites science with philosophy, not as scientism, but along a continuum, where mathematics and philosophy provide the method for tackling questions of the special sciences which, in turn, provide data whereby methods can be reviewed, improved and progressed, and information revealed.

The primary sources for Peirce's published writings are:

- CLL** *Chance, Love and Logic. Philosophical Essays*, edited by Morris R. Cohen, followed by page number.
- CP** *Collected Papers of Charles Sanders Peirce*, edited by Charles Hartshorne and Paul Weiss, (volumes 1-6) and Arthur Burks (volumes 7-8), followed by volume and paragraph number.
- EP** *The Essential Peirce: Selected Philosophical Writings*, edited by Nathan Houser et al., (volumes 1-2), followed by volume and page number.
- HP** *Historical Perspectives on Peirce's Logic of Science: A History of Science*, 2 volumes, edited by Carolyn Eisele.
- MS** *The Charles S. Peirce Papers* in Houghton Library, followed by a Richard Robin number. Manuscript letters and drafts are identified by an **L** preceding the manuscript number.
- N** *Contributions to "The Nation"*, volumes 1-4, edited by Kenneth Laine Ketner and James Cook.
- NEM** *The New Elements of Mathematics by Charles S. Peirce*, 4 volumes, edited by Carolyn Eisele.
- PAP** *Pragmatism as a Principle and Method of Right Thinking: The 1903 Harvard Lectures on Pragmatism*, edited by Patricia Ann Turrisi.
- PSWS** *Peirce on Signs: Writings on Semiotic*, edited by James Hoopes.
- PWP** *Philosophical Writings of Peirce*, edited by Justus Buchler.
- RLT** *Reasoning and the Logic of Things: The Cambridge Conferences Lectures of 1898*, edited by Kenneth Laine Ketner, followed by page number.
- SS** *Semiotic and Significs: The Correspondence between Charles S. Peirce and Victoria Lady Welby*, edited by Charles S. Harwick.
- SW** *Charles S. Peirce Selected Writings: Values in a Universe of Chance*, edited by Philip P. Wiener, followed by page number.
- W** *Writings of Charles S. Peirce: A Chronological Edition*, (volumes 1-6 & 8) edited by the Peirce Edition Project. followed by volume and page number.
- Charles S. Peirce: Essays in the Philosophy of Science*, edited by Vincent Tomas.
- Philosophy of Mathematics: Selected Writings Charles S. Peirce*, edited by Mathew E. Moore.
- Illustrations of the Logic of Science*, edited by Cornelis de Waal.
- The Commens Dictionary of Peirce's Terms*, edited by Mats Bergman & Sami Paavola.

In referring to these, I observe the conventional notation set forth for referencing the primary texts of Peirce.

**Part 1**  
**A review of the evolutionary**  
**philosophy of**  
**Charles S. Peirce**



## Chapter 1 Why Peirce?

At the outset I put forward the question: what does it mean to say something, anything, everything matters and what is *it* that matters – what *is* 'mattering'?

Philosophy is the discipline of inquiry to which I am most drawn: the Ancients, Scholastics, Rationalists, Empiricists, Idealists, Common sense realists, Materialists, Pragmatists, Phenomenologists, Process philosophers, Existentialists, post and neo this-and-that. Although I have learnt much from many of these, when I happened upon the American polymath, Charles Peirce, I knew I had found a way of comprehensively and meaningfully exploring. Unfortunately analytic philosophy, the "brain child" of a number of early 20<sup>th</sup> century luminaries, has colonised much of the West. What began in opposition to Idealism, has mutated over the century since its beginnings, even infiltrating other positions such as classic pragmatism, and becoming hegemonic. As John Searle (2003: 1) notes:

...analytic philosophy is the dominant mode of philosophizing not only in the United States, but throughout the entire English-speaking world, including Great Britain, Canada, Australia and New Zealand. It is also the dominant mode of philosophizing in Scandinavia and it is also becoming more widespread in Germany, France, Italy, and throughout Latin America.

Taking philosophy in its very broadest sense, one needs a broad model. Being mindful that though physics split off from philosophy in the seventeenth century, biology in the nineteenth, psychology around the beginning of the twentieth, linguistics in the mid-twentieth century (Thagard 1990) and that contemporary philosophers such as the late Richard Rorty and Hilary Putnam would further exclude metaphysics, a generic model needs to be able to embrace these. Analytic philosophy strips the core of philosophy of everything bar epistemology and logic of which mathematics is considered a sub-set. If one considers logic as a sub-system of the broader category, reasoning, then one can see it as evaluative. Only in the atemporal form that is classic logic might valid argument be deemed true, but so saying it is not a pipeline to Truth. The relationship of truth and validity is given by Peter Suber in his course notes 'Symbolic Logic' (1997):

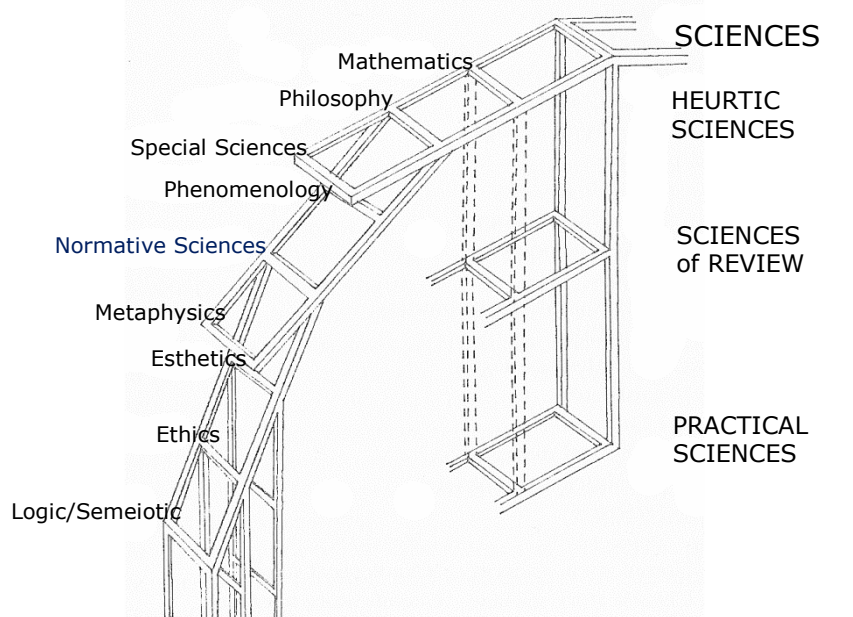
Truth and validity are combined in the concept of *soundness*. An argument is sound if (and only if) all its premises are true *and* its reasoning is valid; all others are unsound. It follows that all sound arguments have true conclusions. ... Empirical scientists ... tell us whether statements are true. Logicians tell us whether reasoning is valid. ... An argument is valid in a weak sense if it simply is not invalid. This weak sense of validity turns out to suffice for all the purposes of rigorous reasoning in science, mathematics, and daily life.

Little is said in the literature about the framing of hypotheses yet there is a great deal written after the fact about inferences. For Peirce, mathematics is the discipline in which to conduct such an activity. He called this creative act of reasoning, abduction and though he did designate it as logic in his broad sense of logic as semeiotic, he considered it the weakest form. This meets Suber's criteria for soundness but not his separation between empirical scientists and logicians. Peirce, however, did not restrict observation to the empiricists but rather saw observation as an essential activity of all inquiry including the development of hypotheses. His method, in which empiricism and rationalism are co-dependent, aims for meaning rather than the elusive certainty of truth. Peirce came to realise, nevertheless, that achieving even fallible validity required more than a hypothesis, empiricism and rationalism to settle genuine doubt. If we think of metaphysics as the network of theories we build of the how and the what of the universe - of how the developing parts fit to and with the evolving whole – we will come to realise that it is essential for reality checking. Ethics, of which logic is a kind, is the actualising. Aesthetics, which informs ethics, is concerned with what may be fitting, and phenomenology is the means of focusing and orienting inquiry.

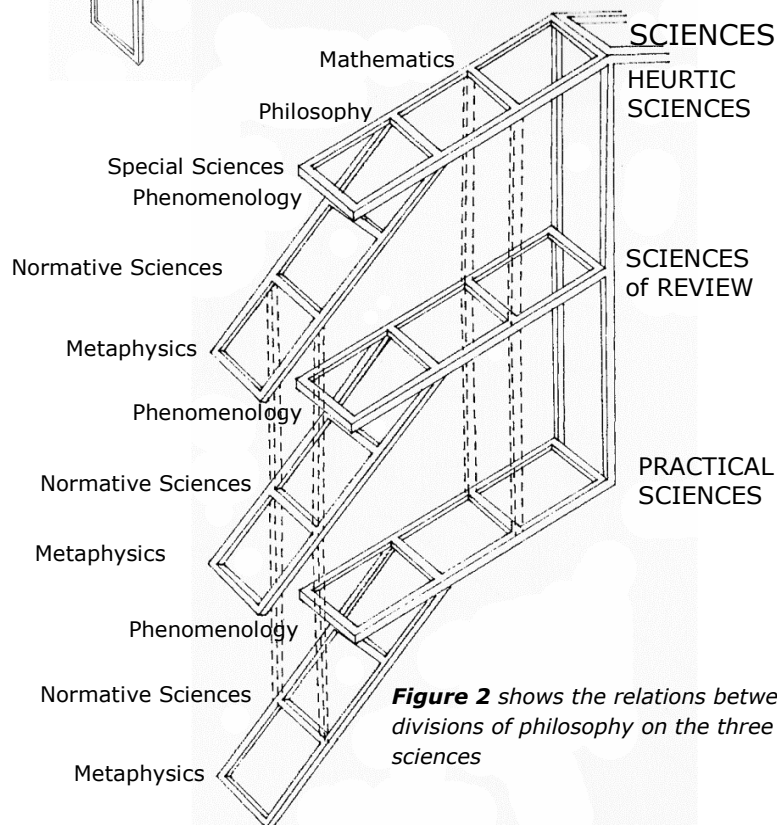
Given that philosophy is only one aspect of Peirce's architectonic, I have reproduced below in Figures 1 & 2, two of the diagrams constructed by Beverley Kent (1987: 136-7) to depict Peirce's description of a

stereoscopic image of his perennial classification. This depiction shows it as a model for learning and all that that entails. Kent prefaced these (pp. 135-136) as follows:

The diagrams included here attempt to capture Peirce's stereoscopic image. He left a verbal description only but it is known that he thought in three-dimensional diagrams and that he participated in the early development of lattices.



**Figure 1** shows ladders attached to the normative sciences rung, which in turn is attached to the philosophy rung on the heuristic sciences ladder



**Figure 2** shows the relations between corresponding divisions of philosophy on the three major levels of the sciences

**Figures 1 & 2:**

Two of the diagrams constructed by Beverley Kent (1987:136-7) to depict Peirce's description of a stereoscopic image of his perennial classification



## Peirce's Pragmaticism: Philosophy as science – science as inquiry

According to John Heil (1993: 45) "epistemological concepts of *truth*, *falsity* and *justification* apply primarily to beliefs and only derivatively, if at all to knowledge. Belief is thus central to epistemology." From the perspective of Peirce's theory of inquiry, doubt and its appeasement is central to the development and growth of knowledge. In one of his earliest pieces of writing, a treatise on metaphysics that he wrote between 1861 and 1862, after critically considering the founding premises of each of dogmatic and transcendental metaphysics and finding both wanting, he suggested:

...the need for an entirely different perspective for metaphysics, one that embraces this failure itself as a critically established fact. This new perspective is fideism, the view that the founding premises must be based on faith. In Peirce's view this is what both the Kantian and Humean positions must ultimately come to. In Kant there must be faith in the relevance of the Ideas of Reason and in the apodicticity of the non-inferential element of cognition, while in Hume there must be faith that our ideas are indeed copies of our impressions and that our judgments of causal relations have objective validity. (Esposito, 1980: 38)

Faith is a commitment to the truth of one's beliefs. According to Peirce's theory of 'true' as a quality of representations, it is of three kinds: verisimilitude, veracity and perfect veracity or verity. Verisimilitude is a *copy*, that is, it has the *appearance* of being true or real; veracity is a *sign* that *corresponds* with truth or facts; verity is a *type* and is *truth* itself. Verity, however, is not directly verifiable – there is nothing more than all with which to validate it. There are those who, in conceding to this, expound complete scepticism. Peirce propounded the cybernetic role of genuine doubt, but he viewed radical scepticism as a sham and those professing to such a position as being disingenuous. What *is* achievable, if we are prepared to accept fallibilism rather than certainty, is cognizable veracity. Forty years later, in the first of his 1903 Harvard Lectures, Peirce stated that "belief consists mainly in being deliberately prepared to adopt the formula believed in as the guide to action" (PAP: 116, 1903). The response to how we know that belief is nothing but this, which he had given in his 1878 article 'How to make our ideas clear', "carried this back to a psychological principle" (*Ibid*). Twenty-five years later he felt the need to clarify this because, as he said, "in the first place, this was not very clearly made out and in the second place, I do not think it satisfactory to reduce such fundamental things to facts of psychology" (*Ibid*).

Taking Peirce's second point first, made largely in response to William James' 1898 lecture, Peirce saw James as misconstruing his ideas and, feeling the need to set the record straight, declared that "... pragmatism is not a *Weltanschauung* but is a method of reflexion having for its purpose to render ideas clear" (CP5.13n, 1902). This method is captured in his maxim:

Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object. (CP5.402, 1877, 1906)

Regarding his first point, Peirce thought that in order to make our ideas clear, and before we are in a position to consider how to interpret propositions of belief, it is first necessary to differentiate between belief and assertion. He stated that:

... the act of assertion is an act of a totally different nature from the act of apprehending the meaning of the proposition and we cannot expect that any analysis of what assertion is (or any analysis of what judgment or belief is, if that act is at all allied to assertion), should throw any light at all on the widely different question of what the apprehension of the meaning of a proposition is (CP5.30, 1903).

Over the years, he discussed the nature of assertion (see CP2.332-343, 1895; CP3.432-437, 1896; PAP: 116-7, 1903; CP5.411-412, 1905; CP5.546-548, 1908) and from these excerpts, one can discern two relevant points:

Assertions are particular and are made in the past and stop in the present tense, which means in the main that they are bivalent and are not subject to generalization – they are nominalistic.

An example is the Pledge of Allegiance of the United States of America which is recited daily by millions of Americans. Written in 1892 by the American Baptist minister and Christian Socialist Francis Bellamy for publication in the widely circulated *Youth's Companion*, it originally read:

I pledge allegiance to my flag and the republic for which it stands, one nation, indivisible, with liberty and justice for all.

In that same year "to" was included. According to Wikipedia, Bellamy "had initially also considered using the words *equality* and *fraternity* but decided against it - knowing that the state superintendents of education on his committee were against equality for women and African Americans." In 1923 "my flag" was substituted with "the flag of the United States" and "of America" added a year later. It was formally adopted by US Congress as the pledge in 1942. In 1954 "under God" was formally added. It now reads:

I pledge allegiance to the flag of the United States of America and to the republic for which it stands, one nation under God, indivisible, with liberty and justice for all.

As an assertion, it is an expression of a *Weltanschauung* of the USA. While it is true *that* it is asserted, asserting it does not make it true either in *what* it asserts or *for* any given asserter. If, however, it is made the subject of inquiry, as it was prior to each of the changes made to it, or by individuals or groups, for a variety of reasons, then the reality of its form, content, justification and validity is opened to questioning. Likewise the *Weltanschauung* of many Christian denominations as expressed in what is called the Apostles Creed:

I believe in God,  
The Father almighty,  
Creator of heaven and earth...

When as an undergraduate student I was studying the phenomenology of religion, I asked my professor, a Jesuit priest, what it meant to say "I am a Christian" - to be a Christian – his reply referred me to John 15: 12: "This is my commandment, that ye love one another, even as I have loved you." What he was saying was that to proclaim oneself a Christian is to live in accordance with that commandment – the rest is decoration. One need learn how Jesus had shown his love for his disciples, and how to mirror that love in our behaviour towards others. Peirce would point out that to be Real, such loving, as mediator, should be grounded in the experience of such loving, and be predictive of behaviour so grounded.

My mother always loved me and she was kind. Sometimes though, when I had once again done something reprehensible, she would tell me that she loved me dearly but that on such occasions she didn't particularly like me. She would tell me to be a good girl and I, believing myself incapable of so being, would say no. She would express exasperation, call me incorrigible, and tell me that if I couldn't be good, then to be kind. I agreed, believing I could do that. She'd raise her eyes to the heavens, and I would go off to continue doing my becoming. As all grown up now I can say that I love as I've been loved, and that I am a kind trouble maker.

To proclaim "I believe" is to make an assertion. One may truly believe, yet, unless one's assertion is propositional, and one is prepared to act in accord with that proposition, the fervency of one's believing

has no bearing on the truth or otherwise of that which is said to be believed. Marge Piercy, in her poem 'In the Men's Room(s)' sums it up well, if somewhat sardonically:

Now I get coarse when the abstract nouns start flashing.  
I go out in the kitchen to talk cabbages and habits.  
I try hard to remember to watch what people do.  
Yes, keep your eyes on the hands, let the voice go buzzing

Had Peirce identified the difference between belief and assertion in 1877 when 'The fixation of belief' was first published, he may have called 'beliefs' fixed by tenacity, authority, or a *priorism* – 'methods' that strip beliefs of propositional value – assertions.

Elizabeth Cooke puts it well:

...the method of tenacity is basically the claim that "I will not inquire." The method of authority is the method by which "We will not allow you to inquire." And the *a priori* method is that by which "you have no need to inquire: It is all self-evident." (2007: 34)

Those who resort to the first two 'methods' may well be called dogmatic, stubborn, or even tyrannical. Unfortunately, the same is not usually said of the *a priorists* because rationalization is mistaken for rationalism. Even more unfortunate is that *a priorism* is so endemic to Western thinking that it has become hegemonic. The meaning of hegemony here, adapting Bullock's definition (1988), stresses not only the political and economic control exercised by a dominant culture but its success in projecting its own particular way of seeing the world, human, and social relationships, so that this is accepted as 'common sense' and part of the natural order even by those who are in fact subordinated to it. Even when raw aggression is not sanctioned as a method of imposing will, there are a myriad of culturally acceptable, even institutionally lucrative ways of achieving hegemony. Accounting for hegemony when inquiring into the spread, or stymieing, or mutation of ideas and concomitant decisions and actions can reveal a whole lot about what may seem otherwise puzzling to a 'purely' objective observer. This, however, is speculation; testing its validity requires a method of inquiry that does not hang itself by its own petard, that is, one that does not demand absolute certainty, absolute exactitude, or absolute universality. In other words, it requires recourse to a way of investigation that recognises the fallibility of its method, its product and its realism in proclaiming warrant.

Because hegemony is so censorious that it does not countenance doubt, it would be well to consider, for a moment, Peirce's conception of experience. As far as he was concerned: "Experience is our only teacher" (CP5.50, 1903). It is a relationship in the form of an interaction between ego and non-ego. While ever the two appear in sympathy we can give propositional value to our assertions of belief; we have reason to trust and no *reason* to doubt. The insistence of experience makes it quite impervious to will, including a will to believe or to doubt. Only a scission in a bond between our expectations and experience – what Peirce calls surprise – can call belief into doubt and give a genuine reason for critical inquiry. In addition, as John Smith (1978: 94) notes:

There is a further feature of experience stressed by Peirce which is important because it is fundamental... and that is the tendency of experience to accumulate or fund itself and thus to become established in the pervasive form of commonsense. Commonplaces, said Peirce, are in fact 'universal experiences' taken for granted as the common basis for life; he was fond of contrasting the body of large, ordinary experience which he regarded as 'a valuable reservoir of truth', with special and extraordinary experience by which he meant science and the results of research into recondite matters. Funded experience shared by all sustains a culture and assumes the form of wisdom that can be passed on from one generation to another; as a consequence, pervasive experiences attains to an instinctual status which sets it off from the special and controlled experience of detail which forms the substance of science.

Although it is safe to say that it is universal that the notion of commonsense is taken for granted sense, *what* is taken as commonsense is not universal. The example of the immediate effect of touching fire, used by Peirce in speaking about indubitable beliefs, is one that can be tested empirically universally and

which anyone, anywhere, learns not to test for themselves. This, however, does not cut to the core of taken-for-granted beliefs that result from enculturation. If, say, belief about time is considered, the argument given for the universality of commonsense does not hold. How different cultures experience time is not universal. Nor is what is considered empirical. Having reason to believe does not make beliefs true; beliefs have no secure foundation in fact – they are *in futuro* and are reliant on the relationship between believers and the 'objects' of belief, being sustained by trust, the suspension of disbelief (a term coined in 1817 by Samuel Taylor Coleridge [1772-1834]), with every breath we take, so to speak.

In 'The fixation of belief' Peirce argued for 'the method of science' as the way "by which our beliefs may be determined" (CP5.384, 1877). This could strike one as contradictory in light of the comment in his 1898 Cambridge lectures that there is "no proposition at all in science which answers to the conception of belief" (RLT1:112). Unless one notes at the outset that practical affairs are the province of belief as habit and that science (including philosophy) as inquiry proceeds theoretically, one is likely to experience confusion. Unlike assertions, beliefs are propositional and therefore open to inquiry. If genuine doubt springs a leak in belief, inquiry can be activated. Whilst it is fine, for the purpose of getting on with life, to adopt the products of inquiry at particular junctures as true, this can only be on the proviso that one accepts Peirce's doctrine of fallibilism – that in a world that is evolving, there is no guarantee of certainty. This is not the fallibilism typical of contemporary theories which, as Elizabeth Cooke (2007: 4) points out, "is usually committed to mere coherence."

Peirce's fallibilism is unique in that it rests on a commitment to a kind of vague and indeterminate correspondence with the real, but dynamic world. ... It is not really a correspondence in the traditional sense, in the sense of static ideas mapping onto static forms.

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Following are a few examples of the interplay of belief and doubt that may also highlight the difference between assertions and belief:

*Example 1:*

Peirce had begun lecture 4 of his 1903 Harvard Lectures:

Here is a stone. Now I place that stone where there will be no obstacle between it and the floor and I will predict with confidence that as soon as I let go my hold upon the stone it will fall to the floor. I will prove that I can make a correct prediction by actual trial if you like. But I see by your faces that you all think it will be a very silly experiment. Why so? Because you all know very well that I can predict what will happen and that the fact will verify my prediction. (CP5.93, 1903)

We too may well have thought that it would be "a very silly experiment": At the time in our life when our scientific investigation of the world is greatest – during early childhood – we discover for ourselves the law of gravity. From countless experiments conducted from our mother's knee, from the lofty heights of our highchair... we learn that *everything* dropped falls to the ground. Throughout our life nothing – with the possible exception of helium balloons – disabuses us of this belief which we learn to call gravity. Peirce's lecture was not, however, about truth, but rather "that *Thirdness* is operative in Nature" (PAP: 190, 1903). Nevertheless, as Peirce said at the end of the lecture series:

The elements of every concept enter into logical thought at the gate of perception and make their exit at the gate of purposive action; and whatever cannot show its passports at both those two gates is to be arrested as unauthorized by reason. (PAP: 256, 1903)

In a contemporary context: When a number of visitors – adults and children, female and male – to a space exhibition at the Powerhouse Museum in Sydney were asked if they could explain why the astronauts on the Space-Station appear to float, each of them replied that it was because there was no gravity. They all expressed surprise when told that, despite appearances to the contrary, the astronauts

were, in fact, falling and bewilderment when told that, furthermore, the Space-Station, too, was falling to earth. The physicist, Dr Derek Muller explained:

Well, the reason is the Space Station and astronauts inside have this huge sideways velocity of about twenty-eight thousand kilometres per hour. So even though they're falling towards the Earth, they're going so fast that as they fall towards the Earth's surface, it curves away from them. (ABC, Catalyst. 3 May 2012)

We live and learn.

*Example 2:*

Turning now to mathematics – specifically geometry and the fifth postulate of the five postulates set forth by Euclid [365-275 BCE] as an introduction in *The Elements* to prove the rest of his theorems. These postulates are:

1. *To draw a straight line from any point to any other.*
2. *To produce a finite straight line continuously in a straight line.*
3. *To describe a circle with any centre and distance.*
4. *That all right angles are equal to each other.*
5. *That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, if produced indefinitely, meet on that side on which are the angles less than the two right angles.*

A postulate, though it may appear indubitable, is nonetheless a proposition. The history of doubt concerning the fifth postulate, traces back more than two millennia to Posidonius of Rhodes [135-51 BCE], thence to Ptolemy [83-168] and proceeds through Proclus [412-485], Girolamo Saccheri [1667-1733], Jean d'Alembert [1717-1783], Johann Lambert [1728-1777], Adrien-Marie Legendre [1752-1833], Carl Gauss [1777-1855], Nikolai Lobachevsky [1792-1856], Janos Bolyai [1802-1860], Arthur Cayley [1802-1860], Bernhard Riemann [1826-1866] and Felix Klein [1849-1925].

Klein showed that there are three basically different types of geometry. In the Bolyai-Lobachevsky type of geometry, straight lines have two infinitely distant points. In the Riemann type of spherical geometry, lines have no (or more precisely two imaginary) infinitely distant points. Euclidean geometry is a limiting case between the two where for each line there are two coincident infinitely distant points.

[noneuclidean.tripod.com/history.html](http://noneuclidean.tripod.com/history.html)

To my mind, the development of topology from the late nineteenth century onwards, has been the greatest outcome of this freeing of geometry to move beyond the 2-dimensional plane of Euclidian geometry to the 3-dimentional space of non-Euclidian geometry. Topology is the study of qualitative properties of objects that are invariant under a certain kind of transformation called a continuous map. Of particular concern for transformation is convergence, connectedness and continuity. It is the way my mind does mathematics by default.

We learn from those who live and have lived.

*Example 3:*

My last example relates to a situation in which the identification of a change in reality caused by an absence triggered surprise. A taxi driver who, many years ago, having dropped his passenger off at a hospital's ER, prepared to back-out of the drive. He looked in his rear-view mirror; all was clear . . . yet something was wrong. He got out of the cab to check; he found his passenger passed-out in front of his back wheels. Out of sight is *not* out of mind: in the absence of seeing her in his rear-view mirror as he expected, he had, nevertheless, conceived her probable trajectory and speed and concluded what he had found. Because *I* was that passenger, I am alive to relate the incident in greater detail with the help of Peirce and his three *cotary* propositions of pragmatism (pragmaticism).

He called these propositions *cotary* from *cos cotis*, a whetstone, because, as he said, they “appear to me to put the edge on the maxim of pragmatism” (PAP: 241, 1903).

First: “*Nihil est in intellectu quod non prius fuerit in sensu*” (Nothing is in the understanding that was not earlier in the senses) is a central tenet of the empiricism of Gassendi [1582-1655], Locke [1632-1704] and Mill [1806-1873].

Second: “perceptual judgments contain general elements, so that universal propositions are deducible from them in the manner in which the logic of relations shows that particular propositions usually, not to say invariably, allow universal propositions to be necessarily inferred from them.”

Third: “abductive inference shades into perceptual judgment without any sharp line of demarcation between them; or, in other words, our first premisses, the perceptual judgments, are to be regarded as an extreme case of abductive inferences, from which they differ in being absolutely beyond criticism.”

The abductive suggestion comes to us like a flash. It is an act of insight, although of extremely fallible insight. It is true that the different elements of the hypothesis were in our minds before; but it is the idea of putting together what we had never before dreamed of putting together which flashes the new suggestion before our contemplation. (PAP: 242, 1903).

With these three cotary propositions in mind, let me take you through the taxi-driver’s moments between turning to look behind him and pulling the handbrake back on. The moment of looking behind before taking his foot off the brake and on the accelerator is a moment of inquiry in the manner which Peirce called ‘tuism’. *Tuism* – from Latin *tu*, thou – is the doctrine in ethics which puts the emphasis on the well-being of others. In general parlance it is another name for *altruism*. Max Fisch pointed out in his introduction to the first volume of *The Writings of Charles S. Peirce* (1982: xxix) that in 1891 in the Century Dictionary, that Peirce defines ‘tuism’ as “the doctrine that all thought is addressed to a second person, or to one’s future self as to a second person.”

Beginning with mathematics in which the taxi driver looked for patterns in the view behind him before reversing. He saw nothing obstructing his reversal down the driveway. Thankfully he was not myopic. I had stepped out of the cab and headed towards its rear intending to walk around it and across to the ER. The driver had inferred my path. The moment or two it took him to stow my fare, take the wheel, put the cab in first gear, put his foot on the brake, take off the handbrake, look in the rear-view mirror and turn to look behind him, would have given me time to clear the rear of the taxi but not enough to reach the ER entrance door. He had seen me, now he didn’t. He did not understand. He had inferred my trajectory and that it would have taken more than six or seven seconds to complete it, given that all my movements had indicated to him that I would be walking slowly, but I was nowhere to be seen on that trajectory. Humans do not vanish into thin air; he abducted that I had to be on the ground behind him. He pulled the handbrake back on, got out of the cab, came to its rear and found me.

We learn and live.

## Truth or understanding

The findings of scientific inquiry using Peirce's method are provisional – they are intelligible in an ongoing process directed at truth, that is, cognizable veracity. Perfect veracity, that is, truth, may only be arrived at in the long-run. Having said this, I should say something about what is meant by speaking of 'truth in the long run'. Almeder (1985) identified a minimum of thirteen theories of truth in Peirce's oeuvre dating from 1873 to 1905, just three of which he deemed intelligible. Without making reference to any other of the many secondary writers, my interpretation is that Peirce was equivocal on the subject, and differed depending on whether he was focused on inquiry or on an object. From the former perspective, his Baldwin Dictionary definition is:

Truth is that concordance of an abstract statement with the ideal limit towards which endless investigation would tend to bring scientific belief, which concordance the abstract statement may possess by virtue of the confession of its inaccuracy and one-sidedness and this confession is an essential ingredient of truth. (CP1.565, 1901)

His most pithy statement from the latter perspective that I found is that: "Truth is the correspondence of a representation with its object" (CP 5.553, 1902). The poem  $\pi$  by the 1996 Polish recipient of the Noble Prize for Literature, Wisława Szymborska, expresses this notion together with the meaning of truth in the long run:

$\pi$

$\pi$  deserves our full admiration  
*three point four one.*  
All its following digits are also non-recurring,  
five nine two because it never ends.  
It cannot be grasped *six five three five* at a glance,  
*eight nine* in a calculus  
*seven nine* in imagination,  
or even *three two three eight* in a conceit, that is, a comparison  
*four six* with anything else  
*two six four three* in the world.  
The longest snake on earth breaks off after several metres.  
Likewise, though at greater length, do fabled snakes.  
The series comprising  $\pi$   
doesn't stop at the edge of the sheet,  
it can stretch across the table, through the air,  
through the wall, leaf, bird's nest, clouds, straight to heaven,  
through all the heavens' chasms and distensions.  
How short, how mouse-like is the comet's tail!  
How frail a star's ray, that it bends in any bit of space!  
Meanwhile, *two three fifteen three hundred nineteen*  
*my telephone number the size of your shirt*  
*the year nineteen hundred and seventy three sixth floor*  
*the number of inhabitants sixty-five pennies*  
*the waist measurement two fingers* a charade a code,  
in which *singing still dost soar, and soaring every singest*  
and *please be calm*  
and also *heaven and earth shall pass away,*  
but not  $\pi$ , no, certainly not,  
she's still on with her passable *five*  
above average *eight*  
the not-final *seven*  
urging, yes, urging a sluggish eternity  
to persevere.

To my knowledge, there is no disagreement in the scientific community – with anyone or any community of 'anyones' – that the truth of  $\pi$  is in its representation, but that though it is contained in the symbol, it

is *in futuro*. Notwithstanding the degree of confidence we enjoy with regards to  $\pi$ , we need to hold in mind that believing truth to be contained in an abstract statement means it can only be grasped as a tendency *in futuro*. Saying this is a "confession of its inaccuracy and one-sidedness and this confession is an essential ingredient of truth." (CP5.565, 1901) No matter how stable we deem any tendency, we cannot ascribe certainty to it by reference to it *a priori*. We must confess to the fallibility of our conclusions for the very reason that meaning always includes, besides the Firstness of potentiality and the Secondness of actuality, the Thirdness, of possibility.

My hypothesis of 'matting' certainly requires rigorous exploration and demonstration to reveal the possibility that it is 'true', but, more importantly, that its *p* value is significant. Experience – including accumulated experience and knowledge of actuality – only travels the continuum as far as now. I can speak of *knowing* 'mattered' and 'matters', but not with any certainty concerning the truth of 'matting' which is contained in its Thirdness and yet is irreducible from its Firstness and Secondness. Although truth cannot be claimed as *known* without the rider of fallibility, any such claim can be made intelligible, that is, reason can be shown for such a claim – it can be understood.

Peter Forrest speaks of this as aesthetic understanding.

The aesthetic interpretation of Science states that there are two desiderata for a scientific theory. The first is empirical adequacy...The other desideratum is that the theory, if correct, reveals the aesthetic value of those aspects of the world with which it is concerned. The term currently used to express this aesthetic value is 'elegance'. Another value term which might be appropriate in place of 'elegance' is 'fittingness'. (Forrest, 1991: 527)

Without knowing Peirce's work, the physicist Paul Davies, like Peirce, is of the opinion that science is faith-based. As Davies writes in the *New York Times* Op-Ed article *Taking science on faith* (November 24, 2007), "science has its own faith-based belief system."

All science proceeds on the assumption that nature is ordered in a rational and intelligible way. You couldn't be a scientist if you thought the universe was a meaningless jumble of odds and ends haphazardly juxtaposed. When physicists probe to a deeper level of subatomic structure, or astronomers extend the reach of their instruments, they expect to encounter additional elegant mathematical order. And so far this faith has been justified.

Faith follows from a confession of fallibility as a rider to a claim of truth which has been arrived at by reason of systematic work from the creation of the hypothesis in mathematics, through phenomenology where the categories are identifiable and thence the normative sciences and leads to metaphysics. Joseph Esposito (2001) records that from an early age Peirce saw metaphysical theory as consisting of:

the orderly unfolding of triadic relations by means of a small number of recursive operations...that may be described as *abstract unity*, *concrete plurality* and *concrete unity* [which] govern the unfolding of a process whereby abstract or virtual reality becomes increasingly differentiated and particularized only to become reunified so as to start the dialectic once again on a more complex level.

Metaphysical mapping readies scientists to design and conduct experimental programmes; so too can it serve to bring artists and their materials together in the creation of works of art. It enables identification of the fit of particular within the context of the whole.

Saying that 'this', 'that', 'something', 'anything', 'nothing', 'it' matters is saying at least that 'it' is substantive, but more usually with the emphasis that 'it' is significant or has significance. Being made intelligible through process means unfolding patterns of truth contained in concepts can be understood and given *p* values by inquirers.



## Chapter 2: Review of Peirce's Architectonic

Peirce was by inclination, a philosopher, with the exception of a brief stint as a lecturer in logic at Johns Hopkins [1879-1884], he was by profession a scientist, specifically a geodesist with the United States Coast Survey and an astronomer at the Harvard Observatory. Until such time as his responsibilities to his employers ceased, it was on his own time that he read and wrote in philosophy. In addition, he conducted an unstinting critique of his writings, making many drafts of his papers to achieve a clarity with which he could be satisfied. He paid the same close attention to his reading and was scrupulous in acknowledging his sources. Despite the fact that he recorded some unflattering first impression of authors – initially he spoke with contempt of Hegel – he ultimately made thorough assessments, affording each (including Hegel) the thoughtful respect often denied him. As Manley Thompson commented:

...no other philosopher engaged more in self-commentary, more in the practice of appending explanatory and critical notes to his writings many years after they were written and in giving detailed intellectual autobiographies to explain the origin of his views than did Peirce...Faithful adherence to such a method of exposition prior to any attempt at critical evaluation should provide some check against the danger of missing the importance of a philosophical statement by forcing it into a preconceived pattern of interpretation, consonant with the convictions of the commentator but utterly foreign to the original intention of the author. (Thompson, 1953: xii)

Peirce, in an autobiographical prelude, wrote:

From the moment when I could think at all, until now, about forty years, I have been diligently and incessantly occupied with the study of methods [of] inquiry, both those which have been and are pursued and those which ought to be pursued. For ten years before this study began, I had been in training in the chemical laboratory. I was thoroughly grounded not only in all that was then known of physics and chemistry, but also in the way in which those who were successfully advancing knowledge proceeded. I have paid the most attention to the methods of the most exact sciences, have intimately communed with some of the greatest minds of our times in physical science and have myself made positive contributions - none of them of any very great importance, perhaps - in mathematics, gravitation, optics, chemistry, astronomy, etc. I am saturated, through and through, with the spirit of the physical sciences. I have been a great student of logic, having read everything of any importance on the subject, devoting a great deal of time to medieval thought, without neglecting the works of the Greeks, the English, the Germans, the French, etc. In metaphysics, my training has been less systematic; yet I have read and deeply pondered upon all the main systems, never being satisfied until I was able to think about them as their own advocates thought. (CP1.3, c.1897)

He was a voracious reader. In addition to the 8000 books, many interleaved with notes and annotations, which remained at his death, he had owned many others, including rare titles, which he had sold to support himself. Others he had borrowed from various sources including university collections. He read many in logic, as a way of auditing what texts were being promulgated as right thinking up to and during his lifetime but which have since gone into obscurity for want of an audience prepared to accept the mediocre. He was fluent in a number of languages including Greek, German, French and Latin, knew some Egyptian and Arabic and read texts, where these were available to him, in the original. Apropos Peirce's reading, Joseph Esposito (n.d.) makes an apt comment:

Peirce studied the history of epistemology as an ethnologist studies a foreign culture, as an outsider trying to understand and make sense of an activity that appears at first blush to be uncomplicated, natural, spontaneous and yet on reflection largely unintelligible.

It took Peirce his lifetime to develop his method of achieving intelligibility, but as order is brought to the disarray of his work, the sheer elegance of his detailed architectonic is being realised.

## Peirce's Architectonic involving Classification of the Sciences

Peirce, like Kant, adopted the term architectonic to describe his system. He found it an appropriate metaphor because, as he put it:

...a great building, such as alone can call out the depths of the architect's soul, is meant for the whole people and is erected by the exertions of an army representative of the whole people. It is the message with which an age is charged and which it delivers to posterity. Consequently, thought characteristic of an individual - the piquant, the nice, the clever - is too little to play any but the most subordinate rôle in architecture. (CP1.176, 1893)

The Sydney Opera House comes to mind for me in finding this description so apt. Jørn Utzon, the original architect, is quoted as having said:

I have made a sculpture ... you will never be finished with - when you pass around it or see it against the sky ... something new goes on all the time ... together with the sun, the light and the clouds, it makes a living thing.

Those who have read this undated quotation in the many places it is reproduced would most likely think that it refers to the actual building. It is, in fact from the text accompanying the original design sketch submitted in 1957 and relates to what was then the germ of an idea. Among other things, it illustrates exceedingly well aspects of Peirce's thinking underlying his Classification of the Sciences.

Before embarking on details of this classification, it is necessary to throw some light on his thinking in relation to 'ideas' and 'science'. First, 'ideas': in a draft of *The Minute Logic: Chapter II. Prelogical Notions. Section I. Classification of the Sciences (Logic II)* he wrote:

If you ask what mode of being is supposed to belong to an idea that is in no mind, the reply will come that undoubtedly the idea must be embodied (or ensouled - it is all one) in order to attain complete being and that if, at any moment, it should happen that an idea - say that of physical decency - was quite unconceived by any living being, then its mode of being (supposing that it was not altogether dead) would consist precisely in this, namely, that it was about to receive embodiment (or ensoulment) and to work in the world. ...

... What I do insist upon is not now the infinite vitality of those particular ideas, but that every idea has in some measure, in the same sense that those are supposed to have it in unlimited measure, the power to work out physical and psychical results. They have life, generative life. (MS427, 1902)

How ideas are embodied, considered and applied is revealed in his perennial classification of the sciences which is the blueprint of his architectonic. Beverly Kent's *Charles S. Peirce: Logic and the Classification of the Sciences* (1987) is the most comprehensive and thorough secondary source of this and it is her research that guides this section of the discussion. Kent surveys Peirce's examination of previous attempts throughout history to classify the sciences and his own attempts from his 1866 Lowell lecture through to the period 1903-1911 when it stabilised. The most influential earlier attempt for him was that of Auguste Comte [1798-1857] though it is wrong to think, as some did in the early part of the twentieth century, that he was thus a positivist. To understand what Peirce meant by qualifying 'science' as 'positive' in his classification, one needs to realise his definition of 'definition'.

The definition and the utility of a definition require it to specify everything essential and to omit all that is inessential, to its *definitum*: though it may be pardoned for calling special attention to an omission in order to show that it was not inconsiderate. (EP2: 454, 1911)

In an earlier paper, he brought to our attention that: *A definition does not assert that anything exists* (EP 2: 302, 1904). Peirce found both method and system essential to the definition of science, yet neither of these convey its 'livingness', nor whether it is dependent. Although Coleridge's *Encyclopædia Metropolitana* (1852) defined science as systematized knowledge, it did so without suggesting that the

organisation be in accordance with principles (CP7.54, c.1902). Furthermore, it included what Peirce referred to as "fossilized remains" of science (MS614, 1908).

This classification, which aims to base itself on the principal affinities of the objects classified, is concerned not with all possible sciences, nor with so many branches of knowledge, but with sciences in their present condition, as so many businesses of groups of living men. It borrows its idea from Comte's classification; namely, the idea that one science depends upon another for fundamental principles, but does not furnish such principles to that other. (MS478, 1903)

Science is inquiry which is systematically directed towards developing ideas and discovering truth. Positive science is experiential and is principle-dependent within a natural classification. Peirce saw that any two sciences could be related in three different ways: by the relationship of material content, dynamical action and rational government. Having no illusion that any one scheme could capture all of the relations of dependence, he opted for the third ordering as being the most stable. Kent (1987: 124) points out:

Peirce maintained that, with the single exception of mathematics, every science employs without question a principle discovered by some other science. The latter science may call upon the narrower one for data, problems, suggestions and fields of application.

Understood in terms of the activities of those who are directed to developing ideas and truth, science falls into the category of mind; each of the three branches, heuritic sciences, sciences of review and practical sciences is distinguished by its different motive. Without going into detail here, or into all Peirce's particular meaning of terms, what follows is a summary of his classification of the sciences.

Heuritic, meaning (designating or pertaining to) that which treats of discovery or invention, is from the Greek *heuretikos*, inventive, which is from *heuriskein*, find *heuretikos*, inventive. Heuritic sciences are motivated by discovery for the sake of discovery, are formal, theoretic and originate in observation. The differentiating idea is concerned with the relation of the sciences to phenomena either in terms of the kind of phenomena observed, or in terms of the kind of assertions made as a result of reasoning on those observations, that is, the sort of orientation each heuritic science takes towards developing ideas and truth.

Mathematics is first in the classification and is so because it is the only science which is not principle dependent. The differentiating idea of mathematics concerns the general nature of the hypotheses it creates, which are distinguished by the multitude of elements hypothesised and then in terms of the relations between those elements.

Philosophy, the second heuritic science, inquires into positive universal truth using principles discovered in mathematics. It examines the phenomenon of ordinary experience in terms of its mode of being. Utilizing the familiar experience acknowledged by everyone, observations are of the phenomena common to all. Philosophy's sub-classes, or orders, are, in the first place phenomenology, in the second, the normative sciences, being aesthetics, ethics and logic and in the third place, metaphysics.

Phenomenology focuses on what Peirce called the phaneron as it immediately presents itself. It provides the observational groundwork for the rest of philosophy, endeavouring to determine the universal indecomposable elements in whatever appears before the mind.

Normative sciences study the phenomenon insofar as we can act upon it and it on us and endeavour to determine the conditions required for an object to be fine irrespective of whether any specific objects possess that fineness. The three sub-classes are esthetics, ethics, and logic. Esthetics (to use Peirce's spelling) inquires into the deliberate formation of habits of feeling that are consistent with the aesthetic ideal. Ethics inquires into the theory of the formation of habits of action that are consistent with the

deliberately adopted aim. Logic studies the deliberate formation of habits of thought that are consistent with the logical end.

Metaphysics, using principles of logic, inquires into what is real (and not figment) as far as can be ascertained from ordinary experience. It is differentiated by the various relations in the different kinds of phenomena discovered to be real.

The third heuritic science comprises the special sciences – those most commonly understood as science. Entailing observations of previously unknown phenomena, this class is divided by Peirce into physics and psychics – meaning the physical sciences and the human sciences. It was in physics – specifically geodesy and astronomy – that Peirce was employed for most of his working life.

The sciences of review are motivated by discovery for the sake of applying knowledge. This is the class under which this review of pragmatism falls.

All the sciences to this point in the hierarchy may be considered theoretical. The final class in Peirce's classification is the practical sciences where discovery is for the sake of doing. This class, significantly, is differentiated from those above by its concern with ulterior purpose.

## SCIENCE

### HEURETIC SCIENCES *[branch]*

#### Mathematics *[class]*

Finite collections *[order]*

Pure deductive logic *[suborder]*

General theory of finite collections *[suborder]*

Infinite collections *[order]*

Arithmetic *[suborder]*

Calculus *[suborder]*

Continua *[order]*

#### Philosophy *[class]*

Phenomenology *[order]*

Normative sciences *[order]*

Esthetics *[suborder]*

Physiology *[division]*

Classification *[division]*

Methodology *[division]*

Ethics *[suborder]*

Physiology *[division]*

Classification *[division]*

Methodology *[division]*

Logic / Semeiotic *[suborder]*

Speculative grammar *[division]*

Critic *[division]*

Methodeutic *[division]*

Metaphysics *[order]*

Ontology *[suborder]*

Religious metaphysics *[suborder]*

Physical metaphysics *[suborder]*

#### Special sciences *[class]*

Physics *[subclass]*

Psychics *[subclass]*

Nomological sciences *[order]*

Classificatory sciences *[order]*

Explanatory sciences *[order]*

### SCIENCES OF REVIEW *[branch]*

### PRACTICAL SCIENCES *[branch]*

**Figure 3:** Peirce's Perennial Classification of the Sciences: (adaptation of Kent 1987: 130-135)

## Peirce's Architectonic Classes

### Mathematics

Publication of two books in 2010, both edited by Mathew E. Moore, *Philosophy of Mathematics: Selected Writings Charles S. Peirce* and *New Essays on Peirce's Mathematical Philosophy* have made possible the task of reviewing, with some confidence, Peirce's view of mathematics as the first heuritic science. Peirce states, that mathematics

...does not undertake to ascertain any matter of fact whatever, but merely posits hypotheses and traces out their consequences. It is observational, in so far as it makes constructions in the imagination according to abstract precepts and then observes these imaginary objects, finding in them relations of parts not specified in the precept of construction. (CP1.240, 1896)

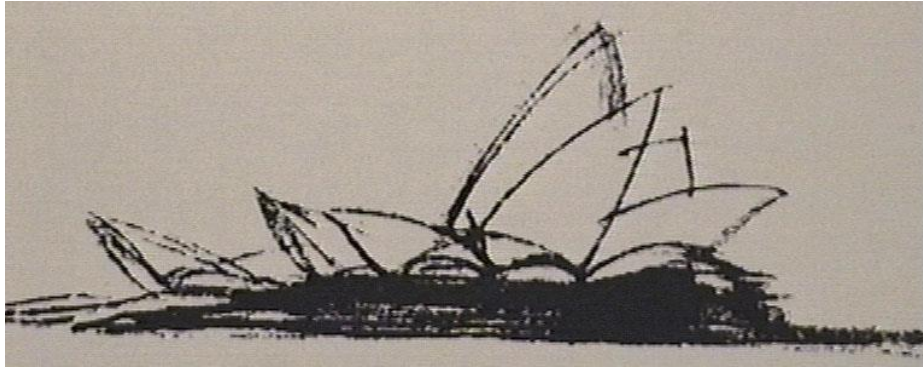
As Moore points out:

It cannot be said that all framing of hypotheses is mathematics. For that would not distinguish between the mathematician and the poet...Mathematics is, therefore, the study of the substance of hypotheses, or mental creations, with the view to the drawing of necessary conclusions. (2010b: 4)

A number of the papers in *New Essays on Peirce's Mathematical Philosophy* (2010b) detail Peirce's thesis of mathematics as observational. Let me here refer at length to the contribution by Daniel Campos (pp. 123-145).

Peirce, in his 1902 paper *The Essence of Mathematics*, restated that according to its method, mathematics is "the science which draws necessary conclusions" (CP4.228, c.1902) then gave a second, complimentary definition which, according to its aim and subject matter, is "the study of what is true of hypothetical states of things" (CP4.233, c.1902). In considering these complimentary definitions Campos shows that two kinds of mathematical hypothesis-making can be identified: what he called *framing* and *experimental* hypotheses. Peirce distinguished between the two kinds of necessary reasoning – corollarial and theorematic – which originated in his study of the structure of proofs in Euclid. A corollarial deduction does not involve any ideas other than those already stated in a premise, that is, there is no need to imagine any formal relations not stated in the original premise. Theorematic proof "differs from a corollarial proof from a methodeutic point of view, in as much as it requires the intervention of an idea not at all forced upon us by the terms of the thesis" (N4.8, 1901). He argued that "theorematic reasoning characterizes mathematics as an activity" (CP4.233, 1902). The first step of this activity is to "demonstrate that"; the second step, to *imagine* an individual diagram that *embodies* all the general characteristics assumed in the hypothesis; the third step is to experiment upon the diagram by *imagining* – and actually drawing, if necessary to aid the imagination – modifications that might help us to *show* that the hypothesised relations do obtain. This "experimentation" consists in the imaginative and judicious modification of the original diagram so as to produce a related diagram that might literally show or "*monstrate*" the hypothesised relations among elements of the original diagram. The introduction of an experimental hypothesis is the theorematic step. The consideration of possible experimental diagrams is constrained by the assumptions of the mathematical system within which the mathematician is working. In Euclid's geometry these assumptions are given by postulates and common notions or axioms. In general, a postulate is "the affirmation of a possibility" while an axiom "is the denial of a possibility" (N4.8, 1901). They constrain, then, the possibilities for creating diagrams of relations within the given mathematical system, including diagrams that represent experimental hypotheses in the course of a demonstration. Theorematic reasoning is not confined to geometry – but takes many other forms in other mathematical problem-contexts.

As previously suggested, the design and construction of the Sydney Opera House serves as an example of the workings of Peirce's Classification of the Sciences and in this case, of mathematics. Not only were the drawings rough, but Utzon's submission was short on detail. It became very obvious to the appointed engineer, Ove Arup, that much of the design was impossible to construct. The shells, for example, were originally a series of parabolas, which couldn't be built with the technology of the time.



**Figure 4:** Jørn Utzon's sketch of his 1956 winning submission to the Sydney Opera House design competition.

Moving up a level to the Sciences of Review (motivated by discovery for the sake of applying knowledge) Utzon and Arup found no precedent to act as a guide; they had to return to first principles for a solution. Yuzo Mikami, an architect on the design teams of Utzon and Arup tells the story of finding the solution.

One summer day in 1961 Utzon went to the model shop alone with a heavy heart and began dismantling the perspex model, sadly thinking that it would have no use if he could not find a solution for it to be constructed in a rational way. The whole job would be cancelled after all these years of hard work. In order to save space to store the models of the shells, he stacked them together one by one, a smaller shell inside a larger one. When he finished the stacking, something struck his eyes. The curvatures of the shells which he thought to be quite different from one shell to the other, were more similar to each other than he had thought all these years.

An idea flashed in his head like a lightning in a dark sky. If they were so similar, why couldn't they be cut out from a common surface? In order to do that the curvature must be the same in all directions. What is a geometrical body with a constant curvature in all directions? A sphere!

He rushed home and taking a child's rubber beach ball, put it into the bath-tub full of water. The surface of the red rubber ball changed colour when it was wet. Therefore he was able to see the shapes of the spherical triangles he could cut out from the ball on the parts which were left dry. After many trials he realised that the variety of shapes and sizes available were almost limitless. Big and small, flat and upright. He could now compose the whole shell by the pieces of spherical triangles cut out from just one single sphere. He had found the solution.



**Figure 5:** the model of Jørn Utzon's solution.

For further information about the design and construction of the Sydney Opera House refer to the links shown in the bibliography.

## Philosophy

In considering philosophy as a science rather than an art, Peirce was treating it as a *method* for discovering truth – as a *process* – not as a *Weltanschauung* which is often a *product*. For him, philosophy and its components are considered:

... derivative of formal sciences because they do not study the form of their own constructions but study the form of things already constructed, so to speak. One might label them "reconstructive" formal sciences rather than "constructive" ones like mathematics (Liszka 1996: 2).

In contradistinction to the special sciences which discover new phenomena, however, Peirce stressed that philosophy "limits itself to so much of truth as can be inferred from common experience." (CP1.184, 1903) "By Experience" he explained, "I mean any conscious effect contributing to a habit, satisfactory and self-controlled yet destructible by no exercise of intellectual vigour but only by deadening one's powers" (MS843, n.d.). John E. Smith points out that:

The key to Peirce's conception of experience is found in his rejection of privileged starting points for thought and his emphasis on the *insistence* of experience over against the human will, including elements of surprise which confound human expectations. (Smith 1978: 91)

Two papers by Peirce which appeared in the *Journal of Speculative Philosophy* (2:1868): 'Questions concerning certain faculties claimed for man' (pp. 103-114) and 'Some consequences of four incapacities' (pp. 140-157) are of particular relevance to his pragmatist philosophy. So too are his two papers published a decade later in *Popular Science Monthly*, 12: 'Fixation of belief' (1877: 1-15) and 'How to make our ideas clear' (1878: 286-302). In arguing his position, he took particular issue with Descartes and with the British empiricists, John Locke, George Berkeley, David Hume and John Stuart Mill. He rejected the foundationalist doctrine of Descartes, arguing that knowledge could not be regarded statically as a body of propositions but, as with the notion of scientific progress which had become commonplace in the nineteenth century, dynamically as a process of inquiry. Science

...is not standing upon the bedrock of fact. It is walking upon a bog and can only say, this ground seems to hold for the present. Here I will stay till it begins to give way. (CP5.589, 1892)

So too, he argued, was this the case for epistemology. In arguing against Descartes' program for finding certainty, Peirce also rejected Hume's skepticism. Peter Skagestad (1981: 19) summarises:

If we have no independent vantage point from which to *justify* our body of knowledge as a whole, neither do we have an independent vantage point from which to *reject* our knowledge as a whole. The only vantage point available is the one provided by the knowledge we in fact have. Within the framework of this knowledge we may criticize and reject each one of our beliefs individually, but we cannot step outside this framework and reject all our beliefs collectively. Total skepticism is as impossible as absolute certainty.

His issue with Locke was the latter's notion of *tabula rasa*. Peirce agreed with his definition of experience but found it wanting in two respects. In assuming *tabula rasa*, it discounted past experience and denied expectation and thus did not account for surprise. Observers are neither passive nor 'pure'; likewise for observables. This is so even with objects being observed. In speaking of matter as "effete mind" (CP6.25, 1891) Peirce was acknowledging that even so-called inert matter is active, albeit languidly so. However, as Smith points out, Peirce "insisted that the kind of thing to which the word "experience" is more particularly applied is an 'event' which has a temporal stretch or duration." (1978: 93)

In this regard, Peirce also strenuously opposed the doctrine of intuition at the base of John Stuart Mill's empiricism. Having shown that "there is no intuition or cognition not determined by previous cognitions," he argued that "it follows that the striking in of a new experience is never an instantaneous affair, but is an event occupying time and coming to pass by a continuous process." (1868)

And while he admired Berkeley, he argued against his view of reality as actual perception and his neglect of real possibility.

## Phenomenology

Phenomenology, (phaneroscopy, as he first named it) the first order within the derivative or reconstructive formal heuristic class, philosophy, should not to be confused with the continental version as developed by Edmund Husserl, though there are similarities. According to Peirce:

This science of Phenomenology is in my view the most primal of all the positive sciences. That is, it is not based, as to its principles, upon any other positive science. By a positive science I mean an inquiry which seeks for positive knowledge; that is, for such knowledge as may conveniently be expressed in a categorical proposition (CP5.39, 1903).

Herbert Spiegelberg (1956: 168) cites a letter to James dated 3 October 1904 in which Peirce argued that what he was calling phenomenology was, as he saw it, what William James was propounding under the new title of radical empiricism.

As I understand you, then, the proposition you are arguing is a proposition in what I called phenomenology, that is just the analysis of what kind of constituents there are in our thoughts and lives (whether these be valid or invalid being quite aside from the question)... Perhaps the most important aspect of the series of papers of which the one you sent me is the first, will prove to be that phenomenology is one science and psychology a very different one ... Phenomenology has no right to appeal to logic, except to-deductive logic. On the contrary, logic must be founded on phenomenology. Psychology, you may say, observes the same facts as phenomenology does. No. It does not observe the same facts. It looks upon the same world and the same world that the astronomer looks at but what it observes in that world is different. Psychology of all sciences stands most in need of the discoveries of the logician, which he makes by the aid of the phenomenologist.

Peirce's phenomenology – his doctrine of categories – “ascertains and studies the kinds of elements universally present in the phenomenon; meaning by the *phenomenon*, whatever is present at any time to the mind in any way.” (CP1.186, 1903) It requires keen skills of observation. He initially developed this crucial aspect of his philosophy in response to the categories of Kant. Likewise, he considered those of Aristotle whose work he had also studied at great depth. William L. Rosensohn summarises Peirce's lead-up to the development of his own doctrine of categories as follows:

According to Peirce, Kant fails to undertake any pre-logical analysis prior to accepting a table of logical judgements from which his set of categories could be deduced. Thus “he affords no warranty for the correctness of the original table” [W1.351, 1866]. Aristotle commences with “a half-grammatical, half-logical analysis” [L75, 1902] of composite forms of speech, deriving a list of ten types of simple linguistic expressions predicable of a subject. These he called categories, or predicaments. Peirce, however, makes his “one contribution to philosophy” [L67, 1905] neither with logic nor language but “experience” itself. His categories, he contends, rest on no “previous philosophizing at all” [L75, 1902]. By going “back to experience, in the sense of whatever we find to have been forced upon our minds” [L75, 1902] he introduced a new method: phenomenological analysis, or the analysis of the phenomenon (1974: 37).

The principles of mathematics inform his phenomenology. As stated above, mathematics is “the study of the substance of hypotheses, or mental creations, with the view to the drawing of necessary conclusions.” (Moore 2010b: 4) Peirce's hypothesis is that the categories, which he called First, Second, and Third, constitute the passage from Being to Substance. Whilst, the first four pages of his paper ‘The logic of mathematics: an attempt to develop my categories from within’ (MS900, c. 1896; CP1.417-520) are missing, enough has survived to judge that his mental creation is sound. Lest seeing ‘logic’ in the title, one is inclined to put the cart before the horse, Peirce brings to our attention that “mathematics performs its reasonings by a *logica utens* which it develops for itself and has no need of any appeal to a *logica docens*; for no disputes about reasoning arise in mathematics which need to be submitted to the principles of the philosophy of thought for decision” (CP1.417, 1896).

Peirce tells us that the purpose of phenomenology is to describe what is before the mind and to show that the description is correct. He further tells us that “what we have to do, as students of phenomenology, is simply to open our mental eyes and look well at the phenomenon and say what are the characteristics that are never wanting in it, whether that phenomenon be something that outward



experience forces upon our attention, or whether it be the wildest of dreams, or whether it be the most abstract and general of the conclusions of science" (CP5.41, 1903). In a letter to the Italian pragmatist, Mario Calderoni speaking of the phenomenon, or what he came to name the phaneron (another of his neologisms) he wrote:

I use the word phaneron to mean all that is present to the mind in any sense or in any way whatsoever, regardless of whether it be fact or figment. I examine the phaneron and I endeavor to sort out its elements according to the complexity of their structure. I thus reach my three categories. (CP8.213, c.1905)

Joseph Esposito (1980) gives a detailed study of Peirce's categories, but as an initial guide to recognising these, let me first give a brush-stroke sketch of the genuine form of the three which I will discuss in more detail as I proceed with this review:

Firstness is potential, possibility, may be; it is qualifier, feeling, sensation, spontaneity; in logic it is terms; in Peirce's semiotic it is Icon; in his metaphysical doctrine it is *Tychism* (Greek for chance). The conventions of those of our languages which insist on the copular enable us to speak of Firstness, but whilst logically it is positively characterised, negatively it is devoid of existence. As Peirce says of Firstness, "it is without reference to anything else within it or without it, regardless of all force and of all reason" (CP2.85, c.1902).

The idea of First is predominant in the ideas of freshness, life, freedom. The free is that which has not another behind it, determining its actions; but so far as the idea of the negation of another enters, the idea of another enters; and such negative idea must be put in the background, or else we cannot say that the Firstness is predominant. Freedom can only manifest itself in unlimited and uncontrolled variety and multiplicity; and thus the first becomes predominant in the ideas of measureless variety and multiplicity. (CP1.302, c.1894)

Secondness is brute force; it is habit, resistance, dependence, contingency; it is experienced as otherness; in logic it is propositions; in semiotic, Indices; in Peirce's cosmology it is *Synechism* (Greek for continuity).

...secondness consists in one thing acting upon another – brute action. I say brute, because so far as the idea of any law or reason comes in, Thirdness comes in. When a stone falls to the ground, the law of gravitation does not act to make it fall. The law of gravitation is the judge upon the bench who may pronounce the law till doomsday, but unless the strong arm of the law, the brutal sheriff, gives effect to the law, it amounts to nothing. True, the judge can create a sheriff if need be; but he must have one. The stone's actually falling is purely the affair of the stone and the earth at the time. This is a case of reaction. So is existence which is the mode of being of that which reacts with other things. (CP8.330, 1904)

Thirdness is reasonableness; it is purpose, order, mediation, law, adaption; in logic it is inferences; in semiotic, Symbols; in metaphysics, *Agapasm*.

Let us proceed in the same way with Thirdness. We have here a first, a second and a third. The first is a positive qualitative possibility, in itself nothing more. The second is an existent thing without any mode of being less than existence, but determined by that first. A third has a mode of being which consists in the Secondnesses that it determines, the mode of being of a law, or concept. Do not confound this with the ideal being of a quality in itself. A quality is something capable of being completely embodied. A law never can be embodied in its character as a law except by determining a habit. A quality is how something may or might have been. A law is how an endless future must continue to be. (CP1.536, 1903)

Because Secondness is an essential part of Thirdness and Firstness is an essential part of both Secondness and Thirdness, there is a distinction between the genuine and the degenerate forms of the categories. Vincent Potter (1997: 17) lists the following combinations:

- 1) Firstness of Firstness – quality in itself, or possibility (*Primity*)
- 2) Firstness of Secondness – existence or actuality (*Secundity*)
- 3) Firstness of Thirdness – mentality

Taking Secondness:

- 1) Secondness of Secondness – reaction
- 2) Secondness of Thirdness – law as actual compulsion

Finally Thirdness:

- 1) Thirdness of Thirdness – generality, lawfulness, reasonableness.

As Felicia Kruse points out, however, in her paper 'Genuineness and degeneracy in Peirce's categories':

...the categories of Firstness, Secondness and Thirdness express relations, not absolute entities. Because genuine Secondness and Thirdness are relations, they are dependent for their genuineness upon the terms that maintain the relations. ... The distinction between genuineness and degeneracy in the Peircean categories is perhaps best understood as a distinction along a continuum. On one end of the continuum we have the most genuine cases and on the other we have the most degenerate - those which are "merely a way of looking at things." In between, we have the realm of the relatively genuine and the relatively degenerate, where genuineness and degeneracy depend not only upon the nature of the terms of the relations themselves, but also upon the position of the relations with respect to other relations. (Kruse 1991: 292-3)

In order to describe phenomenon, we need first to engage in mental separation of 'thisness' from the 'thusness' of the phaneron. According to Peirce, when observing the phaneron, there are three ways of attending to aspects, or parts of the whole. These three modes of mental separation are precision, discrimination and dissociation, with the first being the method of abstraction.

Abstraction or precision ought to be carefully distinguished from two other modes of mental separation, which may be termed discrimination and dissociation. Discrimination has to do merely with the senses of terms and only draws a distinction in meaning. Dissociation is that separation which, in the absence of a constant association, is permitted by the law of association of images. It is the consciousness of one thing, without the necessary simultaneous consciousness of the other. Abstraction or precision, therefore, supposes a greater separation than discrimination, but a less separation than dissociation. (CP1.549, 1867)

As a mode of mental analysis, discrimination<sup>2</sup> can do no more than identify difference. For those who believe that facts speak for themselves, or that observation is value-free, nothing more than discrimination is considered necessary. Dissociation, for its part, allows one to disregard all that is not of concern in the cacophony. "The proper way of abstraction is by prescindin<sup>g</sup>." (Hausman 1993: 134) This is a very different way of proceeding with inquiry than that prescribed by analytic philosophers. Precision allows for focus on what the Medieval Scholars called the *quidditas* or 'whatness' (*primity*), the *haecceitas* or 'thisness' (*secundity*) and the *entitas* or 'beingness' (*tertianity*) – the Firstness, Secondness and Thirdness of concern.

Let me exemplify this through exploration of the following incident related in the BBC science program, *The Human Mind* (Spiers & Gimple, 2003) and given as an example of the operation of the psychological phenomena, intuition: In 2001 Andy Kirk, a UK fire chief, was called out to a big factory fire. Judging it safe enough for his experienced team to manage, Kirk sent them in to extinguish the fire. Within a short period the team appeared to have it under control. Kirk then had what he later described as a 'strange feeling'. Sometime later he was able to piece together the mediation process between his sudden 'strange feeling' and his response. His cortex had picked up changes in his present situation; he remembered every fire he had ever experienced and identified three differences between them and the scene before him: the smoke was orange, air appeared to be moving into the building rather than out as was usual, and whereas fires usually crackle, there was no sound.

Let us say, for the sake of the exercise, that an artist, seeing the surprising event of orange smoke, wants to paint it. For a painter, the meaning of orange smoke would differ from that of a firefighter. A trained artist looks at a scene in terms of the elements and principles of design. The elements – line,

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<sup>2</sup> The term discrimination is commonly used in a pejorative sense when the distinction made is judged to be unjust or prejudicial as when used in terms of the practice or instance of discriminating *against* a person on grounds of race, colour, sex, social status, age, etc. In such cases, men and women, for example, are perceived as the *entitas* – beingness – rather than as the *haecceitas* – thisness – of the *entitas*: people.

shape, direction (horizontal, vertical and oblique), size, texture and colour (hue, chiaroscuro and intensity) – are the things that form design. The principals, which govern the relationships of the elements, are balance, proximity, alignment, repetition, contrast and space. Concentrating here on the element of colour and being fully conversant with the colour-wheel, the artist can discriminate between colours and knows that grey, which could be seen because of its being embodied in smoke, is tertiary with cyan predominating. Seeing it as orange, the artist would prescind magenta and yellow and dissociate cyan. Nevertheless, observing smoke orangy, the artist may experience a sense of, say, foreboding, and create an artwork that, juxtapositioning the elements and principles of design imaginatively, paints the experience of foreboding. The aesthetic 'beauty' of the painting is 'measured' by the degree to which it embodies feelingfulness creatively.

To a fire-chief, such observation is moot; their purpose in observing such a scene and therefore how they view it, is significantly different from that of an artist. Although for both, orange smoke is a surprising fact, and generates a feeling – maybe one of foreboding – the purpose of observing what is going on around them differs. The feeling of, say, foreboding the fire-chief Andy Kirk may have experienced may well have arisen from a subconscious awareness that 'things' didn't seem to jibe with what his crew had reported. As their chief, his purpose is to ensure the fire-fighting team performs effectively, efficiently and ethically; that they meet health and safety standard to care for their own wellbeing; and that they prioritise saving life over property in the performance of their job. More than this, though, which is more in keeping with the role of a supervisor, as chief, Andy's role would have included taking a wider view of events – the bigger picture – and responding to it appropriately in accordance with his purpose.

By way of explanation, let me return to the incident in more detail: Taking the second surprising fact the fire-chief picked-up on: that air appeared to be moving into the building rather than out as would be expected. Knowing that air is colourless, I am assuming that the presence of smoke made this observation possible. Furthermore, because he makes no reference to wind, I presume it was not a factor in causality. Having identified smoke moving into the building, names have been named and thus the act of discrimination completed. Dissociation serves only indirectly in that in the absence of wind, one would not usually associate smoke moving towards the fire that had produced it. Whilst discrimination is useful for describing this situation and dissociation (indirectly) indicates a surprising fact observed, the mode of mental analysis that can be used to interpret the available data, that is, construct an explanation (abduct) is prescind. Thus, though reference to movement cannot be prescinded from air, air can be prescinded from movement and movement thereby considered in relationship to air. The constituent of air that fuels fire is oxygen; as fire burns oxygen, air pressure is reduced and more air moves in. If for some reason oxygen cannot be replaced at the same rate it is depleted, then pressure increases to the extent that in the presence of smoke, the movement of air into the building stands out from all other everywhere-and-at-all-time movement of air. The fire-chief was, in fact, observing the operation of localised air pressure.

His third observation – that the crackling sound normally associated with large fires was absent, is less straightforward to interpret. Peirce tells us that "prescission, consists in...supposing one of the two constituents of the idea, termed the prescinded constituent to be realized in a subject while the other, termed the abstracted constituent is supposed to be absent." (MS284, 1905) The abstracted constituent that was absent was sound and it was this that finally alerted the fire-chief to the fact that it was not fire that he was witnessing, but a lack thereof. Kirk's observations had picked-up on the signs of an imminent backdraft. He pulled his team out and moments later the factory exploded.

Peirce's three categories crystallise observation in every class – in the superordinate mathematics and the subordinate, normative sciences, metaphysics, the special sciences, the sciences of review, and the

practical sciences – by serving as the means for making experience intelligible. They are universal and elementary and are purely formal. “They are elementary, because they are the constituents of all experience; universal, because they are *necessary* for *any* understanding” (Rosensohn 1974: 45).

Phenomena experienced are not limited, as the classical empiricists would have it, to those detectable by the senses. When describing what he came to call the *phaneron*, as “whatever is present at any time to the mind in any way” (CP1.186, 1903), he later added “quite regardless of whether it corresponds to any real thing or not” (MS1334, 1905). By way of example, in what Peirce identified as the seven systems of metaphysics, through reference to Firstness, Secondness and Thirdness, he identifies the shortcomings of six of the systems (CP5.78, 1903).

One very naturally and properly endeavors to give an account of the universe with the fewest and simplest possible categories.

*Praedicamenta non sunt multiplicanda praeter necessitatem.*

*Berkeleyans:*

two kinds of entities souls, or centres of determinable thought ideas in the souls being regarded as pure statical entities deny Secondness, which they wish to replace by Divine Creative Influence, which certainly has all the flavour of Thirdness.  
[May include: Gottfried Leibniz]

*Hegel:*

only Third category – other two only introduced in order to be *aufgehoben*.

*Cartesian metaphysics:*  
admit Categories Second and Third fundamental and deny the First.

*Spinoza and Kant:*  
do full justice to Categories Second & Third and minimize the First.

*Condillac Associationalists:*  
explain everything by means of qualities of feeling.

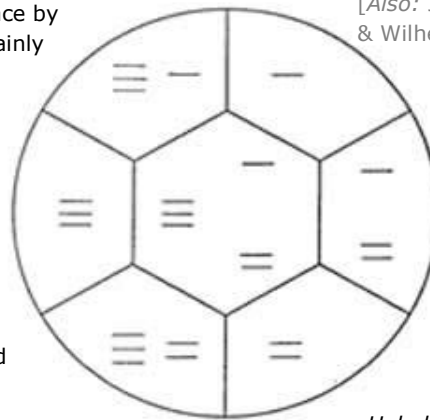
[Also: J S Mill, Alexander Bain & Wilhelm Wundt]

*Moderate Nominalists:*  
apply the epithet *mere* to thought and to representamens.

[Includes: Thomas Hobbes]

*Helmholtz Corpuscularians:*  
mechanical force – not distinguished from individual reaction.

[Includes: John Locke]



**Figure 6:** Peirce’s diagram of the seven systems of metaphysics, through reference to Firstness, Secondness and Thirdness, summing up the shortcomings of six of the systems (CP5.78, 1903)

Precision is multiple and entails identification of those aspects of the phaneron that will provide sufficient means to inquirers enabling them to discover probable explanations that matter to the motives, ideals and purposes of their lines of inquiry. As a practical scientist, the fire-chief is motivated to inquire for the sake of doing. But doing what? This is where the next division of Peirce’s classification, the normative sciences come in, addressing the regulatory methods for finding answers.

## The Normative Sciences

Peirce did not settle on the normative science as the mid-class of philosophy until c.1903. He came to realise that "though these sciences do study what ought to be, that is, ideals, they are the very most purely theoretical of purely theoretical sciences." (CP1.281, 1903) For him, "the three normative sciences are logic or semeiotic, ethics and esthetics, [being the three doctrines that can be distinguished on the normative curve]; Logic in regard to representations of truth, Ethics in regard to efforts of will, and Esthetics in objects considered simply in their presentation" (CP5.36, 1903). To be in a position to make evaluation, is to make use of some criterion. Normative science, he contends, "investigates the universal and necessary laws of the relation of Phenomena to Ends" (CP5.121, 1903). Vincent Potter points out, "Peirce looks upon normative science as positive science" (1997: 25).

Viewing the normative sciences as natural kinds, Peirce may appear to commit the naturalistic fallacy, but this is not so. Concerning Peirce's theory of the formation of habits, imperatives are categorical; through the process of translating this theory into practice, these imperatives become hypothetical. Exploring his theory of the formation of habits may help to clarify this. Skagestad, in discussing Peirce's theory of inquiry, points out:

...we come to philosophy with a network of preconceived opinions which it never occurs to us to doubt, because we are not aware that they can be doubted, or even that they are there. If we imagine that we doubt everything that can be doubted, we simply deceive ourselves and give our prejudices free play in determining our future beliefs. (1981: 28)

Doubt cannot be in name only as is the case with those who take skepticism as their starting point; doubt generated by choice is fictitious.

It is important for the reader to satisfy himself that genuine doubt always has an external origin, usually from surprise; and that it is as impossible for a man to create in himself a genuine doubt by such an act of the will as would suffice to imagine the condition of a mathematical theorem, as it would be for him to give himself a genuine surprise by a simple act of the will. (CP5.443, c.1905)

A true doubt is accordingly a doubt which really interferes with the smooth working of the belief-habit. (CP5.510, c.1905)

Prejudices are taken for granted belief-habits. For Peirce:

A habit arises, when, having had the sensation of performing a certain act, *m*, on several occasions *a*, *b*, *c*, we come to do it upon every occurrence of the general event, *l*, of which *a*, *b* and *c* are special cases. That is to say, by the cognition that:

Every case of *a*, *b*, or *c*, is a case of *m*, is determined the cognition that  
Every case of *l* is a case of *m*.

Thus the formation of a habit is an induction and is therefore necessarily connected with attention or abstraction. Voluntary actions result from the sensations produced by habits. (CP5.297, c.1905)

Belief, he contended, has three properties:

First, it is something that we are aware of; second, it appeases the irritation of doubt; and, third, it involves the establishment in our nature of a rule of action, or, say for short, a habit. As it appeases the irritation of doubt, which is the motive for thinking, thought relaxes and comes to rest for a moment when belief is reached. But, since belief is a rule for action, the application of which involves further doubt and further thought, at the same time that it is a stopping-place, it is also a new starting-place for thought. That is why I have permitted myself to call it thought at rest, although thought is essentially an action. The final upshot of thinking is the exercise of volition and of this thought no longer forms a part; but belief is only a stadium of mental action, an effect upon our nature due to thought, which will influence future thinking. (CP5.397, 1893)

He stressed that:

Belief is not a momentary mode of consciousness; it is a habit of mind essentially enduring for some time and mostly (at least) unconscious; and like other habits, it is (until it meets with some surprise that begins its dissolution) perfectly self-satisfied. Doubt is of an altogether contrary

genus. It is not a habit, but the privation of a habit. Now a privation of a habit, in order to be anything at all, must be a condition of erratic activity that in some way must get superseded by a habit. (CP5.417, c.1905)

Living life through the medium of habits is unproblematic until one is, for one reason or another, assailed by doubt. As Peirce sees it: "The irritation of doubt causes a struggle to attain a state of belief. I shall term this struggle Inquiry" (CP5.374, 1893).

Some philosophers have imagined that to start an inquiry it was only necessary to utter a question whether orally or by setting it down upon paper and have even recommended us to begin our studies with questioning everything! But the mere putting of a proposition into the interrogative form does not stimulate the mind to any struggle after belief. There must be a real and living doubt and without this all discussion is idle.

In 'The fixation of belief' (1877) Peirce could be said to be intent on provoking the "irritation of doubt" in those who have determined their beliefs without the benefit of logic. He is not so much concerned with individuals *qua* individuals, but as members of a community. He said, in speaking of what he called the method of tenacity, that it "will be unable to hold its ground in practice."

The social impulse is against it. The man who adopts it will find that other men think differently from him and it will be apt to occur to him, in some saner moment, that their opinions are quite as good as his own and this will shake his confidence in his belief. This conception, that another man's thought or sentiment may be equivalent to one's own, is a distinctly new step and a highly important one. It arises from an impulse too strong in man to be suppressed, without danger of destroying the human species. Unless we make ourselves hermits, we shall necessarily influence each other's opinions; so that the problem becomes how to fix belief, not in the individual merely, but in the community. (CP5.378, 1877)

Likewise, the second method he discussed, "the method of authority" takes into account the "social impulse". As Skagestad (1981: 33) puts it: "This method consists in letting the state legislate all beliefs, conduct systematic indoctrination, keep the population in ignorance of everything which may create doubt and punish all those who profess divergent beliefs." Equally, this method applies to religious dogma and peer pressure.

In failing to attend to experience, the third method, the *a priori* method, is related to the preceding two flawed methods. Peirce concedes:

This method is far more intellectual and respectable from the point of view of reason than either of the others... But its failure has been the most manifest. It makes of inquiry something similar to the development of taste ... and accordingly metaphysicians have never come to any fixed agreement, but the pendulum has swung backward and forward between a more material and a more spiritual philosophy, from the earliest times to the latest.

To satisfy our doubts, therefore, it is necessary that a method should be found by which our beliefs may be determined by nothing human, but by some external permanency – by something upon which our thinking has no effect. ... Our external permanency would not be external, in our sense, if it was restricted in its influence to one individual. It must be something which affects, or might affect, every man. And, though these affections are necessarily as various as are individual conditions, yet the method must be such that the ultimate conclusion of every man shall be the same. (CP5. 383-384, 1877)

Notwithstanding that belief and doubt are not subject to will, deciding on a method for determining their validity is an act of volition. Furthermore, such a method requires the work of a community if it is to resist our eccentricities, the imposition of hegemony, or the vicissitudes of tastes. A method as choice is normative, arises in response, not to the facts of the matter, but to interpretation of what is observed. As with phenomenology before it, and mathematics before that, observation is vital to inquiry, which in turn, is driven by purpose. What *is* observed vis-à-vis what is expected – what *should be* observable – is the esthetics; the performance in response to any interpretation is not so much the action itself, but rather what should be done in accord with esthetics and is the ethics. Logic as normative entails concentrating on what are the possible consequences of the choices of actions in response to the esthetic interpretation.

## Esthetics

Esthetics as the normative science of values should not be confused with aesthetics as evaluation though they are of course related, the latter being dependent on the former for its principles. Within Esthetics, the *summum bonum* as ideal, is categorial; Esthetics as process is hypothetical by relationship. Thus, what we ought to *do* – where 'do' includes 'feel' – stands in relation to an end or ideal. According to Peirce

...the only satisfactory aim [ideal] is the broadest, highest and most general possible aim; and for any more definite information, as I conceive the matter, he has to refer us to the esthetician, whose business it is to say what is the state of things which is most admirable in itself regardless of any ulterior reason. (CP1.611, 1903)

Esthetics, as categorial, is a First; as a process, "esthetic quality is related to the three categories: It is Firstness that belongs to a Thirdness in its achievement of Secondness." (MS301, 1903)

Let me illustrate this, holding in mind esthetic's place within Peirce's classification of heurctic science, i.e., discovery for the sake of discovery, philosophy, a positive, i.e. experiential, heurctic science and following phenomenology, which focuses on the phaneron as it immediately presents itself and that, furthermore, the classifications and the categories which are revealed through phenomenology are formal.

Saying that the ideal of mathematics should be to produce conclusions that are elegant is to make a normative statement. Pronouncing the mathematical phenomenon,  $m=E/c^2$  (Einstein's 'second law'), as elegant is to make an aesthetic evaluation. Whilst mathematics is superordinate to esthetics and therefore is not dependent on it for its principles, the principles of esthetics contribute to refinement of the principles and findings of mathematics.

Elegance may be defined as, *inter alia*, 'the quality of ingenious simplicity and effectiveness'. Remembering that defining anything does not assert to its existence (EP2: 302, 1904), elegance is a possibility; it is a First. Saying that  $m=E/c^2$  is elegant is to actualise it through embodiment; it is a First of a Second.

This does not, however, warrant pronouncing elegance as the *summum bonum* of mathematics. Elegance as the ideal of mathematics is determined within esthetics and is categorial. The steps in the process within Peirce's esthetics are:

1. Physiology which investigates the *summum bonum* and discovers the physiology of phenomena in their Firstness.
2. Classification which inquires into the conditions of conformity to the ideal; and
3. Methodology which studies the principles governing the production of the aesthetic object.

Once again straying into metaphysics for a moment: nominating elegance as the ideal of mathematics may well be appropriate, but to judge  $m=E/c^2$  as elegant, therefore ideal, without consideration of its propositional value, is to opt for authority as the method of fixing belief. Such a method is not only nominalistic, it also leaves unexamined the notion of elegance as an ideal. Furthermore, as a dogmatic statement, it blocks further inquiry. History tells us this is the antithesis to progress or process.

Joseph Raz (2003) speaks of the 'practice of value', that is, that value depends on valuers. He delineates values and valuers and in so doing succeeds in separating the categorial process of determining the criteria and warrant of value from the normative process of valuing. This also serves to make Peirce's notion of esthetics as valuing, intrinsic to the process of inquiry. I will extend his theory in concert with Peirce's broader theory of mind in Part 2. For the moment, it serves to emphasise continuation of the normative process from consideration of ideal as quality to ideal action.

## Ethics

Peirce "takes the theory of the control of conduct and of action in general, so as to conform to an ideal, as being the mid-normative science." (CP1.573, 1905) In the same way that what he has to say on esthetics should not be conflated to include aesthetic evaluation, so too ethics as a normative science should not be confused with practical ethics or pragmatics. Ethics as a normative science asks "to what end all effort shall be directed." (CP2.199, c.1903) Peirce argues that "the problem of ethics is to ascertain what end is possible" (CP5.134, 1903). In the same way it is important to differentiate Peirce's pragmatics from his Ethics, so too is it important to differentiate ideals of conduct with motives to action.

Every action has a motive; but an ideal only belongs to a line of conduct which is deliberate. To say that conduct is deliberate implies that each action, or each important action, is reviewed by the actor and his judgment is passed upon it, as to whether he wishes his future to be like that or not. His ideal is the kind of conduct which attracts him upon review. His self-criticism, followed by a more or less conscious resolution that in its turn excites a determination of his habit, will, with the aid of the *sequelæ*, modify a future action; but it will not generally be a moving cause to action. It is an almost purely passive liking for a way of doing whatever he may be moved to do...whether his own conduct or that of another person... (CP1.574, 1906)

Contrary to what Descartes would have had us believe, blanket skepticism is not only *not* a necessary prelude to inquiry – it does not constitute a motive to action; to the contrary, it is an expression of 'contempt prior to investigation'. Genuine doubt, on the other hand, is, as discussed above, a motive to action – it is an itch that demands to be scratched.

Ethics inquires into the theory of the formation of habits of action that are consistent with a deliberately adopted ideal of conduct. Within Peirce's classification, the divisions of Ethics are:

1. Physiology which discovers the ethical ideal and the physiology of conduct;
2. Classification which inquires into the conditions of conformity to the ethical ideal; and
3. Methodology which inquires into the principles for actualising the ethical ideal.

Saying, for instance, that rigor is the right way of achieving mathematical elegance is to speak of ideals of conduct within mathematics. In his book *How Mathematicians Think* (2007) William Byers questioned rigor as the right way of conducting mathematics, arguing that it stymies the creativity necessary for the generation of original ideas. According to Douglas Hofstadter (1979), Euclid was the founder of rigor in mathematics and yet, as he is quoted in the OED following the definition of rigor as "strict accuracy, severe exactitude [L15]", "Euclid's lack of absolute rigor was the cause of some path-breaking mathematics." Creativity may well be argued as the right conduct for achieving the esthetic ideal of pure mathematics. Not so in the case of applied mathematics where rigor, defined as "the strict application or enforcement of law, rule, etc. [LME]" (OED), is essential. Once again, the Sydney Opera House comes to mind as an example of difference. In his review of Yuzo Mikami's 'Utzon's sphere: Sydney Opera House – how it was designed and built', Paul Bentley speaks of Mikami's way of describing such difference:

The transformation of simple competition drawings into complex structure is portrayed as the battle of B6 and H2 pencils. Utzon's tool of trade was a green Faber Castell lead holder, perfect for locating form and rhythm in thick, soft strokes. The hard, sharp pencils of his assistants were used to convert the ideas into blueprints. <http://www.twf.org.au/research/mikami.html>

Whether these authors are right or wrong is not at issue here; my purpose in raising it is to point out that consideration of what is good conduct requires the normative science of Ethics for exploring such propositions. It also illustrates that ethics is dependent on esthetics, that is, what is considered as right action is dependent on what is conceived of as the *summum bonum*. In this respect ethics operates as a hypothetical imperative.



## Logic

"Logic emerges in the scheme of the normative sciences as a special case of ethics, just as ethics involved a special determination of the aesthetic ideal" (Anderson 1995: 45). Peirce argued that "a logical reasoner is a reasoner who exercises great self-control in his intellectual operations; and therefore the logical good is simply a particular species of the morally good" (CP2.198, 1902-4). For Peirce "logic is a study of the means of attaining the end of thought" (CP2.198, 1902-4). He employs the term 'logic' in two senses, which reveals his three divisions in his perennial classification of the sciences.

In its narrower sense, it is the science of the necessary conditions of the attainment of truth. In its broader sense, it is the science of the necessary laws of thought, or, still better (thought always taking place by means of signs), it is general semeiotic treating not merely of truth, but also of the general conditions of signs being signs ... also of the laws of the evolution of thought, which ... coincides with the study of the necessary conditions of the transmission of meaning by signs from mind to mind and from one state of mind to another. (CP1.444, 1896)

Formatting this as it appears in the perennial classification of the sciences, (and including the variety of labels he employed at different times in brackets) one can see that the narrow sense is folded into its broader sense:

Logic (also called General semeiotic; Normative semeiotic; Semeiotic; Semiotic) studies the deliberate formation of habits of thought that are consistent with the logical end.

1. Speculative grammar: (on occasions referred to as Formal grammar; Hermeneutic; Logical syntax; Obsistent logic; *Stecheotic*; *Stechiology*; *Stoicheia*; Universal grammar) inquires into the logical end and analyses reasoning into ultimate components;
2. Critic: (or Critical logic; Logic; Originalian logic) studies the kinds and degrees of trust that are appropriate to different ways of reasoning; and
3. Methodeutic: (sometimes called Formal rhetoric; Heuristic; Method; Methodic; Methodology; Objective logic; Pure rhetoric; Speculative rhetoric; Transuasional logic) studies ways of pursuing different kinds of inquiry.

Logic, which inquires into the theory of the formation of habits of thought, where thought is mental action, is an extension of ethics. Mental action should not be conflated with mental processes which are the concern of empirical scientists such as psychologists and neuroscientists. As a normative science, Logic is the theory of *conditions* of truth; not what *is* true. Just as he was against logicism, so too was Peirce vocal in his opposition to the psychologism of such figures as Heinrich Christoph von Sigwart and John Stuart Mill.

In the same way, Peirce's semeiotic should not be confused with the semiology of the Swiss linguist, Ferdinand de Saussure whose *Cours de linguistique générale (Course in General Linguistics)* (1916) was published two years after Peirce's death. According to Floyd Merrell (2001b):

...one of the chief distinctions between Peirce and Saussure lies in the scope of their theories. Peirce's semiotics encompasses the range of all possible signs and their human and nonhuman makers and takers alike, regarding both inorganic and organic and living and nonliving domains – in addition to what is construed by dualists to be the realm of mind. This all-inclusive semiotic sphere exists in stark contrast to Saussure's call for a "science of signs," which according to the proper conception was destined to become basically a "linguistic science," thus limited to distinctively human communication.

More importantly, however, James Liszka points out, "for Saussure, signs are primarily a psychological entity" (1996:15) whereas "Peirce sees semeiotic as leading principles to sciences such as general and social psychology and linguistics." Peirce's semeiotic is normative; Saussure's semiology is empirical and as Liszka argues (*Ibid*):

The only way in which the logical or formal view of semeiotic and the empirical one would be compatible is if the empirical and the formal were treated the same. This is generally called the theory of psychologism; it is something Peirce argues fervently against (see CP2.39-54, c.1902).

## Speculative grammar

Speculative grammar, the first division of Peirce's logic as semeiotic, is concerned with the formal conditions for 'something' to count as a sign.

A sign, or *representamen*, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the *interpretant* of the first sign. The sign stands for something, its *object*. It stands for that object, not in all respects, but in reference to a sort of idea, which I have sometimes called the *ground* of the representamen. (CP2.228, 1897)

A number of introductory texts of Peirce's semeiotic have appeared over the years including James Jakóbc Liszka's *A General Introduction to the Semeiotic of Charles Sanders Peirce* (1996). Below, as a partial synopsis of Peirce's Speculative grammar is an extract from Liszka's summary of his book.

### *The ground of a sign*

The ground of the sign is a set of particular qualities present in the sign which serves as the basis of representation of its object for the interpretant. Its role is to mediate between object and interpretant.

### *The object of a sign*

There are two kinds of objects, the dynamic and the immediate. The dynamic object serves to determine and constrain the sign process relevant to it; the immediate object is the dynamic object as represented in the sign and so serves as the means by which the sign is correlated to an object by some interpretant.

### *The interpretant of a sign*

The interpretant of a sign is the process by which the sign becomes informative for some sign agency. That is to say, in the interpretant, the sign conveys information by saying something (conveying some quality) about the object it represents.

### *The typology of signs*

Typologies are concerned with discerning the various types or classes of signs, while classification is concerned with their organization.

### *The typology of signs in regard to their presentative character*

The presentative character of the sign is the features it has *qua* sign which serve as the basis of its capacity to represent some object.

### *The typology of signs in regard to their representative character*

The representative character of the sign is its ability to correlate with some object.

### *The typology of signs in regard to their interpretative power*

The interpretative character of the sign is the sign's capability of directing or determining its interpretant toward a certain focus in the interpretation of the object.

### *The classification of signs*

The various types of signs can be organized into interrelated classes with the following rules:

1. *The composition rule*: each class will have an element from the three types; that is, each class will consist in a presentative, representative and interpretative type.
2. *The qualification rule*: based on some of the leading principles of phenomenology, the presentative aspect of a sign can only be combined with representative aspects which are equal to or lower than the presentative's phenomenological type; similarly the representative aspect of the sign can only be combined with interpretative aspects which are equal to or lower than the representative's phenomenological type. This reduces 27 possible classes of signs to 10 (see Figure 7).
3. The *dominance rule* suggests that although every sign requires an element from each of the three trichotomies of signs, some subset will predominate over the others.
4. The *instantiation rule* claims that all signs in order to count as such must be instantiated.

5. The *inclusion rule* argues that within the same aspect of the sign, the division with the higher phenomenological status involves the divisions with lower ones.

SR <sub>1</sub> (S <sub>1</sub> ,OR <sub>1</sub> , IR <sub>1</sub> ) <b>Qualisign:</b>	vague feeling	any quality which acts as a sign (such as hardness, softness, warmth, coldness); can only be 'rhematic' and 'iconic'; may be determined by its 'immediate object' because of internal properties of its own	IR <sub>1</sub>	OR <sub>1</sub>	S <sub>1</sub>
SR <sub>2</sub> (S <sub>2</sub> ,OR <sub>1</sub> , IR <sub>1</sub> ) <b>Iconic Sinsign:</b>	unidentified pattern	a representation or likeness of an actually existing thing or event (such as a photograph or a diagram or a metaphor); can only be 'rhematic'	IR <sub>1</sub>	OR <sub>1</sub>	S <sub>2</sub>
SR <sub>3</sub> (S <sub>2</sub> ,OR <sub>2</sub> , IR <sub>1</sub> ) <b>Rhematic Indexical Sinsign:</b>	cry from shock or surprise	a sign which directs attention to the object by which it is caused (such as a cry in the street)	IR <sub>1</sub>	OR <sub>2</sub>	S <sub>2</sub>
SR <sub>4</sub> (S <sub>2</sub> ,OR <sub>2</sub> , IR <sub>2</sub> ) <b>Dicent sinsign:</b>	weathervane	a sign which demonstrates the influence of its object (such as a bullet hole in a wall, or the motion of a weathervane)	IR <sub>2</sub>	OR <sub>2</sub>	S <sub>2</sub>
SR <sub>5</sub> (S <sub>3</sub> ,OR <sub>1</sub> , IR <sub>1</sub> ) <b>Iconic Legisign:</b>	identified pattern or diagram	any general law or set of principles which itself demonstrates the qualities of the object to which it refers (such as a map or a diagram)	IR <sub>1</sub>	OR <sub>1</sub>	S <sub>3</sub>
SR <sub>6</sub> (S <sub>3</sub> ,OR <sub>2</sub> , IR <sub>1</sub> ) <b>Rhematic Indexical Legisign:</b>	pronoun; indicator	any general law which requires each manifestation of it to demonstrate the influence of the object to which it refers, thus attracting attention to that object (such as a knock on the door or the ringing of a telephone)	IR <sub>1</sub>	OR <sub>2</sub>	S <sub>3</sub>
SR <sub>7</sub> (S <sub>3</sub> ,OR <sub>2</sub> , IR <sub>2</sub> ) <b>Dicent Indexical Legisign:</b>	commonplace expression	any general law which requires each manifestation of it to demonstrate the influence of the object to which it refers, thus providing specific information about that object (such as the manner in which a person behaves, or the manner in which a person communicates with others)	IR <sub>2</sub>	OR <sub>2</sub>	S <sub>3</sub>
SR <sub>8</sub> (S <sub>3</sub> ,OR <sub>3</sub> , IR <sub>1</sub> ) <b>Rhematic Symbol:</b>	term (word)	a sign which may be interpreted to refer to a general concept (such as a badge, an emblem, a uniform, or a flag)	IR <sub>1</sub>	OR <sub>3</sub>	S <sub>3</sub>
SR <sub>9</sub> (S <sub>3</sub> ,OR <sub>3</sub> , IR <sub>2</sub> ) <b>Dicent Symbol:</b>	proposition (sentence)	a sign which may be interpreted to refer to an actually existing object (such as a proposition or a description)	IR <sub>2</sub>	OR <sub>3</sub>	S <sub>3</sub>
SR <sub>10</sub> (S <sub>3</sub> ,OR <sub>3</sub> , IR <sub>3</sub> ) <b>Argument:</b>	argument (text)	a sign of a general law or of a conclusion which leads to the truth (such as a syllogism)	IR <sub>3</sub>	OR <sub>3</sub>	S <sub>3</sub>

**Figure 7:** The 10 classes of Peirce's signs (adapted from Hoffmann 2001)

## Critic

"Whoever reasons *ipso facto* virtually holds a logical doctrine, his *logica utens*." (CP5.130, 1903) This is "in contradistinction to the result of the scientific study, which is called *logica docens* [and which] ... is often considered to embrace the whole of logic; but a more correct designation is Critic." (CP2.204-205, 1902)

Critic, which "classifies arguments and determines the validity and degree of force of each kind" (CP1.191, 1903) is concerned with the formal conditions for counting a sign as true. Whilst there are a range of forms of reasoning including analogy and metaphoric reasoning, Peirce articulated three kinds of arguments: abduction, deduction and induction.

*Abduction*: plays the role of generating new ideas or hypotheses; deduction functions as evaluating the hypotheses; and induction is justifying of the hypothesis with data (Staat, 1998). In Peirce's words:

The whole operation of reasoning begins with Abduction ... Its occasion is a surprise. That is, some belief, active or passive, formulated or unformulated, has just been broken up. It may be in real experience or it may equally be in pure mathematics, which has its marvels, as nature has. The mind seeks to bring the facts, as modified by the new discovery, into order; that is, to form a general conception embracing them. In some cases, it does this by an act of generalization. In other cases, no new law is suggested, but only a peculiar state of facts that will "explain" the surprising phenomenon; and a law already known is recognized as applicable to the suggested hypothesis, so that the phenomenon, under that assumption, would not be surprising, but quite likely, or even would be a necessary result. This synthesis suggesting a new conception or hypothesis, is the Abduction. It is recognized that the phenomena are like, i.e. constitute an Icon of, a replica of a general conception, or Symbol. This is not accepted as shown to be true, nor even probable in the technical sense, - i.e., not probable in such a sense that underwriters could safely make it the basis of business, however multitudinous the cases might be; - but it is shown to be likely, in the sense of being some sort of approach to the truth, in an indefinite sense. The conclusion is drawn in the interrogative mood. (EP2:287, 1903)

We live our belief-habits until we have reason to doubt them. This is the point at which we engage in inquiry which is science. Peirce explains in his Carnegie Application:

Methodetic has a special interest in Abduction, or the inference which starts a scientific hypothesis. For it is not sufficient that a hypothesis should be a justifiable one. Any hypothesis which explains the facts is justified critically. But among justifiable hypotheses we have to select that one which is suitable for being tested by experiment. (L75, NEM4:62, 1902).

Much has been written about abduction - whole books in fact - but it remains little understood by philosophers in general and still less by those engaged in the special sciences. It has great relevance to 'mattearing' and therefore I will discuss it more in Part 2.

*Deduction*: is the form of logic used in mathematics.

The second kind of reasoning is deduction, or necessary reasoning. It is applicable only to an ideal state of things, or to a state of things in so far as it may conform to an ideal. It merely gives a new aspect to the premisses. It consists in constructing an image or diagram in accordance with a general precept, in observing in that image certain relations of parts not explicitly laid down in the precept and in convincing oneself that the same relations will always occur when that precept is followed out. ; (CP8.209, c.1905)

*Induction*: is 'classical logic'.

Induction is the experimental testing of a theory. The justification of it is that, although the conclusion at any stage of the investigation may be more or less erroneous, yet the further application of the same method must correct the error. The only thing that induction accomplishes is to determine the value of a quantity. It sets out with a theory and it measures the degree of concordance of that theory with fact. (CP5.145, 1903)

## Methodeutic / Speculative Rhetoric

The word 'methodeutic' does not appear in dictionaries so I assume it is one of Peirce's neologisms. He uses Methodeutic in preference to Method "as this word is also used in the concrete." (CP2.207, c.1902) It is my guess that he did not choose to name this division Methodology, which he also suggested in passing as an alternative to Method, because this is the label he used for a sub-order in esthetics and ethics and would be a subdivision of the divisions of Logic. The word 'methodology' came into English early in the eighteenth century to mean *the branch of knowledge that deals with method and its application in a particular field; the study of empirical research or the techniques employed in it*. By the mid-eighteenth century, it had also come to mean *a body of methods used in a particular branch of study or activity*.

The whole discussion of the logical nature of the different kinds of possible signs makes up the first division of logic, .... The second division... discusses the relation of signs to their objects, that is, their truth. The third division, Methodeutic, discusses the relations of signs to their interpretants, that is, their knowledge-producing value. (MS793, c.1906)

In his unpublished manuscript, 'Ideas, stray or stolen, about scientific writing' (MS.774, 1904.) Peirce says "it is high time to acknowledge" that:

Evidently our conception of rhetoric has got to be generalized; and while we are about it, why not remove the restriction of rhetoric to speech? What is the principal virtue ascribed to algebraical notation, if not the rhetorical virtue of perspicuity? Has not many a picture, many a sculpture the very same fault which in a poem we analyse as being too rhetorical. Let us cut short such objections by acknowledging at once, as an *ens in posse*, a universal art of rhetoric, which shall be the general secret of rendering signs effective, including under the term "sign" every picture, diagram, natural cry, pointing finger, wink, knot in one's handkerchief, memory, dream, fancy, concept, indication, token, symptom, letter, numeral, word, sentence, chapter, book, library and in short whatever, be it in the physical universe, be it in the world of thought, that, whether embodying an idea of any kind (and permit us throughout to use this term to cover purposes and feelings), or being connected with some existing object, or referring to future events through a general rule, causes something else, its interpreting sign, to be determined to a corresponding relation to the same idea, existing thing, or law ... there is ... a science to which should be referable the fundamental principles of everything like rhetoric, a speculative rhetoric, the science of the essential conditions under which a sign may determine an interpretant sign of itself and of whatever it signifies, or may, as a sign bring about a physical result.

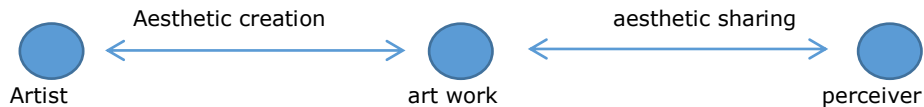
He writes that "the methodeutic interest [is] in the devices which have to be employed to bring those new relations to light" (CP4.370, 1903). Poetry is one such device, and one that for me can bring reality to light in ways that prosaic speech is incapable. Towards the end of Chapter 1 I gave the example of Wisława Szymborska's poem  $\pi$ , not as a literary way of communicating facts but as a device for reflecting experience which, being both temporal and concrete, enables understanding. Another very pertinent example is the poem *Beyond Metaphor* by the renown Australian poet Gwen Harwood:

Sometimes I'm gripped by poems so sad and awful  
I could not write them down. They're like those dreams  
you have of irremediable anguish  
but can't recount, though you were there, you suffered  
your lost love's pain, your child's unanswered cry.  
Only Mozart, perhaps, found the right tone  
to make things bearable. Who was it said  
of the end of the *Tractatus*: What you can't say  
you can't say, and you can't whistle it either.

Ludwig Wittgenstein, often spoken of as the greatest philosopher of the 20<sup>th</sup> century, was the author of the *Tractatus Logico-Philosophicus* (1921). At the time of writing this linguistic thesis, he was a logical atomist along with his teacher Bertram Russell. His *Philosophical Investigations* published posthumously in 1953, while refuting much of *Tractatus*, remained analytic. Perhaps it was the credence given last century to this strain by teachers that turned Australian kids off poetry in droves. Around the time "Baby Boomers" were in school, science was being championed and academics seemed intent on squeezing

their disciplines into what they took to be its method. What they didn't realise was the effect of the discovery of quantum physics on the mainstay of rationalism, classical logic. More profound was the pervasive fear it engendered in society of being blown to smithereens by 'The Bomb'. Its antithesis was the cry: Make love not war. In 1989 at the Charles S. Peirce Sesquicentennial International Congress at Harvard University, a paper 'Peirce as participant in the Bohr-Einstein discussion' presented by Peder-Voetmann Christansen, concluded that: "The future may show that neither Bohr nor Einstein but Peirce had the correct interpretation of a theory he did not even know" (1993: 232).

Peirce's semeiotics is not a language any more than is musical notation, or literary forms: their main purpose is not to communicate nor to express, but rather to reflect or enlighten. Bennett Reimer, in the 1<sup>st</sup> edition of his book *A Philosophy of Music Education* (1970) shows how it works for art in a diagram.



**Figure 8:** Reimer's interpretation of aesthetic experience (1970: 51)

Reimer has a clear understanding of the difference between emotion and feeling that is in accord with Peirce's explanations of feeling as the (a)esthetic ground of experience.

Liszka, in his paper, 'Peirce's new rhetoric' (2000: 439-449) recalls Peirce's "division of semiotic, or the theory of signs into a trivium that mirrors the classical liberal arts: grammar, logic and rhetoric.

Semeiotically focused grammar, however, is concerned to study the essential features of a sign, "those conditions without the fulfilment of which [signs] would not be signs at all" (MS 1147A:111). Logic studies the conditions under which signs may represent their objects truthfully (CP2.229, 1897), or "the conditions which determine reasoning to be secure" (CP2.1, 1902).

He goes on to say: "Although these two divisions of semiotic are well-developed, the same is not true of the third division of rhetoric." (*Ibid*: 440)

Although it is only developed programmatically, Peirce's rhetoric concerns the practice of inquiry and calls for an integration of rhetoric and logic on that basis, one which could possibly transform both disciplines in a fruitful way (*Ibid*: 439)

Better still is the realisation that together with grammar they can inform. I could have given a prosaic explanation of 'truth in the long run', for instance, but to my mind none would bring greater clarity or be more likely to enlighten than Szymborska's poem  $\pi$ . It is unfortunate, therefore, that for some inclusion of poetry and personal narratives that are contrary to the norm for dissertation can appear to obfuscate rather than throw light on the subject. I was prepared to take the risk; to illustrate methodetic as more than a means of what is commonly understood as communication. As the Thirdness of logic it is mediator; as Firstness of metaphysics it is creative, as degenerate Secondness of philosophy it is actual: "that which is met within the past, present and future" (CP6: 453). Had the cost not been prohibitive, I would have included a pop-up of the Sydney Opera House in the front cover of every hard copy of 'Mattering' to illuminate its meaning. We all need to get out of silos to catch reality in passing.

Tony Jappy's *Introduction to Peircean Visual Semiotics* (2013) (his translation into English of his 2010 French edition) is what could be called a handbook for an increasingly visual oriented world. As kids, my brother and I were wont to be reading a book as we walked along the street; we were considered odd, These days it is quite normal to see every other person with their eyes on their 'phone' and earphones filling their ears wherever they happen to be, or be going.

The first two divisions of Peirce's logic are largely technical; not so his third division. Grammar discusses what is possible; Critic considers what is admissible; Methodetic can be said to focus on what is advantageous. Because its aim is truth and truth is what it is regardless of you or I, 'advantageous'

should not be taken to mean 'expedient' or merely 'instrumental'. These constitute rationalisations. To illustrate where rationalisation can lead, let me relate a piece of black humour by Michael Kindler, Faculty of Education, University of Western Sydney, that I found some years ago in the otherwise mundane machinations of the University of Sydney Senate papers (n.d.).

Schubert's Unfinished Symphony No. 8, *Die Unvollendete*

*An economic parable for all those concerned with the effective use of resources in times of educational restructuring and financial stringency.*

A Management Review Task Force in a new cluster visited an outer Western Sydney high school to conduct an educational audit. The visit coincided with one of the concerts of the Sydney Symphony Orchestra, to which the Principal was in the habit of going. On this occasion, because he had to attend a global budget meeting followed by a staff selection committee, he could not go. With his usual generosity, however, he gave his ticket to the leader of the Management Review Task Force, who had never been to a symphony concert before. The main work that night was Schubert's *Unfinished Symphony*.

When he asked his visitor the following morning how he had enjoyed the concert, the Principal was surprised to be handed a typewritten report:

1. *For considerable periods the four oboe players had nothing to do. The number should be reduced and their work be more conveniently spread over the whole concert, thus eliminating peaks of activity.*
2. *All the 12 violins were playing identical notes. This seems unnecessary duplication. The staff of this section should be drastically cut and if a large volume of sound is really required, this could be obtained by means of an electronic amplifier.*
3. *Much effort was absorbed in the playing of demi-semiquavers. This seems to us an excessive refinement and it is recommended that all notes be rounded up to the nearest semiquaver. If this were done it should be possible to use trainees and lower grade operators.*
4. *There seems to be too much repetition of some musical passages. No useful purpose is served by repeating with horns the passage already handled by the strings. If all such redundant passages were eliminated, the whole concert time of two hours would have been reduced to twenty minutes and there would have been no need for an interval.*

*If the composer had attended to these matters he would probably been able to finish his symphony.*

Methodetic as being concerned with the relations of signs to their interpretants leads to consideration of Peirce's pragmatic maxim and his pragmatism. In a public lecture in 1898 William James introduced the term 'pragmatism', which he ascribed to Peirce but which he described in a way that Peirce immediately distanced himself. James was, *inter alia*, a psychologist and a radical empiricist. Peirce, in correspondence with James, explained to his friend the role of logic in pragmatism and of the interpretant in logic as semeiotic.

The Sign creates something in the Mind of the Interpreter, which something, in that it has been so created by the sign, has been, in a mediate and relative way, also created by the Object of the Sign, although the Object is essentially other than the Sign. And this creature of the sign is called the Interpretant. (EP2:493-4, 1909)

*The Interpretant:* Empiricists would have it that there is a one-to-one correspondence between perception and interpretation. Peirce says they are mistaken; that this is conjecture on their part. This is what he called the Immediate Interpretant which "consists in the Quality of the Impression that a sign is fit to produce, not to any actual reaction" (CP8.315, 1909). In a letter to Lady Welby with whom he corresponded over a number of years, he described the three forms of the Interpretant as representation.

I understand the [Immediate Interpretant] to be the total unanalyzed effect that the Sign is calculated to produce; and I have been accustomed to identify this with the effect the sign first produces or may produce upon a mind, without any reflection upon it...I might describe my Immediate Interpretation, as so much of a Sign that would enable a person to say whether or not the Sign was applicable to anything concerning which that person had sufficient acquaintance ...My Immediate Interpretant is implied in the fact that each Sign must have its peculiar

Interpretability before it gets any Interpreter....The Immediate Interpretant is an abstraction, consisting in a Possibility.

My Dynamical Interpretant consists in direct effect actually produced by a Sign upon an Interpreter of it. ...My Dynamical Interpretant is that which is experienced in each act of Interpretation and is different in each from that of the other....The Dynamical Interpretant is a single actual event.

My Final Interpretant is...the effect the Sign would produce upon any mind upon which the circumstances should permit it to work out its full effect.... [It] is the one Interpretative result to which every Interpreter is destined to come if the Sign is sufficiently considered....The Final Interpretant is that toward which the actual tends. (Letter to Lady Welby, SS110-1, 1909)

At one point, rather than describe processes as teleological which suggests purpose, Peirce coined the neologism, 'finious', "to express the tendency toward a final state." (CP7.471, 1898) As he put it:

It is ... a widespread error to think that a "final cause" is necessarily a purpose. A purpose is merely that form of final cause which is most familiar to our experience. The signification of the phrase "final cause" must be determined by its use in the statement of Aristotle that all causation divides into two grand branches, the efficient, or forceful; and the ideal, or final. If we are to conserve the truth of that statement, we must understand by final causation that mode of bringing facts about according to which a general description of result is made to come about, quite irrespective of any compulsion for it to come about in this or that particular way; although the means may be adapted to the end. The general result may be brought about at one time in one way and at another time in another way. Final causation does not determine in what particular way it is to be brought about, but only that the result shall have a certain general character. (CP1.211, c.1902)

*Causation*: Meno Hulswit (1997, 2002) describes this process as *causation and* distinguishes it from the classical theories of *causality*. Discussion of Peirce's theory of causation might be considered more relevant to his metaphysics, but raising it here serves three purposes. First it helps to clarify Peirce's Interpretant, second, it illustrates the natural progression of his classification and third, it brings into context his Pragmatic Maxim. Peirce first enunciated this maxim in 1873 and reiterated it in 1905 in his discussion of the difference between what he came to call pragmatism – the pragmatism he authored – and the popularised versions of pragmatism. (CP5.438, 1905)

Pragmatism was originally enounced in the form of a maxim, as follows: Consider what effects that might conceivably have practical bearings you conceive the objects of your conception to have. Then, your conception of those effects is the whole of your conception of the object.

Hulswit points out that causation "assumes causal relata to be discrete entities between which there is not even a hint of continuity" (2002: 176) and furthermore, regarding the causal relata, theories of causality are ambiguous. He argues that:

Though most contemporary philosophers hold that the causal relata are *events*, there are also some philosophers that hold that they are *facts* and again some who hold that, next to event causality or fact causality, there is also agent causality in which the agents are conceived as *substances*. ... [I]t would appear that the received view's apparent insistence on events is trapped between Aristotle's substance ontology and the modern scientific fact ontology. (p. 176 & 178)

Through his study of the history of the concept of cause, Peirce observed these discrepancies, which he identified as being between (i) the Aristotelian conception, (ii) the modern physicist's conception and (iii) the currently accepted view (RLT197-202, 1898). Hulswit identifies three different approaches Peirce took in the resolution process of these three mutually incompatible meanings: "(1) a logical analysis of the different concepts of cause, (2) an analysis of scientific knowledge of natural processes and (3) an analysis of mental processes." (2002: 182)

The reconciliation led to Peirce's theory of causation, most clearly enunciated in his 1902 paper '*On science and natural classes*' (EP2, item 9). Hulswit (2002: 187) gives a synopsis:

Peirce developed the highly original view that each act of causation involves an efficient component, a final component and a chance component. The efficient aspect of causation is that each event or fact is produced by a previous event or fact (the efficient cause). The teleological



aspect is that each event is part of a chain of events with a definite tendency. The chance component is that each event has some aspect that is determined neither by the efficient nor by the final cause.

Understanding this process of causation gives an inkling of what Peirce meant by "truth in the long run." Szymborska told us in her poem  $\pi$  [pi]

The series comprising  $\pi$   
doesn't stop at the edge of the sheet

Likewise the finious process of causation perseveres. As Peirce points out:

...experience can only mean the total cognitive result of living and includes interpretations quite as truly as it does the matter of sense. Even more truly, since this matter of sense is a hypothetical something which we never can seize as such, free from all interpretive working over. (CP7.538, n.d.)

In terms of causation, the universe should be considered as living and any definition of life must take this into account. To this end, I suggest that power could be considered as the capacity to cause and effect. This does not define power any more than "never having to say you're sorry" defines love. These are matters for metaphysics. Whilst observation alone may serve epistemology, semeiotic is essential for developing a metaphysics that is sound and which can lead to discovery in the special sciences.

Peirce's *Speculative Rhetoric/Methodetic* is wide ranging. Liszka (2011: 440) recognising this, covers the broad territory in part, noting:

...however it is called throughout its history, it is considered in a number of different ways: as the matter of conducting research wisely (MS165, 1895), or as how truth must be properly investigated (MS320:27, 1907; MS606: 15, 1905, CP1.191, 1903), as the formal conditions for the attainment of truth (CP2.207, 1902); the ordering and arranging of inquiries (MS478, 1903; MS452:9, 1903; CP3.430, 1896; CP2.106-110, 1902), the study of the general conditions under which a problem presents itself for solution (CP3.430, 1896), the method of methods (CP2.108, 1902), the management and economy of hypotheses (MSL75, 1902). But it also has to do with the power of symbols to appeal to a mind (CP4.116, 1893; CP1.559, 1867; CP1.444, 1896), or conditions for the intelligibility of symbols (MS 340: 34, 1864-5; WI: 175, 1865; MS 774: 9-11, 1904), or the clarity of ideas (MSL75, 1902; MS322:12, 1907); it is concerned with the transmission of ideas (CP1.445, 1896; CP2.93, 1902), the consequences of accepting beliefs (NEM4: 291), or how to render signs effective (MS74: 2, 1904). In addition, speculative rhetoric studies the growth of Reason (NEM4: 30-31), the science of the general laws of a symbol's relation to other systems of symbols (WI: 258, 1865), evolution of thought (CP2.108, 1902; CP2.111, 1902), the advancement of knowledge (MS 449: 56, 1903) and the influence of ideas (NEM4: 31); it is concerned with systematic and architectonic matters (MS346: 3, 1864-5; CP4.116, 1893).

In his *Minute Logic* (CP2.105, 1902) Peirce wrote: "All this brings us close to Methodetic, or Speculative Rhetoric. The practical want of a good treatment of this subject is acute." He had intended to write such a book but did not, largely because he was denied the Carnegie grant which would have funded his work. The practical want a good treatment of this division, of a sub-order, of an order, of a class, of a branch, remains acute. Tony Jappy (2013) is one who demonstrates the observable operation of Peirce's semeiotic, especially his speculative rhetoric in relation to abduction and metaphor.

Ultimately, it is not logic in the atemporal classical sense, but rather in the temporal sense of his semeiotic that sets Peirce apart from other pragmatists in particular and other philosophers in general. The logicist position of analytic philosophy creates an irresolvable barrier to the inclusion of metaphysics in systematic inquiry. For the rationalists, logic is the be all and end all of philosophy – metaphysics is *merely* recreation. From the reductionist empiricists' point of view, metaphysics is irrelevant. To many modern-day specialist scientists, metaphysics is 'stuff and nonsense'. Peirce's method reconciled the rationalist and empiricist positions, and even though he had a low opinion of much of enlightenment metaphysics, he came to see metaphysics as essential to inquiry.

## Metaphysics

In the production of knowledge, mathematics produces necessary inferences. Nevertheless, in confining itself, as it does, to drawing necessary conclusions from entirely hypothetical constructions, without caring in the least whether these constructions apply to anything real, it does not produce positive knowledge. The discovery of positive facts begins with philosophy and is of two kinds: perceptual and conceptual knowledge. The knowledge of phenomenology is perceptual knowledge which Peirce spoke of as follows: "The knowledge which you are compelled to admit is that knowledge which is directly forced upon you and which there is no criticizing, because it is directly forced upon you." (CP2.141, c.1902) "Perceptual knowledge, although in some sense general, is beyond human control." (Curley 1969: 92-3) For Peirce "a classification of arguments, antecedent to any systematic study of the subject, is called the reasoner's *logica utens*, in contradistinction to the result of the scientific study, which is called *logica docens*." (CP2.204, 1901) It is through *logica docens* that conceptual knowledge, which concerns criticism and control, is developed and clarified. According to Peirce:

Logic requires that the more abstract sciences should be developed earlier than the more concrete ones. For the more concrete sciences require as fundamental principles the results of the more abstract sciences, while the latter only make use of the results of the former as data; and if one fact is wanting, some other will generally serve to support the same generalization. (CP6.1, 1898)

Nevertheless, this more abstract science, to which he was alluding, metaphysics, he pronounced as being in a deplorable condition. Yet having determined it as prerequisite to the special sciences, he devoted many years to developing it. Cornelis de Waal in his 2005 paper 'Why metaphysics needs logic and mathematics doesn't', points out that for Peirce "the issue is not whether we should have a metaphysics - as everyone has a metaphysics whether they want to or not - but whether we want to keep our metaphysics unconscious or bring it out in the open where it can be subjected to the same scrutiny as our scientific work" (p.293). However, he reminds us that:

...in doing metaphysics we should obey the important principle never to settle *a priori* what can conceivably be settled by experience. The routine violation of this principle has made metaphysics a discipline that hampers science rather than helps it and has given metaphysicians such a bad rap among scientist. (p.294)

Over the past three centuries, special scientists have increasingly bypassed philosophy – by which they usually mean metaphysics – seeing it as irrelevant and turning their attention, instead, to mathematics. Certainly mathematics is indispensable to special sciences. As de Waal points out:

...the mathematician's main business is ... the simplification of complicated sets of facts by reducing them to a shape that facilitates their study while still being representative. For this one needs recourse to the three key mental qualities Peirce associated with doing mathematics: imagination, concentration and generalization. (p.295)

Yet, while mathematical modelling optimises necessary reasoning, it does not allow for the *logica docens* required to develop and clarify the *concepts* of metaphysics that, in turn, provides "a roadmap for the special sciences by developing a general system in which all possible facts can be given a place" (p.294).

In Peirce's classification:

Metaphysics may be divided into, i, General Metaphysics, or Ontology; ii, Psychical, or Religious, Metaphysics ... and iii, Physical Metaphysics... The second and third branches appear at present to look upon one another with supreme contempt. (CP1.192, 1903)

Such contempt arises because, largely as a result of nominalism, there is a general misunderstanding of what is meant by 'facts'. This misunderstanding is not so much to do with a distinction between facts and fiction, as it is with their ontological status and can be traced back to the stance of the Greek Atomist Democritus [5 BCE]. Peirce chose to heed the likes of Plato, Aristotle, Duns Scotus, Kant, realists, in constructing his metaphysics.

## Ontology

Taking two definitions of metaphysics: (i) the branch of philosophy that studies the ultimate structure and constitution of *reality*; (ii) the branch of philosophy concerned with the ultimate nature of *existence*, Plato is more readily equated with the former and Aristotle with the latter. Peirce was a realist – an extreme realist – or as Rosa Mayorga (2007: 152) argues, a scholastic ‘realist’. She summarises her thesis:

Peirce incorporates elements of nominalism, idealism and scholastic realism in his notion of the real. He accepts the nominalist notion that generals, or universals, are of the nature of thought, but rejects that doctrine’s claim that only individuals are real. He accepts the idealist notion that reality is relative to the mind, but rejects Berkeley’s description of reality. He accepts the scholastic notion of the reality of universals and adapts Scotus’s *realitas* to reflect his own notion of reality, but rejects Scotus’s notion of contraction. Peirce then takes all these elements, adds some of his own such as synechism and combines them into his own theory, which I have suggested should be called his scholastic realism.

	PLATO	ARISTOTLE	REALISTS	NOMINALIST	PEIRCE
UNIVERSALS	Exist Real	Exist (?) Real (maybe)	Don't Exist Real	Don't Exist Not Real	Don't Exist Real
SINGULARS	Exist Not Real	Exist Real	Exist Real	Exist Real	Exist No Reality

**Figure 9:** Table showing Peirce’s incorporation of elements of nominalism, idealism and scholastic realism together with elements of his such as synechism suggesting his theory of realism called here scholastic realism (Mayorga 2007: 152)

This may make more sense if we understand what Boler (1963: 138-143) points out and Moore (PM: xxxix) brings to our attention, that:

Peirce tends to drain Seconds of their content and restrict the reality of Secondness to instantaneous; what we ordinarily count as an individual – an individual person say – is not a Second but rather a Third, a law that governs the host of Seconds that go to make up the person. (See Peirce EP2.221-222, 1903.)

He was also an antifoundationalist, but as Richard Bernstein (2013) notes: “Peirce realized that in criticizing foundationalism he was attacking many of the most cherished doctrines and dogmas that constituted modern philosophy.” Unlike modern-day scientists, however, he did not see this as obviating metaphysics – whether we recognise it or not, we all have a metaphysical position; our metaphysics is the fabric of our everyday reality. He concluded that metaphysics needed a total overhaul. Having pronounced radical scepticism untenable, he was not blind to the inadequacy of either empiricism or rationalism on their own for discovering truth. Exploration needs to begin with creativity, imagination, a theory, a hypothesis. Here it is worth revisiting Peirce’s theory of ‘true’ as a quality of the three kinds of representations: verisimilitude, veracity and perfect veracity, or verity. Quoting his argument from his 1861 ‘Treatise on metaphysics’:

The objection to verisimilitude’s being the truth of conception is its limitation as to completeness; the objection to veracity’s is its limitation in beginning. Neither is open to the objection against the other. But veracity was called that kind of truth which was not verisimilitude. Conceive, however, veracity to be perfect – to be founded not upon convention but upon the very nature of things and what have we?

1. The nature of a thing is that which it derives from its origin. Derivation not in time is the relation of accident to substance. Hence, an invariable connection in the nature of things is unity of substance.
2. The qualities of things are founded in the nature of things; hence, unity of substance implies perfect correspondence of qualities.
3. Hence perfect veracity is of a distinct character from cognizable veracity and it approaches quite as nearly perfection of verisimilitude. I will call it ‘verity’ and the representation a ‘type’.
4. Since conceptions perfectly correspond with qualities and since they have a connection therewith in the nature of things, they are ‘types’ of things (W1: 80, 1861).

Verity, however, is not *directly* verifiable – there is nothing more than all with which to validate it. Peirce had it that inquiry is initiated when something surprising occurs to bring some belief into doubt. Given there is no certainty *in futuro*, then for the sake of clarity, when we engage in inquiry, we need to be upfront about our assumptions before launching into inquiry. As Peter Skagestad tells us (1981: 83):

From the vantage point of the observer the notion of truth as correspondence is adequate (although it will no longer do when applied to his own beliefs). The scientist needs an equally absolute notion of truth as a regulative idea...

What *is* achievable, if we are prepared to accept fallibilism is cognisable veracity. "Indeed," said Peirce, "out of a contrite fallibilism, combined with a high faith in the reality of knowledge and an intense desire to find things out, all my philosophy has always seemed to me to grow." (CP1.14, 1897)

Whilst he accepted that all reality is not known, such acceptance is not tantamount to conceding to incognisability. Peirce did not countenance the inexplicable, seeing such an idea, exemplified, for instance, in Kant's "thing-in-itself", as incoherent. In her book *Peirce's Pragmatic Theory of Inquiry: Fallibilism and Indeterminacy* (2007), Elizabeth Cooke points out that: "The commitment to fallibilism is a commitment to the belief that there are knowable truths about which inquirers are fallible" (p. 23). She speaks of Peirce's model of knowledge as "adapationalist" noting that on his account, "knowledge is not 'true belief' but is the integration of rational habits with ontological habits" (p. 28). What is interesting in Peirce's philosophy is that "both certainty and skepticism are seen as posing roadblocks to inquiry instead of being virtues or goals of inquiry." (p. 32)

In his 1899 paper 'First rule of logic' (CP1.135-140, 1899) Peirce presents fallibilism as a propositional attitude:

Upon this first and in one sense this sole, rule of reason, that in order to learn you must desire to learn and in so desiring not be satisfied with what you already incline to think, there follows one corollary which itself deserves to be inscribed upon every wall of the city of philosophy:

Do not block the way of inquiry.

Although it is better to be methodical in our investigations and to consider the economics of research, yet there is no positive sin against logic in trying any theory which may come into our heads, so long as it is adopted in such a sense as to permit the investigation to go on unimpeded and undiscouraged. On the other hand, to set up a philosophy which barricades the road of further advance toward the truth is the one unpardonable offence in reasoning, as it is also the one to which metaphysicians have in all ages shown themselves the most addicted.

Let me call your attention to four familiar shapes in which this venomous error assails our knowledge:

The first is the shape of absolute assertion....

The second bar which philosophers often set up across the roadway of inquiry lies in maintaining that this, that and the other never can be known....

The third philosophical stratagem for cutting off inquiry consists in maintaining that this, that, or the other element of science is basic, ultimate, independent of aught else and utterly inexplicable – not so much from any defect in our knowing as because there is nothing beneath it to know....

The last philosophical obstacle to the advance of knowledge ... is the holding that this or that law or truth has found its last and perfect formulation....

Peirce railed against all dogmatists, be they philosophers, teachers, scientists, or theologians. Let me point out here that we are unlikely to know what is impossible until we know the full breadth and depth of possibility, which, to quote a popular song of the 1950s, will not be "until the twelfth of never".

## Religious metaphysics

Because use of the words 'religion' and 'religious' generate deep suspicion and antagonism I will defer to Paul Tillich's (1957) definition of 'faith' as "the state of being ultimately concerned" and 'religion' broadly as "ultimate concern". Tillich did not exclude atheists in his exposition of faith, for as he saw it, "even if the act of faith includes the denial of God, where there is ultimate concern, God can be denied only in the name of God" (1957: 52). Peirce's view of religion was that, in the individual, it was "a deep recognition of a something in the circumambient All..." However, on his view of reality, he saw that, "religion cannot reside in its totality in a single individual. Like every species of reality, it is essentially a social, a public affair." (CP6.428, 1898) His view was that: "Religion is a life and can be identified with a belief only provided that belief be a living belief – a thing to be lived rather than said or thought." (CP6.439, 1893)

Although he was Christian, he did not push any doctrinal line. In his paper 'Answers to questions about my belief in God' (MS845, 1906) he says:

"God" is a vernacular word and, like all such words, but more than almost any, is vague. No words are so well understood as vernacular words, in one way; yet they are invariably vague; and of many of them it is true that, let the logician do his best to substitute precise equivalents in their places, still the vernacular words alone, for all their vagueness, answer the principal purposes. This is emphatically the case with the very vague word "God," which is not made less vague by saying that it imports "infinity," etc., since those attributes are at least as vague. (CP6.494, 1906)

Furthermore, he is consistent with his radical realism and speaks not of the *existence* but of the *reality* of God, as in his paper 'A neglected argument for the reality of God' (CP6.452-480, 1908). As he explains, "I define the real as that which holds its characters on such a tenure that it makes not the slightest difference what any man or men may have thought them to be, or ever will have thought them to be." (CP6.495, 1906) Anderson points out in his commentary on the paper:

The actual, or the existent, on the other hand, is one moment of the real, the reality of Secondness. The actual is thus that which is located in causal relations; it "is that which is met in the past, present, or future". The importance of the distinction here is that Peirce wants to discuss the "reality" of God, not the "actuality" or the "existence" of God under the narrower conception. (1995: 141)

I find the word "located" to be the key here: that which can be located *exists*; not so that which is *real*. The difference would confound those nominalists who, in the face of all and any of the proofs to the *existence* of God (by any name), speak of themselves as agnostic. To call oneself an agnostic is not necessarily an expression of disbelief in God but rather to say that one cannot *know* of the existence or otherwise of God.

Peirce's outlook on religion developed in relation to his view of science. For him, the purpose of religion "is to conduct our lives ... in such a way as to ameliorate human existence" (Anderson 2002). Science, on the other hand, is inquiry which is systematically directed towards developing ideas and discovering truth. Anderson points out that Peirce "envisioned religion in a reciprocal dependence with science; the two must engage in an ongoing dialectical relationship. An idea that is effective as a religious belief, if it is to be theorized about, must turn itself over to scientific inquiry, to criticism" (p.7).

Peirce was scathing in his condemnation of theologians. Because his tirades against theology were so vitriolic, rather than quote him directly, let me cite in part Anderson's synopsis of his argument (p. 6):

Theology's method, if it is a method, is to express and defend tenaciously and authoritatively some specific version of religious ideas. To do this, it tries to specify the ideas so particular rules and interpretations can be nailed down. For example, the vernacular God is replaced with a named being or beings who are historically located, embodied, or otherwise definitely described. Likewise, the good is reduced to a narrow formula of behavior, a set of rules that curtails human variety and flexibility in dealing with life situations. In short, theologians produce and defend creeds and doctrines.

## Physical metaphysics – Cosmogony and Cosmology

Peirce's cosmogony begins with his notion of boundless freedom.

The initial condition, before the universe existed, was not a state of pure abstract being. On the contrary it was a state of just nothing at all, not even a state of emptiness, for even emptiness is something.

(CP6.215, 1898)

So too is time something, being sequenced and therefore a beginning is also excluded.

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 every 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.

So of potential being there was in that initial state no lack. (CP6.217, 1898)

Peirce argued that nothing necessarily, that is, deductively, results from the nothing of boundless freedom. From the perspective of Firstness, potentiality became potentiality of this or that sort – that is, of some quality.

Thus the zero of bare possibility, by evolutionary logic, leapt into the unit of some quality. This was hypothetic inference. Its form was:

Something is possible,

Red is something;

∴ Red is possible. (CP6.220, 1898)

Responding philosophically to the question: "Why there is something rather than nothing?" and to the idea of an evolving, developing telos (without the need for recourse to, or denial of a Creator) becomes more straightforward when approached via Peirce's categories. First possibility, Second actuality, Third probability. First nothing which is teaming with all possibility, Second chaos, which is a First of a Second – unstable, disorganised, unreasonable 'something', Third Reality: from infinite possibility, emerges an arbitrary, disorderly rabble, which 'finds' rhyme and reason and value, and voilà: the Cosmos. From nothing, something. As Peirce said:

Without going into other important questions of philosophical architectonic, we can readily foresee what sort of a metaphysics would appropriately be constructed from those conceptions. Like some of the most ancient and some of the most recent speculations it would be a Cosmogonic Philosophy. It would suppose that in the beginning – infinitely remote – there was a chaos of unpersonalized feeling, which being without connection or regularity would properly be without existence. This feeling, sporting here and there in pure arbitrariness, would have started the germ of a generalizing tendency. Its other sportings would be evanescent, but this would have a growing virtue. Thus, the tendency to habit would be started; and from this, with the other principles of evolution, all the regularities of the universe would be evolved. At any time, however, an element of pure chance survives and will remain until the world becomes an absolutely perfect, rational and symmetrical system, in which mind is at last crystallized in the infinitely distant future. (CP6.33, 1891)

A driving force of his cosmogony and cosmology was his response to and rejection of popularly held beliefs in the nineteenth century, in agnosticism, necessarianism and mechanism. Agnosticism is here used to express the notion of 'unknowable' which may well have been promulgated to keep religion off limits to the probing of science. The closely related necessarianism and mechanism he saw as uncongenial to any possibility of freedom or novelty in the universe. As he saw it:

...the only possible way of accounting for the laws of nature and for uniformity in general is to suppose them results of evolution. This supposes them not to be absolute, not to be obeyed

precisely. It makes an element of indeterminacy, spontaneity, or absolute chance in nature. (CP6.13, 1891)

That idea has been worked out by me with elaboration. It accounts for the main features of the universe as we know it – the characters of time, space, matter, force, gravitation, electricity, etc. It predicts many more things which new observations can alone bring to the test. May some future student go over this ground again and have the leisure to give his results to the world. (CP6.33-34, 1891)

Keeping in mind that Peirce's cosmology is not wild speculation, but is principle dependent on all the preceding classes in his perennial classification and in turn, provides data to those classes, its purpose is to develop the concepts for special science to test. In his cosmology these concepts are what he calls *synechism*, *tychism* and *agapasm*.

The term *synechism* is derived from the Greek *syneche*, meaning 'continuity', or 'held together'. As a methodological doctrine, *synechism* exhorts us to attempt to tie together all known facts about the universe, leaving no loose ends....*Tychism* (from the Greek *tyche*, meaning 'chance') is the hypothesis that the world is essentially indeterministic, that no law of nature is absolutely exact.... *Agapasm* (from the Greek *agape*, meaning 'love') posits the reality of final causes in the processes of the world.... As in the cosmologies of some of the ancient Greeks, love is understood here as a uniting or attractive force that draws all the component parts of the universe into a coherent whole. (Reynolds 2002: 11)

Those who reject the role of metaphysics in the furtherance of scientific discovery are perhaps rejecting, as did Peirce, the shambolic state of much of what has passed itself off as metaphysics. As stated above, Peirce's cosmology was not idle speculation but was informed downwards from mathematics and upwards from evolutionary sciences. Listed below are just a few of these:

Downwards:

- Pierre Varignon [1654–1722] the advocate of infinitesimal calculus, who recognized the importance of a test for the convergence of series, simplified the proofs of many propositions in mechanics, adapted the calculus of Gottfried Leibniz [1646-1716] to the inertial mechanics of Newton's Principia and treated mechanics in terms of the composition of forces.
- Jacob Bernoulli [1654–1705] who described the known results in probability theory and in enumeration, often providing alternative proofs of known results and who introduced the theorem known as the law of large numbers.
- Thomas Bayes [1702-1761] whose theorem proposes that evidence confirms the likelihood of a hypothesis only to the degree that the appearance of this evidence would be more probable with the assumption of the hypothesis than without it.
- Joseph Lagrange [1736-1813] one of the creators of the calculus of variations, deriving the Euler–Lagrange equations for *extrema* of functionals. He also extended the method to take into account possible constraints, arriving at the method known as Lagrange multipliers, and invented the method of solving differential equations known as variation of parameters, applied differential calculus to the theory of probabilities and attained notable work on the solution of equations. At a later period he reverted to the use of infinitesimals in preference to founding the differential calculus on the study of algebraic forms.
- Augustin-Louis Cauchy [1789–1857] who initiated the project of formulating and proving the theorems of infinitesimal calculus in a rigorous manner.
- Nikolai Lobachevsky [1792-1856] who developed a non-Euclidean geometry, denying the truth of Euclid's parallel postulate by supposing that there may be two or more such lines passing through a given point.
- Augustus De Morgan [1806-1871] who recognized the need to expand the notion of logical validity beyond the narrow confines of Aristotelian syllogistic and developed the standard statement of De Morgan's Theorems, a pair of logical relationships.

- Hermann Grassmann [1809-1877] who developed the idea of an algebra in which the symbols representing geometric entities such as points, lines and planes, are manipulated using certain rules. He represented subspaces of a space by coordinates leading to point mapping of an algebraic manifold now called the Grassmannian.
- George Boole [1815-1864] who developed a symbolic system for the expression and evaluation of categorical syllogisms, understood as elements in the logic of classes.
- Bernhard Riemann [1826-1866] who developed field theory as a mathematical description of phenomena as apparently diverse as gravitation, magnetism, electricity and light and contributed to the development of topology and non-Euclidean geometry.
- John Venn [1834-1923] who applied the insights of Boole, Euler and others in developing a diagrammatic method for testing the validity of categorical syllogisms and who contributed to the development of modern theories of probability.
- Karl Pearson [1837-1936] who established the discipline of mathematical statistics, and who asserted that the laws of nature are relative to the perceptive ability of the observer.
- Georg Cantor [1845-1918] who developed modern set theory as the foundation for all of mathematics and used the "diagonal proof" to demonstrate that lines, planes and spaces must all contain a non-denumerable infinity of points, that is, they cannot be counted in a one-to-one correspondence with the rational numbers. The reality of trans-finite quantities within the set of real numbers lead, in turn to "Cantor's paradox"—that every set has more subsets than members, so that there can be no set of all sets.

Downwards and upwards:

- James Clerk Maxwell [1831-1879] whose work in producing a unified model of electromagnetism is considered to be one of the greatest advances in physics. He also developed the Maxwell distribution, a statistical means of describing aspects of the kinetic theory of gases. These two discoveries helped usher in the era of modern physics, laying the foundation for future work in such fields as special relativity and quantum mechanics.

Upwards:

- Jean-Baptiste Lamarck [1744-1829] whose study of invertebrates led to the conviction that species evolve through the hereditary transmission of acquired traits, by means of which species perfect their adaptation to their environment in an optimal fashion. His contribution to evolutionary theory consisted of the first truly cohesive theory of evolution, in which an alchemical complexifying force drove organisms up a ladder of complexity and a second environmental force adapted them to local environments through use and disuse of characteristics, differentiating them from other organisms.
- George Bentham [1800-1884] who is quoted as saying: "We cannot form an idea of a species from a single individual, nor of a genus from a single one of its species. We can no more set up a typical species than a typical individual."

And of course Charles Darwin [1809-1882] whose work Peirce discussed at length with Chauncey Wright [1830-1875] co-founder with Peirce of The Metaphysical Club and whose views on Darwinism played a significant role in shaping the ideas of the other members of the club.

An aspect of Peirce's cosmology was his doctrine of matter:

The one intelligible theory of the universe is that of objective idealism, that matter is effete mind, inveterate habits becoming physical laws. But before this can be accepted it must show itself capable of explaining the tri-dimensionality of space, the laws of motion and the general characteristics of the universe, with mathematical clearness and precision; for no less should be demanded of every philosophy. (CP6.25. 1891)

My concern, though, is not with matter *per se* but, rather, with mattering.



## Philosophy as a prerequisite to progress in the special sciences

Those special scientists who reject philosophy out of hand, do themselves a great disservice in the pursuit of their particular field. I am talking here, not of knowing but of *doing* philosophy. Granted, there is much that calls itself philosophy – or part there of – that may be considered of dubious merit, but competence in doing philosophy enables one to identify the charlatans. Dogmatism is one such, but then, so too is scepticism if it is not genuine.

Every aspect of that which is called the scientific method is the product of philosophy. Picking-up methods by rote and running with them is limiting. Take, for example, diagnosis in medicine: Donald Stanley, co-author of 'The logic of medical diagnosis' (2013) notes that research has shown that "diagnostic error accounts for 40,000 to 80,000 deaths per year" and asks "Why does improving diagnosis go largely under-mentioned, subservient to evaluating evidence for treatment decisions? Why have medical school educators devoted more time to research on treatment than to diagnosis?" (p.301) Stanley's co-author, Campos, points to a poor understanding of abduction.

When we are confronted with new, often puzzling, facts that we seek to explain, we are in a situation that requires us to make a conjecture that would explain the facts and to adopt the conjecture provisionally as a hypothesis that we may test. The abductive suggestion consists in the conjecture that a general rule — say, the general character of a certain type of event, such as the condition of lactase deficiency ... — explains the facts under investigation (p.305).

Calling abduction 'inference to the best explanation' (IBE) obfuscates just what is involved in making such inferences. For instance, as Campos notes, there are at least two species of abductive reasoning: what might be termed "habitual abduction" and "creative abduction" (p.306). And that is just a start – as would be learning how to abduct as the method for diagnosis. Ultimately it requires practice and on-going learning. What a diagnosis is, is a positive hypothesis (as opposed to a formal hypothesis as in mathematics) and is thus a guess, but not, if one knows what one is doing, a wild or woolly one.

I suggest that learning how to philosophise furthers any journey of discovery. Using Peirce's pragmatism sheds light on how to abduct, that is, how to create hypotheses which lend themselves to deduction and induction. It gives the steps to follow in identifying the three irreducible categories of First, Second and Third and of how to discriminate, disassociate, but most importantly, prescind – how, that is, to observe with purpose. It shows how to identify aptness, or fit of hypotheses with purpose for action which in turn suggests how best to proceed reasonably. This step involves engagement with and exploration of concepts that woven from prescinded perceptions leads to the possibility of realisation that is the evolving developing universe. Finally it details how to develop a metaphysical fabric that, though it is fallible, is sufficiently stable to support the experimental sciences. Apart from any other consideration, it is an economical method of conducting inquiry that brings clarity to the endeavour, and that assists in avoiding getting bogged down, misled, diverted or stunted.

Admissions to fallibility require humility but so saying, such open mindedness is protection against the tyranny of prejudice; the time, money, and life wasting activity of 'beating a dead horse', and any blocks to the freedom of the imagination and creativity. Furthermore, it allows for the process of discovery to move beyond the facts of knowledge to the possibility of information. It is the way of creating or discovering the new. Philosophy, as with all science, is a human endeavour. As with all endeavour it takes time: maybe a couple of thousand years as with disproving Euclid's Fifth Postulate and opening the way to topology; maybe a few moments as with Andy Kirk's prediction of a backdraft in time to save his team from fatal disaster; maybe some minutes, hours, days for Denise Levertov to write one of her breath taking poems; maybe a lifetime to live ourselves.

## The Special Sciences

The Special Sciences constitute the third heuritic science, that is, their concern is with discovery for the sake of discovery. According to Peirce, "sciences must be classified according to the peculiar means of observation they employ." (CP1.101, c.1896) Every discovery has its origin in an observation – observation is the foundation on which all the sciences are erected – in the case of the Special Sciences, observations are of previously unknown phenomena and are empirical.

Peirce identified two sub-classes of the Special Sciences: Physical Sciences and Humanistic Sciences and the same three orders for each.

1. Nomological sciences: study the ubiquitous phenomena of the physical and psychical universes, ascertain their general laws and measure the quantities involved.
2. Classificatory sciences: describe and classify the various kinds among the objects studied and endeavour to explain them by means of the general laws.
3. Explanatory sciences: study and minutely describe individual objects and events and subsequently seek to explain using the findings of the nomological and classificatory sciences.

As with the preceding classes in the perennial classification, the Special Sciences are principle dependent and provide data upward that can serve to refine the principles of the sciences superordinate to them.

In his book *What is this Thing Called Science*, (1982) Alan Chalmers, rejects the popularly held belief of science as *product*. Science as *inquiry* is process. Chalmers speaks of the *aim* of science. In arguing for the objectivity of observation in science, he attempts to capture the middle ground between the extremes of universal method and sceptical relativism by appeal to historically contingent standards implicit in successful practices. He rejects inductivism, which he argues is a mistaken attempt to formalise the popular view of science, and then Popper's falsificationist account saying that attention to history strongly suggests that both it and the inductivist accounts are too piecemeal.

Neither the naive inductivist emphasis on the inductive derivation of theories from observation, nor the falsificationist scheme of conjectures and falsifications, is capable of yielding an adequate characterisation of the genesis and growth of realistically complex theories (1982: 77).

Following this he makes summaries of two attempts to analyse theories as organised structures: Lakatos' research programs and Kuhn's paradigms, which have given rise to a debate concerning the two contrasting positions associated with them: 'rationalism' and 'relativism'. He sums up the discussion by noting that "Lakatos aimed to give a rationalist account of science but failed, whilst Kuhn denied that he aimed to give a relativist account of science but gave one nevertheless." (p.108)

He proposes "a way of analysing science, its aims and its mode of progress, which focuses on features of science itself, irrespective of what individuals or groups might think" (p.110). In arguing for the objectivity of observation in science, Chalmers stresses that he is arguing against sceptical relativism, not fallibilism. His arguments stand against those of empiricists and instrumentalists who put forward the notions that in being theory dependent, science is on the one hand subjective and on the other unable to establish truth. He counters these by arguing that:

If we interpret 'objective' to mean something like 'testable by routine procedures'...what is correct about the 'theory dependence of observation' thesis is not that observation in science lacks objectivity, but that the adequacy and relevance of observation reports within science is subject to revision. Observation in science may be objectified, but we do not thereby have access to secure foundations for science. (1990, 59)

Jaime Nubiola, in his paper 'The branching of science according to C. S. Peirce' (1995), argues that "the key to the advancement of knowledge and to the development of sciences is not revolution, but growth in a very peculiar mixture of continuity and fallibilism." For Peirce:

The principle of continuity is the idea of fallibilism objectified. For fallibilism is the doctrine that our knowledge is never absolute but always swims, as it were, in a continuum of uncertainty and of indeterminacy. Now the doctrine of continuity is that *all things* so swim in continua. (CP1.171, 1897)

In order to make sense of our world, it is sometimes necessary to backtrack through the history of thought to discover where we may have taken a wrong turn. In Australia, on those occasions when a highway's egress and exit are side-by-side, motorists who mistakenly enter an exit are informed by a sign, a few metres into the slipway: 'Go back you are going the wrong way'. Peirce, in going back, identified the major culprit as the nominalism of William of Ockham and reinstated and improved upon Duns Scotus's realism.

Likewise, Jon Ogborn and Edwin F. Taylor trace the transition from fundamental quantum mechanics to derived classical mechanics in their paper 'Quantum physics explains Newton's laws of motion' (2005):

Newton was obliged to give his laws of motion as fundamental axioms. But today we know that the quantum world is fundamental and Newton's laws can be seen as *consequences* of fundamental quantum laws.

Werner Heisenberg, in his 1927 paper that introduced the uncertainty principle to the world, established that there are pairs of quantities in the quantum world that cannot both be measured to an arbitrary level of precision at the same time.

If you know a particle's position  $x$  to within a certain accuracy  $\Delta x$ , then the uncertainty  $\Delta p$  on its momentum  $p$  is given by the mathematical inequality  $\Delta x \Delta p \geq \hbar/2$ . Here,  $\hbar$  is a fixed number of nature known as the reduced Planck constant. This inequality says that, taken together,  $\Delta x$  and  $\Delta p$  cannot undercut  $\hbar/2$ . So in general, the more we know about where a particle is (the smaller  $\Delta x$  is), the less we can know about where it is (the larger  $\Delta p$  is) and vice versa. The uncertainty principle also applies to other pairs of quantities such as energy and time and the spins and polarisations of particles in various directions. The energy-time uncertainty relation is the reason why quantum particles can pop out of nothingness and disappear again. As long as the energy,  $\Delta E$  they borrow to do that and the time,  $\Delta t$ , for which they hang around don't bust the uncertainty bound, the fuzzy logic of quantum mechanics remain satisfied (Anathaswamy 2011).

Many theoretical and experimental physicists have worked over the years to grasp uncertainty. Translating insights from the theory of information devised by the American mathematician Claude Shannon, to the quantum world, the Dutch physicists Hans Maassen and Jos Uffink showed in 1988 how it is impossible to reduce the Shannon entropy associated with any measurable quantum quantity to zero and that the more you squeeze the entropy of one variable, the more the entropy of the other increases. Information that a quantum system gives with one hand, it takes with the other. To the question: 'what is it that keeps quantum theory as weird as it is and no weirder?' Stefanie Wehner and Jonathan Oppenheim's answer is (*Science* 2010 v.330: 1072): the uncertainty principle (Anathaswamy 2011).

Parmenides is the philosopher for those focused on atemporal equilibrium physics where nothing changes. Heraclites would get the nod from non-equilibrium physicists: those who believe history matters and who are concerned with the physics of complex systems. Peirce had great respect for the genius of the likes of Newton and Darwin but he did not share their fatalist or *a priori* assumptions about natural law for the former, and mechanistic evolution for the latter. Peirce did not refute Darwin, for instance, but he was of the view that his theory was inadequate to explain reality. He considered a combination of the ideas of Darwin with those of Clarence King [1842-1901] the American geologist and author of the paper 'Catastrophism and the evolution of environment' (*American Naturalist*, 11, 8: 449-470, 1877) and Jean-Baptiste Lamarck [1744-1829] the French evolutionist, more fitting and intelligible. Peirce's pragmatism is a theory of meaning. Although he saw truth as something to be sought in the long run, his method of inquiry focused on discovery of meaning. In Part 2 I focus on 'matting'; on its evolution and its reality. But before that, Peirce's meaning of 'real' and 'reality'.



## Chapter 3 The Real

Peirce did not explicate 'mattering' directly, yet most of the essential information for doing so is contained in his oeuvre. He defined information as "the connection of form with matter" (CP2.418 n, 1893), yet, as indicated in the Introduction, in detailing his classification, distinction of form took precedence over distinctions of matter. As I pointed out there, given that the purpose of a natural classification is to render phenomena comprehensible, he believed that "[f]orm is something that the mind can assimilate and comprehend, while Matter is always foreign to it, a recognizable but incomprehensible something." (MS499(s), 1907) I then proposed that this may be the case if matter is viewed as a *fait accompli*, but not when considered as process – the process of 'mattering'. Process, in turn, prior to investigation, assumes movement. In his book *Representative Practices* (2004: 34-35) Kory Sorrell points out:

Peirce did not have an ontological category of process. There is quality, brute actuality and continuity or lawful behavior, but not process *as such*. Yet, for Peirce, this set of categories does not signify the irrelevance of process, but rather its absolute certainty.

In his early paper 'On a new list of categories', (1867) Peirce "refers to his categories as conceptions necessary to unify experience through joining subjects and predicates" (Hausman 1979:204); by 1894 he had developed the categories on the basis of his logic of relations.

Following this logic, the categories are defined as three kinds of relation, each relation being defined by the number of its relata. From this perspective, the categories are most appropriately called "the monad," "the dyad," and "the triad." (Hausman 1979: 204)

These are his categories from the standpoint of the logic of relations. Peirce, however, identified and described his categories from two perspectives, one formal or logical and one material or phenomenological. From the perspective of his phenomenology he called his universal categories Firstness, Secondness and Thirdness. "As given in phenomena," Hausman (p. 204) reminds us "they are empirically discoverable; yet they also condition what is discovered."

As commonly understood, to say that phenomena are empirically discoverable is to say they can be perceived. The experience of perception – "that knowledge which is directly forced upon you and which there is no criticizing, because it is directly forced upon you." (CP2.141, 1902) – is what Peirce came to call *haecceity* (Latin for "thisness"). This term *haecceity*, is one he adopted from Duns Scotus and adapted to signify the existence of quantifiers of "thisness," or "hereness and nowness" (CP1.405, 1890) and thereby unambiguously distinguish the particular.

Those who experience its effects perceive and know it in that action; and just that constitutes its very being. It is existent, in that its being does not consist in any qualities, but in its effects – in its actually acting and being acted on, so long as this action and suffering endures. Those who experience its effects perceive and know it in that action; and just that constitutes its very being. It is not in perceiving its qualities that they know it, but in hefting its insistency then and there, which Duns calls its *haecceitas*. (CP6.318, 1908)

This appears, at first glance, to fly in the face of Peirce's radical realism, in which, as he puts it "the absolute individual can not only not be realized in sense or thought, but cannot exist, properly speaking" (CP3.93n, 1870). Second glance shows this is not the case. An *absolute* individual would be a monad or a First which is no more than a possibility; it can only come into existence by being embodied or determined through Secondness which is a dyad, that is, not an *absolute* individual. As an experience of a dyad, Jeffrey DiLeo (1991) stresses that "*haecceity* is perceived and not inferred" (p. 97), that is, it is 'brutal fact' and not Scotus' contraction, "the process whereby the common nature was converted into an individual possessing numerical unit" (p. 98). DiLeo points out that "Peirce rejected contraction as a process of individuation" but that in doing so "he is merely denying 'reductionism' of the categories" and not particularity. Expanding on Peirce's *haecceity* as the experience of 'brutal fact', DiLeo explains:

For Peirce, because the 'facts' are characterized by particularity, they are completely determinate in regard to whether they are in the possession of qualities. Moreover, the principles of contradiction and excluded middle are applicable only to what is individual, viz., "the individual is determinate in regard to every possibility, or quality, either as possessing it or as not possessing it" (CP1.434, 1896). Thus, given that the principles of contradiction and excluded middle hold for *haecceity*, the qualitative experience of *haecceity* is impossible. (DiLeo 1991: 97-98)

It could be argued that Peirce, in developing his phenomenology, introduced *haecceity* because as DiLeo (p. 98) notes: "without individuals and *haecceity* there would be neither Secondness nor perception and without perception Peirce's epistemology would be untenable." Phenomena, however, cannot be reducible to the category of Secondness. *Haecceity* is not reality but rather is abstracted from reality which in the case of Peirce's phenomenology is the phaneron.

The purpose of phenomenology as Peirce defined it is to describe *what* is before the mind. The 'whatness' is, utilising another Scholastic term, the *quidditas* or primarity; it is the Firstness of Secondness. However, identifying the *quidditas* entails, in the first instance, mental separation of the particularity of *haecceity* or 'thisness' from the unity of 'thusness' of the phaneron. Peirce first discussed the grades of separability of one idea from another in 'On a new list of categories', (1867) then raised them again in detailing the doctrine of categories which condition what is discoverable through his phenomenology. In his later writings, he called the three grades of separability 'dissociation', 'prescission'<sup>3</sup> and 'distinction' (rather than 'discrimination' as in his 1867 paper) and described them as follows:

In the first place, two ideas may be so little allied that one of them may be present to the consciousness in an image which does not contain the other at all; in this way we can imagine red without imagining blue and vice versa; we can also imagine sound without melody, but not melody without sound. I call this kind of separation dissociation. In the second place, even in cases where two conceptions cannot be separated in the imagination, we can often suppose one without the other, that is we can imagine data from which we should be led to believe in a state of things where one was separated from the other. Thus, we can suppose uncolored space, though we cannot dissociate space from color. I call this mode of separation prescission. In the third place, even when one element cannot even be supposed without another, they may oftentimes be distinguished from one another. Thus we can neither imagine nor suppose a taller without a shorter, yet we can distinguish the taller from the shorter. I call this mode of separation distinction. Now, the categories cannot be dissociated in imagination from each other, nor from other ideas. The category of first can be prescinded from second and third and second can be prescinded from third. But second cannot be prescinded from first, nor third from second. (CP1.353, 1905)

Reference to the design and construction of the Sydney Opera House – in this case the podium as shown below – can serve to further exemplify the grades of separability of one idea from another.

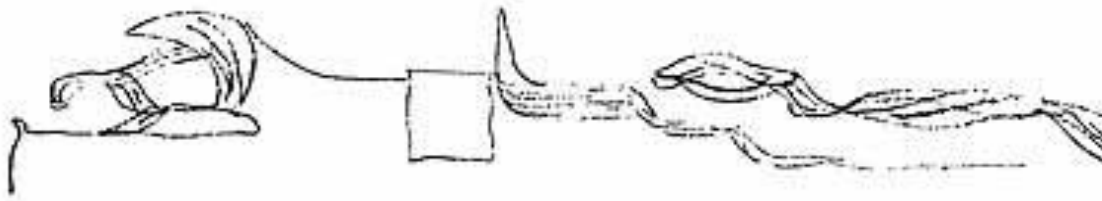


**Figure 10:** Sydney Opera House showing the podium

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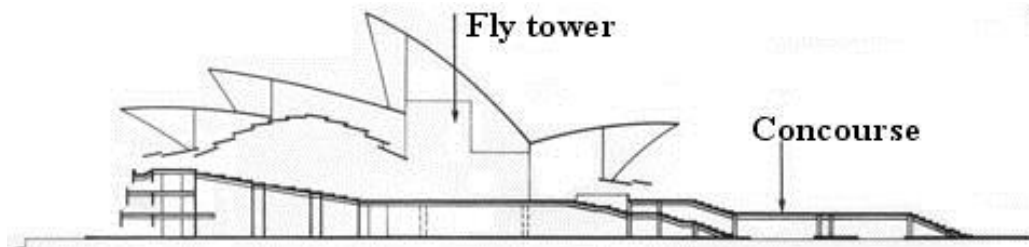
<sup>3</sup> The skill of prescissing is not one I have ever been taught in any of my formal education, so I can only imagine how powerful it would have been in the process of learning how to perceive; in identifying the 'whatness' of *quidditas* of the particularity of *haecceity* in moving beyond knowing to understanding reality. It is purposeful abstraction.

This sketch of the podium by the design architect Jørn Utzon



**Figure 11:** Jørn Utzon's sketch of the podium of the Sydney Opera House

and this drawing by the construction engineer Ove Arup



**Figure 12:** Ove Arup's drawing of the podium

were found on the internet (see Bibliography: Web).

Apart from the obvious that both can be dissociated from the web but not vice-versa, these images cannot be supposed without a medium on which to present them, be it the paper of the originals or any of a variety of media to display the reproductions. Both are of the same aspect of the Opera House, yet they are distinct because not only do they occupy separate places, but as noted in the labels, one is by the designing architect and the other by the chief engineer. Furthermore, they are chronologically distinct, the second being developed as a consequence of the first. Anyone viewing the originals would see that both were drawn with pencils as oppose to ink, but even without the assumption that each man would have his own tools, prescision can reveal that two different pencils were used. Most pencil cores are made of graphite (one of the allotropes of carbon) mixed with a clay (a naturally occurring aluminium silicate) binder, leaving grey or black marks. Graphite is durable: although it can be removed with an eraser, it is resistant to moisture, most chemicals, ultraviolet radiation and natural ageing. Pencils are graded according to the mix of graphite and clay from "B" (for blackness) to "H" (for hardness). Figure 11 is blacker than Figure 12. Yuzo Mikami confirms this. In his book, *Utzon's sphere: Sydney Opera House – How it was Designed and Built* (2001), he talks of "the battle of B6 and H2 pencils". Utzon, he tells us, used the B6, perfect for locating form and rhythm in thick, soft strokes. The H2 pencils of the technical teams were used to convert the ideas into blueprints.

DiLeo notes that "for Peirce, not only is *haecceity* only known through experience, its very being is determined through experience" (1991: 93). Considered as process, Peirce's categories reveal the pervasive features of experience by phenomena. When we engage in his phenomenology we are really experiencing experiencing. Sorrell notes that experience denotes acting *and* suffering.

But experience also denotes history; it is the storied past that informs the present, provides a context for its explanation and directs future development along some lines and not others. ... When both senses of the term are operative, experience is seen to be of things that are in the process of development or change, sometimes radically so, but continuous with their respective pasts. (2004: 39)

As nascent, phenomena are not so much things, as events. Put another way, phenomena are eventful. Paper is a good example of this. Wikipedia tells me that paper is produced by pressing together moist fibres, typically cellulose pulp and drying them into flexible sheets. Much of the early paper made from wood pulp contained significant amounts of alum, a variety of aluminium sulphate salts that are significantly acidic. Alum was added to paper to assist in sizing the paper, that is, making it somewhat water resistant so that inks did not "run" or spread uncontrollably. The early papermakers did not realize that the alum they added liberally to cure almost every problem encountered in making their product would eventually be detrimental. The cellulose fibres which make up paper are hydrolysed by acid and the presence of alum eventually degrades the fibres until the paper disintegrates in a process which has come to be known as "slow fire". Whilst the use of non-acidic additives in the manufacturing process makes for greater stability of paper, all paper is at risk of acid decay, because cellulose itself produces formic, acetic, lactic and oxalic acids. Paper is an event.

Furthermore, we as observers are as much phenomena as that which we observe; observers and observed are experienced and experiencing.

Crossing roads of moving traffic exemplifies this. Peirce pointed out that it is because we find ourselves in such complicated situations that it is impossible to determine with exactitude what the consequences could be that one calls for the help of the mathematician (N2: 9). Some years ago I realised that crossing city roads, as I had been doing for as long as I could remember and living unscathed to tell the story, meant that, contrary to what I had until then believed, I can do mathematics. Once we understand that mathematics is less about manipulating notations and more about considering the relationships embodied in phenomena, we realise that we are all mathematicians.

To do the preliminary mathematics whereby I frame the hypothesis with the view to the drawing of necessary conclusions and study what is true of the hypothetical states of things, I need to be able to imagine, concentrate and generalise. Campos (2009: 137) elucidates this.

In his writings on mathematics, Peirce often emphasizes the abilities of imagination, concentration and generalization that are necessary for mathematical reasoning (see, for instance, CP2.81, 1902 and CP4.611, 1908). In my estimation, these powers correspond, respectively, to the necessary abilities to (i) create a mathematical "icon"—a presentation of a hypothetical state of things that is of interest for its own intrinsic formal character to the inquirer *qua* mathematician; (ii) discriminate between mathematically essential and superfluous relations in the determination of the icon and focus the attention on the essential ones; and (iii) generalize on the basis of the characters and relations embodied in the icon.

Certainly my general hypothesis, that I can cross busy roads without mishap, has proved true to date but it can never be guaranteed – every occasion is an exercise in theorematic reasoning following from the *haecceity* of the situation. Each time I stop at a kerb intending to cross, I again need to study what is true of hypothetical states of things by considering the variables and the relationships embodied therein.

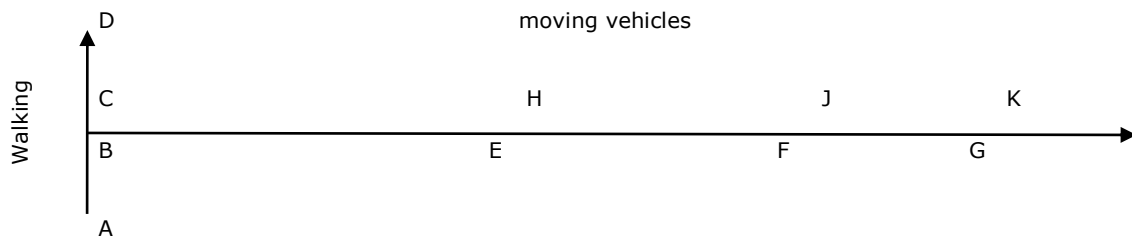
The variables that would impact on my hypothesis include, but are not limited to, the number of lanes in one or two directions of moving traffic and whether traffic is intermittent, continual, continuous; whether overtaking is allowed; whether there are any roundabouts or whether there are cross streets or T junctions and whether turning into or out of these, left or right, is permitted; whether stopping, standing, parking is permitted; whether there are parked vehicles and whether there is any indication that any of these may enter traffic; whether there are parking spaces; what kind of and in what condition is the road surface; what time of day is it and therefore what is the position of the light source; what are the weather conditions; and, just as important, because I am implicated in the hypothesis, what is my physical and mental condition at the time.



To perceive the actual state of things, I need to be able to dissociate, prescind and distinguish. Because this is a complex of events, utilising Ockham's razor, I dissociate many seconds from thirds, mostly unconsciously and even before I stop at the kerb. In terms of weather conditions, for example, I dissociate fog. If, in fact, fog is present, I would not even consider crossing a road because, apart from anything else, essential perception would be compromised. Because momentum is pervasive and because any sudden increase is necessarily precluded from my hypothesis, precision is only of seconds from thirds. An exception might be if the road had suffered a storm that produced potholes deep enough to create the possibility of changes in the momentum of vehicles driving over them and of water collected in them. Notwithstanding these kinds of events, in terms of traffic, I prescind distances and speed, velocity and acceleration and distinguish left from right, etc, nearer from further and faster from slower.

I then need to ascertain the best – the esthetic – juxtaposition of all the relationships of all the variables. To identify the space-time to cross I need to be able to generalise, anticipate and predict. What I am doing is identifying nascent patterns of the events before me, looking for the best moment to step in becoming another event within it without disturbing the prevailing momentum. If, as I wait to cross, any element of chaos, such as even the smallest traffic accident, breaks the pattern, my hypothesis cannot be realised in that situation and I temporarily relinquish my purpose. If, however, I am confident that the necessary conditions of my hypothesis are prevailing, I cross.

All this I do without the aid of any instruments or traffic controls and without using notations. I cannot tell you the speed of any vehicle, or how long it takes to cross a road, or any of the distances involved. Nevertheless, observation has taught me that in traversing the vector AD across a one-way, single lane road as depicted below, that the vectors AB, EB, FB and GB are moving at different speeds in equivalent time. Only the relationships between the time vector AC and HB is safe.



**Figure 13:** Example of juxtaposition of events in space-time

Certainly, to do this, I had to have achieved the level of cognitive development which Piaget called concrete operation enabling me to mentally manipulate information that is present. Whilst there was much I learnt through experience during that period of my developing *logica utens*, conservation and a decline in egocentrism were perhaps the most important. Through the ongoing processes of assimilation and accommodation, the concepts of invariance, causality and distance necessary for observing the relationships of events in space and time develop. Observing the relationships of events and generalising from these, trusting that drivers will more or less obey the man-made rules of the road and with faith that natural laws will hold, I cross if and when I can.

*Haecceity* enables identification of existence, but being secondness, "thisness" is always in the act of becoming "thatness", "thereness" and "thenness" and therefore can be generalised, anticipated, predicted.

Newton's three laws of motion state that:

1. Things that are still stay still and things that are moving keep moving with a steady speed unless a force of some kind pushes or pulls on them.

2. When a force acts on an object, it changes the object's speed and makes it accelerate. The greater the force, the more the object accelerates.
3. When a force acts on an object, there is equal force acting in the opposite direction.

Peirce's secondness – and modern physics – denies the first part of the first law – things that are still stay still. At the subatomic level Heisenberg's Uncertainty Principle states that it is impossible to *know* both the exact position and the exact velocity of an object at the same time. Observation requires light which exists as packets of energy called photons. On subatomic scales, the photons that hit the subatomic particle will cause it to move significantly. In Peircean terms, the event of a photon – required for observation – on say an electron is secondness.

The thisness of the accident of the world of existence is positively repugnant to generality. It is so because of its intrinsic duality; and if you call it individual you are forgetting one term of the pair. For example, this is an object; but it only is so, by virtue of being in reaction with a subject. ... *Thisness* is reaction. ... It is this act. It is act, not power. Secondness not firstness. (MS942:16-17, 1898)

On a macroscopic scale the effect of photons on objects under observation may be insignificant, nevertheless, stillness of phenomena is an illusion. Movement is a necessary condition of existence.

Only what we call 'now' is still. It is analogous to a portal through which possibility streams from nothing into being and becoming. Everything that has been, or is becoming, has passed or is passing through 'now'. All that has been or is becoming, including space, time, light, matter, ideas, mind, natural laws... moves. Actuality is eventful. That which has passed through the brute force of 'now' has become fact – whether it is discovered or not – and therefore is bivalent, but only as fact. Now is the difference between the real and reality. Peirce spoke of the real as "that which is not whatever we happen to think it, but is unaffected by what we may think of it" (CP8: 12, 1871). This is only strictly so in the past tense. As a futurist he wrote that "the opinion which is fated to be ultimately agreed to by all who investigate, is what we mean by the truth and the object represented in this opinion is the real" (CP5: 407, 1893). Lest his use of 'fated' was taken as meaning something like predetermined, he wrote as a footnote: "Fate means merely that which is sure to come true and can nohow be avoided. It is a superstition to suppose that a certain sort of events are ever fated and it is another to suppose that the word fate can never be freed from its superstitious taint. We are all fated to die." (CP5: 407.fn 1, 1893)

The real as fact is past; reality as truth streams ahead. Identifying facts might be achieved by the individual 'historian' but it takes community to predict truth. John E. Smith in his paper 'Community and reality' (1980), speaks of Peirce's notion of community as "the willingness of each individual member to sacrifice what is personal and private to him alone in order to follow the dictates of an interpersonal method that involves free exchange of views and results" (p. 50). In this paper Smith admitted that: "in an earlier paper on Peirce [1952] I quite mistakenly described him as *not* being a systematic philosopher"; that in this "I was deceived"; that "I did confound the form in which his writings have come to us with the logical structure of his thought" (p. 38). Finding error in others is ubiquitous, admission to being wrong is rare.

Let me conclude with Smith's opening remark:

Charles Peirce was at once a genuine and a disturbing philosopher. He was genuine because he dealt directly with the difficult problems of philosophy: the nature of truth, the theory of reality, the problem of mind and God. In his approach there was none of the modern or advanced tendency of thought that anticipates speculative problems merely in order to avoid them or dissolve them into the misadventures of human speech. Peirce is disturbing because he forces us to confront experience afresh and if need be to revise our categories so that this will accord with the real world. If you study Peirce you have to be prepared for surprises; you have to be tough-minded enough to consider the possibility that things may in fact prove to be very different from the way you have long since decided that they *must* be (p. 38).

## Chapter 4 Grasping Peirce:

### The secondary literature

I found Peirce quite by chance. I was working in the much maligned role of administrator at a university and was attempting to design robust tools for mapping the operation of quality in scientific research. Trawling the web, my attention was caught by a paper by Chong Ho Yu, 'Abduction? Deduction? Induction? Is there a logic of exploratory data analysis?' presented at the 1994 Annual Meeting of the American Educational Research Association. It was that very first word 'abduction' that drew me in. This was a word of which I had personal experience in its anatomical meaning as "movement of a limb etc. outward from the median line M17" (SOED 2002) following years of orthopaedic surgery and physiotherapy for congenital dislocated hips (CDH). For me, abduction was not merely a definition or an intellectual concept, but an experience associated with effort. The process as described by Yu suggested an opening out of the mind.

Exploratory data analysis, which aims at suggesting a pattern for further inquiry, contributes to the conceptual or qualitative understanding of a phenomenon. ... Abduction, the logic suggested by Peirce, can be viewed as a logic of exploratory data analysis. For Peirce abduction is the firstness (possibility, potentiality); deduction, the secondness (existence, actuality); and induction, the thirdness (generality, continuity). Abduction plays the role of generating new ideas or hypotheses; deduction functions as evaluating the hypotheses; and induction is justifying of the hypothesis with empirical data.

My attention having been whetted, Yu's paper led me to track down Peirce. In my local bookstore I found and I read *Philosophical Writings of Peirce* edited by Justus Buchler (1955) and online, courtesy of the Gutenberg Project, *Volume 1: Principles of Philosophy* (1931) and *Volume 5: Pragmatism and Pragmaticism* (1934) of *The Collected Papers of Charles Sanders Peirce*, edited by Charles Hartshorne and Paul Weiss (1931-1958) <http://www.textlog.de/philosophie.html>. Yu had presented Peirce as a systematic philosopher who was also a mathematician and scientist and whose model of inquiry suggested that qualitative research was possible. Furthermore, his system appeared to turn epistemological issues into methodological ones – into effort. This, I discovered, is what defines pragmatism.

The most enlightening examination of pragmatism I have found is John E. Smith's *Purpose and Thought: the Meaning of Pragmatism* (1978) in which he elucidates pragmatism through his discussion of the work of the three classical pragmatists: Charles Peirce, William James and John Dewey. This book, unfortunately, is not readily available, unlike *Pragmatism: a Guide for the Perplexed* by Robert B. Talisse and Scott F. Aiken (2008), which had not been published when I began my search. By the time I did read the latter book, I was in a position to assess it in the light of what I had already read and I found it to be inaccurate with regard to Peirce's thought. So saying, inaccuracy should not be confused with faulty argument. Richard Smyth, in his paper 'Peirce's normative science revisited' (2002) commenting on Richard Robin's paper 'Peirce's doctrine of the normative sciences' (1964)], preceded his argument by bringing to the reader's attention that:

...the fact that we read the same texts differently does not mean that one of us is mistaken. Peirce built his philosophy using what he described as the "multiform argumentation of the middle ages" (CP5.264, 1903). He believed this to be the method of "the successful sciences". A philosophy using this method will "trust rather to the multitude and variety of its arguments than to the conclusiveness of any one. Its reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected." (Smyth 2002: 283)

This point is reflected in the title of Douglas Anderson's book *Strands of System: the Philosophy of Charles Peirce* (1995) so named to bring to the fore Peirce's point made in his 1868 paper 'Some consequences of four incapacities', when responding to Descartes' philosophical method.

Listed below, in publication order by year, are all the secondary literature monographs in English, the edited primary literature [P] and the bibliographies [B] of these. The books are chronologically ordered so the reader may see who may have influenced whom, and what primary literature may have been readily available to these writers along the way. Of the 168 secondary literature titles listed, only the 61 that I own are included in my bibliography at the end of this work. I have reviewed 36 of these.

### 1923

- [P] Morris R. Cohen. (Ed.) (1923, 1998) [CLL] PEIRCE, C. S. *Chance, Love and Logic. Philosophical Essays.*

### 1931-1934

- [P] Charles Hartshorne & Paul Weiss. (Eds.) (1931-1934) [CP] PEIRCE, C. S. *Collected Papers of Charles Sanders Peirce, vols. 1-5.*  
*Volume 1: Principles of Philosophy. (1931).*  
*Volume 2: Elements of Logic. (1932).*  
*Volume 3: Exact Logic – published papers. (1933).*  
*Volume 4: The Simplest Mathematics. (1933).*  
*Volume 5: Pragmatism and Pragmaticism. (1934).*

### 1934

- Eugene Freeman. (1934) *The Categories of Charles S. Peirce.*

This appears to be the first book devoted entirely to consideration of Peirce's philosophy. It was published in the same year CP 5 and three years before he was awarded a PhD for his dissertation of the same title. The Foreword was written by Charles Hartshorne who Freeman spoke of in a footnote (p. 3, fn7) as "my teacher and friend...under whose inspiring guidance this study was undertaken." It shows.

### 1935

- [P] Charles Hartshorne & Paul Weiss. (Eds.) (1935) [CP] PEIRCE, C. S. *Collected Papers of Charles Sanders Peirce, vol. 6.*  
*Volume 6: Scientific Metaphysics.*

### 1939

- Justus Buchler. (1939) *Charles Peirce's Empiricism.*

### 1940

- [P] Justus Buchler. (Ed.) (1940, 1955) [PWP] PEIRCE, C. S. *Philosophical Writings of Peirce.*

### 1946

- James K. Feibleman. (1946, 1970) *An Introduction to Peirce's Philosophy: Interpreted as a System.*

Bertrand Russell wrote the foreword to this, the third book devoted to the study of Peirce's philosophy. It is idiosyncratic in its layout – for example, he discusses Peirce's phenomenology under the heading of Metaphysical Ontology – which, though accurate in detail, obscures Peirce's philosophy as system. This is ironical given the book's title. Despite this, his conclusion (p. 487) is perceptive:

Speaking very broadly, there are in the main and with respect to method of presentation, two philosophical traditions: the open or exploratory and the closed, or systematic. The open may be exemplified by Plato's writings; the closed, by Aristotle's. Plato's work has been more suggestive and has on the whole opened up more avenues to research...Aristotle's work, though perfectly formulated and systematized, seemed to end all investigation for some centuries and was chiefly responsible for the fact that Aristotle's name for so long served as he the authority on all important questions. But perhaps his is in the end a detrimental eminence, since it has a tendency to terminate inquiry by assuming that the leading questions have all be answered. Perhaps the chief contribution of Peirce is his open system.

### 1950

- Thomas A. Goudge. (1950) *The Thought of C.S. Peirce*.

### 1952

- W. B. Gallie. (1952) *Peirce and Pragmatism*.

In this book, Gallie is, in his words (p. 13), "concerned almost exclusively with Pragmatism in its original meaning as 'a method of logic' and as one facet of the general philosophy of Peirce." Granted Gallie is from an Anglo-American tradition of philosophy but it is probably his close contact with Charles Hartshorne that led him astray. His exposition is scholarly but flawed.

- Philip P. Wiener & Frederick H. Young. (Eds.) (1952) *Studies in the Philosophy of Charles Sanders Peirce: First Series*.

Once again, the influence of Charles Hartshorne's view which was, in turn, heavily influenced by his association with Alfred North Whitehead, prevails. Nevertheless the inclusion of essays by others, including Max Fisch, John E. Smith and Manley Thompson, who did not share Hartshorne's interpretation, saved the volume from appearing to be a mouthpiece for Hartshorne. Herbert W, Schneider's essay entitled 'Fourthness' (pp. 209-214) is of particular interest when considering the relationship of value and the three and three only irreducible categories Peirce insisted on.

### 1953

- Manley H. Thompson. (1953, 1973) *The Pragmatic Philosophy of C. S. Peirce*.

Manley Thompson's book is a structured commentary on a selection of those papers that were published in Peirce's lifetime and that were reproduced in the Collected Papers (CP). In this way he was able to avoid the worst editorial misdemeanours of Hartshorne and Weiss yet still provide the reader with a source of the primary texts.

### 1958

- [P] Arthur W. Burks. (Ed.) (1958) [CP] PEIRCE, C. S. *Collected Papers of Charles Sanders Peirce, vols. 7-8*.  
*Volume 7: Science and Philosophy*.  
*Volume 8: Reviews, Correspondence and Bibliography*.

- [P] Philip P. Wiener. (Ed.) (1958, 1966) [SW] PEIRCE, C. S. *Charles S. Peirce: Selected Writings. Values in a Universe of Chance*.

- Thomas Stanley Knight. (1958) *Charles Peirce*.

### 1961

- Murray G. Murphey. (1961) *The Development of Peirce's Philosophy*.

### 1962

- Hjalmar Wennerberg. (1962) *The Pragmatism of C.S. Peirce, an Analytical Study*.

### 1963

- John F. Boler. (1963) *Charles Peirce and Scholastic Realism: A Study of Peirce's Relation to John Duns Scotus*.

### 1964

- William Paul Haas. (1964) *The Conception of Law and the Unity of Peirce's Philosophy*.
- Edward C. Moore & Richard S. Robin. (Eds.) (1964) *Studies in the Philosophy of Charles Sanders Peirce: Second Series*.

### 1965

- Richard J. Bernstein. (Ed.) (1965) *Perspectives on Peirce: Critical Essays on Charles Sanders Peirce*.

### 1966

- [P] The Charles S. Peirce Papers. [The microfilm edition. Thirty Reels with Two Supplementary Reels Later Added.] (1966).

- John Joseph Fitzgerald. (1966) *Peirce's Theory of Signs as Foundation for Pragmatism*.

### 1967

- [B]** Richard S. Robin. (1967 & 1971) *Annotated Catalogue of the Papers of Charles S. Peirce*.

- Karl-Otto Apel. (1967, 1981 [English translation]) *Charles S. Peirce: From Pragmatism to Pragmaticism*.

Apel's book is well grounded in Peirce's primary text and is interesting because, being written from a German perspective, it highlights the transcendental influence of Kant and Hegel. Apel is also well versed in the philosophical work of Husserl, Heidegger, Habermas and Heisenberg and is able to identify some of the similarities between their views and those of Peirce. Unfortunately, the bibliography of the 1981 translation is only selective and there is no general index, which makes it less than satisfactory as a reference for research purposes.

- Vincent G. Potter. (1967, 1997) *Charles S. Peirce on Norms and Ideals*.

This is still the only book by a single author on Peirce's normative sciences, yet it left me with more questions than answers. Although a number of the secondary sources of Peirce deal with aspects of Peirce's normative sciences, to my mind, none, on its own, is sufficiently comprehensive or convincing. Collectively, however, they are adequate. Although Peirce wrote little directly on this aspect of his method of inquiry, I suggest that following the length of numerous long strands of his arguments and their historical antecedents lead quite obviously to locating his normative sciences between his phenomenology and his metaphysics.

### 1970

- Kuang Thi Fann. (1970) *Peirce's Theory of Abduction*.
- Francis E. Reilly. (1970) *Charles Peirce's Theory of Scientific Method*.

### 1972

- William Hatcher Davis. (1972) *Peirce's Epistemology*.

### 1973

- Douglas Greenlee. (1973) *Peirce's Concept of Sign*.
- Don D. Roberts. (1973) *The Existential Graphs of Charles S. Peirce*.

### 1974

- William L. Rosensohn. (1974) *The Phenomenology of Charles S. Peirce: from the Doctrine of Categories to Phaneroscopy*.

Rosensohn's book is the only complete book study of Peirce's phenomenology. It is the published version of his PhD dissertation (1971) which was supervised by Marvin Farber, who had studied under such phenomenologists as Edmund Husserl and Martin Heidegger and founded the journal *Philosophy and Phenomenological Research*. Even though Rosensohn saw parallels with Husserl, he emphasises Peirce's unique idea of the categories, the method of their discovery and Phaneroscopy. Max Fisch's reading of an early draft of the dissertation and his ensuing suggestions most likely ensured the accuracy and detail of Peirce's vision that this book displays.

### 1975-87

- [P]** Kenneth Ketner & James Cook. (Eds.) (1975-87) **[CN]** *PEIRCE, C. S. Charles Sanders Peirce: Contributions to The Nation (4 vols.)*.

### 1976

- [P]** Carolyn Eisele. (Ed.) (1976) **[NEM]** *PEIRCE, C. S. The New Elements of Mathematics by Charles S. Peirce (4 vols.)*.

- David Savan. (1976) *An Introduction to C. S. Peirce's Semiotic*.

- Thomas Albert Sebeok. (1976, 1986) *Contributions to the Doctrine of Signs*.

### 1977

**[B]** Kenneth Laine Ketner, Christian Kloesel, & J. W. Joseph Ransdell. (1977) *A Comprehensive Bibliography and Index of the Published Works of Charles Sanders Peirce, with a Bibliography of Secondary Studies* (1<sup>st</sup> edition - fiche).

- Peter T. Turley. (1977) *Peirce's Cosmology*.

### 1978

- Nicholas Rescher. (1978) *Peirce's Philosophy of Science: Critical Studies in his Theory of Induction and Scientific Method*.

**[P]** Charles S. Harwick. (Ed.) (1979) [SS] PEIRCE, C. S. *Semiotic and Significs: The Correspondence between Charles S. Peirce and Victoria Lady Welby*.

### 1979

- Carolyn Eisele. R. M. Martin. (Ed.) (1979) *Studies in the Scientific and Mathematical Philosophy of C.S. Peirce*.

- Institute for Studies in Pragmaticism. (Ed.) (1979) *Studies in Peirce's Semiotic: A Symposium*.

### 1980

- Robert F. Almeder. (1980) *The Philosophy of Charles S. Peirce: A Critical Introduction*.

- Joseph L. Esposito. (1980) *Evolutionary Metaphysics: The Development of Peirce's Theory of Categories*.

Esposito's book is a detailed study that considered both Peirce's published and (at the time) unpublished writings. There are better explorations of Peirce's evolutionary metaphysics than Esposito's, but for insight into the fine detail of the historic development and detail of Peirce's categories, he is excellent.

- Richard Milton Martin. (1980) *Peirce's Logic of Relations and Other Studies*.

### 1981

- Thomas Albert Sebeok. (1981) *The Play of Musement*.

- Peter Skagestad. (1981) *The Road of Inquiry. Peirce's Pragmatic Realism*.

This is a scholarly exposition of some aspects of Peirce's theory of inquiry, but, though it covers his logic, it is silent on it as normative and has nothing to say about esthetics and ethics. Given that the normative sciences are at the heart of Peirce's philosophy and therefore, on the 'road of inquiry', this is, in accord with the metaphor, a significant pothole. Nevertheless, because this absence does not skew the rest of his commentary, it is a useful resource.

### 1982

**[P]** Peirce Edition Project. (Eds.) (1982) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 1. Volume 1: 1857-1866*.

- Maryann Ayim. (1982) *Peirce's View of the Roles of Reason and Instinct in Scientific Inquiry*.

- John Deely. (1982) *Introducing Semiotic: Its History and Doctrine*.

### 1983

- Umberto Eco & Thomas A. Sebeok. (Eds.) (1983, 1988) *The Sign of Three: Dupin, Holmes, Peirce*.

- Eugene Freeman. (Ed.) (1983) *The Relevance of Charles Peirce*.

- Indira Prasad. (1983) *Philosophy and Common Sense: A Study in the Philosophy of C.S. Peirce*.

### 1984

- Donna M. Orange. (1984) *Peirce's Conception of God: A Developmental Study*.

**[P]** Peirce Edition Project. (Eds.) (1984) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 2. Volume 2: 1867-1871.*

### 1985

**[P]** Carolyn Eisele. (Ed.) (1985) [HP] PEIRCE, C. S. *Historical Perspectives on Peirce's Logic of Science: A History of Science (2 vols.)*.

- Christopher Hookway. (1985, 1992) *Peirce*.

This is a comprehensive, thoroughly researched, accurate account of Peirce's philosophy. Perhaps, though, because Hookway's intellectual heritage is English, he does not appear to have recognised that pragmatism is a philosophy of *experience*. That Hookway, through accident of birth, comes out of the British empiricist tradition, so different from the American tradition out of which classical pragmatist arose, may go some way to explaining why experience does not feature.

- David Pharies. (1985) *Charles S. Peirce and the Linguistic Sign*.

### 1986

**[P]** Peirce Edition Project. (Eds.) (1986) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 3. Volume 3: 1872-1878.*

**[B]** Kenneth Laine Ketner *et al.* (1986) *A Comprehensive Bibliography of the Published Works of Charles Sanders Peirce*, (2<sup>nd</sup> edition - book)

- John Deely, John; William Brooke & Felicia Kruse. (Eds.) (1986) *Frontiers in Semiotics*.

- Max H. Fisch. K. L. Ketner & C. J. Kloesel. (Eds.) (1986) *Peirce, Semeiotic and Pragmatism: Essays by Max Fisch*.

This is a collection of Fisch's essays written between 1939 and 1983. Some of these are on topics about which there is a paucity of consideration elsewhere. At the conclusion of his essay 'Peirce and Leibniz' [1972] he wrote: "I have completely passed over many matters of such recurrent concern and importance for Peirce as Leibniz's theory of space. Conclusions would therefore not be in order. They must await the monograph." As far as I can ascertain, however, no scholar has taken up the baton and to date the book remains unwritten. Nor for that matter, can I find any sustained review of Peirce's views on space. Fisch, the "indefatigable champion of Peirce" knew so much about Peirce, yet wrote too little. Everything he did write, however, is a storehouse of scholarship.

- Thomas Albert Sebeok. (1986) *I Think I Am a Verb*.

- Milton. B. Singer. (Ed.) (1986) *Man's Glassy Essence: Explorations in Semiotic Anthropology*.

### 1987

- Douglas R. Anderson. (1987) *Creativity and the Philosophy of C. S. Peirce*.

Anderson explores Peirce's abduction as *both* insight and inference, which, contrary to the reductionist view of analytic philosophers, are not mutually exclusive. Anderson's dissertation shows that speaking of abduction as inference to the best explanation (IBE) is inadequate at best and misleading at worst. Peirce's abduction as insight/inference has a great bearing on 'matting'. As a study of creativity as the ground of Peirce's system, this book is unsurpassed. Only Sami Paavola's: *On the Origin of Ideas: An Abductivist Approach to Discovery*, and John Kaag's: *Thinking through the Imagination: Aesthetics in Human Cognition*, both published



decades later, are significant additions to Anderson's thesis when it comes to consideration of the vital role of creativity, abduction, and esthetics to recreation.

- Beverley E. Kent. (1987) *Charles S. Peirce: Logic and the Classification of the Sciences*.  
Kent's book is an essential resource for understanding the development of Peirce's perennial classification of the sciences and for grasping his method of inquiry as an open system. Feibleman's book, had it not predated it by eighteen years, would have benefited greatly from Kent's exposition. He, however, is one of the few scholars whose work predates Kent who supports Peirce's method as systematic.
- Roberta Kevelson. (1987) *Charles S. Peirce's Method of Methods*.
- Richard Allen Tursman. (1987) *Peirce's Theory of Scientific Discovery: A System of Logic Conceived as Semiotic*.

### 1988

- Vincent Colapietro. (1988) *Peirce's Approach to the Self: A Semiotic Perspective on Human Subjectivity*.
- David Savan. (1988) *An Introduction to C. S. Peirce's Full System of Semiotic*.

### 1989

- [P]** Peirce Edition Project. (Eds.) (1989) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 4. Volume 4: 1879-1884*.
- Gérard Deledalle & S. Petrilli. (trans.) (1989) *Charles S. Peirce, 1839-1914*.
- Michael L. Raposa. (1989) *Peirce's Philosophy of Religion*.  
Although few of Charles Sanders Peirce's writings were devoted explicitly to religious topics, Michael L. Raposa demonstrates that religious ideas played a central role in shaping Peirce's philosophy and are manifest throughout his corpus, in scientific and mathematical papers as well as in his writings on metaphysics, cosmology and the normative sciences. Because Peirce's religious ideas are continuous with and integral to his reflections on these and other issues, they must be identified and understood if his work as a whole is to be interpreted properly.
- John K. Sheriff. (1989) *The Fate of Meaning: Charles Peirce, Structuralism and Literature*.

### 1990

- Gérard Deledalle. (1990) *Charles S. Peirce, 1839-1914: An Intellectual Biography*.  
This is a "systematic reading" of Peirce's philosophy. Deledalle is an historian and true to its title, his book is excellent as a source of chronology. This is especially the cases in those situations where, when reading Peirce in *Collected Papers of Charles Sanders Peirce* (CP) it may be thought that he contradicts himself rather than that his thinking was evolutionary.
- Kenneth Laine Ketner. (1990) *Elements of Logic: An Introduction to Peirce's Existential Graphs*.
- Winfried Nöth. (1990) *Handbook of Semiotics*.

### 1991

- [P]** James Hoopes. (Ed.) (1991) [PSWS] PEIRCE, C. S. *Peirce on Signs: Writings on Semiotic*.
- Robert Burch. (1991) *A Peircean Reduction Thesis: The Foundations of Topological Logic*.
- Cheryl Misak. (1991, 2004) *Truth and the End of Inquiry: A Peircean Account of Truth*.  
Misak, despite the title, misses Peirce's emphasis on discovery of meaning rather than truth as the purpose of inquiry. This creates a number of false conundrums such as bivalence and

excluded middle which are not at issue in the *progress* of inquiry where, as Peirce says "the principle of continuity is the idea of fallibilism objectified" (CP1.171, 1897).

- Roberta Kevelson. (Ed.) (1991) *Peirce and Law: Issues in Pragmatism, Legal Realism and Semiotics*.
- Roberta Kevelson. (1991) *Peirce, Paradox, Praxis: The Image, the Conflict and the Law*.
- Floyd Merrell. (1991) *Signs Becoming Signs: Our Perfusive, Pervasive Universe*.

### 1992

**[P]** Nathan Houser. & Christian J. W. Kloesel. (Eds.) (1992) [EP] PEIRCE, C. S. *The Essential Peirce. Selected Philosophical Writings, vol. 1. Volume 1: 1867-1892*.

**[P]** Kenneth Laine Ketner. (Ed.) (1992) [RLT] PEIRCE, C. S. *Reasoning and the Logic of Things: The Cambridge Conferences Lectures of 1898*.

- Jorgen Dines Johansen. (1992) *Dialogic Semiosis: An Essay on Signs and Meaning*.
- C. W. Spinks. (1992) *Peirce and Triadomania: A Walk in the Semiotic Wilderness*.

### 1993

**[P]** Peirce Edition Project. (Eds.) (1993) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 5. Volume 5: 1884-1886*.

- Joseph Brent. (1993, 1998) *Charles Sanders Peirce: A Life*.

This is the only comprehensive source of Peirce biographical information. Brent, a historian of ideas, wrote Peirce's biography as a history dissertation for which he received a PhD from the University of California, Los Angeles in 1960. His main primary source was the Peirce papers held by the Harvard University Department of Philosophy. For a number of reasons, Brent was unable to publish his thesis until thirty years later in 1993. A revised and enlarged edition was published in 1998. Although I use this book as a source for chronological purposes, I have never been able to read it in its entirety as it makes me weep - Peirce's life was a tragedy of the Shakespearean kind.

- Vincent Colapietro. (1993) *Glossary of Semiotics*.
- Robert S. Corrington. (1993) *An Introduction to C.S. Peirce: Philosopher, Semiotician and Ecstatic Naturalist*.
- C. F. Delaney. (1993) *Science, Knowledge and Mind: A Study in the Philosophy of C.S. Peirce*.
- Carl R. Hausman. (1993) *Charles S. Peirce's Evolutionary Philosophy*.

Hausman's book is an exploration of four major themes, or strands, of Peirce's architectonic characterised as evolutionary realism: his pragmatism, semeiotic, phenomenology and synechism. Although Hausman treats each theme in a separate section, he shows how these strands intertwine to reveal an intelligible universe that is cohesive but creative; teleological but not ultimately determined. The last section of the book is devoted to discussing the error made by the renowned contemporary philosophers Richard Rorty, Donald Davidson and Hilary Putnam, in taking the linguistic turn and rejecting metaphysics.

Strong parallels with Peirce's evolutionary view are expressed in an article 'The flexi-laws of physics' by the physicist Paul Davies (*New Scientist* 30 June 2007). Davies begins: "Science works because the universe is ordered in an intelligible way." He concludes:

In the orthodox view, the laws of physics are floating in an explanatory void. Ironically, the essence of the scientific method is rationality and logic: we suppose that things are the way they are for a reason. Yet when it comes to the laws of physics themselves, well, we

are asked to accept that they exist "reasonlessly". If that were correct, then the entire edifice of science would ultimately be founded on absurdity. By bringing the laws of physics within the compass of science and fusing nature and its laws into a mutually self-consistent explanation, we have some hope of understanding why the laws are what they are. In addition, we can begin to glimpse how we, the observers of this remarkable universe, fit into the great cosmic scheme.

This article was met with horror by adherents to Stephen Hawking's cosmology where the laws of physics are fixed; by followers of John Wheeler's hypothesis, developed thirty years earlier, that the laws emerged over time, it was lauded. A number of philosophers who had chanced upon the article saw that it reflected Peirce's evolutionary philosophy. This was brought to the attention of Davies who confessed that he had not had the good fortune to know of Peirce. Unlike Rorty, Davidson and Putnam, he welcomes sound metaphysics that can serve as a map for scientists to explore.

- Roberta Kevelson. (1993) *Peirce's Esthetics of Freedom: Possibility, Complexity and Emergent Value*. This is the only prolonged study of Peirce's idea of freedom as opposed to the idea of necessity. Kevelson's argument is that according to Peirce:

Freedom emerges as a working value, a primary esthetic principle, in response to that which is perceived as fixed, determined, necessary, absolute....Freedom as the Freedom-to-Focus is a Peircean process that becomes realized through the three stages of Fragment/Fractal, Fact, Form....Freedom's course is nonlineal, self-corrective, dynamic, open. (Back-cover blurb)

Unfortunately Kevelson confines her argument to human sciences.

- Edward C. Moore. (Ed.) (1993) *Charles S. Peirce and the Philosophy of Science: Papers from the Harvard Sesquicentennial Congress*.
- Paul Ryan. (1993) *Video Mind, Earth Mind: Art, Communications and Ecology*.

#### 1994

- Guy Debrock, & Menno Hulswit. (Eds.) (1994) *Living Doubt: Essays Concerning the Epistemology of Charles Sanders Peirce*.
- John Deely. (1994) *The Human Use of Signs*.
- Dinda L. Goriée. (1994) *Semiotics and the Problem of Translation: With Special Reference to the Semiotics of Charles S. Peirce*.
- Floyd Merrell. (1994) *Sign, Textuality, World*.
- Edward C. Moore, & Richard S. ROBIN. (Eds.) (1994) *From Time and Chance to Consciousness: Studies in the Metaphysics of Charles Peirce*.
- Herman Parret. (Ed.) (1994) *Peirce and Value Theory: On Peircean Ethics and Aesthetics*.
- Sandra B. Rosenthal. (1994) *Charles Peirce's Pragmatic Pluralism*.  
Rosenthal compares Peirce in this work to Thomas Kuhn, who was not a philosopher so much as a sociologist and was not a pluralist but was, rather, a relativist. To equate Peirce's relational logic and relativism is quite as erroneous as it would be to equate his phenomenology with phenomenism. Despite her misguided comparison, Rosenthal does know Peirce and she succeeds in eliciting "the inherent strand of pragmatic pluralism that is embedded in the very core of Peirce's thought and that weaves his various doctrines into a systematic pattern of pluralism." (Back-cover blurb)
- Thomas Albert Sebeok. (1994) *Encyclopedic Dictionary of Semiotics (3 vols)*.
- Thomas Albert Sebeok. (1994) *Signs: An Introduction to Semiotics*.

- John K. Sheriff. (1994) *Charles Peirce's Guess at the Riddle: Grounds for Human Significance*.

In his Preface Sheriff comments

Peirce forces us to come to terms with what King Oedipus learned a long time ago but what many scientists and even more humanists today seem never to grasp – that ours is a human perspective, not sometimes, but always. (xx)

In her poem Myth Muriel Rukeyser tells another story:

Long afterward, Oedipus, old and blinded, walked the roads. He smelled a familiar smell. It was the Sphinx. Oedipus said, 'I want to ask one question. Why didn't I recognize my mother?' 'You gave the wrong answer,' said the Sphinx. 'But that was what made everything possible,' said Oedipus. 'No,' she said. 'When I asked, What walks on four legs in the morning, two at noon, and three in the evening, you answered, Man. You didn't say anything about woman. 'When you say Man,' said Oedipus, 'you include women too. Everyone knows that.' She said, 'That's what you think.'

I did not (and would not) turn to Peirce to inquire about the 'human predicament', nor, after reading Sheriff preface, to him for his interpretation of Peirce's system even given that I agree that ours is always a human perspective. For a succinct overview of Peirce, I found de Waal's *On Peirce* (2002) much more conducive to learning. My thesis is littered with poetry – seen by some as the purview of the Arts – because it often conceptualises reality with greater impact than prose.

### 1995

- Douglas R. Anderson. (1995) *Strands of System: The Philosophy of Charles Peirce*.

Anderson's book introduces Peirce, sets out his architectonic, and comments on two of his papers: 'The fixation of belief' (1877) and 'A neglected argument for the reality of God' (1908) which are also included in full. This was the first book I read about Peirce and my paperback copy of it is falling apart through constant use. All my subsequent reading of both primary and secondary material tells me that Anderson grasps Peirce. What this means is that as a secondary source and for the purpose of furthering an understanding of Peirce, Anderson's interpretation matters.

- Kenneth Laine Ketner. (Ed.) (1995) *Peirce & Contemporary Thought: Philosophical Inquiries*.
- Floyd Merrell. (1995) *Peirce's Semiotics Now: A Primer*. Toronto: Canadian Scholars Press.
- Michael Shapiro. (Ed.) (1995) *The Peirce Seminar Papers: Annual of Semiotic Analysis: Volumes I & II*.
- Arian van Baest. (1995) *The Semiotics of C.S. Peirce Applied to Music: A Matter of Belief*.

### 1996

- Vincent M. Colapietro & Thomas M. Olshewsky. (Eds.) (1996) *Peirce's Doctrine of Signs: Theory, Applications and Connections*.
- Risto Hilpinen. (Ed.) (1996) *The Philosophy of C. S. Peirce*.
- Roberta Kevelson. (1996) *Peirce, Science, Signs*.
- James Jakób Liszka. (1996) *A General Introduction to the Semeiotic of Charles Sanders Peirce*.

This is one of many books, both introductory and detailed, of Peirce's semeiotic. Liszka's book, however, stands out because of his grasp of Peirce's logic as normative. Logic, or semeiotic, as he points out "is primarily concerned with the question of truth." This primary concern is what makes it a normative science.

...it is not concerned so much with *what* is true (which is the job of the empirical sciences) but in establishing the conditions for what counts as true. It is at once an evaluative or normative science (since it establishes criteria for something) and formal, because it attempts to discern the necessary conditions for that norm, a science which aims to establish evaluative norms on the basis of categorical accounts. (p. 5)

- Floyd Merrell. (1996) *Semiosis in the Postmodern Age*.
- Floyd Merrell. (1996) *Signs Grow: Semiosis and Life Processes*.
- Vincent G. Potter. Vincent M. Colapietro. (Ed.) (1996) *Peirce's Philosophical Perspectives*.
- Arthur Franklin Stewart. (Ed.) (1996) *Contemporary Essays on Charles S. Peirce*.
- Arthur Franklin Stewart. (Ed.) (1996) *Religious Dimensions of Peirce's Thought*.

### 1997

**[P]** Patricia Ann Turrisi. (Ed.) (1997) [PAP] PEIRCE, C. S. *Pragmatism as a Principle and Method of Right Thinking: The 1903 Harvard Lectures on Pragmatism*.

- Jacqueline Brunning & Paul Forster. (Eds.) (1997) *The Rule of Reason: The Philosophy of Charles Sanders Peirce*.
- Nathan Houser, Don D. Roberts & James Van Evra. (Eds.) (1997) *Studies in the Logic of Charles Sanders Peirce*.
- Dickson Lukose, Harry S. Delugach, Mary Keeler, Leroy Searle, & John F. Sowa. (Eds.) (1997) *Conceptual Structures: Fulfilling Peirce's Dream, Fifth International Conference on Conceptual Structures*.
- Floyd Merrell. (1997) *Peirce, Signs and Meaning*.
- Richard A. Smyth. (1997) *Reading Peirce Reading*.

Smyth explores Peirce's reading of some of his philosophical predecessors and how these influenced his (Peirce's) own evolving system of thought. These include: Aristotle [384-322 BCE], Alexander Bain [1818-1903], George Berkeley [1685-1753], Cicero [106-43 BCE], René Descartes [1596-1650], William Rowan Hamilton [1788-1856], David Hume [1711-1776], Immanuel Kant [1724-1804], Gottfried Leibniz [1646-1706], John Locke [1632-1704], Henry Longueville Mansel [1820-1871], James Mill [1733-1836], John Stuart Mill [1806-1873], William of Ockham [1285-1349], Plotinus [205-270], Thomas Reid [1710-1796], Friedrich Schiller [1759-1805], John Duns Scotus [1266-1308], Richard Whately [1787-1683], William Whewell [1794-1866], Christian Wolff [1679-1754] and Wilhelm Wundt [1832-1920]. To read Peirce as he read is to follow his own approach which was, as far as was possible, to get into the mind of the writer of any text he was reading. Reading Smyth reading Peirce reading exemplifies the great benefit of historiography to philosophy.

### 1998

**[P]** Nathan Houser. et al. (Eds.) (1998) *EP PEIRCE, C. S. The Essential Peirce. Selected Philosophical Writings, vol. 2. Volume 2: 1893-1913*.

- Roberta Kevelson. (1998) *Peirce's Pragmatism: The Medium as Method*.
- Peter Ochs. (1998) *Peirce, Pragmatism and the Logic of Scripture*.
- Kelly, A. Parker. (1998) *The Continuity of Peirce's Thought*.
- Michael Shapiro. (Ed.) (1998) *The Peirce Seminar Papers: Annual of Semiotic Analysis: Volume III*.
- Edwina Taborsky. (1998) *Architectonics of Semiosis*.
- Jaap Van Brakel, & Michael Van Erden. (Eds.) (1998) *C.S. Peirce Categories to Constantinople: Proceedings of the International Symposium on Peirce*.

### 1999

- Roberta Kevelson. (1999) *Peirce and the Mark of the Gryphon*.
- Charles S. Peirce & Ketner, Kenneth Laine. (1999) *His Glassy Essence: An Autobiography of Charles Sanders Peirce*.
- Michael Shapiro. (Ed.) (1999) *The Peirce Seminar Papers: Essays in Semiotic Analysis: Volume IV: Proceedings of the International Colloquium on Language and Peircean Sign Theory*.

### 2000

- [P]** Peirce Edition Project. (Eds.) (2000) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 6. Volume 6: 1886-1890*.
- Robert S. Corrington. (2000) *A Semiotic Theory of Theology and Philosophy*.
- John Deely. (2000) *The Red Book: The Beginning of Postmodern Times or: Charles Sanders Peirce and the Recovery of Signum*.
- John Deely. (2000) *The Green Book: The Impact of Semiotics on Philosophy*.
- Gérard Deledalle. (2000) *C.S. Peirce's Philosophy of Signs*.
- Christopher Hookway. (2000) *Truth, Rationality and Pragmatism: Themes from Peirce*.
- Floyd Merrell. (2000), *Change through Signs of Body, Mind and Language. ...*
- John P. Muller & Joseph Brent. (Eds.) (2000) *Peirce, Semiotics and Psychoanalysis*.

### 2001

- Phyllis Chiasson. John R. Shook. (Ed.) (2001) *Peirce's Pragmatism, the Design for Thinking*.
- Cornelis de Waal (2001) *On Peirce*.  
At ninety-one pages, *On Peirce* is brief. Still, as an introduction to Peirce's philosophy, it is sound, though less so as a research resource as it has neither a bibliography nor an index. Regardless of this, working, as he did with the Peirce Edition Project (PEP) at the University of Indianapolis, de Waal was immersed in Peirce's primary text and his list of suggested Peirce readings is more than adequate for the casual reader.
- Donald L. Gelpi. (2001) *Peirce and Theology: Essays in the Authentication of Doctrine*.
- Blasco Jos Sobrinho. (2001) *Signs, Solidarities and Sociology: Charles S. Peirce and the Pragmatics of Globalization*.

### 2002

- Juan Fontrodona. (2002) *Pragmatism and Management Inquiry: Insights from the Thought of Charles S. Peirce*.
- Menno Hulswit. (2002) *From Cause to Causation: A Peircean Perspective*.  
Hulswit is concerned, as am I, with clarifying the ontological question, which in his view concerns *causation* – or the production of an effect by its cause – rather than *causality*, which is the relationship between cause and effect. He restricts his exposition to four aspects of the problem of causation – necessity, the nature of causal relata, teleology and the distinction between primary and secondary causes – and begins by tracing the history of the concept of causation from Ancient Greece through to contemporary approaches. Hulswit argues that “the received view is inadequate both because it conceives causation as a relation instead of a process and because it falsely assumes the causal relata to be discrete entities between which there is not a hint of continuity” (p. 176). Though he credits A. N. Whitehead as well as Peirce with understanding this, he chose the latter's approach because he found that Peirce's categories, in providing a consistent categorical framework offers better opportunities for exploring causation as process.

- Andrew Reynolds. (2002) *Peirce's Scientific Metaphysics: The Philosophy of Chance, Law and Evolution*.

Reynolds shows a good understanding of Peirce's physical metaphysics but not its place in Peirce's metaphysics in particular, nor his architectonic in general. He shows a low threshold for tolerating tension which he appears to equate with ambiguity, if not contradiction. Those he lists as not supporting Peirce as systematic Goudge (1950), Gallie (1952), Murphy (1961) and Apel (1967), all predate Kent (1987). Those he includes as considering Peirce as highly systematic – Corrington (1993), Hausman (1993), Rosenthal (1994) Anderson (1995) and Parker (1998) – postdate Kent. His bibliography lists Feilbleman's *An Introduction to Peirce's Philosophy* but does not include its subtitle: *Interpreted as a System* which, together with its omission from the above-mentioned list, leads me to suspect that he hadn't even sighted it. Whilst I may be considered as harsh, this is only one example of a plethora of errors in his bibliography, especially with regard to dates. Had he read Kent, he would have understood the importance of chronology.

- Sun-Joo Shin. (2002) *The Iconic Logic of Peirce's Graphs*.

### 2003

- [P] Mats Bergman & Sami Paavola. (2003- ) *The Commens Dictionary of Peirce's Terms*.

- Michael Shapiro. (Ed.) (2003) *The Peirce Seminar Papers: Essays in Semiotic Analysis: Volume V: The State of the Art*.

### 2004

- John Deely. (2004) *Why Semiotics?*
- Ann Freadman. (2004) *The Machinery of Talk: Charles Peirce and the Sign Hypothesis*.
- Cheryl J. Misak, (Ed.) (2004) *The Cambridge Companion to Peirce*.
- Kory Spencer Sorrell. (2004) *Representative Practices: Peirce, Pragmatism and Feminist Epistemology*.

Sorrell starts out well. Chapter 1 – 'Peirce's categories: a first glimpse at representation' – is a good beginning. It is, however, his second chapter – 'The substance of Peirce's categories: the world phenomenologically conceived' – that is of particular interest because of its emphasis on process; on the experiential nature of substance. Sorrell introduces the chapter with a quote from John Steinbeck's *The Winter of Our Discontent* "A Day, a livelong day, is not one thing but many" which, he says (p. 34) is "intended to capture the process of change, of rhythm and of growth and decay." Chapter 3 – 'Mapping the province: from the mirror of nature to constructive representation' – is also of interest because it focuses on semeiotic as the process not of constructing but of experiencing meaning. In chapter 4 'Communities of inquiry: authority, constraint and inclusion' – he broadens the context of representation to that of narrative practice. Here his argument fails, not because of his theme, but because he construes community far too narrowly.

### 2005

- Johannes Ehrat. (2005) *Cinema and Semiotic: Peirce and Film Aesthetics, Narration and Representation*.
- Ivan Mladenov. (2005) *Conceptualizing Metaphors: On Charles Peirce's Marginalia*.

### 2006

- Ralph G. Beil & Kenneth Laine Ketner. (2006) *A Triadic Theory of Elementary Particle Interactions and Quantum Computation*.
- André de Tienne & John Shook. (Eds.) (2006) *The Cambridge School of Pragmatism: Vol. 1: Pragmaticism of Charles S. Peirce*.

- Rossella Fabbrichesi & Susanna Marietti. (Eds.) (2006) *Semiotics and Philosophy in Charles Sanders Peirce*.
- Sami Paavola. (2006) *On the Origin of Ideas: An Abductivist Approach to Discovery*.  
Paavola's aim is to show that abduction can be understood and developed as a way of conceptualizing discovery. In all the literature on the subject, I have found none that is as comprehensive nor as revealing of the subtleties of abduction as this work. As he says in his 2001 paper: Essential tensions in scientific discovery, "it is important to conceptualize dynamic processes of knowledge advancement and knowledge creation, and not just to analyze how already existing knowledge is justified or acquired." What he emphasises in this paper, and makes plain in his book, is that abduction is a process, not a product – it is not a 'matter' of 'either/or', but is rather 'matting' of 'and ... also ...'. Because Paavola's focus is *knowledge making as the process of discovery*, he does not develop abduction as creativity. For this, Douglas Anderson's 1987 book *Creativity and the Philosophy of C. S. Peirce* is excellent.
- Ahti-Veikko Pietarinen. (2006) *Signs of Logic: Peircean Themes on the Philosophy of Language, Games and Communication*.
- Frances Williams Scott. (2006) *C.S. Peirce's System of Science: Life as a Laboratory*.

### 2007

- Noel E. Boulting. (2007) *On Interpretative Activity: A Peircean Approach to the Interpretation of Science, Technology and the Arts*.
- Elizabeth F. Cooke. (2007) *Peirce's Pragmatic Theory of Inquiry: Fallibilism and Indeterminacy*.  
This is a thorough examination of Peirce's fallibilism as the linchpin of his realistic pragmatism. Cooke has shown that Peirce's philosophy does not require any claim to certitude in order to keep his fallibilism from falling into skepticism or contextualism. Cooke's solution to the problem is to interpret Peirce as having reconceived knowledge – traditionally defined as 'foundational' and 'static' – as a dynamic process of inquiry, one which evolves within a larger process of evolution.
- Anette Ejsing. (2007) *Theology of Anticipation: A Constructive Study of C.S. Peirce*.
- Rosa Mayorga. (2007) *From Realism to 'Realicism': The Metaphysics of Charles Sanders Peirce*.  
Mayorga traces the development of Peirce's realism from its early roots in scholastic realism to its eventual revision and consequent moving beyond Scotus's position. This Mayorga named Peirce's 'realicism' in parallel with his renaming his pragmatism 'pragmaticism' to differentiate it from other positions. She begins with the problem of universals, that is, with determining what kind of ontological status universals have and traces the way this problem was handled starting with Socrates and Plato, through to Aristotle, on to Alexander of Aphrodisias, Porphyry, Boethius, Avicenna and thence to Duns Scotus. She devotes a chapter to Scotus before she moves on to her study of Peirce's radical realism. Mayorga's exposition reveals that for Peirce, 'real' and 'existent' are not synonymous and that it is this that differentiates his realism from all those who preceded him; thus his 'realicism'.
- Thomas L. Short. (2007) *Peirce's Theory of Signs*.
- John Zuchero. (2007) *The Practical Peirce: An Introduction to the Triadic Continuum Implemented as a Computer Data Structure*.

### 2009

- Mats Bergman. (2009) *Peirce's Philosophy of Communication: The Rhetorical Underpinnings of the Theory of Signs*.  
This is the only book-length secondary source about Peirce's third division of semeiotic, methodetic, or rhetoric. Peirce described rhetoric as the "highest and most living branch of logic" (CP2.333, c1895); I would add that as well as persuading without a guarantee of certainty, it is



also the most susceptible to subversion. Bergman tells readers at the outset that his "book is a critical study ..." (p.1) ... which, for my purpose, makes his argument very dense and hard going. For this reason, and not because I rejected his argument, I did not finish reading his book. I must add, however, that when considered in terms of 'matting', methodic is as much concerned with abduction and persuasion as it is with communication.

- Thora Margareta Bertilsson. (2009) *Peirce's Theory of Inquiry and Beyond: Towards a Social Reconstruction of Science Theory*.

## 2010

**[P]** Peirce Edition Project. (Eds.) (2010) [W] PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vol. 8. Volume 8: 1890-1892.*

**[P]** Matthew E. Moore. (Ed.) (2010a) [PM] PEIRCE, C. S. *Philosophy of Mathematics: Selected Writings Charles S. Peirce.*

- Mathew E. Moore. (Ed.) (2010b) *New Essays on Peirce's Mathematical Philosophy.*

This collection, together with *Philosophy of Mathematics: Selected Writings Charles S. Peirce* also edited by Mathew Moore in 2010, have made Peirce's unique approach to mathematics accessible to those, such as myself, who are not mathematicians. Prior to this, the only books of or about Peirce's philosophy of mathematics were Carolyn Eisele's *The New Elements of Mathematics*, vols. 1-4 (1976) as a primary source and her *Studies in the Scientific and Mathematical Philosophy of C. S. Peirce* (1979) as a secondary source. These are now out of print and I was unable to access any of the volumes. In Moore's anthology, Claudine Tiercelin's 'Peirce on mathematical objects and mathematical objectivity', Daniel G. Campos' 'The imagination and hypothesis-making: a Peircean account' and Susanna Marietti's 'Observing signs' are of particular interest. Peirce's unique position on pure mathematics is in accord with the theoretical physicists and coming to understand how this works is the key to reuniting science and philosophy.

- Lara Trout. (2010) *The Politics of Survival: Peirce, Affectivity and Social Criticism.*

Trout's thesis is closest to my heart when it comes to considering the actual matting that is reality for humans. Those writers to whom she refers post-date those of similar themes and calibre that I read when studying to be an educator. This was prior to my discovery of Peirce; I, instead read the likes of R. W. Connell's *Gender and Power* (1987), Evelyn Fox Keller's *Refiguring Life: Metaphors of 20th Century Biology* (1995), Victor Frankle's *The Will to Meaning* (1988), Carol Gilligan's *In a Different Voice: Psychological Theory and Women's Development* (1982), Lorna Lippmann's *The Aim is Understanding: Educational Techniques for a Multi-cultural Society* (1973), Nel Noddings' *Caring: A Feminine Approach to Ethics and Moral Education* (1984), Philip Phenix *Realms of Meaning: A Philosophy of the Curriculum for General Education* (1964), William Riker's *The Art of Political Manipulation* (1986). We both hold Antonio Damasio in high esteem: he successfully brings empirical science authority to the embodiment of affectivity, demonstrating the necessity of affect to the objective process of survival. I said earlier that I would not turn to Peirce to inquire about the human condition. Trout's thesis, however, is focused on the conditions of human society and on Peirce's notion of communities of thinkers as real. Her concern is with the operation of power as politics rife with tensions not least of which is freedom and equality. It would be good to see more published on a Peircean perspective on politics, especially on the objectivity of affect.

## 2011

- Paul Forster. (2011) *Peirce and the Threat of Nominalism.*

- Leon Niemoczynski. (2011) *Charles Sanders Peirce and a Religious Metaphysics of Nature.*

## 2012

- Douglas R. Anderson, & Carl R. Hausman. (Eds.) (2012) *Conversations on Peirce: Reals and Ideals*.
- Søren Brier, Bent Sørensen, & Torkild Thellefsen. (2012) *The Scientific Metaphysics of Charles S. Peirce*.
- Cornelis de Waal, & Krzysztof Piotr Skowronski. (Eds.) (2012) *The Normative Thought of Charles S. Peirce*.
- Nicholas Rescher. (2012) *Pragmatism: The Restoration of Its Scientific Roots*.
- Pat Shields. (2012) *Charles S. Peirce on the Logic of Number*.
- Fernando Zalamea. (2012) *Peirce's Logic of Continuity*.

## 2013

- [B]** Kenneth Laine Ketner. (2013) *The Published Works of Charles Sanders Peirce* (3rd edition - online).
- Cornelis de Waal. (2013) *Peirce: A Guide for the Perplexed*.
- Christopher Hookway. (2013) *The Pragmatic Maxim: Essays on Peirce and Pragmatism*.
- Tony Jappy. (2013) *Introduction to Peircean Visual Semiotics*.

## 2014

- [P]** Cornelis de Waal (ed.) (2014) PEIRCE, C. S. *Illustrations of the Logic of Science*.
- Torkild Thellefsen & Bent Sørensen. (Eds.) (2014) *Charles Sanders Peirce in His Own Words: 100 Years of Semiotics, Communication and Cognition*.
- Gabriele Gava (2014) *Peirce's Account of Purposefulness: A Kantian Perspective*.
- Frederik Stjernfelt. (2014) *Natural Propositions: The Actuality of Peirce's Doctrine of Dicisigns*.
- Vinicius Romanini & Eliseo Fernandez. (Eds.) (2014) *Peirce and Biosemiotics: A Guess at the Riddle of Life*.
- Francesco Bellucci, Ahti-Veikko Pietarinen, & Frederik Stjernfelt. (Eds.) (2014) *Peirce: 5 Questions*.
- John Kaag. (2014) *Thinking through the Imagination: Aesthetics in Human Cognition*.  
Kaag opens by speaking of a particular afternoon when, as a young boy he was bickering with his brother, their mother called to them: "Boys! Stop Squabbling! Be *Imaginative!!*" These words from page one continue to reverberate in my mind all this time after reading them. It was a very good beginning. Kaag grasps what Peirce came to realise: that aesthetics informs ethics which informs logic – that imagination is the well-spring.

## 2015

- Mateusz W. Oleksy. (2015) *Realism and Individualism: Charles S. Peirce and the Threat of Modern Nominalism*.

## 2016

- Atkin, Albert. (2016) *Peirce*.

I chose to review the secondary literature monographs entirely devoted to Peirce, because these collectively gave me the best understanding of Peirce's work. Although I have not reviewed any of the hundreds of articles, conference papers, book chapters and dissertations that I have collected, many of these were indispensable to my writing.

- Max Fisch and Atwell Turquett's 'Peirce's triadic logic' (1966);
- Thomas Curley's 'The relation of the normative sciences to Peirce's theory of inquiry' (1969);
- Carl Hausman's 'Value and the Peircean Categories' (1979);
- Joseph DeMarco's 'Peirce's concept of community: its development and change' (1971);
- Jay Zeman's 'Peirce's theory of signs' (1977).

- Willard Miller's 'Peirce on pragmatism and history' (1978);
- Bertrand P. Helm's 'The nature & modes of time' (1983)
- Jeffrey Barnouw's '"Aesthetic" for Schiller and Peirce: a neglected origin of pragmatism' (1988);
- Steven French's 'A Peircean response to the realist-empiricist debate' (1989);
- Carl Hausman's 'In and out of Peirce's percepts' (1990);
- Jeffrey DiLeo's 'Peirce's haecceitism' (1991);
- Claudine Engel-Tiercelin's 'Vagueness and the unity of C.S. Peirce's realism' (1992);
- Paul Forster's 'Peirce and the threat of nominalism' (1992);
- Douglas Anderson's 'Peirce's agape and the generality of concern' (1995);
- Lesley Friedman's 'C. S. Peirce's transcendental and immanent realism' (1995);
- David Hildebrand's 'Genuine doubt and the community in Peirce's theory of inquiry' (1996),
- Timothy Herron's 'C. S. Peirce's theories of infinitesimals' (1997);
- Glenn Kuehn's 'Rhythmic foundations, and the necessary aesthetic in Peirce's categories' (1998);
- Claudine Tiercelin's 'Peirce's objective idealism.' (1998);
- Menno Hulswit's 'Teleology' (2001);
- Arnold Johanson's 'Modern topology and Peirce's theory of the continuum' (2001);
- Sami Paavola's 'Essential tensions in scientific discovery' (2001);
- Edwina Taborsky's 'Energy transformation and semiosis' (2001);
- Carl Hausman's 'Charles Peirce's evolutionary realism as a process philosophy' (2002);
- Sami Pihlström and Charbel Niño El-Hani's 'Emergence theories and pragmatic realism' (2002);
- Richard Smyth's 'Peirce's normative science revisited' (2002);
- Cornelis de Waal's 'Why metaphysics needs logic and mathematics doesn't: mathematics, logic, and metaphysics in Peirce's classification of the sciences' (2005);
- Floyd Merrell's 'Overdeterminacy, underdeterminacy, indeterminacy' (2005);
- André de Tienne's 'Peirce's logic of information' (2006);
- João Queiroz & Charbel Niño El-Hani's 'Semiosis as an emergent process' (2006)
- James Jakób Liszka's 'Pragmatic ethics and normative naturalism' (2007);
- Woosuk Park's 'Abduction and thought experiment in Baduk' (2007);
- Brent Sørensen, Torkild Thellefsen & Morten Moth's 'Metaphor and cognition from a Peircean perspective' (2007);
- Jérôme Havenel's 'Peirce's clarifications of continuity' (2008);.
- David O'Hara's 'Peirce, Plato and miracles: on the mature Peirce's re-discovery of Plato and the overcoming of nominalistic prejudice in history' (2008);
- Daniel Campos's 'Imagination, concentration, and generalization: Peirce on the reasoning abilities of the mathematician' (2009);
- Ivo Assad Ibri's 'The vital importance of the category of Firstness in Peirce's philosophy' (2009)
- Juliana Acosta's 'The conditions of freedom and their metaphysical implications for the philosophies of Aristotle and Peirce' (2010);
- Jeffrey Downard's 'The main question and aims guiding Peirce's phenomenology' (2011);
- Connor Mayo-Wilson's 'Peirce & Brouwer' (2011);
- Donald E. Stanley & Daniel G. Campos's 'The logic of medical diagnosis' (2013)

The relationship between Peirce's pragmatism and matting is recreational. Pragmatism mediates Empiricism and Rationalism. Empiricists, speaking of matter as 'substance', need to verify or 'substantiate' their claims with evidence. Rationalists may refer to 'substance' as the underlying nature/nurture of phenomena, and 'substantiate' or argue the validity of their point of view. Peirce's system enlivens *emergent reality*. The English vernacular, 'matter', of the noun 'substance', is used in a wide range of ways, both physical and non-physical. As a verb, it is well exemplified in the expression: 'those that matter don't mind; those that mind don't matter'. It can take reading a great number of primary and secondary texts over time to grasp Peirce and before my recreation of reality can emerge.



## **Part 2 Mattering**



## Introduction to Part 2

What to believe?

The sceptic would have it that you believe nothing. Pyrrho of Elis [360-270 BCE] originated classical scepticism. Since there are plausible arguments for both sides of any issue, Pyrrho argued, the only rational practice is to suspend all judgment, abandon worries of every kind and live comfortably in an appreciation of the appearances. For the Pyrrhonians, given that neither the sense impressions nor the intellect, nor both combined, is a sufficient means of knowing and conveying truth, one suspends judgement on dogmatic beliefs or anything non-evident.

Agrippa the Sceptic [first century] is regarded as the author of "five grounds of doubt" or tropes, which are purported to establish the impossibility of certain knowledge. The tropes are:

1. Dissent: The uncertainty of the rules of common life and of the opinions of philosophers.
2. Progress *ad infinitum*: All proof requires some further proof and so on to infinity.
3. Relation: All things are changed as their relations become changed, or, as we look upon them from different points of view.
4. Assumption: The truth asserted is merely a hypothesis.
5. Circularity: The truth asserted involves a vicious circle.

Sextus Empiricus [160-210] defended the practical viability of Pyrrhonism as the only way of life that results in genuine *ataraxia* (*ἀταραξία* 'tranquillity'). In his medical work, tradition maintains that he belonged to the 'empiric school', as reflected by his name.

If the purpose of adopting skepticism was *ataraxia*, then the Epicureans qualify. For them *ataraxia* was synonymous with the only true happiness possible for a person. It signifies the state of robust tranquillity derived from eschewing faith in an afterlife, not fearing the gods because they are distant and unconcerned with us, avoiding politics and vexatious people, surrounding oneself with trustworthy and affectionate friends and, most importantly, being an affectionate, virtuous person, worthy of trust.

The philosophy of Epicurus [341-270 BCE] was a complete and interdependent system, involving a view of the goal of human life (happiness, resulting from absence of physical pain and mental disturbance), an empiricist theory of knowledge (sensations, including the perception of pleasure and pain, are infallible criteria), a description of nature based on atomistic materialism and a naturalistic account of evolution, from the formation of the world to the emergence of human societies.

The Stoics, too, sought mental tranquillity seeing *ataraxia* as something to be highly desired and often made use of the term, but for them the analogous state attained by the Stoic sage, was *apatheia* (*ἀπάθεια*; from a-"without" and pathos "suffering" or "passion"). *Apatheia* in Stoic philosophy refers to a state of mind where one is not disturbed by the passions. It may be best translated by the word "equanimity" rather than "indifference". The word *apatheia* has a quite different meaning to the modern English "apathy", which has a negative connotation. It would appear to translate to the modern notion of objectivity.

Neither the Epicureans nor the Stoics were the first nor were they the last to believe these apposing positions to be the way of truth. Around two centuries earlier, empiricist Heraclitus [535-475 BCE] was proclaiming that you can't step in the same river twice, whilst Parmenides [515-450 BCE] firmly believed that nothing changes.

Nearly 2.5 millennium later, we remain unable to guarantee certainty; we can believe with all sincerity but never with warrant. Whatever our position – even those of us who would proclaim radical skepticism – we all have still minimally to get by: we all engage in believing tempered by faith, hope and trust.

Terry Eagleton has suggested that “faith is for the most part performative rather than propositional” (2009: 111). Earlier he speaks of ‘an article of faith’ the definition of which given in the Cambridge Dictionaries Online is “something you believe in very strongly”, and in the Merriam-Webster as “basic belief”. He has to say:

There are those for whom the spectacular successes of science have rendered religion redundant; and there are others for whom those successes spring from a fundamental fact – that our minds seem somehow attuned to the fundamental stuff of the world – which is itself cause for metaphysical reflection.

Why is it that mathematics of all things, seems to encode the intelligibility of the physical universe, and is it reasonable for science to take this, along with the uniformity of physical laws, simply as an article of faith? Is it equally reasonable for science to place its faith in the consistency of mathematics, even when Gödel’s second theorem demonstrates that it cannot be proved? Do we too easily take for granted the fact that before we have even come to reason, the world is open and available to us in the first place? (*Ibid.* 12)

Although faith, by definition, does not rely on evidence or proof, science and religion are by no means necessarily irreconcilable. There are those whose faith is belief *based* on testimony or authority, those whose faith is belief *guided* by testimony or authority, and those whose belief is *fixed* by testimony or authority. Reconciliation may be difficult for the first mentioned and impossible for the last, but for those for whom faith is a *guide*, there may well be tension, but conflict is not inevitable (see Paavola 2001). Nor is the *impasse* presented by nominalism. Peirce’s realism overcomes nominalism because it is temporal process and hope, the reach of subjects into the unknown – the future. “Hope”, according to Eagleton, “must be fallible” (2015: 3) and “is for the most part the future tense of faith” (*Ibid.* 68). He notes that “Peirce argues that the process of acquiring knowledge involves hope in the progress of intellectual activity itself, and that in this sense hope is one of the ‘indispensable requirements of logic’ (*Ibid.* 82; CP 5:357). Knowledge, however, is never more than fact, that is, actuality. Hope reaches out to the future which is the unknown. And yet, as a line in the poem ‘*Ailleurs, ici, partout*’ (Here, there, everywhere) (1946) by the French poet Paul Éluard: *L’espoir ne fait pas de poussière*. (Hope raises no dust.) Perhaps hope is considered too passive for modernity.

And then there is trust. The German philosopher and sociologist, Georg Simmel [1858-1918] understood trust well. His champion Guido Möllering’s paper ‘The nature of trust: from Georg Simmel to a theory of expectation, interpretation and suspension’ (2001). Of particular importance from Möllering’s perspective, is “the recognition of affect besides reason, and system trust besides personal trust”; from the perspective taken here, of greatest importance is that Simmel’s work is process-based – trust powers process. Simmel’s ‘leap’ is reminiscent of the ‘leap of faith’ described by Søren Kierkegaard [1813-1855]. Möllering (pp. 405-406) tells us that according to Simmel (1900, 1990: 179):

To ‘believe in someone’, without adding or even conceiving what it is that one believes about him, is to employ a very subtle and profound idiom. It expresses the feeling that there exists between our idea of a being and the being itself a definite connection and unity, a certain consistency in our conception of it, an assurance and lack of resistance in the surrender of the Ego to this conception, which may rest upon particular reasons, but is not explained by them.

In a footnote Möllering (p.405) brings attention to the fact that in translation of the German *Vertrauen*, “the terms confidence and trust are both used ‘according to context’ (Simmel 1908, 1950: 345). He then points out that for Simmel, confidence is “an antecedent or subsequent form of knowledge” (1908, 1950: 318). Confidence, Simmel further notes “is intermediate between knowledge and ignorance about a man” which “is a logical consequence of the view that complete knowledge or ignorance would eliminate the need for, or possibility of, trust” (1908, 1950: 318).



Simmel stresses reciprocity and the relational quality of trust, whereas other sources consider trust mainly as an individual's state of mind. Ultimately, as Möllering (p.407) notes, Simmel "attributes a high moral value to trust which makes it a rather special medium of social exchange (1908, 1950: 348):

For, in the confidence of one man in another lies as high a moral value as in the fact that the trusted person shows himself worthy of it. Perhaps it is even more free and meritorious, since the trust we *receive* contains an almost compulsory power and to betray it requires thoroughly positive meanness. By contrast, confidence is 'given'; it cannot be requested in the same manner in which we are *requested* to honor it, once we are its recipients.

Trust as Simmel conceived it, bears an uncanny likeness to Peirce's metaphysical concept of *Agape*.

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At the centre of Peirce's philosophy is his normative sciences. If the fractal pattern of his architectonic in relation to his categories, that I suggested in Part 1, maintains, then for his philosophy: his phenomenology is a First of a Second – his normative sciences – of a Third – his metaphysics. In like manner for his normative sciences: esthetics is a First of a Second – ethics – of a Third – logic.

During 1855, the year he entered college and began the study of Kant, Peirce and his then best mate, Horatio Paine, spent hours discussing Friedrich Schiller's *On the Aesthetic Education of Man in a Series of Letters*, (1795) (1801, 1954). This was Peirce's first and, probably, last consideration of aesthetics for some decades. Of particular interest is the dilemma and its horns that Schiller outlined in the first footnote of the Thirteenth Letter:

Once we assert the primary, and therefore necessary, antagonism of the two impulses, there is really no other means of preserving the unity in Man except by the unconditional *subordination* of the sensuous impulse to the rational. But the only result of that is mere uniformity, not harmony, and Man remains forever divided. Subordination there must indeed be, but it must be reciprocal; for although limits can never establish the Absolute – that is, freedom can never be dependent on time – it is equally certain that the Absolute by itself can never establish the limits, that conditions in time cannot be dependent on freedom. Both principles are at once mutually subordinated and co-ordinated – that is, they act and react upon each other; without form no matter, without matter no form. ... Necessary as it may be that feeling should decide nothing in the realm of reason, it is equally necessary that reason should not presume to decide anything in the realm of feeling. In the very act of awarding to either of them its own territory we are shutting the other out, and giving each of them a boundary which can be crossed only to the injury of both.

Parmenides, the founder of the Eleatic School and of Western metaphysics, was a monist. He argued that 'being' is an indivisible 'whole'; that there is no epistemological validity to sense experience such as that expounded by Heraclites, rather logical standards are the criteria of truth. Zeno of Elea [490-430 BCE], also a monist, formulated the paradoxes of which he is famous and which Simmel emulated in his footnote above. A couple of ways around these dilemmas were the Pluralism of the likes of Anaxagoras [500-428 BCE] and Atomism as theorised by Leucippus [*fl.* 440 BCE) and systematized by Democritus [460-457 BCE]. Aristotle [384-322 BCE] was the first to pay serious attention to the problem presented by discreteness and continuity His arguments were rejected by the Epicureans but upheld by the Stoics. Likewise, the concept of infinitesimals, first raised by Democritus was controversial and remains contested into the present. If you come to this believing in the analytic method, that infinitesimals are nonsense, that science is value free, I ask that you read this as if it is a novel and to suspend disbelief. By so doing you may discover the reality 'matting' is the creative act of being and becoming.



## Chapter 5 Information

Anthony Kenny, in the 'General introduction' to his *A New History of Western Philosophy* (2010), tells his readers:

Philosophy is not a matter of expanding knowledge or acquiring new truths about the world; the philosopher is not in possession of information that is denied to others. Philosophy is not a matter of knowledge; it is a matter of understanding, that is to say, of organizing what is known. (Kenny, 2010: x)

He has equated information with knowledge – with content – and differentiated it from understanding which he equates with organizing content – with process. Unfortunately, Kenny does not appear to realise that, conceived of as content, information is not knowledge, nor, as process, is understanding the equivalent of organising. No amount of progress in organising content, that is, knowledge, will bring information to light. Nor will it produce the kind of fit that is understanding. To give him his due, he was expanding on his explanation of progress in philosophy. For him (*Ibid*):

The difference between what we might call the Aristotelian and the Wittgensteinian attitude to progress in philosophy derives from two different views of philosophy itself. Philosophy may be viewed as a science, on the one hand, or as an art, on the other.

He argues that philosophy is neither art nor science but rather lies somewhere between the two. This, I agree, is more appropriate than the traditional view of philosophy as art, or of Peirce's view that, as engaged in discovery through inquiry, it is science. To clarify this, let me reintroduce Peirce to Part 2.

During 1855, the year he entered college and began the study of Kant, Peirce and his then best mate, Horatio Paine, spent hours discussing Friedrich Schiller's *On the Aesthetic Education of Man in a Series of Letters*, (1795) (1801, 1954). I too read Schiller's to see what captivated the two boys. Of particular interest to my mind, is the dilemma and its horns outlined in the first footnote of the Thirteenth Letter:

Once we assert the primary, and therefore necessary, antagonism of the two impulses, there is really no other means of preserving the unity in Man except by the unconditional *subordination* of the sensuous impulse to the rational. But the only result of that is mere uniformity, not harmony, and Man remains forever divided. Subordination there must indeed be, but it must be reciprocal; for although limits can never establish the Absolute – that is, freedom can never be dependent on time – it is equally certain that the Absolute by itself can never establish the limits, that conditions in time cannot be dependent on freedom. Both principles are at once mutually subordinated and co-ordinated – that is, they act and react upon each other; without form no matter, without matter no form. ... Necessary as it may be that feeling should decide nothing in the realm of reason, it is equally necessary that reason should not presume to decide anything in the realm of feeling. In the very act of awarding to either of them its own territory we are shutting the other out, and giving each of them a boundary which can be crossed only to the injury of both.

Recalling this time with his friend forty-something years later, Peirce came to the realisation that Esthetics (aesthetics) informs Ethics. This is the connection, cited in Part 1, between philosophy and science that Peter Forrest (1991) calls 'aesthetic understanding'. Once one grasps Peirce's method, one sees that it is as creative as any work of art, not least because of his engagement of imagination through the process of abduction. But so too is it science though its ability to reveal the reality of the evolving and developing cosmos. It is art-semeiotic-science.

Part 1 focuses on Peirce's third heurctic science – Formal Science: "the means and the method for conducting inquiry" (MS 108, begun in 1865; W1: 303) – particularly on his philosophy, although I was also concerned with illuminating his idea of pure mathematics as the genesis of creativity. At the centre of his philosophy is his normative sciences. If the fractal pattern of his architectonic in relation to his categories, that I suggested in Part 1, maintains, then for his philosophy: his phenomenology is a First of a Second: his normative sciences, of a Third: his metaphysics. In like manner for his normative sciences: esthetics is a First of a Second: ethics, of a Third: logic. Peirce's first heurctic science – positive science – "is experimental science ... conducted for the purpose of determining the ontological validity of a hypothesis" (*ibid*). His second heurctic science, Semiotic – the science of representations ...

is the process of reasoning ... conducted for the purpose of determining meaning. It entails creation, explication and verification of a hypothesis" (*Ibid*).

Peirce outlined a theory of information a combination of his three heuristic sciences – which he defined as "the connection of form with matter" (CP2.418n, 1893). His theory of information provides the resolution to the either/or problem of empirical OR rationalist approaches to inquiry. His identification of abduction as the creative ground of mathematics, phenomenology as the clarifier of observation, and rhetoric as interpretive boost of logic revealed the gateway to his reconstructed metaphysics and ultimately the means of discovering the information of reality. André de Tienne (2006) points out that: "Peirce's pragmatic theory of information is indissolubly connected to his semiotic theory of propositions, itself an elaborate outgrowth of the traditional subject-predicate propositional logic and of the logic of relatives." The theoretical physicist, Frank Wilczek, in speaking of the behaviour of protons and in particular "the indeterminism for which quantum mechanics is famous and which caused Einstein such anguish" has this to say (2006: 46):

This abundance of coexisting possibilities in the phenomena and in the quantum theory that describes them, defies traditional logic. The success of quantum theory in describing reality transcends and in a sense unseats classical logic, which depends on one thing being "true" and its contraries "false."

Notwithstanding that logic is concerned with truth, it is truth *en futuro*. Logic, for Peirce, is a way of dealing with ontology and is directed at the elucidation of reality. As de Tienne (2006) sees it: "truth is not a disembodied property of arbitrary definitions, but a consequential measure of a proposition's capacity to represent "real things", that is, things rooted in an actual world of action and reaction." In a footnote to this he further points out that Peirce explained (EP2: 278, 1903) that "nominal definitions are propositions in the imperative mood and thus not real propositions, which require the indicative mood: a real anchor is a *sine qua non*." Andrew Smith (2009) argues that Peirce offered an account of the *pragmatic* meaningfulness of truth: "of what the experience of grasping truth would involve." In this light, whilst propositions may be *linguistically* meaningful, they are pragmatically meaningless if they cannot be explained in terms of observable effects associated with experiencing their object.

Reality, according to Peirce, is the object of true propositions. And true propositions, which are associated with true beliefs, remain indefeasibly settled not because inquirers are fated to accept them but because they stand up effectively to whatever scrutiny they face (*Ibid*. 3).

Peirce conceded to bivalence only in the case of a dyadic value system:

The simplest of value systems serves as the foundation for mathematics and, indeed, for all reasoning, because the purpose of reasoning is to establish the truth or falsity of our beliefs and the relationship between truth and falsity is precisely that of a dyadic value system (MS6).

Mathematics reveals necessary, but *hypothetical* truth. Positive facts are dyadic – they are secondness – but to be known, they must be triadic, that is, they must be meaningful. In situations of what Peirce called "buried secrets" – past facts that may be irretrievable – if they lack practical significance in accordance with the pragmatic maxim, truth-value is of no conceivable consequence.

Peirce defined information as "the connection of form with matter" (CP2.418 n, 1893). His discussion of information was brief, so let me quote him in full as he worked through to this definition.

In his paper 'Upon logical comprehension and extension' (1867) and adopting William Hamilton's terms 'breadth' and 'depth' for 'extension' and 'comprehension' respectively, Peirce said:

By the informed breadth of a term, I shall mean all the real things of which it is predicable, with logical truth on the whole in a supposed state of information. By the phrase "on the whole" I mean to indicate that all the information at hand must be taken into account and that those things only of which there is on the whole reason to believe that a term is truly predicable are to be reckoned as part of its breadth.

In a footnote added in 1893 he wrote:

I restricted myself to terms, because at the time this chapter was first written (1867), I had not remarked that the whole doctrine of breadth and depth was equally applicable to propositions and to arguments. The breadth of a proposition is the aggregate of possible states of things in which it is true; the breadth of an argument is the aggregate of possible cases to which it applies. The depth of a proposition is the total of fact which it asserts of the state of things to which it is applied; the depth of an argument is the importance of the conclusions which it draws. In fact, every proposition and every argument can be regarded as a term.

Returning to the 1867 paper, he referred to his paper 'On a new list of categories' presented earlier that year in which he said he endeavoured to show that:

...the three conceptions of reference to a ground, reference to a correlate and references to an interpretant, are those of which logic must principally make use. I there also introduced the term "symbol," to include both concept and word. Logic treats of the reference of symbols in general to their objects. A symbol, in its reference to its object, has a triple reference:

First, Its direct reference to its object, or the real things which it represents;  
Second, Its reference to its ground through its object, or the common characters of those objects;  
Third, Its reference to its interpretant through its object, or all the facts known about its object.

What are thus referred to, so far as they are known, are:

First, The informed breadth of the symbol;  
Second, The informed depth of the symbol;  
Third, The sum of synthetical propositions in which the symbol is subject or predicate, or the information concerning the symbol.

By breadth and depth, without an adjective, I shall hereafter mean the informed breadth and depth.

It is plain that the breadth and depth of a symbol, so far as they are not essential, measure the information concerning it, that is, the synthetical propositions of which it is subject or predicate. This follows directly from the definitions of breadth, depth and information. Hence it follows:

First, That, as long as the information remains constant, the greater the breadth, the less the depth;

Second, That every increase of information is accompanied by an increase in depth or breadth, independent of the other quantity;

Third, that, when there is no information, there is either no depth or no breadth and conversely.

These are the true and obvious relations of breadth and depth. They will be naturally suggested if we term the information the area and write--

Breadth X Depth = Area.

Further on in the paper he says:

It is only by confusing a movement which is accompanied with a change of information with one which is not so, that people can confound generalization, induction and abstraction. Generalization is an increase of breadth and a decrease of depth, without change of information. Induction is a certain increase of breadth without a change of depth, by an increase of believed information. Abstraction is a decrease of depth without any change of breadth, by a decrease of conceived information. Specification is commonly used (I should say unfortunately) for an increase of depth without any change of breadth, by an increase of asserted information. Supposition is used for the same process when there is only a conceived increase of information. Determination, for any increase of depth. Restriction, for any decrease of breadth; but more particularly without change of depth, by a supposed decrease of information. Descent, for a decrease of breadth and increase of depth, without change of information.

In a footnote added in 1893 to this last point he says:

Ascent is the most unequivocal noun to denote the passage to a broader and less deep notion, without change of information; and other words of similar literal meaning are used in the same way. It is the decrease in depth, of course, which is directly expressed, the increase in breadth being implied. Extension, which directly expresses increase of breadth, has a somewhat different meaning. It is applied to the discovery (by increase of information) that a predicate applies--*mutatis mutandis*--to subjects to which it had not occurred to us to apply it. It involves no

decrease of depth. ... Generalization in its strict sense, means the discovery, by reflection upon a number of cases, of a general description applicable to them all.

Through inquiry, information emerges by way of a continuous semeiotic process. Knowledge is discovered information; it is only ever partial and never certain. Furthermore, as Peirce explained in a letter to William James (EP 2:495, 1909) in speaking of what he called the Immediate Object and the Dynamical Object, the Immediate Object is "the Object as it is regardless of any particular aspect of it, the Object in such relations as unlimited and final study would show it to be" whereas the Dynamical Object "is the Object that Dynamical Science (or what is called "Objective" science) can investigate." Let me reiterate some of the material covered in Part 1. The Dynamical Object, as experience is indubitable; of itself it is not intelligible. It is the Immediate Object that is cognised through a continuous semeiotic process. Peirce's semeiotic, or system of signs, is implied by his pragmatist maxim. As Hausman notes (1993: 57-58):

if meaning consists of ever-widening connected consequences, then the pragmatist's maxim concerns a dynamic system of references – a growing web of consequences and their interpretations, which not only refer to but which themselves also refer to further interpretations.

In this regard, Peirce distinguished between the Immediate Interpretant, the Dynamical Interpretant and the Final Interpretant:

...in the first place, the Immediate Interpretant, which is the interpretant as it is revealed in the right understanding of the Sign itself and is ordinarily called the *meaning* of the sign; while in the second place, we have to take note of the Dynamical Interpretant which is the actual effect which the Sign, as a Sign, really determines. Finally there is what I provisionally term the Final Interpretant, which refers to the manner in which the Sign *tends* to represent itself to be related to its Object. (CP4.536, 1906)

Three years later, in a letter to Lady Welby, he expanded on his Final Interpretant which he then spoke of as:

...the effect the Sign *would* produce upon any mind upon which the circumstances should permit it to work out its full effect. [---] ...the Final Interpretant is the one Interpretative result to which every Interpreter is destined to come if the Sign is sufficiently considered. [---] The Final Interpretant is that toward which the actual tends. (SS 110-1, 1909)

Informed meaning of Dynamic Objects is the purpose of inquiry. As events, Dynamical Objects are always evolving and thus, in a manner of speaking, always outstrip any knowledge gained. As stated above, Peirce's pragmatism is a method of determining meaning, not a doctrine of the truth of things (MS 322, 1907). His logic or semeiotic, is not, therefore, equivalent to classical logic. In speaking of his pragmatic elucidation of truth Andrew Smith (2009) explains that for Peirce, truth is an epistemic ideal. Propositions can be said to be true and continue to be true, to the extent they stand up effectively to whatever scrutiny they face. Any scrutiny, perforce, involves engagement in semeiotic.

As noted, Peirce used the term "symbol," to include both concept and word and defined them as follows:

Symbols and in some sort other Signs, are either Terms, Propositions, or Arguments. A Term is a sign which leaves its Object and *a fortiori* its Interpretant, to be what it may. A Proposition is a sign which distinctly indicates the Object which it denotes, called its Subject, but leaves its Interpretant to be what it may. An Argument is a sign which distinctly represents the Interpretant, called its Conclusion, which it is intended to determine. That which remains of a Proposition after removal of its Subject is a Term (a rhema) called its Predicate. That which remains of an Argument when its Conclusion is removed is a Proposition called its Premiss<sup>4</sup>, or (since it is ordinarily copulative) more usually its Premisses (CP2.95, 1902).

For him, "the *purport* of words is nothing but their *purpose*" (MS463, 1903); for words to have meaning they must include Firstness, Secondness and Thirdness. The difference between information and knowledge in Peircean terms is the difference between the "immediate object" and the "dynamical object", where "object" may be better understood as "event". Knowledge is that which is found by

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<sup>4</sup> Manley Thompson points out that Peirce used the spelling "premiss" instead of "premise" because "premiss" is derived from the medieval logicians' *praemissa*, while "premise" is properly a legal term... (1953)

collateral experience, that is, it is what is discovered by means of the heuritic sciences and which can be learnt. It is the provenance of discoverers and learners. Knowledge as the difference between the "immediate object" and the "dynamical object", is meant literally: it is that which might be, is, or may be *taken* from the latter as represented by the former. Realising this difference also suggests why Peirce's focus was on meaning rather than truth and on fallibilism rather than certainty. The need is to consider semeiotic, not as language for communicating, but as signs that inform. Seen this way, it is as relevant to the physical sciences as it is to the life sciences of the creating of something from nothing – of 'matting'.

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Most of the contemporary material about information is concerned with information technology and artificial intelligence. The book of papers *Information and the Nature of Reality: From Physics to Metaphysics* (2010) is different. If various of the authors are courageous enough to up their ability to Accommodate – that is change their mental schemata – rather than try to Assimilate – squeeze objective reality – to fit their idea of it, they can progress their respective disciplines. In their introduction to the book (which I will quote at length because of its change of focus regarding information) the editors Paul Davies and Niels Henrik Gregersen comment that:

...information makes a causal difference to our world – something that is immediately obvious when we think of human agency. But even at the quantum level, information matters. (2010: 7)

Paul Davies, in his paper 'Universe from bit' (pp. 65-91), writes: "If one adopts the philosophy that information is primary and ontological, then such a self-consistency argument should be incorporated in a larger program directed at unifying mathematics and physics" (p. 87). Frank Wilczek, in his *The Lightness of Being: Mass, Ether and the Unification of Forces* (2008) entitles one of the chapters 'The bits within the its' and speaks of *embodied ideas*; Davies has the heading 'It from bit'. Both in their way are talking about Information. Davies writes:

The traditional relationship between mathematics, physics and information may be expressed symbolically as follows:

Mathematics      →                      Physics                      →                      Information

... However, an alternative view is gaining in popularity: a view in which *information* is regarded as the primary entity from which physical reality is built. ...

Information      →                      Laws of Physics                      →                      Matter

After all, the laws of physics *are* informational statements: they tell us something about the way the physical world operates. (p. 75)

...quantum mechanics says that the states of matter are fundamentally discrete rather than continuous, so they form a countable set. (p. 77)

In standard thermodynamics, as applied to heat engines, say, entropy is a measure of the degree of disorder of a system, or, alternatively, the negative of the amount of useful energy that may be extracted to perform work. (p. 77)

...entropy can be regarded as a measure of ignorance (Szilard, 1929, 1964) ... Ignorance is the flip side of information, so we may deduce a mathematical relationship between entropy and information *I*. (p. 78)

The link between information (loss) and area seems to be a very deep property of the universe ... a so-called *holographic principle* ... an analogy based on the fact that a hologram is a three-dimensional image generated by shining a laser on a two-dimensional plate. (p. 79)

Furthermore, to understand Peirce's metaphysics of developmental evolution is to realise that Davies statement that "the laws of physics are inherent in and emergent with the universe, not transcendent of it" (p. 83) assumes that the universe is imbued with information. I agree, with Davies statement that:

The flip side of infinity is the use of infinitesimal intervals which form the basis for the calculus. In view of the fact that all the fundamental laws of physics are expressed as differential equations, the status of infinitesimals is crucial. ... Can an interval of space or time be subdivided without limit? (p. 88)

According to Peirce "continuity is the leading conception of science" (CP1.62, 1896) He describes continuity as "merely a discontinuous series with additional possibilities" (CP1.170, 1897). These additional possibilities are infinitesimals. Peirce says of continuity:

...in case of ignorance it is best to adopt the hypothesis which leaves open the greatest field of possibility; now a continuum is merely a discontinuous series with additional possibilities. Among positive reasons, we have that apparent analogy between time and space, between time and degree and so on. There are various other positive reasons, but the weightiest consideration appears to me to be this: How can one mind act upon another mind? How can one particle of matter act upon another at a distance from it? The nominalists tell us this is an ultimate fact — it cannot be explained. Now, if this were meant in [a] merely practical sense, if it were only meant that we know that one thing does act on another but that how it takes place we cannot very well tell, up to date, I should have nothing to say, except to applaud the moderation and good logic of the statement. But this is not what is meant; what is meant is that we come up, bump against actions absolutely unintelligible and inexplicable, where human inquiries have to stop. Now that is a mere *theory* and nothing can justify a theory except its explaining observed facts. It is a poor kind of theory which in place of performing this, the sole legitimate function of a theory, merely supposes the facts to be inexplicable. It is one of the peculiarities of nominalism that it is continually supposing things to be absolutely inexplicable. That blocks the road of inquiry. But if we adopt the theory of continuity we escape this illogical situation. We may then say that one portion of mind acts upon another, because it is in a measure immediately present to that other; just as we suppose that the infinitesimally past is in a measure present. And in like manner we may suppose that one portion of matter acts upon another because it is in a measure in the same place. (CP1: 170, 1897)

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'Semiotic freedom: an emerging force' (pp. 185-204) by Jesper Hoffmeyer: Hoffmeyer is associated with the International Society of Biosemiotic Studies. Unlike Terrence Deacon, who relies on Morris's semiotics, Hoffmeyer demonstrates an understanding of Peirce's semeiotic. He introduces the subject of 'Information in evolution' noting that:

...the meaning of the term "information" is loaded with ambiguities. Whereas theorists may eradicate such ambiguities by rigorous definition, it is often less than clear how well-defined concepts of information relate to the actual use of information as an explanatory tool (p. 186).

In discussing "the heuristic value of the information metaphor" he notes that "something is added to our understanding when we talk about information rather than just about chemistry" (p. 187) and in a footnote, he brings to our attention that:

One promising candidate for an information concept that is both rigorous and biologically useful has been developed in ecology as the so called "average mutual information" a measure for how well organised or determinate a configuration of ecological relationships appears. Theoretical ecologist Robert Ulanowicz has developed this concept further to a concept of *ascendency* that represents: "the coherent power a system could bring to bear in ordering itself and the world around it" (Ulanowicz, 2009) (ff. p. 187).

He then suggests that "the heuristic value of the information concept is connected to the role that history (evolution) plays in the life of cell and organisms" (p. 187).

At the surface, genetic information is treated as if it was just a simple causal factor, but its deep appeal to our understanding derives from its hidden connotation of an otherwise tabooed intentionality. The exclusion of history may be relatively innocent at the level of molecular biology itself, but when molecular biology is understood as the basis for genetics and evolution, this ahistorical understanding serves to reify processes that are in fact embedded in contextual constraints that should be accounted for in our theories. (p. 188)

Biosemiotics suggests that living systems should be studied as semiotic systems in their own right. This idea is based on the belief that the poverty of the information discourse in biological sciences results from the reductive neglect of the interpretative aspect of biological information.



By introducing the concepts of the sign as developed by ... Peirce ... as a substitute for information, it will be assured that the interpretative side of information is not neglected (p. 189).

To speak of living systems as semiotic systems in their own right is, I take it, saying that a semiotic system does not stand for something else, but rather that *it is*. Whilst semiosis may be instrumental, that is, it may be used epistemologically by (among others) biosemioticians; biosemioticians and other subjects (and predicates) are ontological. Hoffmeyer notes that:

Signs, however, are not causes in the traditional sense of (Aristotelian) efficient causality, for the effect of a sign is not compulsory but depends upon a process of interpretation and the interpretation may well be – and probably most often is – mistaken (p. 190).

Although nobody in science denies that living creatures are the result of an evolutionary process, the process is normally not conceived as historical in the usual sense of this term, because it is assumed to have obeyed the deterministic rule of natural laws. The metaphysics of determinism, however, seem less and less supported by the findings of modern science (p. 191-192).

The historical nature of the world has profound consequences for the study of life, because it confronts us with the problem of organization in a new way. If the complex forms of organization exhibited by living systems – from the cell to the ecosystem – are not the inescapable result of predictable lawfulness, they must instead have emerged through processes that are still in need of discovery. The principle of natural selection, of course, greatly helps us in explaining the widespread adaptedness of biosystems, but we need an additional principle that would solve the fundamental question of the “aboutness” of life, the never-ending chain of attempts by living systems to come to terms with their conditions of life (p. 192).

He then points out that “aboutness” ... is not derivable from the principle of natural selection for the simple reason that it is required for natural selection to operate in the first place” (p. 192). As he sees it:

The difficult problem to solve in any theory of the origin of agency [“aboutness”] and life is how to unify two normally quite separate kinds of dynamics: a dynamics of chemical interaction patterns and a dynamics of signification or semiosis. This immediately places this question in the contextual situation of the environment (p. 193).

By way of an analogy he then provides us with a way of grasping the meaning of this. As he puts it:

Living organisms are inscribed in their environment much like patterns woven into a carpet – the two cannot get apart. From a semiotic point of view, the decisive step in the process that led to the origin of life was the appearance in the world of a new kind of asymmetry, *an asymmetry between inside and outside (Ibid)*.

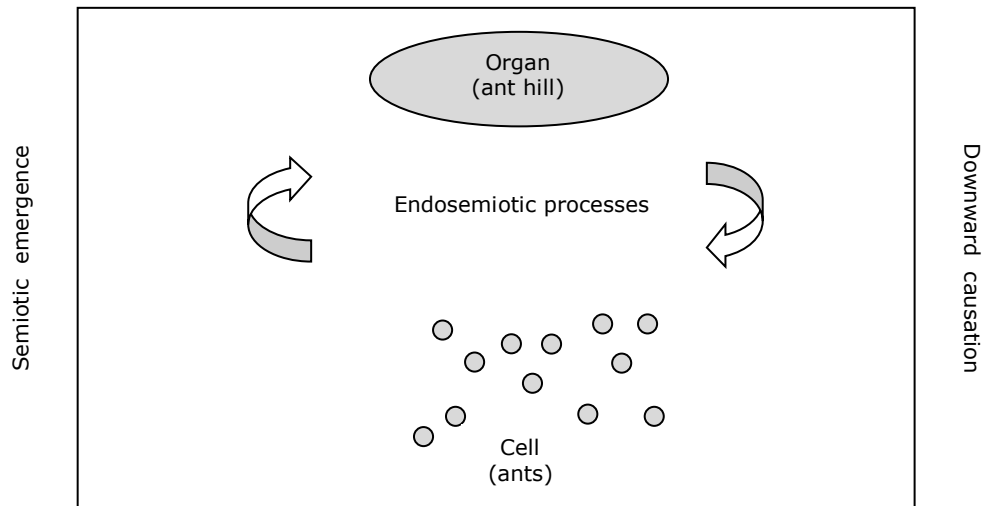
Hoffmeyer then shows the operation of semiotic freedom.

In the semiotic understanding ... the chemotactic machinery serves to integrate the sensing of the outer world to the reality of the inner world as this reality is described in the self-referential, or generic, systems (p. 195).

...natural selection will favour any solution that helps the organism to better interpret the situation it meets. Indeed, selection would be expected to favour the evolution of more sophisticated forms of “semiotic freedom” in the sense of an increased capacity for responding to a variety of signs through the formation of (locally) “meaningful” interpretants (p. 196).

He follows this by declaring that: “Allowing for semiotic freedom in the organic world significantly changes the task of explaining emergent evolution, because semiotic freedom has a self-amplifying dynamic” (p. 196). As he puts it: “Instead of the Cartesian either-or thinking, biosemiotics institutes a more-or-less thinking” (p. 197).

He explains this semiotic emergence through the operation of downward causation, which he says “may be seen as an attempt to express parts of what used to be called “final causation”” (p. 197) – what Peirce called the finious process of causation. For Hoffmeyer “semiotic emergence and downward causation are two sides – or rather two aspects – of the same coin, which I would prefer to call “semiotic causation,” bringing about effects through a process of interpretation” (p.1 98). His diagram below illustrates how this works. This particular example also illustrates how Peirce’s notion of community *vis-a-vis* individuals operates in a system.



**Figure 14:** *The connection between semiotic emergence and downward causation (Hoffmeyer 2001: 200): Downward causation operates through indexical sign relations, that is, the values of system parameters and interpreted by lower-level agents as indexical signs. But this state of affairs in itself presupposes the formation in the first place of a large-scale pattern with a behavior that stabilizes the semiotic interaction between parts.*

Hoffmeyer concludes, under the heading of 'Biosemiotics and God', that:

The biosemiotic approach ... overturns the need for, or legitimacy of, the argument for intelligent design. Biosemiotics does not logically entail any stance on the presence or absence of a transcendental creator, but it may be seen as rescuing the scientific world view from the need of admitting such a transcendental power, a need seems rather inescapable if one adheres to a traditional scientific perspective (p. 202).

His final paragraph reflects the position I take:

The present author remains agnostic towards the questions of a transcendent or immanent deity, but notes that such agnosticism would have been hard or impossible to maintain, had it not been for the biosemiotic solution to the hard problem of natural intentionality (p. 203).

It is this position I take because it not only does away with the need to affirm or deny a belief in God in science, but that it does so without the need to side-step the issue in the pursuit of discovery in the natural sciences. Peirce railed against dogma – against 'blocking the road of inquiry' - not against belief (or non-belief) in God. The solution to the matter of natural intentionality, which attention to Peirce's semeiotic successfully addresses, is one that can serve the physical sciences by following the lead of biosemioticians such as Hoffmeyer.

Claus Emmeche, of the International Society of Biosemiotic Studies, says "understanding C. S. Peirce is mandatory in biosemiotics". He shows just such an understanding when he and co-authors Charbel Niño El-Hani and João Queiroz in *Genes, Information and Semiosis* (2009) point out that it has been shown that "there are several epistemological flaws in the treatment of 'biological information' in 'systems biology, most importantly, a troublesome confusion between information handled by organisms and information handled by the observer. Hoffmeyer and Emmeche had previously argued that "both the metaphors of 'information' and 'program' make the dilemmas of form and substance disappear by simply treating DNA (a substance) and program (information/or potential form) as one and the same thing" (2009: 18). This "one and the same thing" is information as Peirce formulated it:  $I = MF$ . Using Peircean terms to build a framework for theorising information as a process, they formulate: "[Information = semiosis] A triadic-dependent process through which a form embodied in the Object in a regular way is communicated to an Interpretant through the mediation of a Sign" (p. 96). Their definition of process follows that of Nicholas Rescher in *Process Metaphysics: An Introduction to Process Philosophy* (1996: 38): "... a co-ordinated group of changes in the complexion of reality, an organized family of occurrences that are systematically linked to one another either causally or functionally."

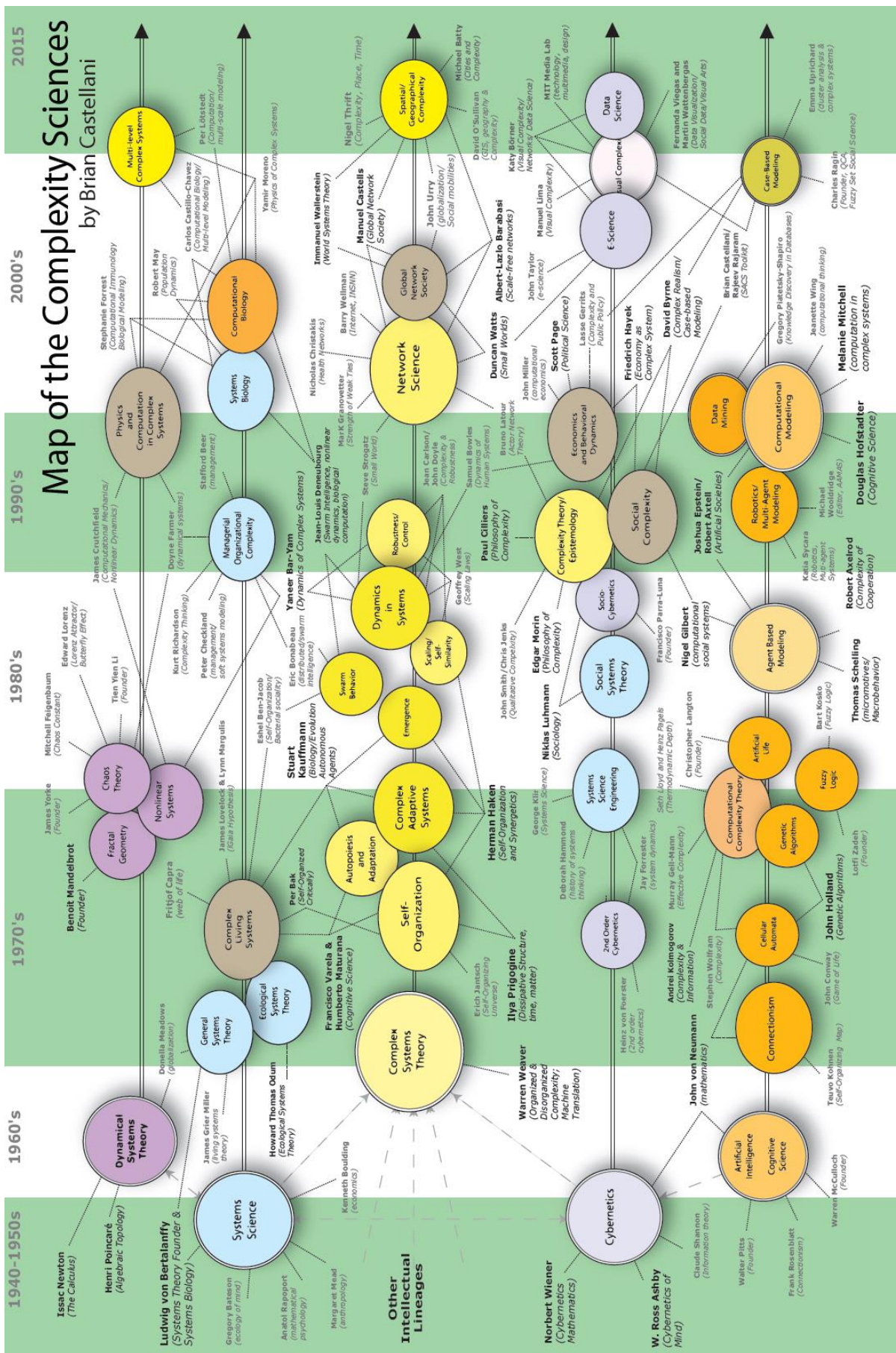


Figure 15: Brian Castellani’s Map of the Complexity Science (2013)

Information as the product of matter and form through time is complex and is in need of a theory to grasp its meaning. Figure 15 above maps some of the development of such theories. This map by Brian Castellani was one of ten maps exhibited by the Places & Spaces: Mapping Science Project in their 9th iterations (2013) *Science Maps Showing Trends and Dynamics* and is intended to show complexity science's major intellectual traditions, leading scholarly themes and methods, as well as key scholars who founded or pioneered work. Whilst information is not the focus of the map, scholars who were concerned with information can be identified in each of the five trajectories. Gregory Bateson [1904-1980], for example, in *Form, Substance and Difference, in Steps to an Ecology of Mind* (1972) spoke of 'information' as a "difference that makes a difference".

Shannon and Kolmogorov are identified as main players by Pieter Adriaans and Johan van Benthem, the editors of *Philosophy of Information* (2008: 13), in their 'Introduction: information is what information does', when describing three stances from which to consider information:

*Information-A* Knowledge, logic, what is conveyed in informative answers  
*Information-B* Probabilistic, information-theoretic, measured quantitatively  
*Information-C* Algorithmic, code compression, measured quantitatively

Over-simplifying a bit, *A* is the world of epistemic logic and linguistic semantics, *B* that of Shannon information theory, linked to entropy in physics and *C* that of Kolmogorov complexity, linked to the foundations of computation. We do not feel that these are opposing camps, but rather natural clusters of themes and research styles. Thus, we felt that all of these need to be represented in our Handbook, since only their encounter gives us the proper canvas for philosophical enquiry.

Nevertheless Casagrande, along with Castellani and the contributors to *Philosophy of Information* focus on epistemological rather than ontological issues of metaphysics. However, their identification of process does warrant consideration when attempting to understand reality: cybernetics, globalisation, self-organization including self-organized criticality, fractal geometry, autopoiesis, adaption, the 'butterfly' effect, nonlinear dynamics, synergetics, swarm intelligence, emergence ... the list goes on.

David Casagrande's 'Information as verb: re-conceptualizing information for cognitive and ecological models' (1999) posited that "current notions of information are inadequate for ecological and cognitive models because they 1) only account for information gain that results from reducing uncertainty; 2) assume binary logic; 3) fail to account for semantics and pragmatics; and 4) cannot account for shared and externalized cognition." He proposed an alternative model "which treats information as a process of state change". The physicist and writer Mark Buchanan's *Ubiquity: the Science of History* (2000) does the same for physics. He explains for the non-physicist the non-equilibrium phenomena of criticality. The theoretical physicists Per Bak, Chao Tang and Kurt Weisenfeld showed in 1987 in the sand-pile game they had devised that critical states are neither aberrations nor exceptional, but rather are natural and inevitable. Whilst avalanches and other phenomena such as volcano eruptions, earthquakes, bushfires happen – that much can be predicted – just when and where they will occur and their magnitude is, as yet, beyond our ken. Statistically, they do not plot on the normative linearity of a bell curve, but rather show as what are called power law patterns. Every grain of sand that fell in Bak, Tang and Weisenfeld's sand-pile game was the same as the first and each and every ensuing grain, but not so its effect. Each gain changed the ontological information of the whole pile which had been changed by each and every grain before it – its effect was in itself *and* in the pile and its history. The potential for avalanches, they found, is 'written' into the matter and formation – the information of a pile of sand.

As we come to understand process as information making, we come to realise that, quite literally, history matters as process.

## Chapter 6 In the beginning...

To talk about initiation of the universe is to enter into consideration of cosmogony: theories or accounts of the origin [L17] and creation [M18] of the universe. Many shy away from cosmogony because it inevitably raises the issue of God<sup>5</sup>. Nevertheless, it is a necessary precursor to any consideration of cosmology: theories or postulate accounts of the evolution and structure of the universe [M17] and the branch of philosophy or metaphysics which deals with the universe as a whole [M18]. Conflating these theories just obfuscates hard but important questions.

In the Western tradition, in response to the Scholastics' question "*An sit Deus?*" (Is there God?), there are three<sup>6</sup> main arguments to the existence of God: the Ontological, the Cosmological and the Teleological. These are probably best called argumentations as they vary depending on who is doing the arguing. For Peirce:

An "Argument" is any process of thought reasonably tending to produce a definite belief. An "Argumentation" is an Argument proceeding upon definitely formulated premisses. (CP6.456, 1908)

The Ontological Argument argues from premises which derive from reason alone – from *a priori* and necessary premises – to the conclusion that God exists. It was first proposed by the scholastic Anselm [1034-1109] who in his *Proslogion*, derived the existence of God from the concept of a *being than which no greater can be conceived*. Descartes [1596-1650] further developed this in 'Meditation V' of his *Meditations on First Philosophy* and this was refined by Leibniz [1646-1716] in *New Essay Concerning Human Understanding*, (1709). The Islamic *falāsifa* (philosopher) Mullā Sadrā's [1571-1640] revision of Avicenna's [980-1037] Cosmological Argument brought a major transition from essentialism to existentialism in Islamic philosophy (*The Metaphysics of Mullā Sadrā. Kitab al-masha'ir (The Book of Metaphysical Penetrations)* (1991). Whilst he presaged Martin Heidegger's [1889-1976] *Being and Time* (1927) by three centuries, translation of Sadra's work into English only began in the second half of the twentieth century. Paul Tillich's [1886-1965] Ontological Argument employed central concepts from existentialism and identified God with the ground of all being. Gödel's Ontological Proof, first published by Hao Wang in his *Reflections on Kurt Gödel* (1987), is a logical investigation showing that Leibniz's proof with classical assumptions correspondingly axiomatized, is possible.

Peirce would not argue *a priori* – as discussed, he was vehemently antifoundationalist – but within mathematics he demonstrated the necessity of his categories of First, Second and Third as intermediate categories between Aristotle's substance (suchness) and being (thusness) to 'realise' the subject and predicate of any hypothesis. From an *a posteriori* position, beginning with his phenomenology, his arguments, then, were not for *existence* but for *reality*. As he said:

I myself always use exist in its strict philosophical sense of "react with the other like things in the environment." Of course, in that sense, it would be fetishism to say that God "exists." (CP6.495, 1906)

The Cosmological Argument argues that there was a "first cause", or "prime mover" which is identified as God, whilst the Teleological Argument argues from order and complexity of the universe and focusing on plan, purpose, intention or design, that these are best explained by reference to a creator God. Both the Cosmological Argument and the Teleological Argument are *a posteriori* arguments and are related. From the perspective of Hulswit's distinction between "*causation* – the production of an effect by its

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<sup>5</sup> Lest one blanches at the word 'God' may I quote Juliet to Romeo in Shakespeare's *Romeo and Juliet* (II, ii, 1-2):

What's in a name? That which we call a rose  
By any other name would smell as sweet.

<sup>6</sup> There are further four classic arguments: Pascal's Wager, the Moral Argument (deployed by Kant), the Argument from Religious Experience, and the Argument from Miracles, which I have not included here.

cause" – and "causality, which is the relationship between cause and effect" (2002: xiv), the Cosmological Argument is concerned with causation and the Teleological Argument with causality.

The Teleological Argument traces back to Socrates [469-399 BCE] who, according to Xenophon [427-355 BCE], argued that the adaptation of human parts to one another, such as the eyelids protecting the eyeballs, could not have been due to chance and was a sign of wise planning in the universe. Plato [427-347 BCE] believed that "everything that becomes or changes must do so owing to some cause; for nothing can come to be without a cause" (*Timaeus* 28a). He did not propose creation *ex nihilo*, but rather posited a "demiurge" of supreme wisdom and intelligence that made order from the chaos of the cosmos, imitating the eternal Forms. Aristotle [384-322 BCE] introduced his theory of the four *aitia* – prerequisite conditions, rather than causes, for answering 'why' questions – which he called the material (*hyle*), formal (*eidos*), efficient (moving) and final (*telos*) *aitia*. For the Stoics, as argued by Chrysippus [280-207 BCE] and commented on by Cicero [106-43 BCE], five of their most basic theses related to causation: 1) the world is ruled by fate, 2) nothing happens without a cause, 3) causation involves exceptionless regularity, 4) causation involves necessity and 5) there is a fundamental distinction between external and internal causes (Hulswit 2002: 5-6). Plotinus [205-270] a Neoplatonist, taught that the One transcendent absolute caused the universe to exist simply as a consequence of its existence - "*creatio ex deo*." His disciple Proclus [412-485] stated that 'the One is God'. Derived from Proclus's *Elements of Theology* was the *Liber de Causis* (or *Liber Aristotelis de Expositione Bonitatis Purae*; Book of Causes) a Latin translation of an Arabic work whose authorship is unknown, but is considered to be by an Islamic or a Jewish scholar.

In Islamic thought, there are two classical Cosmological Arguments. The first, the *kalām* (the use of reason by believers to justify the basic metaphysical presuppositions of the faith) cosmological argument, was developed by Muslim theologians (*mutakallimūm*) such as al-Kindī [801-873] and al-Ghazālī [1058-1111] and is based on the temporality (*huduth*) of the universe. The second, developed by the philosophers (*falāsifa*) such as al-Fārābī [870-950], Avicenna (ibn Sīnā) [980-1037] and Averroes (ibn Rushd) [1126-1198] is based on contingency (*imkan*) of the universe and is atemporal. In addition, there are two teleological arguments – the Qur'anic arguments from design – both of which were developed by Averroes as the argument from providence (*'inayah*) and the argument from creation (*ikhtira*). The *mutakallimūm* were influenced by Democritus (b.480 BCE) who maintained that the universe is comprised of individually indestructible atoms, which account for the formation and dissolution of all observable things. They used reason and argumentation to support their revealed Islamic beliefs and developed the *kalām* version of the argument from the impossibility of an infinite regress. For example, al-Ghazālī argued that everything that begins to exist requires a cause of its beginning. This version of the argument entered the Christian tradition through Bonaventure [1221–74] in his *Sentences* (II Sent. D.1, p.1, a.1, q.2). The *falāsifa* al-Fārābī divided *being* into *necessary* and *contingent*. *Necessary being* is that which exists in itself, or that which cannot but exist; non-existence of it is unthinkable. *Contingent being* is that which receives its existence from another and the non-existence of which is thinkable or possible. The idea that essence (*Mahiat*) precedes existence (*Wujud*) is a concept which dates back to Avicenna. As mentioned above, Avicenna's argument was later revised by Mullā Sadrā. The opposite idea, that existence precedes essence was first developed by Averroes.

The Jewish philosopher, Avendehut (ibn Daud) [1110-1180] was the first Jewish Aristotelian. He grounded Jewish theology on the metaphysics of Avicenna, providing an important influence on the work of Maimonides. Maimonides [1135-1204] proposed an elaborate form of Aristotle's unmoved or 'prime' mover argument, based on an Aristotelian conception of the motion of the heavens and arguments from the existence of change and from contingency, among others.

Augustine [354-430], originally a Neoplatonist, was a Christian apologist. Like the Jewish scholars, he did not put forward an argument for the existence of God, taking God to be a given, but in Books XI-XIII

of *Confessions* (397-8) and Book XI of *The City of God* (413-426) his atemporal teleology out of which the temporal cosmology proceeds by the will (action) of God, is both cogent and unique.

Influenced by all the aforementioned sources, Hulswit (2002: 8) points out that:

most thirteenth century philosophers distinguished two quite different sorts of efficient cause: the *causa prima* and the *causa secunda*, the former being the originative source of being (God), while the latter, which is to be found in created things only, referred to the origin of the beginning of motion or change. Thus, while the (secondary) efficient cause is the source of motion, there is also an active cause that is the source of being. The First Cause works in all secondary causes, which may be considered instrumental causes subservient to the first.

Such was the case for the scholastic Thomas Aquinas [1225-1274]. His five arguments for the plausibility of the existence of God begin with our experience of sense objects. Putting aside for the moment, the fourth argument – concerned with qualities – the first three ways are cosmological arguments and are concerned with efficient causes. The fifth way is teleological, dealing, as it does, with final cause. Hulswit (2002: 12 & 13) explains:

The efficient causes are subordinate to the final causes inasmuch as they are a *means* to ends. The final cause is responsible for a twofold necessity in things. The first kind of necessity (I) appears if we consider the cause-effect relationship from the perspective of the efficient cause.... The second kind of necessity (II) appears if the cause-effect relationship is viewed from the perspective of the effect or end state. It concerns the *means* as necessary condition for the end state. This is called *conditional necessity*.

The Fourth Way by Aquinas is commonly called the argument from degree. The argument translated from *Summa Theologicae* into English reads:

*The fourth way is taken from the gradation to be found in things. Among beings there are some more and some less good, true, noble and the like. But "more" and "less" are predicated of different things, according as they resemble in their different ways something which is the maximum, as a thing is said to be hotter according as it more nearly resembles that which is hottest; so that there is something which is truest, something best, something noblest and, consequently, something which is uttermost being; for those things that are greatest in truth are greatest in being, as it is written in Metaph. ii. Now the maximum in any genus is the cause of all in that genus; as fire, which is the maximum heat, is the cause of all hot things. Therefore there must also be something which is to all beings the cause of their being, goodness, and every other perfection; and this we call God.*

The fourteenth century opened with the fullest development of realism in John Duns Scotus [1266-1308] and closed with its eclipse by the nominalism of William of Ockham [1285-1349]. The Renaissance saw a rejection of the Latin of the Scholastics in favour of Greek and, at the hands of philosophers such as Montaigne [1533-1592], a reconsideration of skepticism rather than rational argument. Furthermore, acceptance of nominalism ostensibly ended consideration of formal and final causation which were obfuscated by being sublimated into God's will.

As a prelude to a discussion of causation in modern philosophy, Hulswit (2002: 15-16) summarises the change in the development of the concept of cause with the rise of modern science in the seventeenth century:

Explanations by formal causation and final causation being rejected, efficient causation alone was considered to provide rational explanation of the phenomena. Moreover, the concept of efficient causation itself had radically changed. Whereas in the Aristotelian and scholastic tradition (a) efficient causation was not restricted to locomotion, (b) did not involve determinism and (c) efficient causes were conceived as the active initiators of a change, in the seventeenth century the idea took hold that (a) all causation refers exclusively to locomotion, (b) that causation involves determinism and (c) that efficient causes are merely inactive nodes in the chain of events, rather than active originators of a change. ... Thus, contrary to what is tacitly assumed, the idea that causation involves *determinism* does not have a scientific, but a theological origin.

He then details (17-45) the rationalist conceptions of causation of Descartes [1596-1650], Hobbes [1588-1679], Leibniz [1646-1716], Spinoza [1632-1677] and Kant [1724-1804] and the empiricist

approaches of Locke [1632-1704], Newton [1643-1727], Hume [1711-1776] and Mill [1806-1873]. These approaches support mechanical determinism which purports to explain natural law.

But from whence natural law? In 'Taking science on faith' (November 24, 2007), the physicist Paul Davies, relates his experience:

When I was a student, the laws of physics were regarded as completely off limits. The job of the scientist, we were told, is to discover the laws and apply them, not inquire into their provenance. The laws were treated as "given" — imprinted on the universe like a maker's mark at the moment of cosmic birth — and fixed forevermore. Therefore, to be a scientist, you had to have faith that the universe is governed by dependable, immutable, absolute, universal, mathematical laws of an unspecified origin.

He goes on to say

Over the years I have often asked my physicist colleagues why the laws of physics are what they are. The answers vary from "that's not a scientific question" to "nobody knows." The favorite reply is, "There is no reason they are what they are — they just are." The idea that the laws exist reasonlessly is deeply anti-rational. After all, the very essence of a scientific explanation of some phenomenon is that the world is ordered logically and that there are reasons things are as they are. If one traces these reasons all the way down to the bedrock of reality — the laws of physics — only to find that reason then deserts us, it makes a mockery of science.

This is fideism in a cipher and is unintelligible. Peirce's reintroduction of final causation, recognition of chance and revision of efficient cause, coupled with acceptance of fallibilism in place of certainty provide an alternative to blind faith on the one hand and denunciation of God on the other when considering cosmogony and cosmology.

## ***An sit Deus?***

To the question "*An sit Deus?*" (Is there God?) Peirce's response was in the affirmative, but as previously cited in Part 1, he stated at the outset in 'Answers to questions concerning my belief in God.' (CP6.494-521, 1906): "'God' is a vernacular word and, like all such words, but more than almost any, is vague." (CP6.494)

Nevertheless, although he kept his descriptions of God to a minimum in his metaphysics, thereby reducing the pitfalls of particularisation, he supported a form of anthropomorphism. In response to what he, as a pragmatist, thought of Humanism, Peirce replied: "Why if you had said Anthropomorphism, I should have replied that I heartily embrace most of the clauses of that doctrine" (CP5.536, c.1905). A couple of years earlier he wrote: "I have after long years of the severest examination become fully satisfied that, other things being equal, an anthropomorphic conception, whether it makes the best nucleus for a scientific working hypothesis or not, is far more likely to be approximately true than one that is not anthropomorphic" (CP5.47 fn, 1903).

Anthropomorphism is ascription of human form, attributes, or personality to God. Judaism, Christianity and Islam are theomorphic religions, that is, these religions hold that, as given in revelation, "God created man in his own image" (Genesis 1:27). Those theomorphists that hold that God is a literal physical being and that mankind is literally created in his image may be termed anthropotheists. Anthropomorphism should, in the case of Peirce, be differentiated from the concretisation of God (gods) of anthropotheism. He was, himself, a Christian for whom God is personal and in his metaphysics, the capitalised He, Him and His referred to the categories of First, Second and Third of the 'personality' (see CP6.157, 1891) of the vernacular God. For Peirce, within his semeiotic which informs his metaphysics, "man is a sign" (CP5.314, 1868), that is, "man", too, is vernacular. Probably, though, he was thinking more of man's reason, or mind.



The phrase "light of reason," or its near equivalent, may probably be found in every literature. The "old philosopher" of China, Lao-Tze, who lived in the sixth century B.C., says for example "Whoso useth reason's light and turneth back and goeth home to its enlightenment, surrendereth not his person to perdition. This is called practising the eternal." [Lao-Tze's *Tao-Teh-King*, Paul Carus, Chicago (1898), ch. 52, sec. 3.] The doctrine of a light of reason seems to be inwrapped in the old Babylonian philosophy of the first chapter of Genesis, where the Godhead says, "Let us make man in our image, after our likeness." It may, no doubt, justly be said that this is only an explanation to account for the resemblances of the images of the gods to men, a difficulty which the Second Commandment meets in another way. But does not this remark simply carry the doctrine back to the days when the gods were first made in man's image? To believe in a god at all, is not that to believe that man's reason is allied to the originating principle of the universe? (CP2.24, c.1902)

And yet, the inescapable gender issues and the nominalism associated with pronouns leave me feeling uneasy with anthropomorphism. The Australian poet Judith Wright expresses this well in her poem, *Eve to her daughters*.

It was not I who began it.  
Turned out into draughty caves,  
hungry so often, having to work for our bread,  
hearing the children whining,  
I was nevertheless not unhappy.  
Where Adam went I was fairly contented to go.  
I adapted myself to the punishment: it was my life.

But Adam, you know . . . !  
He kept brooding over the insult,  
over the trick They had played on us, over the scolding.  
He had discovered a flaw in himself  
and he had to make up for it.

Outside Eden the earth was imperfect,  
the seasons changed, the game was fleet-footed,  
he had to work for our living and he didn't like it.  
He even complained of my cooking  
(it was hard to compete with Heaven).

So he set to work.  
The earth must be made a new Eden  
with central heating, domesticated animals,  
mechanical harvesters, combustion engines,  
escalators, refrigerators,  
and modern means of communication  
and multiplied opportunities for safe investment  
and higher education for Abel and Cain  
and the rest of the family.  
You see how his pride had been hurt.

In the process he had to unravel everything,  
because he believed that mechanism  
was the whole secret - he was always mechanical-minded.  
He got to the very inside of the whole machine  
exclaiming as he went, So that is how it works!  
And now that I know how it works, why, I must have invented it.  
As for God and the Other, they cannot be demonstrated,  
and what cannot be demonstrated  
doesn't exist.  
You see, he had always been jealous.

Yes, he got to the centre  
where nothing at all can be demonstrated.  
And clearly He doesn't exist; but he refuses  
to accept the conclusion.  
You see, he was always an egotist.

It was warmer than this in the cave;  
there was none of this fall-out.  
I would suggest, for the sake of the children,  
that it's time you took over.

But you are my daughters, you inherit my own faults of character;  
you are submissive, following Adam  
even beyond existence.  
Faults of character have their own logic  
and it always works out.  
I observed this with Abel and Cain.

Perhaps the whole elaborate fable  
right from the beginning  
is meant to demonstrate this; perhaps it's the whole secret.  
Perhaps nothing exists but our faults?  
At least they can be demonstrated.

But it's useless to make  
such a suggestion to Adam.  
He has turned himself into God,  
who is faultless and doesn't exist.

Augustine had said in *The City of God* (413-426) "I have thought that each one, in keeping with his powers of understanding, should choose the interpretation that he can grasp" and yet, anthropomorphising God has not only *not* increased understanding but has often been positively divisive and detrimental regarding cosmogony and cosmology and especially so since the ascendancy of nominalism.

Whilst as an agnostic one cannot *know* either *a priori*, that is, from introspection or axioms, or *a posteriori*, from revelation or deduction, in accord with Peirce's pragmatist metaphysics, the *reality* of God is meaningful: insofar as God is general, the principle of excluded middle does not apply, nor, in being vague, does the principle of contradiction apply (see CP 5.505, c.1905). God is not constrained by existence; as *real*, God is boundless.

## ***Quid sit Deus?***

In response to the Scholastics' question "*Quid sit Deus?*" (What is God?), Peirce spoke of Creative Activity:

I am inclined to think (though I admit that there is no necessity of taking that view) that the process of creation has been going on for an infinite time in the past and further, during all past time and, further, that past time had no definite beginning, yet came about by a process which in a generalized sense, of which we cannot easily get much idea, was a development. I believe Time to be a reality and not the figment which Kant's nominalism proposes to explain it as being. As reality, it is due to creative power. People who have had no practice in higher logical analysis are apt to be sceptical as to anybody's being able to attach any idea to such propositions. They are even dumbfounded to hear one say that a part is not necessarily less than its whole; while after one has learned how to think of such things, the marvel is that anybody should ever have deliberately said that the part is necessarily less than the whole or ever should have said "so fast eternity comes on," meaning by "eternity" the infinitely distant future, as if the part of the future that will remain future tomorrow were not just as long as today's or yesterday's future.

I think we must regard Creative Activity as an inseparable attribute of God. (CP6.506, c.1906)

As related in Part 1 and above, Peirce spoke of God in general and not God in particular – of the reality of God – of God as universal. God is a sign.

Hausman (1979: 203-4) brings to our attention that:

In 1903, Peirce compared his sense of the word "category" with his understanding of the senses of the word for Aristotle, Kant and Hegel. He distinguished two orders of categories... The first order of categories is particular. Particular categories are restricted in their range of application; they form a series, only one member of which is present in or dominant in any one phenomenon. The second order is universal and these universal categories, to which Peirce limited himself, are all present in all phenomena.

During the 1880s he spent time developing his evolutionary cosmology and in a draft *Sketch of New Philosophy* (MS 928, n.d.) he described three kinds of philosophy: the elliptic, parabolic and hyperbolic philosophies, a nomenclature based on Felix Klein's [1849-1925] triple distinctions of geometries ("elliptic" for Riemann's [1826-1866] geometry on a surface of positive curvature; "parabolic" for Euclidean [365-275 BCE] geometry; and hyperbolic for Lobachevsky's [1792-1856] geometry). In a letter to Christine Ladd-Franklin (CP8.317, 1891), describing his cosmology that he had developed over the previous ten years, he wrote of his theory that "the evolution of the world is hyperbolic, that is, proceeds from one state of things in the infinite past, to a different state of things in the infinite future."

Space, I take, to be the nothing that is room to move. Peirce argued (CP6.212, 1898) that "the whole nature and function of space refers to Secondness. It is the theatre of the reactions of particles and reaction is Secondness in its purity." From nothingness comes possibility; from possibility comes potentiality which is chaos. In accord with this, as Peirce argued:

The very first and most fundamental element that we have to assume is a Freedom, or Chance, or Spontaneity, by virtue of which the general vague nothing-in-particularness that preceded the chaos took a thousand definite qualities. The second element we have to assume is that there could be accidental reactions between those qualities. The qualities themselves are mere eternal possibilities. But these reactions we must think of as events. Not that Time was. But still, they had all the here-and-nowness of events. (CP6.200, 1898)

The law of chance is lawlessness – it is random – or as Anderson (1987: 100) puts it, "chance's reality is the sheer indeterminacy displayed by the original chaos in relation to a future universe." Because present-day physicists are now able to identify momentary secondness as particles – photons for the electromagnetic field, gravitons for the gravitational field and so on – that pop into and out of existence from nothingness, degenerate thirdness is identifiable. That the modern physicists have discovered that the vacuum – what was in Peirce's day known as the ether – is a seething ferment of activity makes chance no more determinate than it was prior to the discovery. Anderson (pp. 102-3) notes: "When we view chance from the side of actuality rather than possibility, we call it spontaneity." Of itself, chance is not necessary; "...chance may be a necessary condition of creative evolution, but it is not a causal source" (p. 102). In saying that "Tychism, or the doctrine that absolute chance is a factor of the universe" (CP6.201, 1898) Peirce was not defending Tychasticism, the doctrine that indeterminism is the only factor in the universe. Out of chance comes a tendency towards regularity.

Despite the excitement with which Peirce greeted the publication of Charles Darwin's *Origin of Species* (1859) he found the theory to be mechanical. Though Darwin had flirted with William Paley's [1743-1805] analogy between the operation of nature and the movements of a well-designed watch, often regarded as a classic statement of the teleological argument for god's existence, he ultimately opted for a law of natural selection. The underlying belief of both Paley's analogy from design and Darwin's theory, are predetermined – by God for Paley and law for Darwin – and therefore fatalistic.

What sets Peirce's cosmogony and cosmology apart from others in Western thinking, however, is his idea of developmental telos. In contradistinction to the teleological argument of Augustine (and of the *falāsifa* and Aquinas who followed his lead), in which the plans and design, including the laws of the universe, were set in place by God before creation, Peirce's teleology was evolutionary. In this it was and is, truly radical and revolutionary. Referring back to his defence of anthropomorphism: despite my

misgivings, his description of personality as "some kind of coordination or connection of ideas" does serve to clarify his evolutionary telos.

This personality, like any general idea, is not a thing to be apprehended in an instant. It has to be lived in time; nor can any finite time embrace it in all its fullness. ...

But the word coordination implies somewhat more than this; it implies a teleological harmony in ideas and in the case of personality this teleology is more than a mere purposive pursuit of a predetermined end; it is a developmental teleology. This is personal character. A general idea, living and conscious now, it is already determinative of acts in the future to an extent to which it is not now conscious.

This reference to the future is an essential element of personality. Were the ends of a person already explicit, there would be no room for development, for growth, for life; and consequently there would be no personality. The mere carrying out of predetermined purposes is mechanical. (CP6.155-7, 1891)

As creative activity, God's *finious* cause is 'becoming' the *summum bonum*; it is growth itself. This, Peirce named agapastic evolution or agapasm. Evolution by fortuitous variation, he called tychastic evolution or tychasm; evolution by mechanical necessity he labelled anacastic evolution, or anancasm.

All three modes of evolution are composed of the same general elements. Agapasm exhibits them the most clearly. The good result is here brought to pass, first, by the bestowal of spontaneous energy by the parent upon the offspring and, second, by the disposition of the latter to catch the general idea of those about it and thus to subserve the general purpose. In order to express the relation that tychasm and anancasm bear to agapasm let me borrow a word from geometry. An ellipse crossed by a straight line is a sort of cubic curve; for a cubic is a curve which is cut thrice by a straight line; now a straight line might cut the ellipse twice and its associated straight line a third time. Still the ellipse with the straight line across it would not have the characteristics of a cubic. It would have, for instance, no contrary flexure, which no true cubic wants; and it would have two nodes, which no true cubic has. The geometers say that it is a degenerate cubic. Just so, tychasm and anancasm are degenerate forms of agapasm. (CP6.303, 1893)

Although, as Anderson puts it, "the meaning of God's telos is preceded<sup>7</sup> by the specific actualization which fix it as its own referent" (1987: 113), the specific actualisation, although irreversible, is not static but continues into the future. As created the universe is being and to that extent it is fact; as referent, it has been created tychastically, anacastically and agapastically and continues in like manner creating. It is development, as it is commonly understood, as continuity. In general, this may be considered as recreation, it is change, and in changing changes and is changed. In his paper 'Design and chance' Peirce explained:

Suffice it to say that as everything is subject to change everything will change after a time by chance and among those changeable circumstances will be the effects of changes on the probability of further changes. And from this it follows that chance must act to move things in the long run from a state of homogeneity to a state of heterogeneity. (W4:550, 1883-4)

Because when *analysing* the strands of Peirce's realism one can lose sight of the fact that not only are his three categories of First, Second and Third irreducible to each other, so too is realism irreducible to monad or dyad; only as triad is it wholly intelligible. Here is the philosophical underpinning of modern theories of emergence and complexity, the antithesis of the principles of universal determinism, reductionism and disjunction, the hallmarks of much of twentieth century philosophy and science. Yet when it came to understanding these concepts, Peirce, along with other philosophers of the late nineteenth and early twentieth century who propounded alternatives to mechanistic science, including Samuel Alexander [1859-1938], Henri Bergson [1859-1941] and Alfred North Whitehead [1861-1947] were rejected as resorting to *deus-ex-machina* ("god from the machine") explanations.

In their introduction to volume 4 of the *Exploring Complexity Series* (2008) Alicia Juarrero and Carl Rubino bring to our attention (p. 4) that "the term *emergence*, first proposed in the 1870s by George

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<sup>7</sup> See *precide* in glossary

Henry Lewes [1817-1878] in *Problems of Life and Mind* and then taken up by Wilhelm Wundt [1832-1920] in his *Introduction to Psychology*, was coined precisely to identify instances in chemistry and physiology where new and unpredictable properties appear as products that are emphatically not the mere sum of the separate elements from which they arise." Yet, as Juarrero and Rubino point out:

Not until Ilya Prigogine was awarded the Nobel Prize in 1977 for his work on Dissipative Structures and, with Isabelle Stengers, published the surprisingly popular *La Nouvelle Alliance* two years later, did many serious scientists and philosophers dare question "the goals, methods and epistemology" of modern science. Doing so required scientists to reconsider the creative aspects of nature, made manifest in an evolutionary process displaying irreducibly emergent properties. (2008: 7)

Prigogine had read Peirce and credited him with anticipating the 'new' physics. Notwithstanding this and other high-profile endorsements of him, Peirce is still largely sidelined. Although the 'new physics' is progressing, development of the philosophy that informs it is sadly lagging. The astrophysicist Erich Jantsch, inspired by and drawing on the work of Prigogine concerning dissipative structures and nonequilibrium states, explored in his book *The Self-Organizing Universe: Scientific and Human Implications of the Emerging Paradigm of Evolution* (1980), the idea of self-organization as a unifying evolutionary paradigm. Nevertheless, Jantsch's theory argued that God is the self-organizing dynamic of the cosmos and in this it was considered irrational, as was the theory of Fritjof Capra, a member of the Fundamental Fysics Group at Berkeley University, with its talk of cosmic mind and self-organisation.

Such rejection is prejudicious and contravenes what Peirce called the first rule of reason: 'do not block the road of inquiry'. It brings to mind a quotation made famous following the 1939 publication of the first edition of the book *Alcoholics Anonymous* and attributed to Herbert Spencer:

There is a principle which is a bar against all information, which is proof against all arguments and which cannot fail to keep a man in everlasting ignorance - that principle is contempt prior to investigation.

Although differently placed in succeeding editions of the book, the quotation has always appeared in the more than 20million copies printed since its original publication. In a paper 'The survival of a fitting quotation' Michael StGeorge (2005) revealed that "Herbert Spencer never wrote or said anything resembling this quotation." It was first published as quoted above by a Canadian named Rev. William H. Poole who was arguing that the Anglo-Saxon race is actually descended from the ten lost tribes of Israel in his book *Anglo-Israel or, The British Nation: The Lost Tribes of Israel* (1879). Poole attributed the quotation to William Paley. What Paley in fact wrote in *A View of the Evidences of Christianity* (1794):

The infidelity of the Gentile world and that more especially of men of rank and learning in it, is resolved into a principle which, in my judgment, will account for the inefficacy of any argument, or any evidence whatever, viz. contempt prior to examination."

StGeorge says that: "In this context, Paley was trying to give reasons why the Christian faith was rejected by the ancient Greeks and Romans." This is the same William Paley mentioned above in relation to the teleological argument to the existence of God which Darwin rejected but which would be attractive to contemporary adherents of Intelligent Design. In his *Natural Theology* (1802) Paley presented a watchmaker analogy to support his argument. His analogy is strikingly similar to the sundial/water-clock one reported by the Roman statesman Cicero as presented to him by the Stoic philosopher, Quintus Lucilius Balbus (*De Natura Deorum Liber Secundus*) but perhaps not surprisingly, Paley made no acknowledgement of any source.

Dismissing Alexander, Bergson and Whitehead as resorting to *deus-ex-machina* explanations, misrepresents them. From Wikipedia we can learn that "*deus-ex-machina*" is a *plot device* whereby a seemingly unsolvable problem is suddenly and abruptly solved with the contrived and unexpected

intervention of some new event, character, ability, or object. A deeper investigation into the work of these three, however, would show them to be panentheistic.

The word panentheism (from Greek meaning "all-in-God") was coined by Karl Christian Friedrich Krause in 1828. Panentheists see God and the world as interrelated in process, with the world being in God and God being in the world. Panentheism differentiates itself from pantheism, which holds that everything composes an all-encompassing, immanent God, or that the Universe (or Nature) is identical with divinity. Pantheists do not believe in a personal or anthropomorphic god. Based on the work of Baruch Spinoza, whose treatise, *Ethics*, was an answer to Descartes' dualist theory that the body and spirit are separate, pantheists hold the two are the same.

Michael Raposa, in *Peirce's Philosophy of Religion* (1989) suggests that Peirce was a panentheist.

...Peirce, while definitely not a pantheist, might be properly labeled a panentheist, that is, one who views the world as being included in but not exhaustive of the divine reality. Such a view neither undermines the doctrine of creation nor collapses the distinction between God and the universe. (Raposa, 1989: 51)

In a note to this passage (note 22: 160-161) Raposa comments:

The term "panentheism" is used here only in the broadest possible sense and not to designate a specific doctrine associated with a particular thinker or group of thinkers. Decades ago Charles Hartshorne noted Peirce's panentheistic tendencies regretting only that he "falls short" of embracing the dipolar God of contemporary process philosophy, clinging instead to a more classical theism...But in arguing that these classical elements are inconsistent in Peirce's own system, Hartshorne does not appear to have assessed carefully enough what Peirce had to say about continua and their singularities, about the logic of vagueness, or about the *semiotic* relationship between God and the universe...

Notwithstanding Raposa's qualification, in the spirit of Peirce naming his version of pragmatism 'pragmaticism' and Mayorga calling his realism 'realicism', let me coin a term to account for Peirce's hypothesis of God and call it 'pantheisticism'. As with 'pragmaticism' and 'realicism', 'pantheisticism' is a term of differentiation – in this case differentiated from pantheism and panentheism. The most obvious difference is that while 'pantheism' is monadic and 'panentheism' is dyadic, 'pantheisticism', being attributable to the Peircean idiom, is triadic. In a very early manuscript of fragments from a *Treatise on Metaphysics* (MS921, 1861) Peirce wrote of idealism, materialism and what he called realistic pantheism as representing the three worlds of mind, matter and God – worlds which both mutually exclude and include each other. I found no evidence that he employed this term again. Neither, even having read the German philosopher Krause [1781-1832], did he use the term panentheism, despite Krause describing it as universal and idealistic. Instead, inspired by Schilling [1775-1854] whose philosophy, like his, "avoids all and every sort of dogmatism" (Ibri 2009: 282) he advanced Objective Idealism in the first of his *Monist* series of 1891-1893 on metaphysics, 'The architecture of theories', (CP6.7-34, 1891). "But" as he wrote "before this can be accepted it must show itself capable of explaining the tri-dimensionality of space, the laws of motion and the general characteristics of the universe, with mathematical clearness and precision; for no less should be demanded of every philosophy" (CP6.25, 1891).

Yet, as he wrote in his paper 'The marriage of religion and science' (CP6.428-434, 1893), "those who are animated with the spirit of science are for hurrying forward, while those who have the interests of religion at heart are apt to press back."

In this way, science and religion become forced into hostile attitudes. Science, to specialists, may seem to have little or nothing to say that directly concerns religion; but it certainly encourages a philosophy which, if in no other respect, is at any rate opposed to the prevalent tendency of religion, in being animated by a progressive spirit. There arises, too, a tendency to pooh-pooh at things unseen.

In his remarkable paper 'A neglected argument for the reality of God' (CP6.452-493, 1908) Peirce advanced his hypothesis of God. His concept of reality being the antithesis of nominalism, his argument did not pretend to be a *proof* to the *existence* of God, but rather the hypothesis of God flowing from the form of abduction which he called 'Musement' or Pure Play.

Play has no rules, except this very law of liberty. .. It has no purpose, unless recreation. The particular occupation I mean ... may take either the form of aesthetic contemplation, or that of distant castle-building ... or that of considering some wonder in one of the Universes, or some connection between two of the three, with speculation concerning its cause. It is this last kind -- I will call it "Musement" on the whole -- that I particularly recommend, because it will in time flower into the N.A. (CP6.458, 1908)

His argument is, in fact, a nest of three arguments – the humble argument (HA), the neglected argument (NA) and the scientific argument (SA) – which are interdependent. Anderson (1990: 352) explains:

The HA relates to Feeling, the NA to Willing and the SA to Thinking. And these relations are relations of appeal. That is, the HA comes to us by feeling - it appeals to our feeling; the NA appeals to our need to act in the world, to be "willing;" and the SA appeals to our critical thinking, our pursuit of truth.

For the living, feeling is indubitable. To speak of feeling as an argument, as with the HA, is to speak of feeling as reasonable, that is, controllable. Let me discuss this in relation to pain – something I experience (as did Peirce) as a chronic condition. Feeling, *qua* feeling, is suffering, that is, it is caused; it happens; it is suffered. The experience of pain is suffering. It can, however, be controlled. Pain does more than hurt; it has secondary effects such as interfering with equanimity and concentration. Most drug treatments, whilst ameliorating some effects, exacerbate others. Fortunately, there are alternative ways of controlling feeling, including pain. One such is musement, or as I prefer to call it, wonderment – there is nothing like a bit of awe for relief of the bondage of self. The humility it can engender, if one can enter into it as recommended, is not only a superior prophylactic, but it is the ground for the open-mindedness required to engage with reality. As Peirce put it, "it is simply the natural precipitate of meditation upon the origin of the Three Universes" (CP6 487, 1910) and the source of abduction.

K. T. Fann (1970: 5) points out "Peirce's theory of abduction is concerned with the reasoning which starts from data and moves towards hypotheses." The data here are impressions observed in any of Peirce's three Universes. Observation without purpose, partiality, or breach of continuity passes into Musement from which the hypothesis of God can flow. As Peirce saw it:

The hypothesis of God is a peculiar one, in that it supposes an infinitely incomprehensible object, although every hypothesis, as such, supposes its object to be truly conceived in the hypothesis. This leaves the hypothesis but one way of understanding itself; namely, as vague yet as true so far as it is definite and as continually tending to define itself more and more and without limit. The hypothesis, being thus itself inevitably subject to the law of growth, appears in its vagueness to represent God as so, albeit this is directly contradicted in the hypothesis from its very first phase. But this apparent attribution of growth to God, since it is ineradicable from the hypothesis, cannot, according to the hypothesis, be flatly false. Its implications concerning the Universes will be maintained in the hypothesis, while its implications concerning God will be partly disavowed and yet held to be less false than their denial would be. Thus the hypothesis will lead to our thinking of features of each Universe as purposed; and this will stand or fall with the hypothesis. Yet a purpose essentially involves growth and so cannot be attributed to God. Still it will, according to the hypothesis, be less false to speak so than to represent God as purposeless (CP6.466, 1908).

The neglected argument (NA) is concerned with willingness. As a bracket to the HA it is a willingness to engage with the reasonableness of wonderment; as the whole nest of arguments, it is a willingness to commit to the reality of God. Closing the brackets around the HA is the scientific argument (SA) whose "primary appeal is to the category of thinking - to a critical pursuit of the truth" (Anderson 1990: 356), beginning with extension of the process of abduction which 'produced' the hypothesis of God.

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This is an ideal place to again discuss abduction. Whole books, PhD theses and a great number of journal articles have been written on Peirce's concept of abduction, yet the inadequate and misleading definition of 'inference to the best explanation' persists. This definition is reflected in Peirce's early exploration of its meaning. This is shown by Anderson in his paper 'The evolution of Peirce's concept of abduction' (1986: 148)

In the 1878 view of abduction we can see the relation to Aristotle. Its particular form was that of the acceptance of a minor premiss as a hypothesis on the strength of its "fittingness" to a known premiss and a factual conclusion. Thus, if a deduction were to take the following form:

Rule - All the beans from this bag are white.  
Case - These beans are from this bag.  
.∴ Result - These beans are white.

Then its corresponding abduction would be:

Rule - All the beans from this bag are white.  
Result - These beans are white.  
.∴ Case - These beans are from this bag.

Peirce says that in this case of "making a hypothesis ... I at once infer as a probability, or as a fair guess, that this handful was taken out of that bag" (CP2.623, 1893).

Further comparison with the two more familiar forms of reasoning can serve for those who want explanation in bytes. *Abduction* is the process of both generating hypotheses and selecting some for further pursuit, *deduction* draws out their testable consequences, while *induction* evaluates them (CP5.171, 1903; CP6.468-477, 1908). Abduction is reasoning *towards* a hypothesis whilst deduction and induction are reasoning *from* a hypothesis. As Peirce puts it: "Deduction must include every attempt at mathematical demonstration, whether it relate to single occurrences or to 'probabilities', that is, to statistical ratios; Induction must mean the operation that induces an assent, with or without quantitative modification, to a proposition already put forward, this assent or modified assent being regarded as the provisional result of a method that must ultimately bring the truth to light; while Abduction must cover all the operations by which theories and conceptions are engendered" (CP5.509, 1905). On a scale of low to high: abduction is low in security (approach to certainty) but high in what Peirce called uberty (rich growth, fertility, abundance); induction is the reverse.

Let me give a pertinent example of this: The uberty of the physics Standard Model hypothetical particle known as the Higgs boson while it remained hypothetical, took on such hyperbolic proportions in the minds of the media that it became known as the God particle. In July 2012, it was reported as detected by the LHC (Large Hadron Collider), yet the initial euphoria has been followed by disappointment. As *New Scientist* reported in an article entitled 'Higgs boson too saintly and supersymmetry too shy' (Slezak 2012: 12)

Hopes of using the Higgs boson and the elegant theory of supersymmetry [SUSY] as shortcuts to discovering the mysteries of the universe are evaporating fast. That's the verdict of a major update from the Large Hadron Collider in CERN, near Geneva, Switzerland - the first since a boson resembling the Higgs was spotted there earlier this year.

In his paper 'The logic of drawing history from ancient documents' (1901) we find that Peirce adopted Aristotle's term, *apagögé*, which he translated as 'abduction' (CP7.249, 1901). Though he retained the word, his logic went beyond the syllogistic method of Aristotle and in accord with this, his understanding of *apagögé* expanded. Anderson points out (1986: 147) that "in working through Aristotle's discussion of *apagogue*, Peirce lays the foundations for a type of reasoning which has a logical form but which is also



a lived process of thought." His mature meaning of abduction retained an element of inferencing, but became more an insight, that is, a creation of the mind. It is not about 'probability' which is the output of scientific reasoning but rather about reasonable 'may-be', on which scientific reasoning depends. Karl-Otto Apel argues (1967: 160), that for Peirce:

...cognition was seen as a historical process manifested in language and society which, from the standpoint of its unconscious foundations, forms a continuum with the evolutionary process of nature, but which, at the other conscious extreme, is subject to "self-control" through normative logic.

More than anything, it is this normative science of reasoning that distinguishes the psychological leanings of pragmatism as espoused by William James in 1898 from that which Peirce developed an apology after that date and called pragmaticism. From the perspective of pragmaticism, "the hypothesis of God's Reality...is connected so with a theory of the nature of thinking that if this be proved so is that" (6.491, 1910); the HA, through the NA, is open to the "SA's primary appeal is to the category of thinking - to a critical pursuit of the truth" (Anderson, 1990: 356).

Unfortunately no English dictionary that I found gives Peirce's meaning of abduction. The SOED tells us that 'abduction' *noun* is from the Latin *ab* off, away, from + *duct-* pa. ppl. stem of *ducere* to lead + *ion* forming noun denoting verbal action or an instance of it, or a resulting state or thing. In English, from early 17th century it had the general meaning of 'a leading away'. From the middle of that century it meant in anatomy 'movement of a limb etc. outward from the median line'. Supposedly from late in that century it had taken the meaning in logic as 'a syllogistic argument with the major premiss certain, the minor only probable'. L17? No reference to this use of abduction is given, so I can only presume '17' is a typo. The fourth and most commonly understood meaning, dating to mid-18th century, is: The act of illegally carrying off or leading away a person... Wondering from whence 'illegally', I discovered that its etymology is from Latin *abductiō* robbing + *n* forming a perfect passive participle to form a noun of action.

In the spirit of Peirce's developed concept of abduction, I like the meaning given in anatomy which I picture as an opening-out from central control which is both brain and mind. Consider that dance of breathtaking beauty: the flamenco. Flamenco - from the Spanish *flama* fire or flame + *enco* having a quality of - is, as *flamenco puro*, improvised rather than choreographed and, unlike many traditional dances, has no purpose beyond itself. It is interesting to note from Wikipedia that in traditional flamenco, young people are not considered to have the emotional maturity to adequately convey the *duende* (soul) of the genre.

## Back to the beginning

As already stated, Peirce was a Christian. Raised a Unitarian - so named because of its disavowing the Trinity doctrine - he converted to the Episcopalian church as a precondition of his first marriage in 1863. Some relevant notable Unitarians were John Locke [1632-1704] who is also claimed by the Anglicans (Episcopalians), Ralph Waldo Emerson [1803-1882], Peirce's peer and friend Francis Ellingwood Abbot [1836-1903], John Dewey [1859-1952] best known of the classical pragmatists, Arthur Lovejoy [1873-1962] negative commentator of Peirce's philosophy, Alfred North Whitehead [1861-1947] who is listed as a Unitarian friend and Charles Hartshorne [1897-2000] who, despite having years of access to his papers, never did 'get' Peirce.

Lest Peirce's trichotomy be attributed to his conversion, it should be noted that in 1913 in an unpublished document (MS681) he wrote that he did not know and had never inquired whether there was any connection between his own trichotomy and the Divine Trinity. As previously stated, he was

scathing about most theologians and dismissive of parts of the Bible, but he did show respect for and paid attention to John who, I suggest, was Peirce's muse for his cosmogony. The Gospel According to John opens (John 1: 1-3) in the King James edition of the Bible:

In the beginning was the Word and the Word was with God and the Word was God. The same was in the beginning with God. All things were made by him; and without him was not anything made that was made.

I prefer the New English Bible translation (1970) because it uses 'created' – which resonates with originality – rather than 'made' – with its overtones of 'manufactured'.

When all things began, the Word already was. The Word dwelt with God and what God was, the Word was. The Word, then, was with God at the beginning and through him all things came to be; no single thing was created without him.

Now I find this a remarkable statement which, together with another remarkable statement by John that "God is love" (4: 8), is a profound cosmogony.

This is just one of hundreds of creation myths. A myth is a *form* for expressing profound truths and not a fiction, as detractors would have when denigrating others and promoting their own version. If one considers basic types of creation myths, then Peirce's is a combination of three types: *ex nihilo* (out of nothing), creation from chaos, and emergence. Being both an expression of truth and yet speculative, within Peirce's architectonic myth is metaphysical. Unlike Topsey's version of her own beginning, the Universe did not "just grew"; from Peirce's cosmogony – what I have called his 'pantheistic' – flows his cosmology which details the trichotomy of an evolving and developing telos.

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Floyd Merrill, in his paper 'Overdeterminacy, underdeterminacy, indeterminacy' (2005) explores how Peirce's semeiotic "reflects a tension and potential mediation between vagueness and generality, the individual and the universal and discontinuity and continuity, as well as between self and other and self and sign, in such a manner as to defy precise description. Yet, as he further explains:

Taking into account the composite characteristics of possibility (Firstness), actuality (Secondness) and potentiality (Thirdness), a certain 'Principle of Indeterminacy' is crucial to an understanding of Peirce's notion of semiosis.

From the vantage point of 'there now' inquiry can be objective: in the 'here now', a sentence can be determinately judged either 'true' or 'false', but is atemporal and static. When considered from 'here then' and 'there-then', however, its value, having embraced temporality, will have suffered change, if only in time. In this sense, vagueness and generality are complementary forms of indeterminacy.

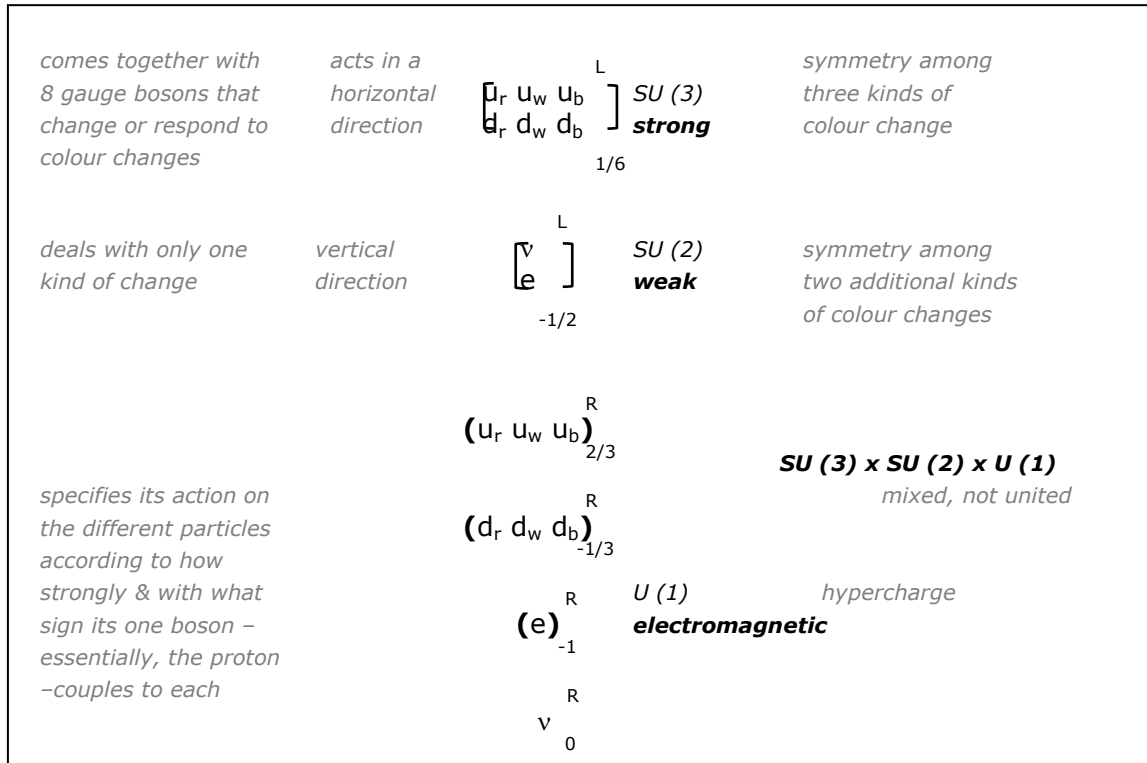
From his limited understanding of philosophy, the Nobel theoretical physicist, Frank Wilczek, in his book *The Lightness of Being: Mass, Either and the Unification of Forces* explains:

Philosophical realists claim that matter is primary, brains (minds) are made from matter and concepts emerge from brains. Idealists claim that concepts are primary, minds are conceptual machines and conceptual machines create matter...Both can be right at the same time. They describe the same thing using different language. (2008: 112)

Both Frank Wilczek and Paul Davies have admitted to being unfamiliar with Peirce's work. My reading of and meeting with both these great physicists (neither of whom take issue with God) convinces me that they would gain as much from Peirce as I have from them. The value of Peirce's three irreducible categories and his perennial classification of the sciences – the very weft and the weave of his system – is that in enabling us to make our ideas clear, the reality of 'mattearing' is realised.

## Chapter 7 Cosmology

The emphasis for cosmogony is on Firstness, for cosmology it is on brute force of Secondness. Science has identified four forms of power: electromagnetism, the strong nuclear force, the weak nuclear force and gravity. The first three of these are accounted for in the Standard Model of Particle Physics.



**Figure 16:** The organisation of particles and interactions in the Standard Model of Particle Physics (Adapted from Wilczek 2008: 164 and annotated.)

Frank Wilczek makes the quantum world intelligible and accessible to non-physicists. For him (and others of like mind) the *summum bonum* is supersymmetry (SUSY). It “unifies the three fundamental forces of the standard model, suggesting that electromagnetism and the strong and weak nuclear forces merge into a single superforce at high energies.” ‘But what if supersymmetry is wrong?’ asks Amanda Geffer (2011) Experimental physicists at CERN’s Large Hadron Collider have so far had little success in their search for SUSY, yet for Wilczek “SUSY is too beautiful to be wrong.” Nevertheless, should substantive evidence of an alternative theory emerge rather than for SUSY, Wilczek would be disappointed, but as the consummate scientist, he would concede.

Gravity is not accounted for by the Standard Model. Many believed that the missing link was the particle dubbed the Higgs Bosom which, it was theorised, gives matter its mass. The Higgs was discovered in July 2012 but study of the data has shown that (to use a non-technical phrase) it ‘doesn’t cut the mustard’. Though I have read a number of reports by naysayers of various stripes that condemn SUSY to the graveyard of defunct theories, I’ve yet to see anything published by supersymmetry supporters. Meanwhile, alternative theories such as string theory have so far been unable to design experiments for testing their theories empirically.

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Physicists the world over are looking for what is called ‘the theory of everything’ which they believe would unify the quantum description of the three known forces: the electromagnetic and the strong and

weak nuclear forces – the Standard Model – with Einstein’s theory of gravity. In spite of the hubris of the claim that any theory can explain everything and thereby, according to some such as Stephen Hawking (Hawking & Mlodinow, 2010), explain away God, many theoretical physicists *do* work cooperatively. Together with experimental physicists they design and conduct experiments to test their theories, they share data and they admit to the hypothetical nature of their findings. In this regard they reflect Peirce’s vision of a scientific community. Furthermore, though most are not aware of this, they come closest to following his model for inquiry according to his perennial classification of the sciences. Michael Duff, Chair of Theoretical Physics at Imperial College London, explains in his *New Scientist* article (2011) that whether engaged in explaining the data generated by their experimental colleagues, or predicting phenomena that has not yet been discovered, the work of theoretical physicists is grounded in mathematics. This is not a mathematics founded on logic. As Claudine Tiercelin (2010: 111) put it, “the real opposition between logic and mathematics lies between the theoretical or observational aspect of inference on the one hand and its practical or operational part on the other.” As she explains:

Peirce’s central idea about necessary deductive reasoning is, indeed, that it proceeds by construction of diagrams which are species of icons, the essential feature of which is to be able to represent the *formal* sides of things, so that they have less a function of resemblance to their objects than of exemplification or exhibition. Also they are formal and not mere empirical images (Tiercelin 2010: 100).

For Peirce “the essence of mathematics lies in its making pure hypotheses and in the character of the hypotheses which it makes” (CP3.558, 1989). In both the case of predicting phenomena that have not yet been found, such as the case for Einstein’s general theory of relativity, or in explaining what has been discovered by experimental physicists, as with much of quantum theory, what is being observed is the product of the phaneron, that is, what “is present to the mind in any sense or in any way whatsoever, regardless of whether it be fact or figment” (CP8.213, c.1905). Both call for the formation of a hypothesis, that is, abduction. Inference to the best explanation (IBE) is the commonly held understanding of what is meant by abduction and such a meaning may be appropriate where what is presented to theoretical physicists is fact or data requiring explanation. Abduction as pure hypothesis making is what is called for in such cases as Einstein’s general theory of relativity, first present to his mind as figment, that is, in his imagination. This requires abduction, not as inference to the best explanation (IBE), but as possibility. Peirce, arguing for originality in mathematics said “originality is not an attribute of the *matter* of life, present in the whole only in so far as it is present in the smallest parts, but is an affair of *form*, of the way in which parts none of which possess it are joined together” (CP4.661, 1908). According to Duff, though imagination, or speculation as he calls it, is a vital part of the scientific process:

It is always constrained by the straightjacket of mathematical consistency and compatibility with established laws. Even before it was tested experimentally, Einstein’s theory of general relativity had to pass several theoretical tests. It had to yield special relativity and Newtonian mechanics in those areas where they were valid, as well as predict new phenomena in those where they were not. (*New Scientist* 4 June 2011)

This is as maybe, however, the Process Physics research group at Flinders University refute Einstein’s non-process model.

The ill-conceived attempt to formulate a model of reality in which absolute motion was without meaning resulted in the introduction of the spacetime construct. This is a four-dimensional geometrical construct in which the one-dimensional model of time is fused with the three-dimensional model of space, but fused in a special way in that observers in relative motion would identify different foliations of the construct as their geometrical time lines, so that their modellings of time no longer coincided and as a consequence they could no longer necessarily agree on the time-ordering of events. Rather than being seen as an indicator of something wrong in the model this aspect of the spacetime model became a celebrated feature and the whole notion of change, of the evolution of reality from a past state to a future state disappeared and reality, it was claimed, was simply a frozen unchanging four-dimensional block of geometry: when the universe was formed the whole of the *future* of that universe also popped into existence. So what about our experiences of the *present moment* and the distinction between past and future? Well that was

dismissed as being some trick of our minds and a trick that psychologists should investigate, but certainly not physicists. (Cahill 2003:9)

In contrast to the reality paradigm associated with the names of Galileo, Newton, Einstein and many others, the Process Physics group are developing an information-theoretic modelling of reality out of which a new theory of gravity has emerged that is in agreement with all experiments and observations. According to, Cahill (p. 15), "the self-referentially limited neural network model, that underpins process physics, is remarkably akin to Peirce's effete mind."

In short, rather than the static 4-dimensional modelling of present day (non-process) physics, Process Physics is providing a dynamic model where space and quantum matter emerge from a fundamentally random but self-organising system. The key insight is that to adequately model reality we must move on from the traditional non-process syntactical information modelling to a process semantic information modelling; such information is 'internally meaningful'.

Speaking of this model Christopher Klinger, in his book *Process Physics: Bootstrapping Reality from the Limitations of Logic* says:

Process Physics utilizes the limitations of logic first identified by Gödel and asserts the priority of process and relational endophysics, realized via a stochastic, autopoietic bootstrap system whose properties emerge *a posteriori* rather than being assumed *a priori*. (Klinger 2005)

It is worth exploring this statement beginning with the idea of Gödel's Incompleteness Theorems (1931) which revealed the limitations of logic.

Gödel... proved fundamental results about axiomatic systems, showing in any axiomatic mathematical system there are propositions that cannot be proved or disproved within the axioms of the system. In particular the consistency of the axioms cannot be proved. This ended a hundred years of attempts to establish axioms which would put the whole of mathematics on an axiomatic basis. One major attempt had been by Bertrand Russell with *Principia Mathematica* (1910-13). Another was Hilbert's formalism which was dealt a severe blow by Gödel's results. The theorem did not destroy the fundamental idea of formalism, but it did demonstrate that any system would have to be more comprehensive than that envisaged by Hilbert. Gödel's results were a landmark in 20th-century mathematics, showing that mathematics is not a finished object, as had been believed.

Peirce would agree for it vindicates his rejection of logicism. I believe he would also be open to the practice of endophysics, which is, in accord with pragmatism, the philosophy of experience. Kirsty Kitto, 'Quantum theories as models of complexity' explains:

The term endophysics [Otto Rössler] has been coined to refer to the study of systems which have observers enclosed within them. Such a view is participatory; how we look determines what we see and with the development of new internal perspectives we might begin to understand the way in which the context of such an observer can affect the observations they make of the system itself. (2007: 10)

Endophysics is a methodology that is concerned with determining meaning, in contrast to exophysics with its epistemological focus on finding truth where observers, in the name of objectivity, are outside looking in. The commonly held understanding of what is meant by objectivity, which equates 'disinterest' with 'disengagement', is plain wrong: reality is real regardless of you or I. Werner Heisenberg once remarked that "the division of the world into an objective and a subjective side much too arbitrary" (1971: 88)

Peirce would not only have no argument with the stochastic approach taken by Process Physics but he championed it himself. Stochastic (from Greek *meaning* "skilled at aiming," since *stochos* is a target) describes an approach to anything that is based on probability. In probability theory, a stochastic process is the counterpart to a deterministic process. Instead of dealing with only one possible reality of how the process might evolve under time, in a stochastic process there is some indeterminacy in its future evolution described by probability distributions. This means that even if the initial condition is known, there are many possibilities the process might go to, but some paths may be more probable and others less so.

Finally, Peirce would have welcomed the theory of autopoiesis, so akin to his evolutionary cosmology of *tychism*, *synechism*, and *agapasm*. An autopoietic [Humberto Maturana] system is one which produces itself. It is a system of components which interact according to some network of interrelationships, where the network of interrelationships is produced by the system components themselves and is the process of dynamics self-maintenance. Autopoietic sets interact in such a way that while the components may be replaced, the system as a whole keeps the same cohesive structure.

A comparison of the models of Newton, Einstein and Process Physics looks like this:

Theory	Time	Space	Gravity	Quantum	k2
Newton	geometry	geometry	force	Quantum Theory	$n^3$
Einstein	curved geometry		curvature	Quantum Field Theory	0
Process	process	quantum foam	inhomogeneous flow	Quantum Homotopic Field Theory	$n(n^2 + 1)$

**Figure 17:** Comparisons of Newtonian, Einsteinian and Process Physics (Cahill 2003: 54)

The Process Physics model, in rejecting Einstein’s model, accounts for the reality of absolute motion, of a complex evolving universe and of space and time. According to Cahill (2003:15) Einstein’s error in rejecting absolute motion trapped twentieth century physics in the non-process or no *now* mindset. He relates Carnap (in P.A. Schilpp, (Ed.) *The Philosophy of Rudolf Carnap*, 1963: 37)

Once Einstein said that the problem of the Now worried him seriously. He explained that the experience of the Now means something special for man, something essentially different from the past and the future, but that this important difference does not and cannot occur within physics. That this experience cannot be grasped by science seems to him a matter of painful but inevitable resignation. I remarked that all that occurs objectively can be described in science: on the one hand the temporal sequence of events is described in physics; and, on the other hand, the peculiarities of man’s experiences with respect to time, including his different attitude toward past, present and future, can be described and (in principle) explained in psychology. But Einstein thought that scientific descriptions cannot possibly satisfy our human needs; that there is something essential about the Now which is just outside of the realm of science.

Notwithstanding my discomfort with calling anything ‘absolute’, Process Physics restores time’s arrow and *haecceity* to a complex evolving universe.

Coming back down to earth: Jon Ogborn and Edwin F Taylor in their article ‘Quantum physics explains Newton’s laws of motion’ (Physics Education January 2005: 26-34) explain that Newton was obliged to give his laws of motion as fundamental axioms, but we now know that the quantum world is fundamental and Newton’s laws can be seen as *consequences* of fundamental quantum laws.

Newton’s law fixes the path so that changes in phase from changes in kinetic energy exactly match those from changes in potential energy. This is the modern quantum field theory view of forces: that forces change phases of quantum amplitudes... What Newtonian physics treats as cause and effect (force producing acceleration) the quantum ‘many paths’ view treats as a balance of changes in phase produced by changes in kinetic and potential energy. (p. 33) ... The structure of our world and our observation of it both depend on this difference between the group behaviour of photons and the group behaviour of electrons. (p. 34)

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Thus far I have given theoretical accounts of ordinary cosmological mattering but there are two further types of matter that physicists have discovered. These are dark matter and dark energy. They are referred to as ‘dark’ because they do not absorb or reflect light; they are transparent. Data from the Planck satellite announced in March 2013, gave the composition of matter in the cosmos as 5% ordinary matter, 26% dark matter and 69% dark energy.

The Swiss astronomer Fritz Zwicky [1898-1974], while examining the Coma galaxy cluster in 1933, was the first to use the virial theorem<sup>8</sup> to infer the existence of unseen matter, which he referred to as *dunkle Materie* 'dark matter'. The existence and properties of dark matter are inferred from its gravitational effects on visible matter, radiation and the large-scale structure of the universe. Zwicky's *dunkle Materie* was ignored for the next thirty years, but over the past fifty years it has been intensely studied both theoretically and empirically. Dark matter has still to be directly identified, but there is a sense among physicists that such an event is immanent. Katherine Freese's *The Cosmic Cocktail* (2014) gives a thorough insider account of dark matter.

What though of dark energy

In the mid-90s, cosmologists had had the sense that they'd painted the Universe into a corner: they had a good handle on the numbers that described it and it remained only to dot a few 'i's and cross a few 't's. That complacency was blown out of the water in 1998, when 'dark energy' burst on the scene.

The Supernova Cosmology Project team, headed by Saul Perlmutter, along with the competing High-z Supernova Search Team led by Adam Riess and Brian P. Schmidt, found evidence of the accelerating expansion of the universe based on observing Type *Ia* supernova<sup>9</sup> in the distant universe. Dark energy was inferred from this discovery along with a further discovery by several teams that there is much more mass in the universe than could be accounted for by normal matter alone.

Dark energy is still largely mysterious, but Frank Wilczek (2008: 106-107) puts forward a possible way of grasping the meaning of dark energy by reference to the cosmological term.

The cosmological term can be viewed in two ways. Like  $E = mc^2$  and  $m = E / c^2$ , they are equivalent mathematically but suggest different interpretations. One way (the way Einstein viewed it) is as a modification of the law of gravity. Alternatively, the term can be viewed as the result of having a constant density of mass and also a constant pressure everywhere in space and for all time. Because both mass-density and pressure have the same value everywhere, they can be regarded as intrinsic properties of space itself...If we take it as a given that space has these properties and focus exclusively on the gravitational consequences, we arrive back at Einstein's viewpoint.

A key relationship governing the physics of the cosmological term relates its density  $\rho$  to the pressure  $p$  it exerts using the speed of light  $c$ . There is no standard name for this equation, but...I'll call it the well-tempered equation.

$$\rho = - p / c^2$$

Is the astronomical discovery that space weighs and seems to obey the well-tempered equation, a brilliant confirmation of the deep structures upon which we erect our best models of the world?

Wilczek would like to think so, but admits it has problems. The response on the Hubble web site to the question "what is dark energy?" is "Well, the simple answer is that we don't know."

What we don't know, we have not only to discover, but work to understand. Those of us, such as myself, who are not cosmologists, are unable to work directly on such matters; we are reliant on the physicists to convey their findings to us in such a way that we can understand. I do not understand dark energy because the physicists do not yet understand it. What I trust is that both dark matter and dark energy are necessary in the process of the self-creating universe.

Up to this point I have focused on the Peircean method of interpreting the interpretable object – the cosmos. In Part 1 I reviewed Peirce's method, his Pragmaticism and his Realicism. Part 2 is the recreation of Peirce's Realicism as 'matting' which is the process of bringing form and matter together.

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<sup>8</sup> The virial theorem states that, for a stable, self-gravitating, spherical distribution of equal mass objects (stars, galaxies, etc), the total kinetic energy of the objects is equal to minus 1/2 times the total gravitational potential energy. In other words, the potential energy must equal the kinetic energy, within a factor of two.

<sup>9</sup> Type *Ia* supernovae occur in binary systems (two stars orbiting one another) in which one of the stars is a white dwarf while the other can vary from a giant star to an even smaller white dwarf. A white dwarf is the remnant of a star that has completed its normal life cycle and has ceased nuclear fusion.

Peirce called the product of this process, information which he defined as "the connection of form with matter" (CP2.418 n, 1893). In Chapter 5 I explored the process of informing. Chapter 6 looked to cosmogony and to finding a satisfactory theory to explain the creation of the Cosmos and the source of telos. In accord with Peirce, I demanded of such a theory, that it be "capable of explaining the tri-dimensionality of space, the laws of motion and the general characteristics of the universe, with mathematical clearness and precision" (CP6: 25, 1891).

This chapter, *Cosmology*, explores theories or postulate accounts of the evolution and structure of the cosmos. Along with Peirce, I take freedom – creativity, spontaneity, chance – as first principle.

Existential philosophy also begins from freedom out of nothingness. The French Existentialist Jean-Paul Sartre [1905-1980] in his major philosophical work of ontology, *l'Être et le néant (Being and Nothingness)* (1943), offered an account of existence in general, including being-for-itself by which humans engage in independent action. His account included discussion of the human propensity to refuse responsibility for one's own actions as 'fear of and flight from freedom' which he condemned as *mauvaise foi* (bad faith).

The Algerian-French writer Albert Camus [1913-1960] struggled throughout his oeuvre with reconciling the ideology of existentialism with existential reality, against a backdrop of the western tradition of Cartesian bivalence and mechanical determinism. Raymond Boisvert of Siena College, Loudonville, NY, explores this idea in his paper 'Camus: between yes and no' (2013). Whilst he agrees that Camus had not achieved a resolution before his untimely death, he shows the path and indications of this purpose throughout Camus' writings. Camus introduced two related ideas of particular merit that that took his work beyond the ideological position of Sartre's Existentialism. The first of these was the notion of limit or measure. Boisvert notes:

The radical freedom of the existentialists may have ignored this notion; but limits are, as Heraclitus pronounced, woven into the fabric of things. Woe to those who would transgress those limits (p. 10).

The second idea was what Camus called *consentment*. Contrary to bivalence of 'yes' or 'no', Camus stretched towards wedding these opposites in human affairs into 'yes' and 'no'. Boisvert concludes:

Camus has projected a comprehensive series of work divided into three cycles. The first two, the cycle of the absurd and the cycle of revolt, he got to accomplish. The third could have taken him into a realm where an overarching 'yes' nonetheless incorporates the need to struggle associated with a 'no'. He called it the cycle of love (*Ibid.*)

Thus, beginning from freedom and bringing together Peirce's three irreducible categories and his architectonic and Camus' recognition of limit and his idea of consentment, let me sketch an intelligible, informed cosmology.

Unfortunately, much as I'd like to, I cannot begin 'Once upon a time'. Before the beginning was nothing – not even time. Nothing is full of potential which too is nothing as Firstness alone. So too is chance, as Firstness, nothing without Secondness and Thirdness. That which is called chaos came from nothingness, by way of spontaneous chance coupled with the powered potential 'to be', or 'to matter', which is Secondness. Without Thirdness, chaos is, as its name denotes, disorder. But when purpose is seen as inherent to being – as the telos of 'matting' – then 'matting' as Thirdness, which is evolution, begins: out of nothing emerges chaos; from chaos the universe creates itself.

Notwithstanding that the physicists' theory of the 'birth' of universe, the Big Bang, was from a point and that a point is by no means nothing, along with the physicists, I cannot (yet) describe in their terms, the origins of that point. Therefore, being mindful that the point was itself 'matting', I will follow from there with my suggestion that the evolution of the laws of physics can be theorised by reference to Peirce's pragmatism and Camus' ideas of 'limit' and 'consentment'. As I spoke of in Chapter 3, the



object of 'matting' is event and therefore I suggest that maybe the first limit, or measure to evolve was time. The physicists tell us, for example, that one second after the Big Bang' the universe was filled with neutrons, proton, electrons, anti-electrons, photons and neutrinos. During the first three minutes, the light elements – deuterium, an isotope of hydrogen, most of which combined to make helium and trace amounts of lithium – were generated. However, according to France's National Centre of Space Research, for the first 380,000 years or so, the universe was essentially too hot for light to shine. I expect this is the horizon beyond which we are unable to see and that therefore will never be able to see the Big Bang.

The patterns which we call natural law had their beginnings in the development of undifferentiated power into what we know so far as the forces identified at the beginning of the chapter, and the more refined patterns such as the laws of thermodynamics. Every chance appearance of potential out of chaos – from before the point from which the Big Bang emanated – was from radical freedom. Matter – which we know from Einstein is energy – to gain differentiated being requires order and order requires consentment and limit. It also requires what, for want of more appropriate language, we can call trust as described by Simmel (1900, 1990). This ordering is the evolution of the laws of matter in concert, with power as the conductor to create the whole which is the universe. The law of everything, which, extending this metaphor, might be considered to be in the mind of the composer, has so far 'evaded' discovery by the physicists. Notwithstanding this, the composition is awesome.

I have speculated that the telos of the universe is 'being' and that the evolutionary telos, is 'becoming'. The telos of being has, I suggest, remained steadfast. Becoming *what*, however, is determined by the composition of the evolving laws of the universe. With an understanding of Heisenberg's Uncertainty Principle we can grasp that spontaneous, chance, potential, continues unabated out of chaos. Until or unless we find ways of discovering what happens between this confounding state of uncertainty and the reality of the universe we inhabit we are left to make a choice among an array of possible choices regarding *our* position in relation to reality. These range from radical scepticism to entrenched dogmatism. Between these extremes is the choice to trust. My 'hypothesis' is that in investigating the quantum level of 'matting', we are observing the fuzzy boundary between chaos and being where potential and possibility are engaged in consentment.

To continue: Earth, evolved 4.54 billion years ago, 9.23 billion years after the Big Bang. Around a billion years (or a bit less) later, the earliest form of life evolved here on Earth. From this beginning our species evolved just 200,000 years ago. It seems to me that the evolution of life was quite the most spectacular event after the Big Bang. From those simple two cell prokaryotes we evolved: a species that not only had developed the ability to react to stimuli, but one that can think. Nevertheless, as special as we may believe ourselves to be, we are not Other, *albeit* we have evolved the ability to be self-conscious, we are an inextricable part of the Whole.

Having focused, to this point, on the method of interpreting the interpretable object, as interpreter, I now follow the lead of the process physicists and step inside the process. In doing so, I am mindful that I am also the interpretable object in general as well as the self-same in particular. Along with Peirce, I am concerned with intelligibility, but also with value. Hausman (1979) argues that value functions as a condition of intelligibility – that as he puts it, (1979: 221) "intelligibility would be blind without value." Value, he argues:

...is neither a fourth category nor reducible to the categories. Instead, value must be conceived as irreducible to the categories, as co-present with them and as a cooperating condition, on equal footing with all three categories. (p. 209)

Although I will be writing from here on about humans in the environment of Earth, value does not begin with us; it is co-present with the Universe as it continues to create itself intelligibly.



## Chapter 8 Value and Purpose

The entry for 'value' in *The Oxford Companion to Philosophy* (Honderich 1995: 895) begins:

Philosophical concern with value has focused on three connected issues: first on what sort of property or characteristic its 'having value' or 'being of value' is; second, on whether having value is an objective or subjective matter, whether value reposes in the object or is a matter of how we feel towards it; third, on trying to say what things have value, are valuable.

These concerns closely parallel concerns with the nature of good, from which value is seldom carefully distinguished in philosophical discussion, though the terms are clearly not synonymous.

My first concern is with clarifying the nature of 'value' and with distinguishing 'value' from 'good' and 'right'.

Until the twentieth-century the term used for the study of values was 'axiology' (from the Greek ἀξία, *axiā*, "value, worth"; and -λόγος, -logos) but since the early 1900s 'value theory' became the preferred label. In philosophy, value theory, is said to concern itself with the notion of goodness and thereby with ethics and morality. The question posed by ethics is: "What ought I to do?" The response given by morality is: "Live according to ethical values." 'Axiology' is the study of value or quality. 'Morality' (from the Latin *moralis*) is concerned with what it is believed is good and evil (bad) or right and wrong. In the Western philosophical tradition, value is more generally equated with *moralis* and less with *axia*. The tradition of equating value with good, so common to the Western idiom, leads to value, good and right being taken as synonymous. Furthermore, as George Crowder (2002: 2) notes:

Monism in one form or another is the mainstream approach to ethics in the Western tradition stretching back to the Greeks, being a subset of the broader *philosophia perennis* according to which error is many but truth, in any field, always one.

In order to avoid what has been considered Western imperialism, one could be forgiven for appealing to an idea of cultural relativism.

Cultural relativism is the view that there are no moral principles or values that apply universally, only particular moral judgments made from within the standpoint of the moral code of a specific culture. (*Ibid.* 7)

This notion, however, is debunked *inter alios* by Bernard Williams (1972: 34-39) who exposed what he labelled the 'anthropologist's heresy'. The epistemological mode used by the proponents of cultural relativism is usually one of phenomenology: empiricism as employed in the natural sciences and transposed to the social sciences. Isaiah Berlin's, using "the technique of *Einfühlen*, or imaginatively 'feeling oneself into' the worldview of people in other times and places" (Crowder 2003: 8) cuts through the extremes of monism and relativism with his notion of 'value pluralism'. The difference between what Berlin sees as value pluralism and his critic, John Gray (1995) as cultural relativism is the difference in the epistemological mode each employs – the difference cited by Mary Belenky *et al.* (1986: 101) between connected and separate knowing. With separate knowing "the orientation is towards impersonal rules", whilst "the connected mode of epistemology is toward relationship". I will discuss these epistemological modes in more detail below, but for the moment, follow on with value.

Berlin's idea of value pluralism turns on the value of choice "according to which basic human goods do not fit neatly together but are irreducibly multiple, frequently incompatible and incommensurable with one another" (Crowder 2003: 2). He argues that "the necessity of choosing between absolute claims is ... an inescapable characteristic of the human condition" (Hardy 2002: 214). Berlin uses 'goods' in contradistinction to 'evils' and the plural to underscore his idea of value pluralism.

Joseph Raz's social dependence thesis presented by him as *The Practice of Value* for the 2001 Tanner Lecture on Human Values, accommodates the spirit of value pluralism. He speaks of "the dependence of values on realisation through valuers" (2003: 22) and of this dependence as being without relativism or reduction. His social dependence theses are (p. 19):

*The special social dependence thesis* claims that some values exist only if there are (or were) social practices sustaining them.

*The (general) social dependence thesis* claims that, with some exceptions, all values depend on social practices either by being subject to the special thesis or through their dependence on values that are subject to the special thesis.

In delineating values and valuers Raz has succeeded in separating the evaluative aspect of values from the object valued, thereby breaking the nexus between values and good/right. Instead, the bond between values and valuers is realised through praxis; the relationship of values to valuers as practice is ontologically dependent, which is to say, it is dependent on the process of realisation of being through relationship.

Raz's theses pertain to society. For him "the value of things is inert" (p. 28). As he sees it:

That an object has value can have an impact on how things are in the world only through being recognised. The normal and appropriate way in which the value of things influences matters in the world is by being appreciated, that is, respected and engaged with because they are realised to be of value.

From a Peircean perspective, no object, in being realised, is inert. Furthermore, as Peirce explained, "[t]he essence of anything lies in what it is intended to do" (CP4.659, 1908), that is, in its purpose. As I argued previously, purpose is inherent to being. Raz is aware of this, but tends to express the idea in the negative, as in: "there is no point to value without valuers" (p. 27). His claim that "values depend on valuers for their realisation" (p. 29) comes close to my claim that without the co-presence of value, being cannot be realised. Symmetry – that valuers depend on values for their realisation – requires acceptance that no object, in being realised, is inert. Despite this, Raz's ideas of practice as the relationship between values and valuers and of universal values as enabling and facilitating practice serve as a powerful model for understanding how the co-presence of value enables realisation of purpose.

I am concerned here with three particular values which, though commonly seen as socially dependent values – as what Raz calls enabling or facilitating values – are essential to the whole process of 'matting'. These are integrity, respect and transparency. It is my contention that without the co-presence of these three with purpose, 'matting' cannot be realised. According to this argument, all three as enabling or facilitating values are categorical imperatives, that is, there are no 'ifs' or 'buts' about them.

Beginning with 'integrity': as a socially dependent value integrity is moral 'righteousness'. As an enabling or facilitating value it is defined as the state of being whole and undivided. As Damian Cox, in his Stanford Encyclopedia of Philosophy entry, *Integrity* (2013), notes:

One may speak of the integrity of a wilderness region or an ecosystem, a computerized database, a defense system, a work of art and so on. When it is applied to objects, integrity refers to the wholeness, intactness or purity of a thing... (Cox 2013)

Taking primary concern not as a fixed point, 'creator', but as process, 'creation' and 'being' as purpose, then integrity is imperative to the process of realising purpose. To say 'beings' are rational, is to say they are intelligible. By the same token, to say 'being' is rational, is to say it is intelligible: 'being' as object is purposeful process. Integrity, in relation to object as purposeful process, when defined as the

state of being whole and undivided, is predicated on the idea of the continuum, on *synechism* as methodology and first principal. Integrity is imperative for 'being' to retain intelligibility.

'Respect', the next enabling or facilitating value, requires an understanding of the relationship of 'whole' and 'parts'. Peirce's gives thirty five definitions of 'Whole (and parts)' in *Baldwin's Dictionary of Psychology and Philosophy* (1902-5); CP 6.381-383) as follows:

We may say that a whole is an *ens rationis* whose being consists in the copulate being of certain other things, either not *entia rationis* or not so much so as the whole; so that a whole is analogous to a collection, which is, in fact, a special kind of whole. There can be no doubt that the word whole always brings before the mind the image of a collection and that we interpret the word whole by analogy with collection. The idea of a collection is itself, however, by no means an easy one to analyze. It is an *ens rationis*, abstraction, or fictitious subject (but the adjective must be understood in a broad sense, to be considered below), which is individual and by means of which we are enabled to transform universal propositions into singular propositions. ... It very often happens that an object given indirect perception as an individual is, on closer scrutiny, seen to be identifiable with a collection of parts. But it does not seem to be strictly accurate to say that the larger object of perception is identical with that abstraction, the collection of the smaller objects. It is rather something perceived which agrees in its relations with the abstraction so well that, for convenience, it is regarded as the same thing. No doubt the parts of a perceived object are virtually objects of consciousness in the first percept; but it is useless to try to extend logical relations to the sort of thought which antecedes the completion of the percept. By the time we conceive an object as a collection, we conceive that the first reality belongs to the members of the collection and that the collection itself is a mere intellectual aspect, or way of regarding these members, justified, in ordinary cases, by certain facts. We may, therefore, define a collection as a fictitious (thought) individual, whose being consists in the being of certain less fictitious individuals. (*Ibid*: 382).

He then gives definitions of the following (*Ibid*: 383): Actual whole (James Burnett [1714-1799]), Collective whole, or aggregate whole (Étienne Chauvin [1640-1725]), Composite whole (Burgersdicius [1590-1635]), Comprehensive whole, Constituent whole, Continuous whole, Copulative whole, Cross Whole by aggregation or aggregate whole, Definite whole, Definitive whole, Discrete whole, Essential whole (Aquinas [1225-1274]), Extensive whole, Formal whole, Heterogeneous whole (Aquinas), Homogeneous whole (Aquinas), Integral whole (since Abélard [1079-1142], Blundeville [1522-1606], Burgersdicius), Integrate whole, Logical whole, Mathematical whole, Metaphysical whole, Natural whole (William Rowan Hamilton [1805-1865]), Negative whole, Physical whole, Positive whole, Potential whole, Potestative whole (Aquinas), Predictive whole, Quantitative whole, Similar whole, Subject whole, Subjective whole, Substantial whole, Universal whole, Whole by accident, Whole by information, Whole by inherence and finally, Whole by itself or *per se*.

'Respect' is the value commonly associated with the 'Categorical Imperative', central to Kant's argument to the existence of God, where God is primary concern – that which matters above all else – the creator and the authority of All. In these terms:

The ... Categorical Imperative commands us to treat all rational beings, including ourselves, with respect. ... [T]reating someone with respect involves treating that person always as an end-in-himself and never merely as a means to our ends (purposes, goals). As an end-in-himself, a person is a free, rational chooser. He decides what to do by virtue of reason and freely acts on that choice. Treating someone with respect has two dimensions, each of which corresponds to perfect and imperfect duties.

The first dimension of treating someone as an end-in-herself involves not interfering or restricting her as a free, rational chooser. This dimension, then, is negative. It requires not getting in the way of a person's reasoning or acting as an independent agent. ...

We are permitted, however, to treat people as a means to our ends so long as we also treat them as ends-in-themselves at the same time....

Respect is imperative to the developmental, evolutionary telos of being which, though manifestly infinitely diverse and multiple, is whole. Peirce's last definition of whole (parts) highlights this: "Whole by itself or *per se*: a whole which essentially belongs to its parts or its parts to it" (CP6.383).

The last value, 'transparency', is most commonly associated with human organisations. The non-government agency, Transparency International, that monitors and publicises corporate and political corruption in international development, defines corruption as the abuse of entrusted power for private gain which eventually hurts everyone who depends on the integrity of people in a position of authority. From this it would follow that transparency means without corruption. *Tychism*, however, rules out this meaning as universal because it excludes evolutionary processes such as mutation in DNA. Defining transparency as evident and intelligible doesn't quite capture the meaning either.

Reference to, and taking some licence with the terminology of Jean-Paul Sartre [1905-1980] in his major philosophical work *l'Être et le néant (1943) Being and Nothingness: a Phenomenological Essay on Ontology (1958)*<sup>10</sup> can perhaps serve to bring more clarity to transparency. The terms to which I refer are: 'being that causes itself' (*ens causa sui*), 'being-in-itself' (*être-en-soi*), 'being-for-itself' (*être-pour-soi*) and 'being-for-others' (*être-pour-autrui*).

The consequence of 'being that causes itself' (freedom) in creating 'being-in-itself' (the facticity of being) is responsibility. Freedom and responsibility are interdependent in the process of becoming real.

During the evolutionary process of realising telos, humans evolved and so too did consciousness evolve. Consciousness, in having evolved along the continuum of 'mattering', is 'being-in-itself', facticity. However, as awareness it can identify itself with itself as object – as 'being-for-itself' – and in so doing, can be aware of 'being-in-itself', which it can then interpret as 'Other'. This awareness enables it to introduce purpose and purposes of its own. When the purpose of 'being-for-itself' is aligned with that of 'being-in-itself', oneness is maintained intact. I will call this 'being-with-other' rather than Sartre's 'being-for-others' which is a psychological term about self-consciousness. This process is transparent. Where and when 'being-for-itself' is not in accord with 'being-in-itself', conflict of purpose ensues with concomitant consequences. This process lacks transparency.

It would do well here to discuss very briefly the concept of 'free-will' and its relationship to freedom as boundless. From the perspective of *synechism* as the method of evolutionary development of telos, free-will, although it emerged *tychistically*, is not free of the continuum from which it evolved. Whereas freedom *qua* freedom is boundless, free-will is temporal and dependent – it is embodied. Although it enables freedom of purpose and choice, it is circumscribed by its embodiment on which it is dependent. That being said, I am not ignoring the enormous achievements of humans as the embodiment of free-will – civilization is a testament to that – but nor am I ignorant of the enormity – even the downright stupidity – of some of our choices and our co-present values.

It is to the practice of values by valuers and socially dependent values that I now turn.

The primary concern of the natural scientist – a 'beings-for-itself' – is with 'being-in-itself'. The value most commonly associated with and expected of scientists is objectivity. Society values the work of scientists to the extent that the scientists can demonstrate their findings have been objectively produced. The main focus of Western 'society' is, however, on the individual 'being-for-itself', or collections of individuals, called here organisations. By 'virtue' of human law, any legally recognised organisation is deemed a person and as such can, in a limited sense, be considered a 'being-for-itself'. If

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<sup>10</sup> Sartre proclaimed himself an Existentialist and that *l'existentialisme est un humanisme* (Existentialism is a Humanism) (1945) and claims that his philosophical views ignore metaphysics, Nevertheless, in arguing the fundamental doctrine of Existentialism that 'existence precedes essence', in contradistinction to Plato's argument that *essentia* precedes *existential*, he was making a metaphysical argument, albeit a truncated metaphysics.

a person who is a part of an organisation acts in ways that are in conflict with the purpose of that organisation, their actions are said to lack transparency.

When society, which is in its facticity 'being-in-itself', is skewed, it sees itself only as 'being-for-itself'. This position has far reaching consequences. Appeals to values such as sovereignty, nationalism, privacy, ownership, etc. give rise to conflict when these values are deemed to have been breached. Here society as 'being-for-itself' is the valuer and its values are socially dependent. Respect, integrity and transparency are the three values, the co-presence of which are imperative where telos is 'being-in-itself'. 'Being-for-itself' can adopt socially dependent values, the practice of which can and often do, contravene these three values. Maybe this is what we really mean when we speak of 'trouble in Paradise'.

If, then, in speaking of values, one is referring to enabling or facilitating values, such values being universal, are not specific and make any further imperative a *non sequitur*. If, however, values here are taken to mean socially dependent values, then the response to any imperative can only be: not necessarily. By way of example, let me begin by discussing the practices of corporations which by 'virtue' of law are deemed persons in the US (entities in Australia) and as such can, in a limited sense, be considered as valuers. All activities of corporations as social practices are reflections of values. The practices considered acceptable are determined by external legislation/regulation and the dictates of the entities' corporate governance leaders. Of these, only the corporate governance leaders can attend to imperatives expressed by *should* in relation to activities considered appropriate and the values expressed by those activities. The values of a corporation, in view of the definition of a corporation – taken here to be a publicly listed (that is, listed on stock exchanges) private sector organisation – are driven by the profit motive, regardless of whether or not these are codified in any statement of mission, vision, purpose, goals, objectives... The effectiveness of a corporation in maximizing the outcomes of this drive is dependent on the degree that all other values, as expressed in practice, can be harnessed to the driving force of the profit motive or value.

Taking a particular corporation to exemplify this: If McDonalds, a fast-food chain incorporated in the US, is considering whether to operate in India, whose values should guide its operations there: America's or India's?<sup>11</sup> McDonalds derives a high proportion of its profit worldwide through the sale of hamburgers. The meat used in McDonald hamburgers is beef. A large percentage of the American population value beef as a food source. When it was originally established, McDonalds' governance dictated that, regardless of where in the world it operated, its menu would be the same. As a corporation, its primary value is profit maximisation<sup>12</sup>, yet in choosing to restrict its menu choices to a demand that was determined in the US, it restricted its appeal in the rest of the world to those countries that either shared or could be persuaded to share these particular American values. Around 80% of India's population is Hindu. Hindus value living cattle, not dead and served in a bun. Their choice not to eat beef is driven by values, not taste. To operate in India and meet its profit-maximising mandate as a corporation, McDonalds needed to make a choice:

1. Set up in an area of India that is not primarily populated by Hindus.
2. Persuade Hindus to abandon their taboo on eating beef.
3. Rule out establishing outlets in India
4. Change or expand the menu to meet fast-food demand in other parts of the world.

McDonalds chose the last mentioned alternative and continues to do so.

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<sup>11</sup> Both the US and India are democracies, are based on the English common law tradition and as members of the WTO, are market economies. Whilst India has laws in place governing foreign investment, none of these would act as a bar to establishment of McDonald's outlets.

<sup>12</sup> In the case of any company listed on stock exchanges, 'profit maximisation' is more properly expressed as 'achieving maximum return on its ordinary shares'.

As with any such corporation, the only *categorical* imperative ('do A') driving it is 'the profit motive'. Notwithstanding legislation and regulation, other practices and the values reflected by those activities are governed by the hypothetical imperative ('do A in order to achieve B'). Whether these values are considered good or right in the sense of ethical or moral, are a sufficient but not a necessary reason for choosing to practice them. Only where profitability is impacted would a corporation that is acting within the legal/regulatory framework, be *compelled* to change its practices to reflect what might be considered 'good' or 'right' by all or any of its stakeholders in particular and public opinion in general.

It can be seen here the co-presence of value and Peirce's normative sciences in operation. By definition, the *summum bonum* of any corporation or publicly listed company – any company listed on the stock exchanges – is to achieve maximum return on its ordinary shares. This is its purpose; as its *summum bonum* it is its ultimate 'good' – that which matters most. But is it 'good'? For the Occupy Wall Street (OWS) protestors, whose slogan is "we are the 99%", the answer is 'no'. Without wading into the debate, by which I mean here, without considering motives or interests, I can say first, that what we have here is a conflict of purpose. Second, 'good' here, has two different meanings. The first is an end; the second, a socially dependant value. This difference can be made clearer by speaking of 'good' here as 'with integrity'. For any corporation to say that it operates with integrity, then minimally, everything that it does must be in accord with its purpose, that is, it must be operating *effectively*. This, however, must be done within the law, not because it is the 'good' or 'right' thing to do, but because it is the law – albeit manmade law – that grants it its 'personhood' and the law which can remove such status if it is found that it is not complying with the law. Nevertheless, to say that it is operating lawfully does not mean that it is operating with integrity in the common sense meaning of integrity as moral 'righteousness', that is, *ethically*.

Shareholders who take action against a corporation that they deem is not operating in accord with its primary purpose as a corporation, may be calling its integrity, in the first sense (its *effectiveness*), into question. Alternatively, they may agree that though it is meeting its purpose, it is not doing so *efficiently*, that is, not optimally. They can vote at a corporation's AGM to demand, say, that the Chair of the Board stand down and, if they have the numbers, succeed. Unfortunately, history shows that shareholders do not call corporate directors to account in the same manner for what may be seen as unethical behaviour. If a corporation is deemed to have acted *unlawfully*, a class action – or group of dissatisfied customers – can argue that said corporation is breaking the law, but cannot use law to challenge its integrity in terms of its primary purpose, not even in the second sense of integrity, regardless of how undesirable or unethical its behaviour is deemed to be. In turn, a Stock Exchange may disallow trading by any listed corporation that contravenes its own rules. Barring these exceptions, it is the buying and selling by the market that determines value.

It is the sustained and extreme breach of integrity in the second sense (*ethically*) that OWS is protesting against, and is directed at not only corporations but also at the likes of hedge fund managers. Whilst corruption can be and is dealt with in law, the same cannot be said for greed which is a value that is not only condoned but, in the not so distant past of the 1980s, was celebrated. OWS's purpose is to communicate the effect of rampant profit making.

Achieving purpose is dependent on integrity in the first sense; it is such integrity that accounts for the process which is continuity. Not so integrity in its second sense which is a choice; it is a value co-present with and qualifying integrity in its first sense.

Because epistemology is intertwined here with value, rather than ontology, let me discuss this a little more by reference to the research project published as *Women's Ways of Knowing* by Mary Belenky et



*al.* (1986). Lest one, by reference to the title, takes this as having a female bias, the authors have recognized that the five ways are not necessarily fixed, exhaustive or universal; that they are abstract and do not account for complexity; that similar categories can describe men's ways of knowing; and that inquiry into knowing can be organized differently. In their study the authors, grouped women's perspectives on knowing into five major epistemological categories as follows:

... *silence*, a position in which women experience themselves as mindless and voiceless and subject to the whims of external authority; *received knowledge*, a perspective from which women conceive of themselves as capable of receiving, even reproducing, knowledge from the all-knowing external authorities but not capable of creating knowledge on their own; *subjective knowledge*, a perspective from which truth and knowledge are conceived of as personal, private and subjectively known or intuited; *procedural knowledge*, a position in which women are invested in learning and applying objective procedures for obtaining and communicating knowledge; and *constructed knowledge*, a position in which women view all knowledge as contextual, experience themselves as creators of knowledge and value both subjective and objective strategies for knowing. (1986: 15)

Following their initial discussion, the authors moved beyond this scheme and referring to Carol Gilligan's *In a Different Voice* (1982) adopted her terms, *separate* and *connected* knowing. Gilligan's study was intent on exposing the deficiencies in Kohlberg's model of moral development. Kohlberg had conducted his research both longitudinally and latitudinally, but his subjects were all male. Gilligan conducted the same research but with female subjects.

When one begins with the study of women and derives developmental constructs from their lives, the outline of a moral conception different from that describe by Freud, Piaget, or Kohlberg begins to emerge and informs a different description of development. In this conception, the moral problem arises from conflicting responsibilities rather than from competing rights and requires for its resolution; a mode of thinking that is contextual and narrative rather than formal and abstract. (1982: 19)

As she says, "the morality of rights differs from the morality of responsibility in its emphasis on separation rather than connection, in its consideration of the individual rather than the relationship as primary" (p. 2) Gilligan stressed that whilst her empirical observation were of women, "this association is not absolute and the contrasts between male and female voices are presented to highlight a distinction between two modes of thought and to focus on problems of interpretation rather than to represent a generalization about either sex" (*Ibid.*) In the literature, these and other similar studies, have largely disappeared like water poured on dessert sand, with separate knowing remaining the hegemonic mode employed. Yet, when only strictly objective critical analysis is recognised as valid, polemic and dualism result, and as Belenky *et al.* noted:

Presented with a proposition, separate knowers immediately look for something wrong – a loophole, a factual error, a logical contradiction, the omission of contrary evidence. (1986: 104)

The implicit value is in competing, in being right, in winning. The promise of certainty, however, is illusory. Moreover, it is a dangerous game to play in the social sciences. It makes objects of subjects. It lacks respect. In the context of the subject of their study, that is, of women's ways of knowing, Belenky *et al.* point out that in relation to procedural knowledge as defined above.

Women who rely on procedural knowledge are systematic thinkers in more than one sense of the term. Their thinking is encapsulated within systems. They can criticize a system, but only in the system's terms, only according to the system's standards. Women at this position may be liberals or conservatives, but they cannot be radicals. If, for example, they are feminists, they want equal opportunity for women within the capitalistic structure; they do not question the premises of the structure. When these women speak of "beating the system," they do not mean violating its expectations but rather exceeding them. (p. 127)

Returning to Honderich's entry for 'value', where he records that the second philosophical concern with the issue is of "whether having value is an objective or subjective matter" (1995: 895). This notion of objectivity hides a multitude of 'sins', not least of which is that it is value-laden. Once we understand

that objectivity is not necessarily 'right' we can see it as such, and looking back to the Ancient Greek philosophy, as the position promulgated by the Stoics as *apatheia* (without passion). The value of *ataraxia* (tranquillity) was also recognised by the Stoics, but for the Epicureans it was of primary importance. I am not well enough read in ancient history to know how the Stoics and Epicureans managed their differences, but I would hazard a guess that the latter believed theirs the 'good' life and the former theirs the 'right' one.

Harking back to Peirce's contention that "[t]he essence of anything lies in what it is intended to do" (CP4.659, 1908), that is, its purpose: objectivity, for him, included mathematics, which he was discussing when he made this statement and which he insisted be conducted diagrammatically. Susanna Marietti (2010: 149) points out that "[a]ccording to Peirce, a diagram is a sign that makes the relations between the objects represented perceptible." Claudine Tiercelin, in her essay 'Peirce on mathematical objects and mathematical objectivity' (2010: 105) points out that:

...he thought that the *meaning* of mathematical statements could not be given independently of any demonstration; in that sense, although Peirce's pragmatistic realism about indeterminacy prevented him from reducing the meaning of a proposition to its conditions of verification, or reducing meaning to use, Peirce never separated the meaning of any mathematical proposition from its conditions of *assertibility*.

This could imply that Peirce was an anti-Platonist – usually meaning *anti-realist* – but this would only be so if one viewed such diagrams as particular rather than general; as static rather than processual. Take, for example, what Frank Wilczek (2008: 19-20) calls 'Einstein's second law',  $m = E/c^2$ . This is a manipulation of  $E = mc^2$  which hypothesised that a body's mass arises from the energy of the stuff it contains, and which suggests the possibility of getting large amounts of energy from small amounts of mass. It calls to mind nuclear reactors and nuclear bombs. Manipulating the 'diagram', however, as in  $m = E/c^2$  suggests the possibility of explaining how mass arises from energy, and it was this turn that led to the search for the Higgs boson. Study of the experimental data of the Higgs, which was isolated by the LHC mid-2012, has suggested, however, that it is not 'the One'

The Process Physics team at Flinders has shown that valuing objectivity in science to the exclusion of the knower, the interpreter, stymies discovery. The value of what Belenky *et al.* have termed 'constructive knowing' and Gilligan as 'connected knowing', are being realised. Kirsty Kitto whose PhD thesis *Modelling and Generating Complex Emergent Behaviour* (2006), says of this shift in value:

Through a proper treatment of context we lose much of the confusion that often surrounds an examination of the Universe; an observer of the Universe can exist *within* that Universe. (p. 10)

Those scientists who do not recognise objectivity as value-laden – who are in its thrall – are unwittingly circumscribing their purpose as scientists. Whilst their integrity, in both senses, may remain intact, they may be forced into a position of compromising other values, or their purpose. This compromising position, commonly called 'conflict of interest', might better be described as 'conflict of purpose'.

There is no absolute good or bad, right or wrong – no certainty. There is only better or worse. Values are not abstractions – valuers value, and values are a property of a relationship between valuers and that which they value. At the heart of value is contingency. What this suggests is that values are intentional, that is, that they are purposeful, which in turn means they are teleological.

Demonstrating this calls for a more complex example than the one given above of McDonalds. I have chosen to consider the conduct of clinical trials here and in Chapter 9. I will speak of the public sector organisations that conduct clinical trials – most often universities – as Clinical Trials Centres (CTCs) and those operating in the private sector as Contract Research Organisations (CROs).

Despite their research status, the bulk of trials CTCs conduct are likely to be industry sponsored. Centres seeking funding for trials that are in the public interest but which are unable to demonstrate that such trials would 'add value' to the primary purpose of a funder, are often engaged in protracted search for funding. An example of such a trial type was the Benefit of Oxygen Saturation Targeting (BOOST) Trial concerned with achieving adequate delivery of oxygen to premature babies without creating oxygen toxicity. The trial was funded by the National Health and Medical Research Council (NHMRC) in Australia, the New Zealand Health Research Council (NZHRC) in New Zealand and the National Research Council (NRC) in the UK. The data from these BOOST trials was then pooled with the data from Surfactant, Positive Pressure and Pulse Oximetry Randomized Trial (SUPPORT) which was funded by the National Institutes of Health (NIH)<sup>13</sup>. The "routine" use of supplemental oxygen in the care of preterm infants originated from observations in the 1940s leading to the widespread practice of unrestricted oxygen supplementation for small or sick infants. Unfortunately, though survival increased, so too did severe eye disease and blindness. Kate Campbell from Australia suggested in 1951 that oxygen could be responsible for this rising epidemic. It took more than fifty years (from 1951 – 2003 when SUPPORT was launched) to garner funding for large randomised clinical trials to investigate Campbell's hypothesis.

As I argued above, all activities of corporations, as social practices, are reflections of the values of their owners. The practices considered acceptable are determined by external legislation and regulation and the dictates of entities' corporate governance leaders. The values of corporations, in view of the definition of a corporation, are driven by the profit motive. The effectiveness of maximizing the outcomes of this drive is dependent on the degree that all other values, as expressed in practice, can be harnessed to the driving force of this motive or value, which is its primary purpose. Only where profitability is impacted would corporations that are acting within the legal and regulatory framework, be compelled to change their practices.

Harnessing the public sector and its values, in the pursuit of maximising shareholder value, is in the interests of big business. Alliances between the sectors are in the interests of national economies on the one hand and profit maximisation on the other. This is very much so in the case of the pharmaceutical industry whose return on investment (ROI) has been in double figures for the multinationals. Graham Dukes of the Unit of Drug Policy Studies at the University of Oslo notes, however, when considering the World Health Organization's report on Priority Medicines for Europe and the World:

Public-Private partnerships can lead to a confusion of priorities and interests. The public P and the private P do largely have different purposes and interests, however much one tries to harness them together and if they are harnessed together there is a risk of the one dragging the other onto its own course (2004).

In the case of public research, the problem is exacerbated by governments' insistence on universities and other public research organisations supplementing their government research income with industry funding, often making securing of such buy-in a prerequisite for receiving government grants. Cutting the funding of public entities has, in many instances, put them in a position where survival of research programs is contingent on industry alliances. This, in turn, has put governments, their instrumentalities and their staff, at enormous risk of entrenched conflict of purpose. To counter this endemic situation, it is necessary to understand first, how, despite acting technically within the law, corporations have succeeded in convincing governments to give their interest precedence, even when this is manifestly not in the public interest. Michelle Brill-Edwards of the Health Protection Branch of Canada's Centre for Health Services and Policy Research (2000), is very aware of the heuristics of this. The first tactic, she says, is to deny for as long as possible that there is an issue through the strategy of divide (and rule). This is achieved by discrediting any complaint that is not in the industry's interest. Such tactics include

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<sup>13</sup> This last mentioned trial is being investigated by the US Department of Health and Human Services (HHS) for not providing adequate risk information to enable parents to give *informed* consent.

labelling detractors as 'biased', 'unreliable', 'disgruntled' 'impractical', 'the loony fringe', 'difficult to work with'... If a situation puts the issue in the wider public spotlight, delay tactics often provide an almost foolproof way of getting it off the public's radar long enough to regroup.

Ultimately, industry will accede to legislation when flagrant disregard can be established. It will do so to protect and retain its gains achieved through dismantling the public sector's stronghold on interests that are in conflict with the profit motive – gains achieved by the pharmaceutical industry largely through, what Brill-Edwards describes as, a protracted process of dismantling the regulatory structures with which drug approval has been governed. This process, which has involved three separate but related tracks: de-regulation, de-professionalization and de-construction, appears engaged in removing anything in the way of getting new products to market in the shortest time possible. FDA regulation is now paid for by fees from industry, a situation that Dorey (2004) notes "has led to the industry becoming treated as the customers, and regulators being anxious to serve the industry". A particularly relevant outcome of this reversal has been the introduction of what is called: 'Notice of Compliance with Conditions'. This permits a company to market drugs – such as Celebrex and Vioxx<sup>14</sup> – without prior evidence of efficacy or safety. All that is required is evidence described as 'promising'. The only condition on such marketing is that the company commits to carrying out more research at some (unspecified) later date. This is an inversion of the previous standard of burden of proof required to market a drug – now causal proof of harm needs to be produced before consideration is given to its withdrawal (Brill-Edwards, 2000). Lexchin (2005) quotes a prediction by Drummond Rennie, editor of *Journal of the American Medical Association (JAMA)* that dependence of clinical research on money from the pharmaceutical industry will change only "when commercial ties are linked to deaths" (in Greenberg, 2003, *Lancet* 362: 302-303). The remedy, instituted by the US Department of Health and Human Services' National Institutes of Health (NIH), is to clamp down harder on individuals.

Under the new rules, all NIH employees are prohibited from engaging in certain outside employment with: 1) substantially affected organizations, including pharmaceutical and biotechnology companies; 2) supported research institutions, including NIH grantees; 3) health care providers and insurers; and 4) related trade, professional or similar associations. Investments in organizations substantially affected by the NIH, such as the biotechnology and pharmaceutical industries, are also not allowed (February 2005).

This move, which provides no compensatory measures, is playing right into the hands of an industry intent on de-professionalising the public sector by stripping it of capable professionals—physicians, scientists, chemists—who can intelligently evaluate data and have the professional capacity to defend their decisions. Even given that the FDA "submitted to a far-reaching reform of its drug approval procedures following the Vioxx debacle" (Dorey, 2004), there has been no suggestion that 'Notice of Compliance with Conditions' will be rescinded or that other, more systemic conflict of purpose will be addressed

The increasingly dependent relationship between government and industry represents a shift by governments, from the public interest to the interest of industry. Such alliances have created entrenched, systematic conflict of purpose which only a systematic solution can address. It is not up to industry – nor is it in its interest – to provide the solution; industry has no conflict of interest. Neither should the onus of responsibility continue to fall on individuals alone; this is a response that focuses on effect only and not on cause. Rather it is the responsibility of governments to honour the social contract and to establish systematic ethical practices for bringing about a more equal contest between public and private interests.

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<sup>14</sup> Celebrex and Vioxx – for the relief of the signs and symptoms of osteoarthritis (OA) – were first brought to market as alternatives to other non-steroid anti-inflammatory drugs (NSAIDs) such as ibuprofen and diclofenac because they were said not to interfere with Cox 1 as other NSAIDs did. The difference in the molecular structure of each allowed for different patents to be taken out prohibiting cheaper generic versions to be marketed until the patents expired.

## Chapter 9 Value and Power

I said at the outset, quoting Mary Gaudron: "The matters that matter may differ depending on who is doing the matting."

In Chapter 8 I showed that 'matting' is grounded in and powered by value and purpose, that is, I focused on the values and purpose of *who* (or *what*, I must add) is doing the 'matting'. In this chapter I focus on the *doing* of 'matting'. In Peircean terms, this is the category of Secondness of my hypothesis: Power – where power is the capacity to cause – is the enabler of force functioning as actual 'matting'.

Because power is as ubiquitous as value and because in reality 'matting' is irreducible, of necessity in discussing value, I have made reference to power in the previous section. Here, however, I show that power enables the 'matting' of the matters that matter expressed through purpose and values to produce consequences along continuums of probability.

I discuss the utilisation of power by human society and specifically as it relates to paid employment. In doing so I compare the organisational models known as 'Best Practice' Model and 'Best Fit' Model as a means of assessing which is best aligned with society's needs. In the first instance I describe the two models, but know that, even though I do not show this level of detail, the models need to be translated into flowcharts and networks. Like Peirce's existential graphs, this method makes observable the logic of processes and the relationships of the parts to the whole organisations as they systematically evolve within an environment. Flowcharts and networks are diagrammatical representations of algorithms. Together with other tools for assessing quality such as histograms, Pareto charts, check sheets, control charts, cause-and-effect diagrams and scatter diagrams, flowcharts and networks reveal the operation of the algorithms – that is, their theoretical power.

The choice of either the 'Best Practice' Model or the 'Best Fit' Model as strategy is determined by the purpose and the values driving the choice of such purpose. The choice of model, regardless of its function, has differing effects on the people – the valuers – that make up organisations.

First, a description of the models, particularly in relation to what organisations of all types call human resource management (HRM).

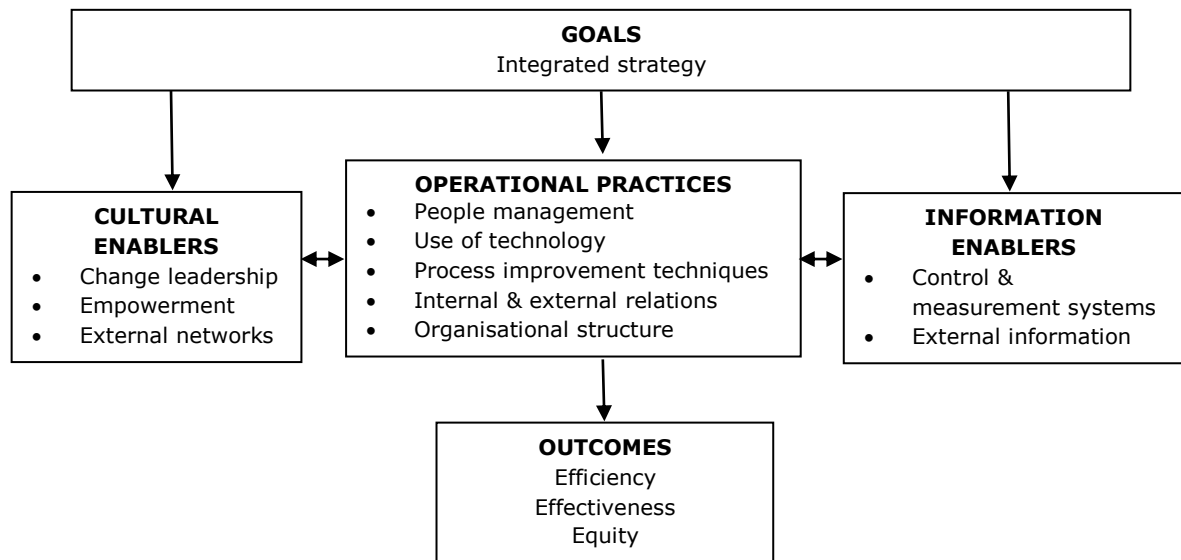
The most commonly recognised HRM 'Best Practice' Model was developed by Jeffery Pfeffer (1998) and whittled down from sixteen to seven dimensions:

1. employment security;
2. selective hiring of new personnel;
3. self-managed teams and decentralisation of decision making as the basic principles of organisational design;
4. comparatively high compensation contingent on organisational performance;
5. extensive training;
6. reduced status distinctions and barriers; and
7. extensive sharing of financial and performance information throughout the organisation.

Pfeffer, though agreeing that several of these dimensions "appear to fly in the face of conventional wisdom", explained their underlying logic and argued that for success in achieving high-performance organisational arrangements, it is counterproductive to take this approach piecemeal (Pfeffer, 1998: 96-124). The 'Best Practice' Model shows as arising from an organisation's vision and following from its vision and mission as follows:

**VISION:** *the leader in measures of excellence, the operational benchmark and the preferred organisation in the particular market.*

**MISSION:** *to achieve organisational BEST PRACTICE*



**Figure 18:** *A Best Practice Model*

This Best Practice model is necessarily transparent – choosing the model means choosing transparency. Not so the Best Fit model (depicted below) which only discloses that which is required by law and what it chooses to disclose. It is correct to say that whilst “Best Fit” may be systematic, as suggested by the beehive structure depicted below, it is a closed system, not only externally but internally also.

In terms of its purpose, an organisation opting for ‘Best Fit’ will always optimise effectiveness and efficiency but not so equity. Freedom and equality may be uttered in the same breath, but any move towards the latter, will always compromise the former. This can account for resistance by private enterprise to any regulation which circumscribes efficiency. Freedom is categorical whilst equality is a value of choice. This may be interpreted as ‘survival of the fittest’, but such interpretation shows a lack of understanding of the evolution of ecosystems to which rampant freedom is anathema. A generic HRM Best Fit model which is contextual and closed, would look something like this:



**Figure 19:** *A Best Fit Model*

The operation of organisations is dependent on its value and purpose or intention. Let me exemplify this by bringing into focus roles within public and private sector clinical trials centres – CTCs and CROs. Such centres expect work to be performed in accordance with their purpose, vision, mission, values, goals, operational rules and outputs, and outcomes to result from performance. This is called accountability:

achieving purpose is being effective; doing so with no more than is necessary to be effective is considered efficient. Performance in these terms is measurable.

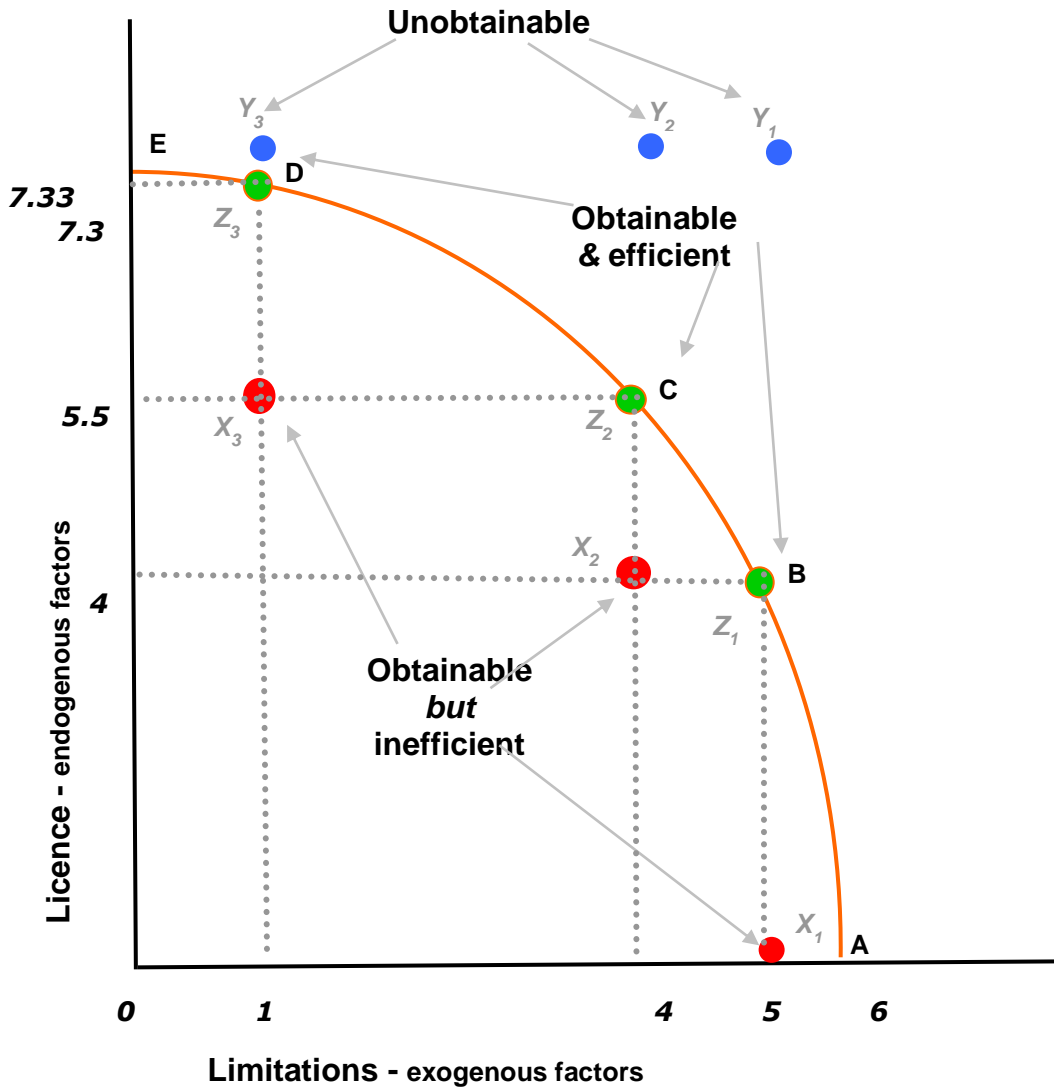


Figure 20: A Performance Productivity Frontier where performance is framed as outcomes

Organisations dedicated to conducting clinical trials typically employ staff engaged in core activities including medical scientists, clinical trialists, statisticians/biostatisticians and support staff of computer technicians and administrators. Every employee has licence, circumscribed by limitations. On average in the public sector, core activity employees have greater licence but are paid less than their counterparts in the private sector. Plotting obtainable and efficient performance expectations along the productivity frontier where time is the limiting factor, a biostatistician who may be required to do research, teach, 'number crunch' and do administrative tasks may plot at B. Increasing productivity – moving up the curve to C – means freeing-up time. This can be done in a number of ways: by way of overtime, by use of own time, by rationalising the role. Where economies of scale can be achieved, a team would share the load and may be able to operate along the BC curve, or even the BD curve. If, say, 20% of the workload of biostatisticians operating at B is taken up with teaching, then the opportunity cost of teaching within a proscribed workload is 20%. If, however, this is an average over a year and an academic year is eight months, then when counting only face-to-face teaching (together with student assessment), the allocated time may be reduced to 13%. This, however, lacks transparency if the assumption is that such time consuming activities such as staying abreast in the field, curriculum development, lecture course planning, mentoring and coaching are excluded from the load, or that these will be conducted in the

biostatisticians' own time. This is not an issue for private sector clinical trials centres where teaching is not included in their purpose.

At this point it is worth clarifying the difference between wages and salaries. In a general way, wages are paid to employees for their time doing work; salaries are paid for getting work done. Those earning wages would (or rather, should) be paid for overtime, whereas, employees who are earning a salary are being paid for the work performed and time taken to do work in excess of time at work would be done in their own-time. In Australian universities, all non-executive employees – both tenured and non-tenured – are paid wages. Those whose roles are primarily devoted to research and teaching are employed on the academic award with over-award remuneration being paid as loadings. Research and teaching academics do not expect, nor are they expected to be paid for overtime even though they are formally being paid for time worked. Ostensibly this is because of a presumption that academics can manage their own workloads putting more hours into teaching in semester sessions and less during the breaks. Even so, a research centre may decide they are not in a position to allow for such flexibility. If this is compounded when, disregarding some aspects of the overall teaching function necessary for meeting all their accountabilities and only accommodating say 5% for a 10% role.

Regardless of whether this is an error in design or an intentional play on the expectation of academics using own-time, it is a breach of integrity by the employer. It also shows a lack of respect and transparency. In this case, lack of respect expressed in terms of Kant's categorical imperative, means use of employees beyond a mutual contract as a means to its own ends. The absence of transparency is the obfuscation of the corruption of the process. The consequences of any breach of values by employers may show-up in a number of observable ways: constantly "overworked" employees, high staff turn-over, hostility between employers and employees, low morale, tit-for-tat breaches of values by employees, to name but a few. Such situations are common and complex even when considered in terms described above where the attributable cause is workload expectations.

Let me put myself in a senior administrative role of a university CTC as a means of resolving such an untenable situation. Before applying the model, I would need to do a great deal of preparatory work including: making a study of the clinical trials 'market' and its history and the management strategies of the sponsors and funders of medicine trials; identifying the CTC's purpose, assessing whether this was aligned with the university's purpose and ascertaining the skills, abilities, experience necessary to meet the purpose and the resources, including funding required to realise its achievement; and negotiating with the CTC's academic and trials directors to develop the vision mission and goals; spelling out the consequences of including such concepts as excellence, benchmarking and best practice. A choice for inclusion of these would suggest the operating rules. At the same time, I would need to be identifying endogenous and exogenous power sources and their predictable impact.

Beginning with the history: two phenomena deserve special attention. First, the passing of the 1980 Bayh-Dole Act, the purpose of which was to encourage the utilisation of inventions produced under US federal funding. The Office of Intellectual Property Management of the University of New Hampshire, for example, issued a statement to its research community (2002) prefacing it:

This policy promotes the participation of universities and small businesses in the development and commercialization process. It also permits exclusive licensing with transfer of an invention to the marketplace for the public good. The government gets a royalty-free, non-exclusive license to use for government purposes (including use by government contractors.)

The policy permits universities (all non-profits) and small businesses to elect to retain title to inventions made in performance of the federally-funded program.

It was understood that stimulation of the U.S. economy would occur through the licensing of new inventions from universities to businesses that would, in turn, manufacture the resulting products in the U.S.



An unfortunate but unintended consequence of the passing of the Bayh-Dole Act and the removal of the firewall between public and private funding, was a shift of clinical trials of pharmaceutical medicines by pharmaceutical companies from universities to the private sector, in particular to newly emerging clinical trials research companies such as Quintiles and Covance. The ensuing decades saw an inversion of a 4:1 ratio in universities' favour in the 1980s to that of private sector companies this century. Remembering that between 1980 and regulation clamping down on practices perceived as conflicts of interest, industry has had more than three decades during which to siphon-off clinical trials expertise from universities to serve its own interests; public interest has been a casualty.

Second and not unrelated, was a change of focus by pharmaceutical companies from improving revenue to cutting costs (Kager & Mozeson 2000) – to a focus on 'productivity' and 'value added'. This change has not been confined to the pharmaceutical industry; it has been taken-up across industry and by public funding bodies including governments. Because of the 'Best-Fit' Model's lack of transparency – often in the name of 'commercial-in-confidence' – it is only by keeping a close eye on trends and on the media that an outsider might gain insight into what has been and is, going on.

This shift of responsibility for funding public health research from the public to the private sector is a reflection of a trend by Western governments to support the economic theories of Adam Smith [1723-1790] rather than those of John Maynard Keynes [1883-1946]<sup>15</sup>. On the one hand, John Maynard Keynes' economics is an approach to economic policy that favours using the government's power to spend, tax and borrow to keep the economy stable and growing. On the other hand, Adam Smith advocated a *laissez-faire* attitude by government toward the marketplace, allowing the "invisible hand" to guide everyone in their economic endeavours, theoretically creating the greatest good for the greatest number of people and generating economic growth. (Gorman, 2003)

Which of these two major economic doctrines individuals tend to value will directly affect their desires, endeavours, expectations and ethics with regards to the economy. As noted above, research scientists in the private sector are in general paid higher salaries than those with comparable roles in the public sector, but – and it is a big but – their freedom or licence is more circumscribed. It could be said that this translates as greater remuneration satisfaction for less job satisfaction. Most notably research scientists in the private sector forego freedom of publication or sharing of their research findings and freedom and time for conducting 'blue skies' research and for teaching. Any university CTC wanting to staunch the flow of their people to the private sector needs to be very aware of this.

With this in mind, as the senior administrator, I next need to identify the CTC's purpose and assess whether it is aligned with the university's purpose. Following this comes the task of listing the generic functions involved in operating a university CTC. These include identifying public and community health issues requiring new or novel treatments; developing hypotheses addressing these; designing appropriate trial programs; exploring novel approaches in biostatistics for interpreting data and finding meaning, conducting systematic reviews and clinical trials; teaching and supervising university undergraduate and postgraduate students; developing and presenting education and training programs and methods for translating evidence into practice; engaging in quality control and performance reviews; and finally keeping up to date in the field. In addition, everything involved in information technology, human resource services, contract development, financial and accounting services, site management, reception and other administrative support must be accounted for. Following this, is the need to draw up the matrix of duty statements, identifying the essential job and candidate criteria and classifying each accordingly. Ascertaining the workloads and the concomitant cost and adding a percentage for non-

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<sup>15</sup> I have not considered the third major modern economic theory, that of Karl Marx, because it has been largely discredited and abandoned by Western powers.

payroll expenditure, then determines the recurrent income stream required to fund the activities of the CTC. Finally comes the task of developing budgets, making grant applications; and seeking sponsors.

The concurrent exercise is of developing a strategic plan for performance in accord with purpose and within resource constraints, focusing on a vision and mission, identifying the values necessary to meet these, specifying the goals and suggesting the operating rules. A top-level plan might look something like this.

### ***Clinical Trials Centre (CTC) of a university***

CTC's **purpose** is to contribute to national and international evidence-based health care in public and community health and in the acquisition, creation, analysis, interpretation, synthesis, translation and transmission of knowledge concerning clinical trials.

CTC's **vision** of itself is as the leader of clinical trials research excellence, the benchmark for the conduct of investigator initiated clinical trials and the preferred reference for translating clinical trials evidence into practice.

CTC's **mission** is to achieve best practice in health care and improve outcomes through the use of clinical trials.

CTC strives to co-operatively demonstrate its **values** of commitment to public and community health and education and learning, integrity, respect, transparency and rigour in all its planning, decision making, actions and interactions.

CTC's **goals** are to:

- *generate high quality evidence of the effectiveness of health care interventions through randomised trials;*
- *be a national resource in design, conduct, analysis and interpretation of randomised trials;*
- *improve evidence-based health care through the use of clinical trials and high quality systematic reviews of trials;*
- *provide high quality education and training in design, conduct, analysis and interpretation of clinical trials;*
- *develop methodologies for designing and undertaking relevant clinical trials and for combining and interpreting trial results for better practice;*
- *develop and assess strategies for improving the translation of trial evidence into best practice.*

CTC's **operational rules:**

*How-to rules – spell out key features of how activities and processes are to be executed, as:*

- *Best Practice*
- *Resourced*

*Boundary rules – focus on which opportunities can be pursued and which should not, ie:*

- *In accord with the vision, mission, values and goals*
- *Stretching (but not exceeding) present or acquired competences*

*Priority rules – rank the accepted opportunities:*

- *In order of their capacity to realise the vision or to lead to activities that can increase that capacity*

*Optimising rules – synchronise and enrich activities*

*by:*

*Consulting, cooperating, coordinating, communicate and coaching*

*Exit rules – decide when to pull out of yesterday's opportunities by:*

- *Spelling-out objectives and performance indicators and conducting periodic reviews*

The minimum values that must be practiced by *all* parties at all times if any organisation is to be effective – that is, continually achieve its purpose in terms of its vision and mission – and efficient – that is, optimally performing in accord with its operating rules – are commitment to public and community health, integrity, transparency, respect and rigour. Other values may be added, but they, like these, must be matched with performance indicators if they are to be considered meaningful and systematic. The purpose, vision and mission of any organisation is value driven and maintained. Values coexist with performance – different values produce different outcomes, as does a lapse in such values in any part of

the organisation. Those values that are identified as essential must be both ubiquitous and continuous. This is so for both employer and employees and thus must operate in performance reviews – performance is grounded in values.

The above plan is cast in terms of expectations of employees but is silent on what employees may expect of the employer. Returning to the seven dimensions of the 'Best Practice' Model: the employer must attend to these if there is to be symmetry of values and concomitant performance between employer and employees in the effective and efficient achievement of the organisations purpose, vision, mission and goals. Taking these one at a time and remembering that they are grounded in the organisation's values:

1. *Employment security* for university employees means tenure. Tenure or tenure-track contingent on performance for both academic and non-academic employees must be the norm. The 'Best-Fit' Model rarely offers this highly valued dimension. Instead, it may offer something like a 10% loading for fixed-term contracts.
2. *Selective hiring of new personnel* is a commitment that can only be made as positions become vacant or with growth. Self-attrition by tenured employees is often considered the only way an organisation can free itself of non-performers, but this is not the case if the employment contracts of unsatisfactory performers are terminated. It must be stressed that the reflection of the organisation's values in performance are the focus of assessment. A tool for making such assessment would first need to be designed and tested by a highly competent team: all the many dozen performance appraisal models and 'kits' available on the market are woeful in my estimation.
3. *Self-managed teams and decentralisation of decision making as the basic principles of organisational design* requires transparency and close attention to change management both of which first require extensive exploitative learning.
4. *Comparatively high compensation contingent on organisational performance* is not just a matter of money. Time for employees to pursue activities in their shared interest with sponsoring universities is highly valued as is control of research data and freedom of publication of results. Here the ability of CTCs to negotiate contracts with funding bodies is essential.
5. *Extensive training*, not only in operational matters, but also in change management, team building, conflict management, problem solving, decision making and understanding values, to name a few, are essential.
6. *Reduced status distinctions and barriers* can be 'the rub'. Dispensing with the use of titles, for example, barely scratches the surface. More important is attention to endemic differences in status ascription in universities between academic and non-academic staff and between a medical model and what may be called a nursical model of health, where the former is directed towards cure and the latter focuses on care. Academics are routinely considered of higher status than non-academics, as is the medical rather than the nursical model of health. Such differential status ascription is hegemonic. Putting aside, for the moment, consideration of barriers, status differentials are always a matter of opinion grounded in value. Any attempts to resolve differences of opinion are doomed to failure, but there is an alternative approach, one put forward by Yasuhiko Genku Kimura in his paper 'Alignment Beyond Agreement' (2003) in which he explains:

Alignment is congruence of intention, whereas agreement is congruence of opinion. Opinion is a supposition elevated to the status of a conclusion held to be right but not substantiated by positive proof—rational or evidential. Because disagreement means difference of opinion, disagreement often escalates into a dispute as to whose opinion is right. ... Alignment does not require agreement as a necessary condition. Alignment as congruence of intention is congruence of resolution for the attainment of a particular aim. ... The question is not "who is right" but "what is best" for the fulfilment of the intention.

The intention is written into the purpose, mission, vision and goals of the CTC and into those same for the university sponsoring the CTC.

7. *Extensive sharing of financial and performance information throughout the organisation* requires complete transparency. This is not merely a matter of making data available; as information sharing, it is focused not so much on knowledge as on understanding the reality of the event that is the organisation 'mattering'.

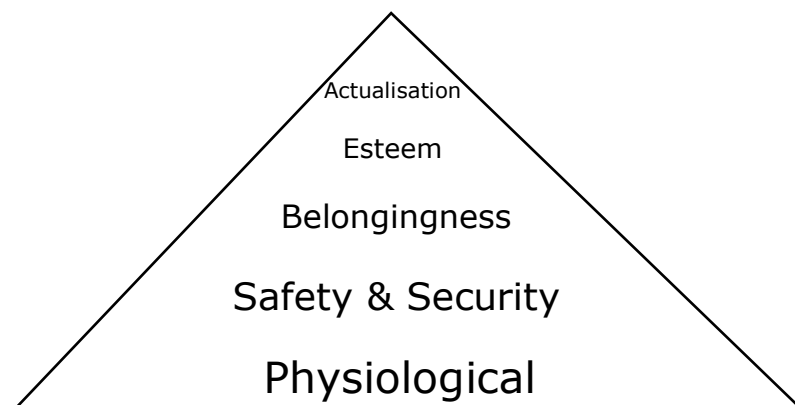
This is all 'well and good' – one may even say 'noble' – but if, as I seem to be implying, a 'Best Practice' Model is better than a 'Best Fit' Model, what makes it better, and in what respect does the preferred model depend on Peirce's system.

The first thing to reiterate about the Best Practice model is that to achieve its purpose *optimally* it must be practiced as a whole. As with Peirce's method, it is temporal, is future directed, its growth and development is evolutionary, and it is mediated. To say it is mediated, is to say it is attended to by itself for its well-being and flourishing as a whole within an environment. Power as attention is practiced throughout the Best Practice organisation and not merely at the top. I use the term 'attention' here as the mediator rather than Peirce's 'agape' because, you might say, the former is better understood during 'business hours'. Attention, ramped up a notch to include commitment comes closer to what Peirce meant by 'agape'. Whatever the term, its meaning remains as does its necessity as mediating power.

As organisations, both models are 'mattering' and, if my hypothesis is valid, as 'mattering', both models are grounded in values and are purposeful; are actualised through the function of causation; and are realized through evolutionary growth and development. The 'Best Practice' Model assumes that a set of practices aimed at high commitment and high performance will benefit all organisations regardless of context. Taking 'fit' in 'Best Fit' to mean possessing or conferring the ability to survive in a particular environment, then, as with Herbert Spencer's biological evolutionary theory of 'survival of the fittest', the model is predicated on an assumption that survival is primary. 'Fit' is concerned externally with competitive strategy and internally with coherence. In the jargon of Human Resource Management (HRM) the 'mattering' of the Best Practice model is 'soft', stressing the 'human' aspects; the 'Mattering' of the 'Best-Fit' Model is 'hard' and is focused on high marginal returns.

Deriving from their purpose for 'mattering', both models are concerned with return on investment. In the case of private sector organisations, this return is profit, regardless of whether or not this is made explicit or is merely implicit in being private sector organisations – it is commitment by the 'owners' of the organisation to achieving the highest profit. Return in the public and Not-For-Profit (NFP) sectors is the outcome of commitment by the parts to the whole.

Regardless of the model utilised, living people are the 'mattering': they are the market, the inputters and outputters, the suppliers and the demanders. For people to matter – that is, to live – needs must. The Hierarchy of Needs developed by Abraham Maslow (1908-1970) illustrates these. Consideration of an *organisation's* responsibility for meeting each of these levels is a telling exercise.



**Figure 21:** An interpretation of Maslow's model of Hierarchy of Needs

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First, though, so as not to create confusion and to accommodate understanding, I need to refer to the concept of 'wholes (parts)' raised in Chapter 8. Even though Maslow's model is concerned with individuals, it makes two assumptions – an environment (a context), and other individuals – necessary for meeting the needs of the individual. Individual people when viewed minimally as engaged in maintaining homeostasis, are organisations; in and of themselves they are wholes. This can be interpreted as what Peirce meant when he claimed that the individual is not real. The real – 'matting' – is irreducible beyond First, Second and Third. Furthermore, as John Donne the English metaphysic poet wrote in his *Meditation XVII* (1624):

No man is an *Iland*, intire of it selfe; every man is a peece of the *Continent*, a part of the *maine*; if a *Clod* bee washed away by the *Sea*, *Europe* is the lesse, as well as if a *Promontorie* were, as well as if a *Mannor* of thy *friends* or of *thine owne* were; any mans *death* diminishes *me*, because I am involved in *Mankinde* ... [Donne's original spelling and punctuation]

Not to diminish self-responsibility given persons are whole organisations, human society as the whole organisation of its parts – people – is responsible for meeting the needs of its parts. Society, however, is spread (unevenly) around this world (environment) which other organisations and their composite parts – people – inhabit. Society as the whole evolves as an 'organisation' of 'organisations' of people such as nations, 'races', cultures, religions, markets. These 'organisations' are all the creation of people as are their 'borders'. Here the claim of sovereignty is highly pertinent. A claim of sovereignty is a claim of supreme controlling power and absolute and independent authority by a person or persons, or in cases of claims on behalf of transcendent power/s (e.g. God), spokespersons through scriptures.

Markets, however, can and do operate over sovereign boundaries. As discussed in the previous chapter, global corporations/organisations, are considered as persons, but unlike human persons, they can cross national borders unimpeded.

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All this is pertinent to value, power and realisation of 'matting'. Let me now return to consideration of an organisation's responsibility for meeting each level of Maslow's model of hierarchy of Needs (Figure 21) and whether such consideration is relevant to an interpretation of the 'Best Practice' Model as better than the 'Best Fit' Model.

The five levels of the model are:

1. *Physiological* needs which are the physical requirements for human survival. If these requirements are not met, the human body cannot function properly and will ultimately fail.
2. *Safety and Security* needs which include: personal security, financial security, health and well-being, safety nets against accidents/illness and their adverse impacts. In the absence of economic safety – due to economic crisis and lack of work opportunities – these safety needs manifest themselves in ways such as a preference for job security, grievance procedures for protection from unilateral authority, savings accounts, insurance policies, reasonable disability accommodations, etc.
3. *Belongingness* which is interpersonal. According to Maslow, humans need to feel a sense of belonging and acceptance among their social groups, regardless if these groups are large or small.
4. *Esteem* which concerns the desire to be accepted and valued by others. Maslow noted two versions of esteem needs: a "lower" version and a "higher" version. The "lower" version of esteem is the need for respect from others. The "higher" version manifests itself as the need for self-respect. This "higher" version takes precedence over the "lower" version because it relies on an inner competence established through experience.
5. *Actualisation* which refers to what a person's full potential is, and the realisation of that potential. Maslow describes this level as the desire to accomplish everything that one can, to become the most that one can be. As previously mentioned, Maslow believed that to understand this level of need, the person must not only achieve the previous needs, but master them.

Maslow, in his later career came to see that the "hierarchies are interrelated rather than sharply separated". His model is still widely used across a number of disciplines but is not without its critics. Nevertheless, such criticisms, once identified, can be largely overcome and if not, then its shortcomings recognised. Putting aside criticism about the positioning of sex – a positioning I have not, in using top-level labels, shown – criticism regarding ethnocentrism raised by Geert Hofstede (1984) is valid. To go towards overcoming this, I have followed the reworking of the model by Turil Cronburg (2010) in which he finds that awareness of first, second and third person perspectives and of each one's input needs and output needs, moves through a general pattern that is basically the same as Maslow's. In accord with this, I have altered the label of Maslow's top level from Self-Actualisation to Actualisation.

My own criticisms are first that there is an unacknowledged shift between needs and desires – these may overlap, but are not synonymous – and second that despite any reworking to address valid criticism, the model remains analytic. By recasting needs (and desires) as values which power the real event of 'matting', a more accurate (albeit fuzzy) and comprehensive account of the interaction of the parts and the wholes can be made clear.

In *Being and Time* (1927) Martin Heidegger wrote:

*Dasein* is a being that does not simply occur among other beings. Rather it is ontically distinguished by the fact that in its being this being is concerned about its very being. Thus it is constitutive of the being of *Dasein* to have, in its very being, a relation of being to this being.

Heidegger would have been thinking of the individual person, but, as identified above in discussing parts and wholes, beings, including organisations are both parts and wholes. All being is "in its very being, a relation of being to this being" and needs to be considered as such – as a relationship rather than as collections reducible to individual parts.

You and I and our dependents are human society. For human society to survive, we are also the providers of our and our dependents' needs for sustenance, shelter, safety, health, belongingness, education/ learning and work. To solve the ongoing problems of meeting our needs, we create culture. I am here considering what we commonly call Western Society and am therefore concerned with Western cultures. These cultures have created power structures and institutions designed to meet our needs. The primary power sources created and recognised by Western Society, are the state, private governance, market forces and economic forces. The state, which wields its power through legislation and military might, includes a spectrum ranging from dictatorship to democracy; private governance pertains to private property and to those aspects of culture over which the state allows individuals and groups to make their own decisions; market forces are those of supply and demand; and economic forces are the factors that help determine competitiveness for limited resources including fiscal and monetary policies.

Because we matter as humans within a natural environment which produces and sustains us, for survival we are both dependent on and responsible for our environment. Attention to the world's environment – much of which knows no borders – is a recently realised need for guaranteeing survival, yet responsibility for addressing this need is strongly contested at present at international forums of states such as the United Nations. Society is not bereft of co-operative abilities and indeed in many situations shows a high aptitude, yet compared to ecosystems, culture is woefully deficient. Some of us have over-stretched our needs (desires) at the expense of others and, now too, of our environment.

Human society is culturally out of kilter with its ultimate sustainer, the environment; as an evolutionary event its telos has become demise. This might be understandable if wealth was evenly distributed (commonwealth) throughout our world, but this we know is not the case. If we ask ourselves whether the wealth of the world is sufficient to sustain human society and to care for our environment and answer in the affirmative, then we are left wondering what is happening in such advanced economies as

the USA, UK and Australia which is causing an increase in poverty, that is, the inability of a growing number to meet even basic physiological needs. This tragic inequality is highest in what by measures of wealth is the most advanced economy in the world, the USA (see Figure 22 below).

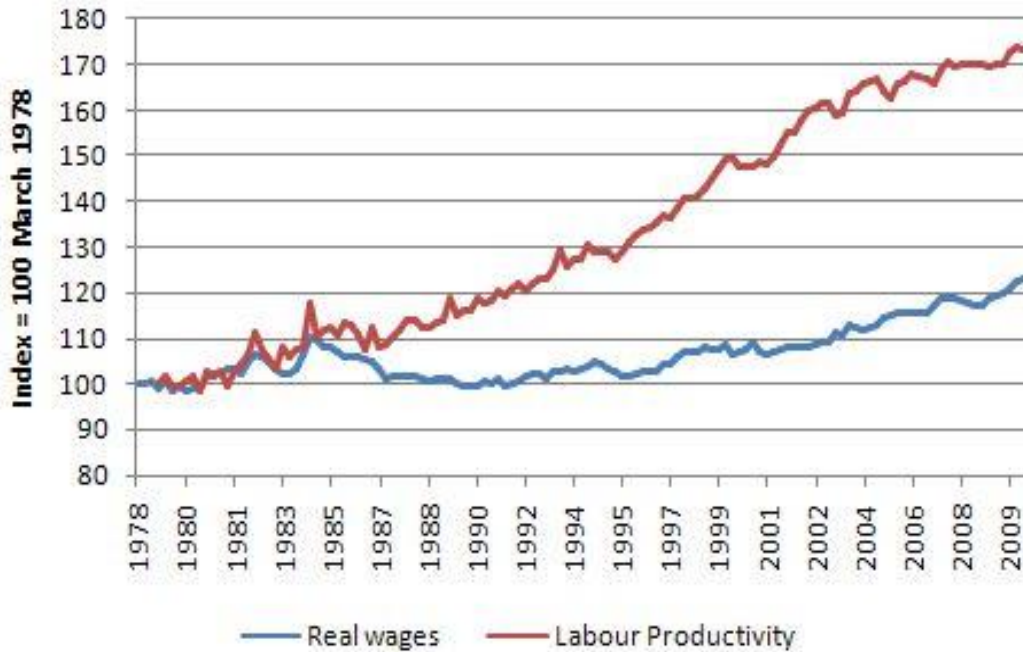
This brings me back to consideration of the 'Best Practice' Model and the 'Best Fit' Model and to the part they play in the distribution of wealth and the role of meeting the needs of society which is both its maker and benefactor. How do they matter? Does power function even-handedly in each? Which evolutionary event of each model leads to a better outcome for society and for the environment?

The accountants, financiers and economists who, it is said, 'run the show' these days, would, in a climate of cost minimisation and high unemployment, always opt for the 'Best Fit' Model as the most efficient for achieving its purpose. In situations such as the need, say, to trial a drug to combat a potential public health epidemic such as Ebola, where demand emanates from public organisations, CTCs are the best option for conducting such trials. Under these circumstances, they are the supplier most likely to have the flexibility and scientific capacity to perform when untethered by limiting contractual demands made by the pharmaceutical industry. Only in circumstances where demand for suitably qualified, capable, experienced employees outstripped the supply of such people would it be in the interest of CROs either to relax their performance limitations or offer potential employees some of the kind of incentives offered by 'Best Practice' Model employers.

Any CTC that generates its own demand, as when it seeks to conduct a medium to large trial to test a hypothesis, needs to persuade an organisation to fund such a trial. This can occur in cases such as BOOST (see Chapter 8), or when a drug is on the market targeting one purpose, but is found to be promising in treating an unrelated condition. The later situation is often found in oncological research, such as the use of a Cox 2 inhibitor, developed to treat osteoarthritis, to supplement treatment of some gastrointestinal cancers. Even though cancer occurs in a large enough section of the population to warrant attention, there is a wide variety of cancers, with few responding in common to any one drug or treatment regime. It is not in the interest of pharmaceutical companies to engage in the expensive business of developing and testing drugs with the specific purpose of providing treatment for what to a global company is a small market. This is especially so since there is still big money to be made from those who can pay – 'first world' populations – for drugs for conditions such as Alzheimer's disease, or by pathologising normal events in human growth and development and developing 'treatments' for them. Nevertheless, pharmaceutical companies may be persuaded to supply a drug to a CTC for trials of secondary treatments; it is, after all, in the interest of CROs for CTCs to continue to operate given they are the training grounds for future employees of pharmaceutical company medicines research. In some cases, where the possibility of a future new income stream is foreseen, pharmaceutical companies may even fully fund such a CTC trial without the restrictions to performance such as publishing results applying, as is often the case with the trialling of the first intended purpose drugs.

Study of the Performance Productivity Frontier in relation to the two models would suggest that the 'Best Fit' Model is the better of the two. This is certainly the case when the power to put the value of profit first is considered to matter most by those who have the power to enable the flourishing of such a value. Such enablers are governments and their concomitant leaders. Given that their responsibility is to the society they are intended to represent, they would appear to have been convinced of the trickle-down effect, a theory that has never been shown to have empirical reality. It is in fact a marketing term used in support of *laissez-faire* economics which encourages governments to lower upper-echelon taxes, deregulate markets, bail-out failed performers and allow CEOs and company directors to grant themselves exorbitant remuneration packages and bonuses even when they fail. Communism, which touts itself as being for workers, appears to be no better than its most extreme rival, rampant capitalism, in serving the whole of the society for which it claims responsibility. Then again, communism cannot be said to support either model, rather it has shown itself to be highly bureaucratic in practice.

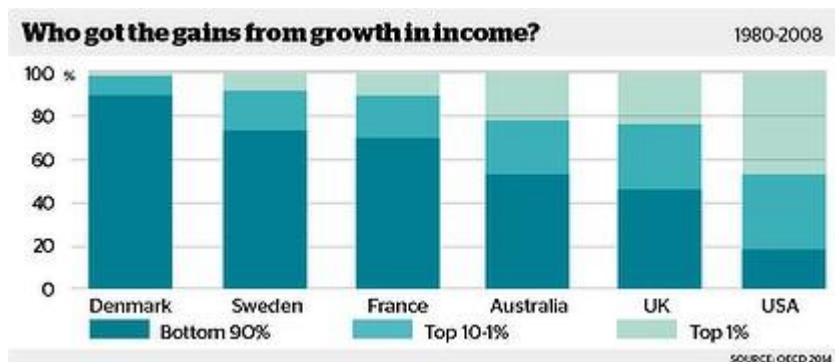
Bill Mitchell, Professor in Economics at the University of Newcastle, NSW, Australia, on his blog composed the following graph using Australian Bureau of Statistics data 2010.



**Figure 22:** shows the evolution of real wages (indexed to 100 in December 1978) and GDP per hour worked (in the market sector) – that is, labour productivity for Australia. In the period June 2010, shown here, the real wage index was at 125.3 while the labour productivity index was at 174.3.

Similar graphs for most advanced countries over this time-line show a common trend towards an increasing gap between the wealth labour has created, represented by the red graph (Labour Productivity) and what they were paid for producing that wealth, represented by the blue graph (Real wages). The gap represents the takings by senior management, capital owners of wealth and the State, of that which was created by labour. Whatever way this is viewed, it reveals a lack of respect by the few for the many. When respect for people, *qua* people and the world we inhabit as the primary concern of society is usurped by any other value, different consequences ensue. Over the past three decades, there has been a shift by some so called advanced nations from common wealth (commonwealth) to Gross Domestic Product (GDP) as the primary concern of the state.

A cursory glance at a few figures should give some weight to my argument. Take the following figure, for example:



**Figure 23:** Distribution of the gain in six OECD countries

The richest 10 per cent of Australians have gained almost 50 per cent of the growth in income over the past three decades as inequality has widened throughout the Western world, according to



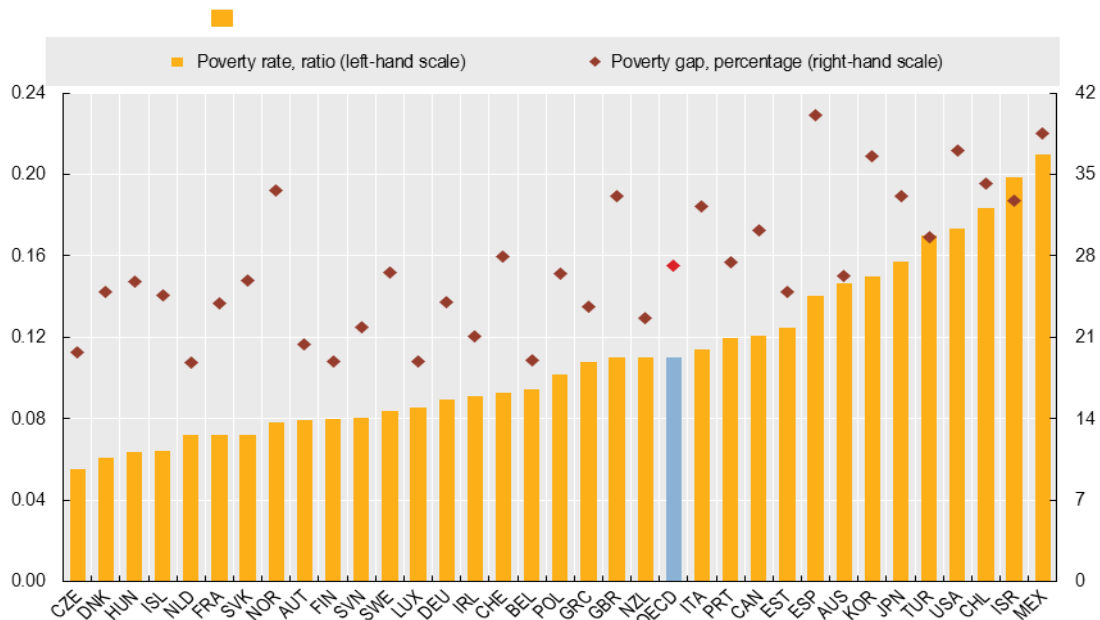
one of the world's foremost authorities. ... John Martin, who has just stepped down after 13 years as the Organisation for Economic Co-operation's director for employment, labour and social affairs, says new OECD figures estimate that between 1980 and 2008, 22 per cent of all growth in Australia's household income went to the richest 1 per cent. (SMH 2013, 10 October)

These figures certainly put a lie to the much touted 'trickle-down effect' that, it was said, would result from the state concentrating first and foremost on deregulated economic growth. In his book, *The Price of Inequality* (2012, 2013) the Nobel economist Joseph Stiglitz describes trickle-down economics as an idea that "has a long pedigree – and has long been discredited." Far from delivering on its promise, Stiglitz points out that:

What America has been experiencing in recent years is the opposite of trickle-down economics: the riches accruing to the top have come at the expense of those down below (2013: 8).

It is interesting to note that of the six countries compared, Denmark has the highest AAA credit rating, with Sweden not far behind. Australia holds on to its AAA by 'the skin of its teeth'; France's rating is AA as is the United States; and the UK's rating comes just ahead of the last two at AA+. On the basis of Figures 23 and 24, Denmark's governance is the most equitable in terms of a fair social contract without discriminating against those whose primary purpose is to make money. The national debt as a percentage of GDP is worst in those countries most heavily engaged in wars: the USA (\$104), France (96%) and the UK (89%), and the highest unemployment is in France (10%).

Looking finally at the levels of poverty in OECD countries shown in Figure 24 and knowing that some households below the poverty line in the USA include a person in full-time employment, respect for all people, in the sense described above, has been outstripped by the social value of wealth creation. Speaking for the bottom 90% of Australian, British and American society, many of us may have been beguiled by hype; ultimately we've been 'had'. Because this situation has evolved and is evolving in a number of OECD countries, as indicated in the last three figures, I want to spend a moment exploring



**Figure 24:** Poverty Rates and Poverty Gaps – late 2000s – Advanced Economies (Source: OECD)

the means by which this has been made possible 'right before our eyes'– how a growing proportion of people in 'advanced' societies are struggling to meet even their basic needs as outlined by Maslow. I have no wish to wade into any political debate and therefore I have no intention of dwelling on the 'whys and wherefores' of the evolving consequences. Instead, I will discuss the use of rhetoric and its misuse, spin, as devices that can reveal or screen emerging meaning.

The following potted description of rhetoric is thanks to the web site developed by Dr K Wheeler of Carson Newman College in Tennessee for his students. Formally understood, rhetoric is the art of using language *according to a body of rules* so as to persuade or influence others. The writer or speaker of rhetoric is a rhetor. In classical Greek rhetoric, there are three basic approaches – three "rhetorical appeals" – a rhetor can use to make a convincing argument: *logos*, *ethos* and *pathos*.

- *Logos* was for Aristotle, the most important means of persuasion. For Plato, it was the only legitimate one. In Greek, *logos* can mean simply "word," or it can mean, "the underlying point that makes sense or meaning behind everything else," or it can mean "logic, reason, rational thinking."
- *Pathos* is the use of language, such as diction, or images to create an emotional reaction in the reader.
- *Ethos* is the hardest rhetorical approach to define, because it doesn't translate well into English. John Gage, in *The Shape of Reason*, defines it as "authority". *Ethos* does include authority, but it also includes something of charisma and individual character. It is whatever inspires trust in an audience. Basically, *ethos* involves three traits:
  - Rhetors must show themselves to be honest individuals of good moral character who sincerely believe what they claim.
  - Rhetors must show themselves be competent, intelligent individuals who know the material or subject-matter they are talking or writing about.
  - Rhetors must show themselves to be open-minded individuals who write, not merely out of personal interest, but because they are also concerned about the audience's best interest or well-being.

Wheeler points his students to *The Forest of Rhetoric* for a detailed guide to the terms of classical and renaissance rhetoric. This guide is useful as a tool, together with Peirce's system and his pragmatic maxim, for reviewing written, spoken and even visual language and for identifying spin.

Spin is corrupted rhetoric and is ubiquitous, insidious, increasingly sophisticated and obfuscating. According to the SOED (2002) spin, in the sense used here, is a bias or slant on information, intended to create a favourable impression when it is presented to the public (orig. *US Politics*) L20.

Lynda Mugglestone (professor of the history of English at Pembroke College, University of Oxford) adds:

Often associated with newspapers and politicians, to use spin is to manipulate meaning, to twist truth for particular ends – usually with the aim of persuading readers or listeners that things are other than they are. As in idioms such as to put a 'positive spin on something' – or a 'negative spin on something' – one line of meaning is concealed, while another – at least intentionally – takes its place. Spin is language which, for whatever reason, has designs on us.

When rhetoric, – a linguistic or visual device for revealing and persuading others to the teleology of ideals – is focused on winning, rather than elucidation, it too easily degenerates into spin. As Mugglestone also points out, spin is often associated with newspapers and politicians and we know from the SOED that its etymology dates back to late 20<sup>th</sup> century US politics<sup>16</sup> but spin is far more pervasive and includes lobbying, public relations, advertising, prospectuses and even peer pressure.

Unfortunately, in highly competitive societies, our general education has provided little opportunity to learn the art of rhetoric in the classical sense. We have not been taught directly how to write and speak in ways that aim to co-operatively elucidate truth. I say co-operatively because writing assumes a reader, and speaking, a listener. Without knowing much about it, we often consider rhetoric with suspicion as insincere hype. We may well have learnt in our language classes how to write eloquently; we may have studied the plays of Shakespeare without considering the *purpose* of some of his characters' great speeches, such as the differing aims of the speeches given by Brutus and Mark Antony

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<sup>16</sup> This is somewhat puzzling as the image to which it is said to refer is that of the spin put on balls by some bowlers in cricket, a game few Americans know much about.

following the assassination of *Julius Caesar* in the play of that name. We have learnt the art of debating but with the primary aim of winning and thereby, maybe unwittingly, learnt how to spin.

In science we are taught to write objectively, treating *pathos* and *ethos* as anathema to successful scientific writing, without considering that language – written, read, oral and aural – involves interpretation. Evelyn Fox Keller, physicist turned historian and philosopher of science, addresses this issue in much of her work including *Refiguring Life: Metaphors of Twentieth Century Biology* (1995). The English philosopher, Mary Midgley's *Science and Poetry* was published in 2001 and *Metaphor and Knowledge: The Challenges of Writing Science* by Ken Baake of Texas Tech University in 2003. Ken Baake who specialises in the rhetoric of scientific literature, is at the same university as Kenneth Ketner, the Charles Sanders Peirce Interdisciplinary Professor, yet there is no indication in his book that he had ever attended to the work of the Institute for Pragmatic Studies which Ketner heads. Interestingly, in the last few pages of his book Baake makes reference to Bryan Magee's *Confessions of a Philosopher: A Personal Journey through Western Philosophy from Plato to Popper* (1997)

Oxford philosopher Bryan Magee delivers what might seem to be a devastating blow to my rhetorical study of science. Citing Popper's attack on positivism, Magee argues that natural science scientists produce a lot of useful information without spiralling off into irresolvable debates over what constitutes an "observation," "measurement," "light," "mass," a "number," and so forth. Nothing is more humbling than spending several years developing an argument, only to find while approaching the end that a seeming rebuttal already is in paperback at popular bookstores (2003: 214).

Knowing Magee's book well, I cannot agree that it undermines Baake's work – the two authors have different purposes in writing – but I can say that to my mind, Magee's rhetoric is close to 'pitch-perfect'. Baake goes on to say: "Magee is right, as was Popper, but this does not mean that rhetorical problems of science are irrelevant to scientists." Here I strongly agree with the second part of his statement, but not the first. Magee and Popper were not so much 'right' as they were transparent in their respective interpretations. Understanding this is to understand Peirce's method of inquiry. In this regard it is instructive to learn that:

Popper also wrote extensively against the famous Copenhagen interpretation of quantum mechanics. He strongly disagreed with Niels Bohr's instrumentalism and supported Albert Einstein's realist approach to scientific theories about the universe. Popper's falsifiability resembles Charles Peirce's nineteenth century fallibilism. In *Of Clocks and Clouds* (1966), Popper remarked that he wished he had known of Peirce's work earlier.

[http://en.citizendium.org/wiki/Philosophy\\_of\\_science](http://en.citizendium.org/wiki/Philosophy_of_science)

Baake was emphatic about one thing: "debate over meaning is at the core of scientific work" and I am in agreement with him on this. For that matter, debate, where it is for the purpose of discovering, should be at the core of honest, open rhetoric. Let us remember, as noted previously, that for Peirce, "the *purport* of words is nothing but their *purpose*" (MS463, 1903); for words to have meaning they must include Firstness, Secondness and Thirdness. In like manner, inquiry must include consideration of its Firstness, Secondness and Thirdness; its dynamical and immediate object; and its dynamical, immediate and final interpretant – that is, application of Peirce's Pragmatic Maxim – to discover the information contained therein. Even a mathematical proof under consideration for, say, a Field prize involves a number of years of peer investigation to validate it and ascertain its value as information. When I said that Magee's rhetoric is close to 'pitch-perfect' I was not implying that it is Truth – as with all knowledge, it is fallible – and he did, after all, champion Popper, who, as suggested above had admitted regret at omitting consideration of Peirce's work. Rather I was saying that Magee's rhetoric demonstrates rigour in laying out his argument against the analytic turn, which is an underlying purpose of his *Confessions*.

I have taken the time here to discuss rhetoric – its uses and abuses – because it highlights the importance of transparency. It is not for nothing that the international organisation that monitors and publicises corporate and political corruption globally calls itself Transparency International. A lack of transparency can, as with the notion of objectivity, hide a multitude of 'sins', most particularly purpose

and values which are the ground of reality. Its absence, if discovered, erodes trust and cooperation and in so doing can bring out the worst in people, not least of which is disengagement, even revolt.

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The 'Best Practice' Model is minimally grounded in and maintained by the three values I have discussed so far: integrity, respect and transparency. The fourth value mentioned, rigour, might be considered the spur to vigilance and, because, as Tony Jappy (2013: 73) points out, "the Peircean system precludes establishing in advance what the interpretant of a given sign may be", to evaluation. But first, the model includes two further values: commitment and co-operation. These two, together with the abovementioned braid, again with rigour as the powering of vigilance, make a stronger braid along an evolving continuum.

Returning then to my particular example of a 'Best Practice' Model, a theoretical university CTC: if my three part hypothesis of 'matting' is valid – that:

1. value functions as a condition of intelligibility – 'matting' is grounded in value and is purposeful;
2. power – where power is the capacity to cause – is the enabler of force functioning as actual 'matting'; and
3. 'matting' is evolutionary realisation

– and if my work is grounded in the same values identified above as essential, then, powered by appropriate, available resources, a vibrant, successful university CTC should emerge. Only continuous evaluation of the evolutionary event reveals the 'matting' of the model and allows for necessary tuning and fine tuning of what is, after all, a human creation purpose designed to the survival – even flourishing – of humanity and, indirectly, but just as essentially, our world.

As existing, that is *being* and *becoming*, the parts *and* the whole of that which is under consideration, are 'matting'. This also means that any environment is as much a whole as the parts which it supports and supports it – it is, along with its parts, organisation, organised and organiser. Hypotheses, *qua* hypotheses, as the creation of hypotheses makers, are neither true nor false. On the other hand, logic, as it is commonly understood, though truth preserving, is not truth making – unlike hypotheses, logic does not get one anywhere new. Logic does, however, when broadened to function semeiotically, lead from the creativity of abduction to grounded metaphysics, on to the special sciences and thence to the sciences of review, whence engagement in the practical sciences can reveal the reality of 'matting' as proposed by the hypothesis.

## Control of Power

Let us say that if, as the senior administrator I was to adjust the performance expectations of the university CTC in question so that they were obtainable – that is in accord with the Best Practice model and mapped onto the Performance Productivity Frontier – and was able to reconcile resource requirement with resource availability, I would still need to do further work, most particularly in relation to identifying both endogenous and exogenous power, before being in a position to evaluate performance.

Given that Pfeffer's Best Practice model prescribes: "*Self-managed teams and decentralisation of decision making as the basic principles of organisational design*" (1998) this is a good place to start in revealing purposeful operation of power. Holding in mind Peirce's Pragmatic Maxim (1873 & 1905) – "Consider what effects that might conceivably have practical bearings you conceive the objects of your conception to have. Then, your conception of those effects is the whole of your conception of the object" – it is best to have a solid understanding of the concepts involved. For instance, the meaning of "team"

and “decentralisation” are many and vary depending on the values informing them and their purpose in so informing.

In the model, teams are comprised of people employed to achieve the organisation’s purpose. Pfeffer’s first mentioned practice is *employment security* (*Ibid*). Employment security is codified in employment contracts. The parties to employment contracts agree, on an on-going basis, or for the term of the contract, to exchange purposeful energy and intelligence for the power of the value of remuneration, benefits and entitlements. The fourth of the seven – *Comparatively high compensation contingent on organisational performance* – can be negotiated between employer and employees or their chosen representative/s through what in Australia are called Enterprise Agreements. These Agreements are lodged with the Fair Work Commission which itself operates through a ‘Best Practice’ Model. Even given that this process of whole of organisation alignment may be complex and protracted in terms of ensuring clarity and comprehensiveness, enterprise agreements, once lodged allow for appeal to external advisors or arbiters in cases of disputes concerning possible breaches and to processes of resolution. The power of a ‘Best Practice’ Model Enterprise Agreement lies in its ability to provide a high degree of certainty to both employers and employees. For the employer it enables long-term planning; for employees it meets Maslow’s first two levels of needs and can assist in the achievement of the other three levels. In his work *The Philosophy of Money* Georg Simmel notes that ‘the feeling of personal security that the possession of money gives is perhaps the most concentrated and pointed form and manifestation of confidence in the socio-political organization and order’ (1900, 1990: 179).

Pfeffer’s second practice, *Selective hiring of new personnel* is powered, as Peirce prescribed, by imagination, concentration and generalisation. This begins with creating, building and vertically and horizontally fitting together the roles and teams in a form that can meet the requirements of the whole as identified in the evolving purpose, mission, vision and goals of the organisation.

The raising of the flow of power – as creativity, concentration and generalisation – through *extensive training* – Pfeffer’s fifth practice – cannot be overemphasised. Pervasive training before and throughout the evolving telos of ‘Best Practice’ Model organisations reduces the likelihood of errors and wrong turns. So too is the power of Pfeffer’s seventh practice *Extensive sharing of financial and performance information throughout the organisation* vital. In serving as a practice of transparency, it also operates as a feedback loop for the whole organisation.

The power of the first part of the third practice, *self-managed teams*, requires consideration of a different kind. The only commonality of the many kinds of teams is that the people who comprise any team are all linked in a common purpose. Regardless of the kind of team, their effectiveness, that is, their ability to meet their purpose, is dependent on their cognition and on the power of the second part of the practice, *decentralisation of decision making as the basic principles of organisational design*. This involves the distribution of authority *throughout* the organisation horizontally and vertically that is aligned with role responsibilities within an organizational matrix. In addition to a document of delegation of authority, a flowchart of authority, which includes training and which flows through performance alignment is essential.

To ensure their effectiveness, multidisciplinary and interdisciplinary teams require power *control*. Why this is so can be better understood in the light of Pfeffer’s sixth principle: *reduced status distinctions and barriers*. This principle can only be achieved when there is a common understanding that every person in the organisation is as important as every other person regardless of their role in the evolving purpose, mission, vision and goals of the organisation; that ‘matting’ of the organisation is grounded not in status but in values. This will sometimes take enormous self-control by senior managers to hold back from exercising the power and authority invested in their positions and interceding arbitrarily into an organisation’s mutually agreed processes, priorities and decision making. This is not the same as

engaging in change management and continuous improvement which is an inherent feature of the evolving telos of any organisation. Rather it is akin to the intercession of fascism into an ostensible democracy.

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I have not shown empirically that the 'Best Practice' Model is better than the 'Best Fit' Model, but I hope I have shown that the latter isn't better than the former. Certainly it is preferable to the bureaucratic way things are run in many public organisations and universities where resentment often outweighs respect, integrity is usually maintained through crisis management, and transparency by trusting no one. The 'Best Fit' Model is only the 'best' model where the primary purpose of an organisation is to maximise the value of ordinary shares. Here the value of any reduced costs and increased productivity is being 'paid' to money, the vast majority of which is in the hands of 1% of the population. Encouraging the more affluent of those below this 1% to invest their money – that is, make it do work for them – increases the number of supporters of the 1%.

With few exceptions, adult humans are no longer self-sufficient; we are dependent on money to exchange for goods and services to meet our needs and wants. Bereft of earning access or ability, we are dependent on government welfare, charity, or family and friends. In dire situations such as natural disaster or war, organisations such as the United Nations, the World Bank and Non-Governmental Organisations (NGOs) step in to address the basic needs of those effected and assist to get economies back on track. It comes to this: we need to pay to live and to support our dependents; in order to pay, we need money. For the majority of the adult population, this means we need to work. As shown in the statistical tables above, the few who start with or accumulate enough money to work for them – even instead of them – are a shrinking section of the population. Money flowing to these few has increased greatly over the past three decades through the increased productivity of the working population. Throughout this period, the cost of living has continued to rise but because the benefit of increased productivity has not garnered to those who laboured for it, those living below the poverty line has increased.

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I hope that I have shown 'matting' is grounded in values which are expressed through the enactment (or powering) of 'matting's purpose or telos. 'Matting' is the process of coming to be, of becoming through evolutionary growth and development. It is ontological but is less about existence and more about reality. A process has consequences and *ipso facto* it is real. I have further attempted to show that notwithstanding that telos is a noun, through the process that is, it evolves – in a manner of speaking, it has a life of its own and grows and develops – or is overtaken. Unfortunately, our inability to recognise this, or our weakened ability to respond to it appears to be making eristic savages of us and to have set us on a trajectory of annihilation, no expense (to ourselves and our environment) spared. We, as a global society, despite any cultural differences must change our feeling, and behaviour, our thinking and understanding, our values, if we are to save our planet and ourselves.

The 'matting' of the universe, I suggest, is grounded in its telos, which I further suggest is in the value of *being* and *becoming*. As the universe continues to create itself, it is minimally necessary for its integrity, respect and transparency to prevail. The same goes for those of us who have evolved but have yet to develop sufficiently to be fit and to fit.

## Conclusion

In the vein of Peirce's strands of system, I have spun a yarn of 'mattering' from its beginning by chance out of nothing to the evolving telos which is the universe. I use the ancient nautical idiom "spin a yarn" because of its multiple metaphorical meanings. To "spin a yarn" is to "tell a tale." "To tell" is "to make known by speech or writing." A "tale" is "discourse; a thing told; a story" or narrative. The wording of anything written is "text." "Text" comes from the Latin *textus* "style or texture of a work", literally "thing woven" from the past participle stem of "*texere*" to weave, from the root *tek* "to weave, to fabricate, to make." Robert Bingham's, in his *The Elements of Typological Style* (2002) enlarges on this:

An ancient metaphor: *thought is a thread and the raconteur is a spinner of yarns — but the true storyteller, the poet, is a weaver.* The scribes made this old and audible abstraction into a new and visible fact. After long practice, their work took on such an even, flexible texture that they called the written page a *textus*, which means cloth.

Because I am human, I can create experience exogenously of what I observe, and come to believe, through language and art. If thought can be seen as a thread of consciousness, then as the story-teller I am spinning long threads together into yarn, which is spun thread, then taking these strands of yarn and weaving them into a narrative. A *true* storyteller, however, is not necessarily a poet. Take my poem, *Not Guilty*:

I'd be deluding you  
if I said I was lying.  
Don't be deceived!

The fact of the matter is  
I don't know what  
bit me on the arse.

If the truth be known,  
*it* should be locked up  
and I should be set free.

Insomuch as it is a mental creation, this plea of innocence is a hypothesis. Insomuch as it is a hypothesis, it is neither true nor false. Insomuch as it is poetic, the purpose for its creation is the created image itself. In this case my purpose was the creation of an image of the proposition: "I'm not the cause of the effects of my actions/decisions/choices". My interest was in exploring the ways humans deny existential responsibility. In pointing out the difference between the interest of poets in creating hypotheses and the interest of mathematician engaged in the same sort of creative action, Peirce wrote, "the poet is interested in his images solely on account of their own beauty or interest as images, while the mathematician is interested in his hypotheses solely on account of the ways in which necessary inferences can be drawn from them" (PM 91-2, 1903). Unlike the proposition of a poem, a mathematical hypothesis is a theory in need of verification. Peirce's philosophy is a method, a system – an architectonic – for discovering, evaluating, and interpreting reality.

As with Peirce's architectonic, in spinning the threads that make the yarn for weaving the fabric of my narrative, I have begun mathematically, that is, I have observed "rhythms of the universe", and framed my hypothesis of 'mattering' accordingly. My narrative, although supported by a growing body of strong empirical evidence, is nonetheless a philosophical account of 'mattering'. It is a metaphysical tale, and is so because while I can support its validity, I cannot attest to its truth. To know anything we need data; understanding requires information. The information necessary to understand what I mean by the reality of 'mattering' requires first an understanding of the philosophical work of Peirce. I hope Part 1 meets this end. I introduced Part 2 by confronting the question of what we believe, concluding that, despite protestations to the contrary, we all believe. I then enlarged on the subject of information. Following

that, with some trepidation I approached cosmogony and the West's idea of the creation of the universe. I discussed what are sometimes called the religions of the Book – Judaism, Christianity, and Islam – covering the period from translation of Aristotle into Latin by Islamic falsafa scholars, through to the end of the Scholastic period, and the rise of nominalism. Meanwhile, the universe continues to create itself, and it is this that the cosmologists work to discover, to understand and to explain. They have yet to find an adequate solution to the enigma of how the universe holds together.

Peirce's metaphysical term agapasm, as the mediator between tychism (chance) and synechism (continuity), is supported by Christian *revelation* as recorded in the *New Testament*. Referring to the *Second Letter of Paul to the Corinthians*, from chapter 13, verse 8-13: perhaps it is as Paul wrote.

Love will never come to an end. Are there prophets? their work will be over. Are there tongues of ecstasy? they will cease. Is there knowledge? it will vanish away; for our knowledge and our prophesy alike are partial and the partial vanishes when wholeness comes. When I was a child, my speech, my outlook and my thoughts were all childish. When I grew up, I had finished with childish things. Now we see only puzzling reflections in a mirror, but then we shall see face to face. My knowledge now is partial; then it will be whole, like God's knowledge of me. In a word, there are three things that last for ever: faith, hope and love; but the greatest of them all is love.

All scientists, regardless of their religious beliefs or leanings could take some of this 'on board': all could agree that "our knowledge and our prophesy [predictions] alike are partial" and even go so far as to agree that "the partial vanishes when wholeness comes." They may concede to the first part of verse 12: "[n]ow we see only puzzling reflections in a mirror", but, as scientists, might view the rest with scepticism. Word swapping is a short term solution. Peirce uses 'agape'; the *King James* edition, 'charity'; in the edition of the *New Testament* cited above the translation is 'love'. It is also unfortunate that namby-pamby images are often conjures up of love (luv). Perhaps when physicists discover the mediator of quantum theory with the atoms of matter we will have a fitting metaphor.

As a continuation along the evolutionary continuum of matting, humans are determined, but to the degree that we have developed our ability to think, we have regained some of the freedom foregone as the means of meeting 'matting's telos. As we learn to wield this which we call free will, we have gained responsibility and thereby the ability to both adorn *and* to undermine the primary purpose of 'matting'. One of the earliest words in a child's vocabulary is 'no', a word expressing the great power of free-will and it is one that is an expression of what I mean by responsibility. Later small children learn another practice of power which they take great delight in: pressing the button – whatever button makes something happen. One of the defining characteristics of life is that it reacts, unlike all 'matting' before it which has surrendered in order to matter. Humans, through their ability to think have developed the ability not only to react but also to respond; to the extent that we have free-will, we alone, in this world at least, are responsible: we can choose. This ability humans alone have developed – to extend beyond reaction and respond – is our moral ability.

Our moral ability is not simply a matter of choosing between right or wrong, good or bad. Peirce, as I have detailed in Part 1, eventually chose Normative Ethics and, as indicated in his Pragmatic Maxim, a kind of Consequentialism. Yet his consequentialism is not that of Bentham's utilitarianism, bereft as it is of Firstness. In the absence of Firstness, there is nothing from which to prescind when inquiring or choosing and we are left with only those unsatisfactory methods of fixing belief described in 'Fixation of belief' (W3: 242-257, 1877): tenacity, authority and *a priori*. Peirce emphasised that his method is fallible – there is no certainty – but that it is the surest method for getting to the truth of 'matting'.

All choosing has purpose and is grounded in values. I have spoken of the values of commitment as expressed in our primary purpose and of integrity, transparency, and respect. These same values are all



inherent to the evolutionary telos of the universe. They are necessary for the production of information, but are not sufficient. I suggest that the addition of the values of imagination, mindfulness and co-operation are sufficient to meet the requirements for the creation of information which is 'matting'.

The potential for a tale streams forth spontaneously from nothingness; it is created, creation and creativity. Its purpose is to be and its value is in its becoming so. This is its Firstness. A real narrative is not only factual: the fact of 'matting' is its Secondness. A true story can only be indicated in the long run: the truth of 'matting' is its Thirdness and is happening as I write. If the truth of 'matting' be known, it must be experienced. Through trust, that is, suspension of disbelief – in this case, the suspension of disbelief in the validity of subjectivity in scientific study – and via the method of endophysics as discussed by Kirst Kitto (2006 & 2007) we can engage semeiotically with the subject of our study, the Cosmos, in its Firstness, Secondness and Thirdness; we can experience the evolutionary telos in which we are partaking.

As bound up in the Universe, we are also determined by and determining its self-creation. Yet, because as humans we can choose, our discourse also includes the possibility of denial, subterfuge and lies; to the great detriment of our world and ourselves, we flout limit – we disengage from consentment – and we think we can get away with it. I have exemplified denial in my poem *Not Guilty*. This can be seen in the outrageous cries of climate-change deniers and of those who would concede to climate change, but still deny all responsibility for its acceleration. These and many more also deny responsibility for ravaging our environment, because, quite simply, it is not in their interest to do so. Subterfuge is exemplified by the behaviour of the parties' intent on bringing to market the industry developed drugs called Cox 2 inhibitors before they have been fully tested, as discussed in Chapter 8. As to lies, look no further than the so-called "trickle-down" which continues to be believed by vast numbers of the 99% of humanity who are its victims. The lie is not in the original exploration of it as hypothesis, but in its projection as evidenced, by those who benefit from its perpetuation.

Free-will means we can change this untenable trajectory. Peirce wrote:

We know only too well that all things are not just as we would like to have them; and the only way of improving the situation is to *do* something about it: mere dreaming will not answer the purpose. This is what is meant by saying that things are *real*. If the world were a dream, we could just dream otherwise. But the real is that which is as it is whatever you or I may think about it. (PM: 132, 1906)

The real is what matters. It does not matter because you or I say it matters but because it is real. You and I matter; we matter as much as any sun or moon, but no more than any grain of pepper or drop of water. So too do our creations – those things we do – matter: growing, preparing and eating food; designing, making and wearing clothes; building shelter, workplaces, schools, hospitals, communities; caring for one another and our environment in sickness and in health; crafting, engineering, communicating; creating and engaging with our plethora of arts. And we play. Nonetheless, we also engage in denial, subterfuge, lying, violence; building barriers; making weapons. All these and more – *all* that is – matters. All have potential and are purposeful; are grounded in value; are actualised through their creation; and have trajectories of possibility – all is real: it is 'matting'.

So much of our part in creation is truly wonderful: hot coffee, a red frock, a veranda on which to sit in a red frock, drinking hot coffee with a friend, the thoughts we bandy about, the memories we recall, the ideas we explore, the music from the radio of the saxophone and the guitar of Col Loughnan and Steve Murphy playing the latter's composition *The Coogee Shuffle*.

All this matters and is 'matting'; but so too is gross misuse of power: greed, lashing out; the destruction, denuding, poaching, carnage, annihilation, scorched earth, genocide. These are not glorious. For some of us, our freedom to choose and values are haywire.

We are, therefore we feel – we experience; we learn, we think, we value, we choose, we do. We learn to think in the same way we learn to read: by doing it. The more we do it, the better we become at it. We need to do more – much more – of both: broadly then deeply so we can move beyond knowledge to understanding of 'matting'. We also need to highly value teaching and learning for meaning and always with a view to understanding the whole and the parts and of how they fit. In this, it is not enough to master the 'Three Rs'; we need the Arts, especially the one most accessible to everyone: music, in addition to philosophy, history, the many and varied sciences and physical engagement.

Regaining the livelihood of all: curbing any penchant we have to violence and violation, to eroding trust, to extremism, to dogma; securing the livelihood of life; reclaiming our environment – our home; our planet Earth – are the things we need to do to change the trajectory of our shared responsibility of 'matting'. The Universe can do it and, even granted that it has been practicing forever, we too *can* do it: we can make it continue to matter. I don't know what we do to recover from the narcissism, self-centredness, selfishness, self-righteousness, greed, hate, nihilism that plaques so many of us and which leads to such destruction. I find pleasure in reading, and as an old hippie I am blessed with joy in beauty, kindness, music, dance and good company. My physical talents are few, but I can feel, observe, imagine, organise, plan, design, think. My pragmatic best towards taking responsibility for reality has been, therefore, to commit this thesis of 'matting' to paper.

The whole/parts creating, creation, creator is universal matting. It is reality and it matters because it is 'matting'.

Amen.

## Glossary

**actual** (Peirce)

that which is met within the past, present and future (CP6: 453)

**causality**

the relationship between cause and effect (Hulswit 2002: 171-2)

**causation**

the production of an effect by its cause (*Ibid.* 171)

Through his study of the history of the concept of cause, Peirce observed these discrepancies, which he identified as being between (i) the Aristotelian conception, (ii) the modern physicist's conception, and (iii) the currently accepted view. (RLT197-202, 1898) Hulswit identifies three different approaches Peirce took in the resolution process of these three mutually incompatible meanings: "(1) a logical analysis of the different concepts of cause, (2) an analysis of scientific knowledge of natural processes, and (3) an analysis of mental processes." (*Ibid.*: 182)

The reconciliation led to Peirce's theory of causation, most clearly enunciated in his 1902 paper 'On science and natural classes' (EP2, item 9). Hulswit (*Ibid.*: 187) gives a synopsis:

Peirce developed the highly original view that each act of causation involves an efficient component, a final component, and a chance component. The efficient aspect of causation is that each event or fact is produced by a previous event or fact (the efficient cause). The teleological aspect is that each event is part of a chain of events with a definite tendency. The chance component is that each event has some aspect that is determined neither by the efficient nor by the final cause.

**central limit theorem** (Peirce)

states that random processes, such as rolling dice, the velocity of gas molecules in a closed container, or sampling arbitrarily from a population, will express itself by the Gaussian power law—the familiar bell-shaped curve, or normal distribution as Peirce originally coined the term. Peirce likes to say that this theorem proves "chance begets order"(CP6.297). More generously interpreted, the central limit theorem suggests that phenomena have a tendency towards self-norming, or as Peirce would put it, "...all things have a tendency to take habits. For ...every conceivable real object, there is a greater probability of acting as on a former like occasion than otherwise" (CP1.409; see also CP 1.390 6.101, 6.280). Peirce calls these *finious* processes, in that direction emerges in and through their interactive behavior (CP7.471).

**critical** (Kant)

the philosophical/rational ability to delimit reason. Kant's first major work, 'The Critique of Pure Reason' set out to show the limits of reason so as to open up the possibility of talking meaningfully about morality and religion, matters that do not fall exclusively within the compass of reason. For example, Kant argued that, though reason enables us to think about causation, it does not allow us to think about the cause of causation. Reason will come to contradictory but equally plausible conclusions (**antinomies**) if it tries to think about things beyond its limits, such as the cause of causation.

**excluded middle**

the individual is determinate in regard to every possibility, or quality, either as possessing it or as not possessing it. This is the principle of excluded middle, which does not hold for anything general, because the general is partially indeterminate

**existent**

that which interacts with things in a spatio-temporal environment

**fact** (Peirce)

that which the logicians call the *contingent*, i.e., the accidentally actual, and whatever involves an unconditional necessity, i.e., force without law or reason, *brute* force

**finious** (Peirce)

tendency toward a final state." (CP7.471, 1898)

**habit** (Peirce)

"[Readiness] to act in a certain way under given circumstances and when actuated by a given motive is a habit; and a deliberate, or self-controlled, habit is precisely a belief." (CP5.480, 1907)

### heuristic

In philosophy, especially in Continental European philosophy, the adjective "heuristic" (or the designation "heuristic device") is used when an entity X exists to enable understanding of, or knowledge concerning, some other entity Y. A good example is a model which, as it is never identical with what it models, is a heuristic device to enable understanding of what it models. Stories, metaphors, etc., can also be termed heuristic in that sense. A classic example is the notion of utopia as described in Plato's best-known work, *The Republic*. This means that the "ideal city" as depicted in *The Republic* is not given as something to be pursued, or to present an orientation-point for development; rather, it shows how things would have to be connected, and how one thing would lead to another (often with highly problematic results), if one would opt for certain principles and carry them through rigorously.

"Heuristic" is also often commonly used as a noun to describe a rule-of-thumb, procedure, or method. Philosophers of science have emphasized the importance of heuristics in creative thought and constructing scientific theories.

### history of philosophy – approaches

The history of philosophy can be approached either **exegetically** (in which case the main question is the **interpretive question** of what past philosophers mean and how the structure of their thought holds together) or **critically** (in which case the main question is the **logical question** of whether what past philosophers said was true or false, and what the philosophical consequences of their views are). The word **exegesis** can mean explanation, but as a technical term it means "to draw the meaning out of" a given text. Exegesis may be contrasted with **eisegesis**, which means "to read one's own interpretation into" a given text. In general, exegesis presumes an attempt to view the text objectively, while eisegesis implies more subjectivity. One may encounter the terms exegesis and **hermeneutics** used interchangeably; however, there remains a distinction. An exegesis is the interpretation and understanding of a text on the basis of the text itself. A hermeneutic is a practical application of a certain method or theory of interpretation, often revolving around the contemporary relevance of the text in question.

### hypostatic abstraction, also hypostasis or subjectal abstraction

a formal operation that takes an element of information, such as might be expressed in a proposition of the form *X is Y*, and conceives its information to consist in the relation between a subject and another subject, such as expressed in a proposition of the form *X has Y-ness*. The existence of the latter subject, here *Y-ness*, consists solely in the truth of those propositions that have the corresponding concrete term, here *Y*, as the predicate. The object of discussion or thought thus introduced may also be called a **hypostatic object**

### nature

according to the Enlightenment, by the exercise of reason, one can undo the damage created by religion and society and uncover – discover – the nature that lies waiting to be revealed beneath but obscured by prejudices. For Enlightenment thinkers, nature is the Good, and they assumed that, by stripping away the prejudices of custom, tradition, and religion and replacing those prejudices with the results of the careful use of reason alone, humankind would discover, implicit in nature, *the* aesthetic and ethical goals and standards.

### normative (Peirce)

The word *normative* was invented in the school of Schleiermacher. The majority of writers who make use of it tell us that there are three normative sciences, logic, esthetics, and ethics, the doctrines of the true, the beautiful, and the good, a triad of ideals which has been recognized since antiquity. On the other hand, we quite commonly find the term "normative science" restricted to logic and ethics; and Schleiermacher himself states their purposes in a way that seems to give room for no third. The one, he says, relates to making thought conform to being, the other, to making being conform to thought. There seems to be much justice in this restriction. For that which renders logic and ethics peculiarly normative is that nothing can be either logically true or morally good without a purpose to be so. For a proposition, and especially the conclusion of an argument, which is only accidentally true is not logical. On the other hand, a thing is beautiful or ugly quite irrespective of any purpose to be so. It would seem, therefore, that esthetics is no more essentially normative than any nomological science. The science of optics, for example, might very well be regarded as the study of the conditions to be observed in making use of light. Under such a conception, nothing essential to optics would be omitted, nor anything foreign to it inserted. Those writers, however, who stand out for the trinity of normative sciences do so upon the ground that they correspond to three fundamental categories of objects

of desire. As to that, the logician may be exempted from inquiring whether the beautiful is a distinct ideal or not; but he is bound to say how it may be with the true; and accordingly the intention of this chapter is to lay the foundation for the doctrine, which will appear more and more evident as we proceed, that that truth the conditions of which the logician endeavors to analyze, and which is the goal of the reasoner's aspirations, is nothing but a phase of the *summum bonum* which forms the subject of pure ethics, and that neither of those men can really understand himself until he perceives clearly that it is so. (CP1.575, 1902)

**percept**

an object of perception M19

the mental product or result of perceiving (as distinguished from action) L19

**precide** (Peirce)

In those respects in which a sign is not vague, it is said to be definite, and also with a slightly different mode of application, to be precise, a meaning probably due to *præecisus* having been applied to curt denials and refusals. It has been the well-established, ordinary sense of precise since the Plantagenets; and it were much to be desired that this word, with its derivatives **precision**, **precisive**, etc., should, in the dialect of philosophy, be restricted to this sense. To express the act of rendering precise (though usually only in reference to numbers, dates, and the like), the French have the verb *préciser*, which, after the analogy of *décider*, should have been *précider*. Would it not be a useful addition to our English terminology of logic, to adopt the verb to precide, to express the general sense, to render precise? Our older logicians with salutary boldness seem to have created for their service the verb to prescind, the corresponding Latin word meaning only to "cut off at the end," while the English word means to suppose without supposing some more or less determinately indicated accompaniment. In geometry, for example, we "**prescind**" shape from color, which is precisely the same thing as to "abstract" color from shape, although very many writers employ the verb "to abstract" so as to make it the equivalent of "prescind." But whether it was the invention or the courage of our philosophical ancestors which exhausted itself in the manufacture of the verb "prescind," the curious fact is that instead of forming from it the noun prescission, they took pattern from the French logicians in putting the word precision to this second use. About the same time (see Watts, *Logick*, 1725, I, vi, 9 ad fin.) the adjective precisive was introduced to signify what prescissive would have more unmistakably conveyed. If we desire to rescue the good ship Philosophy for the service of Science from the hands of lawless rovers of the sea of literature, we shall do well to keep prescind, presciss, prescission, and prescissive on the one hand, to refer to dissection in hypothesis, while precide, precise, precision, and precisive are used so as to refer exclusively to an expression of determination which is made either full or free for the interpreter. We shall thus do much to relieve the stem "abstract" from staggering under the double burden of conveying the idea of **prescission** as well as the unrelated and very important idea of the creation of *ens rationis* out of an {*epos pteroen*} -- to filch the phrase to furnish a name for an expression of non-substantive thought -- an operation that has been treated as a subject of ridicule -- this hypostatic abstraction -- but which gives mathematics half its power (CP5.449, 1905).

**premiss** (Peirce)

Peirce used the spelling "premiss" instead of "premise" because "premiss" is derived from the medieval logicians' *praemissa*, while "premise" is properly a legal term...

**precisive abstraction** or **prescission** (Peirce)

variously spelled **precisive abstraction** or **prescission** a formal operation that marks, selects, or singles out one feature of a concrete experience to the disregard of others (see **precide** above)

**quidditas, entitas & haecceitas**

**quidditas** the particular form imposed that gives some matter its identity, its *quiddity* or refers to the universal qualities of a thing, its "**whatness**", or the aspects of a thing which it may share with other things and by which it may form part of a genus of things

**haecceitas** denotes the discrete qualities, properties or characteristics of a thing which make it a *particular* thing; is the "**thisness**" of a person or object; whereas haecceity refers to aspects of a thing which make it a *particular* thing, *quiddity*

**entitas** the term "**beingness**" translates *entitas*, which is the abstract noun coined to correspond to *ens* ('being') the English cognate ('entity') has a concreteness that is not implied in the Latin term, although it may be, and by Scotus often seemed to be, used in a concrete sense -- as one might speak of this white patch as "whiteness"

**reason**

Following Descartes (via Locke), Enlightenment thinkers took reason to be the sense common to human beings. Reason replaced tradition as the "common sense." Reason was assumed to be a matter of method and to be based on indubitable assumptions. Thus, to be rational was to begin with the appropriate premises and then to proceed methodically. In spite of the fact that Enlightenment thinkers took reason to be a natural ability of any human being, most of them also assumed that the average person's reason has been corrupted by the cultural environment and especially by the influence of churches. Churches were considered the most corrupting of influences because churches put revelation above reason and hold that there is something that transcends reason. The enlightened were those who have escaped the thrall of this influence – those who have escaped the, at best, hasty judgments ("prejudices") of religion and everyday culture

**schemata**

in Kantian philosophy, a rule or procedure of the imagination enabling the understanding to apply a concept, esp. a category, to what is given in sense-perception L18  
a schematic representation of something, a hypothetical outline or plan; a theoretical construction; a draft; a synopsis; a design L19

*psychology*: an (unconscious) organised mental model of something in terms of which new information can be interpreted or an appropriate response made E20

**semiology** – Saussure

Peirce's semeiotic should not be confused with the semiology of the Swiss linguist, Ferdinand de Saussure whose *Cours de linguistique générale* (*Course in General Linguistics*) (1916) was published two years after Peirce's death. According to Floyd Merrell (2001):

...one of the chief distinctions between Peirce and Saussure lies in the scope of their theories. Peirce's semiotics encompasses the range of all possible signs and their human and nonhuman makers and takers alike, regarding both inorganic and organic, and living and nonliving domains – in addition to what is construed by dualists to be the realm of mind. This all-inclusive semiotic sphere exists in stark contrast to Saussure's call for a "science of signs," which according to the proper conception was destined to become basically a "linguistic science," thus limited to distinctively human communication.

More importantly, however, James Liszka points out, "for Saussure, signs are primarily a psychological entity" (1996:15) whereas "Peirce sees semeiotic as leading principles to sciences such as general and social psychology and linguistics." (p. 16) Peirce's semeiotic is normative; Saussure's semiology is empirical, and as Liszka argues (p. 16):

The only way in which the logical or formal view of semeiotic and the empirical one would be compatible is if the empirical and the formal were treated the same. This is generally called the theory of psychologism; it is something Peirce argues fervently against (see CP2.39-54, c.1902).

**semiotics** – Morris

Charles Morris's threefold division of a semiotics syntactics, semantics, and pragmatics based on a dyadic, positivist reading of Peirce's triadic semeiotic, and a misreading of Peirce's critique of dyadic views of signs and of foundationalism

**significs** (Peirce)

may be defined as the science of meaning or the study of significance, provided sufficient recognition is given to its practical aspect as a method of mind, one which is involved in all forms of mental activity, including that of logic. In Baldwin's Dictionary of Philosophy and Psychology (1901-1905) the following definition is given: "1. Significs implies a careful distinction between (a) sense or signification, (b) meaning or intention and (c) significance or ideal worth. It will be seen that the reference of the first is mainly verbal (or rather sensal), of the second volitional, and of the third moral (e.g. we speak of some event ' the significance of which cannot be overrated, and it would be impossible in such a case to substitute the ' sense ' or the ' meaning ' of such event, without serious loss). Significs treats of the relation of the sign in the widest sense to each of these. 2. A proposed method of mental training aiming at the concentration of intellectual activities on that which is implicitly assumed to constitute the primary and ultimate value of every form of study, i.e. what is at present indifferently called its meaning or sense, its import or significance.... Significs as a science would centralise and co-ordinate, interpret, inter-relate and concentrate the efforts to bring out meanings in every form, and in so doing to classify

the various applications of the signifying property clearly and distinctly." Since this dictionary was published, however, the subject has undergone further consideration and some development, which necessitate modifications in the definition given. It is clear that stress needs to be laid upon the application of the principles and method involved, not merely, though notably, to language, but to all other types of human function. There is need to insist on the rectification of mental attitude and increase of interpretative power which must follow on the adoption of the signifi- cal view-point and method, throughout all stages and forms of mental training, and in the demands and contingencies of life.

**stochastic**

randomly determined, that follows some random probability distribution or pattern, so that its behaviour may be analysed statistically but not predicted precisely M20

**tuism** (Peirce)

the doctrine that all thought is addressed to a second person, or to one's future self as to a second person (1891 edition of the *Century Dictionary*)

**valency**

might, power, strength E-M17

*chemistry*: the power or capacity of an atom or group to combine with or displace other atoms or groups in the formation of compounds, equivalent to the number of hydrogen atoms that it could combine with or displace; a unit of this M19

*linguistics*: the power of a grammatical elements esp. a verb, to govern other elements in the same sentence L20

**veracity**

correspondence with truth or fact E17

**verisimilitude**

the appearance of being true or real; likeness or resemblance to truth, or fact; realistic quality; probability E17  
a statement etc. having the mere appearance or show of being true or factual; an apparent truth L18

**verity**

the actuality or reality of something M17

## Bibliography

### CSP Primary Sources

- Bergman, Mats, & Sami Paavola. (Eds.) (2014) *The Commens Dictionary of Peirce's Terms*.  
<http://www.commens.org/dictionary>.
- Buchler, Justus. (Ed.) (1955) PEIRCE, C. S. *Philosophical Writings of Peirce*. NY: Dover.
- Cohen, Morris R. (Ed.) (1923) PEIRCE, C. S. *Chance, Love and Logic. Philosophical Essays*. NY: Harcourt Brace.
- Hartshorne, Charles & Weiss, Paul. (Eds.) PEIRCE, C. S. *Collected Papers of Charles Sanders Peirce, vols. 1-6*. Cambridge, MA: Harvard University Press.  
Volume 1: *Principles of Philosophy*. Charles Hartshorne (Ed.) (1931)  
Volume 2: *Elements of Logic*. Charles Hartshorne & Paul Weiss. (Eds.) (1932)  
Volume 3: *Exact Logic* – published papers. Charles Hartshorne & Paul Weiss. (Eds.) (1933)  
Volume 4: *The Simplest Mathematics*. Charles Hartshorne & Paul Weiss. (Eds.) (1933)  
Volume 5: *Pragmatism and Pragmaticism*. Charles Hartshorne & Paul Weiss. (Eds.) (1934)  
Volume 6: *Scientific Metaphysics*. Charles Hartshorne & Paul Weiss. (Eds.) (1935)
- Burks, Arthur W. (Ed.) PEIRCE, C. S. *Collected Papers of Charles Sanders Peirce, vols. 7-8*. Cambridge, MA: Harvard University Press.  
Volume 7: *Science and Philosophy*. (1958)  
Volume 8: *Reviews, Correspondence and Bibliography*. (1958)
- Houser, Nathan et al. (Eds.) PEIRCE, C. S. *The Essential Peirce. Selected Philosophical Writings, vols. 1-2*. Bloomington, IN: Indiana University Press.  
Volume 1: *1867-1892*. Nathan Houser & Christian J. W. Kloesel. (Eds.) (1992)  
Volume 2: *1893-1913*. Nathan Houser et al. (Eds.) (1998)
- Ketner, Kenneth Laine Ketner. (Ed.) (1992) PEIRCE, C. S. *Reasoning and the Logic of Things: The Cambridge Conferences Lectures of 1898*. Cambridge, MA: Harvard University Press.
- Ketner, Kenneth Laine Ketner & James Cook. (Eds.) (1975-1987) *Contributions to "The Nation" volumes 1-4*. Lubbock, TX: Texas Technological University Press.
- Moore, Matthew E. (Ed.) (2010a) *Philosophy of Mathematics: Selected Writings Charles S. Peirce*. Bloomington, IN: Indiana University Press.
- Peirce, Charles S. (1966) *The Charles S. Peirce Papers*. The microfilm edition. Cambridge, MA: Harvard University Library Photographic Service. [These materials are catalogued in the Richard S. Robin *Annotated Catalogue* (1967) and *Supplementary Catalogue* (1971).]
- Peirce Edition Project. (Eds.). PEIRCE, C. S. *Writings of Charles S. Peirce: A Chronological Edition, vols. 1-6 & 8*. Bloomington, IN: Indiana University Press.  
Volume 1: *1857-1866*. Max H. FISCH et al. (Eds.) (1982)  
Volume 2: *1867-1871*. Edward C. MOORE et al. (Eds.) (1984)  
Volume 3: *1872-1878*. Christian J. W. KLOESEL et al. (Eds.) (1986)  
Volume 4: *1879-1884*. Christian J. W. KLOESEL et al. (Eds.) (1989)  
Volume 5: *1884-1886*. Christian J. W. KLOESEL et al. (Eds.) (1993)  
Volume 6: *1886-1890*. Nathan HOUSER et al. (Eds.) (2000)  
Volume 8: *1890-1892*. Nathan HOUSER et al. (Eds.) (2010)
- Turrisi, Patricia Ann. (Ed.) (1997) *Pragmatism as a Principle and Method of Right Thinking: The 1903 Harvard Lectures on Pragmatism*. NY: State University of NY.
- Wiener, Philip P. (Ed.) (1958) PEIRCE, C. S. *Charles S. Peirce: Selected Writings. Values in a Universe of Change*. NY: Dover.



### **Dictionaries that have included many of CSP's definitions:**

Baldwin, James (Ed.) (1901-2) *Dictionary of Psychology and Philosophy*. NY: Macmillan.

Whitney, William Dwight. (Ed.) (1889-1891) *Century Dictionary*, first edition. NY: The Century Company of NY.

### **Bibliographies of CSP's works:**

Ketner, Kenneth Laine. (2013) *The Published Works of Charles Sanders Peirce*,  
<http://www.pragmatism.net/works/>.

Robin, Richard D. (1967 [supplement 1971]) *Annotated Catalogue of the Papers of Charles S. Peirce*.  
<http://www.iupui.edu/~peirce/robin/robin.htm>.

### **Secondary sources CSP and other sources:**

Adriaans, Pieter & Johan van Benthem. (2008) *Philosophy of Information*.  
<https://www.illc.uva.nl/Research/Publications/Reports/X-2008-10.text.pdf>.

Aldersley-Williams, Hugh. (2005) *Findings*. Norwich: Lulox Books.

Alexander, Samuel. (1968) *Beauty and Other Forms of Value*. NY: Thomas Y. Crowell Co.

Aliseda, Atocha. (2006) *Abductive Reasoning: Logical Investigations into Discovery and Explanation*. Berlin: Springer.

Almeder, Robert. (1985) 'Peirce's thirteen theories of truth.' *Transactions of the Charles S. Peirce Society* 21, 1: 77-94.

Anathaswamy, Anil. (2011) 'Uncertainty entangled.' *New Scientist* 2810: 28-31.

Anderson, Douglas R. (1994) 'Peirce on metaphor.' *Transactions of the Charles S. Peirce Society* 20, 4: 453-468.

Anderson, Douglas R. (1987) *Creativity and the Philosophy of C. S. Peirce*. Dordrecht: Nijhoff.

Anderson, Douglas R. (1995) *Strands of System: The Philosophy of Charles Peirce*. West Lafayette, IN: Purdue University Press.

Anderson, Douglas R. (1995b) 'Peirce's agape and the generality of concern.' *International Journal for Philosophy of Religion* 37: 103-112.

Anderson, Douglas R. (2002) 'Peirce's common sense marriage of religion and science.' SAAP 2002.

Anderson, Douglas R. (2013) Personal email.

Anderson, Douglas R., & Carl R. Hausman. (Eds.) (2012) *Conversations on Peirce: Reals and Ideals*. NY: Fordham University Press.

Anderson, John. (2007) *Space, Time and the Categories: Lectures in Metaphysics 1949-50*. Sydney: Sydney University Press.

- Apel, Karl-Otto. (1967, 1981) *Charles S. Peirce: From Pragmatism to Pragmaticism*. Amherst, NY: University of Massachusetts Press.
- Armstrong, David M. (1978) *Nominalism and Realism. Universals and Scientific Realism Volume I. A Theory of Universals Volume II*. Cambridge University Press.
- Augustine. (2009) *City of God, Book XI*. <http://www.newadvent.org/fathers/1201>.
- Australian Broadcasting Corporation. (2012) 'Physics on the street: weightlessness.' Catalyst, May 3.
- Baake, Ken. (2003) *Metaphor and Knowledge: The Challenges of Writing Science*. Albany, NY: State University of NY Press.
- Bak, Per, & Maya Paczuski. (1995) 'Complexity, contingency, and criticality.' Proc. National Academy of Science USA.
- Barnouw, Jeffrey. (1994) 'Aesthetic' for Schiller and Peirce: a neglected origin of pragmatism.' *Journal of the History of Ideas* 49, 4: 607-632.
- Bateson, Gregory. (1972) 'Form, substance and difference', in *Steps to an Ecology of Mind*. University of Chicago Press: 454-471.
- Belenky, Mary Field, Blythe McVicker Clinchy, Nancy Rule Goldberger, et. al. (1986) *Women's Ways of Knowing: The Development of Self, Voice and Mind*. NY: Basic Books.
- Bergman, Mats. *Peirce's Philosophy of Communication: the Rhetorical Underpinnings of the Theory of Signs*. NY: Continuum.
- Bergson, Henri. (1998 [1911]) *Creative Evolution*, tr., Arthur Mitchell, NY: Dover.
- Bernstein, Richard J. (1993) 'Peirce's theory of perception.' in Edward C. Moore. & Richard S. Robin. (Eds.) (1993) *Studies in the Philosophy of Peirce: Second series*: 165-189.
- Bernstein, Richard J. (2013) *The New Constellation: The Ethical-Political Horizons of Modernity/Postmodernity*. Maiden, MA: Polity Press.
- Bickhard, Mark H. & Donald T. Campbell. (2007) 'Physicalism, emergence and downward causation.' Interactivist Summer Institute, May 27, American University in Paris.
- Binghurst, Robert. (2002) *The Elements of Typological Style*. Vancouver: Hartley & Marks.
- Boler, John F. (1963) *Charles Peirce and Scholastic Realism: A Study of Peirce's Relation to John Duns Scotus*. Seattle: University of Washington Press.
- Boisvert, Raymond. (2013) 'Camus: between yes and no.' *Philosophy Now*. Issue 98.
- Brent, Joseph. (1993) *Charles Sanders Peirce: A Life*. Bloomington, IN: Indiana University Press.
- Brill-Edwards, M. 2000, 'Whose health, what protection?' In M.L. Barer, K.M. McGrail et al (Eds.) *Tales from the Other Drug Wars*. Vancouver: Centre for Health Services and Policy Research.
- Broadie, Alexander. (2010) *A History of Scottish Philosophy*. Edinburgh University Press.
- Bruning, Jacqueline, & Paul Forster. (Eds.) (1997) *The Rule of Reason: The Philosophy of C.S. Peirce*. University of Toronto Press.
- Buchanan, Mark. (2000) *Ubiquity: The Science of History...Or Why the World is Simpler than We Think*. London: Weisenfeld & Nicholson.

- Buchanan, Mark. (2002) *Small World: Uncovering Nature's Hidden Networks*. London: Phoenix.
- Bullock, Alan, et al. (Eds.) (1988) *The Fontana Dictionary of Modern Thought*. London: Fontana.
- Byers, William. (2007) *How Mathematicians Think: Using Ambiguity, Contradiction and Paradox to Create Mathematics*. Princeton, NJ: Princeton University Press.
- Cahill, Reginald. (2003) 'Process physics: from information theory to quantum space and matter'. Adelaide, SA: Flinders University.
- Campos, Daniel G. (2009) 'Imagination, concentration and generalization - Peirce on the reasoning abilities of the mathematician.' *Transactions of the Charles S. Peirce Society* 45, 2: 135-156.
- Camus, Albert. (1958, 2014) *Algerian Chronicles*. Cambridge, MS: Harvard University Press.
- Capek, Milic. (1994) 'Peirce's approach to the problem of time.' In Edward C. Moore, & Richard S. Robin. (Eds.) (1994) *From Time & Chance to Consciousness: Studies in the Metaphysics of Charles Peirce*. Providence, RI: Berg.
- Capra, Fritjof. (1982) *The Turning Point*. London: Flamingo.
- Casagrande, David. (1999) 'Information as verb: re-conceptualizing information for cognitive and ecological models.' *Georgia Journal of Ecological Anthropology* 3: 4-13.
- Cassian, Nina. 'Temptation.' In Andrea Deletant & Brenda Walker (translators from the Romanian). (1988) *Call Yourself Alive: The Poetry of Nina Cassian*. London: Forrest Books.
- Chalmers, Alan F. (1982) *What is This Thing Called Science?* [1st Ed.]. Buckingham: Open University Press.
- Chalmers, Alan F. (1990) *Science and Its Fabrication*. Buckingham: Open University Press.
- Christansen, Peder-Voetmann. (1993) 'Peirce as participant in the Bohr-Einstein discussion.' In Edward C. Moore (Ed.) (1993) *Charles S. Peirce and the Philosophy of Science*. Tuscaloosa, AL: University of Alabama.
- Clayton, Philip. (2010) 'Unsolved dilemmas: the concept of matter in the history of philosophy and in contemporary physics.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.
- Cooke, Elizabeth F. (2007) *Peirce's Pragmatic Theory of Inquiry: Fallibilism and Indeterminacy*. NY: Continuum.
- Cottingham, John. (Ed.) (2008) *Western Philosophy: An Anthology*. Cambridge, MA: Blackwell.
- Cronburg, Turil. (2010) 'The very deep intro to Maslow.' *Evoke*. April 18.
- Crowder, George. (2003) 'Pluralism, relativism and liberalism in Isaiah Berlin.' Australasian Political Studies Association Conference.
- Curley, Thomas V. (1969) 'The Relation of the Normative Sciences to Peirce's Theory of Inquiry.' *Transactions of the Charles S. Peirce Society* 5, 2: 90-106.
- Davies, Paul. (2007) 'Taking science on faith.' *New York Times*: November 24.
- Davies, Paul. (2007b) 'The flexi laws of physics'. *New Scientist* 2610: 30 June.
- Davies, Paul & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.

- Davies, Paul. (2010) 'Universe from bit.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.
- de Tienne André. (2006) 'Peirce's logic of information.' *Seminario del Grupo de Estudios Peirceanos, Universidad de Navarra*.
- de Waal, Cornelis., & Krzysztof Piotr Skowronski. (Eds.) (2012) *The Normative Thought of Charles S. Peirce*. NY: Fordham University Press.
- de Waal, Cornelis. (2001) *On Peirce*. Belmont, Cal: Wadsworth.
- de Waal, Cornelis. (2005) 'Why metaphysics needs logic and mathematics doesn't: mathematics, logic and metaphysics in Peirce's classification of the sciences.' *Transactions of the Charles S. Peirce Society* 41, 2: 283-297.
- Deacon, Terrence W. (2010) 'The concept of information in biology.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.
- Debrock, Guy. (Ed.) (2003) *Process Pragmatism: Essays on a Quiet Philosophical Revolution*. Amsterdam: Rodopi.
- Deely, John. (2000) *The Red Book: The Beginning of Postmodern Times or: Charles Sanders Peirce and the Recovery of Signum*. Helsinki: University of Helsinki Commens Eprint
- Deely, John. (2000b) *The Green Book: The Impact of Semiotics on Philosophy*. Helsinki: University of Helsinki Commens Eprint
- Deely, John. (2001) *Four Ages of Understanding: the First Postmodern Survey of Philosophy from Ancient Times to the Turn of the Twenty-First Century*. Toronto: University of Toronto Press.
- Deledalle, Gérard. (1990) *Charles S. Peirce, 1839-1914: An Intellectual Biography*. Amsterdam: Benjamins.
- DiLeo, Jeffrey R. (1991) 'Peirce's haecceitism.' *Transactions of the Charles S. Peirce Society* 27, 1: 79-109.
- Donne, John. *Meditation XVII* (1624).
- Dorey, E. (2005) 'Conflicts of interest: the close links between public policy and the drug industry.' *Chemistry and Industry*, February 21.
- Dukes, M. N. Graham. (2004) 'W.H.O. and priority medicine: some notes in the margin.' *Medicines for Europe and the World – setting priorities, missing the point*. The Hague, November 18.
- Duff, Michael. (2011) 'Theory of everything: answering the critics.' *New Scientist*, issue 2815, 1 June.
- Eagleton, Terry. (2009) *Reason, Faith, and Revolution: Reflections on the God Debate*. New Haven & London: Yale University Press.
- Eagleton, Terry. (2011) *Hope Without Optimism*. New Haven & London: Yale University Press.
- Eco, Umberto, & Thomas A. Sebeok. (1983) *The Sign of Three: Dupin, Holmes, Peirce*. Bloomington, IN: Indiana University Press.
- Einstein, Albert. (1934) 'On the method of theoretical physics.' *Philosophy of Science* 1, 2: 163-169.

- El-Hani, Niño, João Queiroz, & Claus Emmeche. (2009) *Genes, Information and Semiosis*. Tartu, Estonia: Tartu University Press.
- Ellis, George F. R. (2008) 'On the nature of causation in complex systems.' *Transactions of the Royal Society of South Africa* 63, 1: 69-84.
- Esposito, Joseph. (n.d.) 'Charles Sanders Peirce Biography (1839–1914), Letters on the Aesthetic Education of Man, Critique of Pure Reason.' <http://psychology.irank.org/pages/2123/Charles-Sanders-Peirce.html>
- Esposito, Joseph L. (1980) *Evolutionary Metaphysics. The Development of Peirce's Theory of Categories*. Athens, OH: Ohio University Press.
- Esposito, Joseph L. (2001) 'Synecism: the keystone of Peirce's metaphysics.' *Digital Encyclopedia of Charles S. Peirce*.
- Fann, K. T. (1970) *Peirce's Theory of Abduction*. The Hague: Martinus Nijhoff.
- Feilbleman, James K. (1946, 1969) *An Introduction to Peirce's Philosophy: Interpreted as a System*. London: Allen & Unwin.
- Fisch, Max H. (1986) K. L. Ketner & C. J. Kloesel (Eds.). *Peirce, Semeiotic and Pragmatism*. Bloomington, NY: Indiana University Press.
- Forrest, Peter. (1991) 'Aesthetic understanding.' *Philosophy & Phenomenological Research* 51, 3: 525-540.
- Freeman, Eugene. (1934) *The Categories of Charles S. Peirce*. Chicago: Open Court Publishing.
- Freeman, Eugene. (Ed.) (1983) *The Relevance of Charles Peirce*. La Salle, IL: Monist Library of Philosophy.
- Freese, Katherine. (2014) *The Cosmic Cocktail: Three Parts Dark Matter*. Princeton, NJ: Princeton University Press.
- Furhman, Gary. (2010) 'Rehabilitating information.' *Entropy* 3 February.
- Gallie, W. B. (1952) *Peirce and Pragmatism*. Harmondsworth, Middlesex: Penguin.
- Gefter, Amanda. (2011) 'But what if supersymmetry is wrong?' *New Scientist*, 2804, 19 March.
- Geyer, Denton Loring. (1914) *The Pragmatic Theory of Truth as Developed by Peirce, James and Dewey*. Urbana, IL: University of Illinois Press.
- Gilligan, Carol. (1982) *In a Different Voice: Psychological Theory and Women's Development*. Cambridge, MS: Harvard University Press.
- Gorman, Tom. (2003) *The Complete Idiot's Guide to Economics*. London: Penguin.
- Gray, John. (1995) *Berlin*, Fontana: London.
- Hardy, Henry. (Ed.) (2002) *Liberty: Incorporating Four Essays on Liberty*. Oxford: OUP.
- Hartshorne, Charles. (1973) 'Charles Peirce and Quantum Mechanics.' *Transactions of the Charles S. Peirce Society* 9, 4: 191-201.
- Harwood, Gwen. 'Beyond Metaphor.' In (2014) *The Best 100 Poems of Gwen Harwood*. Collingwood, Vic: Black Inc.

- Hausman, Carl R. (1979) 'Value and the Peircean Categories.' *Transactions of the Charles S. Peirce Society* 15, 3: 203-223.
- Hausman, Carl R. (1993) *Charles S. Peirce's Evolutionary Philosophy*. Cambridge: Cambridge University Press.
- Hausman, Carl R. (2003) 'Charles Peirce's evolutionary realism as a process philosophy.' in Guy Debrock. (Ed.) (2003) *Process Pragmatism: Essays on a Quiet Philosophical Revolution*: 25-38.
- Havenel, Jérôme. (2008) 'Peirce's clarifications of continuity.' *Transactions of the Charles S. Peirce Society* 44, 1: 86-133.
- Heidegger, Martin. (1927, 1962) *Being & Time*. Oxford: Basil Blackwell.
- Heil, John. (1993) 'Belief.' In Jonathan Dancy and Ernest Sosa (eds.) *A Companion to Epistemology*. Oxford: Blackwell.
- Heisenberg, Werner. (1958, 1971) *Physics and Philosophy*. Harmondsworth, Middlesex: Penguin.
- Helm, Bertrand P. (1980) 'The nature and modes of time.' in Eugene Freeman. (Ed.) (1980) *The Relevance of Charles Peirce*: 178-188.
- Hoffman, Michael. (2001) 'The 1903 classification of triadic sign-relations.' *Digital Encyclopedia of Charles S. Peirce*.
- Hoffmeyer, Jesper. (2010) 'Semiotic freedom: an emerging force.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.
- Hofstadter, Douglas. (1979) *Gödel, Escher, Bach: An Eternal Golden Braid*. London: Penguin.
- Hofstede, Geert. (1984) 'The cultural relativity of the quality of life concept.' *The Academy of Management Review* 9, 3: 389-398.
- Honderich, Ted. (Ed.) (1995) *Oxford Companion to Philosophy*, Oxford, OUP.
- Hookway, Christopher. (1985) *Peirce*. NY: Routledge.
- Hookway, Christopher. (2013) *The Pragmatic Maxim: Essays on Peirce and Pragmatism*. Oxford: OUP.
- Houser, Nathan, Don D. Roberts & James Van Evra. (Eds.) (1997) *Studies in the Logic of Charles Sanders Peirce*. Bloomington, IN: Indiana University Press.
- Hulswit, Menno. (1997) 'Peirce's telological approach to natural classes.' *Transactions of the Charles S. Peirce Society* 45, 3: 727-772.
- Hulswit, Menno. (2002) *From Cause to Causation: A Peircean Perspective*. Dordrecht: Kluwer.
- Ibri, Ivo A. (2002) 'The vital importance of the category of Firstness in Peirce's philosophy.' *Cognitio, São Paulo* 3: 46-52.
- Ibri, Ivo A. (2009) 'Reflections on a poetic ground in Peirce's philosophy.' *Transactions of the Charles S. Peirce Society* 33, 3: 273-307.
- Jantsch, Erich. (1980) *The Self-Organizing Universe: Scientific and Human Implications of the Emerging Paradigm of Evolution*. NY: Pergamon.
- Jappy, Tony. (2013) *Introduction to Peircean Visual Semiotics*. NY: Continuum.

- Juarrero, Alicia, & Carl A. Rubino. (2008) 'Contents & Introduction' to Exploring Complexity, v.4 Emergence, Complexity and Self-Organization: Precursors and Prototypes.' Goodyear, AZ: ISCE Publishing.
- Kaag, John. (2014) *Thinking through the Imagination: Aesthetics in Human Cognition*. NY: Fordham University Press.
- Kager, Patrick & Mark Mozeson. (2000) 'Supply chain: the forgotten factor.' Pharmaceutical Executive USA.
- Keller, Evelyn Fox. (1995) *Refiguring Life: Metaphors of 20th Century Biology*. NY: Colombia University Press.
- Kenny, Anthony. (2010) *A New History of Western Philosophy*. Oxford: Clarendon Press.
- Kent, Beverley E. (1987) *Charles S. Peirce: Logic and the Classification of the Sciences*. Kingston: McGill-Queen's University Press.
- Kernan, W. F. (1965) 'The Peirce Manuscripts and Josiah Royce - A Memoir Harvard 1915 - 1916.' Transactions of the Charles S. Peirce Society 1, 1.
- Ketner, Kenneth Laine. (Ed.) (1995) *Peirce and Contemporary Thought: Philosophical Inquiries*. NY: Fordham University Press.
- Kevelson, Roberta. (1987) *Charles S. Peirce's Method of Methods*. Amsterdam: Benjamins.
- Kevelson, Roberta. (1993) *Peirce's Esthetics of Freedom: Possibility, Complexity and Emergent Value*. NY: Peter Lang.
- Kimura, Yasuhiko Genku. (2003) 'Alignment beyond agreement.' Journal of Integral Thinking for Visionary Action, v.1, n.
- Kindler, Michael. (n.d.) 'Schubert's Unfinished Symphony No. 8, *Die Unvollendete*.' In University of Sydney Senate Papers. Sydney, NSW: University of Sydney.
- Kitto, Kirsty. (2006) 'Modelling and generating complex emergent behaviour.' Adelaide, SA: Flinders University.
- Kitto, Kirsty. (2007) 'Quantum theories as models of complexity.' Adelaide, SA: Flinders University.
- Klinger, Christopher M. (2005) 'Bootstrapping reality from the limitations of logic.' Adelaide, SA: Flinders University.
- Kneale, William & Martha Kneale. (1962) *The Development of Logic*. Oxford: Clarendon Press.
- Kruse, Felicia E. (1991) 'Genuineness & degeneracy in Peirce's categories.' *Transactions of the Charles S. Peirce Society* 27,3: 267-298.
- Küppers, Bernd-Olaf. (2010) 'Information and communication in living matter.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.
- Lacey, Hugh. (1999) *Is Science Value Free?: Values and Scientific Understanding*. London & NY: Routledge.
- Laudan, Larry. (1990) 'Normative naturalism.' *Philosophy of Science*. 57, 1: 44-59.
- Lexchin, J.R. (2005) 'Implications of pharmaceutical industry funding on clinical research.' *Annals of Pharmacotherapy*, 39: 194-197.

- Lingis, Alphonso. (1998) *The Imperative*. Bloomington, IN: Indiana University Press.
- Lippman, Lorna. (1977) *The Aim is Understanding: Educational Techniques for a Multi-cultural Society*, Brookvale, NSW: Australia & New Zealand Book Co.
- Liszka, James Jakób. (1996) *A General Introduction to the Semeiotic of Charles Sanders Peirce*. Bloomington, IN: Indiana University Press.
- Liszka, James Jakób. (2011) 'Peirce's new rhetoric.' *Transactions of the Charles S. Peirce Society* 36, 4: 439-476.
- Magee, Bryan. (1997) *Confessions of a Philosopher*. NY: The Modern Library.
- Magee, Bryan. (2001) *The Story of Philosophy*. London: DK Publishing.
- Magnani, Lorenzo. (2001) *Abduction, Reason and Science: Processes of Discovery and Explanation*. NY: Kluwer.
- Marietti, Susanna. (2010) 'Observing signs.' in Matthew E. Moore. (Ed.) (2010b) *New Essays on Peirce's Mathematical Philosophy*: 147-168.
- Merleau-Ponty, Maurice. (2003; 1945) *Phenomenology of Perception*. London & NY: Routledge.
- Mayo-Wilson, Connor. (2007) 'Peirce and Brouwer.' 8th Annual Midwest Philosophy of Mathematics Workshop. Notre Dame. October 27, 2007.
- Mayorga, Rosa. (2007) *From Realism to 'Realicism': The Metaphysics of Charles Sanders Peirce*. Lanham, MD: Rowman & Littlefield.
- McMullin, Eran. (2010) 'From matter to materialism ... and (almost) back.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics*. Cambridge: Cambridge University Press.
- Merrell, Floyd. (2001) 'Peirce's basic classes of signs in a somewhat different vein.' *Digital Encyclopedia of Charles S. Peirce*.
- Merrell, Floyd. (2001b) 'Semiotics versus semiology.' *Digital Encyclopedia of Charles S. Peirce*.
- Merrell, Floyd. (2005) 'Overdeterminacy, underdeterminacy, indeterminacy.' Arisbe.
- Midgley, Mary. (2001) *Science and Poetry*. NY: Routledge.
- Millar, Willard M. (1978) 'Peirce on pragmatism and history.' *Transactions of the Charles S. Peirce Society* 14, 1: 42-52.
- Misak, Cheryl J. (1991) *Truth and the End of Inquiry: A Peircean Account of Truth*. Oxford: Clarendon Press.
- Misak, Cheryl J. (Ed.) (2004) *The Cambridge Companion to Peirce*. Cambridge: Cambridge University Press.
- Mladenov, Ivan. (2005) *Conceptualizing Metaphors: On Charles Peirce's Marginalia*. NY: Routledge.
- Mlodinow, Leonard. (2008) *The Drunkard's Walk: How Randomness Rules Our Lives*. London: Penguin.
- Mollering, Guido. (2001) 'The nature of trust: from Georg Simmel to a theory of expectation, interpretation and suspension.' *Sociology* 35, 2: 403-420.



- Moore, Edward C. (Ed.) (1993) *Charles S. Peirce and the Philosophy of Science: Papers from the Harvard Sesquicentennial Congress*. Tuscaloosa, AL: University of Alabama Press.
- Moore, Edward C. & Richard S. Robin. (Eds.) (1964) *Studies in the Philosophy of C.S. Peirce, Second Series*. Amherst, NY: University of Massachusetts Press.
- Moore, Edward C. & Richard S. Robin. (Eds.) (1994) *From Time & Chance to Consciousness: Studies in the Metaphysics of Charles Peirce*. Providence, RI: Berg.
- Moore, Matthew E. (2009) 'Peirce on perfect sets revised.' *Transactions of the Charles S. Peirce Society* 45, 4: 649-67.
- Moore, Matthew E. (Ed.) (2010b) *New Essays on Peirce's Mathematical Philosophy*. Bloomington, IN: Indiana University Press.
- New English Bible. (1970) Oxford & Cambridge University Presses.
- NIH Office of the Director. (2005) 'NIH announces sweeping ethics reform', NIH News, February 1, US Department of Health and Human Services.
- Nubiola, Jaime. (1995) 'The branching of science according to C. S. Peirce.' 10th International Congress of Logic, Methodology & Philosophy of Science.
- Ogborn, Jon, & Edwin F. Taylor. (2005) 'Quantum physics explains Newton's laws of motion.' *Physics Education* 40, 1: 26-34.
- Paavola, Sami. (2001) 'Essential tensions in scientific discovery.' Helsinki: University of Helsinki.
- Paavola, Sami. (2002) *On the Origin of Ideas: An Abductivist Approach to Discovery*. Helsinki: University of Helsinki - dissertation. [Eprint]
- Park, Woosuk. (2007) 'Abduction and thought experiment in Baduk.' Applying Peirce Conference.
- Peat, David. (2008) 'Trapped in a world view.' *New Scientist*, 2637: 42-43.
- Pfeffer, Jeffrey. (1998) 'Seven practices of successful organizations.' *California Management Review* 40, 2: 96-124.
- Piercy, Marge. 'In the men's room(s).' In Marge Piercy. (1995) *Eight Chambers of the Heart: Selected Poems*. Harmondsworth, Middlesex: Penguin Books.
- Popper, Karl. (1980) 'Freeman on Peirce's anticipation of Popper.' in Eugene Freeman. (ed.) (1980) *The Relevance of Charles Peirce*: 78-79.
- Potter, Vincent G. (1967, 1997) *Charles S. Peirce on Norms and Ideals*. [First published in 1967] NY: Fordham University Press.
- Raposa, Michael L. (1989) *Peirce's Philosophy of Religion*. Bloomington, IN: Indiana University Press.
- Raz, Joseph. (2003) *The Practice of Value*. Oxford: Clarendon Press.
- Rescher, Nicholas (1996) *Process Metaphysics: An Introduction to Process Philosophy*. State University of NY.
- Reilly, Francis E. (1970) *Charles Peirce's Theory of Scientific Method*. NY: Fordham University Press.
- Reimer, Bennett. (1970) *A Philosophy of Music Education*. Englewood Cliffs, NJ: Prentice-Hall.

- Reynolds, Andrew. (2002) *Peirce's Scientific Metaphysics: The Philosophy of Chance, Law and Evolution*. Nashville, TN: Vanderbilt University Press.
- Robin, Richard S. (1964) 'Peirce's doctrine of the normative sciences.' In Edward C. Moore, & Richard S. Robin, (eds.) *Studies in the Philosophy of Peirce: Second series*. Amherst, NY: University of Massachusetts Press.
- Rosensohn, William L. 1974. *The Phenomenology of Charles S. Peirce*. Amsterdam: B. R. Grüner.
- Rosenthal, Sandra B. (1994) *Charles Peirce's Pragmatic Pluralism*. Albany, NY: State University of NY Press.
- Royce, Josiah with W. Fergus Kenan. (1916) 'Charles Sanders Peirce.' *Journal of Philosophy, Psychology and Scientific Methods* 13: 701-709.
- Russell, Bertrand. (1914) *Our Knowledge of the External World as a Field for Scientific Method in Philosophy*. Chicago: Open Court.
- Ryan, Paul. (1993) *Video Mind, Earth Mind: Art, Communications and Ecology*. NY: Peter Lang Inc.
- Sadrā, Mullā. (1992) *The Metaphysics of Mullā Sadrā. Kitāb al-masha'ir (The Book of Metaphysical Penetrations)*. NY: The Society for the Study of Islamic Philosophy & Science.
- Salsburg, David. (2001) *The Lady Tasting Tea: How Statistics Revolutionised Science in the 20th Century*. NY: W. H. Freeman.
- Sartre, Jean-Paul (1958 [1943]) *Being and Nothingness: An Essay on Phenomenological Ontology*. London: Methuen.
- Saussure, Ferdinand de. (1916) *Cours de linguistique générale. (Course in General Linguistics.)* Paris: Payot.
- Schiller, Friedrich. (1801, 1954) *On the Aesthetic Education of Man in a Series of Letters*. NY: Frederick Ungar Publishing.
- Schneider, Herbert W. (1952) 'Fourthness.' In Philip P. Weiner\* & Frederick H. Young. (Eds.) (1952) *Studies in the Philosophy of Charles Sanders Peirce: First series*: 209-214.
- Searle, John. (2003: 1) 'Contemporary philosophy in the United States'. In Nicholas Bunning & E. P. Tsui-James, (Eds.) *The Blackwell Companion to Philosophy*. Oxford: Blackwell.
- Sebeok, Thomas A. (1981) *The Play of Musement*. Bloomington, IN: Indiana University Press.
- Sfendoni-Mentzou, D. (1993) 'The role of potentiality in Peirce's tychism and in contemporary discussions in quantum mechanics and microphysics.' in Edward C. Moore. (Ed.) (1993) *Charles S. Peirce and the Philosophy of Science: Papers from the Harvard Sesquicentennial Congress*. Tuscaloosa, AL: University of Alabama Press: 246-261.
- Sheriff, John K. (1994) *Charles Peirce's Guess at the Riddle: Grounds for Human Significance*. Bloomington, IN: Indiana University Press.
- Shorter Oxford English Dictionary*. (2002) *Shorter Oxford English Dictionary [2 vols.]*. Oxford: OUP.
- Simmel, Georg. (1900, 1990) *The Philosophy of Money*. London: Routledge.
- Skagestad, Peter. (1981) *The Road of Inquiry. Peirce's Pragmatic Realism*. NY: Columbia University Press.
- Slezak, Michael. (2012) 'Higgs boson is too saintly and supersymmetry too shy.' *New Scientist*, 2892: 2.

- Smith Andrew. (2009) 'Truth, negation and the limit of inquiry.' SAAP 2010 Conference.
- Smith, John E. (1952) 'Religion and theology in Peirce.' In Philip P. Wiener\* & Frederick H. Young. (Eds.) (1952) *Studies in the Philosophy of Charles Sanders Peirce: First series:* 251-270.
- Smith, John E. (1978) *Purpose and Thought. The Meaning of Pragmatism.* Chicago: University of Chicago Press.
- Smith, John E. (1980) 'Community and reality.' In Eugene Freeman. (Ed.) (1980) *The Relevance of Charles Peirce:* 38-58.
- Smith, John E. (1987) 'The reconception of experience in Peirce, James and Dewey.' in Robert S. Corrington, Carl Hausman & Thomas M. Seebohm. (Eds.) (1987) *Pragmatism Considers Phenomenology:* 73-92.
- Smith, John Maynard. (2010) 'The concept of information in biology.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics.* Cambridge: Cambridge University Press.
- Smyth, Richard A. (1994) 'What logic can learn from ethics.' in Herman Parret. (Ed.) (1994) *Peirce and Value Theory: On Peircean Ethics and Aesthetics:* 49-60.
- Smyth, Richard A. (1997) *Reading Peirce Reading.* Lanham, MD.: Rowman and Littlefield.
- Smyth, Richard A. (2002) 'Peirce's normative science revisited.' *Transactions of the Charles S. Peirce Society* 38, 1&2: 283-306.
- Sorrell, Kory S. (2004) *Representative Practices: Peirce, Pragmatism and Feminist Epistemology.* NY: Fordham University Press.
- Spiers, Hugo & Jenny Gimple. (2003) *The Human Mind.* Open University, as presented by Robert Winston & produced by BBC1.
- Spiegelberg, Herbert. (1956) 'Husserl's and Peirce's phenomenologies.' In *Philosophy & Phenomenological Research* 17, 2: 164-185.
- Staat, Willem. (1998) 'On abduction, deduction, induction and the categories.' *Transactions of the Charles S. Peirce Society* 29, 2: 225-237.
- Stanley, Donald E. & Daniel G. Campos. 'The logic of medical diagnosis.' *Perspectives in Biology and Medicine* 56, 2: 300-315.
- Stapp, Henry. (2010) 'Minds and values in the quantum universe.' In Paul Davies & Niels Henrik Gregersen. (Eds.) (2010) *Information & the Nature of Reality from Physics to Metaphysics.* Cambridge: Cambridge University Press.
- StGeorge, Michael. (2002) 'Survival of a fitting quotation.' <http://www.silkworth.net/fitquotation.pdf>.
- Stiglitz, Joseph E. (2013) *The Price of Inequality.* Penguin: London.
- Suber, Peter. (1997) 'Symbolic Logic: course notes.' Dept. of Philosophy, Earlham College, Richmond, IN.
- Sydney Morning Herald. (1986) 9 December.
- Szyborska, Wisława. 'π.' In Adam Czerniawski (translator from the Polish). (1990) *People on a Bridge: Poetry of Wisława Szymborska.* London: Forrest Books.
- Talisse, Robert B., & Scott F. Aiken. (2008) *Pragmatism: a Guide for the Perplexed.* NY: Continuum.

- Tiercelin, Claudine. (2010) 'Peirce on mathematical objects and mathematical objectivity.' in Matthew E. Moore. (Ed.) (1993) *New Essays on Peirce's Mathematical Philosophy*: 81-122.
- Thagard, Paul. (1990) 'Philosophy and Machine Learning.' *Canadian Journal of Philosophy*. 20, 2: 261-276.
- Thompson, Manley. (1953) *The Pragmatic Philosophy of C. S. Peirce*. Chicago: University of Chicago Press.
- Tillich, Paul. (1957) *Systematic Theology: Existence and the Christ*. Chicago: University of Chicago Press.
- Tillich, Paul. (1960) *Love, Power and Justice: Ontological Analyses and Ethical Applications*. NY: OUP.
- Torkild Thellefsen & Bent Sørensen. (Eds.) (2014) *Charles Sanders Peirce in His Own Words: 100 Years of Semiotics, Communication and Cognition*. De Gruyter: Boston
- Trout, Lara. (2010) *The Politics of Survival: Peirce, Affectivity and Social Criticism*. NY: Fordham University Press.
- University of New Hampshire, Office of Intellectual Property Management. (2002) 'Bayh-Dole Act.' [www.unh.edu/oipm](http://www.unh.edu/oipm).
- Vesterby, Vincent. (Ed. & Intro.) (2008) *Origins of Self-Organization, Emergence and Cause. Vol.3 of Exploring Complexity*. Goodyear, AZ: ISCE.
- Wang, Hao. (1990) *Reflections on Kurt Gödel*. Cambridge, MA: MIT Press.
- Watts, Isaac. (1745) *Logick*. London: Longman, Shewell & Blackstone.
- Weyl, Hermann. (1940) 'The mathematical way of thinking.' *Science, New Series* 92, 2394: 437-446.
- Whitehead, Alfred North. (1920) *The concept of nature*. The Tarner Lectures delivered in Trinity College, November 1919. <http://www.qutenberg.org>.
- Whitehead, Alfred North. (1985) *Process and Reality: An Essay in Cosmology*. Gilford Lectures delivered in the University of Edinburgh during the session 1927-28. NY: The Free Press.
- Wiener, Philip P. & Frederick H. Young. (Eds.) (1952) *Studies in the Philosophy of Charles Sanders Peirce: First Series*. Cambridge, MA: Harvard University Press.
- Wilczek, Frank. (2008) *The Lightness of Being: Mass, Ether and the Unification of Forces*. NY: Basic Books.
- Williams, Bernard. (1972) *Morality: An Introduction to Ethics*, Cambridge: Cambridge University Press.
- Wisnovsky, Robert. (2004) 'Avicenna and the Avicennian Tradition.' Chapter 6, pp. 92 = 136 in *The Cambridge Companion to Arabic Philosophy* Edited by Peter Adamson & Richard C. Taylor. Cambridge: Cambridge University Press.
- Wright, Judith. 'Eve to her daughters.' In Judith Wright. (1971, 1994) *Collected Poems 1942-1985*. Sydney: Angus & Robertson.
- Yu, Chong Ho. (1994) 'Abduction deduction induction.' Annual Meeting of American Educational Research Association.
- Zalamea, Fernando. (2010) *Peirce's Logic of Continuity*. Boston, MA: Docent Press.

**Web sites:**

Figure 15 Castellani, Brian. 'Map of the complexity sciences.'

[http://scimaps.org/mapdetail/map\\_of\\_complexity\\_sc\\_154](http://scimaps.org/mapdetail/map_of_complexity_sc_154).

Figure 22: Mitchell, Bill. 'Evolution of real wages.'

<http://bilbo.economicoutlook.net/blog/?p=21486>

Figure 23: Who got the gains from growth in income?

<http://www.smh.com.au/federal-politics/political-news/countrys-rich-have-lions-share-of-income-growth-20131009-2v8q2.html>

Figure 24: Poverty Rates and Poverty Gaps – late 2000s – Advanced Economies (Source: OECD)

<http://www.oecd-ilibrary.org/sites/factbook-2010-en/11/02/02/index.html?itemId=/content/chapter/factbook-2010-89-en>

Thomas Aquinas *Summa Theologicae*

<https://thelycaem.wordpress.com/2012/11/11/thomas-aquinas-the-fourth-way/>

Assimilation and Accommodation (Jean Piaget).

<http://www.learningandteaching.info/learning/assimacc.htm>.

Big Bang.

<http://www.space.com/52-the-expanding-universe-from-the-big-bang-to-today.html>

Biosemiotics.

<http://www.biosemiotics.org/>.

<http://www.psych.uw.edu.pl/lasc/Favareau.pdf>.

Categorical Imperative – Kant.

[www.public.iastate.edu/~jkupfer/CIGUIDE.html](http://www.public.iastate.edu/~jkupfer/CIGUIDE.html)

Continuity and infinitesimals.

<http://plato.stanford.edu/entries/continuity/>.

Dark Energy.

[csirouniverseblog.com/tag/nobel-prize-in-physics](http://csirouniverseblog.com/tag/nobel-prize-in-physics)

[hubblesite.org/hubble\\_discoveries/dark\\_energy/de-what\\_is\\_dark\\_energy.php](http://hubblesite.org/hubble_discoveries/dark_energy/de-what_is_dark_energy.php)

[astro.cornell.edu/academics/courses/astro201/vt.htm](http://astro.cornell.edu/academics/courses/astro201/vt.htm)

Gödel's Incompleteness Theorems.

[history.mcs.st-andrews.ac.uk/Biographies/Godel.html](http://history.mcs.st-andrews.ac.uk/Biographies/Godel.html)

Integrity

<http://plato.stanford.edu/entries/integrity/>

Nominalism.

<http://plato.stanford.edu/entries/nominalism-metaphysics/>.

Non-Euclidean geometry - history.

<http://noneuclidean.tripod.com/history.html>.

Peirce biography (Esposito).

<http://psychology.irank.org/pages/2123/Charles-Sanders-Peirce.html>.

Peirce (in his own words).

<http://www.commens.org/dictionary>.

Peirce: The *Collected Papers of Charles Sanders Peirce*. Eds. Charles Hartshorne & Paul Weiss (1931-1958)

<http://www.textlog.de/philosophie.html>.

Process Physics (Flinders University).

[flinders.edu.au/science\\_engineering/caps/our-school/staff-postgrads/info/cahill-r/process-physics](http://flinders.edu.au/science_engineering/caps/our-school/staff-postgrads/info/cahill-r/process-physics).

Rhetoric.

[https://web.cn.edu/kwheeler/resource\\_rhet.html](https://web.cn.edu/kwheeler/resource_rhet.html)

*The Forest of Rhetoric* <http://humanities.byu.edu/rhetoric/silva.htm>

Semiology (Ferdinand de Saussure).

[http://www.academia.edu/4771675/The\\_difference\\_between\\_semiotics\\_and\\_semiology](http://www.academia.edu/4771675/The_difference_between_semiotics_and_semiology).

Semiotics (Charles Morris).

[3.nd.edu/~ehalton/Morrisbio.htm](http://3.nd.edu/~ehalton/Morrisbio.htm)

Spin.

<http://blog.oup.com/2011/09/spin>

Sydney Opera House.

[http://home.vicnet.net.au/~aholgate/structdes/taisd\\_anchor.html](http://home.vicnet.net.au/~aholgate/structdes/taisd_anchor.html).

<http://www.sydneycloseup.com/sydney-opera-house-facts.html>.

<http://www.twf.org.au/research/mikami.html>.

<http://www.twf.org.au/research/mikami.html>.

Wikipedia.

[http://en.wikipedia.org/wiki/Main\\_Page](http://en.wikipedia.org/wiki/Main_Page)