The Development of C.S. Peirce's Evolutionary Theory

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I hereby declare and assure that I, Michele D'Asaro, have drafted this thesis independently, that no other sources and/or means other than those mentioned have been used and that the passages of which the text content or meaning originates in other works - including electronic media - have been identified and the sources clearly stated.

Nijmegen, 7 May 2021

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Precis

In the years 1891-1893, Charles Sanders Peirce published a series of articles in *The Monist*, known as the *Monist* series, where he tried to offer an evolutionary metaphysics. Combining logic, thermodynamics, evolutionary biology, cosmology and theology, Peirce tried to account for natural laws as evolving 'habits' of nature, by means of a complex theory of evolution. Such a highly speculative metaphysical program has often been labeled as the black sheep of Peirce's work. In his master's thesis, Michele D'Asaro tries to reconstruct the development of the evolutionary theory found in the *Monist* series. In order to do so, he examines the earlier published and unpublished metaphysical writings and puts the later theory in the context of Peirce's evolving thought.

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1 Introduction

> Now 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. (CP 6.13)[1]

This passage includes several intriguing concepts, part of a metaphysical program carried out by Charles Sander Peirce in his later years. This program was outlined in a series of five papers written between 1890 and 1893 for *The Monist* journal, and therefore known as the *Monist* series. It is also the result of a long-standing engagement of Peirce's most speculative side with metaphysics, which had started long before the *Monist* series.

The system that he built was meant to give a general account of the cosmos, based on the results of scientific inquiry. The general picture that emerges is that of an evolving universe, which Peirce attempted to investigate by means of an all-pervasive evolutionary theory that combined, however, elements from very different ideas of evolution. Although it was inspired by Charles Darwin, Peirce's evolutionary thought is not just an extension from the biological realm to all that is real, rather the opposite: it is based on a principle that originates in logic and epistemology, but eventually it involves science, religion and ethics. Its objective is to account for how things, ideas and natural laws came into being and to predict where they are going.

The evolutionary theory of the *Monist* series aims to offer a complete description of a self-affirming and self-perpetuating process, which contains elements of different existing views on evolution as well as novelties. As we will see in detail, Peirce envisioned each being and process as undergoing continuous evolution, from the mind to culture, from species to the laws of nature themselves, and even beyond the existent. He depicted, as it were, a world of evolving quasi-Platonic forms.

As Christopher Hookway notices, one imagines that the presumably stereotyped thought of a logician and semiotician like Peirce does not have space for a

[1] References of this type are to volume and paragraphs of the "Collected Papers of Charles Sanders Peirce," following the standard notation. Thus '1.211' refers to volume 1 paragraph number 211. Similarly, we will refer to the "Writings of Charles Sanders Peirce: A Chronological edition," in the abbreviated form W, followed by the number of the volume and page.

speculative evolutionary metaphysics. In fact, Hookway observes, "for some early commentators, the whole idea of a Peircean system of metaphysics was a puzzling embarrassment … such metaphysical speculations seemed anomalous" (Hookway 2).

But while ignored by his contemporaries, Peirce's metaphysical system has been analyzed by later scholars, who did justice to its merits and recognized its central place is Peirce's thought (Hausman 140-193; Murphey 291-408; Esposito, *Evolutionary Metaphysics*; Corrington). Today, we can appreciate its nuances, the interlacing of its elements and the way Peirce pioneered some ideas that were to enter the scientific discourse decades later (Ketner 315-417). Still, various puzzles remain about the precise standing and coherence of certain radical key concepts such as the existence of objective chance or "evolutionary love," key concepts for which, in my view, Peirce at times argued with great precision and at others by means of bizarre arguments and uncareful associations.

Scholars have in fact put three main questions to Peirce's metaphysics: they wish to clarify some key concepts, verify the coherence of the system, and find the motivations behind it. With respect to all three questions, it is particularly useful to look at the development of Peirce's own thought, so as to retrace the steps through which his metaphysical system evolved towards its final shape in the *Monist* series.

But while attention has been paid to the overall architecture of the system, its evolutionary mechanisms have been neglected. Hookway, for example, has realized the importance of an evolutionary cosmology in Peirce's system; he has shown how his whole metaphysical system is built upon the attempt to answer the question "why are there natural laws?" According to Peirce, most metaphysical systems committed naturalistic fallacies by explaining natural laws through some ultimate principles. Both arguments for design and Laplace's reduction to mechanical laws committed that fallacy. Hookway believes that Peirce found with his evolutionary theory a way out of that impasse, but in his commentary he omitted to clarify "the details of the cosmology (that) will then call for serious scientific investigation" (Hookway 22).

The evolutionary theory of the *Monist* series is complex, full of original ideas and unusual logical arguments as well as teeming with apparent inconsistencies and unexpected moralizing. What renders matters more elusive yet is that while many of the *Monist* ideas are presented as novel, Peirce had developed several of them as far back as 15 years earlier, when he started to doubt the axiom that "everything

has a cause" in papers titled "The Order of Nature" (1878) and "Design and Chance" (1884). He there attempted first to make room for theories of evolution and subsequently to construct his own evolutionism, a ‘work in progress’ that went from 1878 to 1893.

The primary scope of this thesis is that of clarifying Peirce’s theory of evolution through the analysis of five stages of its development, following the exegetical approach of Hookway, but focusing on those very aspects that he neglected. It will take into account the just-mentioned older papers ("The Order of Nature" and "Design and Chance"), two intermediate works that should have been part of never finished books ("One, Two, Three" and "A Guess at the Riddle," 1886-88) and the final outline of the system in the *Monist* series (1891-93). I will trace some of the most cryptic arguments and concepts back to their origins with the aim of explaining them through the evolution of Peirce’s thought, and show how eventually he radicalized on some topics.

It will be shown that although Peirce aimed at a coherent, scientific formulation of an explanatory theory of nature, he never solved certain problems that were rooted in his system from the very beginning.

2 Peirce's radical system in the *Monist* series

In the five papers published in the *Monist*, Peirce developed different theories that together define his metaphysics. Many of his arguments are constructed to disprove other views, especially those derived from mechanistic doctrines, and several are proposed as novel. Some scholars like Hartshorne and more recently Atkin have claimed that at the core of the project lays the goal of presenting a theory of the evolution of the universe (Hartshorne; Atkin 246-250). In this section I will outline this evolutionary account and highlight some of its difficulties and puzzles.

Peirce aims at a complete explanation of the cosmos, including all its constituents. This sometimes leads to confusing situations where he seems to be talking simultaneously about the evolution of laws and of natural classes as if they were the same thing. In fact, for him, they belonged to the same realm.[2] We must therefore, or so I would suggest, read Peirce's notion of natural law in a broad sense, as covering both its objects (natural classes) and its relations (which is what we more commonly understand as 'natural law'). The terms 'cosmos' or 'universe' will henceforth refer to the whole ensemble of natural laws and natural classes.

The general idea presented in the *Monist* series is that the universe has changed from a state of *total* indetermination in an infinitely distant past to our own days in which it is mostly governed by natural laws and rarely by chance; it will tend towards an infinitely distant future state where it will be in a totally determined, 'crystallized' state. The way in which this process unfolds is described by an evolutionary theory of the natural laws, a kind of law of all laws, which explains how natural laws first came about and how they change in time. Peirce described his overall theory in a nutshell when writing to one of his former students around the time of the publication of the first article of the *Monist* series (italics mine):

> I may mention that my chief avocation in the last *ten years* has been to develop my cosmology. This theory is that the evolution of the world [. . .]

[2] Peirce was at first introduced to the problem of evolution by Louis Agassiz, who was one of his teachers. Already in 1857, in defending the objective reality of natural classes Peirce wrote: "I am here influenced by the Essay on Classification (1857) of L. Agassiz, whose pupil I was for a few months" (CP 1.205). Agassiz was a fixist and interested in classes and taxonomies. But how did Peirce become interested in the problem of evolution of laws? Any regularity is, for Peirce, of the form "every A is B," which is exactly the core operation of classification. So a class is also a natural law, from a logical point of view, although we usually think of it as the object of the law, and the law itself as the relation among objects. Peirce thus referred to the evolution of natural laws and regularities, and rarely about that of species.

> proceeds from one state of things in the infinite past, to a different state of things in the infinite future. The state of things in the infinite past is chaos, tohu bohu, the nothingness of which consists in the total absence of regularity. The state of things in the infinite future is death, the nothingness of which consists in the complete triumph of law and absence of all spontaneity. Between these, we have on our side a state of things in which there is some absolute spontaneity counter to all law, and some degree of conformity to law, which is constantly on the increase owing to the growth of *habit*. The tendency to form habits or tendency to generalize, is something which grows by its own action, by the *habit of taking habits* itself growing. Its first germs arose from *pure chance*. There were slight tendencies to obey rules that had been followed, and these tendencies were rules which were more and more obeyed by their own action. (CP 8.317)

Peirce imagined that if regularity can emerge out of irregularity, he could *explain* the origin of laws and find a way out of the naturalistic fallacy of explaining natural laws through another natural principle -- or by divine design. His general claim is that laws evolve and that we are confronted with real 'chance' and with a 'law of habit' that is opposed to it. However, how that happens is far from being clearly explained. In the letter just quoted, Peirce used without much explanation crucial concepts such as 'chance', 'habit', and 'habit of taking habits', concepts that at the time were already central to his system on which, as he tells his correspondent, he had been working for "the last ten years."

In this system, he called the way the universe evolves when chance is dominant 'tychastic evolution' (from the Greek word *tychè*, for a kind of chance more similar to luck (Lüthy and Palmerino, 37)), while 'anancastic evolution' (from the Greek word *anankè*, something necessary or compulsive) was the word for conditions when change is determined by necessity or the force of habit. Based on the quote above, and the terms now added, one might presume that Peirce developed a theory of evolution based on the interplay of analytic or scientific concepts. But things are more unusual than that. Peirce's system is also strongly influenced by his religious sentiment, as in the previous quote from the letter can be noted in the use of the biblical expression "tohu-bohu."[3] Indeed he embraced another evolutionary path under the agency of creative, Christian Love. This third mode, 'agapastic evolution' (from agapè, the Greek word for a type of love), was the cherished product of the more mystical side of Peirce: "Philosophy, when just

[3] It is a distortion of the expression "tohu wa-bohu" which indicates in Genesis 1:2 the state of the earth right before light was created.

escaping from its golden pupaskin, mythology, proclaimed the great evolutionary agency of the universe to be Love" (CP 6.287).

The Love Peirce referred to is something he invited the reader to feel and to reason upon, but it is far from being clearly explained. The goal of the next section is to explain what ‘chance’, ‘habits’ and ‘Love’ stand for in Peirce’s theory of evolution.

2.1 Chance, habit, agapè

There are three key concepts in Peirce’s theory of evolution. There is the idea that absolute chance is a real force operative in the universe, which Peirce called ‘tychism’. It follows the idea that every law of nature (which, as we have heard, comprehends both the objects and their relations) is not so much a strict law but a plastic habit of nature, and it is the product of a process he called ‘habit-taking’. Last, there is his idea that a certain kind of love is a real force operative in the universe. As mentioned, he called this love ‘agapè’ and the idea that it is a fundamental force ‘agapism’.

Peirce arrived at tychism from two directions. One the one hand, he invited the reader to consider absolute chance (that is chance possessing an ontological status, as opposed to the notion of chance as ignorance) as a solution to the problem of origin of the universe. Every specific law, as well as law itself as a general phenomenon, cannot be circularly explained by itself. Peirce suggested that chance offers the explanation: all regularities evolved from it, and because of it they continue to evolve. Chance in this sense is needed as a fundamental cosmological agent.

On the other hand, the whole second paper of the *Monist* series is devoted to debunking necessitarianism, the doctrine of mechanical determinism, which rejects absolute chance. Peirce offered tychism as a better theoretical framework for a theory of reality: absolute chance is embraced by refusing determinism. To support his view, he argued for chance as a way to account for the prevalence of growth and variety, which he felt were incompatible with the law of conservation of energy implied by necessitarianism, and for the similarly incompatible phenomena of feeling, free will and consciousness.

The case for tychism is important, because to Peirce’s mind, the idea of a ‘true’ evolution needs ‘real’ chance. Once absolute chance is introduced, cosmic evolution can take place. As Atkin says, tychism "is simply the claim that genuine chance occurrences have a profound impact upon the way the universe has

evolved and will continue to evolve" (Atkin 247). Peirce felt there was a similarity of this notion with Darwin's core idea of variation and Epicurus' swerve (italics mine):

> By thus admitting pure spontaneity or life as a character of the universe, acting always and everywhere though restrained within narrow bounds by law, producing infinitesimal departures from law continually, and great ones with infinite infrequency, I account for all the variety and diversity of the universe, in the only sense in which the really sui generis and new can be said to be accounted for. (CP 6.59)

Before we may turn to 'habit', there is another concept of Peirce's metaphysics, 'synechism', we must mention. 'Synechism' does not designate a core agent of evolution, but is important to the point that Hausman and Esposito placed it at the centre of Peirce's thought: it is the idea that everything that exists is continuous (Hausman 14-17; Esposito, "Synechism"). That Peirce's arguments in favor of synechism are hard to summarize has to do with the definition of continuity he constructed in opposition to Kant and Cantor (Locke). From its descriptions in the third and fourth papers of the *Monist* series, three key features of synechism may be identified: inexactitude (the sum of the angles of a triangle is never 180, rather is in an interval, no matter how abstract the triangle is, as space is continuous and so is an angle), anti-discreteness (discrete things are such only in appearance, even things such as being and not being), and pervasiveness (synechism is not an isolated phenomena but rather a principle of the universe). Synechism was important to Peirce's evolutionary theory because it allowed for a smooth development of the cosmos. It is because of synechism that tychism does not generate isolated chance events, rather it 'swerves' here and there the continuum of reality. Because of synechism, Peirce also holds a gradualistic view of opposites, so that the universe unfolds in a continuum between law and chance. The same also holds for mind and matter, which has provided ammunition to those who take Peirce to have been an idealist. In "The Law of Mind" Peirce wrote:

> I have begun by showing that tychism must give birth to an evolutionary cosmology, in which all the regularities of nature and of mind are regarded as products of growth, and to a Schelling-fashioned idealism which holds matter to be mere specialised and partially deadened mind. (CP 6.102)

As mentioned, Peirce saw laws of nature as developed habits. But what are they if they are neither chance nor laws? And how did they develop? Habit is best

understood, in my view, as the logical middle ground between chance and law. Whoever finds the existence of a middle ground between opposites counterintuitive should be reminded of the continuist thesis of synechism. Peirce seems to be suggesting that whereas chance generates diversity in existence (because, by definition, an event governed by chance may bring into existence something that does not follow from the status quo of existence), habit changes the universe by generalizing, that is, by bringing into existence something that follows from what is already existing. Chance and habit are the only two forces at work when one looks at the cosmos as changing because of diversification, growth and regularity:

> In short, diversification is the vestige of chance-spontaneity; and wherever diversity is increasing, there chance must be operative. On the other hand, wherever uniformity is increasing, habit must be operative. (CP 6.267)

We recall that Peirce wanted to find a way out of the naturalistic fallacy to describe the origin of habits and therefore of natural laws. He therefore had to find a way of justifying how habits could evolve from chance. The principle he came up with is that of 'habit-taking', a kind of intermediate step between chance and habit. While mentioned in the *Monist* series, the mechanism by which this occurs is, however, left largely unexplained.

Taken together, tychism and synechism result in the picture of a universe that is in continuous change under the force of habit and chance. But where is this change directed towards? Peirce surely falls in the category of evolutionary thinkers who aimed to offer us a solid orthogenesis, that is to say, a directed evolution. In order to achieve this, he introduced in the last paper of the *Monist* series, the force of agapè.

Agapè directs the change of the world in a way that is fundamentally different from that of absolute chance (which, for Peirce, also enforces a direction, just not the 'right' one as we will see). Agapè, as in the Gospels, is a form of love that is neither directed to oneself nor to the entire universe, but it is of the 'love thy neighbor' kind -- the kind that was advocated by Jesus as the charitable love for the lowly and miserable, and hence fundamentally different from *eros* or *philia*. This element is the most mystical of Peirce's system, especially when we consider that he came to the conclusion that matter is partially deadened mind and that therefore there is some agapè directing the cosmic change also where no humans are involved:

> Everybody can see that the statement of St. John is the formula of an evolutionary philosophy, which teaches that growth comes only from love, from—I will not say self-sacrifice, but from the ardent impulse to fulfil another's highest impulse. [...] and as for the cosmos, only so far as it yet is mind, and so has life, is it capable of further evolution. (CP 6.289)

Chance, habit and agapè are the key propellants of Peirce's evolutionary theory. The ways they operate to bring change in the universe are more properly the engines of that theory.

2.2 Evolutionary theory

Peirce wanted to explain cosmic evolution as an interplay of chance, habit and agapè. For the purpose of this thesis, it would be sufficient to consider synechism as a general idea regarding not the evolutionary process itself but rather the substratum, the object undergoing change. Under the synechistic hypothesis the changing universe is a continuous fabric, a "continuity of changeable qualities" (CP 6.132). Cosmic evolution, according to Peirce, begins from a state of pure chance, since law cannot explain itself nor originate from itself. In the fourth paper of the *Monist* series, Peirce wrote:

> I long ago showed that real existence, or thing-ness, consists in regularities. So, that primeval chaos in which there was no regularity was mere nothing, from a physical aspect. (CP 6.265)

With that "long ago" Peirce was referring, as we shall see, to his previous work on chance and regularity. Chance is *real* because we must suppose it as the origin of law, but no chance event per se is *existent*: a universe of chance, without regularity, is not persistent, where persistence for Peirce is the key property defining the category of existence. Peirce thought that out of this chaos, regularity eventually emerged as one of the outcomes of the twists and turns of chance:

> At any rate, it is clear that nothing but a principle of habit, itself due to the growth by habit of an infinitesimal chance tendency toward habit-taking, is the only bridge that can span the chasm between the chance medley of chaos and the cosmos of order and law. (CP 6.262)

Habit-taking is thus the beginning of all habits, which in turn establish themselves as laws. In other words, it is this relation between chance and habit that triggers cosmic evolution. From the moment that this interaction initiates, evolution is

carried forward by the interaction of chance (as variation), habit (as plastic laws), and agapè.

In the first paper of the *Monist* series, Peirce sketched the modes of evolution, but it is only in the last paper that the full layout is revealed:

> Three modes of evolution have thus been brought before us; evolution by fortuitous variation, evolution by mechanical necessity, and evolution by creative love. We may term them tychastic evolution, or tychasm, anancastic evolution, or anancasm, and agapastic evolution, or agapasm. [...] All three modes of evolution are composed of the same general elements. Agapasm exhibits them the most clearly. (CP 6.302-3)

Where change is brought in by absolute chance, there is tychastic evolution. This idea is apparently in conflict with the idea that a universe of pure chance does not properly exist. But Peirce understood chance as bringing forth real possibilities, that might become properly existing items through a process of habit-taking similar to that of natural selection. Tychastic evolution is evidently possible only where there are already some existing regularities, and as we shall see, a large number of them. This mode of evolution proceeds mostly by minute variations and slowly changes the state of things, and Peirce saw it as a generalization of Darwinism from the biological to the cosmic realm:

> This Darwinian principle is plainly capable of great generalization. Wherever there are large numbers of objects, having a tendency to retain certain characters unaltered, this tendency, however, not being absolute but giving room for chance variations, then, if the amount of variation is absolutely limited in certain directions by the destruction of everything which reaches those limits, there will be a gradual tendency to change in directions of departure from them. (CP 6.15)

Peirce was convinced that laws of nature every now and then ‘swerve’ out of their strictness, and that eventually new habits can be established. He further believed that such new habits develop in a directed way. This direction is defined by the constraints, or "limits," of existence, what he saw as a generalization of the principle of Darwinian selection into the realm of ontology. He explained what he meant by limits with respect to ontology in previous works, as we shall see in the following chapters. Peirce saw this mode of evolution loaded with violence and inequality:

> Only, in the tychastic evolution progress is solely owing to the distribution of the napkin-hidden talent of the rejected servant among those not rejected [...]. It makes the felicity of the lambs just the damnation of the goats, transposed to the other side of the equation. In genuine agapasm, on the other hand, advance takes place by virtue of a positive sympathy among the created springing from continuity of mind. (CP 6.304)

Such a condemnation of Darwinism, in such complicated words, is a characteristic trait of the Peirce of the *Monist* series. It will be our task to understand what he wanted to say and how he got there, as we shall see starting his project years before with completely different views on Darwinism.

Evolution by the force of love, agapastic evolution, also has a direction for Peirce, but in a more explicit way. Peirce referred to it as a "developmental teleology" moving the universe towards the *summum bonum*, by virtue of love that binds the developed to the underdeveloped. Loosely resembling parental love for an animal towards the offspring, or sympathy among individuals, agapastic evolution is applicable also to the development of ideas, the idea being underdeveloped and 'raised' by the thinker. Peirce oddily refers to Lamarckian evolution as similar to agapastic evolution when applied to biology. Although there is no place for 'love' in Lamarck's theory, the Lamarckian model fits Peirce's idea because he saw that change under agapastic conditions is brought about by active striving and effort, or more in general by final causes, as opposed to the process of natural selection.

The third process is anancastic evolution, where change is powered by necessity, by the force of habit upon habit:

> Anancastic evolution advances by successive strides with pauses between. [...] The character which distinguishes it from agapasm is its purposelessness. (CP 6.312)

It is not deterministic only insofar as habits are also subject to chance, but it is not directed to an end. Peirce saw the evolutionary theory of catastrophism as anancasm applied to geology and biology, but again he generalized the idea to the whole universe.

Through this puzzling theory Peirce attempted to describe the evolution of the cosmos from its origins in a state of chaos (which is the creator of all that exists), to its end, in a state of total determination (which is at the same time the *telos* of a pervasive agapè), but was he really successful? The peculiar picture that the reader

is presented with is that of three fundamental forces at work, each contributing to change the universe.

2.3 Some puzzles

Upon a first view, the theory of evolution as presented in the *Monist* series looks dense and sometimes confused. The density is due to the fact that Peirce wanted to explain many things at once with his theory, namely the (logical) origin of the universe, how it is currently still evolving, and where it is developing towards. As mentioned before, Peirce was vague when describing the process of habit-taking. An additional source of confusion also has to do with his concept of chance, whose description draws from several semantic areas.

Although Peirce offered an analytical definition of chance as "fortuitous variation" and as being "uncaused," there are many passages in which chance is proposed as a synonym of "originality" and "spontaneity" and others in which it is equated to "feeling." On the one hand, Peirce aimed to provide a logical explanation for the causal origin of the universe: he needed something uncaused (in the Aristotelian sense) to explain law itself. On the other hand, he posited that habits are in continuous change because of small swerves in the fabric of reality, an idea that seems to draw both on Epicurus' swerve of atoms and on Darwinian variation. On the other hand, he was also tempted to explain consciousness through chance, describing the human body as the place where the swerves are highly amplified, with consciousness emerging as a consequence -- which is an idea that may originally have caused Epicurus' notion of the swerve in the first place. In other words, absolute chance is asked to fulfill a multitude of tasks, and that inevitably leads to ambiguities. In fact, sometimes, Peirce seems to regard chance a fundamental force, as a fundamental explanation or even as the creator of the universe. At other times he depicts it as a subordinate force, with the swerves acting upon the more fundamental fabric of natural laws. At still other times it seems even that chance is itself also a kind of law, or "chance in the form of a spontaneity which is to some degree regular" (CP 6.63). Peirce is also ambiguous, if not outright contradictory, in explaining the connection between chance and habits. Sometimes it seems that both result always and immediately from absolute chance, like the laws of gas in thermodynamics:

> Physicists hold that the particles of gases are moving about irregularly, substantially as if by real chance [...]. Here, then, is in substance the very situation supposed. (CP 6.47)

But Peirce also maintains the following:

> I make use of chance chiefly to make room for a principle of generalization, or tendency to form habits, which I hold has produced all regularities. (CP 6.59)

The latter quote suggests that absolute chance is the cause of the principle of habit-taking, which in turn is the cause of all regularities. But if the notion of absolute chance is ambiguous, so too is that of tychastic evolution. With respect to the latter, the main issue is: how is it possible that tychastic evolution, which is powered by chance, has a direction? And given that it has a direction, why can't it be the only power that directs evolution? The reader suspects that Peirce was indeed tempted to develop a theory of evolution by absolute chance, but in the end did not accept it on moral grounds and went on to develop the idea of agapè in order to alleviate the tension from which his theory suffered.

In fact, agapism is one of the most obscure concepts of the *Monist* series. While it is not my aim here to dwell much on this idea, which has already been subject to comments (Corrington 192-204; Pape; Ventimiglia 121-144), a close analysis of the development of Peirce's system will show how he progressively transferred some vitalist, or possibly religious, connotations from his concept of absolute chance to that of agapè. The mystical terminology with which Peirce wrote the last paper of the *Monist* series, "Evolutionary Love," was already found in previous writings, and can be traced back to earlier roots. The same paper voices strong criticism of social Darwinism and its derivatives, which Peirce called the "Gospel of Greed," a tendency found in humanity to embrace mercilessness as a principle of development. We will show that Peirce moved from accepting a form of universal Darwinism as the sole mode of evolution to a form of morally loaded evolution through agapism.

Peirce strove to develop a 'scientific metaphysics', a grand theory of evolution that should be able to explain particular phenomena. One would expect him to try to verify his theory by applying it to specific cases that are already investigated by evolutionary theories, such as biology, but he did not do that. Instead he applied it to cosmology, to the development of thought, the evolution of ideas, of science, and of the laws of history. The most worked-out domain is cosmology. Peirce depicted the cosmos as undergoing a process of 'solidification', from chaos to rigid determinacy. But where did this idea originate, and how did this visionary description match with the mechanisms of evolution as explained above?

Here, we must point out that Peirce had a tendency to proceed by means of 'triads' of concepts (such as chance, law, and habit-taking; or tychastic, anancastic, and agapastic; and so on). Sometimes his use of those triads leads us straight into ambiguities and analogical reasoning which Peirce employed rather carelessly. Take the following example:

> In psychology Feeling is First, Sense of reaction Second, General conception Third, or mediation. In biology, the idea of arbitrary sporting is First, heredity is Second, the process whereby the accidental characters become fixed is Third. Chance is First, Law is Second, the tendency to take habits is Third. Mind is First, Matter is Second, Evolution is Third. (CP 6.32)

This Peircean 'habit' of dividing everything into triads manifested itself before the *Monist* series, but was not there before he started to develop his evolutionary theory. A careful look at the stages in the development of his theory can show how his faithfulness to triadic explanations led Peirce to confuse and merge some of his concepts and their properties.

In the following chapters, I will look into the papers that preceded the *Monist* series and follow the themes and issues that I have so far outlined through their development. I will focus on the concepts of chance, habit and habit-taking, on the models of cosmogony and on the supposed direction(s) of evolution. I will thereafter return to the *Monist* series and shed new light on the puzzles of Peirce's evolutionary theory and the possible motivations that underlie it.

3 Peirce's Doubts in "The Order of Nature"

> What sort of conception we ought to have of the universe, how to think of the ensemble of things, is a fundamental problem in the theory of reasoning. (CP 6.397)

This vast 'problem' might summarize how and why Peirce started to think of metaphysics: it was to tackle the 'problem' of finding a holistic way of looking at the universe -- a problem that initially was to upgrade and empower his logic.

The quote above is taken from "The Order of Nature," which was the fifth paper of a series published in *Popular Science Monthly*.[4] In those papers, the driving question is about the nature of probabilistic inference, and Peirce was looking in particular for the conditions that render probabilistic inference possible and 'useful'. In "The Order of Nature," this question takes the following form: are there causes for regularity in the world?

In particular, Peirce there examines the possibility of a God as creator of regularities ('regularity' being for Peirce an umbrella term for 'law of nature' and 'classes' of things, as already mentioned). In this sense he was ready to account not only for a strictly religious notion of God, but also for all sorts of superior powers and active 'first principles'. Peirce criticized Laplace, who thought he held an atheistic theory, while in the end simply shifting the problem of what is universal and primordial from a God of religion to the laws of mechanics. In the year right before writing "The Order of Nature," Peirce had already argued that also the nominalists such as Hume, Mill, and Wright had simply placed the uniformity of nature as an ultimate, universal principle instead of God (Wiener 327).

To Peirce, the core of the investigation in which he engaged was to find "any general characteristic of the universe, any mannerism in the ways of Nature, any law anywhere applicable and universally valid" (CP 6.397). The result of his search (which could also be that there was no such general law) would constitute the cornerstone of the general philosophy of the universe that Peirce was looking for to account for his theory of probabilistic inference.

[4] The series may be considered the output of Peirce's metaphysical speculations after his encounters with the Cambridge Metaphysical Club (W2:xxix-xxxvii).

3.1 The chance world of a polyp

If there is no general character of the universe, one reason might be that *everything* happens by chance, that is "by accident, and no general proposition could ever be established" (CP 6.399). Peirce proffered two arguments to refute this hypothesis. First, a fully chancy world (which logically is a system in which all objects carry all possible relations to all others) was logically intelligible and systematic -- the latter being the opposite of what we usually refer to when we speak of chancy events. The second argument was psychological: in a chance world there would be nothing surprising, and nothing would have important consequences. In such a world, why generate any memory or have a mind? Since we do not experience the world as chancy, and since otherwise it would be hard to imagine why there is memory, Peirce concludes that the world is not a chaos of chance.

In the next step though, Peirce appealed to his common-sensism and offered a hypothesis that, in its essence, he did not change throughout his subsequent investigations: the world as it appears now is not a pure chance-medley, but could it be at least *partially* a chance-medley? In "The Order of Nature," Peirce did not specify yet in which way he intended the word "partially": is it that chance is restricted in some dimensions or categories, such as operating only at small scales of space and time? Or is it that chance is present rarely? This blurriness was to last together with the core hypothesis throughout the metaphysical studies that followed, and it was to cause no few problems.

However, the acceptance of this weakened chance hypothesis was the starting point that might have been the force behind Peirce's decision to embrace evolutionism. In "The Order of Nature," his line of argumentation follows from an additional weakening of the chance hypothesis: it is imaginable that out there, the world is even more lawful than it appears to us. It might be that certain laws are somehow not interesting to our senses and we do not perceive them. In a strange phenomenological thought experiment, Peirce imagined that the world must be closer to a chance medley when experienced by a polyp, being a 'lower' animal. Such an imperfect being, "an animal at the very vanishing-point of intelligence," cannot capture all the causality that surrounds it (CP 6.406). Peirce concluded that regularities are more interesting to an animal the higher it is in this invisible *scala naturae*. A new question arises here: if the world becomes more and more regular for higher beings, that would imply that its substratum must be *completely* determined, although only a perfect being would experience it as such.

In this first metaphysical layout, Peirce performed quite some ‘jumps’: he seemed to propose that a kind of real chance operates in the universe, and to be on his way towards exploration of the psychological and ethical consequences of this insight. But then he mingled this idea with --or shifted back to-- the traditional notion of chance as ignorance. The polyp, for one, sees chance wherein fact there is law. Peirce appears to be unperturbed by this tension. At this stage in his thought process, his arguments aimed primarily to disprove the general conceptions of God as an anthropomorphous designer and with human-like intentions; they were not yet much concerned with the ontological status of chance. Chance in "The Order of Nature" might be seen as lurking at the borders of perception, as a kind of blurring agent operating on the Kantian fundamental categories – the general system to which Peirce was still attached at this stage of his life (Atkin 227-228).

Peirce maintained that it is definitely because the world *appears* as a partial chance medley that it is meaningful to carry out inferences in the form of inductions helped by statistics. This was, for Peirce, the way that we discover regularities in nature and bring them together in what we commonly refer to as natural laws. The principle that for every discovered regularity a reason or law can always be found, reflects the broader principle that "every event must have a cause" (CP 6.414).

3.2 Every cloud is actually a clock, but how do we see that?

In 1878, Peirce was convinced of a certain kind of determinism, one that perhaps leaves room for irregularities because the laws that are yet to be discovered are not necessarily the actual laws of nature, but just approximations, and the chance events are seen as some apparent ‘exceptions’ to the law, while at the same time they must have a hitherto unknown cause. Indeed Peirce, guided as much by logic as by his experience as a scientist, affirmed that "every empirical rule has an exception" (CP 6.416). We must therefore distinguish between what Peirce called ‘empirical rules’ and ‘natural laws’, the first being the products of the processes of inference, the latter the real causes of events. He viewed natural laws as completely determined. In the words used by Popper almost a century later, we might say that at this stage in his thinking, Peirce held that "all clouds are clocks" (where by cloud is intended some indeterministic entity, and clock a fully deterministic one), and while a polyp sees only very ‘cloudy’ clouds, we humans see somewhat more ‘regular’ clouds (Popper).

However, if we follow through with his line of epistemological arguments, we end up with Peirce hitting upon a rudimentary version of the well-known ‘frame

problem' of contemporary philosophy of AI and of mind: if regularities have exceptions, and moreover if humans are supposed to be clueless when looking for them, how on earth do we discover those regularities in the first place, and, in particular, how do some of them appear to be so strikingly uniform and universally valid? Peirce was talking about the very basic regularities of space and time, to which he also added force. Inductions based on those regularities, he suggested, always seemed to be infallible and universal (CP 6.416). Are some regularities inferred, are we just a better-equipped polyp, or are they the real laws of nature, and are we somehow hardwired to see them?

Confronted with this issue, Peirce turned to the problem of innate ideas, as he rejected the hypothesis that the fundamental categories (that is, the perceived regularities of space, time and force) are reached by 'mere accident'. But he had a strange definition of innateness of an idea: it "admits of degree, for (innateness) consists in the tendency of that idea to present itself to the mind" (CP 6.416). This vague definition is not unproblematic (where does the idea come from in the first place, and why is the mind 'ready' to embrace it?), but it indicates the solution towards which Peirce was marching, as it made room for an evolutionary theory of ideas, innate or otherwise.

Peirce stated that the mind is surely "strongly adapted" to comprehend the world, and that there is a tendency of certain ideas to "naturally" arise to the mind (CP 6.417). This tendency is the cornerstone on which all of what Peirce had built up to that moment (the validity of the inferences, the metaphysical speculations) rests. He observed that without this tendency the mind would have had "no development at all," and 'no mind' means 'no empirical rules' and a fortiori 'no metaphysics'. The terminology used by Peirce in this context betrays a lurking teleology underlying such a mental development, which is not too distant from the idea of the polyp perceiving a chancy cloudy world, while a logical animal at the top of the *scala naturae* perceives a determined, clock-like world. Importantly, at this stage in the argument, he thus lay down his first principle of evolution, and built upon it by asking: "(h)how are we to explain such adaptations" of the mind? (CP 6.418)

In 1878, shortly after reading Darwin, Peirce saw the theory of evolution by natural selection as the only possible way of explaining the adaptation of the mind. Once an animal has been provided with an *instinct*, it is able to develop it into a mind whenever those "mechanical conceptions" (that are the instincts) do not break down in novel situations (CP 6.418). This answer obviously does not satisfy the problem of innateness, as it shifts the explanatory burden to the nature

of the instinct, and one wonders in fact whether Peirce took that hypothesis seriously or not. Although he didn't seem to have noticed the chicken-and-egg problem with instincts, he acknowledged that his hypothesis could not account for the "extraordinary accuracy" of the basic regularities (such as those of perceived time and space), and left the argument suspended by saying that "it is probable that there is some secret here which remains to be discovered" (CP 6.418).

3.3 Evolution 'in' the mind

It may be said that all of the evolutionary theories that Peirce constructed after 1878 were attempts to solve this very problem. It might be useful, before getting back to the theological speculations that conclude "The Order of Nature," to reframe the arguments that led to his first introduction of the notion of evolution: the world is not pure chance; it is possible to find regularities, and thanks to that also empirical rules through induction, which also implies that the the world appears to be partially randomic; finding regularities and their relations reflects the principle that every event must have a cause (a natural law determining it); some empirical rules seem to be very close to natural laws, so much so that is right to suspect that the rules are not the result of a process of pure induction (which is subject to error); moreover, we acquire an increasing understanding of regularities because our minds evolve; however, the regularities that are closer to natural laws such as space and time might be innate ideas, because natural selection does not explain their accuracy. In pursuing this line of arguments, Peirce took some leaps here and there, while being guided by two fundamental conceptions, which were very common at his time and may not have been immediately visible to him, but which were nonetheless important for his thought, as he returned to them in later works.

The first conception is that of progress in evolution: that "we find on our earth a constant progress of development since the planet was a red hot ball" (CP 6.420). The development of organisms, as well as the development of the mind, are teleologically directed towards some greater good. The perception of the world as ruled by regularity instead of chaos becomes the measure of an organism's "place in the scale of intelligence" (CP 6.609). In the evolution of mind, ideas evolve from instincts towards "more correct" ideas because they are "constantly selected" (CP 6.418). Interestingly, the recipe Peirce imagined to account for selection and progress seems to have been less a theory of evolution than one of inferences (in the sense that we select hypotheses for their importance, but it is key that we sample at random, and the empirical rule is more and more refined). At times it is

as if Peirce's cosmos were a static, perfectly regular Platonic world towards which the phenomenal world tends *in the long run*.

The second idea is that of chance as ignorance. Although Peirce criticized Laplace for his false atheism, he probably agreed with him on the idea that effects of unknown causes look like chance events to a mind that is not provided with the right tools. "The Order of Nature" is the last paper in which Peirce seemed to subscribe to a kind of determinism. This view is visible in his statement that solid mechanical principles is what distinguishes good science from perpetual motion theories (CP 6.423-424). This suggests that Peirce at the time was not just a determinist, but held a mechanistic vision of the world -- a view that stood in evident tension with his criticism of Laplace, a tension that at this stage remained unsolved.

Peirce also introduced a third idea, one that was later to turn into his concept of habit and habit-taking. The idea is that 'innateness' is a tendency of the mind to repeat something. Peirce's description is obscure; he only mentioned that the way an idea acquires solidity in the mind and becomes a fundamental category (like time and space) must be gradual and evolutionary. The mechanism behind this tendency is left unexplained, and Peirce was to return to it only in 1886 in "One, Two, Three," which marks a breakthrough in his thinking about innate ideas.

4 Peirce's Hypothesis in "Design and Chance"

In 1884 Peirce changed much of his previous ideas while continuing the inquiry that he had embarked on in "The Order of Nature." Instead of insisting on an analysis of the arguments for design, Peirce now followed the idea of evolution more thoroughly. He took a step back by doubting the axiom previously embraced that "every event must have a cause" and now attempted to discover how much could be built upon the idea of chance as an existing force of the universe.

The important changes in his thought were the product of three strong influences on Peirce that occurred at that time. They are explicitly mentioned in the appendix of the paper[5] "Design and Chance," which is the topic of this section. There, Peirce praised Epicurus, Aristotle and Darwin.[6] He was supervising Allan Marquand in this period, who was writing a thesis on Epicurus (W4:XLVI). This supervision might have led Peirce to study the Epicurean *swerve* of atoms, which he combined with the Aristotelian notion of chance, *tychè*. This engagement with ancient thought resulted in the first version of his concept of absolute chance. On the other hand, a deeper understanding of Darwinism led him to a logical generalization of it, or, in his own words, "Darwinism [...] brought into the realm of ontology" (W4:552). Above, I have described the result, "Design and Chance," as a combination of the Epicurean swerve and Darwinian evolutionism, a traditional view among scholars (W4:XLVI). Now, I will show that more properly it would be a combination of those two elements plus Peirce's interpretation of the laws of the thermodynamics of gases.

4.1 Evolution of laws and absolute chance: all clocks are clouds

The core hypothesis that Peirce ended up with can be found in the appendix of "Design and Chance":

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[5] More properly, the manuscript of a lecture for the Johns Hopkins University Metaphysical Club.

[6] All three appear in a weird document named "My list of great Men" dated 1883-84, although Darwin is listed under the biologists, not the philosophers. It is noticeable that from this list (wide enough to contain political men from far away countries like Cavour or ancient conquerors like Belisarius) other evolutionists like Spencer or Wallace are excluded, while Hegel is included. Epicurus appears in the 'longlist' among those "provisionally accepted" (probably there because of his philosophy was new to Peirce), while Lucretius (from whom most likely Peirce got the notion of the swerve of atoms) is listed as a "doubtful" entry. It is also striking that among the many scientists, scholastic and Enlightenment philosophers, we also encounter more mystical thinkers like Schopenhauer and Steiner (W5:34).

> May not the laws of physics be habits gradually acquired by systems [?] Why, for instance, do heavenly bodies tend to attract one another? Because in the long run bodies that repel or that do not attract will get thrown out of the region of space leaving only the mutually attracting bodies. [...] Why do they attract inversely as the square of the distance? This may be only the average law of attraction. (W4:554)

There are two key ideas here. First, that the universe may be seen as a kind of ecosystem, where natural laws are not fixed but gradually evolve, just as species evolve for Darwin by (random) variation, heredity and selection. Second, that this evolution might follow the laws of probability, just as macroscopic laws of thermodynamics emerge as statistical averages of the (random) motions of the particles of a gas.

Peirce arrived at this hypothesis on the basis of a chain of arguments that constitute the body of "Design and Chance." This chain starts with him questioning the fundamental axiom that he had already tackled in "The Order of Nature": that every event must have a cause. Peirce now questioned the axiom primarily because he was dissatisfied with the usual answer given to it by science: that yes, every event has a cause and that cause is found in certain laws of nature. Peirce pointed out that law itself (although it is not an event in the usual sense) also requires an *explanation*, just like events. If I can explain an event through the laws that govern it, what explains the laws? The election of some further law as the ultimate principle constitutes, in his eyes, the fallacy that he had already criticized in "The Order of Nature." In "Design and Chance," Peirce now loosed up the axiom: perhaps not everything has a cause, but still everything must be explainable, natural laws included.[7] The explanation of the latter could take the form of a theory of evolution of natural laws that includes an element that is uncaused.

At this point in his argument, Peirce exclaimed triumphantly that "we want a theory of evolution of physical law" (W4:548). Before we examine the consequences of this desideratum, we may be allowed to wonder: why a theory of evolution and not another kind of theory? One reason that Peirce offered is that "evolution is the postulate of logic, itself; for what is an explanation but the adoption of a simpler supposition to account for a complex state of things[?]" (W4:547). Peirce took evolution to be a process by which something more

[7]The position for which everything should be explainable, that can be summarized in the Peircean maxim ‘do not block the road to inquiry!’, is a pillar of Peirce’s *pragmaticism* and an 'axiom' of his philosophy.

complex arises from the more simple -- analogously to how in "The Order of Nature" he had thought of more complex ideas developing in the mind through evolution. ‘Evolution’ thus furnished the required explanation.

It is actually conceivable that Peirce was attracted to evolutionary theories also as a logician, interested as he was in the scholastic problem of universals or, as he called them, ‘generals’ and in the solution that Duns Scotus had offered for the problem. One gets the impression that he perceived an analogy between natural laws and species, when he claimed that "Darwin’s view is nearer to mine" (W4:552). We should remember that he had studied with Louis Agassiz the problem of taxonomies and the classification of species, which is of course a special case of the problem of universals applied to biology. When he loosened up his fixist approach to both species and universals in general, and called them *regularities*, the broad question for him became whether there existed regularities at all. This question is obviously quite ambitious: Peirce was looking for a theory that should be able to explain how regularity, and therefore law, came about as a phenomenon, as well as how particular laws came about. Even more ambitiously, these laws had to explain the entire cosmos.

To the question whether it wasn’t the case that any theory provided a form of explanation, Peirce would have answered that an explanation based on evolution differed from other theories because of a key element that allowed it to cut the chain of causation while maintaining the chain of explanation unbroken. This key element was chance "in the Aristotelian sense, mere *absence of cause*" (W4:547).[8] But in order to be able to include this element in his cosmological theory of natural laws, Peirce deviated from existing theories of evolution, which in his eyes were short-sighted in taking for granted static and universal laws of nature. His own philosophical project was to bring Darwinism into the realm of ontology.

His new theory of evolution of natural law had to explain how law itself originated and how a heterogeneity of laws emerged. Peirce invited his readers to consider that "as we go back into the indefinite past not merely special laws but *law* itself is found to be less and less determinate" (W4:548, italics original). Note that this supposition implies that in the beginning, the principle of causality itself was far less rigid than it became later on.

As we have adumbrated, in "The Order of Nature," Peirce had proposed a comparable idea about what he called ‘empirical rules’, that is, the imprecise

[8] It is debatable whether Peirce understood Aristotle’s doctrine of chance, since the latter had a more complex view than what Peirce reported (Lüthy and Palmerino).

approximations temporarily accepted by the scientific community. Of those he said that in *the long run* they tend to resemble the static and universal ‘laws of nature’. The polyp has highly indeterminate empirical rules, while humans have far less chancy rules. What does it take to apply such an evolutionary view to the actual laws of nature? Peirce suggested that "[c]hance is the essential agency upon which the whole process [evolution of natural laws] depends" (ibid.). If the hierarchy of determinacy for 'empirical rules' was defined by the degree of experienced chance intended as ignorance (the polyp sees a chance-world), Peirce’s new theory of evolution of natural laws requires that there be a new, ontological kind of chance (sometimes written with a capital ‘C’ in the original).

Peirce explicitly named this distinction between the two kinds of chance, "ordinary (or relative) chance" and "absolute chance" (W4:549). The former is the commonly known view of chance as ignorance, which had already played a role in "The Order of Nature." The latter is a new concept of chance, with an important ontological status. It is an active force, which stands at the origin of the evolution of natural laws. Peirce defined "absolute chance" as uncaused and defined it operatively as the reason why "on excessively sporadic occasions a law of nature is violated in some infinitesimal degree" (ibid.), a definition that is reminiscent of both the Epicurean swerve and of Darwinian variation. With the entry of "absolute chance," Peirce gives us really an indeterministic view of the universe, where any observed regularity eventually results from chance and is also continuously, albeit slightly, still altered by chance. To invoke Popper’s comparison once more, for Peirce all clocks now started to look more and more like clouds, or at least all clocks originate from a cloud. In both cases it is a big shift from the deterministic position of "The Order of Nature."

4.2 A model of evolution: the players game

In "Design and Chance," Peirce was clear about the origin and scope of his new theory. But he was quite obscure about the way in defining how his explanation worked (italics mine):

> Now I will suppose that all known laws are due to chance and repose upon others far less rigid themselves due to chance and so on in an infinite regress, the further we *go back* the more indefinite being the nature of the laws, and in this way we see the possibility of an indefinite approximation toward a complete explanation of nature. (W4:551)

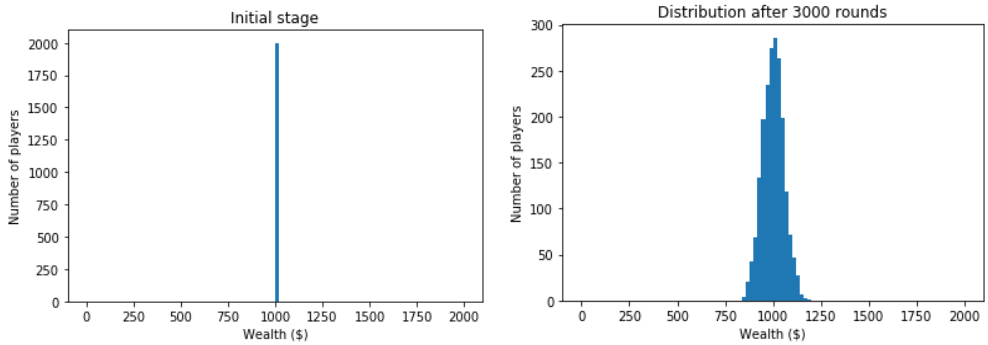
But "go back" to where? In my view, this expression can mean two things. On the one hand, it may mean "back" to more fundamental laws, in a way that is consistent with the idea that "laws of matter are statistical results" (ibid.) of less determinate ones, like the thermodynamic laws of gases, which we suppose to result *at all times* from the indeterminate motion of particles. Saying that laws result from chance in this sense seems to me the same as saying that at all times there are some microscopic chance-driven forces out of which macroscopic and seemingly rigid laws emerge. In this sense, laws *do not evolve*. We might label this interpretation of Peirce's quote as the 'explanatory' version. On the other hand, one can also "go back" in time. In this sense, Peirce suggested -- "we want a theory of evolution of natural laws" (W4:554)-- that macroscopic uniformities emerged *through time* due to an evolutionary process that makes them more and more determined, originating from chance. We might wish to label this other interpretation as 'evolutionary'. Did Peirce reconcile these two views? Until the end of the paper, he vaguely gestured towards a kind of Darwinism of laws, but did not explain the mechanism underlying this evolutionary process, nor did he seek the equivalents of biological variation, heredity, and selection for his theory.

However, there is a passage -- an example -- to be found in Peirce's article in which he seems to me to combine the two possible ways of "going back" in a brilliant, though still ambivalent manner. It is a passage that has raised the eyebrows of commentators (Short 529; Reynolds 705-707), with some critics dismissing it as unserious (Wiener 336). Here, I suggest to take it seriously and to examine how it may solve the question at stake. I have in fact simulated Peirce's example in a computer algorithm and have, to facilitate understanding, plotted the results, which are, as we shall see, in accordance with Peirce's tabulated predictions.

The passage in question gives us the example of a number of players sitting at a table and playing a repetitive dice game in which they have a 50% chance of winning or losing 1$ at each round.[9] Peirce assumed them to be many players and to start with a large stack, and he looked at the evolution of their wealth through time. Their wealth, being the only observable variable, identifies the *class* to which a player belongs. At the beginning, all players belong to the same class, as all still own their initial stack: the distribution of their wealth is a 'peak', centered around the starting value. Obviously, as the players play, some will win and some

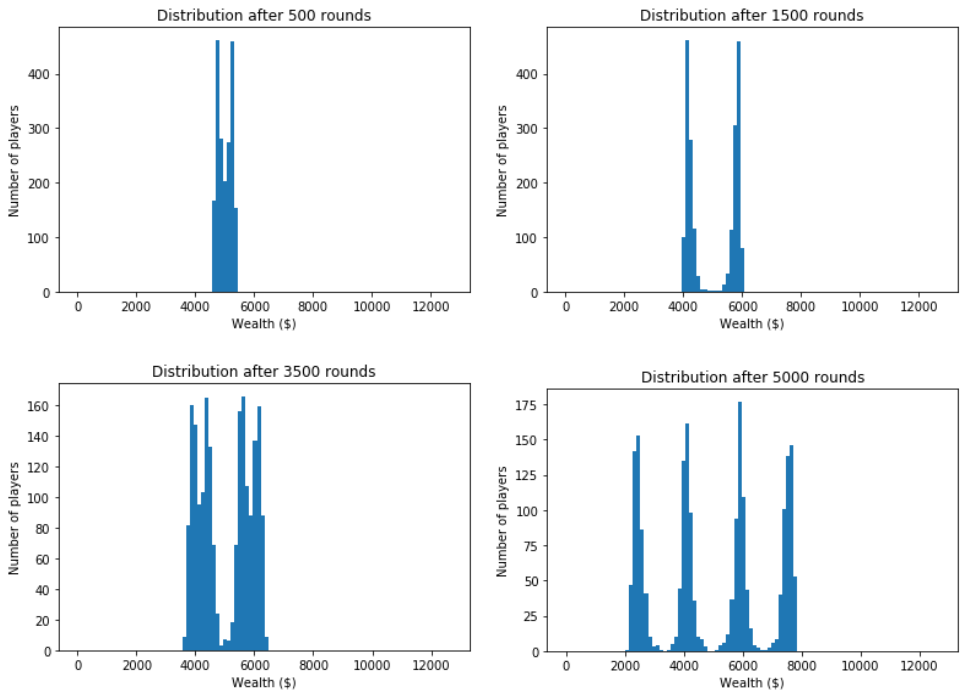
[9] Examples of this kind might seem bizarre to our eyes, but at that time statistics and probability theory still paid a good debt to their first field of application, gambling.

will lose, and after some rounds the original peak will spread out (see figure below).



Simulations of the players' game with fair dice (relative chance): we plotted the distribution players according to their wealth. At step-0, all 2000 players have the same wealth. After some rounds, the distribution spreads out symmetrically.

Things change however if we follow Peirce in taking absolute chance seriously (as opposed to relative chance, or chance as ignorance, in this case of the forces behind each dice throw). The introduction of absolute chance means to 'loosen up' every rule that governs the game: "everything being explicable, everything has been brought about; and consequently everything is subject to chance. [...] Chance will sometime bring about a change in every condition" (W4:549). The consequence for the game is that the players' dice will no longer be 'fair': Peirce invited the reader to think of a process that progressively 'loads' the dice, for example by making a player who wins more prone to win in the future, and vice versa for the loser. Adding even more variability, Peirce suggested that, more rarely, the loading process would be inverted, making the player who just won more likely to lose the next round, and vice versa. In this case the unfolding of the game will first separate the original peak into two distinct peaks, one moving more and more to the right (winning players), the other to the left (losing players) of the plot. A rare, chance-driven inversion of the loading process will give us several distinct peaks (see images below).



Simulations of the players' game with changing dice (absolute chance): after a few rounds, the initial peak divides in two according to winning and losing players (top). After more rounds a chance change in the loading rule occurs, consequently each of the two peaks branches again.

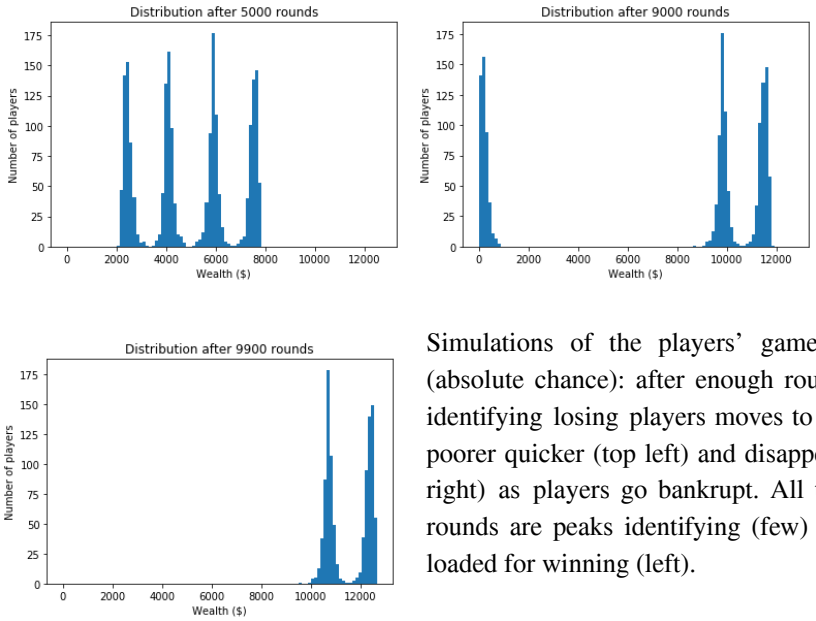
Let's imagine an external observer, who has no knowledge of the history of the game, trying to make sense of what he sees. He will see two (or more) distinct groups of players, the poorer and the richer, and call them 'classes'. They do not seem to do the same thing, and the observer could verify the regularity that 'all players that are rich will be richer, all that are poorer will be poorer' and call it a 'law'. He could also verify more strict regularities, but all of them will be subject to some apparent variation. For example, as soon as some rounds have been played, the quantity defined as the 'rate of change of the global average wealth' will approach what would look like a constant value, and the observer would conclude that it is a 'constant of nature'. However, Peirce knows that those apparent regularities are nothing but the statistical aggregates of chance events. He thus called all those regularities (classes, laws, constants) 'habits', as they are not completely determined.[10]

We must note that Peirce, although advocating for an all-pervasive role for absolute chance, was in fact narrowing down its practical effects in his own example. The loading of the dice, which he portraits as the consequence of loosening up the laws, may as well look like a law, or at least a rule. This comes to

[10] Remember, as already mentioned, that for Peirce a natural class and a natural law are not so different, a natural class being the regularity 'every B is an A'.

the fore when one tries to run the game as a computer simulation, as the loading process of the dice *adds* some lines of code and looks just like a rule, or as Reynolds points at, a law (Reynolds 707). As we will see, in later writings Peirce will not refrain from saying that absolute chance as an operative force is to some degree regular, but it seems that in 1884 he did not notice.

However obscure, with his example, Peirce wanted to make two points. First, that regularity, in the form of more or less strict habits, can emerge out of chance through time. Secondly, that one homogeneous habit can evolve into more heterogeneous ones (one peak branching into two). In more mathematical terms, the heterogeneity of the whole system increases, while homogeneity within each class increases[11]. The main text of "Design and Chance" stops here. But, in his appendix to the paper, Peirce introduced a more 'Darwinian' element, showing how his example of the players could accommodate a kind of 'selection' of habits. After a sufficient number of rounds, there will be some poor players who will have their dice still loaded into losing more often, and they will lose their last dollar and get out of the game. In this case, the external observer will see a class of players, who appear to become increasingly poor, will eventually get 'extinct'. Once the poor players have all disappeared, to a later observer, there will be no such regularity as 'poor players become poorer'. Peirce showed how "systems or compounds which have bad habits are quickly destroyed" (W4:553), and thus he suggested a sort of 'natural selection' of habits (see image below).



Simulations of the players' game with changing dice (absolute chance): after enough rounds, one of the peaks identifying losing players moves to the left as players get poorer quicker (top left) and disappears from the plot (top right) as players go bankrupt. All that is left after more rounds are peaks identifying (few) rich players with dice loaded for winning (left).

[11] For a mathematically rigorous proof of this statement see the paper from Pollard (Pollard, 195-197)

By means of this dense and complex example, Peirce tried to show how both ways of thinking of "going back" to more chancy laws (the ‘evolutionary’ and the ‘explanatory’) coexist. There is a hierarchy of increasingly less chancy regularities that at all times as well as through time lets more rigid regularities emerge. Paul Forster, in his analysis of the roots of Peirce’s indeterminism, is therefore mistaken when saying that the idea of chance as explanation is incompatible with the notion of chance as variation of law (Forster, 74). Peirce showed that given a system that ultimately has chance at its base, there will always be regularities emerging at some level, where the effect of the original chance, to an external observer, will look like no more than small variation.

It was not Peirce’s intention to argue with his example that this is exactly how the laws of nature came about. All he wanted to show is that if you embrace absolute chance, it is still possible to obtain a heterogeneous sort of regularity. He was suggesting that an external observer will be in a good position to explain what she sees when she describes the regularities of the system as laws, and the chance manifestations as violations of the laws. The difference with respect to holding the usual view of relative chance (chance as ignorance) is that with absolute chance we can explain all regularity and moreover actually make predictions on how new regularities evolve, since we account for all of them to be affected by chance. He pointed to this latter aspect in a letter to William James in 1885, saying he had made "an attempt to explain the laws of nature, to show their general characteristics and to trace them to their origin & predict new laws by the laws of the laws of nature" (W6:595).

4.3 Habits and cosmic evolution

We have already seen that Peirce called non-fixed laws of nature ‘habits’ (borrowing the term *habitus* again from Aristotle). Just like chance, habit is a relation between events, whose main element is "the tendency to repeat any action which has been performed before" (W4:553). Peirce thereby extended the notion of habit as employed in psychology to ontology. Indeed the quote just given can be compared with how Peirce characterized in 1878 the innateness of an idea, which "consists in the tendency of that idea to present itself to the mind" (CP 6.416). Evolving habits strongly resemble the hypothetical evolution of the mind suggested in "The Order of Nature." But why should one expect a similar mechanism of evolution to apply also to the cosmos? Curiously, Peirce here seemed to have anthropomorphized the evolution of natural law, while in "The

Order of Nature" he had warned his readers against the fallacious tendency to "personify everything" (CP 6.416).

The concept of habit was still visibly shaky at this stage, but so was also that of absolute chance. Peirce wrote that it was the force "upon which the whole process depends," (W4:548) but at the same time it "can only work upon the basis of some law or uniformity" (W4:551). Although I have suggested that through the example of the game, Peirce managed to bridge the gap between the ‘explanatory’ and the ‘evolutionary’ aspects of absolute chance, he did not provide a description of how chance worked outside of the model of the players with the loaded dice.

The foundational and logical aspect is chance as ‘absence of cause’, as Peirce said, "in the Aristotelian sense" (W4:547). But Peirce seems to have followed rather Epicurus in adopting the idea of chance into his ontology and accepting that everything can ‘swerve’. With these ingredients, he felt that he could build a self-explanatory, cosmic theory of evolution à la Darwin in which absolute chance works as the principle of variation and habits are selected. This evolution would extend to natural laws, given that he took them to be only statistically determined and as the result of a temporal evolution as well as of the aggregation of more chancy laws, just like the laws of the thermodynamics of gases.

In his conclusion to "Design and Chance," Peirce gave a possible description of the cosmos evolving under his hypothesis. In doing so, he favoured the ‘thermodynamic’ legacy of his theory. He realized that if strict thermodynamic laws were the only immutable force at work, the universe would tend towards death, reaching a state of total uniformity in which the temperature is the same everywhere. Absolute chance was the force that he imagined, if not to defeat so at least to oppose this tendency, as if law and chance were opposite forces of a cosmic battle of ‘entropy versus negentropy’: "force is in the long run dissipative; chance is in the long run concentrative" (W4:551). With this view Peirce came close to the Milesian school of thought that saw the evolution of the world going from a state of chaos towards more and more rationality, a view that he became attached to more strongly in the ensuing years. He further believed that the current state of the universe was one in which the two forces, law and chance, counterbalanced each other in a way that was observable.

This digression on the state and fate of the universe, which looks a bit off track in the mathematical logic of "Design and Chance," betrays maybe the first trace of Peirce’s later ‘mystical drift’. Indeed, it appears that he wanted chance to save the universe from its final destiny of cold death, which to him would be "the most

materialistic and the most *anti-teleological* conceivable" result (emphasis mine) (ibid.). Peirce did not elaborate upon his view on teleology in evolution, but he betrayed his point of view in certain passages such as "chance in its action tends to destroy the *weak*," or "*bad* habits are quickly destroyed, [...] *good* habits tend to survive" (W4:553, emphasis mine). These traces suggest that he imagined evolution being directed and a kind of progress -- a tendency on which he was to be more explicit in the ensuing papers he wrote.

However incomplete it may have been, his hypothesis of an evolutionary theory was definitely all there: accepting chance as operative in the world and habit as the tendency to repeat an action, Peirce's effort now went into describing how a system generally comes about and evolves under these forces. Peirce believed he found the ingredients for a way out of the naturalistic fallacy into which philosophers had been falling when giving answers to the question: why are laws of nature as they are? In Laplace's case, the fallacy resided in attributing the special status of eternity and immutability to the laws of nature; in the case of theologians, the fallacy lay in their arguments from design. Peirce's way out of what he perceived as fallacious answers was an evolutionary theory that encompassed all that is conceivable and at the root of which lay a principle of non-causality, of absolute chance.

5 An Attempt at Systematizing in "One, Two, Three"

Around 1886, Peirce was developing his theory of categories and attempted to produce a unified system of metaphysics. This resulted in his unfinished treatise entitled "One, Two, Three." Writing to his friend Edward Holde, Peirce explained: "[y]ou remember that I told you something of a sort of evolutionist speculation of mine. This has grown much..." (W5:XXXVI). Although they are unfinished, some of the chapters of "One, Two, Three" can help us understand how Peirce built up from where he had left his theory, and how he introduced new elements into it.

5.1 A continuation of the players game hypothesis

One of the chapters of "One, Two, Three" addresses the theory of evolution, reframing the ideas already present in "Design and Chance." Absolute laws of nature are once again depicted as the product of evolution and as ultimately originating in absolute chance:

> It is difficult for us to believe that any physical constant, any finite quantity in nature, is primordial. It may be so, but we cannot help at least asking how it came to have the precise value that it has. [...] For then it is suggested that there must have been some cause tending to change the value of the constant and to bring it nearer and nearer to the number that it nearly equals. In such a case, therefore, we have a positive reason for thinking that the quantity is not primordial. (W5:292)

In Peirce's perception, this is exactly the right supposition to explain the (only apparent) 'constants of nature', which are nothing but statistical regularities as discussed in our previous chapter. Although in "One, Two, Three" Peirce did not mention explicitly the players' game, we can read his statement as referring to it: Peirce was describing how the external observer of his game might try to find causes for regularities.

In the period in which "One, Two, Three" was written, Peirce held a position as a working scientist for the U. S. Coast and Geodetic Survey and was interested in the problem of measurements and the theory of errors (Lenzen). He wondered whether errors in measurements were related to absolute chance. Are we -- he wondered -- measuring chance (or its effect), or are errors and chance two different worlds? Peirce came to believe that both chance and errors, in similar

ways, show us the impossibility of verifying the exact accordance of facts to law. Yet, measurement errors are visible and known, while Peirce speculated that "we cannot be sure that there are not similar, though much smaller, aberrations in the events themselves" (W5:292). In this context, then, Peirce began to develop another argument for absolute chance: we should accept it as we can not prove that there is no aberration in things themselves, and moreover, no quantity is exact. The word "aberrations" suggests that, to the external observer, absolute chance seems to operate upon the fabric of natural laws, forcing it to deviate from standard patterns. From this perspective, Peirce added that one should not suppose the average of such aberrations to amount to zero, that "it is infinitely more probable that it is not" (ibid.).[12] Again, we can read this in light of his game example: the classes of players in the gambling game are not stable but evolve due to the non-zero mean of the fluctuations of the rules that determine their fortunes. But to an observer that is not omniscient those fluctuations look like aberrations, deviations from law. In accordance with that, in "Design and Chance," Peirce declared that the "formation of habits could be accounted for by the principles of probability" (W4:553). But he also explained that we ought to "imagine a large number of systems in some of which there is a decided tendency towards doing again what has once been done" (ibid.). If we merge the idea expressed in this last quote with the definition of habit given some sentences before ("the tendency to repeat any action which has been performed before," (ibid.) then one is left with a tendency towards habit. But is that different from saying that habits are the statistical product of chance? The answer to that question is provided by the idea of 'habit-taking' as introduced in "One, Two, Three," where we are given the following two notions.

On the one hand, habit-taking is explained as a logical middle ground between chance and law: "this is the Third or mediating element between chance, which brings forth First and original events, and law which produces sequences or Seconds" (W5:293). This is obviously a reframing of the evolutionary principles within Peirce's triad, to which I have already drawn attention above, and to which I will return later. Peirce supposed that if two opposites like chance and law are real, then there must be a third, middle element (a rudimentary notion of synechism, an idea that at the time he had not yet fully developed).

[12] This step of the argument is unclear: at the time it was clearly known that mixed errors of similar size (in the sense that they have no entanglement, and may be considered chance in an Aristotelian way) sum up to a zero-mean distribution (the so-called Central Limit Theorem). It seems to me that Peirce made use of statistics rather selectively, and was possibly even in bad faith here.

On the other hand, habit-taking is also presented as being itself an evolved habit: "this tendency must itself have been gradually evolved; and it would evidently tend to strengthen itself" (ibid.). The logic of the evolution of this habit of habit-taking, however, was only to be explored by Peirce at a later stage.

5.2 Cosmic evolution as interplain of aberrations, habits, habit-taking

As must have been obvious from what has just been said,Peirce had thus reached a more complete hypothesis of cosmic evolution. Absolute chance is the origin of all habits, among which the habit of taking habits, and all apparent natural laws are gradually acquired habits. Although the hypothesis was formulated already in "Design and Chance," Peirce back then was still hesitant about whether to consider each natural law a habit, and he described habit as "a phenomenon at least coextensive with life, and it may cover still a wider realm" (W4:553). In "One, Two, Three," he displayed a greater conviction and reformulated the following evolutionary scenario of the cosmos:

> We must further suppose that this element [chance] in the ages of the past was indefinitely more prominent than now, and that the present almost exact conformity of nature to law is something that has been gradually brought about. [...] If the universe is thus progressing from a state of all but pure chance to a state of all but complete determination by law, we must suppose that there is an original, elemental, tendency of things to acquire determinate properties, to take habits. (W5:293)

The first part of this statement follows from Peirce's earlier reasoning in "Design and Chance." The second part presents traces of his thoughts from "The Order of Nature," where he supposed empirical rules to refine and, in the long run, to approximate natural laws. At the same time, it seems a radicalized version of the picture offered in "Design and Chance," where the supporting argument was a generalization of the thermodynamic principle of dissipation of energy, which was leading the universe towards thermodynamic death. But we may wonder: why should the universe tend towards ever greater determinacy, if chance lies at its foundation? On the one hand, it might be argued that this almost fatalistic view clashes with the idea of absolute chance governing the whole process, as if a pessimistic Peirce had been trying to bend his own logical deductions. On the other hand, he might have deduced the scenario by noting the self-affirming characteristic of habit-taking: although absolute chance (observed by us as

"aberrations") brings novelty into habits, there is one habit, namely that of habit-taking, which might over-rule this process and make habits more and more determined.

5.3 The first triad in metaphysics

In "One, Two, Three," Peirce organized the elements of his evolutionary theory more clearly into a "triad," a collection of three irreducible items. The idea behind it was that to describe any logical system, one needs no more than three fundamental elements. There is much debate on the nature of this principle, and Peirce himself wrote extensively about this issue (Esposito 46-56; Atkin 226-240; Skidmore). For the purpose of the present argument, it must suffice to know that Peirce was more than just convinced of his "triadism," in fact, he had a veritable obsession with it, by his own admission (CP 1.568). The whole project of the book "One, Two, Three" (but also of "A Guess at the Riddle") was to apply fundamental triads ("trichotomic" being "the art of making threefold divisions" (W5:294)) to every branch of the sciences, philosophy and theology.

A triad obviously consists of three elements: a "First," a "Second," and a "Third." Peirce wanted those categories to be as broad as possible "-- vague, if you like" (W5:298). A ‘first’ is what it is because of itself only, described as anything immediate, unsubjected, unmediated, "a sheer wonder of first impressions" (W5:299). A ‘second’ is anything that exists because of something else, anything dual; relations, correlations and the like are ‘seconds’, as it is "the real, the stubborn fact" (W5:300). A ‘third’ is any medium between a ‘first’ and a ‘second’, it is what it is because it mediates between the other two. In Peirce’s ontology at that stage in his thinking, chance was ‘first’, law was ‘second’, and habit-taking was ‘third’.

The triad as presented in "One, Two, Three" is sketchy and does not really add much to the theory that had already been in place. But the way Peirce here described in particular First and Second is interesting for understanding certain influences that would dominate his later works. The First is described with an abundance of Christian religious expressions, such as "virgin purity," "innocence," or "[w]hat the world was to Adam the day he opened his eyes to it" (W5:299). Peirce also used expressions that suggest a certain vitalism, such as "essentially vivid, present, and conscious" (ibid.). At the same time, he described absolute chance with a range of synonyms: "we must therefore suppose an element of absolute chance, sporting, spontaneity, originality, freedom, in nature" (W5:293). By looking at dictionaries from the period in which Peirce was writing, one can

see which semantic spheres he attached to chance: 'sporting' was used (also by Darwin[13]) to described mutations in plants (Webster 1276); 'original' was used to differentiate primal rocks formed directly by liquid matter (Whitney 12:907); 'spontaneity' and 'freedom' were all pertinent to human affairs, the mind and its actions (Webster 542; Whitney 11:496). Similarly, Peirce gave a biological connotation to the idea of Second (and thus to law) by writing that "the completely second is dead" (W5:300).

It seems that in a departure from the dry logic of "Design and Chance," Peirce now began to contaminate his concepts with terminology from the realms of biology, geology, psychology and religion, taking the first steps towards what would become ever more visible forms of vitalism and mysticism.

[13] Charles Darwin also attributed ‘habits’ to plants, even in the title of his book of 1875 "On the Movements and Habits of Climbing Plants." In botany, ‘habit’ was understood as growth according to conformity, while ‘sporting’ designated growth that made the appearances of a plant change slightly.

6 The First System in "A Guess at the Riddle"

"A Guess at the Riddle"[14] should have been a book in which Peirce's trichotomy was applied to any field of science, but it was not completed. In fact, most of the ideas on chance, habit and habit-taking were not radically different from what can be found in "One, Two, Three," and the same holds for cosmic evolution. However, the contaminations with extraneous elements already observable in "One, Two, Three," notably religious influences, almost took over the original, logical schema, most visibly in the chapter "The triad in metaphysics."

6.1 Cosmic evolution as God's revelation and as a catastrophe of habits

Peirce applied the triadic division of chance as First, law as Second and habit-taking as Third to his cosmic evolutionary schema, bestowing upon the triad a temporal dimension. Since Third is what mediates between First and Second, any "present" time can be thought of as the expression of Thirdness mediating between the original chaos of the "infinitely distant past" and the rigidity of the "infinitely distant future" (CP 1.362). Peirce intended those two 'termini' mathematically, as external intervals to the whole set of time points. That makes them real time points, but not verily existing, as they are never reached.

In rephrasing his cosmic evolution, though, Peirce let his religious ideas intrude even more strongly. Absolute First, the original chance, becomes "God the Creator," and Absolute Second, the situation in the infinite distant future where law is all there is, becomes "the terminus of the universe, God completely revealed" (ibid.). The overlap of a 'Christianized' triad to the logic of chance and habit-taking cannot but create confusion, and one suspects that Peirce had fundamentally changed his mind with respect to the time of "The Order of Nature" in which he had criticized the idea of a God as designer of the universe. Peirce made no secret about the biblical source upon which he now drew when he declared that "[o]ur conceptions of the first stages must be as vague and figurative as the expressions of the first chapter of Genesis" (CP 1.412). Again in contrast with the "The Order of Nature," where he advised against anthropomorphisms and the idea of a human or animal-like God, we find Peirce talking in "A Guess at the Riddle" of the "womb of indeterminacy" (ibid.) from which the First arises, the

[14] Although Peirce made a guess at the 'riddle' of the universe, the term is believed to be a reference to Emerson's "The Riddle of the Sphinx" (W6:LXXXIV).

"womb of homogeneity"[15] (CP 1.373) from which comes variety, or the "germ" (CP 1.409) out of which habit-taking emerges. These are maybe not personifications, but we can at least recognize a biomorphic language.

Although his terminology had undergone a shift, Peirce also developed a number of logical details of his theory of evolution further. The important novelty is that Peirce realized the power of habit-taking as the last piece of his cosmic evolutionary hypothesis, especially to explain the first stages of cosmogony.

In "A Guess at the Riddle," Peirce proposed the final formulation of his answer to the original problem of explaining natural laws, as described in our introduction. In short, habit-taking is also an habit, and its explanation is chance:

> I will begin the work with this guess. Uniformities in the modes of action of things have come about by their taking habits. At present, the course of events is approximately determined by law. In the past that approximation was less perfect; in the future it will be more perfect. The tendency to obey laws has always been and always will be growing. We look back toward a point in the infinitely distant past when there was no law but mere indeterminacy; we look forward to a point in the infinitely distant future when there will be no indeterminacy or chance but a complete reign of law. But at any assignable date in the past, however early, there was already some tendency toward uniformity; and at any assignable date in the future there will be some slight aberrancy from law. Moreover, all things have a tendency to take habits. For atoms and their parts, molecules and groups of molecules, and in short every conceivable real object, there is a greater probability of acting as on a former like occasion than otherwise. This tendency itself constitutes a regularity, and is continually on the increase. In looking back into the past we are looking toward periods when it was a less and less decided tendency. But its own essential nature is to grow. It is a generalizing tendency; it causes actions in the future to follow some generalization of past actions; and this tendency is itself something capable of similar generalizations; and thus, it is self-generative. We have therefore only to suppose the smallest spur of it in the past, and that germ would have been bound to develope into a mighty and over-ruling principle, until it supersedes itself by strengthening habits into absolute laws regulating the action of all things in every respect in the indefinite future. (CP 1.409)

[15] It is possible that Peirce is responding here to Spencer's "instability of the homogeneous" (Spencer 358-387).

The argument can, I think, be rephrased as follows: In a cosmos without regularity, there is only chance, which will explore all the possibilities at the same time; none of the chance entities will 'last', since nothing has yet duration and, besides that, there is not yet any such time as could regulate things. One of the possibilities explored in that state is habit-taking; but once habit-taking becomes a real entity, things start to take habits by themselves, and some of those chance variations will start to 'endure' and in turn generate new habits. In other words, as soon as out of absolute chance (and we must suppose the 'explanatory' type of chance here, as 'originality' and not as 'sporting') a principle of habit-taking arose, it was not contrasted by any principle other than chance itself (in this case we must suppose chance to be of the 'sporting' type, which tries to deviate habit-taking and modify it).

Such a mechanism for habit-taking is radically different from that which explains habits as statistical results of chance events as outlined in "Design and Chance" and which Peirce still partially embraced in "One, Two, Three." Back in 1884, Peirce imagined that however regularities may have emerged through time out of chance, they also resulted at all times out of chance events. This latter aspect had disappeared from his view by 1887. Peirce had maybe imagined a statistical way for the habit of habit-taking to emerge, but if this is the case, he never told us so. Could habit-taking be itself something emerging statistically? This sounds like an hypothesis, since Peirce defined the operation of habit-taking as a "generalizing tendency," and 'generalizing' could be intended as 'creating generals' (where by 'generals', Peirce intended universals, and among them natural classes). This hypothesis finds some confirmation in a passage in which Peirce tried to explain habit-taking through yet another bizarre example, which we might refer to as 'flash theory':

> Out of the womb of indeterminacy we must say that there would have come something by the principle of firstness, which we may call a flash. Then by the principle of habit there would have been a second flash. Though time would not yet have been, this second flash was in some sense after the first, because resulting from it. Then there would have come other successions ever more and more closely connected, the habits and the tendency to take them ever strengthening themselves, until the events would have been bound together into something like a continuous flow. We have no reason to think that even now time is quite perfectly continuous and uniform in its flow. The quasi-flow which would result would, however, differ essentially from time in this respect, that it would not necessarily be in a single stream. Different flashes might start different

> streams, between which there should be no relations of contemporaneity or succession. So one stream might branch into two, or two might coalesce. But the further result of habit would inevitably be to separate utterly those that were long separated, and to make those which presented frequent common points coalesce into perfect union. (CP 1.412)

To imagine a world without laws, in which nothing follows from anything, to Peirce is like imagining an ecosystem (to borrow a term from the same biomorphic language) of logical forms in which everything appears and disappears constantly. To illustrate his hypothesis, Peirce called any such transitory event a "flash," that originates by chance and has no condition determining it. He imagined that as soon as another flash would follow (from that "smallest spur" of habit that we have to imagine to be there in the infinitely remote past), a principle of conformity would be established between the two events and the tendency to habit-taking established. Peirce is fully aware that this visual talk of flashes does not do justice to his idea, which unfortunately can only be expressed vaguely and figuratively. However that be, at some stage, the logical form of habit-taking enters into the scene and grows by virtue of his own nature.

Note that those branching "streams" of flashes strongly resemble the classes of players of "Design and Chance," identified as they are by the peaks in the distribution of wealth that branch from each other and separate. But here Peirce applied that idea, back then derived statistically, to a realm that bears no connection to statistics anymore. While in "Design and Chance," his model of evolution starts with something that already takes habits, he is here describing the very beginning of this process, which means that there are no large numbers nor statistics.

It is unclear whether Peirce completely replaced statistical emergence with the idea of habit-taking, but at this point in his intellectual development, he considered his hypothesis to be complete, as habit-taking, which introduces regularity as a principle, manages in his eyes to generate the existing universe: "habits, from the mode of their formation necessarily consist in the permanence of some relation, and therefore in this theory every law of nature would consist in some permanence" (CP 1.415). Therefore habits, through habit-taking, define all that exists, because "the existence of things consists in their regular behavior" (CP 1.411). One might think of the process of habit-taking as a ‘catastrophe of habit’: once in motion, it is all-pervasive.

But how did Peirce conciliate the evolution of habits, which must ultimately lead to the "reign of law" -- which in "One, Two, Three" was associated with death -- with a type of evolution that should also lead to the revelation of God? It was perhaps this very difficulty that led him to split the two views and to develop the idea of agapastic evolution in his *Monist* series.

The rephrasing of his original hypothesis in "A Guess at the Riddle" also made it more complicated for Peirce to explain his argument for variety. In the beginning of his investigations, he had been focused on chance as an explanation, and when seeking to find a way for chance events to provide both regularity and heterogeneity, he appealed in 1884 to statistics, borrowing some ideas from thermodynamics. In 1887, however, he left this statistical approach and adopted a terminology that made the argument very obscure:

> Indeterminacy is really a character of the [F]irst. But not the indeterminacy of homogeneity. The first is full of life and variety. Yet that variety is only potential; it is not definitely there. Still, the notion of explaining the variety of the world, which was what they mainly wondered at, by non-variety was quite absurd. How is variety to come out of the womb of homogeneity; only by a principle of spontaneity, which is just that virtual variety that is the First. (CP 1.373)

It would appear that the problem has shifted and the burden of explaining variety has moved to the "virtual" and "potential." One is brought to think that absolute chance now resembles more and more something transcendental (which in some manner recalls Anaxagoras' *Nous*).

6.2 The triad as variation, heredity, selection

It is worth remembering that Peirce aimed to formulate his metaphysical system as a hypothesis. He thought that his theory of the evolution of natural laws ought to be tested like any scientific hypothesis: it should explain known natural laws and possibly have predictive power over new discoveries. One attempt at a test was Peirce's endeavor to explain Darwinian evolution by applying to it the framework of the triad (First/Chance, Second/Law, Third/Habit-taking) to biology.

He dissected Darwinian evolution into its logical elements and, predictably, linked his concept of chance to Darwinian variation, law to heredity, and habit-taking to selection. But he was not totally content with the result and was honest enough to admit that it was "a somewhat imperfect reproduction of the same triad as before" (CP 1.399). In the very next sentence though, he changed his point of view,

remarking that "[i]ts imperfection may be the imperfection of the theory of development" (ibid.), leaving the burden of incorrectness to Darwinism. But what exactly was ‘imperfect’ about it? Peirce's absolute chance, in its version of ‘sporting’ (i.e., that which deviates from law), fits Darwinian chance rather well. Peirce understood heredity as the "principle of determination of something by what went before" (ibid.), which resembles his definition of law and habit. The third element is more tricky: for Peirce, natural selection is the "principle of generalization by casting out sporadic cases" (ibid.). It is a kind of generalization insofar as it creates generals, classes, which is what habit-taking does. It is unclear at this point what was pressing for Peirce and made it doubt the application of the triad to Darwinism.

Peirce surely understood the principle of adaptation nested within the Darwinian hypothesis, as he wrote that "the adaptation of a species to its environment consists, for the purpose of natural selection, in a power of continuing to exist" (CP 1.397). Already in "Design and Chance," Peirce had displayed a tendency to view Darwinian evolution as progressive. In "A Guess at the Riddle," this teleological interpretation is evident:

> A very remarkable feature of it is that it shows how merely fortuitous variations of individuals together with merely fortuitous mishaps to them would, under the action of heredity, result, not in mere irregularity, nor even in a statistical constancy, but in continual and indefinite progress toward a better adaptation of means to ends. (CP 1.395)

The argument for this conclusion follows from a twisted interpretation of the by now hackneyed example of the players’ game. Peirce had observed already in 1884 that classes of poor/losing players eventually disappeared and that "bad habits are quickly destroyed" (W4:553). In 1887, he explains the same principle:

> This character [that of continuing to exist through reproduction] plainly is one of those which has an absolute minimum, for no animal can produce fewer offspring than none at all and it has no apparent upper limit. (CP 1.397)

Peirce already had the idea that there are what we might call ‘asymmetrical characters’ (in the case of biological evolution, the number of offsprings) and that they determine the direction of evolution. We can compare the quote above with this one from "Design and Chance":

> For every kind of organism or compound, there is an absolute limit to the weakening process. It ends in destruction; there is no limit to strength. The result is that chance destroys the weak and increases the average strength of the object remaining. (W4:553)

Remember that an external observer of the players' game sees the peaks of wealth distribution (representing classes of players) 'moving' in the opposite direction with respect to the 'wall' representing those having 0$ and thus being eliminated. Every class of players affected by a habit of diminishing their wealth will disappear, and in turn all that will be left in the game are habits that increase wealth. Similarly, if Darwinian variation acts upon the character "number of offspring" by lowering it until it reaches below 1, that species will die out. Generalizing, all habits that lower that character will disappear, leaving space only for the ones that increase it, indeed in a "continual and indefinite progress" that ultimately increases growth and variety. Thus "wealth" (which Peirce generalizes to the biological realm as "strength") and "number of offspring" are asymmetrical characters because changing them in one direction impacts directly on the existence of the system they belong to.

Peirce then extended by analogy his example of the players to all Darwinian circumstances. Obviously that does not do justice to Darwinian evolution, not even as Peirce understood it: it misses the point of making clear which role is played by the game's bank,[16] and it does not describe the complications (which he was eventually to notice) about possible interactions of sporting and selection. But it clarifies the point to which Peirce reacts: that random variation, when given a 'wall' that generates an asymmetry in characters, will result in change in an apparent definite direction away from the 'wall'. This is important because Peirce aimed all along at formulating an orthogenesis, an evolution directed towards more growth and variety, but also because at this stage he attached a religious meaning to his theory. Evolution must aim at a kind of summum bonum, given that the terminus of the universe is God revealed. As Peirce understood it, the Darwinian model provided a mechanism to strive for the better, therefore he did not shy away from asserting that Darwinian evolution had a "purpose" (CP 1.397).

[16] The presence of a bank makes the game formally a non-zero sum game, while it actually is, as for every dollar lost there is a dollar earned by someone. But the fact that dollars are re-distributed equally among all players happens only through a centralized principle that seems to have no counterpart in natural evolution.

6.3 A place for consciousness

But this was not the only teleological aspect that emerged in his updated chance-based hypothesis. In "A Guess at the Riddle," Peirce also addressed the question of how his theory could explain consciousness and mind. His answer was simple: chance as the uncaused became for Peirce an umbrella term for all those phenomena that are unexplainable under a deterministic worldview, including free will and feeling. Peirce's arguments are here the reverse of traditional scientific attempts to explain the emergence of those phenomena: he *starts* with chance and feeling, and must therefore explain how the non-living came about. Since chance, in the form of spontaneity and feeling, is everywhere, albeit in the form of small variations, we must attribute a certain degree of consciousness and free will even to a stone. It is just that the constituents of a stone, due to how much habit-taking has acted upon them, have very little chance or spontaneity left that they are able only to 'swerve' in imperceptible ways.

On the other hand, applying his trichotomy to psychology, Peirce explained that the particularity of the nervous system (or in general of organic tissue, or "protoplasm," as he calls it) is that it is an amplifier of both habit-taking and chance, an idea that later will occupy the whole fourth paper of the *Monist* series. If chance is related to feeling and free will, habit-taking makes the mind acquire habits, memory and mental schemas. The habits acquired by the mind, Peirce realized, are directed by final causes:

> Thus we see these principles not only lead to the establishment of habits, but to habits directed to definite ends [...]. Now it is precisely action according to final causes which distinguishes mental from mechanical action. (CP 1.392)

Where we must understand "mechanical" as referring to mechanical determinism, complete determination by law. This quote is important, because in one of the later chapters of "A Guess at the Riddle," it becomes clear that for Peirce there was no such thing as purely "mechanical action": indeed for him "an element of pure spontaneity or lawless originality mingles […] with law everywhere" (CP 1.407). Since every action is at least partly non-mechanical, it is partly minded and therefore directed to definite ends, thus we can say Peirce is indirectly advocating for a sort of panpsychism. This thesis is reinforced by the wording choice he made, associating chance with life and mind, and law with death.

Peirce was possibly planning to develop a more direct account of his panpsychist view, but if that was the case, he did not finish it. In a note in the unfinished index of "A Guess at the Riddle," we find the following trace of such a possible plan:

> Chapter 8. The triad in sociology or shall I say pneumatology. That the consciousness is a sort of public spirit among nerve-cells. Man as a community of cells; compound animals and composite plants; society; nature. (CP 1.354)

It looks as if Peirce envisioned a sort of distributed mind, with consciousness being this "public spirit," and a single individual human being only a particular stage of emergence within a giant hierarchy where that individual has above himself society and ultimately nature. Could such a view have been compatible with evolution of the Darwinian type, as struggle and elimination of the weak?

The whole idea of actions of the mind directed by final causes seems to be at odds with absolute chance, which after all is ultimately the origin of all habits and actions. I suggest that Peirce was confronted with more than one tension within his system. And this, I would also suggest, ultimately led him to changes to his system and novelty concepts that we encounter in the *Monist* series.

7 The Developed Theory in the *Monist* Series

The previous chapters have run through the development of Peirce's theory of evolution, which reached its final stage in what is considered the first, complete systematic outline of Peirce's metaphysical program, that is to say, the so-called *Monist* series. When considering this entire development, we can now answer some of the initial puzzles sketched in chapter 2.

In the first article of the *Monist* series, Peirce reframed the case for his theory of the evolution of natural laws, restating the argument that it is laws that need to be explained. He thereby continued the query that had started with "The Order of Nature." But he now added that embracing a strict determinism impeded the search for new discoveries. This epistemological argument was based on a statistical conjecture: if one accepted as a foundation of laws immutable and, if possible, mechanical regularities, finding new laws would always require additional hypotheses. This in turn would make the number of possible theories progressively grow and therefore the possibility of getting closer to the truth dwindle. On the other hand, if one presumed the evolution of natural laws, this was not only a better guiding principle in the search for new theories, but "the only possible way of accounting for the laws of nature and for uniformity in general" (CP 6.13). This presupposition was the starting point for Peirce's 'architectural' system.

7.1 The new triad of Darwinism, catastrophism, Lamarckism

In developing his evolutionary theory, Peirce had been mostly inspired by Darwin up to 1891, when he added new sources of inspiration. In "The Architecture of Theories," he invited the reader once more to look at biology as a source of plausible evolutionary theories. In so doing, he continued the search for a biological triad, initiated in "One, Two, Three." But while in 1887 Peirce located the elements of the triad all within Darwinism, in 1891 he also embraced catastrophism and Lamarckism. These three theories formed his new, intermediate triad until his final formulation in 1893.

Peirce therefore broke with his earlier system (or rather repaired it, since in 1887 he had already expressed discontent at how the triad fitted biological evolution). He now described Darwinism as consisting of only two elements, namely imperfect heredity (giving room for sporting) and natural selection. But he continued to view Darwinism as "plainly capable of great generalization" (CP 6.15) and kept on the view outlined in "Design and Chance":

> If the amount of variation is absolutely limited in certain directions by the destruction of everything which reaches those limits, there will be a gradual tendency to change in directions of departure from them. Thus, if a million players sit down to bet at an even game, since one after another will get ruined, the average wealth of those who remain will perpetually increase. (CP 6.15)

Peirce in 1891 was still attached to his player's game model, which resulted from combining Darwinism and thermodynamics back in 1884. However, it seems that the apparent direction of evolution is what he considered really important at this later stage.

Lamarck's model of the inheritance of acquired characters explained, in Peirce's perception, "the development of characters for which individuals strive [...] in consequence of effort and exercise" (CP 6.16), as the result of continuous changes. One can understand how Peirce welcomed this model of evolution, which suited his increasing acceptance of teleology in the evolution of habits, which (as we recall) started in "A Guess at the Riddle," where he sustained that all mental actions, which are nothing else but acquired habits, are directed by final causes. Peirce now concluded that "philosophically conceived, Darwinian evolution is evolution by the operation of chance, and the destruction of bad results, while Lamarckian evolution is evolution by the effect of habit and effort" (ibid.).

In order to complete the triad, Peirce appealed to the cataclysmal theory of evolution (also paying his dues to his teacher Louis Agassiz, who had defended catastrophism), which he depicted as evolution "by external forces and the breaking up of habits" (CP 6.17). We might further generalize it within Peirce's system as the evolution due to the action of habit upon habit.

All three elements of the triad are operative, Peirce suggested, but he clearly did not wish to limit their scope to the biological realm. So he pointed out that cataclysmic evolution fits in "the historical evolution of institutions as in that of ideas" rather well (ibid.). It has been argued by scholars that Peirce's inclusion of the Lamarckian and cataclysmic views was not based on the evidence of biology, but on the "neat ways in which they fitted into his metaphysical and theistic evolutionism" (Wiener 330). This claim seems correct, seeing how in his first *Monist* paper he provided the following, lose paraphrase of Aristotle's second book of *Physics*:

> [E]vents come to pass in three ways, namely, (1) by external compulsion, or the action of efficient causes, (2) by virtue of an inward nature, or the influence of final causes, and (3) irregularly without definite cause, but just by absolute chance; and this doctrine is of the inmost essence of Aristotelianism. It affords, at any rate, a valuable enumeration of the possible ways in which anything can be supposed to have come about. (CP 6.36)

Clearly, (1) corresponds to Peirce's understanding of catastrophism, (2) corresponds to Lamarckism and (3) to Darwinism. If we consider how Peirce had progressively moved from accepting absolute chance as the sole ultimate cause in 1884 to embracing in 1891 what in his eyes was traditional Aristotelianism, it is evident that the purely "statistical" account of evolution had little or importance for him and made room for final causes.

7.2 Chance, habit-taking, and agapè seen as developed ideas

As Peirce explained at the outset of the second paper of the series, "The Doctrine of Necessity Examined," the success and applicability of the laws of mechanics had led philosophers to over-represent efficient causes (CP 6.36) and to the triumph of the "mechanical philosophy," which implied necessitarianism. In opposition to the main tenet of that worldview, that every event is precisely determined by law, Peirce outlined all his arguments for absolute chance, which can be reduced to the following five: 1) chance is the only explanation for law itself; 2) chance is the only cause for variety or heterogeneity; 3) we are in no way able to disprove chance; 4) chance explains free will and consciousness; and 5) chance is the only cause of growth. As we have seen, 1) was already introduced in 1878, 2) in 1884, 3) in 1886 and 4) in 1887. Finally, 5) can be regarded as the real new argument: necessitarianism implies conservation of energy, while accepting growth as a general phenomenon seems to be at odds with it. Accepting absolute chance in opposition to rigid mechanical laws offers a solution.

Peirce emphasised that both the development of organisms and that of ideas in the mind follow from the 'non-conservative' action of chance, (CP 6.60) and he goes as far as stating that the law of mind "resembles the 'non-conservative' forces of physics, such as viscosity and the like, which are due to statistical uniformities in the chance encounters of trillions of molecules." (CP 6.613) This carries an odd resemblance to the core idea of "Design and Chance," where habits were seen as statistical results of chance events continuously occurring. The fact that Peirce's theory carried traces of the seemingly abandoned 'thermodynamic' pathway of

"Design and Chance" is visible also when he described how absolute chance works: "spontaneity […] acting always and everywhere […] producing infinitesimal departures from law continually, and great ones with infinite infrequency" (CP 6.59). That is exactly the modus operandi of his first formulation of chance: small continuous departures are the consequences of the probabilistic basic process of dice throwing, while infrequent great changes are the switching in the loading rule of the dice.

However, in another part of the same *Monist* paper, Peirce stated that he made "use of chance chiefly to make room for a principle of generalization, or tendency to form habits, which I hold has produced all regularities" (CP 6.59). This is the same idea we referred to as the 'catastrophe of habits' and which first appeared in "A Guess at the Riddle" as a consequence of what we termed 'flash theory'. There Peirce stated that all habits are products of habit-taking. Those are two apparently distinct modes of establishing habits, and we are now in a better position to clarify what he thought at the time of writing the *Monist* series.

However, in order to solve the tension between them, we must begin with absolute chance as a principle, as it is the cause and explanation of everything. Following the argument of "A Guess at the Riddle," a principle of habit-taking is established as the realization of one of the many possibilities that appear and disappear (without proper existence) in the original, pure chance state of the universe. Peirce defined habits as regularities and as what repeats itself, and this persistence is to him the core premise for anything to be able to exist. In what might look dangerously close to a tautology, Peirce described habit-taking above all as a tendency to exist, and which consequently has the property of being self-sustaining in a universe where existence was originally rare. Habit-taking is itself a habit and therefore is not a strict and universal law, but itself subject to chance. Therefore in Peirce's primordial universe we must imagine the first permanent 'things' to acquire more permanence but at the same time swerving by the action of chance. From those swerves, new non-permanent things become real and acquire permanence through the tendency of habit-taking. Chance brings in variety, and habit-taking fixates the variations. But Peirce did not see the world as an homogeneous unfolding of chance and habit-taking, and there would be some situations in which chance would be dominant and others in which habit-taking would prevail. In the former situations, indeed the idea does not differ much from the one offered in "Design and Chance." When habit-taking is dominant, Peirce saw change brought in by final causes, a consequence of the idea he first outlined in "One, Two, Three" and explained more clearly in "A Guess at the Riddle": just like the commonly known human habits, habits of nature too are final causes

because they display tendencies toward an end state. The end state, the infinitely distant future, where habits will be so 'solidified' for the universe to be under the "reign of law," coincides for Peirce with God's revelation. In their final stage, all habits will be revelations of God and habit-taking is thus a 'striving' towards that end.

The teleological aspect of habit-taking is the reason why Peirce associated it with Lamarckian evolution. However, Peirce himself admitted his hesitancy on that score (italics mine):

> Lamarckian evolution is thus evolution by the force of habit. -- That sentence slipped off my pen [...]. Of course, it is nonsense. Habit is mere inertia, a resting on one's oars, not a propulsion. Now it is energetic *projaculation* (lucky there is such a word, or this untried hand might have been put to inventing one) by which in the typical instances of Lamarckian evolution the new elements of form are first created. (CP 6.300)

Peirce scholars showed that he was in bad faith here and must have invented the term "projaculation" in order to hide his own doubt in terminological obscurity (W8:413). This unsolved issue adds to the already existing tension surrounding Peirce's idea of future 'crystallized' habits which at the same time also imply God's final self-revelation and are furthermore also associated with cosmic death.

I would suggest that, towards the end of his project, in order to be able to include an explicitly Christian teleology into his cosmic evolution, Peirce turned to agapè, which is introduced only in the last paper of the *Monist* series, "Evolutionary Love." There, Peirce broke with his own tradition and defined agapè almost *ex negativo* with respect to how chance or habits operate, introducing something new in his system. We do however also find a continuation of the mystical and religious terminology that, as we have seen, was previously attached to absolute chance. It is as if Peirce had transferred some features and presumed properties from one force to another. We now find Peirce talking about "creative love" (CP 6.307), while in past works it had been absolute chance to be associated with creation. The earlier Peirce had individuated in God the creative power behind original chance, but also as the rationality of the final destination of evolution. By contrast, in 1893, agapè is "the love that God is […] a love which embraces hatred as an imperfect stage of it" (CP 6.287).

In the realm of biology, agapè is a "bestowal of spontaneous energy by the parent upon the offspring" (CP 6.303), but it is unlike classic habit-taking insofar it forges harmonies rather than being a blind repetition. Agapè acts contrary to how

Peirce understood the Darwinian struggle, by which the strong gets stronger at the expense of the weak. What makes things more confusing for the reader is that Peirce did not refer to some forces of love already known in the philosophical tradition. He wanted to rule out all forms of rational love, such as the greatest good of Jeremy Bentham:

> Sacrifice your own perfection to the perfectionment of your neighbor. [...] Love is not directed to abstractions but to persons; not to persons we do not know, nor to numbers of people, but to our own dear ones, our family and neighbors. (CP 6.288)

It is a strikingly simple way of prescribing what to do, a moral imperative more than a plausible propellant of cosmic evolution. But we must remember that to Peirce, matter is partly "deadened mind" and therefore agapè acts, however limited it may be, everywhere.

7.3 The triad as tychastic, anancastic, agapastic evolution

As we have observed throughout the previous sections, Peirce continuously developed his cosmogonic philosophy. In the *Monist* series, we find all the elements that had accumulated in the course of this development:

> [I] 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. (CP 6.30)

Here, we find a description of the logical evolution of habit-taking from pure chance intended as possibility (first mentioned in "A Guess as the Riddle"), a chance that, once habits start to form, can act only as variation (as described in "One, Two, Three") in a universe that proceeds towards complete solidification (the thermodynamic death described in "Design and Chance"), but all of this is now described following the progressively stronger vitalistic terminology of

Peirce's cosmological thought: chance now receives the properties of "feeling" and "mind," and possibility becomes a "germ."

What Peirce really added to his earlier thought in the *Monist* series is a triad that, once the cosmogenesis had taken place, individuates three modes of evolution, that is, modes of changing habits and of establishing new ones. These are the tychastic, anancastic and agapastic evolution. In the light of the development of Peirce's thought as sketched up to now, we may understand the modes of evolution as modes of habit-taking, in the way Peirce defined habit-taking in "One, Two, Three," namely as a relation between the origin and terminus of the universe.

Peirce explicitly linked these three modes to the triad of biological evolution, such that tychastic evolution, like Darwinian evolution, is mostly propelled by absolute chance, anancastic evolution like catastrophism is propelled by the action of habit upon habit, and agapastic evolution is propelled by the 'lovely' striving to transfer energy towards others that Peirce somewhat clumsily tried to defend as a case of Lamarckian evolution.

Tychastic evolution proceeds by minute variation which acts upon the existing habits. This sporting can lead to formation of new habits in two ways: by them becoming habits by the habit of habit-taking, or statistically, when the number of varying systems belonging to the same class is large. In the latter case, which is Darwinian evolution, for Peirce the new habits that will actually survive are 'selected' by the process of elimination explained in "Design and Chance."

But established habits can also break other habits or self-determine themselves into change: this is the idea of catastrophism, which Peirce mixed with Hegelian dialectic evolution, and which he categorized under the mode of anancastic evolution. He sometimes referred to it as evolution by "mechanical necessity," because it is the effect of habits devoid of all the chance that, however marginally, always operates on them. In his own words, "[e]volution by sporting and evolution by mechanical necessity are conceptions warring against one another" (CP 6.299, 6.302).

However, the way Peirce now described the interplay between absolute chance and habits is very different from the way he did in "A Guess at the Riddle." Chance is now devoid of that association to "God the creator," and evolution by habit is reduced to the mechanical necessity that he previously condemned as being an unfair reduction of reality. Specifically what is missing with respect to the previous systems is the characterization of habit-taking as a general Third that

mediates between the original chaos as God the creator and the ultimate fate of the universe as the revelation of God.

I believe that agapastic evolution is the form of habit-taking that fills that void. Just as Peirce explained his idea of absolute chance as opposed to the doctrine of mechanical necessity, it seems that he constructed agapastic evolution as an alternative to tychastic and anancastic evolution.

Agapastic evolution is thus characterized by purposive relations between different individuals. It is different from anancastic evolution because it is purposive, the purpose dictated by the (however mysterious) agapè. It is different from tychastic evolution because, while the latter advances by the destruction of the weak (as Peirce already started to notice in 1887), in agapastic evolution "advance takes place by virtue of a positive sympathy among the created springing from continuity of mind" (CP 6.304).

It would seem that the later Peirce changed his mind concerning the Darwinian/tychastic mode and turned his own example of the players upside down. In 1884, he declared that "bad habits" were destroyed and "good habits" evolved, but in 1893 he wrote that "in the tychastic evolution … ruined gamesters leave their money on the table to make those not yet ruined so much the richer. It makes the felicity of the lambs just the damnation of the goats" (CP 6.304). I will reserve more attention to this in the next chapter, and argue that Peirce developed much of his later theory as a response to the moral threat that he saw in considering Darwinian/tychastic evolution as the sole possible mode.

It is important to bear in mind that Peirce thought that all three modes of evolution were operative at the same time and were ultimately made of the same elements, although in different proportions. This suggestion might sound absurd, given that agapastic evolution seems to be applicable to humans and perhaps animals, while it is hard to feel the love of a stone or an atom. But we need to remember that since 1886, Peirce had continued to associate chance with feeling and mind; in the third paper of the *Monist* series he explained that "such a theory, fully developed, is bound to call in a tychistic idealism as its indispensable adjunct. Wherever chance-spontaneity is found, there, in the same proportion, feeling exists" (CP 6.265). This form of idealism implies that since chance is found, in however minute quantities, everywhere, we must suppose everything to be at least partially mind and therefore subjected to agapastic evolution. It also allows Peirce to talk about evolution of ideas without worrying too much that he is leaving more earthly matters behind.

Indeed, the only example Peirce gave of how the three modes operate concerns the way ideas develop the three different circumstances. The thychastic development of an idea proceeds by "slight departures from habitual ideas," purposeless and unconstrained, which unpredictably will become fixated in some new habitual idea (CP 6.307). The anancastic development of an idea follows the Hegelian way, where new ideas are adopted "without foreseeing whither they tend, but having a character determined by causes either external to the mind ... or internal to the mind as logical developments" (ibid.). Finally, the agapastic development is described as "an immediate attraction for the idea itself, whose nature is divined before the mind possesses it, by the power of sympathy," which one can read as the interconnectedness nature of the mind as Peirce saw it (ibid.). So a collective of men has a collective mind that can spread ideas before individuals consciously understand them, but at the same time it links man to God, by virtue of "the continuity between the man's mind and the Most High" (ibid.).

8 Development through Recurrent Themes

We have seen how Peirce developed his evolutionary theory in the course of at least 15 years. In the following, I propose to examine three recurrent themes, the development of which, I suspect, Peirce experienced as problematic; and in case it wasn't problematic for Peirce, it is at least so for his readers who struggle to make sense of what he was trying to tell them. These themes are (1) the forced triadic categorization of evolutionary forces, (2) the vitalistic tendencies that end up in panpsychism, and (3) Peirce's idea of direction, or better of directions, of evolution.

8.1 The evolution of the triads

At the moment that Peirce started to think in triads, his theory of evolution was that of "Design and Chance," a mix of Darwinism and thermodynamics applied to ontology. While absolute chance was for him already a developed concept, he merely sketched the idea of habit and left unexplained why chance events should aggregate statistically in what was the first, implicit form of habit-taking. But from 1886 onwards, we find every new development of his theory of evolution made to fit into one or more triads, while the framing of the triads was far from consistent.

In 1886, Peirce presented a logical triad of chance, law and habit-taking. In 1887, he escalated this triadism to all fields of knowledge. We find all of the triads summarized in the first paper of the *Monist* series in 1891:

> In psychology Feeling is First, Sense of reaction Second, General conception Third, or mediation. In biology, the idea of arbitrary sporting is First, heredity is Second, the process whereby the accidental characters become fixed is Third. Chance is First, Law is Second, the tendency to take habits is Third. Mind is First, Matter is Second, Evolution is Third. (CP 6.32)

However, we have seen above how Peirce came to reject the biological triad described here, which still echoes his earlier attempt to 'trichotomize' Darwinism in 1887, and that he eventually included catastrophism and Lamarckian evolution. We also find, in the last triad of the quote, a trace of his idea of the future thermodynamic death of the universe: if chance and feeling are first, law and dead matter are what the process of evolution will result in the infinitely distant future.

Scholars who disregarded Peirce's 'triadism' were at pains to understand what Peirce was saying. For example, Noth has wondered whether Peirce was inconsistent and defined "the laws of nature sometimes as habit-like and the laws of physics sometimes as blind" (Noth 53-54), and, since he rejected this notion of inconsistency, identified the second paper of the *Monist* series (written in 1892) as the moment in which Peirce changed his mind on the subject; according to Noth, before 1892 all laws were strict and after 1892 all were habits (ibid.). We may reply to Noth by saying that Peirce described laws of physics as 'solidified' habits since at least 1886. And even more importantly, since then Peirce also referred to "law" in general as the end point of an evolutionary process, an end point that is real only insofar as it is part of a logical, triadic relation with chance and habit-taking. Any existing point of time, any "present," as Peirce said already in 1887, is a third between the origin and the terminus, so that all that exists are habits.

On the other hand, Peirce's triadism is oftentimes confusing. Take the final system, offered in 1893, which presented a further trichotomy of the Third "Evolution" into tychastic, anancastic and agapastic modes, the latter being the most important. Its setup implied a return to the idea of God as a creator at the origin of cosmogony, and as being revealed at the endpoint of evolution. While in 1887, God had been seen as a creator in a chaos of chance and as being revealed in an ultimate rationality of laws, in 1893 Peirce embraced agapè and God as a personal creator, who revealed himself in the harmony and in the teleology of evolutionary love. While the triad is thus clearly a structure that Peirce maintained throughout his various changes of mind, its elements continuously changed, often drastically. To make things more confusing even, tychastic, anancastic and agapastic evolution do not stand in a real triadic relation, or at least not explicitly, and in this failure serve as a good example of the "triadomany" that Peirce was subject to.

For the reasons just mentioned, triads sometimes provide the key to understanding Peirce, but are sometimes also misleading. Our textual exegesis should suffice to advise exegetes against making them always their starting point for understanding Peirce's evolutionary cosmology, as for example Atkin has done (Atkin 226-240). We should also keep in mind that triadism was a doctrine that by admission of Peirce himself was more an obsession than anything else, as he wrote later in 1910: "I fully admit that there is a not uncommon craze for trichotomies" (CP 1.568). What is important to note, at any rate, is that Peirce's triads became increasingly 'biological': it is through the step of Darwinism -catastrophism-Lamarckism that Peirce introduced his own final modes of

evolution, and it is through the association of chance and feeling, both understood as Firsts, that Peirce ended up with that "tychastic idealism" that more properly is a form of panpsychism, as we shall see.

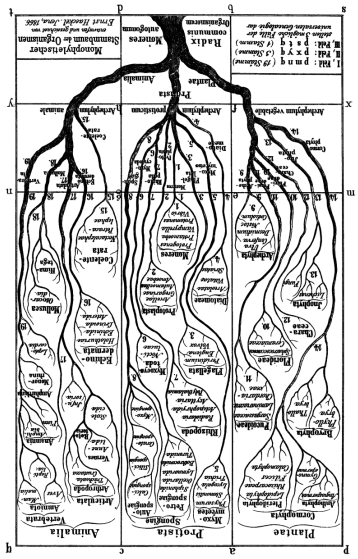
8.2 From vitalistic tendencies to panpsychism

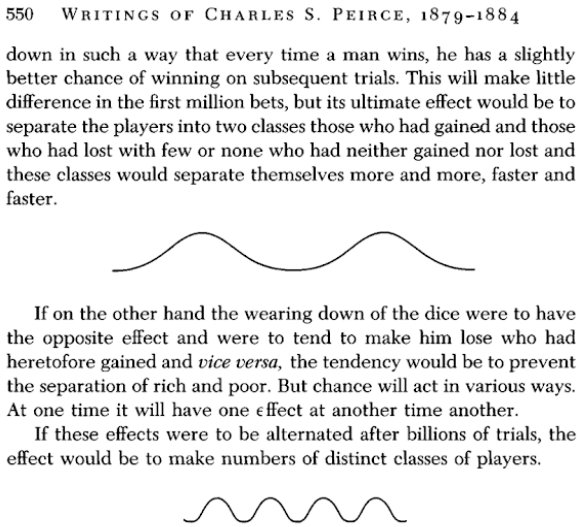
It is difficult to discern whether there has been a specific vitalistic influence on Peirce or whether his panpsychism was instead an innovative consequence of his own conjecture, which Peirce termed "tychastic idealism" in the fourth paper of the *Monist* series. That idea was a refinement of what had been first proposed in "A Guess at the Riddle" and builds upon accepting feeling as a primordial phenomenon. Chance "is but the outward aspect" (CP 6.265) of what a subject experiences as feeling.[17] We attribute feeling to living beings, because protoplasm is in "an excessively unstable condition" (CP 6.264) and becomes an amplifier of small chance effects, while dead matter is less unstable.

The question here is not so much how to explain feeling, which is tantamount to chance and is original, but how to explain dead matter. Peirce's answer is that "physical events are but degraded or undeveloped forms of psychical events" (CP 6.264), and "that matter is effete mind, inveterate habits becoming physical laws" (CP 6.25). But if that is the case, habit is really intended as the habits of a mind. Indeed, as Peirce explained in a letter to Christine Ladd-Franklin in 1891: "I believe the law of habit to be purely psychical. But then I suppose matter is merely mind deadened by the development of habit" (CP 8.318).

This strong formulation may be from 1891, but we have seen that Peirce's thought displayed vitalistic tendencies a few years earlier. We recall that in "The Order of Nature," Peirce still did not believe that natural laws evolved. But he believed in biological evolution and was looking for that "law of habit" that could justify the evolution of what looked like innate ideas. In "Design and Chance," he outlined a model of evolution by means of his example of the gambling players, a model that worked on the basis of statistics and probably applied better to gases than to organisms. But at the same time, he was also preoccupied with showing that classes of players were 'branching' into heterogeneous classes just like a taxonomic tree.

[17] This is more than an analogy, at the root of which there is Peirce's general idea that there is continuity between the physical and the psychical worlds, by virtue of synechism.





550 WRITINGS OF CHARLES S. PEIRCE, 1879–1884

down in such a way that every time a man wins, he has a slightly better chance of winning on subsequent trials. This will make little difference in the first million bets, but its ultimate effect would be to separate the players into two classes those who had gained and those who had lost with few or none who had neither gained nor lost and these classes would separate themselves more and more, faster and faster.

If on the other hand the wearing down of the dice were to have the opposite effect and were to tend to make him lose who had heretofore gained and *vice versa,* the tendency would be to prevent the separation of rich and poor. But chance will act in various ways. At one time it will have one effect at another time another.

If these effects were to be alternated after billions of trials, the effect would be to make numbers of distinct classes of players.

On the left, Haeckel's tree of life in Generelle Morphologie der Organismen (1866), branching from top to bottom (Haeckel). On the right, a page from "Design and Chance" in which Peirce visually explains the branching into more classes of players resulting from the action of chance (top, after some rounds, bottom after many more rounds). The tree of life is upside down in order to facilitate the visual analogy with the branching classes and the branching ‘peaks-classes’.

In "One, Two, Three," as we have seen, he attached an entire terminology borrowed from biology to his concept of chance, a tendency that became even more visible in "A Guess at the Riddle," where we found ‘wombs’ and ‘germs’ out of which the primordial habits were established. Even in the exotic ‘flash theory’ for the origin of habit-taking, Peirce talked about *branching* streams of flashes. We may therefore suppose that Peirce never really abandoned the language of biology when accounting for a cosmic evolution, with the consequence that everything looked at least in part biological, and ultimately conscious. This biomorphic language couldn’t but lead to vitalism, as Peirce clearly bestowed creative powers to chance, which viewed from that perspective became a sort of Peircean ‘vital spark’. In the *Monist* series, this tendency resulted in an indiscriminate treatment of chance and life, as when Peirce advocated (italics mine) "admitting pure spontaneity *or life* as a character of the universe" (CP 6.59). Because chance is at least partly everywhere, panpsychism follows from this form of vitalism: "the cosmos, only so far as it yet is mind, and so has life, is it capable of further evolution" (CP 6.289). Habit and habit-taking in this sense are nothing more than the "secret to be discovered here" at the basis of innate ideas, which Peirce had mentioned in 1878. Given this long lineage, it is not surprising to find that in 1891, he still started off with biological theories of evolution in order to construct his own, nor it is surprising that he chose to apply them to the case of the evolution of human ideas.

Whether it was the result of an influence from the outside or the outcome of his own chain of thoughts, the panpsychism that Peirce ended up with in the *Monist* series was not limited to attributing partial minds to non-living matter. Peirce actually accepted as at least partially conscious also collective, societal entities. In a continuation of the fragment of the chapter on sociology of "A Guess at the Riddle," he declared in "Evolutionary Love":

> It is true that when the generalisation of feeling has been carried so far as to include all within a person, a stopping place, in a certain sense, has been attained; and further generalisation will have less lively character. But we must not think it will cease. Esprit de corps, national sentiment, sympathy, are no mere metaphors. None of us can fully realise what the minds of corporations are, any more than my brain cells can know what the whole brain is thinking. (CP 6.271)

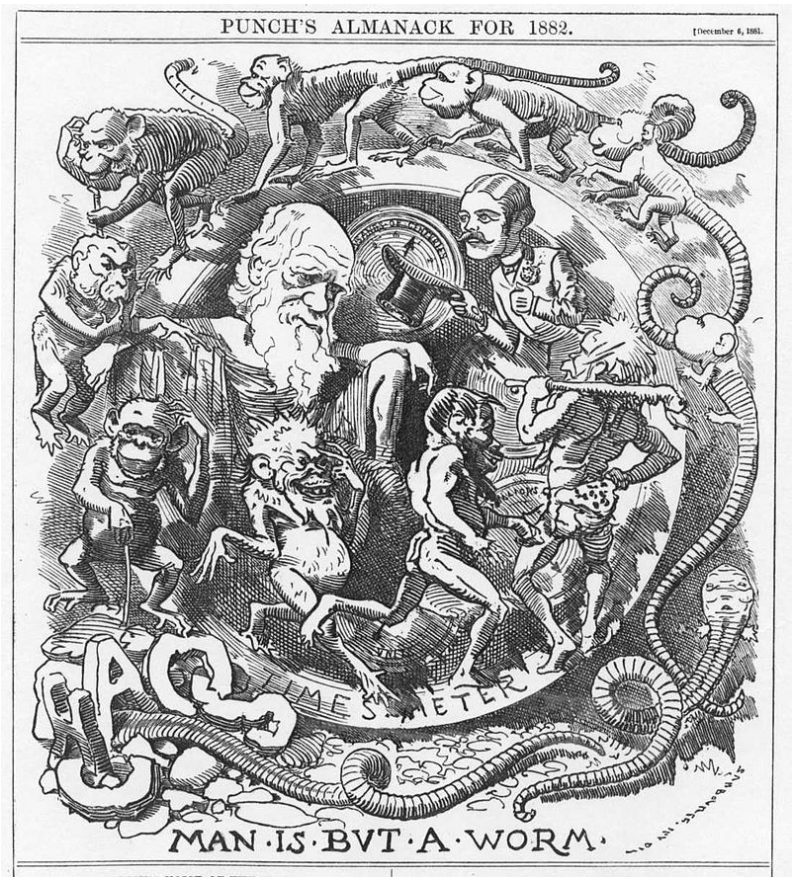
This quote gives us a clue as to how agapè may fit into this panpsychist framework. Agapè may be seen as the principle by which minds can coordinate in harmony, this coordination being itself a mind which develops through an agapastic form of habit-taking. This principle is the opposite of the tychastic principle that, as we have seen, develops only by the elimination of the weak following from a struggle. In case this suggestion sounds speculative, it actually finds confirmation from the analysis of another idea dear to Peirce, that of the direction of evolution.

8.3 The direction of evolution: from the *scala naturae* to agapism

We have seen how, from the very beginning of his evolutionary metaphysics, Peirce had the stable idea that the cosmos was evolving from a state of chaos to one of order. Moreover, it appears that all along, this notion of cosmic evolution was inseparable from the idea of progress.

While in "The Order of Nature" Peirce took a determinist and fixist view of the laws of nature, we still found him talking of a ‘scala naturae’ of increasingly intelligent creatures. We recall that those at the bottom of the range experience a world of chance, while at the top, there is a perfect Being experiencing everything rationally and according to law. In this view, the path from chaos to order is thus not dynamic or evolving, but static and merely a question of perspectival experience. I would like to suggest that in essence, Peirce entertained this hierarchical view all along, and in this I agree with Noth who lucidly suggests that

Peirce merely changed his focus, shifting from a "synchronic perspective on the laws of nature to an evolutionary one" (Noth 54). Yet I propose that he is wrong in locating this shift in the late Peirce of the *Monist* series. As we have seen, Peirce went through different stages: in "Design and Chance," synchronic and evolutionary views coexist, while as soon as the idea of habit-taking was developed in "One, Two, Three," the evolutionary one came to dominate. Nevertheless, his tendency to recognize a hierarchy and the related notion of progress did not change, it merely took different forms.



"Man is But a Worm" by Edward Linley Sambourne, Punch's Almanack for 1882 (Burnard 1881). We find in this drawing, contemporary to Peirce, many of the themes of his early view of evolution: a directed, gradual evolution towards the highest animals, arising out of chaos, under the Darwinian hypothesis.

In "The Order of Nature," Peirce saw the cosmos undergoing a "constant progress of development since the planet was a red hot ball" (CP 6.420). The progress was headed towards increasingly conscious beings that could perceive more and more of the static regularities surrounding them. The *telos* was the comprehension of a static, perfectly rational universe.

In "Design and Chance," Peirce dropped determinism and through his algorithmic model of the players' game demonstrated, among other properties, also progress by means of what Wiener called a "statistical cosmological theorem" (Wiener 335). Here, evolution powered by chance altered the (merely apparent) laws of nature. Still, Peirce specified that only the "good" ones would remain while "bad habits are quickly destroyed" (W4:553). Even if the 'habits' of that model hardly encounter any correspondence in the real world, in the ensuing works we still find him entertain the idea that under Darwinian or tychastic conditions, there was a "continual and indefinite progress toward a better adaptation" due to the same 'statistical theorem'. In later writings, Peirce would refer to Darwinian evolution as having a "quasi-purpose" (CP 1.269).

After 1886 we see Peirce professing that habits emerge out of chance not as statistical results, but rather as possibilities that become stable via habit-taking. The universe thus proceeds from a state of chaos towards that ultimate state of pure determination by habits. But for Peirce, habits, and also habit-taking, are themselves final causes. Since habits evolve and habit-taking is itself a habit, we now have a model in which everything evolves by a final cause, which directs the development to a final state which *is itself evolving*. Here lies the big difference with the first scenario in "The Order of Nature," where the perceived world of discovered 'empirical rules' would, in the long run, tend towards a system of real 'natural laws' that is all along *static*, being some kind of Platonic forms. For the later Peirce, by contrast, the cosmos was tending towards some 'quasi-Platonic' state, which itself was also evolving.

For the later Peirce, the way in which this teleological process took place began to be of moral concern. We recall how in the last paper of the *Monist* series, Peirce loaded tychastic or Darwinian evolution with a moral judgement. The analogy of the players' game is now turned upside down, as if Peirce, all at a sudden, had come to recognize the 'tragedy' of the broken players, which in a biblical tone he referred, in "Evolutionary Love," as the "damnation of the goats." Despite this new moral layer, the mechanism behind the model did not change between 1884 and 1893. What did change is that Peirce explored new possibilities for his evolutionary theory to be directed by final causes, possibilities that better fitted his growing religious commitment:

> As Darwin puts it on his title-page, it is the struggle for existence; and he should have added for his motto: Every individual for himself, and the Devil take the hindmost! Jesus, in his sermon on the Mount, expressed a different opinion. (CP 6.293)

While in 1884, Peirce had thought of a form of Darwinism as the only way to bring together absolute chance and cosmic evolution, in 1893 he posited agapastic evolution as a mode that leveraged sympathy and collaboration rather than individualistic struggle, as I will show l in the next chapter. It would therefore appear that Peirce had started to develop his theory of evolution based on his concept of absolute chance, but in the end did not fully accept the consequences of this premise.

9 Reading the *Monist* Series through the Development of Peirce's Thought

9.1 Peirce versus social Darwinism

As we have shown in the previous chapter, for Peirce evolution remained a matter of progress, and "Evolutionary Love" was largely a moral critique of the argument that to achieve progress, the Darwinian mechanism was the only way. Peirce rejected the notion of competitive struggle, which he called the "Gospel of Greed," pitting against it his own agapism, inspired by the "Gospel of Christ":

> The gospel of Christ says that progress comes from every individual merging his individuality in sympathy with his neighbours. On the other side, the conviction of the nineteenth century is that progress takes place by virtue of every individual's striving for himself with all his might and trampling his neighbour under foot whenever he gets a chance to do so. This may accurately be called the Gospel of Greed. (CP 6.294)

Today, we would dismiss such an association of Darwinism with greed as a misunderstanding. But in the later nineteenth century, it was not uncommon to conflate theories of biological and social evolution.

Peirce constructed an historical argument that ultimately described a self-reinforcing cycle of the "Gospel of Greed," broadly conceived in terms of the newly popular economy-based thinking, where all final causes are a form of material profit. He felt that recent advances in physics were reinforcing both the study of economics and the necessitarian philosophy (CP 6.290), the latter connection being shared by contemporary thinkers such as James Clerk Maxwell (Campbell and Lewis 362-366). Peirce was convinced that necessitarianism and economy-based thinking led to the acceptance of greed and violence as natural principles and therefore to a predisposition to accept the idea of Darwin:

> What I mean is that his hypothesis, while without dispute one of the most ingenious and pretty ever devised … did not appear, at first, at all near to being proved … but the extraordinarily favorable reception it met with was plainly owing, in large measure, to its ideas being those toward which the age was favorably disposed, especially, because of the encouragement it gave to the greed-philosophy. (CP 6.294)

For this argument, Peirce relied on an exotic claim. According to him, it was not just scientists that were favorably disposed to a philosophy of greed and violence --because of the alleged individualism implied by the laws of mechanics (CP 6.262)-- but so were the people of the western world, because the recent invention of anaesthetics had taken pain away and in so doing made them prone "to relish a ruthless theory" (CP 6.294). The cycle closed with Peirce's belief that Darwinism, especially in its 'necessitarian' form of Spencerianism, was ultimately justifying and reinforcing the same "Gospel of Greed" that favoured its acceptance.

Peirce devised this historical argument to show that Darwinism was part of a broader doctrine that suggested that "greed is the great agent in the elevation of the human race and in the evolution of the universe" (CP 6.290). Holding on to the idea of progress, he claimed to have instead placed love as the central force instead of greed, in defense of what he called "sentimentalism," defined as "the doctrine that great respect should be paid to the natural judgments of the sensible heart" (CP 6.292). But in his criticism of a generalized Darwinism, Peirce was incoherent in many ways. Despite his Hegelian streak and his recognition of what he elsewhere called the "spirit of an age" (CP 6.271), he anthropomorphized this spirit (once again against his own advice to avoid personification): how can the spirit of an age perceive pain (and thus avoid it through anaesthetics), and in turn influence philosophical doctrines, is left unexplained. Moreover, in "Evolutionary Love," we find the claim that "The Origin of Species of Darwin merely extends politico-economical views of progress to the entire realm of animal and vegetable life" (6.293), which incidentally is different from saying that it is welcomed by, and because of, the reigning socio-political atmosphere. But at the same time, Peirce also praised "the real science that Darwin was leading men to" (CP 6.294). One recognizes in this tension Peirce's long-standing, double-sided attitude towards Darwinism. His seemingly extravagant arguments in "Evolutionary Love" appear as the last stage of this development, whose remaining contradictions are the results of a perennially unresolved tension.

In fact, back in 1878, Peirce had acknowledged Darwinism as the sole possible mode of biological and mental evolution. In 1884, he wished to bring "Darwin in the realm of ontology," while admitting that he did not know other evolutionary philosophies than Darwin's and Spencer's. One could even claim that his example of the players is no more than social Darwinism brought into the casino. But already in 1886, he wished to distinguish himself from Spencer, whom he accused of blindly accepting the necessitarian axiom. Until 1893 Peirce kept responding to Spencer whenever he could (CP 6.157, 6.14), stressing the fact that no heterogeneity or growth could arise from mechanical, conservative forces. His

own indeterminism, Peirce argued, not only explained variety and growth, but he also saw it, at least since 1887, as a way to achieve the greatest good. This last view, in turn, crumbled when Peirce revised his theory in 1893 on moral grounds. As we have seen above, he now introduced agapè and furthermore associated necessitarianism with the moral decay resulting from the "Gospel of Greed." His conviction had become that "growth comes only from love" (CP 6.289), whereas previously, chance had been the only origin of growth.

Wiener has argued that Peirce was convinced of a sort of anti-Darwinism from before he started his metaphysical program (Wiener 328). But from an examination of the development of Peirce's thought, a more nuanced view arises. What I have suggested here is that Peirce developed his theory from a logical generalization of Darwinism, but subsequently changed his mind in a series of ways. Years later, in 1897, he would even claim that he "had learned little from the evolutionary philosophers" (CP 1.5). Our preliminary analysis might profitably be further extended, since the development of Peirce's evolutionism has not yet been examined and interpreted as an on-going confrontation with Darwin and Spencer -- an perspective that looks very promising as a line of interpretation.

9.2 Ambiguities of chance, law and agapè

As we have seen, Peirce's doctrine of tychism, when applied to biology, also contained a moral commitment. As appears from the *Monist* series, tychism is a complex doctrine even at the purely logical level. From an examination of the development of Peirce's ideas, it becomes clear that the concept of absolute chance and the way it operates were modified and enriched at different stages. In "The Order of Nature," Peirce held an ontological determinism and an epistemological indeterminism, where the "partially chancy" world of perception is effectively investigated by means of statistical induction, the best ideas being 'selected' for their effectiveness. In "Design and Chance," Peirce extended his indeterminism to ontology: chance now operated statistically, aggregating events into apparent natural laws which are better seen as evolving habits, which in turn are constantly selected by (unspecified) existential constraints. He had this idea in mind as early as 1877, when he wrote that "Darwin proposed to apply the statistical method to biology. The same thing had been done in a widely different branch of science, the theory of gases" (W3:244). But from 1886 onwards, we find him proposing a new mechanism, in which chance acts as a possibility for new habits to take place, generating those 'flashes' that "will chance to take habits of persistence and will get to be less and less liable to disappear; while those that

fail to take such habits will fall out of existence" (CP 1.414). We thus have two different, parallel ways in which chance acts. In chapter 4, we have seen that the first one, statistical chance, itself originates from two modalities active at the same time (the 'explanatory' and the 'evolutionary' modalities as we called them). This complicated structure came about as Peirce merged his own theory of habit-taking (which was much more in line with his chaos-to-order cosmology) with his view on chance, which was derived from Darwinism and thermodynamics.

An additional layer of complication, which eventually led to the moral dilemmas analyzed in our last chapter, is due to the heavy influence that Epicurus exerted on Peirce, who tried to explain free will and consciousness through absolute chance. Some scholars have been confused with respect to this Epicurean element by only looking at the *Monist* series. Hartman, for example, maintains that Peirce introduced agapè in order to make room for the mind and free will, which are excluded by the necessitarian view, and says that he already had anticipated agapè before writing "Evolutionary Love" (Hartman 35). But, as we have seen, Peirce had developed even before the *Monist* series arguments designed to make room for the mind and free will, which he borrowed from Epicurus.

Our reply, just as our response to Noth in chapter 8.1, points to a wider problem surrounding the secondary literature on Peirce's metaphysics: many analyses on specific topics such as agapè either focus on a single work and thus capture a narrow time interval, or are collections of the a-temporal quotes from the *Collected Papers*, without the necessary context. The ambition of this study was that its longitudinal analysis of Peirce's evolution, albeit limited to 15 years, may have shed new light on the influences that at different times impacted on his theory. Our hope was furthermore that the idiosyncratic and often densely obscure concepts of the *Monist* series look, when placed in the history of their origin, somewhat more accessible and the problems they carry along appear more evident.

Aristotle's influence, which led Peirce to first define absolute chance as what is uncaused, remained stable all along. Tychism was designed to provide a better account of natural laws, with absolute chance figuring as an explanation possessing the special property of stopping the infinite regress of causation. Peirce's entire theory is built upon the premise that everything should be explainable.

But is agapè explicable in the same way? Peirce gestures towards such an explanation when he appeals to the "sensible heart." But what argument was Peirce here using exactly? In his own words:

> Such a confession [that of revealing a passionate predilection for the "Gospel of Christ" over the "Gospel of Greed"] will probably shock my scientific brethren. Yet the strong feeling is in itself, I think, an argument of some weight in favor of the agapastic theory of evolution? So far as it may be presumed to bespeak the normal judgment of the Sensible Heart. (CP 6.295)

We must remember that Peirce defined the agapastic evolution of an idea as that "immediate attraction for the idea itself" (CP 6.307). But would it not seem, then, that Peirce explained agapè circularly, with an agapastic argument? As an alternative, we might read this argument just like that for absolute chance. Chance explains causation (as regularity) by a principle of non-causation, just as agapè explains logical development by a principle that is not logical but emotional: in any case, it seems far less solid. This analogy seems to shed more shadow on chance than light on agapè.

Should we then accept both chance and agapè as 'First', as primordial principles? This road also has its problems. If they are primordial, real and tangible, then they should possess some kind of regularity, since in 1886 Peirce wrote that "the existence of things consists in their regular behavior" (CP 1.411). We have noticed when analyzing "Design and Chance," that the absolute chance Peirce was first describing carried some law-like characteristics. With respect to this matter, we may applaud Atkin when he asserts that not only chance is sometimes described as a law (Atkin 260), but also agapè. Indeed we should also recall that in 1893, Peirce defined agapism by means of the proposition that the "law of love [is] … operative in the cosmos" (CP 6.302). But if chance and agapè are laws, isn't Peirce developing yet another one of those systems based on primordial, universal laws that he started to criticize in 1878? In what I have shown in this analysis, such doubts seem legitimate.

Another road out of the quagmire would be to consider chance and agapè as transcendental, in the religious sense. While this hypothesis is more obvious for agapè, it is generally reinforced by Peirce's descriptions of chance, which we have found loaded with religious terms for the period after 1884 and which later at least partly 'migrated' when it came to define agapè. This interpretation agrees with the views of the later Peirce, who became more religious and turned (against his own

criticism in "The Order of Nature") to accept the traditional Christian God as a personal creator of the universe. In a letter from 1909 he wrote:

> To me there is an additional argument in favor of this theory of objective chance -- I say to me because the argument supposes the reality of God, the Absolute, which I think the majority of intellectual men do not very confidently believe. It is that the universe of Nature seems much grander and more worthy of its creator, when it is conceived of, not as completed at the outset, but as such that from the merest chaos with nothing rational in it, it grows by an inevitable tendency more and more rational. It satisfies my religious instinct far better; and I have faith in the religious instinct. (Quoted in Wiener 350)

9.3 Did Peirce reach his own goal of formulating a "scientific metaphysics"?

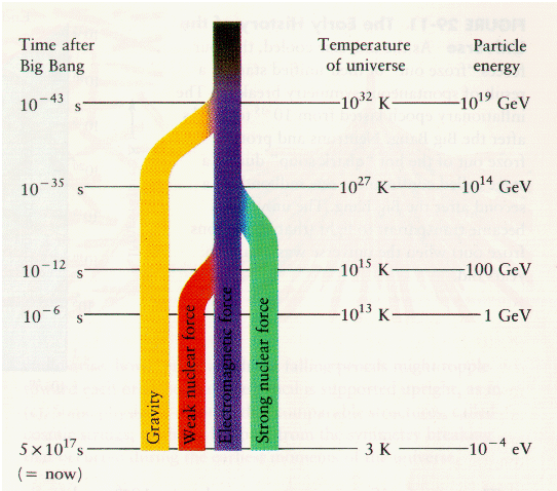
The fact that Peirce became increasingly religious towards the end of his life also had an impact on the final formulation of his evolutionary theory, which had already previously to the religious phase displayed a series of inconsistencies. The religious turn obviously undermined the very purpose of Peirce's ambition of offering a "scientific metaphysics," a law of laws that would help science in finding new laws. It had been his project as far back as in 1884, and it was restated also in the first paper of the *Monist* series as follows:

> To find out much more about molecules and atoms, we must search out a natural history of laws of nature, which may fulfil that function which the presumption in favor of simple laws fulfilled in the early days of dynamics, by showing us what kind of laws we have to expect and by answering such questions as this: Can we with reasonable prospect of not wasting time, try the supposition that atoms attract one another inversely as the seventh power of their distances, or can we not? (CP 6.12)

But did Peirce succeed in this? Atkin, for example, has answered this question with a forceful "no" (Atkin 260-262). But he did not acknowledge the value of Peirce's theory in that it was very original and swam against a strong tide of mechanical determinism,[18] as other commentators like Pickering recognized

[18] One could speculate that Peirce read the treaty "Vestiges of the Natural History of Creation" (published in 1844 anonymously), in which the idea of evolution was applied to the cosmos and natural laws. There is, however, no proof of such a connection, if not the peculiar word choice (emphasis mine): "diversification is the *vestige* of chance-spontaneity" (CP 6.267).

(Pickering 90). Peirce is also credited with pioneering several ideas related to his evolutionism and indeterminism that would enter scientific discourse only much later (Hartshorne 49; Pickering 92-106). In today's physics manuals, it is not uncommon to find illustrations of cosmogenesis based on the idea of the spontaneous separation of fundamental forces, which branch off one another just as Peirce would have imagined a 'genetic tree' of habits (image below).



In line with Atkin, I suggest that despite all the merits the analysis of the development of Peirce's evolutionism does not only show how he did *not* build a scientific metaphysics, but also that this goal was not his constant focus. Peirce progressively moved from offering a theory close to a scientific hypothesis to a purely descriptive and ultimately prescriptive one. The 'cosmic statistical theorem' presented in "Design and Chance" was, for all its rudimentary state, closer to a scientific hypothesis than the theory of habit taking that Peirce outlined later. It became descriptive (but not scientific, rather a 'just-so story'), because with the final evolutionary triads Peirce could basically catalog all processes that can be described as evolutionary, for when each mode was made to correspond to a kind of causation, and all modes were said to be operative at the same time, it became difficult to disprove his theory with observed facts. The theory finally became prescriptive because of the great importance it bestowed upon agapastic evolution, which was reducible to the Gospel of Christ, which ultimately is a moral tale.

Even when Peirce tried to apply his evolutionism, he chose examples from disciplines that were not yet regulated by science, such as the history of ideas or that of civilizations, in what seems not much more than a search for patterns that fitted his theory well. While he may be considered a pioneer of the evolutionary

approach to new fields, one also wonders why he did not test his evolutionism in a more established field at the time, such as biology.

The result of Peirce's endeavors was not 'scientific metaphysics' also for another reason. Peirce never made clear what his reality was made of: what is that which takes habits and what undergoes chance variations? In 1884, Peirce referred generically to "systems" or "compounds," while in 1887 he postulated a primordial, basic entity which he called a "flash." This is not much in terms of an ontology of the object of evolution. This fundamental gap may have led him to apply his theory not to reality, but to other theories. In "The Order of Nature," Peirce proposed an evolving epistemology, and in fact he returned to that very same notion in the *Monist* series, where we remember him testing his models on the development of ideas and theories. It is in fact in that domain that perhaps his obscure theory of agapè might have made some sense; after all, what Peirce is telling us there is that emotion, or what he calls 'sentiment', plays a part in inquiry by offering hypotheses, but also that it is never the only agent in the process. An idea is attractive (agapastically), a theory is built (logically and so anancastically), new ideas arise (tychastically), and so the theory is modified. But upon this reading, Peirce is merely an idealist in the domain of epistemology, however innovative and romantic his ideas might have been. Although this much reduced view of Peirce's project seems shared by few scholars (Hartman, Ibri), it happens to be coherent with what our exegesis has shown us about the evolution of Peirce's own thinking: an evolutionary theory (such as his) can be the multifaceted product of extreme hypotheses taken seriously, of sudden radical changes as well as of irrational tendencies to maintain ideas belonging to abandoned arguments, and of moral imperatives intruding upon its very core.

In the light of the above, this thesis hopefully contributed to shed light on some of the difficulties and mysteries which continue to attract, but at the same time confuse, the curious readers of Peirce. His evolutionary metaphysics remains to this day one of the less studied and most obscure parts of his philosophy.

Would it be too cheap an ending if we invoked Peirce's very words in a review of Henry James's "The Secret of Swedenborg"?

> We must fairly warn our readers that all the hard study we have devoted to an attempt to understand this book may have gone for nothing, for it is terribly difficult. (W1:437)

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