

The Evolution of Reason

The Evolutionary Metaphysics of Aristotle through the lens of Peirce's Objective Idealism

Sajad Abdallah

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Aristotle's metaphysics bridges the gap between mind and nature explaining how their relationship constitutes development in life. Charles Sanders Peirce's objective idealism similarly aims to investigate how the principles of thought are fundamental in the way the universe operates and develops. The method of this inquiry hopes to investigate Aristotle's metaphysics through the scope of Peirce's objective idealism in the significance of the argument that *reason* is the driving substance for development in the world. This ontological position is grounded in Ancient and Pragmatic thinking, providing an alternative understanding, that perhaps, challenges the modern narratives concerning the concept of evolution.

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Chapter One: Introductory Remarks

The term “metaphysics” has historically developed a negative meaning, associating the word with that science which investigates the nature beyond the physical, excluding the notion of matter.¹ This etymological understanding of the term metaphysics is often attributed with Aristotle. However, the Ancient Greek phrase *metaphysiká* is vague and has little to do with the issues that Aristotle raises. It simply means after the physics, or following the lectures on natural science; with the word “meta” denoting a position ‘after’ or ‘beyond’.² Aristotle provides a definition of metaphysics that is truly reflective of the science. Aristotle appropriately uses the phrase “first philosophy” to describe metaphysic because it deals with the most fundamental and abstract questions of existence. Metaphysics for Aristotle does not investigate nature beyond the physical but rather investigates the most essential nature of the physical.³ Metaphysics is the inquiry into the very essential nature of the object rather than simply what is said about it.⁴

The ontological thinking of this inquiry is derived mainly from Aristotle but is highly appropriated by the much more recent figure of Charles Sanders Peirce. This inquiry will explore Aristotle's metaphysics through a Peircean lens to explain the notion of *reason* and how it is the substance responsible for development in the world. The method of this thesis, concerning writing style and philosophical exposition, involves considering Aristotle and Peirce together in an interwoven way, instead of the more standard method of expositing their views separately then drawing connections

¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IV.1.1003a1

² Aristotle tr. Jowett rev. Barnes, *Metaphysics* IV.1.1003a1

³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IV.1.1003b1

⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IV.1.1003b1

thereafter. This interconnected style of writing is an application of the Ancient Greek way of dialectical writing. This style of writing is integral for metaphysical projects because it involves the figuring out and establishing the subject matter instead of simply analyzing it. The need for a subject matter in metaphysics is an especially peculiar task because the “first philosophy” cannot merely introduce the topic at hand but must rather make a statement about the “beginning” in general.⁵ The point of metaphysics is to formulate a beginning and so it cannot, as all other sciences do, presuppose its subject matter as something already given.

Natural sciences, like biology for example, already have at their disposal a pre-established subject matter, such as living organisms, and preconceived facts associated with that subject matter. The task of biology, for instance, is simply to dispense with and develop its subject matter. Metaphysics on the contrary cannot presuppose any facts or rules of thinking beforehand because these constitute part of its own content and have to be established during the very application of the science itself.⁶ This is why logic is the appropriate tool for metaphysical thinking: it involves the working out of the forms and rules of thinking necessary for a reliable foundation on which all subsequent sciences can be built on.

The metaphysical project has no mediate place to start and therefore it starts by reasoning about where to start. Metaphysics therefore takes this very reasoning that asks for a starting place as the very starting place for the inquiry, and delves right into the work, asking the question: what is the essential nature of things? In this case, what is this “reasoning” that enquires into the essential nature of things? The lack of a

⁵ Hegel, *The Science of Logic*, 33

⁶ Hegel, *The Science of Logic*, 34

mediate subject matter is the unique property of metaphysics enabling it to a) reflect on and criticize the methods of all the other disciplines, b) examine the most general concepts of science, for example substance, quantity, relation, etc., and c) explore existences that are essential to, and more fundamental than, the physical domain.⁷

If this inquiry is to be labelled under a philosophical trope, it can be attributed as “objective idealism”.⁸ However, the reader is urged to refrain from placing an already preconceived notion on what objective idealism – a fairly confused philosophical topic– might constitute. It is confused in the same way that the term metaphysics is confused, because the term “idealism” is ordinarily held to concern the discussion of abstract ideas devoid of any concreteness.⁹ This inquiry aims to establish through its scope that the latter claim is far from the truth. In fact, every science is idealistic because the supposed subject matter is taken as constituting the ultimate basis for reality.¹⁰ For example, scientific materialism takes the notion of matter as constituting the absolute substance of the universe. Objective idealism is not necessarily ideas devoid of matter, but instead the general sense of idealism concerns the influence of mind on the status of the any existent.¹¹ Objective idealism is appropriate for this inquiry because the principle of *reason* is contended to be the essential substance for what our organs of sensations conceive as material reality.

The obvious question is: Why is the concept of evolution appropriate to build on as a foundation of metaphysics? Evolution in its general meaning involves the process of *becoming*. The term “evolution” has its basis in what the Ancient Greeks refer to as

⁷ J. Novak communicated

⁸ Peirce, *Collected Papers* 6.605

⁹ Hegel, *The Science of Logic*, 316

¹⁰ Hegel, *The Science of Logic*, 316

¹¹ J. Novak communicated

movement, change or process, all of which are defined by the Greek term “kinesis”.¹² The term “kinesis” simply means “any difference in something’s condition between two different times”.¹³ This basic understanding of change is informed by the more fundamental term for the Greeks, that is, what they called “Energeia”, which means activity. *Energeia* for the Greeks define the nature of “logos,” or in modern terms, *reason*.¹⁴ *Energeia* explains developmental powers and the actualization of capacity. The word “capacity” (*dunatos*) for the Greeks precisely defines the term matter.¹⁵ In this sense, *logos* is the substance which has matter as the capacity for its activity. Evolutionary metaphysics is concerned with the kind of activity necessary for overall development, or equally, the fundamentals of development.

In recent times, the ontological position of science is accustomed to certain theories of evolution and takes those theories as the complete basis for deriving new knowledge. The dominant theory in biology today is Darwinian evolution.¹⁶ The ontological claim dominating many modern theories on evolution is that evolution in terms of biological life forms is seen to constitute a separate process independent of world evolution.¹⁷ This creates a divide between world history and life history, and between life history and human history.¹⁸ From this ontological point of view, the universe is seen as a cycle disclosing no alteration and no aim.¹⁹ In the realm of biological life and humankind, by contrast, the opposite is true: aim and development

¹² Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 416

¹³ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 416

¹⁴ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 414

¹⁵ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 388

¹⁶ Beatty, *The Evolutionary Contingency Thesis* 47

¹⁷ Beatty, *The Evolutionary Contingency Thesis* 47

¹⁸ Beatty, *The Evolutionary Contingency Thesis* 47

¹⁹ Whitehead, *Nature Alive* 212

are essential concepts for any explanation.²⁰ For example, in animal and human life, aim is an essential feature for most activities: hunger aims at food, sexual intercourse is for the purpose of reproduction, and so on.²¹

This prompts a question: Why is it that everything in the human realm supposes some kind of aim but the universe discloses no aim? The reason is that many observations about nature are limited to abstractions.²² Abstractions however only provide partial knowledge about the nature of development in the world.²³ Moreover, all the mental antecedents that we so habitually rely on to derive knowledge are usually disregarded as playing a role in the process of world evolution.²⁴

In this thesis, I hope to provide an alternative approach concerning the concept of evolution derived from the metaphysical works of Aristotle and Peirce. Both philosophers argue for the same ontological notion that *reason* is the driving principle for development in the world, and that our understanding about nature will acquire a more comprehensive scope if we adopt this ontological view.²⁵ In this thesis I hope to achieve several interconnected objectives: a) To investigate the notion of *reason*, in particular as the driving substance for development in the world, based on the works of Aristotle and Peirce b) To link the philosophical topics of objective idealism and evolutionary metaphysics in a manner so as to show that the development of knowledge is intimate with the development of life; c) Moreover to invert through this ontological thinking the ordinary narrative that sees matter as the primary condition for the world, and instead argue that matter is a quality from the activity of logic indicative to the

²⁰ Whitehead, *Nature Alive* 212

²¹ Whitehead, *Nature Alive* 213

²² Whitehead, *Nature Alive* 212

²³ Whitehead, *Nature Alive* 212

²⁴ Whitehead, *Nature Alive* 214

²⁵ The term “world” here means the universe, nature and reality.

concrete nature of *reason*.

This thesis is structured in the following order; in the Second Chapter we will explore the process of knowledge in nature. First, we will examine how science is a system. Second, it will be important to explore what is meant by the notion of “thought” and exactly how thought is related to the object? Finally, we will see exactly what is meant by the idea that logic is an activity of thought, and how *reason* defines thought distinguishing two types of logic – natural and formal logic.

In Chapter Three, we will explore how the constitution of substance defines *reason*. In this way we will explore how form and matter are essential properties of nature. Secondly, I will offer an explanation of what it means to possess a “nature”? Third, we will examine in what sense does form and matter include efficient and final causation? And finally, what constitutes change and the generation of things in the world?

In Chapter Four, we will discover how the development of life is synonymous with the development of knowledge, and how in this process the faculties of rationality acquire their function. In Chapter Five, the concluding remarks, we will reflect back on the scope of the thesis.

Chapter Two: Thought is Substance

2.1. Scientific Knowledge

According to the Ancient Greeks, knowledge in the strictest sense is understood as “episteme”, which is ordinarily translated as scientific knowledge.²⁶ Peirce explains that the best translation of *episteme* is “comprehension” which is “the ability to define a thing in such a manner that all its properties shall be corollaries from its definition”.²⁷ Unlike what we think of today as scientific knowledge, Aristotle intends the term to include knowledge of nature but not to be restricted to it.

The term “science” is more general for the Ancient Greeks. Aristotle thinks we can achieve scientific knowledge of such things as the nature of absolute reality. Peirce states that “Aristotle was a thorough-paced scientific man as we see nowadays, except for this, that he ranged over all knowledge”.²⁸ Aristotle held that strictly speaking there are three disciplines that yield scientific knowledge: metaphysics, physics, and mathematics. By physics Aristotle means what today we call the principles of natural science.²⁹ He refers to metaphysics as the “first philosophy”.³⁰

Aristotle believes that all three disciplines provide knowledge that is invariably, or at least generally, true. He refers to these three disciplines as theoretical science(s) because they provide knowledge that is valuable purely for its own sake.³¹ What Aristotle calls the practical disciplines are studies of morals and how people should live if they

²⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 424

²⁷ Peirce, *Collected Papers* 1.232

²⁸ Peirce, *Collected Papers* 1.618

²⁹ Peirce, *Collected Papers* 1.618

³⁰ Peirce, *Collected Papers* 1.618

³¹ Peirce, *Collected Papers* 1.618

and their community are to flourish.³² Aristotle frequently warns that unlike the theoretical disciplines, the practical disciplines deal with relatively imprecise topics.³³ There will invariably be many exceptions to any general truths about politics and ethics. Keeping in mind Aristotle's three kinds of disciplines, let us turn to the most basic of the theoretical sciences, metaphysics – “the first philosophy”.³⁴

According to Peirce, philosophy consists of two parts, logic and metaphysics.³⁵ Peirce explains that logic is the science of thought in general and not merely the study of psychical phenomena.³⁶ Metaphysics on the other hand is the science of *being* and “not merely as given in physical experience, but of being in general”.³⁷ Metaphysics is the science that investigates *being*, not in the same way as any of the specialized sciences do, because they study only a specific part of *being* and not *being* in and of itself.³⁸ Greek philosophers before Aristotle were occupied with the question: What is *being*?³⁹ Aristotle makes this question scientific by asking, what is *substance (ousia)*?⁴⁰ Unlike the concept of *being*, substance is not vague, because it presupposes a nature with particular characteristics that are conceivable.⁴¹ Substance is responsible for explaining the specific nature of *being*.⁴²

In addition to the claim that metaphysics is concerned with substance, Aristotle adds that metaphysics is the study of the fundamental principles of demonstration and

³² Peirce, *Collected Papers* 1.618

³³ Vanier, *Made for happiness* Loc. 152

³⁴ Peirce, *Collected Papers* 1.618

³⁵ Peirce, “Philosophy and the Conduct of Life” in *Selected Philosophical Writings* 35

³⁶ Peirce, “Philosophy and the Conduct of Life” in *Selected Philosophical Writings* 35

³⁷ Peirce, “Philosophy and the Conduct of Life” in *Selected Philosophical Writings* 35

³⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IV.1.1003a1.25-30

³⁹ Aristotle tr. Lawson-Tancred, *Metaphysics* 1028b

⁴⁰ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 427

⁴¹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 418

⁴² Aristotle tr. Lawson-Tancred, *Metaphysics* 1028a

logic.⁴³ The reason why the fundamental principles of logic falls to metaphysics is because these principles are likewise not concerned with some specific department of *being*, such as the specialized sciences study, but with *being* as a whole, the province of philosophy.⁴⁴ It is true that specialized scientist, especially natural scientist, have taken an interest in the past foundations of logic, but in so doing, they have been using the foundations of metaphysics.⁴⁵ In any case, the notion of substance is wider than the natural world, so that the natural scientist would be going outside their field and into the realm of philosophy, a move that Aristotle is inclined to take when inquiring into nature.

Peirce explains that Aristotle “was driven to his strange distinction between what is better known to Nature and what is better known to us”.⁴⁶ Aristotle’s claim that things can be “known by nature” indicates that there are certain facts that make objects the kind of things that they are exclusive of any person knowing them.⁴⁷ Scientific knowledge begins with what is better known to us, based on what we sense and understand, but should ultimately arrive at a comprehension of things better known in themselves. Peirce elaborates:

But were every probable inference less certain than its premisses, science, which piles inference upon inference, often quite deeply, would soon be in a bad way. Every astronomer, however, is familiar with the fact that the catalogue place of a fundamental star, which is the result of elaborate reasoning, is far more accurate than any of the observations from which it was deduced.⁴⁸

Aristotle’s notion of science can be interpreted in this way: scientific knowledge is “the

⁴³ Aristotle tr. Lawson-Tancred, *Metaphysics* IV.3

⁴⁴ Aristotle tr. Lawson-Tancred, *Metaphysics* IV.3.1005a

⁴⁵ Aristotle tr. Lawson-Tancred, *Metaphysics* IV.3.1005b

⁴⁶ Peirce, *Collected Papers* 5.575

⁴⁷ Peirce, *Collected Papers* 6.452

⁴⁸ Peirce, *Collected Papers* 5.575

agreement of thought with the object”.⁴⁹ The “business of science is simply to bring the specific work of reason, which is in the thing, to consciousness”.⁵⁰ Science is the “comprehension” of the essential nature constituting the object.⁵¹

Aristotle explains that “the proper object of unqualified scientific knowledge is something which cannot be other than it is”.⁵² Scientific knowledge is achieved when “the fact could not be other than it is”.⁵³ By this Aristotle is indicating the distinction between a belief concerning the nature of the object and the true conception of the object. There may be many beliefs concerning the nature of the object, but there can only be relatively few true conceptions about what it actually is.⁵⁴ The latter achieves scientific knowledge, but how do we acquire this? Aristotle explains that scientific knowledge is derived by way of “demonstration”. Peirce explains:

Aristotle argues that there must be certain first principles of science, because every scientific demonstration reposes upon a general principle as a premiss. If this premiss be scientifically demonstrated in its turn, that demonstration must again have been based upon a general principle as its premiss. Now there must have been a beginning of the process, and therefore a first demonstration reposing upon an indemonstrable premiss.⁵⁵

The demonstration is not merely any fact but rather it must have true premises prior to the conclusion; that is, the premises must be known prior to knowing the conclusion.⁵⁶

When Aristotle asserts that to gain scientific knowledge we must have the “cause of the fact,” he is claiming that we must know the reasons why the conclusion is true even if we are certain of its truth.⁵⁷ For example, we can never fully be certain that dropping a ball will fall to the ground unless we know the proposition that explains why it falls. We can

⁴⁹ Hegel, *The Science of Logic* 39

⁵⁰ Hegel, *Philosophy of Right* 48

⁵¹ Peirce, *Collected Papers* 1.232

⁵² Aristotle tr. Mure, *Posterior Analytics* I.2

⁵³ Aristotle tr. Mure, *Posterior Analytics* I.2

⁵⁴ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.2.71b1.20-25

⁵⁵ Peirce, *Collected Papers* 2.27

⁵⁶ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.2.71b1.20-30

⁵⁷ Aristotle tr. Mure, *Posterior Analytics* I.2

for instance say that gravity is the reason why the ball falls to the ground, which becomes in its turn a conclusion that requires further premises that must be demonstrated.

The second condition of scientific knowledge is that we know only the “things that cannot be otherwise”.⁵⁸ For Aristotle, science is only able to process what is possibly true.⁵⁹ It is impossible to think of not-something because then you have thought of it. Any negation of a thought is just another thought. For example, it is impossible to think of not-a-cat because that triggers the thought of a cat, and in addition perhaps even the thought of a dog and so on. By this Aristotle means that anything we know is scientifically true when the “necessary conclusion is just equally as certain as its premises, while a probable conclusion is somewhat less so”.⁶⁰ For example, we can scientifically know that the three internal angles of a triangle add up to be equal to two right angles, or that mammals birth their offspring alive.⁶¹ The fact about triangles is always true but the fact about mammals is only sometimes true. However even in the latter example, according to Aristotle, it is always true that mammals birth their offspring sometimes alive and sometimes dead.⁶² This is simply meant to indicate that there are some conclusions whose premises are absolutely true, and other conclusions involve multiple true premises absolutely.⁶³

Once a conclusion is scientifically known to be true it can be used as a premise in another syllogism to derive more knowledge. Aristotle thinks that knowledge in a particular discipline can be laid out to provide a systematic body of knowledge. Every

⁵⁸ Aristotle tr. Mure, *Posterior Analytics* I.2

⁵⁹ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.2.71b1.20-25

⁶⁰ Peirce, *Collected Papers* 5.575

⁶¹ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.5.74a1.10-30

⁶² Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.2.72a1.5-20

⁶³ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.2.72a1.5-20

fact is in turn derived from more basic knowledge.

According to Aristotle it is important to recognize that not all truths making up scientific knowledge are demonstrable.⁶⁴ There are some premises that are not deduced from anything.⁶⁵ There are premises that provide the basis from which demonstration is deduced, and such premises are what Aristotle calls the “first principles” of science.⁶⁶

Peirce explains what this means:

But the Aristotelians, who compose the majority of the more minute logicians, appeal directly to the light of reason, or to self-evidence, as the support of the principles of logic. Grote and other empiricists think that they have proved that Aristotle did not do this, inasmuch as he considered the first principles to owe their origin to induction from sensible experiences. No doubt, Aristotle did hold that to be the case, and held moreover, that the general in the particular was directly perceived, an extraordinarily crude opinion. But that process of induction by which he held that first principles became known, was according to Aristotle not to be recovered and criticized. It was not even voluntary. Consequently, if Aristotle had been asked how he knew that the same proposition could not be at once true and false, he could have given no other proof of it than its self-evidence.⁶⁷

The first principles of scientific knowledge must themselves be knowable, yet they are not derived from anything, they must be self-explanatory.⁶⁸ The term “first principle” is somewhat misleading and has several possible meanings. Peirce is not entirely satisfied with Aristotle’s argument for first principles. He states:

Who shall say what the nature of that process was? He cannot; for during the process he was occupied with the object about which he was thinking, not with himself nor with his motions. Had he been thinking of those things his current of thought would have been broken up, and altogether modified; for he must then have alternated from one subject of thought to another [...] That argument is a representation of the *last part* of his thought, so far as its logic goes, that is, that the conclusion would be true supposing the premiss is so. But the self-observer has absolutely no warrant whatever for assuming that that premiss represented an attitude in which thought remained stock-still, even for an instant.⁶⁹

⁶⁴ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.3.72b1.15-20

⁶⁵ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.3.72b1.15-20

⁶⁶ Aristotle tr. Jowett rev. Barnes, *Prior Analytics* II.16.64b1.30-35

⁶⁷ Peirce, *Collected Papers* 2.26

⁶⁸ Aristotle tr. Jowett rev. Barnes, *Prior Analytics* II.16.64b1.30-35

⁶⁹ Peirce, *Collected Papers* 2.27

Peirce explains that first principles are based on the assumption that the process of thought in the mind is really composed of distinct parts, each requiring a distinct effort of thought.⁷⁰ Peirce says that there is no necessity for supposing that the process of thought, as it takes place in the mind, consists of distinct arguments, each having a previously thought premise.⁷¹ This is basically to say that our thinking process is not organized in such a way that a first argument is required to initiate it.

Although Peirce is correct in pointing out that “there is no necessity for a series of arguments representing a course of thought to have a first argument”⁷² – for Aristotle, thought, no matter how it operates nevertheless conceives something in the object that serves as the object’s first principle.⁷³ By first principle Aristotle is looking for the idea essential to the object. In this sense, first principles are ultimately the result of the thinking process.⁷⁴ They are the “universals” perceived by the rational faculty and set down as a system.⁷⁵

Peirce is saying that the thinking process is not structured in such a way as to assume a starting point, but Aristotle says that thought ultimately arrives at the kind of structure where there are fundamental and indemonstrable premises in which systematic knowledge is based on. Both are pointing out two equally necessary parts required for science to achieve knowledge, that is, the process of thinking and its results. Knowledge for Aristotle, as well as for Peirce, is a living phenomenon in nature. Peirce says:

This calls to mind one of the most wonderful features of reasoning and one of the most

⁷⁰ Peirce, *Collected Papers* 2.27

⁷¹ Peirce, *Collected Papers* 2.27

⁷² Peirce, *Collected Papers* 2.27

⁷³ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.5.74a1.10-30

⁷⁴ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.6.74b1.5-15

⁷⁵ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.4.73b1.25

important philosophemes in the doctrine of science, of which, however, you will search in vain for any mention in any book I can think of; namely, that reasoning tends to correct itself, and the more so, the more wisely its plan is laid. Nay, it not only corrects its conclusions, it even corrects its premises.⁷⁶

This self-correcting feature indicates that reasoning is a natural element because it has an immanent movement. For Aristotle, logic is the immanent movement of reasoning.⁷⁷ Peirce states that “of the two branches of philosophy, logic is somewhat more affiliated to psychics, metaphysics to physics”.⁷⁸ Aristotle introduces logic to the science of metaphysics. As Peirce suggests, logic does not only deal with the right conduct of thinking.⁷⁹ There is a deeper claim here, namely that logic, being the science of thought generally, speaks precisely to the metaphysical question of what *being* is. The affiliation of logic to metaphysics is primarily the affiliation of thought to nature.

Aristotle is extremely interested in logic, not only because logic establishes the correct conduct for reasoning but also because he believes that logic deals with the nature of substance that generates the forms essential for physics. For Aristotle, logic is not only a product derived from human thinking, but it also belongs naturally in the world.⁸⁰ Logic is univocal because the logical system is meant to grasp real abstractions concerning the fundamental relations in the world. For example, the *laws of thought* for Aristotle are not just correct inferential rules. The laws of thought are the actual ways substance operates.⁸¹ The most fundamental principle of all for instance, – the law of non-contradiction – describes the most basic nature of substance by stating that it is

⁷⁶ Peirce, *Collected Papers* 5.575

⁷⁷ Aristotle tr. Lawson-Tancred, *Metaphysics* IV.3.1005b

⁷⁸ Peirce, “Philosophy and the Conduct of Life” in *Selected Philosophical Writings* 35

⁷⁹ Peirce, “Philosophy and the Conduct of Life” in *Selected Philosophical Writings* 35

⁸⁰ Aristotle tr. Lawson-Tancred, *Metaphysics* IV.3.

⁸¹ Aristotle tr. Lawson-Tancred, *Categories* 1b1.25–2a1.5–35

impossible for the same thing to have and not have the same feature at a single time.⁸²

This principle is not only an abstract rule but it is an essential fact about the universe. In Book five of the *Metaphysics*, Aristotle goes on to outline a list of logical principles and definitions to further describe the nature of substance in the universe.

The ordinary understanding, on the other hand, sees the laws of thought as just another system of inferences that can be disproven by other kinds of formal systems of inferences. What the understanding fails to grasp is that the laws of thought are actual abstractions taken from the world. Once separated from the world, they are taught as valid ways of reasoning, yet they have their origin in the way the world operates.

Logic immanent in nature is not random; rather, natural logic exhibits complex and integral structures characteristic of a thought process.⁸³ When it comes to grasping the notion of logic, Peirce is right to say that the formal side of logic is predicated by the natural. Peirce distinguishes between what he identifies as *logica utens* and *logica docens*.⁸⁴ The latter explains the logic learned as a formal system whereas the former explains the “pre-theoretical innate faculty” that thought naturally applies.⁸⁵

Logica docens is a formal system of logic taught in schools. The formal side of logic is the method of the cognition that extracts from all content, and the so-called second constituent belonging to thinking, namely its matter, is said to come from somewhere else; and that since matter is absolutely independent from logic, logic teaches only the rules of thinking without any reference to what is thought of, that is, the object.⁸⁶ Formal logic in this way sees the rules of thinking as something distinct from

⁸² Aristotle tr. Lawson-Tancred, *Metaphysics* IV.3.1005b

⁸³ Hegel, *The Science of Logic* 83

⁸⁴ Dea, “*Merely a Veil over the Living Thought*” 501

⁸⁵ Dea, “*Merely a Veil over the Living Thought*” 501

⁸⁶ Hegel, *The Science of Logic* 35

the other important element of thought, namely matter, which is what is thinking is confronted with in the first place.⁸⁷

Formal logic presupposes a separation between thought and the object.⁸⁸ It assumes that the material of knowing is merely present on its own account as a ready-made world apart from thought, and that thinking on its own is empty and external from the object.⁸⁹ In this sense, thinking receives the material external from it and thus acquires the content for its knowledge; yet at the same time, when thought completes itself with this external content, it excludes the object as playing a role in its forms of thinking?⁹⁰

The concept of abstraction, in one sense, explains how the human understanding deals with the material world. Peirce defines “abstraction” as follows:

Abstraction [*aphaeresis*] is the separation in thought of an attribute or relation from its subject, by neglecting the latter. This seems to be its sense, in Aristotle [...] Such a separation of matter and form, or of certain characters from others, but not of one thing from another.⁹¹

The ordinary understanding is endowed with the capacity to perceive the object and then abstract its qualities.⁹² When cognition makes an abstraction, it regards the form as something taken from the matter.⁹³ This assumes that the forms derived from matter, for example, mathematical relations such as size, density, shapes and so on; are qualities that only come after the inception of the material object.⁹⁴ The ordinary understanding misses the fact that the object is also the particular configuration of those qualities in

⁸⁷ Hegel, *The Science of Logic* 35

⁸⁸ Hegel, *The Science of Logic* 38

⁸⁹ Hegel, *The Science of Logic* 38

⁹⁰ Hegel, *The Science of Logic* 39

⁹¹ Peirce, *The Writings of Charles S. Peirce* 2.117

⁹² Aristotle tr. Jowett rev. Barnes, *On the Soul*. III.4.429b1.20

⁹³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.1.1028a1.10–30

⁹⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul*. III.4.429b1.20

the first place before a concept can be derived from it.⁹⁵

Ancient metaphysics in this respect offers an accurate conception of thought because in the Ancient era thought is not seen as anything alien to the object, but rather is seen as its essential nature.⁹⁶ Even language, for instance, depends on the affinity between thought and object. For example, every word supposes the object of what the word indicates and the thought about the object.⁹⁷ Aristotle examines the relationship between thought and object because in this relation, he thinks lies the secret of substance.

2.2. Thought and Object

In his work the *Metaphysics*, Aristotle uses the term “thought” throughout his discussion about the prime mover.⁹⁸ In one idiomatic use, thought is defined by the Ancient term *nous*, which is translated as the *understanding* and is represented by the word “sense”.⁹⁹ For example, someone with *nous* has common sense; he or she understands what is going on and reacts sensibly.¹⁰⁰ In the *Metaphysics* however, Aristotle has a more restrictive use of the word thought, one that is more general than its idiomatic usage.

Aristotle says that “human thought, or rather the thought of composite objects, is in a certain period of time” whereas “eternity is the thought which has itself for its object”.¹⁰¹ For Aristotle, thought is not reducible to the “sense” associated with the understanding of individuals. Aristotle sees thought as an element in the universe, in the

⁹⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.1.1028a1.10–30

⁹⁶ Hegel, *The Science of Logic* 42

⁹⁷ Hegel, *The Science of Logic* 42

⁹⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1

⁹⁹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 429

¹⁰⁰ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 429

¹⁰¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1075a1.5

same way that corporeal bodies are elements in nature, like “the bodies of animals and their parts and with vegetable bodies, and similarly also with those of the elements.”¹⁰² Except unlike corporeal elements, which are “subject to increase and diminution”¹⁰³, Aristotle sees thought as the most fundamental substance – “a circular motion” – “which moves without being moved, being eternal, substance, and actuality [...] thought move in this way.”¹⁰⁴ What Aristotle means by the latter claim is simply to say that “thinking is the starting-point.”¹⁰⁵ Aristotle argues:

Those who suppose, as the Pythagoreans and Speusippus do, that supreme beauty and goodness are not present in the beginning, because the beginnings both of plants and of animals are causes, but beauty and completeness are in the effects of these, are wrong in their opinion. For the seed comes from other individuals which are prior and complete, and the first thing is not seed but the complete being, [1073a1] e.g. we must say that before the seed there is a man,—not the man produced from the seed, but another from whom the seed comes.¹⁰⁶

Aristotle here explains that the whole is fundamental to the parts. Aristotle points out the complex relation between the whole and parts. He says:

Evidently even of the things that are thought to be substances, most are only potentialities,—e.g. the parts of animals (for none of them exists separately; and when they are separated, then they too exist, all of them, merely as matter) and earth and fire and air; for none of them is one, but they are like a heap before it is fused by heat and some one thing is made out of the bits. One might suppose [10] especially that the parts of living things and the corresponding parts of the soul are both, i.e. exist both actually and potentially, because they have sources of movement in something in their joints; for which reason some animals live when divided. Yet all the parts must exist only potentially, when they are one and continuous by nature,—not by force or even by growing together, for such a [15] phenomenon is an abnormality.¹⁰⁷

In this passage Aristotle hints at the following paradox in metaphysics: there are parts within parts that are not considered substances because some parts are only powers, or

¹⁰² Aristotle tr. Jowett rev. Barnes, *On The Heavens* I.3.270a1.30

¹⁰³ Aristotle tr. Jowett rev. Barnes, *On The Heavens* I.3.270b1.30

¹⁰⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072a1.25

¹⁰⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072a1.25

¹⁰⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1-1073a1.30

¹⁰⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1.5-15

potencies, contributing to the whole.¹⁰⁸ The whole however is only complete because of its parts.¹⁰⁹ Although each part on its own is a whole so as to be an individual part, the parts are only parts when they belong to the whole.¹¹⁰

Aristotle is looking for the universal substance that gives each particular object its distinctive nature. The Ancient Greek term for the word “particular” is *kath’hekaston* or *kath’kekasta*, which means an individual object or a definite nature.¹¹¹ In fact, claiming knowledge of an individual object is to point out its definite nature. Aristotle argues that thought defines the nature of the object as a definite and particular thing. Aristotle explains the fundamental relationship between thought and the object in the following way:

And thought thinks in itself deals with that which is best in itself, and that which is thought in the fullest sense with that which is best in the fullest sense. And thought thinks itself because it shares the nature of the object of thought; for it becomes an object of thought in coming into contact with and thinking its objects, so that thought and object of thought are the same. For that which is capable of receiving the object of thought, i.e. substance, is thought. And it is active when it possesses this object. Therefore the latter rather than the former is the divine element which thought seems to contain, and the act of contemplation is what is most pleasant and best.¹¹²

According to Aristotle, the object does not exist prior to the thought of it.¹¹³ Thought and the object are indivisible in the world because it is impossible for one to exist without the other.¹¹⁴ Thought and object constitute a synonymous relation, but they require each other differently. If thought is removed and only the object is left, there is no indication as to why the object should exist. Without thought, the object may both exist and not exist at the same time because there is no means of knowing one over the other.

¹⁰⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1.5-15

¹⁰⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1.5-15

¹¹⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1.5-15

¹¹¹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 418

¹¹² Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1.15-20

¹¹³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1075a1, 5

¹¹⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1.15-20

Aristotle says:

But actuality is prior in a higher sense also; for eternal things are prior in substance to perishable things [...] The reason is this. Every potentiality is at one and the same time a potentiality for the opposite; for, while that which is not capable of being present in a subject cannot be present, everything that is capable of being may possibly not be actual. That, then, which is [10] capable of being may either be or not be; the same thing, then, is capable both of being and of not being.¹¹⁵

Thought is “actuality” because without it “the same thing, then, is capable both of being and not being”, that is to say, the thing’s existence is the same as its nonexistence, therefore the object does not exist.¹¹⁶ Aristotle explains that thought is the actual substance because it is the activity identifying whether the object is “of being and of not being.”¹¹⁷ Thought is essential because it identifies the object and therefore gives it meaning. The object, on the other hand, is the potentiality of thought because it subscribes that meaning.¹¹⁸ Aristotle goes deeper and says that if we remove all objects and only thought remains, thought becomes receptive to nothing else but itself as the object.¹¹⁹ In the absence of all things, thought identifies itself.

Aristotle says that “while thought is held to be the most divine of phenomena, the question what it must be in order to have that character involves difficulties”.¹²⁰ Aristotle aims to clarify what he means by the statement that “thought is the object”, he asks the following question: is thought merely the act of thinking?¹²¹ Aristotle speculates that the act of thinking can belong to the thought of one thing and not anything else.¹²² Thought therefore cannot just be the act of thinking because once that act is thought of,

¹¹⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IX.8.1050b1,5-20

¹¹⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IX.8.1050b1,10

¹¹⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IX.8.1050b1,10

¹¹⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IX.8.1050b1,5-20

¹¹⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1-1075a1, 35

¹²⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1, 15

¹²¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1, 15-20

¹²² Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1, 15-20

it no longer remains the same.¹²³ Moreover, thought is not just the thinking about particular things over other things.¹²⁴ If thought thinks nothing, it is equally nothing, while if its thinking depends on something else, then thought is not substance but a particular capacity and ceases to be anything else beyond that capacity.¹²⁵

Thought, Aristotle says, is not just a particular action that signifies a capacity to pick out specific objects. Aristotle says, “Thought in the fullest sense”, “deals with that which is best in itself”. “And thought thinks itself” because it is “that which is best in the fullest sense”.¹²⁶ Aristotle makes the crude notion that “thought has itself for its object”, which means that substance “must be itself that thought thinks (since it is the most excellent of things), and its thinking is a thinking on thinking”.¹²⁷ This means that the object is always inherently a principle of thought because thought is the element that identifies the object.¹²⁸ The deeper claim is that thought does not only identify the object, but in identifying it, thought actually creates the object.¹²⁹ Aristotle goes on to argue that the activity of thought characterizes the notion of “God”. He says:

If, then, God is always in that good state in which we sometimes are, this compels our wonder; and if in a better this [25] compels it yet more. And God is in a better state. And life also belongs to God; for the actuality of thought is life, and God is that actuality; and God’s essential actuality is life most good and eternal. We say therefore that God is a living being, eternal, most good, so that life and duration continuous and eternal belong to God; [30] for this is God.¹³⁰

The Ancient word for the term “God” is *theos* or *theios*, which is interchangeable with the word “divine”.¹³¹ Aristotle notices that the word “divine” indicates something beyond

¹²³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1, 20

¹²⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1, 15-20

¹²⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1, 15-25

¹²⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1,15

¹²⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1,30

¹²⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1,15-20

¹²⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1075a1

¹³⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.7.1072b1,20-30

¹³¹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 405

normal human capacities.¹³² He also critiques the traditional views of the gods by referring to them as objects of worship, prayer and sacrifice.¹³³ Aristotle wants to correct some common anthropomorphic views of the gods. *God* cannot have anything like human personalities.¹³⁴ Aristotle associates the divine being with a rational soul with no feelings; it is self-sufficient, permanent and essential feature of the universe.¹³⁵ *God* is always in the activity of contemplation, and this is the object of divine “pleasure”.¹³⁶ *God*, Aristotle argues, is the pure activity of thought.

God is therefore the ideal of thought in so far as the human being has the capacity for rational study, and the activity of this capacity is the single activity that best fulfils the criteria for wellbeing – or as Aristotle calls it– *Eudaimonia*.¹³⁷ *Eudaimonia* renders a meaning beyond human pleasure or so-called “happiness”.¹³⁸ *Eudaimonia* is the complete state of being. It is complete because it is the most comprehensive; there is no more comprehensive end for it to promote.¹³⁹ Aristotle makes the same point in calling *God* self-sufficient and lacking nothing.¹⁴⁰ In this way, *Eudaimonia* is the state of the divine, which includes all other ends pursued for themselves. The “virtuous” person partakes in this divine state of being by engaging in “intelligence”, which deliberates and finds what is “right” to do.¹⁴¹ The result is that the virtuous person partakes in the divine nature of thought by deciding to pursue action for its own sake.¹⁴²

In the same way that the sensible forms are objects in human thought, Aristotle

¹³² Aristotle tr. Irwin, *Nicomachean Ethics*. 1122b20,1160a24. Glossary 405

¹³³ Aristotle tr. Irwin, *Nicomachean Ethics*. Glossary 405

¹³⁴ Aristotle tr. Irwin, *Nicomachean Ethics*. 1101b18, 1178b8. Glossary 405

¹³⁵ Aristotle tr. Irwin, *Nicomachean Ethics*.1134b28, 1141a20-b8, 1154b26. Glossary 405

¹³⁶ Aristotle tr. Irwin, *Nicomachean Ethics*. 1154b26, 1175a3. Glossary 406

¹³⁷ Aristotle tr. Irwin, *Nicomachean Ethics*. 1177b26. Glossary 407

¹³⁸ Aristotle tr. Irwin, *Nicomachean Ethics*. Glossary 407

¹³⁹ Aristotle tr. Irwin, *Nicomachean Ethics*. Glossary 407

¹⁴⁰ Aristotle tr. Irwin, *Nicomachean Ethics*. Glossary 407

¹⁴¹ Aristotle tr. Irwin, *Nicomachean Ethics*.1140a28. Glossary 407

¹⁴² Aristotle tr. Irwin, *Nicomachean Ethics*. 1105a31. Glossary 407

argues that life, human beings and the universe are actually objects in the thought of *God*. What we see as objects are really the ideas of divine thought. Aristotle does not go any further to elaborate on this perplexing notion, either because this is where his work ends, or because fragments of Aristotle's work have been lost throughout history. Aristotle does however explain the specific details of thought.

2.3. Logos is Natural Formula

The concept "Reason" explain precisely what Aristotle means by thought as the substance in the universe. Aristotle says: "For Reason is one, so that if matter also is one, that must have come to be in actuality what the matter was in potentiality. The causes and the principles, then, are three, two being the pair of contraries of which one is formula and form and the other is privation, and the third being the matter."¹⁴³ Reason denotes the conceivable characteristics that constitute the nature of thought. Aristotle employs the Ancient term "logos" to define reason. *Logos* indicates the activities and structures essential in objects.¹⁴⁴ When Aristotle says that the object possess "logos", he is looking for the formula of the object.¹⁴⁵ The formula of the object in succession allows for a true definition.¹⁴⁶ Aristotle says that the formula of the object is logic, which defines thought as the "thinking on thinking."¹⁴⁷ This means two things: first, logic is the activity of thought that generates the form of the object; and second, logic is also the systematic thinking about the object of thought.¹⁴⁸ Logic is both the

¹⁴³ Aristotle tr. Jowett rev. Barnes, *Metaphysics*. XII.2.1069b1, 30

¹⁴⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics*. XI.1049b1.15-25

¹⁴⁵ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 422-423

¹⁴⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 422-423

¹⁴⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1,30

¹⁴⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.9.1074b1,30-35

natural formula of the object and its scientific definition.¹⁴⁹

Aristotelian logic in this sense is defined by the ontological concept of “internal relations,” which may be described as follows:

Internal relations – embraces all those ontologies which assume relations are internal, meaning by this that an ultimate component’s essential qualities are the outcome of its relations and that the component is itself a quality, an adjective, of its situation.¹⁵⁰

Internal relations define the foundational determinations of logic; the proposition of one thing cannot be made without the presupposition of another. For example, if not-P is proposed, then P is invariably presupposed.¹⁵¹ The proposition of not-P gives rise to P as something distinct, and vice versa.¹⁵² Logic is “indivisible” substance because its relations constitute structures such that, if one component is missing, the entire system collapses. Peirce compares logic with mathematics in this way:

Where a mathematical calculus aims to reduce the number of intermediate steps necessary to reach a conclusion, a logical calculus expands the number of steps in order to better demonstrate the validity of the argument.¹⁵³

Mathematics aims to reach resolution by the fewest number of steps, whereas logic aims to point out every possible step. Logic according to Peirce is foundational for mathematics because all the possibilities of a calculus must first be shown before we can ascertain the fastest route to resolve the calculus.¹⁵⁴ Similarly, internal relation is the necessary concept for the counterpart ontology external relations. The concept of “external relations” is defined as follows:

External relations – embraces all those ontologies which assume these relations are external, meaning by this that the essential qualities of an ultimate component (an “atom”) exist independently of its relations and that an ultimate component possesses

¹⁴⁹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 423

¹⁵⁰ Winslow, “*Atomism and Organicism*”

¹⁵¹ Aristotle tr. Jowett rev. Barnes, *De Interpretatione*.I.10.19b1-20b1

¹⁵² Aristotle tr. Jowett rev. Barnes, *De Interpretatione*.I.10.19b1-20b1

¹⁵³ Dea, “*Merely a Veil over the Living Thought*” 505

¹⁵⁴ Peirce, *The Law of Mind*, 538–539

qualities without being itself a quality.¹⁵⁵

Internal and external relations are two sides of the same coin because the former explains the generation of form while the latter explains the changes that form undergoes after generation.¹⁵⁶ The distinction made by Aristotle between thought and its object outlines some fundamental questions in his metaphysics; namely, what is the mind in relationship to nature?¹⁵⁷ Is reason a property of the mind or of nature, and what is the difference between form and matter when trying to understand the similarities between thought and object? Let us turn to the subsequent chapters to explore these questions.

¹⁵⁵ Winslow “*Atomism and Organicism*”

¹⁵⁶ Aristotle tr. Smith, *On the Soul* II.1-2

¹⁵⁷ The word “thought” for Aristotle is interchangeable with reason and mind

Chapter Three: The Nature of Substance

3.1. Form and Matter

Aristotle's method of inquiry requires us to begin with things that seem to be obviously true.¹⁵⁸ Then we look for the principles that will best explain them. Aristotle's investigation into what is true begins with the assumption that "real" things are the individual objects we see and feel, for example trees, dogs, people and so on.¹⁵⁹

However, Aristotle is concerned with the more fundamental notion of *substance* (*ousia*), which he believes is the definition of truth.¹⁶⁰ Aristotle explains:

We have said that the causes, principles, and elements of substances are the object of our search. And some substances are recognized by everyone, but some have been advocated by particular schools. Those generally recognized are the natural substances, i.e. fire, earth, water, air, &c., the simple bodies; second plants and their parts, and animals and the parts of animals; and finally the physical universe and its parts.¹⁶¹

Aristotle illustrates what other philosophers take to be true. He argues:

Some particular schools say that Forms and the objects of mathematics are substances. And it follows from our arguments that there are other substances, the essence and the substratum. Again, in another way the genus seems more substantial than the species, and the universal than the particulars. And with the universal and the genus the Ideas are connected; it is in virtue of the same argument [15] that they are thought to be substances. And since the essence is substance, and the definition is a formula of the essence, for this reason we have discussed definition and essential predication. Since the definition is a formula, and a formula has parts, we had to consider with respect to the notion of part, what are parts of the substance [20] and what are not, and whether the same things are also parts of the definition. Further, then, neither the universal nor the genus is a substance; we must inquire later into the Ideas and the objects of mathematics; for some say these exist apart from sensible substances.¹⁶²

Some philosophers think that nothing is a substance except things that can be sensed.¹⁶³

Empiricists for example in Ancient times and up to this day think in this way. Other

¹⁵⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.5-15

¹⁵⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.5-15

¹⁶⁰ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 418

¹⁶¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.5-10

¹⁶² Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.10-20

¹⁶³ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.10-20

philosophers believe that there are eternal beings, which are more numerable and real. Plato for example thinks that “Ideas,” or what he identifies as the Forms, are the truest substance in the world.¹⁶⁴ The Forms and the mathematical relations are substances that are more real for Plato than sensible bodies.¹⁶⁵

It is a commonly held opinion that the Platonic and Aristotelian philosophies are opposed, the latter being realistic and the former being idealistic. What is often overlooked is the fact that both philosophers elaborate the same ontological notion that *reason* is the principle of the world. They differ because Plato indicates *how* reason is the principle of the world, and Aristotle explains *why* reason is the principle of the world.¹⁶⁶ By outlining why reason is the principle of the world, Aristotle succeeds Plato; that is, Aristotle explains exactly in what way thought operates as the driving substance for development in nature.¹⁶⁷ In contrast to Aristotle, Plato is an example of a philosopher whose thinking does not involve the idea of development, while nevertheless recognizing the foundations for it.

Aristotle enquires into why material substances exist and how they relate to each other. Moreover, he aims to discover whether a substance exists that is more fundamental than a material body.¹⁶⁸ Plato and Aristotle both divide substance into *form* and *matter*. The distinction between form and matter as separate properties is the starting point in philosophical science because it allows for the investigation into the essentials of nature. Understanding the relationship between form and matter

¹⁶⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.10-20

¹⁶⁵ Plato tr. Fowler, *Symposium* 211a–b

¹⁶⁶ Aristotle tr. Jowett rev. Barnes, *Physics* II.3.194b1.15-20

¹⁶⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.

¹⁶⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.10-20

constitutes the basis for inquiring into substance.¹⁶⁹ Peirce states:

What is the general upshot of all these sciences, what do they all come to? Now in minor particulars I am hostile to Plato. I think it most unfortunate that he should in his most brilliant works have eviscerated his Ideas of those two elements, which especially render ideas valuable. But in regard to the general conception of what the ultimate purpose and importance of science consists in, no philosopher who ever lived, ever brought that more clearly than this early scientific philosopher.¹⁷⁰

Plato achieves the fundamental realization that form and matter are different. Plato does this with his argument that Form, or Ideas, are *ousia* (substances) devoid of matter. Plato's claim that *ousia* is devoid of matter creates the basic divide between form and matter. Plato however does not adequately describe *why* form and matter are different. Peirce explains:

Aristotle for example justly complains that of the four kinds of causes Plato only recognizes the two *internal* ones. Form and Matter, and loses sight of the two *external* ones, the Efficient Cause and the End. Though in regard to the final causes this is scarcely just, it is more than just in another respect. For not only does Plato only recognize internal causes, but he does not even recognize Matter as anything positive. He makes it mere negation, mere non-being, or Emptiness, forgetting or perhaps not knowing that that which produces positive effects must have a positive nature.¹⁷¹

Aristotle evaluates Plato's doctrine conceiving reality as consisting of different degrees. Plato believes that there are different kinds of substances. First, there are Forms or Ideas, which involves concepts and mathematical relations.¹⁷² The Forms are such things as the concepts of justice and beauty; and mathematical relations are things like 'the square root of 4 is 2' or 'the sum of the areas of the two squares on the shorter sides of a right triangle equals the area of the square on the hypotenuse'.¹⁷³ Although today we think of concepts and mathematical relations as purely abstract, Plato believes that they

¹⁶⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.1.

¹⁷⁰ Peirce, "Philosophy and the Conduct of Life," in *Selected Philosophical Writings* 37

¹⁷¹ Peirce, "Philosophy and the Conduct of Life," in *Selected Philosophical Writings* 37

¹⁷² Plato tr. Fowler, *Symposium* 211a–b

¹⁷³ Pythagoras' theorem

really exist in the world independently of our conception of them.¹⁷⁴

The second class of substance for Plato is what he calls “sensible bodies”.¹⁷⁵ Sensible bodies constitute a lower degree of reality than the Forms or mathematical relations.¹⁷⁶ For Plato, sensible bodies are objects that we can see and feel; however, they are always subject to change and never perfectly embody any characteristics.¹⁷⁷ For example, sensible bodies we take to be beautiful always bear some imperfection because we can always imagine a more beautiful object. Plato is led to believe that Forms are more real than the sensible objects we perceive because concepts exist eternally and perfectly, whereas material objects are constantly in flux and imperfect.¹⁷⁸

For Plato, the Forms are distinct from the material world; they are conceived only by the “intelligence” and are imperceptible to the senses.¹⁷⁹ However, the sensible bodies are based on the Forms. This idea makes more sense if we say that each material object relates to a concept that explains its constitution. For example, any object we perceive with a certain shape is based on certain geometric relations. Plato does not see the concept as derived after the conception of the object, as we ordinarily think today. Plato rather sees the concept as predicating the makeup of the particular object. For Aristotle, the concept and the object are simultaneous. Whether Form is prior to or after matter has been a metaphysical concern ever since.

For Aristotle, the task of the scientific philosopher is to find the common elements in all real things. Once these common elements are grasped, the philosopher can understand what makes a substance the kind of thing that it is. Aristotle agrees with

¹⁷⁴ Plato tr. Fowler, *Symposium* 211a–b

¹⁷⁵ Plato, tr. Fowler, *Symposium* 211a–b

¹⁷⁶ Plato, tr. Reeve, *Republic* 514a

¹⁷⁷ Plato tr. Fowler, *Symposium* 211a–b

¹⁷⁸ Plato tr. Fowler, *Symposium* 211a–b

¹⁷⁹ Plato, *Republic* 247d

Plato that all substances are compounds made up of form and matter.¹⁸⁰ However, Aristotle sees a fundamental error in how Plato conceives this relationship.¹⁸¹

Plato asserts that form is the requirement for sensible matter, but at the same time takes form as bearing a separable existence independent of matter.¹⁸² He fails, however, to explain how form is necessary for matter and yet separate from it. Aristotle agrees that form is the actual substance necessary for matter, but he has a deeper concern; namely, how can form be actual substance yet at the same time not act on anything; in this case, not acting on the sensible?¹⁸³ This gives no “explanation of the movement, the transition from possibility to actuality. Plato becomes entrenched in the formal cause” and overlooks the equally important efficient and final causes.¹⁸⁴

For Plato, the most real things are eternal and unchanging so that any process is evidence of a lack of actuality. Plato does not explain how form constitutes actuality because he does not explain the process necessary in order for something to be actual.¹⁸⁵ Aristotle resolves this by indicating that the very nature of formal substance is activity, and the persistence of the activity is the material substratum.¹⁸⁶ For Aristotle, actuality is not merely given; rather, it is developed.¹⁸⁷

3.2. The Nature

Aristotle is deeply interested in nature because he believes that nature is the object of thought and the realm where substance develops. He states that it is absurd,

¹⁸⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.4.1070b1.10-15

¹⁸¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.4.1070b1.10-15

¹⁸² Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.4.1070b1.10-15

¹⁸³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.4.1070b1.10-15

¹⁸⁴ Vanier, *Made for Happiness* Loc. 1384

¹⁸⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.4.1070a1

¹⁸⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.4.1070a1

¹⁸⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.13.1038b.5-30

even “laughable,” to argue about whether or not nature itself exists. He asserts:

*That nature exists, it would be absurd to try to prove; for it is obvious that there are many things of this kind, and to prove what is obvious by [5] what is not is the mark of a man who is unable to distinguish what is self-evident from what is not. (This state of mind is clearly possible. A man blind from birth might reason about colours.)*¹⁸⁸

Aristotle explains what makes something natural. He does this by comparing a natural substance to something that is produced artificially. He says:

Nature has within itself a principle of motion and of stationariness (in respect of place, or of growth and decrease, or by way of alteration). On the other hand, a bed and a coat and anything else of that sort, qua receiving these designations – i.e. in so far as they are products of art – have no innate impulse to change.¹⁸⁹

Natural objects have an innate tendency to change whereas things produced unnaturally have no inherent impulse for change.¹⁹⁰ When something has a nature, it is inherently able to move.¹⁹¹ For example, if the nature of earth is heaviness, then its locomotion is downwards. The term “nature” (*phusis*)¹⁹² has a two-fold meaning: things that develop naturally not only exist in nature but they also have a nature.¹⁹³ For example, we might say that it is the nature of the flower to receive light, or that the nature of the tiger is to hunt. The task of the natural scientist, in Aristotle’s view, is to discover the natures of different things. Peirce says:

Aristotle, on the other hand, whose system, like all the greatest systems, was evolutionary, recognized besides an embryonic kind of being, like the being of a tree in its seed, or like the being of a future contingent event, depending on how a man shall decide to act. In a few passages Aristotle seems to have a dim *aperçue* of a third mode of being in the *entelechy*. The embryonic being for Aristotle was the being he called *matter*, which is alike in all things, and which in the course of its development took on *form*. Form is an element having a different mode of being.¹⁹⁴

¹⁸⁸ Aristotle tr. Jowett rev. Barnes, *Physics* II.1.193a1.

¹⁸⁹ Aristotle tr. Hardie and Gaye, *Physics* II.1

¹⁹⁰ Aristotle tr. Jowett rev. Barnes, *Physics* II.1.193a1.30-35

¹⁹¹ Aristotle tr. Jowett rev. Barnes, *Physics* 254b1-10

¹⁹² Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 416

¹⁹³ Aristotle tr. Jowett rev. Barnes, *Physics* II.1.193b1.5

¹⁹⁴ Peirce, *Collected Papers* 1.22

Every natural substance is a compound of two things: a) substratum is the material making up the substance, and b) form is the organization of matter that makes the substratum a particular kind of thing.¹⁹⁵ Matter is the nature of substance that is able to take on properties without itself being the property-giving principle.¹⁹⁶ The form of the substance is the activity that makes the nature of the matter perform its characteristic functions.¹⁹⁷ If a substance lost its characteristic function, it would no longer possess the features that make it the kind of being that it was before losing that nature.¹⁹⁸ If for example a living organism such as a dog dies, it no longer possesses the kind of nature characteristic of dogs. A dog is only a dog so long as it continues living and partakes in the nature of dogs.

To say that something has a nature means that its distinctive properties make it recognizable as a particular kind of thing.¹⁹⁹ The material component of a particular object is simply that of which it is made.²⁰⁰ Trees are made of wood; humans are made up of flesh, tissue, bones and so on. While matter is a nature belonging to all things, the material that something is made of is not the property that gives the object its distinctive kind of nature.²⁰¹ For example, being made of wood will never explain why something is a tree, the same wood can be a chair.²⁰² Aristotle argues that if the material component does not define the nature of the object, then the other component of substance, its form, must determine what it is.²⁰³

¹⁹⁵ Peirce, *Collected Papers* 1.22

¹⁹⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 389, 396

¹⁹⁷ Aristotle tr. Lawson-Tancred, *Metaphysics* 1038b

¹⁹⁸ Aristotle tr. Lawson-Tancred, *Metaphysics* 1038b

¹⁹⁹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 416

²⁰⁰ Aristotle tr. Lawson-Tancred, *Metaphysics* 983b

²⁰¹ Aristotle tr. Jowett rev. Barnes, *Physics* II.1.193b1.5-10

²⁰² Aristotle tr. Jowett rev. Barnes, *Physics* II.1.193b1.5-10

²⁰³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1070b1.20-25

Aristotle uses the term “form” in several ways. In one sense, form is the organization, structure or configuration of the material object.²⁰⁴ In this sense, the material that something is made of is based on the structure of the form.²⁰⁵ However, Aristotle is searching for what makes something a substance and so he is aiming to uncover the essential nature of the particular thing.²⁰⁶ The structure of a material object still requires the kind of cause that make it have its structure.²⁰⁷ Peirce says:

Aristotle’s two grades of being are (potentiality) and (actuality). As regards the two kinds of actualities. For activity is the end, and the actuality [energy] is the activity; hence the term ‘*actuality*’ is derived from ‘*activity*’, and tends to have a meaning of ‘complete reality’ [entelechy]. The distinction is thus between the action being accomplished (the process of actualization) and the accomplished result of this action.²⁰⁸

Form is not just the structure of matter; it is also the *activity* that determines the property or set of properties that the object must have to be the kind of thing that it is.²⁰⁹ Having a form, an essential property presupposes, a) the action being accomplished by process of actualization, which determines the final result that gives the object its distinctive structure, and b) a kind of efficient cause that keeps the accomplished result of this action.²¹⁰ The efficient cause is simply the subsistence of the activity constituting the form of substance. Form is therefore the kind of activity necessary for the object’s structure, and so long as something is active, it is material.²¹¹ More will be said about this later in the chapter, but first; how is form related to matter?

Having form identifies the nature of something because it allows a substance to

²⁰⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.2-3.1042b1-1043b1

²⁰⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.2-3.1042b1-1043b1

²⁰⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.VIII.2-3.1042b1-1043b1

²⁰⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1070b1.25

²⁰⁸ Peirce, Notes, “The Seven Systems of Metaphysics”, in *The Essential Peirce* 522

²⁰⁹ Peirce, Notes, “The Seven Systems of Metaphysics”, in *The Essential Peirce* 522

²¹⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1072b1.30

²¹¹ The Aristotelian notion that matter in its essential nature is an activity indirectly influences the very fundamental proposition of the modern use for the concept “quantum”. The word quantum refers to the smallest possible unit of energy. The plural term “quanta” means the indivisible discrete unit of process. Matter in quantum physics means discrete unit of process. (University of Oregon, “Quantum Physics”).

perform the functions that characterize its species.²¹² Aristotle thinks that all substances of the same nature tend to perform the same basic functions.²¹³ For example, all plants go through the process of photosynthesis, all deciduous trees shed their leaves in the fall, and humans have the capacity to reason.

When Aristotle says that the nature of substance is identified with its form, he is talking about the notion that the activity of substance defines its material structure. Aristotle explains this by critiquing what he sees as Plato's misunderstanding of what the "soul" is.²¹⁴ In the same way Plato asserts that form is separate from matter, he also believes that the soul is able to leave the body. Plato thinks that after the soul leaves the perishable body, the soul chooses yet another body to inhabit, even the body of a completely different species.²¹⁵ Aristotle contends that any idea whereby the soul passes from one body to another simply misapprehends what the soul is. He writes:

The view we have just been examining, in company with most theories about the soul, involves the following absurdity: they all join the soul to a body, or place it in a body, without adding any specification of the reason of their union, or of the bodily conditions required for it [...] All, however, that these thinkers do is to describe the specific characteristics of the soul; they do not try to determine anything about the body which is to contain it, as if it were possible [...] that any soul could be clothed upon with any body – an absurd view, for each body seems to have a form and shape of its own.²¹⁶

The soul according to Aristotle requires not just a body but also a particular kind of body that is able to do particular kinds of things.²¹⁷ For example, a human soul requires a human body; a dog's soul requires a dog's body and so on. But if the soul should not be understood as something that persists after the body, how do we understand what it is?

The soul is defined as the essential idea of the body rather than something external to

²¹² Aristotle tr. Jowett rev. Barnes, *On the Soul* I.1

²¹³ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.1

²¹⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.414a.10

²¹⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.2

²¹⁶ Aristotle tr. Smith, *On the Soul* I.3

²¹⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.2-3

it.²¹⁸ Aristotle argues:

Suppose that the eye were an animal – sight would have been its soul, for sight is the substance or essence of the eye which corresponds to the formula, the eye being merely the matter of seeing; when seeing is removed the eye is no longer an eye, except in name only – it is no more a real eye than the eye of a statue or of a painted figure.²¹⁹

It makes no sense to say that the quality of a material object can exist beyond that object, because it would then be something other than what it is. It is clear that for Aristotle the matter of something coexists with the idea of it, and the idea of something represents the form defining its active function.²²⁰

Peirce explains that “an ‘idea’ is the substance of an actual unitary thought or fancy”.²²¹ The term “actual” for Peirce “is that which is met with in the past, present or future”, which is simply to say that actuality, is a cause for any process.²²² Anything actual either existed, exists or will exist as opposed to something possible which might never exist. The mark of existing in time is causality: all actual things and events have effects in the world. Ideas constitute actuality because they entail causal efficacy.²²³

Peirce says:

What I mean by the idea’s conferring existence upon the individual members of the class is that it confers upon them the power of working out results in this world, that it confers upon them, that is to say, organic existence, or, in one word, life. The existence of an individual man is a totally different thing from the existence of the matter which at any given instant happens to compose him, and which is incessantly passing in and out.²²⁴

Ideas are “real”, which according to Peirce, is a word “to signify having Properties, i.e., characters sufficing to identify their subject, and possessing these whether they be

²¹⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.1.412b1.15

²¹⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.1.412b1.15

²²⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.1.412b1.

²²¹ Peirce, *Collected Papers* 6.452

²²² Peirce, *Collected Papers* 6.453

²²³ Peirce, *Collected Papers* 6.453, & Shannon Dea communicated

²²⁴ Peirce, *Collected Papers* 1.220

anywise attributed to it by any single men or group of men, or not”.²²⁵ Peirce continues: “‘idea’ – nearer Plato’s idea [...] denotes anything whose Being consists in its mere capacity for getting fully represented, regardless of any person’s faculty or impotence to represent it.”²²⁶ Plato argues that Forms, or “Ideas” are the actual substance of material objects, except he does not explain how actuality entails causality. For Aristotle, actuality entails causal efficacy because form is the activity necessary for the organization of the object that gives it a definite kind of nature. The “idea” as Peirce explains, represents the form essential to the material object. In this way the idea entails causal efficacy because it allows for natural objects to be identifiable.

Having an experience of something means to develop knowledge of its idea, but ideas are not conjured up by knowledge; instead, they are received by it.²²⁷ Experience according to Peirce is a “brutally produced [...] effect that contributes to a habit.”²²⁸ What we mean by the term “experience” is the effect that the idea has on the mind. Experience is the compulsion of the form onto the mind, and this is what it means to have an “idea”.²²⁹ Peirce argues that ideas “are not all mere creations of this or that mind, but on the contrary have a power of finding or creating their vehicles, and having found them, or conferring upon them the ability to transform the face of the earth.”²³⁰ For Peirce ideas have “unlimited [...] power to work out physical and psychical results. They have life, generative life.”²³¹ Having an idea is not a matter of wondering about things. Instead ideas spring forth into the mind from the object and the idea represents

²²⁵ Peirce, *Collected Papers* 6.453

²²⁶ Peirce, *Collected Papers* 6.453

²²⁷ Peirce, *Collected Papers* 5.611

²²⁸ Peirce, *Collected Papers* 6.454

²²⁹ Peirce, *Collected Papers* 5.611

²³⁰ Peirce, *Collected Papers* 1.217

²³¹ Peirce, *Collected Papers* 1.219

the form of the object. The evidence for this “stares us all in the face every hour of our lives” whenever we perceive an object.²³²

The idea is not a hypothesis of what the thing might be. The idea is actual form, and serves as the quality of the material substance responsible for structure and function. For Aristotle, the soul and the body, or form and matter, are really two necessary aspects of the same thing. He says: “we need no more inquire whether the soul and body are one than whether a piece of wax and the print on it are the same”.²³³ Substance is therefore the indivisible relationship between form and matter in such a way whereby both constitute the same object.²³⁴ They however do not constitute it in the same way.

Aristotle adds two further conditions for being a substance. First, to be a substance the particular thing must be able to perform the function that characterizes all other things like it.²³⁵ For example, a plant must exhibit respiration just as all other plants do. Second, a substance must be able to perform that function independently of all other things.²³⁶ For example, a plant must exhibit respiration without the help of other plants. It follows then that not every object that performs a function is a substance. The heart for example clearly has the function of pumping blood through the body, but the heart on its own is not a substance according to Aristotle, because it is unable to perform its function independently of the body.²³⁷ Substance therefore defines each and every thing yet operates more fundamentally than each and every thing.

Substance involves an indivisible but also an inverse relation of form and matter.

²³² Peirce, *Collected Papers* 1.219

²³³ Aristotle tr. Smith, *On the Soul* II.1

²³⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.1.412b1.5

²³⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1

²³⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1

²³⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VII.16.1040b1.20

For instance, form is universal when it provides the object with the function that characterizes all other things like it. While matter is particular when it appropriates form in an individual manner. However, form is particular when it gives the matter a definite kind of nature and matter is universal when it is the principle that is able to take on form without providing form. Let us turn to Aristotle's notion on causation to further explain the efficacy of substance.

3.3. Four Causes

The Ancient Greek word *aitia* means explanation or cause.²³⁸ In fact, what it means for someone to explain something is to point out its cause. Aristotle outlines four fundamental modes of causation. This explanation is commonly known as the doctrine of the “four causes”.²³⁹ Peirce explains:

As Aristotle remarks, what the Ionian philosophers were trying to find out as the principles of things was what they were made of. Aristotle himself, as I need not remind you, recognizes *four* distinct kinds of cause, which go to determining a fact: the *matter* to which it owes its existence, the *form* to which it owes its nature, the *efficient cause* which acts upon it from past time, and the *final cause* which acts upon it from future time.²⁴⁰

Thus far, we have been examining the categories of form and matter Aristotle uses to understand natural substance. The natural scientist however wants to understand the specific underlying ways concerning how form and matter operate as the causes for various changes in nature.²⁴¹ In the four causes, each cause is not only meant to be used individually to explain a different phenomenon of change. The causes are meant to explain each other.

For instance, the term “matter” initially had no distinct or exact definition for the

²³⁸ Aristotle tr. Jowett rev. Barnes, *Physics* 194b24

²³⁹ Aristotle tr. Lawson-Tancred, *Metaphysics* 983b

²⁴⁰ Peirce, *Collected Papers* 6.66

²⁴¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IX.6–8

Greeks. The Greeks referred to matter as “hyle”, which means “stuff”.²⁴² The term matter was simply used for pointing to specific objects, such as wood or rocks. It is only until Aristotle that the term “matter” derived the definition of the general substrate. The understanding that matter is the substrate only tells us that it is universally shared by everything, namely because it is the potentiality of things, but it does not say anything more about what this potentiality that is shared might be?

Matter is usually described in the following ways: first, matter is composite, meaning that it is spatially and temporally extended; second, it is impenetrable and offers resistance, meaning that it is tangible and visible.²⁴³ Both these simply mean that matter exists for some specific forms of perceptions, like vision, or it means that matter simply exists generally. Either way, this tells us nothing more than that matter exists.²⁴⁴ This is the same reason why the material property of the object does not explain its nature; referring back to the previous example, a table made out of wood will never explain why it is a table, the same wood can be a tree. The matter of something simply indicates that some quality is there without indicating what the quality is.

Just because matter is able to take on every property, this is not equivalent to say that matter is the cause for every property. In fact, for Aristotle, matter must first be indifferent to particular qualities because if it is to be the potentiality of a thing, it has to be the neutral substance that can equally be one thing or another. As stated earlier in the inquiry, matter is the quality that is able to take on qualities without itself being the quality giving principle.²⁴⁵ When Aristotle proposes the term “matter” to mean the

²⁴² Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 415

²⁴³ Hegel, “Matter”, in *The Philosophy of Nature*, 203

²⁴⁴ Hegel, “Matter”, in *The Philosophy of Nature*, 203

²⁴⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.1

particular content of a proposition distinct from its form, he is searching for an explanation as to how the nature of matter explains efficient causation.²⁴⁶

Before Aristotle, the pre-Socratics began, naturally enough, by looking for the material cause without fully realizing it.²⁴⁷ But what they were really searching for was an explanation of how matter serves as the efficient cause. Ascertaining how matter is an efficient cause will explain the subsistence of the objects they perceived around them. Aristotle figured out that matter, being the quality able to take on qualities without being itself able to endow qualities, precisely explains the efficient cause as the subsistence of the object.²⁴⁸ For Aristotle matter is simply the potential substrate where the activity happens and where the form of the activity is presented.

Plato, on the other hand, was occupied with the formal cause but really he was searching for an explanation into how form operates as the final cause.²⁴⁹ For Plato the final cause is elaborated as the “Good”, which Aristotle appropriates as the *telos* of substance – the form which the activity aims to actualize.²⁵⁰ The final cause is the challenging one, requiring further investigation, and it is the one that gives Aristotle’s theory of causation a unique place in the development of natural science.

3.4. Final Causation

In the *Physics*, Aristotle explains that everything in the universe, including the stars, are moved by the fourth cause.²⁵¹ Aristotle explains that the final cause, referred to

²⁴⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 389

²⁴⁷ Peirce, *Collected Papers* 6.66

²⁴⁸ Aristotle tr. Jowett rev. Barnes, *Physics* II.3

²⁴⁹ Vainer, *Made for Happiness* Loc.1389

²⁵⁰ Aristotle tr. Jowett rev. Barnes, *Physics* II.3

²⁵¹ Aristotle tr. Jowett rev. Barnes, *Physics* II.3

as the *telos* of the movement, explains why it took place.²⁵² The *telos* as we will see is not some external end for the object but is innate and first in it. All classes of objects in the universe operate due to their respective final causes.²⁵³ Natural classes are explained by fundamental forms, which Aristotle calls the rational principles.²⁵⁴ This is why for example the stars move spherically: they mimic intrinsic geometric shapes.²⁵⁵ Peirce argues against a view that sees no final causation in nature, he goes on to explain:

It may be that some reader, even at this day, remains imbued with the old notion that there are no final causes in nature; in which case, natural selection, and every form of evolution, would be false. For evolution is nothing more nor less than the working out of a definite end. A final cause may be conceived to operate without having been the purpose of any mind: that supposed phenomenon goes by the name of fate. The doctrine of evolution refrains from pronouncing whether forms are simply fated or whether they are providential; but that definite ends are worked out none of us today any longer deny. Our eyes have been opened; and the evidence is too overwhelming. In regard to natural objects, however, it may be said, in general, that we do not know precisely what their final causes are. But need that prevent us from ascertaining whether or not there is a common cause by virtue of which those things that have the essential characters of the class are enabled to exist? The manner of distribution of the class-character will show, with a high degree of certainty, whether or not it is determinative of existence.²⁵⁶

For Peirce, the concept of evolution necessarily presupposes final causation. Nature without final causation is reducible to fate, which finds no necessary determinacy for development.²⁵⁷ For Peirce, there is always a common cause by virtue of which natural classes have their essential character.²⁵⁸ It is important then to understand exactly what Peirce means by final causation. Aristotle and Peirce understand the phrase “final cause” in this way:

The signification of the phrase “final cause” must be determined by its use in the statement of Aristotle that all causation divides into two grand branches, the efficient, or forceful; and the ideal, or final. If we are to conserve the truth of that statement, we

²⁵² Aristotle tr. Jowett rev. Barnes, *Physics* II.3

²⁵³ Peirce, *Collected Papers* 1.211

²⁵⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics*.II.2.994b1.5-10

²⁵⁵ Aristotle tr. Jowett rev. Barnes, *On The Heavens* I.2.269a1.15

²⁵⁶ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 117–118

²⁵⁷ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 117–118

²⁵⁸ Peirce, *Collected Papers* 1.211

must understand by final causation that mode of bringing facts about according to which a general description of result is made to come about, quite irrespective of any compulsion for it to come about in this or that particular way; although *the means may be adapted to the end*. The general result may be brought about at one time in one way, and at another time in another way. Final causation does not determine in what particular way it is to be brought about, but only that the result shall have a certain general character. Efficient causation, on the other hand, is a compulsion determined by the particular condition of things, and is a compulsion acting to make that situation begin to change in a perfectly determinate way; and what the general character of the result may be in no way concerns the efficient causation [my emphasis].²⁵⁹

In the scheme of natural substance, each of the causes presupposes the other. The first and necessary cause is final causation. Final causation is not only the end result of a process, it is also the initiation for it to begin.²⁶⁰ This is why Peirce does not like to use “purpose” as a defining term for final causation because it presupposes some kind of external law or force that nature is tending towards.²⁶¹ Peirce says:

[...] we were engaged in tracing out some of the consequences of understanding the term “natural” or “real class” to mean a class the existence of whose members is due to a common and peculiar final cause. It is, as I was saying, a widespread error to think that a “final cause” is necessarily a purpose. A purpose is merely that form of final cause which is most familiar to our experience.²⁶²

Final causation is the determination that aims at something rather than some kind of already predisposed aim. The latter in fact presupposes the former. The *telos* of a process is its final cause because it is the primary activity, which takes on an essential form that a) inheres in the soul, which according to Aristotle, is life exhibiting the activity of thought, b) is sustained by the process as efficient cause; and c) explains the occurrence of the process fundamental to each class of objects in the universe with a certain description.²⁶³

²⁵⁹ Peirce, *Collected Papers* 1.211–212

²⁶⁰ Peirce, *Collected Papers* 1.211–212

²⁶¹ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 120

²⁶² Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 119–120

²⁶³ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 396

The efficient cause is instrumental to the activity of the final cause, and on its own has no say about the general character of the result.²⁶⁴ Yet according to Peirce, idea without efficiency is impossible:

When we speak of an “idea,” or “notion,” or “conception of the mind,” we are most usually thinking,—or trying to think,—of an idea abstracted from all efficiency. But a court without a sheriff, or the means of creating one, would not be a court at all; and did it ever occur to you, my reader, that an idea without efficiency is something equally absurd and unthinkable? Imagine such an idea if you can! Have you done so? Well, where did you get this idea? If it was communicated to you viva voce from another person, it must have had efficiency enough to get the particles of air vibrating.²⁶⁵

The assertion that the idea brings with it efficacy, means that the efficient cause is the indicative effect that form produces during the process of causation.²⁶⁶ For Aristotle, the efficient cause is the energy sustaining change without having any specific tendency as to what change is for. The physical condition that maintains the persistence of form simply means that form is the activity causing change.²⁶⁷ For Aristotle, the term “cause” is a thing, not an event, Peirce explains:

It is generally held that the word “cause” has simply been narrowed to that one of the four Aristotelian causes which was named from the circumstance that it alone produces an *effect*. But this notion that our conception of cause is that of the Aristotelian efficient cause will hardly bear examination. The efficient cause was, in the first place, generally a *thing*, not an *event*; then, something which need not do anything; its mere existence might be sufficient. Neither did the effect always necessarily follow. True when it did follow it was said to be compelled [my emphasis].²⁶⁸

For Peirce, the lay-understanding of Aristotle’s cause narrows the term to mean the bringing about of an external effect. The Aristotelian use of the term *cause* does not automatically presuppose with it an effect that is something outside the character (*ēthos*) of the cause itself.²⁶⁹ The efficient cause is therefore the effect that the final cause

²⁶⁴ Peirce, *Collected Papers* 1.211–212

²⁶⁵ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 121

²⁶⁶ Peirce, *Collected Papers* 1.211–212

²⁶⁷ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 120

²⁶⁸ Peirce, *Collected Papers* 6.66

²⁶⁹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 399

produces.²⁷⁰ Peirce explains the relationship between efficient and final causation in this way:

Efficient causation is that kind of causation whereby the parts compose the whole; final causation is that kind of causation whereby the whole calls out its parts. Final causation without efficient causation is helpless; mere calling for parts is what a Hotspur, or any man, may do; but they will not come without efficient causation. Efficient causation without final causation, however, is worse than helpless, by far; it is mere chaos; and chaos is not even so much as chaos, without final causation; it is blank nothing.²⁷¹

Though every action in the broadest sense has a final end, it does not have only an external end.²⁷² Internal and external ends distinguish movements from activities.²⁷³

The efficient cause for example has its movement outside itself because it is the material substrate that only exists to sustain the form of the activity. The final cause however has its end internal because it is the activity that proposes the form, which then produces the idea whereby it comes to life, and takes the actualization of the form as the very *telos*.²⁷⁴

The efficient cause is the appearance of the final cause – the aesthetic value of the form. Final causation is the necessary condition for efficient causation and not just the other way around.²⁷⁵ So the notion of final causation is not somewhere, out there that the efficient movement is tending towards fulfilling.²⁷⁶ Efficacy is the indicative mood of final causation and the latter is the imperative mood of the former.²⁷⁷ We will benefit with a clearer understanding of causation in turning to how Aristotle understands change in nature.

²⁷⁰ Peirce, *Collected Papers* 1.211–212

²⁷¹ Peirce, *Collected Papers* 1.220

²⁷² Aristotle tr. Irwin, *Nicomachean Ethics*, 1094a3

²⁷³ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 396

²⁷⁴ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 120

²⁷⁵ Peirce, *Collected Papers* 1.211–212

²⁷⁶ Peirce, *Collected Papers* 1.211–212

²⁷⁷ Peirce, *Collected Papers* 5.18

3.5. Change

We now have some grasp of the notion that the true nature of substance is activity. We might still ask an obvious yet fundamental question: will the true nature of something today be its true nature tomorrow? What is change (*kinesis*) in nature?²⁷⁸ It is precisely this question that makes Aristotle's metaphysics distinctively evolutionary.

Aristotle argues that nothing in nature is static. It is easy to say that things change, but it is hard to say what change is. It is hard to predict what will change and what will stay the same; also, when exactly can we say that an important change took place? It is difficult for example to know exactly when in the process of evolution, a species comes into being or becomes extinct. There are however generalities of change. Aristotle says that all change is classified in at least one of four basic ways. He outlines these as follows:

Change in respect to Quality is generation and corruption. Change with respect to Quantity is increase or decrease. Change with respect to affection is alteration. Change in respect to place is locomotion [paraphrased].²⁷⁹

Generation refers to the existence of quality.²⁸⁰ Quality refers to the specific details pertaining to the form essential to the object. Generation is characterized by the term "process," which is better understood via the adjective "processing" (*metabole*).²⁸¹ Generation for example occurs when the union of an egg with a sperm forms an embryo. The embryo is a quality altogether different than the individual parts that gave rise to it. Increase and decrease refer to changes in size. Alteration occurs when something changes from one state to another: for example, when a mammal changes from being

²⁷⁸ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 416

²⁷⁹ Aristotle tr. Jowett rev. Barnes, *Physics* V.2

²⁸⁰ Aristotle tr. Jowett rev. Barnes, *Physics* V.2

²⁸¹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 416

warm to being cool.²⁸² Locomotion occurs when a natural substance moves from one place to another.²⁸³ For example, a rock falling from a cliff to the ground is an instance of locomotion. Aristotle argues that all changes in nature exemplify three principles:

- a) The property an object changes from,
- b) the property it changes to, and
- c) the object itself that endures the change.²⁸⁴

Aristotle calls the third element the substratum of the change. Change in the substratum with respect to quantity, size and locomotion are obvious enough. Aristotle classifies these changes in the following basic ways:

(1) By change of shape, as a statue; (2) by addition, as things which grow; (3) by taking away, as the Hermes from the stone; (4) by putting together, as a house; (5) by alteration, as things which “turn” in respect of their material substance. It is plain that these are all cases of coming to be from some underlying [10] thing.²⁸⁵

The mathematical elements – addition, subtraction, shapes and so on – are properties of the substratum.²⁸⁶ These are straightforward for Aristotle, but what underlies the change when a new substance comes into existence or when an old substance ceases to exist? Aristotle answers that even when drastic changes take place there must be something that endures throughout the change.²⁸⁷ He asserts:

Now in all cases other than substance it is plain that there must be some subject, namely, that which becomes. For we know that when a thing comes to be of such a quantity or quality or in such a relation, time, or place, a subject is always presupposed, since substance alone is not predicated of another subject, but everything else of substance.²⁸⁸

In each case of change a new form comes into existence but an underlying substance is present before, during and after the form’s inception. Aristotle would oppose the

²⁸² Aristotle tr. Jowett rev. Barnes, *Physics* V.2

²⁸³ Aristotle tr. Jowett rev. Barnes, *Physics* V.2

²⁸⁴ Aristotle tr. Jowett rev. Barnes, *Physics* I.7

²⁸⁵ Aristotle tr. Jowett rev. Barnes, *Physics* I.7.190b1.5-10

²⁸⁶ Aristotle tr. Jowett rev. Barnes, *Physics* I.7

²⁸⁷ Aristotle tr. Jowett rev. Barnes, *Physics* I.7

²⁸⁸ Aristotle tr. Hardie and Gaye, *Physics* I.7

theological notion that something can be created out of absolutely nothing. If Aristotle is right, at no time in the history of the universe could new substances simply be created. For any change whatsoever, regardless of how long ago the change took place, there must have been an underlying, unchanging substance.²⁸⁹ This insight from Aristotle influences one of the fundamental laws of modern physics: *energy is neither created nor destroyed, but only altered.*

Change in the substratum is explained by what Aristotle means by “motion”.²⁹⁰ Aristotle has a unique way of understanding motion. For Aristotle motion is not reducible to locomotion. Objects have to first involve a becoming or a generation, before they can derive location.²⁹¹ Aristotle conceives motion logically.²⁹² For example, in order for something to move, it first has to be moveable. The part that is moveable is a substance that imparts motion.²⁹³ Locomotion is therefore a specific type of motion that first presupposes the presence of a moveable substance.²⁹⁴ It is commonly said that if there is a first moved, there must also be another time when there is no such thing, but only something that is at rest.²⁹⁵ But even this very thing that is at rest requires the process of change that serves as the cause of it being at rest.²⁹⁶ There must be some motion that causes it to be at rest and therefore motion is primary for rest, or that rest must also come-to-be that which makes it at rest.

Aristotle understands motion as the efficient effect representing the activity of substance. Motion for Aristotle is eternal because substance is always becoming, and by

²⁸⁹ Aristotle tr. Jowett rev. Barnes, *Physics* I.7

²⁹⁰ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.1.250b1.10

²⁹¹ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.*Physics*.251a1

²⁹² Aristotle tr. Jowett rev. Barnes, *Physics* VIII.251a1.5

²⁹³ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.251a1.5

²⁹⁴ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.251a1.10

²⁹⁵ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.251a1.25

²⁹⁶ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.251a1.25

this presence it causes. Aristotle is looking for the substance that is able a) to produce things capable of motion, and b) to produce motion in moveable things.²⁹⁷ Motion therefore not only represents locomotion but also generation.

In every change, a new property arises, but it is nevertheless a property of a substratum that exists before and after the change. However, there remains the question of generation, which refers to the change that occurs when a new quality is actually formed. For example, if a fruit changes from being green to being red, where did the colour red come from? Aristotle answers that all change is really an activity whereby something processes from the potential to the actual.²⁹⁸ When the fruit was actually green it was only potentially red, and when it changed colour, it became actually red. The movement from the potential into the actual explains why every living thing develops in a way that manifests its nature. Generation is activity in terms of what Aristotle identifies as *energeia*, which we will turn to next.

3.6. Potentiality and Actuality in Comparison to the Categories

Peirce's categories of reality – Firstness, Secondness and Thirdness – are comparable to Aristotle's two principals of substance, identified as *potentiality* and *actuality*.²⁹⁹ These are intended to describe how the activity of substance generates form. Peirce's categories elaborate the more specific mechanisms that comprise the activity. Peirce explains Aristotle's two principles of substance in the following way:

For activity is the end, and actuality is the activity. The doctrine of Aristotle is distinguished from substantially all modern philosophy by its recognition of at least two grades of being. That is, besides actual reactive existence, Aristotle recognizes a germinal

²⁹⁷ Aristotle tr. Jowett rev. Barnes, *Physics* VIII.251a1

²⁹⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* IX.5–10

²⁹⁹ Aristotle tr. Lawson-Tancred, *Metaphysics* 1045b

being, an esse in potential or I like to call it an esse in future.³⁰⁰

Aristotle characterizes actuality as *energeia*, by which he means activity, or more appropriately as free or complete activity (*entelechy*).³⁰¹ Aristotle characterizes potentiality as *dunamis*, which means passive activity and the capacity that is able to take form without itself being the form-giving principle.³⁰² Actuality is the active cause for change whereas potentiality is the capacity that receives the change.³⁰³

Actuality and potentiality exist synonymously and in fact constitute the opposing forces of substance.³⁰⁴ Aristotle associates form with actuality and matter with potentiality.³⁰⁵ In the indivisible unity between form and matter, Aristotle gives actuality priority over potentiality because he says that it is for the sake of form that matter is acquired.³⁰⁶ Matter exists in a potential state purely so that it may come to some particular form.³⁰⁷ For example, Aristotle says that animals do not see in order that they have sight, but they have sight so that they may see.³⁰⁸ Actuality is a cause in more than one sense of a form realizing its potential.³⁰⁹

There is however a difficulty concerning the relation between form and matter, or in more abstract terms, how actuality is related to potentiality. Our ordinary understanding, without careful reflection, sees actuality and potentiality contradicting one another. If for example thought thinks while first being potentiality it cannot always think, or it is not always thinking, because what is potentially true may also be

³⁰⁰ Peirce, "The Seven Systems of Metaphysics", in *The Essential Peirce* 180

³⁰¹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 396

³⁰² Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 396

³⁰³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* X.1.1046a12

³⁰⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1048b1–3

³⁰⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1072a1, 25–30

³⁰⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1050a9–17

³⁰⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1050a9–17

³⁰⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1050a9–17

³⁰⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1050a1.5–20

potentially not-true.³¹⁰ The primary substance must then be actuality. The complication is that for something to think it must first be able to potentially think, so that potentiality is prior to actuality, since how can something be actual without first being a potential?³¹¹ But as we said, if potentiality is prior then there is no real reason why there should be actuality at all.³¹² If something is potentially true without being actually true, then nothing at all exists, even if it is capable of existing without yet existing.³¹³

This kind of thinking follows if we adopt the view that either of these concepts can exist without the other. The chronological ordering of categories is a trait of our understanding that aims to organize the facts it derives in hopes of establishing them. When the understanding sees, for example, potentiality coming prior to actuality, the term “potentiality” develops the negative connotation of being devoid of any real concreteness. For Aristotle however matter is the potentiality of a thing, it is the sufficient nature necessarily assumed by any actual substance, and it is obviously not lacking concreteness.³¹⁴ For Aristotle, actuality and potentiality cannot exist without each other, instead; each principle is defined by the other.³¹⁵

This relates to what Aristotle describes as the difference between possessing something and using it. He explains: “Now the word actuality has two senses corresponding respectively to the possession of knowledge and the actual exercise of knowledge”.³¹⁶ Aristotle distinguishes between possessing something and using it because a living body may possess certain powers yet not necessarily use them, maybe

³¹⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.6.1070b1, 20-25

³¹¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.6.1070b1, 20-25

³¹² Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.6.1070b1, 20-25

³¹³ Aristotle tr. Jowett rev. Barnes, *Metaphysics* XII.6.1070b1, 25

³¹⁴ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.1

³¹⁵ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1048b1–3

³¹⁶ Aristotle tr. Smith, *On the Soul* II.1.412a1.20-25

because the body is not yet using them, inhibited from using them or perhaps by some other reason.³¹⁷

When we say for instance that something has a potential, or in other words, an object has not reached its full potential, we are saying that there is an actual nature that the object is tending towards fulfilling.³¹⁸ For example, as in case of any natural object, the flower does not blossom due to poor nutrition, or I have the potential of being made healthy but at the moment I am not.³¹⁹ This means that I actually possess the quality of health and the flower has the quality of blossoming.³²⁰ Potentiality is the efficacy whereby one actuality transitions to another actuality.³²¹ The potential is not something prior to the actual; it is in fact the continuity of the actual.³²² For example, potentiality is capacity where illness transitions into health or health transitions into illness, generation into corruption or corruption into generation, small into large or large into small etc.

Peirce explains that the potentials that are being generated into actuality are in fact the Platonic forms. He states: “The evolutionary process is, therefore, not a mere evolution of the *existing universe*, but rather a process by which the very Platonic forms themselves have become or are becoming developed”.³²³ For Peirce, the forms themselves evolve, a view that Plato would reject.³²⁴ The consensus however is that the forms are not just mere hypotheses. The forms are concepts that serve as the matter’s blueprint. For Plato, the idea of “Beauty” for example is not anyone’s conception of

³¹⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.1.25

³¹⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1049b1.5–20

³¹⁹ Aristotle tr. Jowett rev. Barnes, *Physics* 257a1–15

³²⁰ Aristotle tr. Jowett rev. Barnes, *Physics* 257a1–15

³²¹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.5–6

³²² Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.5–6

³²³ Peirce, *Collected Papers* 6.194

³²⁴ Peirce, *Collected Papers* 6.200

particular objects that are beautiful. The idea of “Beauty” involves a more basic nature than a particular object that is beautiful.³²⁵ The idea of “Beauty” is just the very general form required for beautiful objects to arise as distinctively beautiful.³²⁶ For example, the form of “Beauty” can be defined as symmetry. Symmetry is first required as a general idea before particular objects take on symmetrical properties.

Now of course Plato fails to explain how the forms are generated into matter, which according to Aristotle, Plato merely points to the existence of beauty without identifying what is beautiful.³²⁷ But for Aristotle, forms such as mathematical relations and concepts are processed into actuality, and once they are real, they are alterable into each other.³²⁸ Alteration in the most basic sense is the physical change between generated forms. When a liquid is altered into a solid, this is possible because the liquid was potentially a solid.³²⁹ Both forms are potentially each other because they are actual. They are actual because each form is held by the other in a relation that constitutes them as distinctive properties.

Aristotle goes further than Plato and claims that the general idea of beauty is the constitution of the beautiful objects around us, like trees, flowers, animals, all of which are forms. The forms are not out there somewhere, who knows where; they are immanent in the objects around us. This means that substance is the actual activity that potentially has within it all qualities, and the objects we see around us are real ideas taking on forms.³³⁰ The potential of substance is therefore found in the relations between actual forms.

³²⁵ Plato tr. Fowler, *Symposium*, 211a–b

³²⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.6

³²⁷ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1071-1072

³²⁸ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1071-1072

³²⁹ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.6

³³⁰ Aristotle tr. Jowett rev. Barnes, *Metaphysics* VIII.6 1071-1072

Peirce formulates his categories as a “table of conceptions drawn from the logical analysis of thought and regarded as applicable to being”, stating that: ³³¹

The first is that whose being is simply in itself, not referring to anything nor lying behind anything. The second is that which is what it is by force of something to which it is second. The third is that which is what it is owing to things between which it mediates and which it brings into relation to each other.³³²

There is an underlying suggestion that Peirce’s categories make a chronological order. It is more useful, however, not to read these categories as being chronologically ordered, although in Peirce’s cosmology they do form a chronology.³³³ Reading these categories chronologically suggests that one can exist without the other; which, when they are taken as categories of logic, cannot be true because they form an internal relation wherein one category is only present in combination with the others. The categories, we can say, are moments of the same substance.

The category of Firstness is potentiality whose being is vague and is devoid of any particular form. ³³⁴ For example, imagine staring at the colour red so that your mind becomes so infused with redness that it loses awareness of any other thing.³³⁵ This pure experience of redness is analogous to Firstness. Aristotle similarly associates potentiality with matter, which is the general substrate devoid of any particular quality but universally and neutrally pertains to all particular qualities.³³⁶ Firstness is potentiality because it is the possession of quality without its actual employment.

Secondness constitutes actuality because it is the form of the activity taking on a particular nature. In this mode there is a compulsion against Firstness. Peirce says: “I

³³¹ Peirce, *Collected Papers* 1.300

³³² Peirce, *Collected Papers* 1.356

³³³ Dea, “*Firstness, Evolution and the Absolute in Peirce’s Spinoza*”

³³⁴ Peirce, *Collected Papers* 1.356

³³⁵ Merrel, “*Semiotics versus Semiology*”

³³⁶ Aristotle tr. Jowett rev. Barnes, *Metaphysics* 1048a.35

instance putting your shoulder against a door and trying to force it open against an unseen, silent and unknown resistance. We have a two-sided consciousness of effort and resistance, which seems to me to come tolerably near to a pure sense of actuality”.³³⁷ When the activity takes on a particular actuality, that contradicts its universal potentiality. There is then a contradiction in substance between a) universal and b) particular.³³⁸ The only thing the universal and the particular share in common is their opposition, which affirms for both forms, their respective positions as mutually exclusive properties.³³⁹

Thirdness is the mode from which relations are observed and represented. In Thirdness, the opposition between the universal and the particular itself takes on a distinct form.³⁴⁰ Their opposition, which is at the same time their unity, being the only thing they share in common, allows for one form to be adopted exclusively from the other because there is an alterity where each is perceived from the point of view of the other encompassing their difference and their identity.³⁴¹ Peirce calls Thirdness the generality constituting “all” because it is the third mode of mind where the tension between forms becomes a habit, forming a generality.³⁴² In this generality, the universal and the particular form a unity where they oppose each other. Let us then turn to the final chapter to see exactly how substance naturally develops in this way.

³³⁷ Peirce, *Collected Papers* 1.24

³³⁸ Hegel, *Philosophy of History*, 53

³³⁹ Hegel, *The Science of Logic*, 187

³⁴⁰ Peirce, *The Law of Mind*, 552

³⁴¹ Peirce, *The Law of Mind*, 552

³⁴² Peirce, *Collected Papers* 1.356

Chapter Four: The Process of Natural Knowledge

4.1. The Development of Knowledge through the Stages of Life

Aristotle's views on the mind and its relation to the body are fundamental to understanding knowledge and nature. Here we will only explore a portion of Aristotle's theory of mind. Aristotle's term for mind is often translated as "soul"; the equivalent Ancient Greek term is *psuchê*.³⁴³ In spite of this widespread usage, the term "soul" is misleading. First, the English word "soul" has a spiritual connotation that is not shared by the Greek term "psuchê".³⁴⁴ Second, *psuchê* generally has a much broader meaning than the term "mind". Mind in the sense of *psuchê* is understood as the substance for life and not only an organ for reasoning. Aristotle took for granted that mind is what makes every living thing alive.³⁴⁵

We should notice that what Aristotle is concerned with when proposing the notion of mind, is to understand both what rationality is and what makes a living thing alive. Peirce says:

So, those logicians imagine that an idea has to be connected with a brain, or has to inhere in a "soul". This is preposterous: the idea does not belong to the soul; it is the soul that belongs to the idea. The soul does for the idea just what the cellulose does for the Beauty of the rose; that is to say, it affords it opportunity. It is the court-sheriff, the arm of the law.³⁴⁶

The Ancient term *psuchê* conceives a relationship between mind and life, which explains the process of growth.³⁴⁷ Generally speaking, the soul for Aristotle simply means life,

³⁴³ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 422

³⁴⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul*, I.2

³⁴⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul*, I.3.407a1.5-20

³⁴⁶ Peirce, *Collected Papers* 1.216

³⁴⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul*, I.3.406a1.10

and life is the mind's activity for bringing things into existence.³⁴⁸ Peirce explains:

Such is everything which is essentially a Sign — not the mere body of the Sign, which is not essentially such, but, so to speak, the Sign's Soul, which has its Being in its power of serving as intermediary between its Object and a Mind. Such, too, is a living consciousness, and such the life, the power of growth, of a plant. Such is a living constitution — a daily newspaper, a great fortune, a social “movement”.³⁴⁹

Life is the soul of the mind, or in better terms, life is the active character of mind.³⁵⁰

Aristotle defines *psuchê* as the motion of thought.³⁵¹ This means that the soul is the first activity of a living body.³⁵² The soul of a living organism is related to its work: the soul is the characteristic forms and functions that are essential to the organism and explain the other features it has.³⁵³

Aristotle divides the soul into rational and non-rational parts.³⁵⁴ The non-rational part of the soul is different from the rational part because it lacks deliberate and reflective awareness.³⁵⁵ As we will later see, the rational part of the soul is conscious of the essential nature of a thing, not merely of the “pleasant”.³⁵⁶ For Aristotle however, the non-rational part of the soul does not imply an exclusion of mind.³⁵⁷ For example, living things such as plants are governed by the non-rational part of the soul, they are nutritive, but this does not mean that they lack mind, a *psuchê*.³⁵⁸ For Aristotle, all living things, even plants, have mind by virtue of possessing a characteristic form and function.³⁵⁹ The classification of life will help explain how even basic life forms are

³⁴⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.2

³⁴⁹ Peirce, *Collected Papers* 6.455

³⁵⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.2.404b1.25

³⁵¹ Aristotle tr. Jowett rev. Barnes, *On the Soul*, I.3.407a1.5-20

³⁵² Aristotle tr. Jowett rev. Barnes, *On the Soul* II.4.415b1.5

³⁵³ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 426

³⁵⁴ Aristotle tr. Irwin, *Nicomachean Ethics*, 1144a2, 1145a3, 1166a16

³⁵⁵ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 426

³⁵⁶ Aristotle tr. Jowett rev. Barnes, *On the Soul*, 433b1.5-10, 434a1.5-10

³⁵⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.1.412a1.20-25

³⁵⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.12.434a1.20-25

³⁵⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.1.402a1

governed by mind.

Aristotle says there are as many different kinds of souls as there are different species. Classifying life is necessary for understanding how mind operates. The classification of life relates to the study of genesis.³⁶⁰ Peirce explains:

All natural classification is then essentially, we may almost say, an attempt to find out the true genesis of the objects classified. But by genesis must be understood not the efficient action which produces the whole by producing the parts, but the final action which produces the parts because they are needed to make the whole. Genesis is the production from ideas.³⁶¹

The total of objects in the universe with a certain explanation is what Peirce refers to as a *class*. Peirce understands the class of things in this way:

A class, of course, is the total of whatever objects there may be in the universe which are of a certain description. What if we try taking the term “natural” or “real class” to mean a class of which all the members owe their existence as members of the class to a common final cause? This is somewhat vague; but it is better to allow a term like this to remain vague, until we see our way to rational precision.³⁶²

In identifying a class as the totality of objects in the universe sharing a certain description, Peirce explains how we come to understand the genesis of a class in this sense: “but one can trace the genesis of a class and ascertain how several have been derived by different lines of descent from one less specialized form, this is the best route toward an understanding of what the natural classes are”.³⁶³ Each class of things in the universe is predicated by something more fundamental. Understanding the genesis of life requires tracing back the fundamentals to which a class relates. The “natural class” in this sense is defined as “the existence of whose members is due to a common and peculiar final cause”.³⁶⁴ The *specie* for Aristotle is understood by the term *eidos*, which is

³⁶⁰ Peirce, *Collected Papers* 1.227

³⁶¹ Peirce, *Collected Papers* 1.227

³⁶² Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 117

³⁶³ Peirce, “On Science and Natural Classes”, in *The Essential Peirce* 125

³⁶⁴ Peirce, *Collected Papers* 1.211

also the term used to refer to form.³⁶⁵ It is important to note that Aristotle associates the nature of a species with the form it exhibits because the form characterizes the natural class's final cause.³⁶⁶

Form is explained by the following division in metaphysics, that is, “the [distinction between] the universal [and] that of the individual”.³⁶⁷ This division in metaphysics describes how thought formulates classifications.³⁶⁸ Natural classification is composed of a) general whole and b) particular parts.³⁶⁹ The natural origin by which life-forms come to develop involves the connection between a universal form and the individual members of that form.³⁷⁰ The universal is the general form, which contains the common characteristics that pertain to each individual member, but each individual member takes on the general character in a particular way.³⁷¹ Genesis is explained not by the sum total of the parts making up the whole, but rather by how each individual part is a conception of the whole.³⁷² The rule of natural genesis is defined by how the “means may be adapted to the end”³⁷³ and not how the means make up the end.³⁷⁴

The relation between the universal and the particular explain the form of the living organism by stating the genus and the differentia of the genus that isolates the specie.³⁷⁵ Often the genus is associated with the question “what?” For example, what is a human being? – An animal.³⁷⁶ The differentia that isolates the species is concerned with

³⁶⁵ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 389

³⁶⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 426

³⁶⁷ Hegel, *Philosophy of History*, 53

³⁶⁸ Peirce, *Collected Papers* 1.227

³⁶⁹ Peirce, *Collected Papers* 1.227

³⁷⁰ For Aristotle general means “universal”

³⁷¹ Peirce, *Collected Papers* 1.227

³⁷² Peirce, *Collected Papers* 1.227

³⁷³ Also stated as: the end determines the means

³⁷⁴ Peirce, *Collected Papers* 1.211

³⁷⁵ Aristotle tr. Jowett rev. Barnes, *On the Heavens*. 6.400b1.20-30

³⁷⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, 394

the question “what sort of?” For example, what sort of animal is a human being? – A rational biped animal.³⁷⁷ The genus contains the general form that encompasses the multiplicity of differing species. Once the genus groups particular species together based on a general form they share, we can go on to classify each individual species as its own general form. The species in its turn contains a general morphology that groups together a multiplicity of individual members. The genus and the species constitutes a hierarchy of life that operates on the notion that the general form determines the individual parts.

Aristotle suggests that there is a virtually infinite variety of species ranging from the simplest plants to the most complex of animals. In this continuum, Aristotle states that at the very basic levels of life it is very hard to distinguish between what is living and what is non-living.³⁷⁸ Aristotle nevertheless believes that this variety of life forms can be classified into three basic categories based on different kinds of *eidos* exhibiting function (*ergon*):³⁷⁹ the vegetative or “nutritive”, the “sensitive” and the “rational”.³⁸⁰ This is ordinarily understood as the “three types of soul” argument. For Aristotle, the three soul types are really just stages of life, with each stage developing a higher ordered form of knowledge.³⁸¹

The most basic functional characteristics of all living substance are a) to assimilate energy as source or food, b) to increase and decrease in size and c) to eventually generate and degenerate in and out of existence through reproduction and decay.³⁸² This is the vegetative stage of life, which includes the most basic form of

³⁷⁷ Aristotle tr. Irwin, *Nicomachean Ethics*, 394

³⁷⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432a1.15-25

³⁷⁹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 397

³⁸⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432a1-432b1.25-5

³⁸¹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.4

³⁸² Aristotle tr. Jowett rev. Barnes, *On the Soul* II.4.415a1.25

knowledge – assimilation.³⁸³ The plant’s capacity to perform its elemental functions is derived from assimilating experiences from its environment and reproducing those experiences.³⁸⁴

The environment is a compilation of rudimentary elements, specifically fire, air, water and earth.³⁸⁵ Each element is an expression of an even more general idea.³⁸⁶ Fire for example is an expression of heat, heat is an expression of energy, energy is an expression of matter, matter is an expression of time, and so on. Without going into too much details, we can immediately see that each particular concept is an expression of a more general one. The rudimentary elements in the environment culminate into one organic whole, that is, the vegetative stage, and this whole assimilates itself into a variety of unique individual expressions of that whole. Assimilation can be understood in this way:

The growth of the plant is an assimilation into itself of the other; but as a self-multiplication, this assimilation is also a going-forth-from-itself. It is not a coming-to-self as an individual, but a multiplication of the individuality: so that the one individuality is only the superficial unity of the many. The individuals remain a separated plurality, indifferent to each other.... Schultz therefore says: “The growth of plants is a perpetual addition of new parts which did not exist previously”.³⁸⁷

Reproduction in the vegetative stage involves a process where a general form is assimilated and multiplied into different unique parts.³⁸⁸ This process reaches a limit when there are an infinite variety of different parts that are at the same time homogenous to the same form.³⁸⁹ For example, the species of oak tree consists of separate individual oak trees that vary in size and shape, yet they all drop acorns in the

³⁸³ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.4.415a1.25

³⁸⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432b1.5-10

³⁸⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.2

³⁸⁶ Peirce, *Writings of Charles S. Peirce* 5.48

³⁸⁷ Hegel, *Philosophy of Nature* 304

³⁸⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.5.411a1.10-20

³⁸⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.4.416b1.15

fall. When we experience an object like an oak tree, we are experiencing a more general idea that the oak tree characterizes, namely the vegetative stage, which is the compilation of the more general rudimentary properties in the environment.³⁹⁰

When life forms in the vegetative stage assimilate, they are assimilating every possible outcome of the general idea to which they belong. The general form of plants in one sense is to assimilate energy as source from the sun, for example, the process of photosynthesis. Yet each particular plant of the same species physically varies in size. In the general process of energy assimilation, plants increase and decrease in peculiar ways, which means that each separate plant involves a unique possible expression of the sun's energy.

The general form is the same soul shared by the virtually infinite multiplicity of individual members.³⁹¹ In the vegetative stage for instance we see that all individual plants are still physically connected. It is not all that clear whether one plant can be said to constitute a separate member that can be differentiated from all other plants in the species. Especially if for example plants do not possess the ability of locomotion and they are all connected by the same underlying root system.

Each individual plant is therefore a particular expression of the same idea, but in the same idea, the particular parts contradict each other while at the same time they aim to maintain themselves as part of the same idea. The differences that are present between the particular plants in the same species produce immediate interactions. For example, the asymmetrical stem structures of plants begin to spatially infringe on one

³⁹⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* I.5.411a1

³⁹¹ Peirce, *Collected Papers* 1.227

another by virtue of one being taller or shorter in size than the other.³⁹²

The interactions between life forms create the immediacy for living things to maintain their unique structures as particular members of the species.³⁹³ Life forms therefore develop a mechanism that allows them to differentiate themselves from everything else. This mechanism is the power of *sensation*.³⁹⁴ Aristotle argues:

[Self-nutrition] is the origination power the possession of which leads us to speak of things as living at all, but it is the possession of sensation that leads us for the first time to speak of living things as animals; for even those beings which possess no power of local movement but do possess the power of sensation we call animals and not merely living things.³⁹⁵

The transition of the vegetative stage into the sensitive stage is marked by a development of an entirely new kingdom, Animalia (*zoön*).³⁹⁶ For example, insects are the class of life forms that mark the developmental culmination of the vegetative stage and the beginning of the sensitive stage.³⁹⁷ In the sensitive stage, all life forms have at least the basic sensation of touch attributed with their structures, which allows the particular organism to differentiate itself from its species and also its environment.³⁹⁸

Any organism in which touch resides also experiences pleasure and pain.³⁹⁹ Pleasure and pain indicate what is good and what is bad for the survival of the organism.⁴⁰⁰ This calls for the development of sense perception (*aesthesis*), which enables an organism to find the things that sustain its life.⁴⁰¹ But in order for perception to be effective, the organism must be motivated to attain what is good for its living

³⁹² Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.418a1.5

³⁹³ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.4.416b1.15

³⁹⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.413b1.5

³⁹⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.413b1.5

³⁹⁶ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 387

³⁹⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.413b1.20

³⁹⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.413b1.5

³⁹⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.413b1.20

⁴⁰⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.414b1.5

⁴⁰¹ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 386

existence. This motive power is *desire (orexis)*.⁴⁰² Desires are always for something, so it would be useless for animals to have desire yet not seek what they want.⁴⁰³ Aristotle says that the powers of sensation are an organism's aptitude to pick out desired objects in its environment.⁴⁰⁴ In the sensitive stage, sense perception develops in life forms the capacity of movement from location to location in pursuit of the objects of desire.⁴⁰⁵

Desire in this sense aims at some purpose, but Peirce defines "purpose" as just "an operative desire".⁴⁰⁶ For Aristotle, desire is a mechanism in living organisms that enables them to distinguish between what is good and what is bad for their natures.⁴⁰⁷ Peirce formulates a more general understanding to the concept of desire. He states: "a desire is always general; that is, it is always some *kind* of thing or event which is desired".⁴⁰⁸ Desire is the universal form of the sensitive stage of life. Desire creates extremely broad classes, but in the pursuit of them, desire becomes more specific.⁴⁰⁹ For example, all organisms generally desire food, but more specifically they also desire particular kinds of food.

Associated with the fact that every desire is general is the additional fact that desire is always vague and shifting depending on the circumstances.⁴¹⁰ For example, omnivores consume food of both plant and animal origin.⁴¹¹ Desire in this sense involves

⁴⁰² Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 394

⁴⁰³ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.414b1.5

⁴⁰⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.414b1.5

⁴⁰⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.415a1.5

⁴⁰⁶ Peirce, *Collected Papers* 1.205

⁴⁰⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.414b1.5

⁴⁰⁸ Peirce, *Collected Papers* 1.205

⁴⁰⁹ Peirce, *Collected Papers* 1.205

⁴¹⁰ Peirce, *Collected Papers* 1.206

⁴¹¹ Peirce, *Collected Papers* 1.206

variety, “and as far as we can compare Nature’s ways with ours, she seems to be even more given to variety than we”.⁴¹²

Desire as a general principle operative in nature is the mechanism for diversity.⁴¹³ This is true because desire is not only general and vague but also indeterminate.⁴¹⁴ A good result for one desire may harm other desires, and so a compromise is reached whereby certain desires settle for something less than ideal.⁴¹⁵ For example, the eye may desire light from fire, but coming too close to the fire will relentlessly consume the body that holds the eye. This produces a cluster of desires operating in diverging ways.⁴¹⁶ This explains why there is such a diverse classification of organisms in the animal kingdom, all with distinct spectra of development.

Desire sustains the living organism to bear the kind form that characterizes its species because if it lacks the desire to be the thing that it is, it would cease to be.⁴¹⁷ The form of the species however directs the particular organism’s desire by defining the objects for it. When life forms develop powers of sensation and are therefore able to desire, they begin to differentiate between what is pleasant and what is not.⁴¹⁸ This is the basic form of knowledge as awareness because the organisms are now able to differentiate themselves from the objects they desire.⁴¹⁹ This enables the organism to recognize that the objects they desire have differing natures. But the recognition that things have different natures invariably develops the desire to find similarities in those

⁴¹² Peirce, *Collected Papers* 1.206

⁴¹³ Peirce, *Collected Papers* 1.206

⁴¹⁴ Peirce, *Collected Papers* 1.207

⁴¹⁵ Peirce, *Collected Papers* 1.207

⁴¹⁶ Peirce, *Collected Papers* 1.207

⁴¹⁷ Peirce, *Collected Papers* 1.207

⁴¹⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.414b1.5

⁴¹⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432a1.10-15

differences, especially similarities that relate to the organism.⁴²⁰ This two-fold recognition allows the organism to pick out differences in an object it perceives similar to itself. This is precisely why life forms have desire: they seek features that are not unique to them in other objects that are like them.⁴²¹

The biological concept of sexual reproduction for example is the modern notion that describes what individual organisms desire in their own species. Desire is the general form of sexual reproduction, which achieves greater diversity in life forms. Instead of assimilation, the sensitive stage achieves *analyzation*.⁴²² Analyzation is the ability to separate into constituent parts.⁴²³ This allows organisms to differentiate qualities within objects.⁴²⁴ Imagine for example a squirrel searching for the finest nut. Analyzation develops selection, which creates the ability for the desired qualities to be adopted.⁴²⁵ Life forms are no longer just assimilating experiences but are also selecting them. This is why sexual reproduction produces a greater diversity of life forms than assimilative reproduction. Organisms instinctively select the qualities they desire in other objects and adopt them for their own.⁴²⁶

The Darwinian notion of “natural selection” states that the organisms that are well adapted to their environment tend to survive and produce more offspring, but also states that competition is the reason why some species of animals adapt and survive while others die out.⁴²⁷ This however does not adequately explain *why* some animals are

⁴²⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.2.426b1.5-20

⁴²¹ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.2.426b1.5-20

⁴²² Hegel, *Glossary*

⁴²³ Hegel, *The Science of Logic*, 80

⁴²⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.3.427a1.20

⁴²⁵ Aristotle tr. Jowett rev. Barnes *On the Soul* III.2.426b1.5-20

⁴²⁶ Hegel, *Philosophy of Nature*, C. The Animal Organism

⁴²⁷ UC Museum of Palaeontology and NSCE, “Early Concepts of Evolution: Jean-Baptiste Lamarck”

better adapted to their environment than others, because it leaves unaddressed the question of which features of the organism allow for greater chances of survival through competition? The answer in Aristotelian terms is that superior adaptation is dependent on the animal's kinds of desires. Darwin's notion of natural selection is incomplete because he forgets to expand on a very important aspect of survival, namely animals' desires. Returning to Aristotle, we see that desire is crucially important for progression from the sensitive stage into the rational stage.⁴²⁸ The modern equivalent of this Aristotelian idea is Jean Baptiste Lamarck's account of evolution, which today is generally dismissed.

Lamarck points out a very important aspect of evolution arguably overlooked by Darwin.⁴²⁹ According to Lamarck, evolutionary change occurs through a process of "use and disuse," which accounts for acquired characteristics that are inherited by offsprings in the next generation.⁴³⁰ Lamarck proposes that the efforts of individuals during their lifetime are very important in the traits they will pass on to their offspring.⁴³¹ Evolutionary change in this sense is based on what the organism desires and needs, resulting in changes in behavior, changes in organ usage and development, change in physiological form, and eventually gradual transmutation of the species itself.⁴³² For example, Lamarck believes that giraffes used to have short necks at a time when food and water was more easily attainable. Giraffes' desire for more plentiful food made them reach for the increased parts of trees, influencing physical changes in the structures of

⁴²⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432b1

⁴²⁹ New England Complex Systems Institute, "Evolution"

⁴³⁰ *New World Encyclopedia* "Jean-Baptiste Lamarck"

⁴³¹ *New World Encyclopedia* "Jean-Baptiste Lamarck"

⁴³² UC Museum of Palaeontology and NSCE, "Early Concepts of Evolution"

their necks, and these changes were passed down to their offspring.⁴³³

Lamarck also says that body parts that are not being used, such as the human appendix and little toes, are gradually disappearing and eventually people will be born without them.⁴³⁴ The notion that desire is a key factor for evolutionary development is not such a far-fetched idea. For example, the modern study of Epigenetic indicates that certain stressful factors in the parent's environment literally alter the genetics of their offspring.⁴³⁵

Desire also goes beyond mere survival. Alfred North Whitehead evaluates the idea that associates evolution with the common phrase "the survival of the fittest".⁴³⁶ He identifies this as the "evolutionist fallacy" because it reduces the general notion of life to survival.⁴³⁷ Although survival is clearly a necessary element for any species to continue adapting to its environment, adaptation goes beyond survival. In fact, Whitehead argues that complex living organisms are generally deficient in survival value.⁴³⁸ For example, rocks persist in composition for millions of years, some trees for thousands, and certain reptiles and mammals for hundreds, compared to humans with survival typically less than a hundred years, and everything in-between varies within that range.⁴³⁹ It seems that biological sophistication and longevity are not correlated.⁴⁴⁰ Aside from lacking longevity, many complex biological life forms are either eaten or die out before they reach their full survival potential. Any doctrine of evolution must then explain how complex living organisms, with such deficient survival power, ever evolved.

⁴³³ UC Museum of Palaeontology and NSCE, "Early Concepts of Evolution"

⁴³⁴ New England Complex Systems Institute, "Evolution"

⁴³⁵ WhatIsEpigenetics.com, "Epigenetics: Fundamentals"

⁴³⁶ Whitehead, *The Function of Reason* loc.111

⁴³⁷ Whitehead, *The Function of Reason* loc.111

⁴³⁸ Whitehead, *The Function of Reason* loc.111

⁴³⁹ Whitehead, *The Function of Reason* loc.126

⁴⁴⁰ Whitehead, *The Function of Reason* loc.111

Whitehead argues that any evolutionary theory must not only look at how well the organism adapts to its environment, but moreover how well the organism undertakes the task of adapting the environment to itself.⁴⁴¹ This means that life forms are inversely engaged in modifying their environment at the same time as being modified by their environment.⁴⁴² For example, birds build nests, beavers cut down trees and dam rivers, and insects build elaborate social dwellings.⁴⁴³ The organism's recognition that there are differences between objects results in the desire to find similarities between such differences. This is explicitly achieved in the third category of life, the rational stage.

4.2. The Rational Stage

The development of what Aristotle calls the rational stage of life begins when desire develops a greater sophistication of awareness.⁴⁴⁴ The rational *psuchê* enables a higher form of knowing. Any organism possessing rationality, like the human being, also possesses the nutritive and sensitive powers.⁴⁴⁵ But rationality is the power to grasp abstractions, or what Aristotle calls “universals” (*katholou*).⁴⁴⁶

In the rational stage, the living being grasps the general form constituting the particular objects. When an idea enters the mind from perceiving an object, the mind conceptualizes that idea as a universal.⁴⁴⁷ Mere sensation, by contrast, only allows us to perceive the object's immediate particular characteristics, which Aristotle calls sensible

⁴⁴¹ Whitehead, *The Function of Reason* loc.150

⁴⁴² Whitehead, *The Function of Reason* loc.150

⁴⁴³ Whitehead, *The Function of Reason* loc.150

⁴⁴⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.10.433a1.10

⁴⁴⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432b1

⁴⁴⁶ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.20

⁴⁴⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.20

forms.⁴⁴⁸ For example, vision allows us to see that one thing is black while another is white, but when we grasp that both of these perceived qualities belong to say, the same zebra, we are employing our rational faculty.⁴⁴⁹ The mind in this case grasps a “universal” because it conceives that both qualities share the same essential characteristic.⁴⁵⁰ Aristotle distinguishes sensation and reason as follows:

Actual sensation corresponds to the stage of the exercise of knowledge. But between the two cases compared there is a difference; the objects that excite the sensory powers to activity, the seen, the heard, &c., are outside. The ground of this difference is that what actual sensation apprehends is individuals, while what knowledge apprehends is universals, and these are in a sense within the soul. That is why a [human] can exercise his knowledge when he wishes, but his sensation does not depend upon himself a sensible object must be there. A similar statement must be made about our knowledge of what is sensible – on the same ground, viz. that the sensible objects are individual and external.⁴⁵¹

Aristotle indicates that sensation and rationality are different because the former is only able to grasp particular features whereas the latter grasps universal features.⁴⁵²

Rationality desires the general form constituting the individual members, whereas sensation has no choice but to conceive only the particular parts.⁴⁵³ Although thinking and sensing are different, they are also similar, as Aristotle explains:

If thinking is like perceiving, it must be either a process in which the soul is acted upon by what is capable of being thought, or a process different from but analogous to that. The thinking part of the soul must therefore be, while impassible, capable of receiving the form of an object; that is, must be potentially identical in character with its object without being the object. Mind must be related to what is thinkable, as sense is to what is sensible.⁴⁵⁴

The organism’s capacity for sensation is present in its power to pick out the aspects of

⁴⁴⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.20

⁴⁴⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.2.426b1.5-10

⁴⁵⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.2.426b1.20

⁴⁵¹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.15-25

⁴⁵² Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.15-25

⁴⁵³ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.15-25

⁴⁵⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429a1.10-15

the object that are sensible.⁴⁵⁵ The sensation of touch for example allows the organism to feel that objects are composed of some kind of ridged or soft material structure.⁴⁵⁶ In the same way, the organism's faculty for reason is present in its power to pick out what is rational in the object.⁴⁵⁷ Reason is receptive to the idea of the object, that is, it's essential form, which involves qualities that are only capable of being comprehended by the reasoning faculty and not by the organs of sensation— qualities such as the object's behaviour or geometric patterns, aesthetic value, function and so on.⁴⁵⁸ Both sensation and reason are meant to pick out the nature of the object corresponding to the respective faculty.

The rational faculty desires the first principles of the object, the idea essential to the object. Induction is the natural means that acquires knowledge of first principles.

Aristotle explains how this is possible in this extended passage:

If on the other hand we acquire them and do not previously possess them, how could we apprehend and learn without a basis of pre-existent knowledge? For that is impossible, as we used to find in the case of demonstration. So it emerges that neither can we possess them from birth, nor can they come to be in us if we are without knowledge of them to the extent of having no such developed state at all. Therefore we must possess a capacity of some sort, but not such as to rank higher in accuracy than these developed states. And this at least is an obvious characteristic of all animals, for they possess a congenital discriminative capacity which is called sense-perception. But though sense-perception is innate in all animals, in some the sense-impression comes to persist, in others it does not. So animals in which this persistence does not come to be have either no knowledge at all outside the act of perceiving, or no knowledge of objects of which no impression persists; animals in which it does come into being have perception and can continue to retain the sense-impression in the soul: and when such persistence is frequently repeated a further distinction at once arises between those which out of the persistence of such sense-impressions develop a power of systematizing them and those which do not. So out of sense-perception comes to be what we call memory, and out of frequently repeated memories of the same thing develops experience; for a number of memories constitute a single experience. From experience again – i.e. from the universal now stabilized in its entirety within the soul, the one beside the many which is a single identity within them all – originate the skill of the craftsman and the knowledge of the

⁴⁵⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429a1.10-15

⁴⁵⁶ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.2.426a1

⁴⁵⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429a1.10-15

⁴⁵⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429a1

man of science, skill in the sphere of coming to be and science in the sphere of being.⁴⁵⁹ Our grasp of first principles begins by perceiving a number of things of the same type.⁴⁶⁰ First, the objects of experience are grasped by sense perception.⁴⁶¹ Sense perception is the immediate form of knowledge because external objects directly stimulate the organs of sensation: touch, smell, hearing, taste, and so on. Second, knowledge derived from sense perception enables frequently repeated memories of the same thing to constitute experience.⁴⁶² When memory recalls what it perceives from sensation, the mind undergoes a process of “induction”.⁴⁶³ Induction allows the mind to access memory to recall what it perceived. Induction then begins to reflect on the recollected experiences by finding a common characteristic between them.⁴⁶⁴ Peirce says that “induction, in the narrow sense, is that it is the inference of the major premiss ... from the minor premiss and conclusion, as data, or premisses”.⁴⁶⁵ Induction is the initial way the mind comes to understand the general form of particular parts.⁴⁶⁶

According to Aristotle, induction is the active feature belonging to the *intuition*.

Peirce understands intuition in the following way:

But just as a conclusion (good or bad) is determined in the mind of the reasoner by its premiss, so cognitions not judgments may be determined by previous cognitions; and a cognition not so determined, and therefore determined directly by the transcendental object, is to be termed an *intuition*.⁴⁶⁷

For Peirce, intuition is activated every time a new object is conceived. Whenever we come across a new object, we develop an intuition about it. For Aristotle, however,

⁴⁵⁹ Aristotle tr. Mure, *Posterior Analytics* II.19.99b1-100a1.25-10

⁴⁶⁰ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.99b1-100a1.25-10

⁴⁶¹ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.99b1-100a1.25-10

⁴⁶² Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.99b1-100a1.25-10

⁴⁶³ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.99b1-100a1.25-10

⁴⁶⁴ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.18.81b1

⁴⁶⁵ Peirce, *Collected Papers* 7.249

⁴⁶⁶ For Peirce, abduction also does this

⁴⁶⁷ Peirce, *Collected Papers* 5.213

intuition is able to do more than just conceive the immediate nature of an object. The intuition is the faculty where form physically enters the mind. According to Aristotle, intuition is able to grasp the essential relations of objects.⁴⁶⁸

In any kind of interaction, sense perception grasps that there are objects. Desire differentiates between the objects as separate constituents.⁴⁶⁹ Intuition then grasps the nature of the interactions.⁴⁷⁰ Returning to our previous example, the sensation of perception derives that there is a pattern of colours, desire is able to consider that there is a distinction between the colours white and black, but the intuition conceives that those colours interact in the same particular animal, a zebra.⁴⁷¹ Induction then concludes that the black and white colour patterns are a common characteristic among zebras.⁴⁷² The interactions among objects triggers an intuitive inclination for the mind to see how such interactions pertain to the self that is perceiving them. For example, when induction sees that the white and black pattern is a common characteristic of zebras, the intuition asks: How is that zebra related to me? The intuition develops the faculty of the “understanding”.⁴⁷³

4.3. The Understanding

The intuition develops into the stage of the *understanding (nous)*, “which [is] the soul [that] knows and thinks”.⁴⁷⁴ The understanding is a return to desire, but this time,

⁴⁶⁸ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.99b1-100a1

⁴⁶⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.3.414b1.5

⁴⁷⁰ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.99b1-100a1

⁴⁷¹ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.2.426b1.5-10

⁴⁷² Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* I.18.81b1

⁴⁷³ Aristotle tr. Smith, *On the Soul* III.4.429a1.10

⁴⁷⁴ Aristotle tr. Smith, *On the Soul* III.4.429a1.10

with consciousness.⁴⁷⁵ The understanding is the cognition of judgment and representation. Desire in its highest form is knowledge as understanding, while the highest form of intuition is knowledge as reason. The understanding strives to accomplish reason so it is important to comprehend the limits of the former insofar as to emancipate the latter.⁴⁷⁶ Reason is distinguished from the understanding in two ways; first, reason exists naturally in the world, and second, reason is the final resolution at which the understanding arrives.⁴⁷⁷ The understanding stands in the awkward position mediating the reason natural to the world, and the reason adopted as the formal system by the intellect.

During the stage of the understanding, desire is equipped with the intuition, but instead of searching for objects, having already found them, the understanding desires the differences in the essential relations constituting the object.⁴⁷⁸ The understanding dissects the universals derived by induction. The nature of the object is received by the understanding as two abstractions: a) the material makeup of the object is one thing, and b) the form of it is seen as another thing.⁴⁷⁹ The understanding represents the matter of the object as the “concrete”, and represents the form of the object as the “abstract”.⁴⁸⁰ The understanding conceives that the material component is one thing, which is external or “out there,” whereas the idea is another thing that is internal, “here” in the mind.⁴⁸¹ The understanding, on its own, does not make the final connection to comprehend that the form and the matter are really two necessary aspects of the same

⁴⁷⁵ Aristotle tr. Irwin, *Nicomachean Ethics*, Glossary 417

⁴⁷⁶ Hegel, *Phenomenology of Spirit*. 298

⁴⁷⁷ Hegel, *Encyclopedia of Philosophical Sciences*, 81

⁴⁷⁸ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.9.432a1.15

⁴⁷⁹ Hegel, *Philosophy of History* 26

⁴⁸⁰ Hegel, *Philosophy of History* 26

⁴⁸¹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.5.417b1.15-25

thing. In this way the understanding usually falls into contradiction concerning the nature of the object by believing that the very separation it makes is a literal truth about the object.⁴⁸² A perfect example of this is Descartes' mind-body dualism.

Descartes for example expresses a dualism between “material substances” and “mental substances.”⁴⁸³ The latter is seen as external to the former in that neither type requires the other.⁴⁸⁴ Descartes argues that because the mind and the body can be separated by the intellect, they are also separable in external reality.⁴⁸⁵ But it does not necessarily follow that just because we can separate things in our intellect, they are actually separable in their concrete reality.

Instead of induction, which belongs to the intuition, the understanding applies “deduction”, which Peirce defines as follows:

Deduction is that mode of reasoning which examines the state of things asserted in the premisses, forms a diagram of that state of things, perceives in the parts of that diagram relations not explicitly mentioned in the premisses, satisfies itself by mental experiments upon the diagram that these relations would always subsist, or at least would do so in a certain proportion of cases, and concludes their necessary, or probable, truth.⁴⁸⁶

Deduction is when “the mind is under the dominion of a habit or association by virtue of which a general idea suggests in each case a corresponding *reaction*”.⁴⁸⁷ The understanding takes the “universals” from induction, and suggests a corresponding re-evaluation.⁴⁸⁸ Once the understanding divides the object into abstract and concrete – form and matter – it aims to find further differences in this relation.⁴⁸⁹ In order to do this, the understanding adopts the attitude that sees no relationship between form and

⁴⁸² Hegel, *Logic Defined & Divided*, 79

⁴⁸³ Descartes ed. Cress, *Meditations* 78

⁴⁸⁴ Descartes ed. Cress, *Meditations* 78

⁴⁸⁵ Descartes ed. Cress, *Meditations* 78

⁴⁸⁶ Peirce, *Collected Papers* 1.66

⁴⁸⁷ Peirce, *The Law of Mind*, 552

⁴⁸⁸ The relationship between deduction and induction is inverted in the cosmological account. Here we have induction first then deduction. But in cosmology, deduction is first then induction.

⁴⁸⁹ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.2.414a1.5-20

matter, and everything is viewed as separate from everything else.⁴⁹⁰ Georg Wilhelm Hegel says: “Thought, as Understanding, sticks to fixity of characters and their distinctness from one another: every such limited abstract it treats as having a subsistence and being of its own”.⁴⁹¹ This feature of the understanding is however necessary for achieving reason because without it, “there is no fixity or accuracy in the region of theory or of practice”.⁴⁹² The contribution of the understanding comes in the form of distinguishing between things which is necessary for discovering that objects are particular parts having their own subsistence and being.⁴⁹³

The result however is inevitably contradictory because each particular object is portrayed as constituting its own universal form.⁴⁹⁴ This therefore eliminates any real general form that can group the individual objects together. Each part is seen as being its own whole without seeing how the whole constitutes the parts. If thought stops at this stage of the understanding, the particular objects appear to involve no universal, and they lose their essential nature that bears their relationship.⁴⁹⁵

Another difficulty strikes the understanding in the analyzation process when the form is separated from its matter. The understanding operates on the predicate nature of sensation, and sense perception perceives a multiplicity of things simultaneously.⁴⁹⁶ The understanding simultaneously examines different objects, and so when the form is seen as distinct from matter, it is unclear which matter belongs to which form.⁴⁹⁷ For example, if the understanding takes the animal zebra as the substrate that is one thing,

⁴⁹⁰ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429b1.15

⁴⁹¹ Hegel *Glossary*, “Understanding”

⁴⁹² Hegel, *Logic Defined & Divided* 80

⁴⁹³ Hegel, *Philosophy of History* 26

⁴⁹⁴ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429b1

⁴⁹⁵ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429b1.20-30

⁴⁹⁶ Aristotle tr. Jowett rev. Barnes, *On the Soul* II.11.422b1.15-30

⁴⁹⁷ Aristotle tr. Jowett rev. Barnes, *On the Soul* III.4.429b1

different than the colour patterns white and black that is another thing, the understanding on its own is unable to associate which characteristic belongs to which object. The zebra loses the indication that makes it that animal with white and black colour pattern, and as far as the understanding is concerned, any animal can be replaced with a white and black colour pattern.

Peirce's "maxim of pragmatism" precisely aims to resolve the contradiction between the abstract and the concrete.⁴⁹⁸ Peirce explains:

Pragmatism is the principle that every theoretical judgment expressible in a sentence in the indicative mood is a confused form of thought whose only meaning, if it has any, lies in its tendency to enforce a corresponding practical maxim expressible as a conditional sentence having its apodosis in the imperative mood.⁴⁹⁹

Peirce's pragmatic maxim rightly recognizes that there is a discrepancy between the abstract and concrete.⁵⁰⁰ The discrepancy between the abstract and the concrete is solely a feature of the understanding. There is no such distinction in the realm of reason, which is the active substance in the world, as well as the final stage of knowledge. In the realm of nature, the indicative and the imperative form an indivisible unity, and this indivisible unity is one that the understanding is developing towards.

Whenever the understanding grows hopeless of ever achieving, by its own means, the solution to the contradiction, which it has brought upon itself, it returns back to reason, which is in the world, for the resolution.⁵⁰¹ In nature, any contradiction is equally met with a resolution in that each presupposes the other. In order for the understanding to achieve reason, it must recall the nature of the object when first

⁴⁹⁸ Peirce, *Collected Papers* 5.18

⁴⁹⁹ Peirce, *Collected Papers* 5.18

⁵⁰⁰ Peirce, *Collected Papers* 5.18

⁵⁰¹ Hegel, *Encyclopedia of Philosophical Sciences* 11

grasped by the intuition, and then confirms which form belongs to which matter.⁵⁰²

Something grasped by the intuition bears no distinction between form and matter.⁵⁰³

This is the case because the intuition is the crude faculty which receives the object in its natural form. In the same way that the material parts of the object stimulate the organs of sensation, the form of the object also enters the rational faculty. Form and matter are by nature indivisible, and so when an idea enters the rational faculty from natural substances, it enters both as abstract and concrete at the same time. This has to first be true before the understanding is then able to separate form and matter into respective constituents.

The intuition grasps all the features constituting the object; these includes logical and geometric forms, quantitative properties such as density, size, colour etc. images and pictorial properties and so on. The final stage of the rational faculty aims to make sense of these properties by synthesizing them into an accurate conception.⁵⁰⁴ In order for reason to be achieved, the relations grasped by the intuition must be brought up in contrast to the distillations produced by the understanding. The analytical findings of the understanding must then be reorganized into a synthetic resolution that reaffirms the true nature of the thing.⁵⁰⁵ In this way a concept is created that accurately captures the true nature of the object.⁵⁰⁶ The concept is scientific because it is the “comprehension” of the true nature of the object, which allows all the properties of a thing to be corollaries from its definition.⁵⁰⁷ It is in this sense that reason achieves

⁵⁰² Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.100a1

⁵⁰³ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.100a1.10-15

⁵⁰⁴ Hegel, *Encyclopedia of Philosophical Sciences* 11

⁵⁰⁵ Hegel, *Encyclopedia of Philosophical Sciences* 11

⁵⁰⁶ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.100a1

⁵⁰⁷ Peirce, *Collected Papers* 1.232

consciousness of its self in the object.⁵⁰⁸

We have to keep cautious that in theory we divide the mind into separate faculties; namely sensation, desire, intuition, understanding and reason, but this is a feature of our own understanding at play, in reality they are one holistic system undergoing knowledge of the object. It is psychologically difficult for the human being to imagine that their essential property, that is – reason, belongs to the world. This is one oversight of the human being that has to be remedied by the self-correcting mechanism of reason.⁵⁰⁹ Metaphysics wants to figure out how the reason present in the individual is related to the reason existing in the universal. The relationship between the abstract and the concrete is intimate in nature. This has been the overarching theme of this inquiry.

⁵⁰⁸ Aristotle tr. Jowett rev. Barnes, *Posterior Analytics* II.19.100a1.10-15

⁵⁰⁹ Peirce, *Collected Papers* 5.575

Chapter Five: Closing Remarks

The central theme of this inquiry has been the ontological notion of objective idealism applied to evolutionary metaphysics, in the significance of Aristotle's arguments, and Peirce's analysis, that *reason* is the principle for development. What this means is that evolution is fundamentally a rational process and the properties of development are logical. This is the basis by which we come to understand the nature of physical reality.

In the spirit of Peirce's objective idealism, I provided alternative ways of thinking, and clarified Aristotelian concepts, which explain that the development of life is correlated with rational development. Several objectives have been accomplished to support the thesis argument that reason is the principle for development: In Chapter Two, we explored Aristotle's distinction between things known in themselves in contrast to things known by us. This outlined Aristotle's investigation into the relationship between thought and object. In support of this we pointed out that logic is the essential activity of thought and we contrasted between two types of logic – natural and formal logic. We have shown how natural logic is more fundamental than formal logic.

In Chapter Three, we explored the constitution of substance – what are the essentials of reason? In answering this question, we showed how form and matter are the qualities of substance. Subsequently substance constitutes the nature possessed by things, as well as things possessed by nature. The inquiry of nature enabled the analysis of how efficient and final causation explain the underlying relation between form and matter. We also looked at how change is a process whereby things generate from the potential to the actual. And finally how the concepts of actuality and potentiality

describe the activities that define form and matter.

In Chapter Four, we explored in greater detail Aristotle's notion of "mind", which is argued to be the governing principle in nature, and the so-called "soul" of life is its active character. This shows how the development of life is at the same time synonymous with the development of knowledge, and how in this developmental process the faculties of reason acquire their function.

This thesis has been concerned with providing a general insight into the science of metaphysics concerned with the origin and development of life. Some direction for future inquiry involves an elaboration of the metaphysical concepts discussed throughout this study, but more importantly, the future project appropriating this inquiry should focus more on the details of the concepts by actually mapping out the logical flow of evolutionary development. Moreover, the ontology discussed throughout this study should guide the natural sciences in their inquiry into the mechanics of the universe. Let us conclude this thesis with the following quote, as Peirce says, the potential of the world is boundless:

We start, then, with nothing, pure zero. But this is not the nothing of negation. For *not* means *other than*, and *other* is merely a synonym of the ordinal numeral *second*. As such it implies a first; while the present pure zero is prior to every first. The nothing of negation is the nothing of death, which comes *second* to, or after, everything. But this pure zero is the nothing of not having been born. There is no individual thing, no compulsion, outward nor inward, no law. It is the germinal nothing, in which the whole universe is involved or foreshadowed. As such, it is absolutely undefined and unlimited possibility — boundless possibility. There is no compulsion and no law. It is boundless freedom.⁵¹⁰

This "absolutely undefined and unlimited possibility — boundless possibility" is the very desire of the metaphysician. Whether any one individual can ever fully comprehend this "boundless freedom" is the metaphysical question.

⁵¹⁰ Peirce, *Collected Papers* 6.217

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