Whereas the history of philosophy defines metaphysics as asking the question “What is Being?”; here is asked, “Where is Being?” What is to be analyzed is indeed part of the tradition of metaphysics to inquire about Being qua being, but here the inquiry is into its structure, its position within the ontological whole. The concept of the “architectonic” is borrowed from Kant, albeit with differing intentions. In doing this analysis, two points become explicit: one, ontology has a structure; and two, the status of Being within this structure. In this work, three philosophical structures are chosen for a more extensive examination: the three “architectonics” are that of Plato’s chora, Aristotle’s continuum, and finally Leibniz’s labyrinth. In the end, any architectonic of philosophy necessarily implies a construction, destruction, and eventual reconstruction of its projects.
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THE ARCHITECTONIC OF PHILOSOPHY
PLATO, ARISTOTLE, LEIBNIZ

Leslie Jaye Kavanaugh
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PREFACE

I have always believed that if I was very fortunate in this life, I would be blessed with one question, one guiding thread that compelled me to inquiry, unsettling me in my all too convenient presuppositions, awakening me to my greatest and most profound knowing. This question for me is space.

Given the present impossibility of overcoming metaphysics as defined by the Western tradition, the philosophical difficulty in actually seeing the way forward, this project attempts to make explicit the ontological structures that comprise the metaphysical project of Western metaphysics. This work examines three such architectonics. Firstly, within a critique of the possibility of a philosophy of penultimate origins or first principles, a reading of Plato’s *Timaeus* shows that the origin is a never-ending, or more accurately always beginning anew, eternally receding beginning. Secondly, in a critique of the possibility of a universality, a reading of Aristotle’s *Physics* alongside other of his texts, shows that although of “one piece” the phenomenal and ontological are an infinitely divisible continuum. Furthermore, in a critique of ontological hierarchies, is a reading of Leibniz’s oeuvre that shows that the metaphysical intertwined with the phenomenal is a labyrinth that we scarcely dare dream of escaping.

I will not ask about the “end” of philosophy, or indeed, ask about its status in opposition to or relation with other disciplines within the humanities. I leave that project to others. I will not be calling for the demise of metaphysics, for its “Destruktion”, or even for its “deconstruction”; rather I will precisely be doing metaphysics – doing exactly what metaphysics has always done – asking itself what it is. In this way this project is to do metaphysics, to construct yet another architectonic of philosophy. Because finally, to “overcome”, to “escape”, to “end”, to “deconstruct”, to “go beyond”, is in my opinion at present not only not possible, but also perhaps not even desirable. Perhaps, I conclude, metaphysics is primarily this very desire to construct, to contain, and to delimit. If so, then, are these structures optional?
other structures be proposed that are configured differently, and are therefore more useful and meaningful for contemporary concerns?

Ultimately, this project is constructivist, as opposed to deconstructivist. In the final chapter of this work, I propose a new architectonic, a structure that is perhaps more immanent, more broadly based as a foundation, and pluralist whilst being a singular continuity. Yet it too will merely be among the many architectonic structures in the metaphysical landscape. I call this proposal the reticulum.

This work is long in the preparation and undoubtedly impossible without the considerable encouragement of many. First and foremost, is my teacher, Prof.dr. Hent de Vries. He did what all great teachers do – he left me free to wrestle with my own questions, and then carefully and precisely critiqued what I have thought. I am grateful for both the freedom and the precision. Further, many others have read over the years sections of the manuscript and offered their criticisms: Marga Jager has essentially helped with the Greek philosophy; members of the Leibniz Society have offered comments on various drafts of papers given at conferences; and students have with their seemingly naïve questioning often put their finger on precisely the critical issues. I am indeed grateful to a few persons who helped bring this manuscript forward into a book: Angelique Caccia who did the text editing and suggested many improvements for legibility, Tahl Kaminer who layed out the cover, Janine Toussaint who layed out the book, Patrick Healy who made helpful suggestions, Cristina Ampatzidou who corrected the Greek language, and finally Marieke Soons, Editor, and Patrick Weening, Production Coordinator at Amsterdam University Press who actually made this book a possibility.

It only remains for me to say that none of this work would have been even thinkable without the man who is the condition of all my possibilities, Marcel Speklé, my loving and eternally patient husband.
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INTRODUCTION: 
THE ARCHITECTONIC

“...the Architect of reason searches, probes, prepares the ground. In search of the bedrock, the ultimate Grund on which to raise the whole of metaphysics...Thus the critique as such attempts to descend to the bythos, to the bottom of the abyss [Abgrund], without knowing whether it exists.”
Derrida

A task is thereby set for thought: that of contesting the origin of things, but of contesting it in order to give it a foundation,...that origin without origin or beginning, on the basis of which everything is able to come into being.
Foucault

In this work, I examine the architectonic of philosophy. This examination is about space in its ontological status, about metaphysics as a construction. Three ontologies in Western metaphysics, three “architectonic structures”, are examined; that of Plato’s chora, Aristotle’s continuum, and finally Leibniz’s labyrinth. This work does not attempt to be comprehensive in scope, yet the choice of texts for exegesis is deliberate. Each of these three demonstrates a clear and singular architectonic structure.

On Method: Onto-topology
Whereas the history of philosophy defines metaphysics as asking the question “What is Being?”; here is asked, “Where is Being?” Since even before Aristotle, the question that has always been asked, and will always be asked because it never ceases to bewilder us, is the question, “What is Being?” Indeed, the question of Being has never failed to be asked. In contrast, the question as to the location of Being has rarely been asked. Metaphysics - whether immanent, hierarchical, transcendental, negative, “beyond”, higher than, “Outside”, or “Otherwise than Being”, always implies an architectonic - an ontological structure that positions beings and Being within a complex composition. What is to be analyzed here is indeed part of the tradition of metaphysics to inquire about Being qua being, but here the inquiry is into its structure, its position within the ontological whole. In doing this analysis, two points become explicit: one, ontology has a structure; and two, the status of Being within this structure. In short, an analysis is required of the formal structure of Being that functions as the ground or condition of possibility of all ontology.

The method that has developed in order to make explicit this structure, is called onto-topology. Topology can be defined as a relationship between linked elements in a system. As such, a topology can be considered as a kind of whole which constitutes a unity even though it is comprised of various parts - even disparate, incongruent, and hybrid parts. Onto-topology, as a method, can then be defined as the making explicit the ontological structures that underpin the metaphysical project of Western metaphysics. This method inquires into the position of Being and beings within the various formal accounts of the parts, making a connected whole, or a continuum. Onto-topology - the logos of the “situation” of being – is simply asking: “Where is Being?”

Ontological Structures: The Architectonic
Traditionally, philosophy has been in search of firm foundations. These grounds were seen as immutable, eternal propositions about

3 Aristotle; Metaphysics 1028b5-7.
which no contestation could be made. Upon these foundations, other knowledge based on either experience or reason could be firmly placed in order to reconstruct or to understand the structure of the world. It was only a matter of time when the superior intellect of man would discover the building blocks of knowledge. Essentially, man sought to discover what God had already created, and in our hubris believed it within our intellectual powers to understand every mystery in the world. Even critical philosophy, in attempting to question the metaphysical “remains”, still attempted to restore philosophy to her true foundations and to retrace the origins of truth.

Yet man not only constructed his architectonic of philosophy, he made the building blocks as well. Consequently, the search for origins and the excavation of original, more primordial foundations are subject to question. We will only discover what we have ourselves constructed earlier. Interesting perhaps, but not more true. As Nietzsche suggested in On Truth and Lies in a Non-moral Sense:

...one may certainly admire man as a mighty genius of construction, who succeeds in piling up an infinitely complicated dome of concepts upon an unstable foundation, and, as it were, on running water. As a genius of construction, man raises himself far above; ...man builds with far more delicate conceptual material which he first has to manufacture from himself. In this he is greatly to be admired, but not on account of his drive for truth or for pure knowledge of things.⁴

Man, precariously balancing upon shifting foundations, shored up by his tenuous scaffolding, attempts to raise himself far above - perhaps nearer to God - and in doing so constructs his architectonic of philosophy.

Of course, the formulation of the “architectonic” is from Kant. Kant proposes an “architectonic”, a tight systematic edifice organizing metaphysics within the limit of human reason, and the transcendental conditions of the possibility of all experience. There are four “supports”, as it were, in this architectonic: the Transcendental

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Aesthetic, the Transcendental Logic, the Transcendental Analytic, and the Transcendental Dialectic.\(^5\) In the *Prolegomena*, Kant dismissed both the excesses of a metaphysics without proper foundation, and an empiricism without Transcendental Idealism. The architectonic is the possibility of all cognition given by pure reason. In the architectonic, Kant constructs a philosophical structure, yet one that he hopes will be unassailable. “Human reason”, he advanced, “so delights in constructions, that it has several times built up a tower, and then razed it to examine the nature of the foundation. It is never too late to become wise...”\(^6\) Yet, this path is the one often trod in the history of philosophy.

**The Transcendental Structure of Kant’s Architectonic**

In the *Critique of Pure Reason* in the chapter entitled *Transcendental Doctrine of Method*, Kant set out the method of critical philosophy in the section, “The Architectonic of Pure Reason”\(^7\). This section comes at the very end of the *Critique of Pure Reason*, after Kant has extensively treated the question of the limits of knowledge, eradicating every tendency to speculation as “useless” and “fruitless”. Within these self-imposed bounds, Kant constructs his architectonic, which is indeed the very art of constructing a system.\(^8\) Fundamental to his philosophic method is a systematic unity containing all facets of cognition, forming a coherent edifice wherein the *apriori* limits are defined, as well as the place of the various forms of knowledge and their relationship to each other. Not only does this edifice comprise a method as a systematic unity, but is internally self-sufficient and organic. As a unified whole, the architectonic includes a place for “filling in the gaps”, yet per definition does not allow for external appendages to the system, for that would constitute a mere aggregation and not a true unity. As


\(^6\) Kant, Immanuel; *Prolegomena* trans. P. Carus (Chicago: Open Court, 1994)p.2.


\(^8\) Kant; *CPR*, op cit, p.653. [A832/B860].
a result, the method of the architectonic of pure reason constitutes
the construction of a schema wherein the parts are arranged as to first
principles. This schema, originating from an idea, is an architectonical
unity rather than a technical unity, the whole of which is guided by
an apriori plan, forming the condition of possibility of pure reason,
an “unified system of human knowledge”, “framed on architectonical
principles”, and resting upon the foundation of pure reason.9

Yet within this architectonic schema, one may ask where was the
place of space and time within this system? Space and time, for Kant,
are pure ontological categories that provide the Grund, “foundation”,
or the condition of the possibility of experience. Indeed, for Kant,
space and time, as the only pure form of intuition, are of paramount
importance in his architectonic. Kant emphatically states: “The only
intuition that is given apriori is that of the pure form of appearances
(phenomena) – space and time”.10 As such, space and time are not in
themselves constituted, but purely propaedeutic; i.e., the inquiry into
the powers of reason with regard to apriori cognition. This is to say
that space and time are not themselves phenomena, but the form of
intuition; things that are given in space and time, on the other hand,
are aposteriori in that they are represented in perception. Space and
time are the only apriori intuitions. Simply stated, these intuitions,
without which no object could be perceived in space and time, are
merely the representations of phenomena to ourselves.11 Nevertheless,
the priority of these intuitions assumes that space and time were not
in any way constituted, but purely given.

And it is precisely this presupposition to the pure form of
intuition of space and time for Kant that brings structural instability into
his architectonic, making his metaphysical edifice vulnerable. Several
objections can be made to the beautiful pristine purity of his idea.
One, Kant’s architectonic itself is a construction - a schema that places
space and time at the foundation of all cognition given by pure reason.

9 Kant, Immanuel; The Critique of Pure Reason trans. J.M.D. Meikeljohn (New York:
{A834/B862}.
10 Kant; CPR, translation Kemp-Smith, p.581-3. {A720/B748}.
11 Kant; CPR {A42/B59}.
Two, metaphysics, according to the Kantian definition, is an inquiry into first principles, and is therefore engaging in the determination of the ontological category of space and time themselves, and as apriori synthetic pure intuition. Three, this entire architectonic edifice is a systematic unity presupposing a variation of space and time, and as such is dependent upon the verity of this conception. A relational view of space and time,\(^\text{12}\) in contrast, would imply no fixed place; therefore, no priority, no transcendence, and ultimately no static determinations of any possible cognitive subject. The Kantian architectonic, the art of constructing a system, constructs a foundation (Bestimmungsgrund) for itself as foundation, (Grundlage). Yet, the architectonic edifice rests upon, is supported by, the presupposition that space and time are not only apriori, but not in themselves constituted.

In fact, for Kant, space and time are constituted. If one traces the development of these determinations through out his work; space and time are themselves an evolving construction. In his earliest works, the so-called “pre-Critical” works,\(^\text{13}\) Kant is deeply engaged in what can be termed “Natural Philosophy”, a systematic explanation of both phenomena and metaphysical concerns. In 1747 in *Thoughts on the True Estimation of Living Forces*, his view of space is a reconciliation between Leibniz and Descartes. Yet, in the early 1750’s, Kant experiences a philosophical “conversion” to Newtonianism.\(^\text{14}\) Slowly, Leibniz and Descartes recede into the background, and the natural science

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\(^{13}\) The pre-Critical works are collected in English translation: Kant, Immanuel; *Theoretical Philosophy 1755-1770* translation by Walford and Meerbote (Cambridge: Cambridge UP, 1992) and in Kant, Immanuel: *Inaugural Dissertation and Early Writings on Space* translated by Handyside (Chicago and London: Open Court, 1929).

\(^{14}\) Kant sought to establish a philosophy adequate to the natural sciences of his day, as a proper grounding and a solid conceptual foundation. Michael Friedman explains that although Kant did not exactly have a “parasitic” relationship to the increasing secularization of metaphysics and the mathematization of natural philosophy, he was profoundly dependent upon the modern scientific paradigm. “Moreover, it is quite clear” he argues, “that Newton’s *Principia* serves as the model for scientific achievement during the whole of
of Newton – and Newton through Euler – become the model for Kant of philosophical certainty.\textsuperscript{15} With the 1768 essay, Concerning the Ultimate Foundation of the Distinction of Directions in Space, Kant makes his definitive turn from Leibniz’s relational space. His position at this point, under the influence of both Newton and Euler,\textsuperscript{16} is decidedly on the side of absolute space, Kant writes: “absolute space has a reality of its own, independent of the existence of all matter, and indeed as the first ground of the possibility of the compositeness of matter”.\textsuperscript{17} Kant goes on to say: “...absolute space is not an object of an outer sensation, but a fundamental concept which first makes all such sensations possible...”\textsuperscript{18} Thus, already in 1768 Kant sketches out his position that will be incorporated into his architectonic system of The Critique of Pure Reason: space is temporally prior to experience and constitutive synthetically.

Nevertheless, absolute space presupposes an absolute viewpoint from which all other objects in space are measured. In this way any extension into space can only be thought of geometrically - as a measurant in relation to a meta-physical entity. This “taking-measure” requires a conception of space as homogeneous, and time as uniform

\textsuperscript{15} For example, the 1755 essay, Universal Natural History and Theory of the Heavens, or Essay on the Constitution and Mechanical Origin of the Entire Universe, Treated in Accordance with Newtonian Principles, signals Kant’s conversion to Newton, yet still contains Leibnizian elements. According to Schönfeld: “Following Newton, Kant thought of physical nature as a system of motions and bodies; following Leibniz, he thought of the world as perfect. This prompted Kant to construct an improved version of the Newtonian model that represented physical nature not just as a mechanical system, but as a flawless mechanical system.” cf. Schönfeld, Martin; The Philosophy of Young Kant (Oxford: Oxford UP, 2000)p.105. my emphasis.

\textsuperscript{16} Euler, Leonhard; Réflexions sur l’espace et le temps (Berlin: 1748). Garnett states that “Kant’s theories of space about 1769 are so similar to the teachings of Euler that it seems definite...that Kant was directly influenced by, and consciously indebted to him in that year.” cf. Garnett, Christopher Browne Jr.; The Kantian Philosophy of Space (New York: Columbia UP, 1939)p.141-2.

\textsuperscript{17} On the First Ground of the Distinction of Regions in Space in Kant, Immanuel; Inaugural Dissertation and Early Writings on Space translated by Handyside (Chicago and London: Open Court, 1929)p.20. italics in the original.

\textsuperscript{18} Kant; On the First Ground of the Distinction of Regions in Space, op cit, p.28.
duration. Displacement has meaning only in context of change in relation to a fixed point - in this case God. God as the unchangeable, as the self-created, as causa sui becomes necessary not only in order to establish a metaphysical structure, but also to establish a mathematics and a physics as an allegedly objective undertaking as well. Kant gains much in his “conversion” to Newton. Nonetheless, the adoption of mathematics as procedure to ground synthetic constructions in metaphysics, is precisely what will eventually lead Kant to reject a whole-scale acceptance of the Newtonian model, thus precipitating another philosophical crisis. As Martin Schönfeld describes Kant’s predicament:

The precritical project was falling apart. Of the envisioned metaphysics that combined Newtonian physics with a teleology of purpose, a deduction of , and a demonstration of God, only the ontological proof remained. It was the last, solitary bulwark standing in the ruins of a once grand design.19

The philosophical crisis that left Kant without a suitable methodology to ground both metaphysics and natural philosophy begins in The Inaugural Dissertation of 1770, the Dissertation on the Form and Principles of the Sensible and Intelligible World, to point a way forward. In this short work that provides the foundation for that which will be painstakingly worked out in the next decade for The Critique of Pure Reason in 1781, space forms the possibility of singular representation, not an abstraction from phenomena. Space is most decidedly given and not constituted or generated from sensations or perceptions. Pure intuition, temporally prior to experience, is non-empirical. Already in 1770, space is an intuition (Anschauung). By the time Kant experiences his “conversion” to Newton, and then is subsequently forced to radically re-think the foundations of his philosophy for The Critique of Pure Reason in 1781, space and time are firmly established as synthetic apriori, as indeed metaphysics itself as the science of the limits of human reason.

19 Schönfeld; op cit, p.214.
In The Critique of Pure Reason, in the section entitled: “The Transcendental Aesthetic”, Kant extensively examines how we represent objects outside of ourselves to ourselves, that is to say, how objects of experience are given in space and time.

We assert, then, the empirical reality of space, as regards all possible outer experience; and yet at the same time we assert its transcendental ideality - in other words, that it is nothing at all, immediately we withdraw the above condition, namely, its limitation to possible experience, and so look upon it as something that underlies things in themselves.

Admittedly, nevertheless, in “The Transcendental Aesthetic” and later in the section “The Transcendental Analytic”, space forms two different, somewhat irreconcilable constructions of intuition and synthesis. Indeed, Garnett explains that Kant has no less than four accounts of space in The Critique of Pure Reason:

First, space has a necessary, intuitive nature; it is not generated by a synthesis but is given or presented temporally prior to experience. Secondly, space has a necessary, intuitive nature; it is not yielded by a synthesis but is given or presented upon the occasion of experience. In these first two positions, space is given as an infinite whole. Thirdly, space is yielded by a synthesis of the parts beginning with the materials of sense and not merely on the occasion of our apprehension of those materials....Fourthly, if the synthesis beginning with the materials of

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20 Kant; CPR, (A22/B37)ff.
22 As acknowledged, Kant’s notion of space and time evolved and changed throughout his lifetime. However, at the time of the Critique of Pure Reason, when he was constructing his great system, his architectonic, Kant was deeply indebted to Newton as the paradigmatic example of exact science, indeed, of “modern” science. In the end, as Brittan points out, Kant is in fact forced to reject a purely Newtonian theory of absolute space and time, quite simply because it is not a possible object of experience. cf. Brittan, Gordon G.; Kant’s Theory of Science (Princeton, N.J.: Princeton UP, 1978)pp.98-104. Brittan concentrates on the Kantian Critical texts, but tries to integrate into a coherent account, Kant’s investigations into science and mathematics. As a consequence, Kant’s relationship to Newton and Euclid specifically, Brittan shows, informed the project of the three Critiques. Brittan goes on to say: “One thing that very much complicates Kant’s discussion of geometry and space in the Transcendental Aesthetic is his [Kant’s] failure there to distinguish as sharply as he does elsewhere between spatiality and space.” Brittan; op cit, p.85.
sense does not even yield a necessary nature, spaces would...merely be the arrangement of objects as set together.23

In the Aesthetic, space is given as a form of pure intuition; in the Analytic, space is constructed, a synthesis upon the occasion of experience.

Although an extended exposition of Kant’s philosophy of space and time is beyond the scope of this work,24 the position of this ground within Kant’s architectonic is decisive. Space and time hold fundamental positions in both the Aesthetic and in the Analytic in *The Critique of Pure Reason*. Yet in the twentieth century, without the absolute fixed and unchangeable viewpoint of a God as a tenable underpinning, not only does Kant’s architectonic break apart and fall into ruin, but also the whole conception of physics as static, fixed and objective. Kant’s architectonic edifice rested upon a foundation supported by the presupposition that space and time are not only *apriori* synthetic, but also a variant of absolute. Although Kant divorced the projects of natural science and metaphysics in his philosophical edifice of *The Critique of Pure Reason*, space and time remained as an *apriori* synthetic. Would questioning these presuppositions expose Kant’s architectonic as structurally vulnerable?

In *The Critique of Pure Reason*, “The Transcendental Aesthetic”, dealing with the question of how objects of experience are given in space and time, is one of the four “supports” in the Kantian Critical architectonic. In the end, because intuitions of space and time themselves can be said to be constructions, determined variably in different philosophic or scientific systems, they prove to be quite fragile underpinnings. Although Kant determined space and time to be the only *apriori* intuition, a foundation for his architectonic as the condition of possibility of all experience, his conceptions have proven anything but immutable. Kant had, in fact, constructed his notions of

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23 Garnett; op cit, p.226-7.
absolute space and time fundamentally from the paradigms of scientific certainty in his time – on Euler and on Newton; i.e., a scientific theory that itself was not sturdily grounded in empirical phenomena. Yet, in his turn from the relational space and time of Leibniz, and the three-dimensional geometric extension of Descartes, he thought he had found in Newton something solid, something neutral, pure and transcendental upon which to construct his metaphysic. In turning from Leibniz, Kant was able to avoid the philosophical problem of how substances themselves communicated and were related. Yet not only did Kant pay a high price in order to have a firm foundation upon which to stand in that the physis of meta-physis became the ground of all inquiry, that firmness ultimately would shift under his feet - standing, as it were, on the uncertain or mutable fundament called space and time. All speculative reason, for Kant, is forbidden within the system of possible experience as the only criteria for cognition. Yet obviously, when the foundations of absolute space and time were themselves in turn questioned, as was the case with Einstein and Bohr questioning Newton’s universal gravitation, and Reimann and Bolyail-Lobatschewsky questioning the hegemony of Euclidean geometry, then the architectonic is suddenly lying in ruins, deprived of a critical support. This questioning effectively means that the foundations of the apriori synthetic of Kant eventually are exposed as structurally vulnerable. The foundations of Euclidean geometry and Newtonian mechanics have indeed proven to be just as uncertain as the other realms of knowledge. Admittedly, these notions survived serious challenge for longer than many - thus structurally more integral - yet, universal they did not remain.

In asking if metaphysics were possible - and answering in a highly framed manner - Kant attempted to eradicate speculative metaphysics and to place philosophy firmly upon the ground of the conditions of possibility of experience, insuring a project of metaphysics as the science of the limits of human reason. Nevertheless, the

25 Perhaps the most comprehensive criticism of Newton’s supposed “empiricism” is to be found in Mach, Ernst; The Science of Mechanics: A Critical and Historical Account of its Development translation McCormack (La Salle, Illinois: Open Court, 1902/1974).
architectonic suffered from structural failure. Others, in their critique of the Kantian project, had hoped to recover something salvageable. For example, Hans Reichenbach in *The Theory of Relativity and Apriori Knowledge*,\(^{26}\) tried to criticize the Kantian possibility of the *apriori* synthetic and to put it on a different foundation, i.e., independent of Euclidean geometry or Newtonian physics. Further, Reichenbach offered in *The Philosophy of Space and Time*,\(^{27}\) a critique of the category of space as a transcendental ideal. Ultimately, he was compelled to conclude, harshly, that the “Kantian method at its best was nothing else than an analysis of Newtonian mechanics in the guise of a system of pure reason”.\(^{28}\) Although perhaps that condemnation is not totally warranted, undeniably the foundations of Kant’s architectonic made him vulnerable to criticism. The foundation of absolute space and time as the only *apriori* intuition proved to be a critical underpinning in his metaphysical edifice. New supports would be necessary in order to proceed; yet, as Theodor Adorno concurred: “all efforts to emancipate Kantian epistemology from the realm of natural science [are doomed] to fail”.\(^{29}\)

All the same, the Kantian architectonic stood solidly for quite a long time, influencing philosophical thought well past its original construction. In this work, the Kantian term “architectonic” is borrowed. Yet, let us not forget that all constructions, no matter how solid, how “fruitful”, are always just that – constructions. Nietzsche reminded us that a bee like a man:

...builds ever newer and higher storys; supports, purifies, renews old cells, and endeavors *above all* to fill that gigantic framework and to arrange within it the whole of the empiric world; i.e., the anthromorphic world. And as the man of action binds his life to reason and its ideas, in


\(^{27}\) Reichenbach, Hans; *The Philosophy of Space and Time* (New York: Dover, 1958). Mach in his *The Science of Mechanics* also gives one of the most decisive dismissals of notions of absolute space and time.

\(^{28}\) Reichenbach; *The Theory of Relativity and Apriori Knowledge*, op cit, z.xiii.

order to avoid being swept away and losing himself, so the seeker after truth builds his hut close to the towering edifice of science in order to collaborate with it and find protection. And he needs protection. For these are awful powers which press continually upon him...\(^\text{30}\).

Making explicit the architectonic is not to overcome or to escape it. In fact, escape is impossible. Rather, a careful structural analysis, an onto-topology, is necessary in order to lay bare the tendency to construct inherent in all metaphysics. Ultimately, in acknowledging the plurality of ontological structures within the architectonic of philosophy, the history of Western metaphysics can be seen to be a sort of landscape littered with literally hundreds of ontological structures, each singular, each with its own particular beauty, each with its own particular structural vulnerabilities. In the following chapters, a three structures will be examined more closely, the three: the arché, the continuum, and the labyrinth.

**The Lay of the Land**

In this work, three architectonics are chosen for a more extensive examination: the three “architectonic structures” are those of Plato’s chora, Aristotle’s continuum, and finally Leibniz’s labyrinth. The first chapter is entitled: The Architectonic as Arché: Origin, First principles, Beginning: Reading Plato’s *Timaeus*. To begin, the question is asked of Plato’s notion of the Chora in the *Timeaus*, why Being has been prefaced or preferred or profiled historically before Becoming and the Chora? In the triptych Being-Chora-Becoming, the intermediate term Chora has not only been insufficiently problematized as a third term, but Being itself decidedly has had the most extensive examination in philosophical thought. The Chora is the third kind, alongside Being and Becoming, constituting the origins or arché of all philosophy. Metaphysics inculcates the perennial, incessant, unyielding desire for the search for origins. At the heart, center, genesis of every search for

origins is the primordial desire to begin to build anew – to establish foundations from which to spring again. In the end, as in the beginning, is not philosophy’s desire for the origin an endemic and foundational occupation?

The second chapter is entitled: *The Architectonic as Continuum: Atoms, Indivisibles, Infinity: Reading Aristotle’s Physics*. Proceeding from the Chora as architectonic of the immediacy of the origin, the chapter on Aristotle engages with the issues of indivisible units, the possibility of void, and infinity in a continuum. Along the infinity of Being, Aristotle took up a criticism of the Parmenidean precept that “All that is, together forms Being.” In his profound exploration of the possibility of Not-Being, yet still attempting to account for change and generation, Aristotle constituted a unity of substance and the phenomenal continuum of infinitely divisible nature. Aristotle denied the void/being as a material cause of existence, where change is brought about due to the differences in shape, arrangement, and eventual position of atomic particles. Aristotle rejected this account on, among other grounds, that an infinite amount and variation of atoms would be entailed in the coming-together and perishing of phenomena. Aristotle’s architectonic is a continuum: in time as a boundary of eternally occurring “now’s”; and in place as the immediate limit surrounding the limit of a body; in magnitude as infinite divisibility. The architectonic for Aristotle is a continuum of infinity, magnitude, time, and place; a never-ending and never-failing circular line of coming-to-be and passing away.

The third chapter is entitled: *The Architectonic as Labyrinth: Bond, Fold, Relation: Reading Leibniz*. Although dealing with similar issues of origin, space/time, and the nature of substance, Leibniz has been seen as a kind of historical hinge between Aristotelian influenced Scholasticism and Modernism. As such, his architectonic could be characterized as a pyramidal hierarchy with Being/God at the apex. Nevertheless, in the philosophy of Leibniz, even in the *Monadology*, there are already traces of a “transcendent immanence”. If the privileged position of God in the Leibnizian system can be shown to be a “special case monad”, then the theory of concomitance can be extended to explicate a notion of intersubstantial connectivity in
INTRODUCTION

the universal harmony. Although Leibniz still privileges God in his onto-topology, a re-interpretation of his philosophy as built upon a system of metaphysical relations and monadic perception takes into account his philosophical inquiry into the “labyrinth” that occurs in his correspondence with Des Bosses, Arnauld, and de Volder. A closer look at the problem of unity and plurality in the philosophy of Leibniz will have to take into account the fundamental question: “how do ‘things’ hang together?” A unity is per definition that which is without parts; yet, Leibniz provides another kind of unity: a unity of substance that is alive and dynamic, a unity under the pre-established harmony of God, and a unity between soul and organic body joined together with a substantial chain or bond. For Leibniz, neither space nor time is a thing – it is a relation. For Leibniz, as well as Aristotle, phenomena are in an infinitely divisible continuum. However, for Leibniz monadic substance is always in an inter-relationship of singulars in a dynamically unfolding unified system.

In the last chapter entitled: The Architectonic as Reticulum: Network, Web, Interface, another architectonic takes form. Building upon the philosophy of Leibniz, I propose the theory of the reticulum. Not only does this architectonic describe the viscera/vinculum (attachment, connection, bond, relation, nexus, attraction, link, union, tie) tying together disparate elements, but also enables intersubstantiality to communicate. In the reticulum, the distinction between Being and beings falls away. Being is not an existent, rather a relation. Yet how does the notion of the reticulum contribute to a critique of metaphysics? Firstly, by showing the structure, the architectonic, in an explicit way. Secondly, by suggesting - although an architectonic is necessary - its form is optional. And finally, by proposing other structures, namely the reticulum, metaphysics can address more contemporary concerns. Admittedly, the architectonic of the reticulum is dynamic and process-oriented. However, with an emphasis upon the tolerance of uncertainty, metaphysics can become; that is to say, can be productive and attentive to generating thought that is continuous, yet not rigid.

Ultimately, the concept of the “architectonic” was borrowed from Kant, albeit with differing intentions. Kant wished to mount
an indestructible defense against speculation in metaphysics, both immutable and legislative, carefully delimiting what could be considered as knowledge based upon pure reason. Kant may have regarded the sum of the cognition of pure speculative reason as an edifice, but prior to all *apriori* intuitions of space and time lay the determination of philosophy itself as the founding/grounding/limiting of the possibility of all knowledge, whether reason or intuition, practical or pure. Like the surveyor who lays out the benchmarks and outlines the site for the excavation and eventual construction of foundations, philosophy is, at its ground, engaged in the construction or clearing or founding in order to ask the question, the question that “has always been asked”. Therefore, philosophy, not just as a metaphysics of transcendence, but all philosophy dealing with the conditions of possibility of all ontology, is fundamentally an architectonic. Implied radically within the constructive enterprise is the notion that any project - whether Greek, or Modernist, or even contemporary - is and will remain a temporal construction, never complete, subject to decay, and perhaps eroded by future additions and interpretations. Any architectonic of philosophy necessarily implies a construction, destruction, and eventual re-construction of its projects. Kant, in casting his eye upon his predecessors, acknowledges that they too attempted to raise an edifice of philosophy; yet these structures, in his assessment, lay in a ruinous condition. In one regard, Kant was decidedly correct: all preceding philosophical edifices have merely “formed the commencement, rather than the conclusion...of the speculative efforts of the human mind”.\(^\text{31}\) In fact, the only project that remains, is simply to ask: what shall the philosophers, the “mighty geniuses of construction”, build next?

\(^{31}\) Kant, Immanuel; CPR, op cit, trans. Meiklejohn, p.478. {A852/B880}. 
THE ARCHITECTONIC AS ARCHÉ:
ORIGIN, FIRST PRINCIPLES, BEGINNING-
READING PLATO’S TIMAEUS

Philosophy inquires into the arché.
Heidegger32

Heaven preserve you from questions of origin.
Valéry33

Experience has shown that it is by no means difficult for philosophy to begin. Far from it. It begins with nothing, and consequently can always begin. But the difficulty, both for philosophy and for philosophers, is to stop.
Kierkegaard34

To Begin
Philosophy begins, Aristotle says, when men begin to wonder.35 To ask the question of the beginning, the arché of philosophy, where must we begin? Wonderment and perplexity are fruitful grounds, for the arché has from the time of the ancient Greeks meant verily: beginning, origin, source, basic principle, foundational principle, first principle,

33 Valéry, Paul; Cahiers (C.21, p.275, 1938) as quoted by Derrida, Margins of Philosophy (Chicago: Univ. of Chicago Press,1982)p.290.
original or elemental constituent. Philosophy seemingly begins with wonderment, and yet remains with the never-ending desire to search for the beginning, for the origin, for the first, for something solid and basic on which to stand firmly. The oldest philosophical texts also searched for the arché. The most elemental was thought to be alternatively various kinds of material - a prime cause, a principle of generation and destruction, the chaos, or the beginning without end. First was the beginning. Yet this beginning is an unceasing grasping into blue vacuous space, an unremitting search for what elusively recedes backwards, an infinite regress, beyond any steadfast hold on what came first.

The arché withdraws. The beginning begins, seemingly without beginning itself, emphatically without origin, or cause, or impulse to life. Has then, the beginning, an origin? Does the arché stand on the void, without foundation, without first principles? Is the arché in fact an-arhic?

If the origin has no beginning, what is certain is that it has no end.

Metaphysics inculcates the perennial, incessant, unyielding desire for the search for origins. Escape seems impossible. At the heart, center, genesis of every search for origins, is the primordial desire to begin to build anew - primordial foundations from which to spring again. Or as Derrida asks: “Is not the quest for an archia in general, no matter with what precautions one surrounds the concept, still the ‘essential’ operation of metaphysics”. In the end, is not philosophy’s desire for the origin an endemic and foundational occupation?

So to begin, again. To begin, with a discourse on beginnings. Yet this dialogue, the Timaeus, is only a beginning, a text on beginnings that in fact begins again and again.

36 “...I do not believe that someday it will be possible simply to escape metaphysics...”. [modified]. Derrida, Jacques; Positions trans. Alan Bass (Chicago: University of Chicago Press, 1981)p.17. He too, will search for the origin, only to declare it absent.

The Timaeus – The Dialogue about the Genesis

The Timaeus, belonging to the late works of Plato, concerns questions of origin. Although widely commented upon from antiquity to contemporary philosophy, interpretations vary widely. The original plan was a trilogy: Timaeus, Critias, Hermocrates – all named after the characters taking part in the dialogues, along with Socrates of course. The overall scheme was an exposition, albeit speculative and provisional, of the universal harmony between the cosmology of the universe, the genealogy of man, and the origin of society. The triptych began with the Timaeus, proceeded to the Critias, but remained incomplete. The final part, the Hermocrates, is widely considered to be taken up in the Laws. Yet one must remember that the Timaeus, primarily a discourse on the metaphysics and physics of origin, was intentionally tied to an overall harmonizing scheme or framework embodying the cosmological, human and social. The world soul, according to Plato, was also expressed in the individual soul and the ideal society.

38 Although the established standpoint, this statement is by no means inconvertible. G.E.L. Owen in “The Place of the Timaeus in Plato’s Dialogues” carefully argues with an extensive survey of literature, that in his opinion, the Timaeus belongs to the middle group of dialogues. However, H.F. Cherniss in “The Relation of the Timaeus to Plato’s Later Dialogues” provided counter-arguments. “The evidence at our disposal” Cherniss argues, “does not suffice for a rigorous demonstration of any such exact relative chronology. It does, however, in my opinion suffice to show 1). that they belong to the latest group of dialogues and so are later than the Theaetetus and the Parmenides, 2). that they may be and probably are later than the Sophist and the Politicus, ...”(p.340-341). Both essays are reprinted in Allen, R. E. (ed.); Studies in Plato’s Metaphysics (London: Routledge & Kegan Paul, 1965).

39 cf. Guthrie, W. K. C.; A History of Greek Philosophy vol. V: The Later Plato and the Academy (Cambridge: Cambridge UP, 1986)p.24f/ff. “The influence of the Timaeus down to the Renaissance was enormous and the interest in it has continued unabated, if from different motives, to the present day.” Contemporary treatments of the Timaeus include but are not limited to Heidegger, Derrida, Sallis, Casey, Toulmin, Whitehead, as well as Classical Scholars such as Algra, Sorabji, Vlastos, Cleary, Wilson, Wright, Taylor, Cornford, Miller, etc. The enduring fascination for the dialogue is further exemplified by the recently published collection of essays: Sharples, Robert W. and Sheppard, Anne (eds.); Ancient Approaches to Plato’s Timaeus (London: University of London, 2003).

In the *Timaeus*, Plato records a conversation (or invented a dialogue) between the philosopher Timaeus of Locri, Plato’s great grandfather the elderly Critias, the Statesman Hermocrates, and Socrates. The men that he had received the day before during the festival of the goddess, now receive Socrates in turn as a guest. Already in these opening remarks of the dialogue (17a-27b), the themes of the *Timaeus* begin: the notion of receiving, the possibility of the memory of origin, the “three”, “being children”, birth, and midwifery. It is a festive occasion; Socrates is dressed in his party clothing and is looking forward as a guest to receive the planned discourse from the other three. Yet his hosts must be reminded of the task set out by Socrates the day before. Socrates longs for a detailed description of the Ideal society to be provided by his companions who are all capable men of action, as opposed to “mere” philosophers such as himself. Socrates wishes for a “living image”, not something like looking at figures in a painting, unable to move or actively to implement their powerful potential. Socrates wishes, after describing his ideal society, that these ideals stand up and live. He wishes to see his city “transferred

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41 In fact, the dialogue begins with Socrates counting: “One, two, three...” (17a). All translations of Plato unless otherwise noted are from Jowett in *Plato: Collected Dialogues* edited by E. Hamilton and H. Cairns (Princeton: Princeton UP, 1989). However, translations from Cornford and Lee are often cited for comparison purposes.


43 Although the Republic also lays out a description of the ideal city, this is probably a literary device on the part of Plato. Cornford puts forward the thesis that the trilogy of *Timaeus-Critias-Hermocrates* are “completely independent of the Republic” arguing that “the dramatic date and setting of the Republic have no bearing whatever on the dramatic date of the Timaeus trilogy...no ground remains for any inference that Plato meant the contents of the later books of the Republic to be superseded or corrected by the Timaeus.” (Cornford; *op cit*; p.4-5). In the Republic, Plato also sets out the distinction between the ideal city and that which must be implemented, albeit imperfectly by its citizens: “You mean the city whose establishment we have described, the city whose home is in the ideal, for I think that it can be found nowhere on earth. Well, said I, perhaps there is a pattern of it laid up in heaven for him who wishes to contemplate it and so beholding to constitute himself its citizen. But it makes no difference whether it exists now or ever will come into being.” (*Republic* ix; 592a-b).

44 19b.
from the plane of theory to temporal fact”, not like animals painted upon walls, representing creatures that are alive, but motionless. The city must live, possessing all the qualities of the Ideal. Quite notably, Socrates compares himself unfavorably with the men of action who are his hosts. Socrates feigns incapacity to the task. As opposed to them, he has had no hard experience which is crucial in times of difficulty for a city, namely in times of struggle and conflict. That which is beyond one’s personal experience is difficult to put into practice, he emphasizes, and even still more difficult to put into words.

Even though he feigns inexperience, he is surprised that the ancient poets have not faired better in their description of the ideal state. They have had no home; rather, they wander from place to place earning their bread through rhetoric, being unbound to a place. Anyone could see, according to Socrates, that they are a “tribe of imitators”, engaged in simulacrum, disingenuous representations of the ideal. Notably, being bound to place and to experience is a prerequisite here

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45 26c.

46 feign (verb) from Merriam Webster online dictionary.
1). to give a false appearance of : to induce as a false impression
2). to assert as if true : to pretend

“Feign” is all about faking it, but that hasn’t always been so. In one of its earliest senses, “feign” meant “to fashion, form, or shape.” That meaning is true to the term’s Latin ancestor: the verb “fingere,” which also means “to shape.” The current senses of “feign” still retain the essence of the Latin source, since to feign something, such as surprise or an illness, requires one to fashion an impression or shape an image. Several other English words that trace to the same ancestor refer to things that are shaped with either the hands, as in “figure” and “effigy,” or the imagination, as in “fiction” and “figment.” Although Socrates “feigns”, that is to say he is more than capable to the task he has in fact demonstrated the day before, Socrates could be accused of false modesty. Rather on the other hand, Socrates is “feigning”, he is “giving shape”, “forming” the ideal. Just as he receives, so here he stands in as chora, feigning.

47 19e.

48 19d.

49 simulacrum (noun)
from the Latin, simulare, “to feign”.
1). An image
2). A mere semblance, vague representation, sham.

Sometimes, Socrates, too, resembles the Sophist. He too, feigns. He too, wanders, placeless.
for Socrates in order to escape the Sophist pejorative of “imitator”. But before he allows his hosts to proceed, a short recapitulation is necessary in order to remind themselves of the task at hand; they must summarize briefly the principles set out the day before. The three then agree upon a division of the task at hand, each according to his own area of expertise. **Socrates, in turn, “receives”** as a guest of the other **three**.

In order to provide a framework for the discussion, a link between Socrates’ description of the ideal city of the day before and the rest of the participants in the dialogue is made. Critias takes up the dialogue and recounts a story that he heard from his grandfather long ago. His grandfather had heard it from an elder when he was a mere child, who in turn had heard the narrative from the famous Greek poet Solon who heard it from an old Egyptian priest. By this oral tradition, the history of the origins of Greek society were passed on. Critias at this point is also an old man, in principle far removed from the narrative which he is about to recount. However, as is often the case, he can recall his youth more clearly than yesterday. His story originated from the ancient Egyptians and, although about the great exploits and civil organization of the ancient Greeks, is presumably set eight thousand years prior to this recounting. When Solon the elder traveled to Egypt, he was received with great honors due to the reputation of the government and expertise in warfare of his country in the past. Yet Solon, like many of his compatriots, has no knowledge of the ancient history of his own land. They had forgotten the origin. Instead, the Egyptian priests found it necessary to recount to him the genealogy of the “first man” because the Greeks had forgotten their own heritage.

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50 17a-c.

51 cf. Miller, Dana; *The Third Kind in Plato’s Timaeus* (Göttingen: Vandenhoek & Ruprecht, 2003)p19 note1:“μεταληπτικόν - literally, ‘that which is capable of receiving’; the reference is to the Receptacle that receives forms. The term can also be translated as ‘the participant’.” From the Greek term, μεταλαμβάνω, to receive, to participate in, to claim for oneself, or to partake of communion in.

52 22a.
“In Greece there is no such thing as an old man,” admonishes the old priest; “you Greeks are just like children”.53 Due to the passage of time and various natural catastrophes such as flood, fire, and earthquake, the Greek civilization was repeatedly decimated. The Greeks, having all records destroyed in antiquity, were forced to “constantly begin again like children”; the survivors of the catastrophes left to rebuild time and time again the civilization of the past. Egypt, in contrast, enjoyed an advantageous site54 protected by the ebb and flow of the Nile, where the records and sacred writings55 (archives) were preserved in temples. Thus the priests were able to recount for Solon “from the beginning” a short description, leaving the longer account for another time when they could consult the archives, having the record before them.56 The Egyptians, not the Greeks, preserved the origin of Greek history; the archival site was not at the original site, rather it was an-archic. So the Greeks were “children” in the eyes of the Egyptian priest/scribes because they were constantly returning to the beginning of civilization. They had no “sacred records” that could be consulted

53 22b.

54 here chora (χώρα) in a proto-philosophical sense. In fact, not until §52a does Plato call the chora, “space”. Prior to this specific philosophical use, Greek literature will use chora in a pedestrian sense meaning homeland, region, land, or country.

55 In ancient Egypt, the written script was a sacred word, imbued with magical powers, learned and perpetuated by a small elite caste of priest/scribes, bearing almost no relation to the spoken word which was considered “polluted” by functioning orally. Only in the degradation of the Egyptian civilization from the 25th Dynasty to the late Roman occupations (715 B.C.- 470 A.D.) did the hieroglyphic texts (hieratikos = priestly) give way to a more cursive form of writing derived from the use of a reed on papyrus as opposed to ideograms and phonograms carved into stone. In this period, the Demotic (demotikos=popular) or Enchorial (enkhorios=native) became the writing employed in daily practice in texts such as testaments, wills, correspondence, literature and agricultural records. At the time that the Timaeus was written, the Greeks had already been traveling to ancient Egypt since the seventh century B.C., and had greatly admired their civilization. Of course, it was only after this period that Egypt, greatly weakened by centuries of war and decline, was forced to submit to occupation under Alexander the Great. cf. Gardiner, Sir Alan; Egyptian Grammar (Oxford: Oxford University Press, 1988)especially pp.1-11 for a brief history of the philology of the Egyptian language.

56 24a. cf. Taylor, A.E.; A Commentary on Plato's Timaeus (Oxford: Clarendon Press, 1928)p.50 “In the Critias (113b2) he refers to certain γράμματα ‘family papers’, written by Solon as the authority for the story.”
when no authentic source could be consulted either through age and death, or natural disasters which destroyed cities. A civilization could be built again; nonetheless, the Athenian culture was only perpetuated by the preservation of the written traditions of the Egyptians. The Greeks were forced “to begin all over again like children”. Only the Egyptians had rescued the citizens of Athens from oblivion.

Solon had heard the story from the Egyptian priests. Critias’ grandfather had heard it from him while young, and Critias heard it from him while younger still. This story was the authentic story, the true account of the origin. Yet, in recalling the story of the achievements of the Greek city, Critias first had to “rehearse” the story to himself, making sure he remembered it properly and accurately, because “after so long an interval, my memory was imperfect”. He was amazed when he heard Socrates’ portrayal of the ideal society the day before because it was remarkably close “by some miraculous chance” to the rendition that he had heard from his grandfather. He had been “well placed” in the presence of the story-teller and he “should be surprised if any detail of this story I heard so long ago has escaped me. I listened to it then with a child’s delight, and the old man was glad to answer my innumerable questions, so that the details have been indelibly branded on my memory”. Critias asked his grandfather again and again to reiterate the story so that he would never forget it, so that it would be as an indelible picture branded into his mind. Still Critias had had to repeat the story over and over to himself, rehearsing with

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57 23b.
58 27b.
59 26a. translation Cornford.
60 26c. Cornford translation: “Have stayed in my mind indelible like an encaustic picture” (Cornford; op cit, 25c). The image of knowledge being impressed upon the mind as a wax tablet comes from the Theaetetus: “When a man has in his mind a good thick slab of wax, smooth and kneaded to the right consistency, and the impressions that come through the senses are stamped on these tables of the ‘heart’...then the imprints are clear and deep enough to last a long time. Such people are quick to learn and also have good memories, and besides they do not interchange the imprints of their perceptions but think truly. These imprints being distinct and well spaced are quickly assigned to their several stamps—the ‘real things’ as they are called – and such men are said to be clever.” Theaetetus; 194c-d.
his companions the history to pass onto Socrates. This rehearsal, too, is the reiteration, the repetition of the origin, just as the Greeks constantly had to rebuild their civilization time and time again after each destruction. Through repetition, Critias could confidently say: now “we will transfer the state you described yesterday and its citizens from the region of theory to concrete fact...”, transfer as imprints are transferred to a wax tablet. He could not remember yesterday, but he could remember the origin of the story in his childhood because he was well-placed to receive the story of the origin. Branded on his memory as a child, reiteration refreshed the memory, re-established the beginning. He received the narrative from the old man as a child, and then recounts authentically in detail to those who receive, to Socrates. Socrates receives the arch(ive).

Socrates receives the “unrecorded yet authentic achievement of the city” from Critias, “not a mere legend but an actual fact”, a narrative that has “the virtue of being natural and suitable to the festival of the goddess, and has the very great advantage of being a fact and not a fiction”. Socrates extols the priority of speech over writing, in spite of the fact that it was indeed preserved by the ancient Egyptian temple texts. Remarkably, what is “unrecorded” is considered “a true story”, recounting orally the true genealogy of the Greeks and the origin of the society based upon the law and first principles - “no fiction, but genuine history”. The tradition that is unrecorded is considered to be the most veritable. “Tell us from the beginning”, the participants implore. The rendition of the beginning is told authentically by a chain of narrators all the way to the beginning. Yet the city itself is lost - lost again and again.

61 26c-d, translation Cornford. The Jowett translation is: “fiction to...world of reality.” Plato alternatively uses the word mythos or logoi for the beginning point of inquiry. Specifically in 26c-d, Socrates wishes to go from mythos to ἐπὶ τὰ ληθές, from a “true story” to a “fact”. We must make it true, he says.
62 21a.
63 26e.
64 26e, translation Cornford.
65 21d.
Does this mean that Socrates has no memory, no proximity to the storytellers in order to give an “authentic” but as yet (until of course, Plato) unwritten account? He, like the poets both past and present, is not able to give a true account due to lack of experience of the authentic account. Socrates is not well-placed in the lineage of the oral tradition; yet he “receives” the authentic true account from Critias. Socrates also has no home, and is therefore not well-placed. The other participants have a home, wealth, position, and education; consequently, they can tell the story of the origin. Socrates has no place; therefore, he must receive.66

Later in the dialogue when Timaeus is giving an account of the divine lineage of the Greeks, he also makes an appeal to an authentic history. The Greeks dwell in the divine realm of the goddess and are descendent from the gods. Yet even though the Greeks are descendants of the gods themselves, knowledge of the origin (archē) of the divinities is not possible. Only the narrative of the ancestors brought down through the lineage of the “children of the gods” is the genealogy of the gods “received” and perpetuated. We must believe them – not because the story is inconvertible truth or a certain proof – but because “we must conform to custom and believe them”.

Does authenticity then, rest upon a divine genealogy? The account must be believed because they are the children of the gods. Surely, the narrator Timaeus must be “well-placed” in order to

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66 More explicitly, Derrida compares Socrates to the chora “herself”, if indeed the chora could be called a “thing”. “In any case, he puts himself in its/her place, which is not just a place among others, but perhaps place itself, the irreplaceable place. Irreplaceable and unplaceable place from which he receives the word(s) of those before whom he effaces himself but who receive them from him....What is place? To what and to whom does it give place?” Derrida, Jacques; “Khōra” in On the Name edited by Thomas Dutoit and translated by Ian McLeod (Stanford, California: Stanford UP, 1995)p.111 from the French Khōra (Paris: Editions Galilée, 1993). Paradoxically, Socrates, like the Sophists, also has no place; he too wanders. “Socrates privileges here again the situation, the relation to place: the genus of the Sophists is characterized by the absence of a proper place, an economy [oikos] a fixed domicile [oikos]; these people have no domesticity, no house that is proper to them (oikēsis idias). They wander from place to place, from town to town, incapable of understanding these men, who being philosophers and politicians, have (a) place...”. Derrida; “Khōra”, op cit, p.107.

67 40d-e.
“receive” the genuine history. Since there are no inconvertible truths, only indelible impressions upon the memory, the orator must be well-placed both in the lineage of the gods, and in the direct proximity (presence) of the genuine truth, as well as well-placed in the city of law established by the goddess herself.

Being well-placed is critical to authentic truth. Subsequently, both in the *Timaeus* and the *Laws* (book iv), the choice of the site of the city is most important. The place must be both advantageous in the sustenance of the citizens, but must not be so desirable as to invoke the envy of her neighbors, thus inciting war. The goddess herself chose the well-placed site with a well-tempered climate, the site most likely to produce men most resembling herself. In this region, she placed her first settlement, bestowing the culture with order and system. In this home territory, the Greeks, resembling the perfection of the goddess, “surpassed all other men in every excellence”.68 Yet these institutions of law, order, and first principles were all but destroyed since the Greeks had no graphic tradition. Only the Egyptians preserved the archive. Critically, the philosopher must be “well-placed” in order to receive the true account, and the city must be well-placed in order for the goddess to perpetuate a society of excellent men.

For the Greeks, the true account of their genealogy is an oral tradition passed on through the “children of god”. Notably, the status of writing and speech in the *Timaeus* differs greatly from the position that Socrates takes in the later part of the *Phaedrus*.69 Again in this Platonic dialogue ancient Egypt is evoked, yet here in the guise of the god Thoth - the god of writing, mathematics, geometry and astronomy. Thoth is understandably proud of his contribution of writing to the well being of man. Yet the King of Upper Egypt admonishes him saying that he would sow forgetfulness in the people since no one would need to remember anything that was written down “by means of external marks”. Notably, writing is an “external mark”, as opposed to the indelible mark of the soul that Socrates advocates. Writing is

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68 24c-d.  
mere “semblance”, filling men not with true wisdom, but with the conceit of wisdom, empty signs. Socrates goes on to make an analogy with painting, but in a different way than in the Timaeus. In that dialogue, he wishes his description of his ideal city to leap off the wall of semblance and live. In the Phaedrus, Socrates says that written words are like images in a painting – they seem real, but they are silent. In his setting out of the differences between dialectic and rhetoric, he adamantly regards writing as an undefended child; writing occupies a site in the world, yet its author never knows to what use it will be put, nor can he defend its propositions. Speech, that is to say the spoken word, is on the other hand directed towards a specific type of soul and is the true “writing”. The speaker is “present” with his speech. Speech is true and permanent because it is written on the soul of man; thereby producing a “man’s own legitimate children”, a brother or son who has been imbued with the “love of wisdom”, philosophia. Therefore, only the “living speech” can be considered as true wisdom, while writing is a mere simulacrum of the original. Through the Socratic method of examination and questioning, Socrates becomes a sort of midwife who brings forth the legitimate children of philosophy. The dialectic is also the doctrine of the relations of the various forms, in fact the very structure of the Ideal world of forms. In this way, Socrates can be said to be chora, the immaterial “form-giving” to the ideal forms. He is maieutic.

70 Phaedrus 278a.
71 maieutic (adjective): relating to or resembling the Socratic method of eliciting new ideas from another. “Maieutic” comes from “maieutikos,” the Greek word for “of midwifery.” Whoever applied “maieutic” to the Socratic method of bringing forth new ideas by reasoning and dialogue must have thought the techniques of Socrates analogous to those a midwife uses in delivering a baby. A teacher who uses maieutic methods can be thought of as an intellectual midwife who assists students in bringing forth ideas and conceptions previously latent in their minds. (from MSN Encarta dictionary). In Sedley, David; The Midwife of Platonism: Text and Subtext in Plato’s Theaetetus (Oxford: Clarendon Press, 2004)p.8. David Sedley in fact argues that Socrates as an historical figure was the “midwife of Platonism”. In his interpretation of the Theaetetus, Socrates characterizes himself as a midwife, giving birth to knowledge in the minds of his interlocutors. “Socrates [reigns that he] is intellectually barren, having no brainchild of his own to give birth to. Instead, he helps others by delivering their brain children, and the painful puzlement which he inflicts on his interlocutors is in reality nothing less than their birth pangs.” However, not
To return, then, to Socrates as a guest receiving the discourse of Timaeus. The plan of the evening’s discourse, after the recapitulation of the ideal city, is to continue with Timaeus and his cosmological account of the origin of the universe, from the creation of the world to the composition of the human soul. Next, Critias will take up a discourse on the ideal city of Atlantis, asking about the origins of ideal government and society, followed presumably by Hermocrates’ account of the order and law necessary to institute and to preserve these municipal institutions.\(^{72}\) In the composition of the trilogy, *Timaeus/Critias/Hermocrates*, the organization of the world was decidedly in a mutual relationship between the order of the universe, government, and the composition of the human soul, implanted in it at birth. Socrates ends this initial part of the dialogue by enthusiastically declaring: “I see I am about to receive a complete and splendid banquet of discourse in return for mine”.\(^{73}\) The three are present.

**Plato’s *Timaeus*: the Third Term**

In the *Timaeus*, Plato attempts to define\(^{74}\) a third term between being and becoming, the *chora*. Admittedly, he finds the definition of the third term difficult, albeit now necessary. Two terms were previously considered sufficient, now a third must be determined. “We must”, he insists, “begin by distinguishing between that which always is and never becomes (τὸ ὁν ἀεί), from that which is always becoming but never is (τὸ γιγνόμενον μὲν ἀεί)”.\(^{75}\) In the process of distinguishing the origins of the cosmos, he is compelled to introduce a third term, the receptacle of becoming, the chora, “the third and intermediate kind

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\(^{72}\) The dialogue of *Hermocrates* is presumed never to have been written. Nevertheless, I think Cornford goes too far when he considers the *Timaeus* as “only a preface” to the planned discourse on government in the *Hermocrates*. *cf. Cornford; op cit, p.20.*

\(^{73}\) 27b translated by Cornford. *my emphasis.*

\(^{74}\) λόγους ἐμφανιτοῦ logoi emphanitou, “put into words” or literally “make itself visible”. *cf. Taylor; op cit, p.74.*

\(^{75}\) 27d-28a. *chora* (χώρα) is the third kind; being (τὸ ὁν) is the first kind; becoming (τὸ γιγνόμενον) is the second kind.
of being”. The chora is explored as the nursemaid of becoming, as pure neutral receptor accepting form from some other cause, and as a sort of alchemical beaker shaken-up and spilled-out to form the primordial components from which all originates. At this place in the dialogue, the third term of the chora joins with the other two kinds of form (being) and copy (becoming), and is to be called “space”. In this Platonic dialogue, “space” has an equal ontological status. Yet, the chora ultimately remains, as Plato suggests, difficult and elusive.

Plato had, of course, already set up the distinction between the Ideal and the copy (ἰδέαι / εἰδη), or “real being”, and “becoming” in the Sophist. Real being (ontos) was unchanging and only accessed by the soul through reflection. Becoming (genesis), on the other hand, was mutable and available to sense perception. Not only was “becoming” characterized by its ability to change, but also the ability to act and be acted upon. Real being, by contrast, was immutable and unable to act. In the earlier dialogues, Plato admitted only these two Forms.

35a. The “third” term is brought to the foreground in this interpretation, taking quite seriously the textual evidence of the “intermediate kind of being”. Yet depending upon the positioning of the Timaeus within the Platonic oeuvre, the importance of the “third” as a possible shift from the stark dualism of Form-copy, is one of the most contested in Platonic scholarship. cf. Guthrie; op cit, p. 243ff: If the Timaeus is read as belonging to the middle dialogues as argued by G.E.L. Owen, then “they can be interpreted as teaching a more sophisticated metaphysic based on renunciation of the doctrine of paradigmatic Forms and the opposition between Being and Becoming. [However, Guthrie disagrees, having shown] at several points that these doctrines still make their appearance in Theaetetus, Sophist, Politicus and Philebus.”

50d1. cf. Miller; op cit, p.53. “that in which”, receptacle = τὸ ἐν ἐγκαίρω; “that in which comes to be” = τὸ ἐν ὅ γίγνεται.

“Which groups of problems within the Theory of Forms are studied by Plato in the Timaeus, then? Not their existence, since several proofs have been given in the other dialogues. Not the interrelations of Forms, either, since they are discussed in the Sophist.... Rather, it is the relations between Forms and sensibles that concern Plato in the Timaeus, complicated as they are by the introduction of the Receptacle, medium, or space.” Maula, Erkka; Studies in Plato’s Theory of Forms in the Timaeus (Helsinki: Academic Dissertation at the University of Helsinki, 1970)p.4.

248a. 264c-265d, he distinguishes two kinds of production - “the one divine, the other human....Production...we defined as any power that can bring into existence what did not exist before....Must we not attribute the coming-into-being of these things [plants and animals] out of not-being to divine craftsmanship and nothing else?”(265b).
Nevertheless, the Ideal Theory for Plato was anything but a static concept. As A.E. Taylor points out, in the earlier dialogues, especially the *Republic* and the *Phaedo*, Plato propounds the theory through Socrates “that the Forms (ἐδή) are ‘in’ or ‘present to’ the things our senses perceive; these things ‘partake’ (μετέχει) of them”.\(^{81}\) Yet when the Platonic dialogue *Parmenides* is written, the doctrine is looking less firm. Instead of Forms being “inmanent in’ things which ‘partake of’ them”; the sensible becomes a copy of the Forms. By the time that the *Timaeus* is written,

...we never hear of “participation” (μεθηξιον) of things in Forms. We are told that the Forms are “patterns” or “models” (παραδείγματα) which things “immitate” (μιμεται)...He [Plato] now taught, therefore, that things are “copies” of Forms which are not in them but “outside” them and transcend them. The *Parmenides* is a literary record of this radical change of view, and in all the later dialogues from the *Sophists* to the *Philebus* and *Timaeus*, it is the “later” form of the “Ideal Theory” that confronts us. It is this “later theory” which Aristotle has in mind when he finds fault with Plato [e.g. *Metaphysics* 987b11ff.] as he often does, for saying that the Forms are “separate” or “separable” (χωρις, χωριστα) from sensible things, and the *Timaeus* is the one dialogue in which this “later doctrine of Ideas” is fully expounded.\(^{82}\)

Consequently, the *Timaeus* is crucial within the oeuvre of Plato in tracing this important ontological shift from the developing theory of forms, to the intermediate necessity between the Form and copies – indeed, from the two to the three. The earlier subtle shift

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\(^{82}\) *ibid*, p.27-8.
from immanence to transcendence of the Forms, now required a third intermediary kind of being to make possible the transition of being to becoming.

The Arché is to Ask the Question about the Beginning, the Origin. At the beginning, even before the explication of the origin of the universe, Timaeus states that anyone with the least amount of sense must begin with an invocation of the gods. Any undertaking, great or small, begun or having no beginning must begin with the beginning, an invocation, beginning at the “proper place”, “according to nature”. After the invocation, he begins: “First then, in my judgment, we must make a distinction and ask, What is that which always is and has no becoming, and what is that which is always becoming and never is?”

The is, being, is eternal and unchanging, the same (ταύτα ὁν). The becoming, on the other hand, is never fully real according to Timaeus, but is constantly coming-to-be and then passing-away. The eternal ideal is “apprehended by intelligence and reason” (λογος), whereas the changing becoming is merely an object of opinion (δοξα), apprehended through perception. Timaeus sets out this distinction “in his opinion”, as matter of doxa. As an object of his opinion, he must ask of the world: had the world always existed, or was it created from some origin?

In his opinion, even though the origin is in the order of being, the eternal, it is “beyond finding out” as is, indeed, also the creator of this universe. Therefore, he concludes, one must ask the world itself, ask it about itself.

84 27d-28a.
85 27d.
86 Gregory Vlastos argues: “That the cosmos was not always in existence, but ‘has been generated, having started from some ἀρχή (28b6-7) is not merely asserted in the Timaeus, but demonstrated, and from premises which give every appearance of expressing firm metaphysical doctrine. It is argued at 28b4-c2 that the cosmos must have been generated, because (1) it is corporeal and as such is an object of sense perception and belief, while (2) all such objects ‘are in process of becoming and have been generated’. ” Vlastos, Gregory; “Creation in the Timaeus: Is it Fiction?” in Allen, R. E. (ed.); Studies in Plato’s Metaphysics (London: Routledge & Kegan Paul, 1965)p.402.
87 28c, translation H.D.P. Lee: “As for the world...we must ask about it [about it or ask it the question:] the question one is bound to ask to begin with about anything: whether
Questioning the universe, Timaeus reasons that the universe is created, and having an origin, must have been created by some cause. He asks the cosmos the question of the beginning of the cosmos: “Would a creator use as a model, the imperfect ever-changing realm of becoming?” No, the created and sensible must necessarily have been created with a model most perfect, and by a cause most perfect and good. “Everyone will see that he must have looked to the eternal, for the world is the fairest of creations and he is the best of causes”. Again in the Timaeus, Plato makes the distinction between the pattern that is Ideal and unchanging, and the copy that is constructed - the same (tauton) and the different (thateron). Because the world is sensible and changing, it is therefore a copy, or likeness, of an original eternal pattern. That which is changeless and eternal must be invariant and irrefutable; that is, (τὸ ὄν) “real things”, being. That which is becoming, is however a mere likeness, eikon (εἰκών). Similarly, real existence, ὄντως ὄν(ontos on) is distinguished from “a sort of existence” eidolon (εἴδωλον). Being, (τὸ ὄντως), is opposed to becoming (γένεσις) genesis and coming-into-being (γένεσις εἰς οὐσιαν), genesis eis ousian, that is to say becoming an individual thing. The ideal pattern, Form (eiδη), is opposed to the various “kinds” of

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88 Please note, most importantly, that Plato’s universe is isotropic. This universe is modeled on the pure pristine geometrical shape of the sphere. As such, even though the Form-Copy metaphysic has a hierarchical structure, the universe including the world-soul has no directionality. Because of this geometry, one cannot speak of “above” or “below” in the universe, only “regions” (chora) or places (topos) relative to others.

89 29a.


91 cf. Gurhrie, W. K. C.; A History of Greek Philosophy vol. V: The Later Plato and the Academy (Cambridge: Cambridge UP, 1986)p.303-4. “The Greek words for ‘becoming’ and ‘to become’ (γένεσις-γίνεσθαι) had two senses: (a) coming into existence at a particular time, either suddenly or at the end of a process of development or manufacture; (b) in process of change, in which though something new is always appearing, something old passing away, the process may be thought of as going on perpetually….The later sense had a peculiar importance for Plato, whose talk of ‘what is’ and ‘what becomes’ marked a difference of ontological rather than temporal status.”
these forms, genos, \((\gamma \nu \epsilon \nu \sigma \zeta)\). “As being is to becoming, so is truth to belief”\(^{92}\), says Timaeus; \((\omega \delta \sigma \iota \alpha\) is to \(\gamma \nu \epsilon \nu \sigma \iota \alpha\) as \(\alpha \lambda \iota \theta \epsilon \iota \alpha \) is to \(\pi \iota \sigma \tau \iota \alpha\). The maker of the universe, being good and perfect, chose the eternal as his model. The universe, necessarily, is modeled on the likeness of this perfect idea.

Because Timaeus is forced to ask the universe about herself, as the likeness herself, then any account \((\logos)\(^{93}\) of the origin of this universe can only ever be a “likely story”, or probable account \((eikos\ \logos; \ e\iota k\omega \varsigma \ \lambda \gamma \omicron \sigma \iota \)\). The universe is sensible and changing, dealing necessarily with the copy, the “likeness” \((eikon; \ e\iota k\omega \varsigma)\), and is merely “likely” \((eikos; \ e\iota k\omega \varsigma)\). Nevertheless, the words used to describe both the likeness and the pattern must themselves be “of the same order as that which they describe”\(^{94}\). Plato means that the sensible was changing, so consequently a description of it is not immutable or incontrovertible. At best, Timaeus warns his colleagues, his story can only be provisional, “merely likely”. Forgive me, he implores, for we are only human. We should accept the rational account for the realm of becoming. All physical phenomena are in the sensible realm of becoming, and consequently any account \((\logos)\) albeit logical, will never be anything but “likely”. The description of a “likeness” is merely “likely”\(^{95}\).

\(^{92}\) 29c.

\(^{93}\) Remember that in the Theaetetus the proposition is put forward that knowledge is “true belief with an account”, and although later refuted by Socrates without proposing a suitable definition in its place, here \(\logos\) (account) is tempering the true belief, that is to say in the terms of the Timaeus, a rational account, a “likely story”. Cornford explains: “English provides no single equivalent for \(\logos\), a word which covers (1) statement, speech; (2) expression, definition, description, formula; (3) ‘tale’ or enumeration; (4) explanation, account, ground.” Cornford, F.M.; Plato’s Theory of Knowledge, op cit, p.142.fn.1

\(^{94}\) 29b, translation H.D.P. Lee.

\(^{95}\) In his Preface to Plato’s Cosmology, Cornford criticizes A.E. Taylor’s position in A Commentary on Plato’s Timaeus; pp.19 and 59ff that Plato’s cosmology is merely a tale like the truth, a composite of earlier efforts of Pythagoras and Empedocles, therefore can “never be more than ‘provisional’.” Cornford rejects this theory of “likely” to be merely an imaginative, cautionary fable on Plato’s part. Certainly, he provides evidence that Plato’s contemporaries took the Timaeus to be an original work, rather than a fabrication of irreconcilables. cf. Cornford; Plato’s Cosmology, op cit, p.ixff. Furthermore, Cornford takes issue with various interpretations of the “likely story” as influenced by modern
Yet often scholars urgently disagree about the “mere likely” account of the Timaeus. To quote Gregory Vlastos extensively:

Commentators often pick the expression εἰκότα μῶθον (29d) out of Timaeus’ epistemological introduction (29b-d), and use it as though the emphasis were on μῶθον instead of εἰκότα. This is certainly wrong. εἰκός is an important word. It is used thrice explicitly (29c2, 8, 29d2), and once implicitly (29b εἰκόνος ... ἀναγνώρισσας). Of these four, it is used thrice as an adjective of λόγος, once of μῶθον. In the seventeen echoes of this introduction throughout the rest of the dialogue, μῶθον is used thrice (59c, 68d, 69c), while εἰκός ανθέθηκε εἰκότας, etc. are used sixteen times (30b, 34c, 44d, 48c, 48d, 49b, 53d, 55d, 56a, 56d, 57d, 59c, 68d, 72d, 90e). εἰκότα λόγον is used eight times; εἰκότα μῶθον twice. And it is a pretty commentary on the ‘mythological’ connotations of εἰκότα μῶθον that it is used both times of a purely scientific opinion: 59c, of the composition of metals, and 68d, of color-mixture.

A mythos is a tale. Not all tales are fictions....The typical mythos is mythological. But there is none of this in the discourse of Timaeus where only the eikos is tolerated. And what eikos means is this context is carefully defined: the metaphysical contrast of the eternal forms and their perishing copy determines the epistemological contrast of certainty and probability.96

Consequently, in spite of the frequent denigrative references to the account of the origins of the cosmos given in the Timaeus by various scholars of Plato, the “likely” account97 is not mythological, fictitious, or down-right “belief” ungrounded in logical argumentation. Rather, it

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97 cf. Johansen, Kjeller; Plato’s Natural Philosophy: A Study of the Timaeus-Critias (Cambridge: Cambridge UP, 2004)p.48n1. Plato alternates in the text between the terms eikos mythos and eikos logos. Johansen gives the following textual references in the Timaeus for the “likely account”: cf. 30b, 34c, 44d, 48c, 48d, 49b, 53d, 55d, 56a, 56d, 57d, 59c, 68d, 72d, 90e.
is the most probable in that it deals with the sensible, visible world of becoming in constant flux. Any physics is necessarily “provisional”, or merely probable, precisely because it is sensible.

To conclude this section, asking the question of the origin of the universe, several important positions in this short beginning\(^{98}\) of the dialogue emerge: 1) The distinction between being that is eternal and becoming that is always coming-to-be and passing-away. 2) A reiteration of the Platonic Ideal/likens scheme. 3) An introduction of the premise that the first cause is “necessary” for the created universe. And 4) Any account of the changing universe is necessarily only a “likely story” – a rational account (meta logon) of the realm of becoming.

In the beginning of the dialogue, Timaeus poignantly asks (of the universe): “has it always been, without any source (arché) of becoming; or has it come to be, starting from some beginning?” (ἀρχή).\(^{99}\) He reasons that it must have come to be because the resultant phenomena are generated; they are sensible things therefore belong to the realm of becoming. Yet this does not, in fact, answer the question of the origin. The beginning, the arché of becoming is generated in this account (logos) by the unchanging forms (eidos) generating the sensible things that are likenesses (eikon) of eternal being. But how does the unchangeable provide an impulse for generation? This problem is precisely what leads Plato to propose the third term, the chora as intermediary, further on in the dialogue. But does this account (logos) give us the source (arché), something solid to stand upon, some ground (logos), some place upon which to define the starting point (arché) of the beginning (arché)?

Arché as the First Cause (29d-37c)

To ask the question of the arché, is also in a certain sense to ask the question of causality: from where did it all begin? The cause\(^{100}\) is in fact

\(^{98}\) 27c-29d.

\(^{99}\) 28b. translation Cornford.

\(^{100}\) 46c7. For an extended discussion of the notion of cause (aitia) and concomitant cause (aitia συναιτίας) in Plato see Sinnige, T.G.; Matter and Infinity in the Presocratic Schools and Plato (Assen: van Gorcum, 1968)pp.200-201. See also Taylor; op cit, pp.291ff.
a motivation – the motivation on the part of the Creator\textsuperscript{101} to create a universe as perfect as possible and as closely identified with the Ideal forms. The Creator’s motivation is to bring order to the universe, the wish to do Good, and to bring intelligence to the World Soul. Also later in \textit{Timaeus} 68e-69a, Plato speaks of cause. Only the Divine being causes, and has itself no causal origin. The Divine is the source of all causes, i.e. creation. The Maker has no jealousy and therefore desires the universe to be as “like” himself as possible. Again, this account is a “true belief” that must be taken on the good authority of wise men. Relying upon this account, “using the language of probability”,\textsuperscript{102} we are given to believe that the Creator manifests the origin of the world as a living being with intelligence enfolded into the world soul, and the soul likewise enfolded into the body. The Demiurge, of course, desiring all things to be good, wishes everything to be as orderly, beautiful and intelligent as possible. Good is better than bad, obviously. Consequently, the Demiurge has brought order to the chaos of the universe, beauty to the visible world, and intelligence to the souls of creatures. Timaeus recounts that the Creator “found” the “visible sphere” agitated and disorderly. Interestingly, at this point in the dialogue, the universe exists prior to the \textit{arché}, the inception of the physical world, waiting only to be ordered by the Creator.

In addition to being perfect, the original must be complete and unique. Only wholes are the image of the ideal. The original, quite obviously, contains all individuals which are parts or portions

\textsuperscript{101} According to Guthrie; \textit{op cit}, p.253ff, “In the \textit{Republic}, Plato calls the maker of heavenly bodies their \textit{demonergos}, and this word is used several times in the \textit{Timaeus}. Consequently, he is now usually known as the Demiurge, though Plato more frequently calls him God (that is, usually \textit{theos} with the definite article, to distinguish him from the many derivative gods)…”. Plato variably uses the terms Creator, Demiurge, Maker, Divine Craftsman, Father, Begetter, Best of Causes for the tasks of creating the ordered cosmos in the sense of “putting together”, making, shaping, ordering. The Creator works to a model (\textit{paradigma}) but does not in fact create the “original stuff”. Further Guthrie explicates p.254: “The spirit of Socrates still lives, with his endless talk of ‘shoemakers’, carpenters and smiths’, and the word reminds us that a craftsman works in a given material and to a pattern or form, either before his eyes or reflected in his mind. Similarly the Maker of this world is not omnipotent, but does the best he can with an already existing stuff, and creates the physical cosmos after the model of the eternal Realities.”

\textsuperscript{102} 30b.
of the whole. “For the original of the universe contains in itself all intelligible beings, just as this world comprehends us and all other visible creatures”. Consequently, for Plato, only one world is possible. If the created world is a copy of the original, containing all individuals, nothing can lie outside of this living being. There can be only one world, because no parts can remain outside of the universe. The created world, being in the realm of Becoming, is necessarily visible and tangible. This corporeality is composed of four basic elements: fire for visibility, earth for solidity; and water and air for binding the two together. The bonds between them are proportioned harmoniously (φιλία) as the most perfect bond of union in which to combine the materials of the corporeal universe. Having been created by the “framer of the universe”, the world is consequently indestructible by any force outside of the creator himself. At the end, “he gave to the world the figure which was suitable and also natural”. That perfect figure was a sphere – both as a universe and a soul – regulated by revolutions in a circular pattern, smooth and with the soul embedded in the very center. Whereas the soul (πνεύμα-ψυχή) is embedded in the intelligence (νοῦς-νοῦς) and the intelligence in turn is embedded in the body (σώμα-σωμα), the soul was prior to and dominant over the body, being more “originary”, excellent, and acting as an elder to the younger body. Therefore, the rulership of the soul over the body is most appropriate, for she is indestructible, unchanging, indivisible, and wise. However, the problem occurs as to how the unchangeable being of the soul (ψυχή) communicates or is related to the ever-changing tangibility of the corporeal body.

This problem of the relation between the soul and the body, the unchangeable and the mutable, the being and the becoming, is enormously crucial at this juncture in ancient philosophy. The dialogue

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103 30d.
104 31b-32c.
105 33b.
106 33b-34b. Notably, the figure of the sphere is also the shape of the Parmenidean soul. cf. Cornford; op cit, p.49.
of the *Timaeus* upholds the Idealism of Plato whilst at the same time introducing various intermediate measures with which to bridge the divide.\footnote{Guthrie; *op cit*, p.267ff. The Platonic doctrine of Forms is hardly a static theory, yet according to Guthrie in the *Timaeus*, “we have the familiar relationship of imitation in the classical doctrine of Forms, which Plato never abandoned, but has refined in three ways” in this dialogue.} *Timaeus* 35a-37d is one of the most obscure passages in the Platonic oeuvre, yet is critical to understanding this relationship. The soul is made from the following elements:

From the being which is indivisible and unchangeable, and from that kind of being which is distributed among bodies, he compounded a \textbf{third} and intermediate kind of being. He did likewise with the same and the different, blending together the indivisible kind of each with that which is portioned out in bodies. The, taking the three new elements, he mingled them all into one form, compressing by force the reluctant and unsociable nature of the different into the same. When he had mingled them with the intermediate kind of being and out of three made one, he again divided the whole into as many portions as was fitting, each portion being a compound of the \textit{same}, the \textit{different}, and \textit{being}.\footnote{35a-b. \textit{my emphasis}.} These three.

Following this passage, Timaeus goes on to explain how the \textbf{three} are further divided into harmonious proportions. However, let us focus on the soul composed of being, the same and the different, bridging the world of generation (\textit{genesis}) and the world of immutable being (\textit{ousia}). This passage is so difficult that commentaries generally leave it in obscurity, where some would maintain it belongs. However, Cornford devotes seven pages\footnote{Cornford; *Plato’s Cosmology*, *op cit* pp.59-66, especially the schema on p.61. See also his Plato’s \textit{Theory of Knowledge}, esp.273ff for the discussion of existence, motion, and rest; i.e. the three most important Forms, in the \textit{Sophist}. Any Form is both the Same and Different in the sense that it is the self-same as identical to itself as well as being wholly differentiated from any other Form. See also Luc Brisson; \textit{Le même et l’autre dans la structure ontologique du Timée de Platon: un commentaire systématique de Timée de Platon}, (*Publications de l’Université de Paris X Nanterre; no.23; Series A, 1974*). Especially pp.270ff.} to the explanation of the admixtures
of the same, the different, and being, influenced by the interpretation given by Proclus. He proposes the following schema:

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\begin{array}{|l|l|}
\hline
\text{Indivisible Existence (being/ουσία/ousia)} & \text{First mixture} \\
\text{Divisible Existence} & \text{Intermediate} \\
\text{Indivisible Sameness (identity/ταύτων/tauton)} & \text{Existence} \\
\text{Divisible Sameness} & \text{Intermediate} \\
\text{Indivisible Difference (differentiation/θάτερον/thateron)} & \text{Sameness} \\
\text{Divisible Difference} & \text{Intermediate} \\
\hline
\end{array}
\]

\[
\text{Soul (ψυχή/psyche)} \quad \text{Final mixture}
\]

Undoubtedly, this obscure passage is susceptible to various interpretations, yet Plato is trying to account for both unity and diversity in the sensible. How does the pattern of the ideal remain the same whilst at the same time providing innumerable variation? In this schema, Cornford is able to clarify an interpretation of this passage in the Timaeus as a three-fold mixture of the indivisible forms and the divisible generations of the three ingredients of existence (being), sameness, and difference. The process of the two mixtures results in the soul – both the world soul and the human soul. Thus, Plato explains the coming-into-being of the “differing kinds”, comprised of both the eternally unchanging forms, and the multiplicity of generated, becoming, differentiated things. Further in the Timaeus 35b, the unity

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110 Cornford; Plato’s Cosmology, op cit, p.63 cites Proclus ii;117, ii;137, and ii;147. In contrast, Johansen complains: “What is the point of this elaborate account?” He instead appeals to Plutarch (DeAn.Procr.1012E-1013A translated by H. Cherniss) who “outlines two different interpretations which were common in antiquity. On the ‘kinetic’ reading, as one might call it, the composition of the world soul is supposed to explain the soul as a principle of motion. On the ‘cognitive’ reading, the point of the mixtures is to account for the world soul’s ability to make different sorts of judgment.” Johansen; op cit, p.138-9 &138n2.

111 Cornford; Plato’s Cosmology, op cit. p.61.
of the three being/sameness/difference as a whole, is further divided into the multiplicity which is the world-soul - always a mixture of the unchanging being with generated becoming, each in their own harmonic measure. The soul (psyche-ψυχή) is the resultant three-fold. Notably, since the three are radically differing kinds (genos), they have to be brought together and mixed with force. In order for “like to be known to like”, each must participate in the other. Yet the kinds do not mix easily. Once unified, however, the soul as a compound of being, sameness, and difference bridge – or the soul is in fact an intermediary between - the ideal forms and the divisible, ever-changing, becoming. The soul is the third.

Time at the Beginning (37c-39e).
Time begins, for Plato, with the origin of the cosmos. Yet Plato makes a distinction between two kinds of time. On the one hand is the time of eternity, (αἰών/aión), eternal duration, that which has always existed (τὸ ὄν àei/to on æi) and will never cease to exist. On the other hand, is the time of the moving and changing physical world, (χρόνος/chronos) that which came into being with the creation of the cosmos. Notably, aeonic time and chronological time are respectively

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112 35a.

113 cf. Sorabji, Richard; Time, Creation, and the Continuum: Theories in Antiquity and the Early Middle Ages (London: Duckworth, 1983)p.268. “Plato’s meaning in the Timaeus has been the subject of endless dispute. But he warns us at Timaeus 29c-d that his account of the physical world (as opposed to the eternal) is only a likely story, and that there may be inconsistencies in it. So it is not surprising that different interpretations of his story soon developed. I shall divide the main interpretations into three groups... First, time began together with the ordered kosmos, and there was nothing before that. Secondly, orderly time began together with the ordered kosmos, but before that there was disorderly matter, motion and time. Thirdly, nothing began, the talk of beginning being merely a metaphor.” By far the most prevalent interpretation is the second, and the one followed here, although I argue that “matter” is somewhat problematic. Later on in the dialogue, Plato speaks of “traces” of the elements, that is to say, not yet physical matter. So in my opinion, in the state prior to creation, there is disorderly motion, and eternal time, but not matter.

114 Yet, Cornford is careful to point out that an exegesis of the text: μὲνοντος αἰώνος ἐν ἐνὶ καὶ ἀριθμοὶ ἰοις ἀιώνιον ἑκόνα is ambiguous in relation to other Platonic dialogues in the terminology used for “ever-lasting time”. “Even here, where he is contrasting eternal duration (αἰών) with everlastingness in time, Plato will not reserve αἰώνος for ‘eternal’ and αἰώνιος for ‘everlasting’. αἰώνιο is applied to both the model and to the everlasting gods.
comparable to the Ideal realm - the world of immutable being, and the material realm - the world of generation. In fact, this distinction precisely motivates the Creator of the universe. Seeing that the soul of the universe is perfect and everlasting, he wishes to create a copy of the eternal as closely as possible to the rational and harmonious universe. Nevertheless, an absolutely perfect copy of the Ideal being impossible, he creates a “moving image of eternity”.\textsuperscript{115} This moving image is chronological time.

Time is coeval with the realm of becoming, with the creation of the cosmos, the ordered state of the universe.\textsuperscript{116} When he puts order into the universe (cosmos meaning order, after all) he resolves to copy the eternal duration and unity of the Ideal, yet “according to number”, and this he calls “time” (\textit{chronos}). Prior to the creation of the cosmos, although there was chaotic movement, this motion was not harmonic and regular. With the creation of the world, motion is ordered into years, months, and days. Precisely in order to measure time, the Maker fixes the “moving image of eternity” into the cyclical revolutions of the planets. Time is meted out by the regular planetary motions. The rotation of the earth gives a “moving image” of time. For Plato, time is not linear; rather, time is a circular orbit, a rhythmic rotation. In the \textit{Timaeus}, an extensive speculative discussion ensues as to the rotation and orbits of planetary motion. These motions are regulated or ordered through the laws of number and proportion. Specifically, the motion of the sun and moon are convenient for the description of the pattern of nature.\textsuperscript{117} Time is the measurement or the harmonics of

\textbf{But in this particular phrase it is certainly strange that the moving likeness contrasted with abiding duration should be called \textit{αἰώνεια}}. Cornford; \textit{Plato’s Cosmology, op cit}, 98n.1.

In contrast, Taylor emphasizes the similarities between eternity and ever-lasting time: “... Timaeus means to insist not on the hackneyed contrast between time and eternity, but on their positive resemblance. They are not merely contrasted. Though time is not eternity, it is a real ‘likeness’ (a true ‘perspective’) of it.” Taylor; \textit{op cit}, p.184. Taylor also points to discussions in \textit{Parmenides 155e4-157b5} where Plato discusses an “instant” (τὸ \textit{ἐξαιρητικός}) and continuity of \textit{kinesis} (κίνησις). Taylor; \textit{op cit}, p.190.

\textsuperscript{115} 37d.

\textsuperscript{116} “Was there time before the creation of the Cosmos?” cf. Sorabji, Richard; \textit{Time, Creation, and the Continuum, op cit}, pp.268-275.

\textsuperscript{117} With Pythagoras, in contradistinction, time had a metaphysical status as harmonic sequences and proportions. The law of numbers was indeed the order of things ideally.
this moving image. Remarkably, time does not proceed from the past into the future, but is ordered according to number of the moving and sensible planetary patterns. Time is cyclical.

Consequently, we inaccurately speak of “that which was”, or “that which will be”\textsuperscript{118} because the sensible world is a mere copy of the eternal duration before the creation of the universe. The becoming of time is generated motion, therefore, it becomes, and it comes-to-be and passes-away, being the mere moving image of aeonic time. Plato succinctly states: “that which is immovably the Same forever cannot become older or younger by time”.\textsuperscript{119} Only the generated sensible universe can change and is subject to measurement as “parts of time” because these becomings belong to chronological time. Consequently, time as chronological time, came into being with the creation of the cosmos. Having been created together, chronological time will endure only so long as the sensible world endures, being a copy or image of eternity or aeonic time.

Chronological time is in the realm of appearances, a likeness “moving according to number”.\textsuperscript{120} As such, time endures and moves according to regular proportions (\textit{analogia}). However, in fact, when we speak of something coming-to-be, existing, and passing-away, these are expressions that are, according to Plato, “inaccurate modes of expression”.\textsuperscript{121} Eternity itself “abides in unity”,\textsuperscript{122} is in the realm of “being” (\textit{ousia}), and in fact does not change. Time, as opposed

\textsuperscript{118} 38a. Guthrie reminds us that “nothing generated can be strictly eternal, that is, not simply everlasting, but exempt from all distinctions of before and after, was and will be”. Guthrie; \textit{op cit.} p.299.
\textsuperscript{119} 38a. “What is Plato’s conception of eternity? Much of what he says...would suggest that the ideal Forms are eternal in the sense of being timeless. Thus Plato differentiates eternity (\textit{aion}) from time which he treats as a mere likeness. And he denies that ‘was’ or ‘shall be’ are applicable to the Forms, or that they grow older.” cf. Sorabji; \textit{Time, Creation, and the Continuum, op cit.} p.109. And further, “...Plato often speaks in the \textit{Timea} of the Forms as existing \textit{always} (\textit{aet}).” \textit{ibid}, p.110. Notably, eternity does not change, but in the pre-creation state, does have movement, i.e., disordered or chaotic movement of the “traces” of the elements. See above cited source for an extended historical discussion in a chapter entitled “Is Eternity Timelessness?” \textit{ibid}, pp.108-112.
\textsuperscript{120} 37d. cf. Taylor; \textit{op cit.} p.95-96.
\textsuperscript{121} 38b.
\textsuperscript{122} 37d. translation Cornford.
to eternity, is a mere image/copy/likeness (eikon). Time merely imitates eternity.

In addition, the rhythmic and harmonic motion of the planetary “gods” are for Plato, not only the measure of time, but also the means by which human souls through the study of mathematics or the measure of time, can attain the perfections of eternity. Indeed, the goal is that they too might resemble more closely the pattern of the Ideal. Furthermore, the means by which the human soul comes to understand the Ideal is not possible without a visible model. Yet to know absolutely the nature of the universe in aeonic time, or to comprehend the origin of the cosmos or other divine beings, is not possible for men. They must satisfy themselves with the dialectic, with the study of the moving image of eternity, time (chronos), and the search for the order of things that reveals the pattern of the Ideal. Notably, time is not paired with space in coevality with the creation of the universe. Space, as seen later in the dialogue, has an entirely different metaphysical status; namely, space is prior to all determinations of the ideal/appearance and being/becoming.

To conclude, in order to understand time in Platonic terms, it is important to remember the Ideal/copy distinction occurs between eternal duration (aìòv/aion) on one hand, and ever-lasting time (χρόνος/chronos) on the other. The nature of the Ideal is eternal. Prior to the creation of the cosmos, the universe moved in a disorderly fashion. Yet eternity is in the realm of the Ideal and strictly speaking does not change. Instead it is sempiternal: aeonic time endures forever, with neither beginning nor end. The Maker or Creator sought in his perfection to make the created cosmos an ever-lasting copy of the Ideal forms. As a copy of the eternal, the creator made in the physical world, “a moving image of eternity” called chronological time.

123 37e.
The Correspondence between the World-Soul and the Human Soul (39e-47e)
When the Creator composes the World-Soul, the soul is impregnated and enveloped in the corporal body of the universe, dwelling in every part of the divisible. The two great circles of the invisible/indivisible soul and the visible/divisible world are united “center to center”. Notably, the World-soul is in time; so although “enduring throughout all time”,125 having begun a “divine beginning never-ceasing”, the psyche (ψυχή) is a composition of the three. The World-soul is part of time, not eternity. Nevertheless, the psyche participates in the perfections of the Ideal, reason, and harmony, and is self-moving. In fact, since the soul dwells in both the world of generation and the world of unchanging being (being of course a mixture of the three), she is the critical intelligence of the known world and provides the very possibility that “true opinion”, the logical account, and “certain belief” are achievable. Thus the Creator has made an ever-lasting copy of the eternal being.

Similarly, the human soul (psyche) is a composition of the three and participates in the realms of both being and becoming. The soul is ever-lasting and dwells up to the very interior limit of the body, a body which can generate and corrupt. Nevertheless in contrast, the human being is not as the universe, created by the Creator; rather, the human was created by the children of the gods. If the Creator had created the human being, then they would wholly participate in the perfections of the Ideal and would be equal to the gods. The Creator wished to create a perfect copy of the original, but apparently not this perfect. Consequently, he charges the gods with the task of creating the “three kinds of mortal beings”.126 The gods, although also a “copy”, were not self-caused but did not degenerate - not because of their inherent nature, but because the Creator had promised not to dissolve them into mortality because they were directly his own handiwork. “All that is bound may be undone”.127 As created beings, they can be “undone” or

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125 37a.
126 41b. “kinds” is γένη.
127 41b.
subject to coming-to-be and passing-away. However, unlike the human beings, they have the guarantee of immortality and indissolubility from the Creator. In contrast, human beings are an interweaving of the mortal and the immortal.\textsuperscript{128} The Creator will only plant a seed of the immortal in the form of the soul (\textit{psyche}) of the human being, the guiding principle that will follow reason and justice in order to one day be returned to their corresponding soul-star. Notably, it is the lesser gods who will in the end receive them again at the time of their mortal death.\textsuperscript{129}

In order to make the human soul, the Creator follows the same procedure that he did with the creation of the World-soul as an intermediate mixture between the three: being, sameness, and difference. He turns again to his mixing bowl (\textit{kratér}). Although also intermediate between three, the ingredients are a second or third degree remainder,\textsuperscript{130} less pure than that which comprised the World-soul. Notably, the Creator determines that the “first birth would be one and the same for all”,\textsuperscript{131} and the mortals are shown before their birth (the \textit{arché} before the origin) all the mysteries of the universe, the structure of the Forms, and the laws of destiny. This knowledge will account for the Platonic doctrine of “recollection” (\textit{anάμνησις/}

\textsuperscript{128} 41d.
\textsuperscript{129} 41d.
\textsuperscript{130} 41d. Some discrepancy exists over what constitutes the “remainder”, \textit{ὑπόλοιπα τῶν πρόσθεμα}. Cornford, for example, suggests that the impurity accounts for free-will in human beings, i.e. humans can choose to be imperfect. cf. Cornford; \textit{Plato’s Cosmology}, \textit{op cit}, p.142-143. Taylor, on the other hand, insists that the human soul is “not made of what was left in the \textit{κρατέρ}” [bowl/cup]. cf. Taylor; \textit{op cit}, p.255. That there would be a remainder left over in the mixing cup would imply something left out of the composition of the universe, which clearly was stated as being “one” and “whole” in 30d: “For the original of the universe contains in itself all intelligible beings....”. Although the \textit{psyche} of the human is inferior to the \textit{psyche} of the universe, Taylor denies that Timaeus is speaking of the residue of the World-soul. “But our souls are neither ‘parts’ of the cosmic soul nor emanations’ from it. They are just as directly the ‘creation’ of the Supreme God as the cosmic soul is.” cf. Taylor; \textit{op cit}, p.255. Taylor suggests, instead, that the diluted second or third degree mixture is in fact a “second brew”. An unlikely reading, in my opinion; however, the problem remains of the “remainder” being a residue falling outside of the “one” of the universe.
\textsuperscript{131} 41e.
anamnesis).\textsuperscript{132} No human soul is at a disadvantage from another human soul; each soul is born equi-primordially with prior knowledge both of the universe, and the faculties of sensation\textsuperscript{133} and love.

Next, the soul must be combined with the body of the mortal creatures. “Having made a beginning” the Creator “hands the work over” to the lesser gods.\textsuperscript{134} Imitating their Creator, they in their turn mix the human soul with the four elements, bound by impermanent chains.\textsuperscript{135} In this way, the gods are copies of the perfection of the Creator, yet the humans are copies of the gods, made partly by the residue in the bowl of the universal soul and elements put together by the lesser gods. Are mortals, then, an imitation of an imitation? The nature of humans is such that they are not self-caused; rather, subject to actions of external forces causing fluctuations. The human is created on the model of the World-soul, having also the regulation of two intersecting circles. The greater or finer circle is the human head, the dwelling place of the divine.\textsuperscript{136} When a person is not guided by reason, his circles become unbalanced, their revolutions loosing their wise direction, and producing effects without order or design.\textsuperscript{137} However, when a person is a “lover of wisdom”, his “circles can return to the natural form and their revolutions are corrected, and they call the same and the other by their right names and make the possessor of them to become a rational being”.\textsuperscript{138}

Consequently, the human soul participates in the “mix” of the psyche, and the structure of the two circles. The soul, as the divine portion, guides the human in following a proper measured course. The soul, “partaking of the natural truth of reason, might imitate the absolutely unerring courses of God and regulate our own vagaries”.\textsuperscript{139}

\textsuperscript{132} \textit{Phaedo 76d} and \textit{Meno}.
\textsuperscript{133} Vision being the most exalted. cf. 45b-47c. “Sight...leads to thinking, and thinking to that understanding of the order in things which we call philosophy. The true ‘end’ of vision is thus philosophy.” cf. Taylor; \textit{op cit}, p.294.
\textsuperscript{134} 41c.
\textsuperscript{135} 42e-43a.
\textsuperscript{136} 44d-e.
\textsuperscript{137} 46e and 47d.
\textsuperscript{138} 44b.
\textsuperscript{139} 47c.
So the *psyche* is the origin (*arché*) of all movement, as well as the impulse or guide for staying the course of reason, or for regular and orderly purpose. Ultimately, the love of wisdom (*philosophia*) is the correct means for the balance and regularity of the revolutions of the two circles. All must be ordered and measured. As above, so below; thereby insuring the correspondence between the World-Soul and the human mortal soul, albeit composed from a “remainder”.

The *Arché* is Beginning Again… *the Origin* (47e- 52b)

Timaeus pauses in his discourse in order to return, once again, to the objections of a “likely story”. The *arché* is further back than originally thought. His account up to this point had been an attempt to provide an explanation according to reason and divine intelligence for the creation of the universe. However, he must return to the beginning again in order to incorporate, along with reason, an errant or indeterminate cause that is most decidedly and necessarily part of the account. Although necessity has been subjected to reason, an account must be given of the previous state of the universe before creation. In fact, the account begins again, getting trapped in a sort of eternal regress.

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140 “The ultimate aim of *philosophia* [philosophia] then is a moral one, the attainment of a certain kind of life. Knowledge of the periods of the circles in the heavens and computation of their ratios to one another (it is to this that the words *logismîn kata fÚsin ÑrqÒthtoj metascÒntej* refer) is to lead us to take up the task of bringing the disordered and ‘surd’ revolutions of the circles in our own souls into a corresponding order. Philosophy is thus the completion of the process which was begun by *Orphî trothâ and paîdevîc*, the end of the whole is, as the *Theaetetus* had said, that we become ‘like God’....” cf. Taylor; *op cit*, p.295.

141 Taylor further clarifies “necessity” here *änagkh* (anankê) as something like what we would call “chance”. The necessary for Plato is opposed to that which has divine reason, *nouos*, and is not “irrational” as such but without divine purpose, and has a subservient telos to an intelligent cause. cf. Taylor; *op cit*, pp.300-301; Guthrie; *op cit*, 272ff.; Cornford; *op cit*, 165ff. Consequently, Plato states that the created universe – albeit the most perfect and the best - has order and design where reason or harmony prevails over necessity/chance, but never fully eradicates the possibility of contingency.

142 cf. Cleary, John J.; *Aristotle and Mathematics: Aporetic Method in Cosmology and Metaphysics* (Leiden: Brill, 1995)pp.23-70. Cleary reads the *Timaeus* as a mathematical cosmology, and as such gives another interpretation to this dialogue. Specifically, he privileges the importance of reason and necessity in the creation of the world, attributing a role to...
What were the first principles (arché) before the beginning? No one, according to Timaeus, had been able to explain the nature of the beginning – of fire, water, air and earth. Timaeus is at a loss as to how to describe these four elements of necessity, but he now attempts to give an account. These four in turn, however, must not be considered as first principles (ἀρχή/arché), syllables (συλλαβαί) or elemental particles (στοιχεῖα/stoicheia). The four, although variously translated as elements (stoicheion), roots (rhizomata), or bodies (protosoma), must not be thought of as a basic component or ultimate constituent because they themselves are constructed by still more archaic components. Therefore, the term “compound” seems more appropriate; the four are not simple substances, but comprised of yet more primordial constituents. Furthermore, these four are constantly in a “process of cyclical transformation”. Consequently, these compounds are never discrete stable principles; rather, they are in constant flux in the realm of generation. To describe the “original principle or principles”, the arché, the very first principle, is indeed not possible. Without stability, these elements cannot be “this” or “that” because to describe them as such would suggest a permanence

the Demiurge that is at once less than the Neo-Platonists would have it, and more than perhaps an interpretation of the chora as an intermediary between the ideal and sensible would have it. The function of the receptacle in his account would be to mathematically order the nebulous elements in order to provide a rational unity to the universe.

143 According to Miller, “Στοιχεῖα (elements) is Plato’s usual term for letters of the alphabet.” Miller; op cit, p.72. Guthrie; op cit, p.266: “Far from being stoicheia, they are even more complex than syllables.” Further in note 1 on page 266 he explicates that stoicheia means elements or letters, however “unlike Empedocles, the atomists did try to penetrate beyond the four elements, but in Plato’s view gave the wrong answers. Serious students of Timaeus should be warned that this passage (roughly from 49b to 50b) has been the subject of prolonged controversy.”

144 49c. translation Lee.

145 48b-e. translation Lee, Plato states: “It is not for us to describe the original principle or principles (call them what you will) of the universe, for the simple reason that it would be difficult to explain our views in the context of this discussion. You must not therefore expect such a description from me, nor could I persuade myself that I was right to undertake a task of such magnitude. I shall stick to the principle of likelihood which I laid down at the start, and try to give an account of everything in detail from the beginning that will be more rather than less likely.”
that they do not possess, being as of yet indeterminate.\textsuperscript{146} As Taylor has pointed out: “...nothing which we see changing its character (\textit{ἀλλοτε ἀλλη γιγνόμενον}) ought to be called ‘this’ (\textit{τούτο}); it should only be called \textit{τοιούτον}, ‘this-like’.\textsuperscript{147} Indeed, \textit{τοιούτον}, ‘this-like’ is merely a phase in genesis. Yet, there must be some “such-ness”\textsuperscript{148} that remains through the cycle of generation – through origin, existence, and degeneration. Plato calls this “such-ness” in 28b, \textit{gegonen (γέγονεν)}, that which is coming-into-being (\textit{γενέσεως ἄρχην}), that which exists at this moment.

So after beginning again, Timaeus is forced to begin anew, also with an invocation to the gods in order to bring the account safely into the “haven of probability”,\textsuperscript{149} into the “likely account”. The task of providing a likely account of the origin lies prior to the beginning. To provide the “merely likely” scenario or provisional account of the cosmos entails retracing the origins from an earlier stage, always beginning again. Timaeus begins from the beginning, again. “So now let us begin again” says Timaeus.\textsuperscript{150}

\textbf{A Threefold Schema: Arché – Archetype – Type}

For Plato, the first compounds of the universe are profoundly geometrical. Notably, the archaic “building-blocks” of the cosmos are not material. As such, the elements making up the world are without physical characteristics themselves and without fixed properties; for as Plato says, how could we have any assurance as to the characteristics of the elements when they “never present themselves in the same form”?\textsuperscript{151} Although originally the four roots/elements had been assumed to be primordial, at this point in the dialogue Timaeus corrects himself.

\textsuperscript{146} 49d5.
\textsuperscript{147} Taylor; \textit{op cit}, p.316.
\textsuperscript{148} Lee points out that Plato wishes to make a distinction here between the “Greek word [that] means ‘this’ or ’that’, and indicates that we are talking of a permanent thing, with another [word] which means ‘suchlike’ or ‘having a quality’.” cf. Lee, H.D.P.; \textit{Timaeus and Critias}, \textit{op cit}, p.68n.2.
\textsuperscript{149} 48d.
\textsuperscript{150} 48e.
\textsuperscript{151} 49d.
Timaeus now gives a lengthy account of the triangles making up five geometrical solid figures that ultimately comprise the four compounds. Closest to the original ἀρχαί are the primary triangles. The triangles attach together in such a way as to provide an infinity of materials for the sensible universe. The various combinations of triangles construct in their turn the five regular solids that represent the root elements of earth (cube), air (octahedron), fire (pyramid), water (icosahedron), and the cosmos as a whole (dodecahedron). These component building blocks Plato variously calls genos, or kinds, or types. The multitude of combinations or admixtures of these root elements account for variations in physical appearances where three of the root elements are interchangeable with the others.

Plato also has a theory of bonds necessary to the composition or structure of the elemental. Obviously, two components cannot be joined without a third, a bond of union between them. In the Timaeus, the bond is made of the same elemental stuff or compound; that was to say, of the same proportion. The compounds of water and air are intermediary between fire and earth. This coalescence between the disparate root elements is the most perfect since the body of the cosmos is harmoniously joined together in the philia of the same. Consequently,

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152 From various scholars, Miller gleans ten alternatives to the question, “what are the triangles?” cf. Miller; op cit, p.173ff.
153 from the schema in Lee; op cit, p.77. The four “roots” are considered to be of Empedoclean origin. cf. Taylor; op cit, p.297. “Fire, air, earth, and water were first posited as the four basic elements by Empedocles. He preferred to call them ‘roots’ (rhizomata), which emphasised their biological character, but he also gave them the names of gods – Zeus, Hera, Aidoneus and Nestis – as the authoritative source of all things, and in their eternal unchanging nature deserving the respect and wonder traditionally due to gods.” cf. Wright, M.R.; Cosmology in Antiquity (London: Duckworth, 1995)p.63-64. “Plato, Aristotle, and the Stoics kept the four elements, [but] denied their ultimate primacy and allowed their mutual transformation.” cf. Wright; op cit, p.67. The four elements were unchanging, yet the arrangement of them in various compounds explained phenomenal change.
154 “Plato commonly uses a word for his elements which means ‘kind’ or ‘genus’.” cf. Lee; op cit, p.81.
155 31b-32c.
156 The concept of philia is also of Empedoclean origin, being the opposition to neikos or strife that function as opposite principles of attraction and repulsion accounting for movement and change in the universe. Philia is a harmonious bond.
the “framer of the universe”, the Demiurge, conciliates type with type and sets out the copies of the eternal forms in the cosmos, destructible only by god. Further on in the dialogue, Timaeus speaks again of an interlocking bond (σύγκλεισις) when speaking of anatomy. The bonds, being in the realm of generation, are not permanent. The original force (δύναμις) holding the compounds together is not eternal, degrading over time and allowing the types to break apart and return to their elemental status for constituting the cosmos. Nevertheless, although not eternal, the interlocking bonds are of the same type as the elemental compounds and are consequently ruled by geometrical/mathematical principles.

In order to make the order of primordial elements comprehensible, the following threefold schema might be employed:

<table>
<thead>
<tr>
<th>Arché</th>
<th>Archetype</th>
<th>Type/genos/kind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms</td>
<td>Receptacle</td>
<td>Copy</td>
</tr>
<tr>
<td>Triangles</td>
<td>Geometrical Solids (5)</td>
<td>Elements/Roots/Compounds (4)</td>
</tr>
<tr>
<td>Being</td>
<td>Receiving</td>
<td>Becoming</td>
</tr>
<tr>
<td>stuff</td>
<td>chora</td>
<td>genesis</td>
</tr>
<tr>
<td>Disorder</td>
<td>Space</td>
<td>Place</td>
</tr>
</tbody>
</table>

In this account, the triangles are the most primordial constituent, most closely associated with the original arché, or the eternal forms. These triangles, in turn, are constructed into five geometrical solids, becoming archetypes that are taken up by the receptacle (chora) and organized into the final four compounds of earth, air, water, and fire. These kinds or morphai are a “likeness” of true sensible qualities of fire, air, water, and earth because they are not yet transformed.

157 cf. Sophist 265b-266c: Plato distinguishes two kinds of production: one with a Divine origin, and the other human. However, he warns, the coming-into-being of sensible things is not out of Non-Being but must be attributed to divine poeisis, the original and the image that always accompanies it.
158 81b5-c6, 89c1-3.
159 Further elucidation can be found in 69b we he speaks of them not “deserving their name”. cf. Cornford; Plato’s Cosmology, op cit, p.199-200.
through the medium of the *chora*. Therefore Plato speaks of ἴχνος - traces, footprints, tracks, vestiges - as that which is prior to these elements. Within the *chora*, they show only the trace of the sensible elements that they will become. These four are the building blocks of generation, of the realm of becoming. Consequently, the elemental forms found in the *chora*, which begin to sort themselves out “like to like”, are precisely these geometrical solids composed of the triangles. They were “likenesses” of the elements/roots/compounds but only become material/sensible, aggregating and assembling in the physical universe, *after* going through the intermediary medium of the *chora*. To summarize the threefold schema, then, the triangles/geometrical solids/elemental compounds correspond to the three fold of being/space/becoming which is further explicated in the dialogue. As such, the *Timaeus* evokes again the three, the tripartite schema that is repeated again and again.

The three-fold provides a reasonable account of both the unity and the diversity of the universe. Nevertheless, Plato states, despite the infinity of copies of the eternal forms, there is only one implicitly divinely created world,160 this world being the most perfect and the most beautiful. Earlier accounts argued that the four elements were “generated by and into one another”, yet proved to be erroneous.161 No one, according to *Timaeus*, had been able to explain the nature of the beginning – of fire, water, air and earth. In this section of the dialogue, he goes further back to the source. However, what is prior to this source (arché), still further back to the origin, “only God knows”.162 Indeed, only God knows if there were more archaic principles than the triangles. *Timaeus* gives this “likely account” but he does not rule out the possibility of a yet more originary account. For Plato the cosmos

160 55c-d.

161 54c. Nevertheless, Stephan Toulmin and June Goodfield remind us that even though the notion of the elements was not original to Plato, he “set out to fit Empedocles ‘four elements’ into his own intellectual framework...to match the familiar properties and transformations of these material substances to the more fundamental - geometrical - principles.” cf. Toulmin, Stephan and Goodfield, June; *The Architecture of Matter* (Chicago: University of Chicago Press, 1962)p.76.

162 53d.
was geometrical, reiterating his emphasis on mathematics as the paradigm of nous. The universe was defined by the Forms as pattern, and the roots/elements/compounds were copies of the eternal Forms. The archetypes of the five geometrical solids provided an intermediary third term. In the end (beginning), the perfection of geometry provided Plato with his architectonic of the generated universe.

The Arché as Chora (48e-53c)

With the new beginning, the earlier Platonic schema of the intelligible unchanging realm acting as pattern, and the sensible copy of the pattern in the realm of generation proves to be insufficient. As a consequence, Timaeus introduces the difficult and obscure third realm – the chora, the receptacle or nursing-mother situated between them. Originally, he thought the two would provide a likely account. But now he must go even further back and insert the “third kind” (triton genos), a “new kind of being”. He must begin again. Yet what is this third kind? Plato will variously call the chora (χώρα): the third kind (τρίτο γένος) distinguished from the pattern (παράδειγμα) and the generated copy (μίμημα), the receiving medium (μεταληπτικὸν), or that which receives (τὸ ἐν ὧ), the Same (ταὐτὸν), receptacle (ὑποδοχή, ὑποδείγμα or τὸ παντὸς), nursing mother (παραμάνα), mother (μήτηρ), nurse (τροφῆ), matrix (ἐκμαγεῖον), or space (χώρος).

Hence, the Timaeus, whilst upholding the earlier Platonic Idealism, provides one of the most profound questions in the history of Western philosophy. How is the realm of the ideal pattern translated into the sensible in all its variety and multiplicity? The chora is the intermediary; the means by which all that is eternal is generated into the sensible. Yet the chora is “difficult and obscure” by Plato’s very own admission.

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163 The “hybrid” or “bastard” reasoning required to attain to the genos of space is, according to Duhem (p.23): “geometrical reasoning [which] leads Timaeus to represent specific essences of fire, air, water, and earth, intermediary between being and changing appearances.” Duhem, P; “Plato’s Theory of Space and the Geometrical Composition of the Elements” in Capek, Milic Concepts of Space and Time: Their Structure and Their Development (Dordrecht: Reidel, 1976)pp.21-27.
164 49a.
165 cf. Taylor; op cit, p.312-3.
Numerous accounts have been given\textsuperscript{166} – from Aristotle to the present day. Yet the importance of the chora is \textit{not} the precise determination of its nature since this is impossible to achieve;\textsuperscript{167} rather the chora’s place in the onto-topology, its place in the trilogy of Form-Space-Copy, between being-space-becoming, these \textit{three}.\textsuperscript{168} Although the third term has widely been contested, interpretations swinging from the material to the void; nevertheless, in this Platonic dialogue, “space” takes on ontological priority as an equal to being and becoming.

“We must”, Plato had insisted at the beginning, “begin by distinguishing between that which always is and never becomes,

\textsuperscript{166} Some scholars attribute the \textit{κόρα} to the non-being or void \textit{τὸ μὴ δὲν} - a position with which I do not concur since there is no textual evidence. To take only one example see Sinnige; \textit{op cit}, p.205. “...Plato’s description of the ‘third kind’ has many features in common with a description of not-being.” At the other extreme, Miller takes the receptacle to be material and not metaphysical and reduces the distinction between the chora and the copies to a mere conceptual one. \textit{cf. Miller; op cit}, p.89. Miller also confuses “place”, “inside”, etc. 89ff. Another scholar coming down on the material side is Margaret Wright: “The craftsman-god of the \textit{Timaeus} is like a common workman – a cobbler with leather, a potter with clay, a sculptor with marble – having to exercise his skill on unformed material which may resist the shape he has in mind and wishes to impose, but what would count as the preliminary material for the cosmos? In one obvious way it can be called ‘space’ (chora), that ‘nurse of all becoming and change’, which is so hard to envisage.” \textit{cf. Wright; op cit}, p.81. A default position occasionally occurs, interpreting the chora as space. A further option in the interpretation – and the one with which I concur, is that of the medium or intermediary, found in Mohr, R.D.; \textit{The Platonic Cosmology} (Leiden: Brill, 1985). Another option, found in Algra, Keimpe; \textit{Concepts of Space in Greek Thought} (Leiden: Brill, 1995)pp.31-120, this option is to dismiss all of these interpretations due to the ambiguity of the terms of the \textit{chora} as opposed to \textit{topos}, and \textit{en hoí}, letting remain the “incoherence” of the chora as precisely that – “difficult and obscure”. Algra also notes, \textit{op cit}, p.103 note 62, that Baemker, C.; \textit{Das Problem der Materie in der griechischen Philosophie: eine historisch-kritische Untersuchung} (Münster: 1890) has yet another interpretation: the chora as both space and matter. If Algra were to commit himself to an interpretation for the “difficult and obscure”, he would tend toward this interpretation: “In other words, the receptacle might be at the same time matter and space, though not with respect to the same things. In fact,...this was indeed how Plato in the main presented his receptacle.”(Algra; \textit{op cit}, p.83). Consequently, as I count them, there are six basic interpretations for the chora: as void or non-being, as space, as matter, as intermediary or medium, as “the obscure” as such, or alternatively, as \textit{both} matter and space.

\textsuperscript{167} 48b-e.

\textsuperscript{168} 52d.
from that which is always becoming but never is”. In the process of distinguishing the origins of the cosmos - between cause and necessity - he is now compelled to introduce a third term. In trying to explain the difficult concept of the chora, Plato uses the analogy of the inert metal gold, a material that can take on the form of all possible shapes yet constantly remains unaltered itself. Yet this analogy is misleading and regrettable due to the tendency for others to interpret the chora as a material object. The chora, in fact, participates in the ideal

169 27d-28a.
170 50a.
171 e.g. Aristotle in Physics IV, interprets the chora as the hule, the material. This unfortunate misreading had disastrous consequences for the historical misinterpretation of the third term. In fact, according to Jammer, “In the Physics Aristotle uses exclusively the term ‘place’ (topos), so that strictly speaking, the Physics does not advance a theory of space at all, but only a theory of place or a theory of positions in space.” cf. Jammer, Max; Concepts of Space: the History of Theories of Space in Physics (Cambridge: Harvard UP, 1954)p.15. Yet Jammer himself is seemingly trapped in this spatial confusion when identifying the Timaeus with theories of physical or material space, as Aristotle’s “undifferentiated material substrate” cf. Jammer; op cit, p.13. Because space (chora) for Plato is not sensible, it can be neither matter lacking qualities, nor corporal extension, nor even “empty”. Yet this neglect is already seen in Aristotle’s Metaphysics when he preterms the chora as the intermediation between the ideal and the sensible: “Above all we might examine the question what on earth the Forms contribute to sensible things, whether eternal or subject to generation and decay; for they are not the cause of any motion or change in them….Again, other things are not in any accepted sense derived from the Forms. To say that the Forms are patterns, and that other things participate in them, is to use empty phrases and poetical metaphors; for what is it that fashions things on the model of the Ideas?” cf. Aristotle; Metaphysics 991a9-14. Further neglect of space as a primordial third term alongside being and becoming, is confirmed with the rediscovery of Aristotle in the Middle Ages and the increasing mathematization of the world in theories of matter. Yet as Margret Wright explains, grasping the arché is never a simple matter: “Despite his criticisms of Plato, Aristotle agreed with him in realizing that neither the four simple bodies nor their related opposites were fundamental enough, but rather than looking for an ultimate reality in mathematics, he went back to the concept of an arché from which would be derived first the opposites and then the foundations of earth, water, air and fire. This basic substratum he called prime matter (hule), indeterminate and impossible to isolate. In Aristotelian terms it was ‘potentially alone’, a capacity to receive form and then to emerge into the range of perception with the characteristics of the ‘so-called’ elements. The systems of Plato and Aristotle accepted the Empedoclean tetrad of earth, water, air and fire, and accommodated them to their cosmology by looking for something more fundamental still: mathematical elements in the one case and prime matter in the other.” cf. Wright; op cit, p.105. Nevertheless, this interpretation of chora as matter or indeed, the substratum as prime matter as we will see in the next chapter, is highly problematic.
forms, therefore is unchanging and prior/original to all material considerations. The chora is a “thing-in-itself”, except to say that the chora is also prior to all “thing-ness”; therefore, the chora has neither qualities nor characteristics nor predicates. Plato uses the analogy of the metal gold in order to express the neutrality of the receptacle of the chora. The chora can take on any form, while remaining unaltered itself. As such, the chora “remains the Same”;\footnote{50b.} that is to say never departs from her own nature, giving the “likenesses” or “traces” (τὰ ἵχνη τῶν στοιχείων) of the elements of earth, fire, water, and air the possibility of becoming copies of the eternal patterns. These elements are constantly changing form, in and through the chora.\footnote{Yet Taylor reminds us that “‘they come and go’ \[50c\] not in the sense that they come ‘into’ space from somewhere ‘outside’ space, or ‘go out’ of it to somewhere ‘outside’ it, but in the simple sense that they appear at a given region and vanish again….”. cf. Taylor; \textit{op cit}, p.324.} Consequently, as Plato had stated already in 49c-d, these elements are in a constant process of cyclical transformation, in the realm of becoming, making it impossible to speak of them as “this” or “that”, rather in a process of impress in the receptacle/chora allowing them to take on transient and mutable qualities.

Most importantly, the chora belongs to the realm of the Ideal eternal pattern, the unchanging Same. The chora, whilst structuring the geometrical solids, itself remains without structure. The chora receives yet remains neutral and unchanged, “stamping” an impress of the eternal Forms onto that which it receives. Nevertheless, the significance of calling the chora, the Same, is as misleading or provisionary as comparing it with the inert metal gold, for the chora is not in the dichotomy Same-Different either. The eternal self-same being (\textit{tauton}) in order to be “known” or intelligible in the realm of the material must participate in difference (\textit{thateron}). Consequently, Plato reiterates “the three”.

Plato turns, then, from the gold analogy to a reproductive trilogy making a familial comparison: the father is like the Ideal, the \textit{arché}, the source or spring; the mother is the passive receiver that does not contribute characteristics to the offspring but “gives place” to
them; and finally the offspring are the resultant sensible creations of father and mother. Yet one must keep in mind that the Greek notion of birth and conception were quite different than contemporary notions.\textsuperscript{174} The seed (sperm) was thought to be implanted into the womb of the mother and nurtured there until birth. The mother herself contributed nothing in the Greek conception\textsuperscript{175} - neither egg nor necessary hormones. Thus the womb was neutral, a pure “receptacle”, “devoid of all character”, without contributing “characteristics” of her own - much like a seed that is planted into soil. The soil nurtured the seed, but did not give genetic modifications to the resulting plant.

In this way, the chora could be understood as pure “receptacle”, giving place to the originals to make copies of the ideal for the sensible world. As such, the chora participates in the eternal Same - invisible and formless herself - but necessary for the coming-into-being of all phenomena. She is “intelligible” and “all-embracing”.\textsuperscript{176} Thus, Plato compares the chora to the mother, who like the receptacle/womb stays as neutral as a wax tablet awaiting imprint, or the odorless base for perfumes, yet is “devoid of any particular form”.\textsuperscript{177} The mother/chora receives all but does not impart properties upon sensible creation, neither is the chora actually composed of any material element of fire, earth, water or air. The chora is “hardly real”\textsuperscript{178} meaning that it does not participate in the intelligible although it is eternal and formless. Understandably, Plato admits (again), the chora is decidedly difficult to comprehend.

To recapitulate, the significance of calling the chora the Same or the Ideal eternal unchanging, can be as misleading as comparing her with the materiality of gold, for the chora does not occupy the dichotomy of the Same-Different. The chora is between. Likewise, the description of the chora as “giving place” also conjures up physical

\textsuperscript{174} cf. Cornford; Plato’s Cosmology, op cit, p.187.
\textsuperscript{175} Aristotle in his Biological Works criticized this prevalent conception. cf. Mayhew, Robert; The Female in Aristotle’s Biology: Reason or Rationalization (Chicago: University of Chicago Press, 2004).
\textsuperscript{176} 51b.
\textsuperscript{177} 51a.
\textsuperscript{178} 52b.
extension and will become problematic when taken up by Aristotle in *Physics* IV. The chora is precisely the third term - intermediary between Being and Becoming, between the eternal Same, and the generated and continually changing Different.

**Again...the Ideal-Sensible Distinction**

Consistent with the earlier dialogues of Plato, in the *Timaeus* §51-52, the eternal and the coming-to-be is paired in kind with the intelligible/rational and the true opinion/sensible. Plato asks in 51c the quintessential questions of the Theory of Forms. Are those things which are available to sense perception the only things that truly exist? Indeed, are the intelligible forms, which long have been presupposed to be the only true eternal, in fact merely a name? In the *Phaedo* and the *Sophist* he had attempted to answer these most critical and originary questions, yet was unable to be conclusive. In the *Timaeus* he forestalls, postpones to another location, what would in fact be a tangent to the discourse of the origin, and yet he attempts a succinct account. In his opinion, the mind/intelligible (νοῦς) and true opinion (ἀληθὴς δόξα) are two entirely separate kinds (genres, γένος). The classes of nous and aletes doxa are distinct - “of distinct origin and of a different nature”. Nevertheless, Plato has determined at

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59 cf. Sorabji, Richard; *Matter, Space, and Motion: Theories in Antiquity and Their Sequel* (Ithaca, NY: Cornell UP, 1988)p.35: “Not only was Plato’s account very fluid, it was also less influential on subsequent treatments of prime matter than might have been expected. This was partly because of a major criticism made by Aristotle: place is immobile, whereas prime matter is not, so they cannot be identical.” Aristotle, however, in turn can be accused of blurring Plato’s distinctions between space (chora) and place (topos). cf. Miller; op cit p19: “Aristotle framed much of the long discussion over the interpretation of Plato’s Receptacle [chora] by the following statement: ‘For this reason Plato also says in the *Timaeus* that matter (ὕλη) and space (χώρα) are the same, for he says that the μεταλητικόν and space are one and the same.’ (*Physics* 209b11-13)…As an example of how place can be confused with matter he [always] cites Plato.” Indeed, Plato’s term is space (chora); Aristotle’s term is place (topos). See also the Ross, W.D. commentaries on Aristotle’s *Physics* as well as Cherniss, H.F.; *Aristotle’s Criticism of Plato and the Academy* (Baltimore: Johns Hopkins UP, 1944) specifically pp.84-86. And also, Clagorn, George S.; *Aristotle’s Criticism of Plato’s Timaeus* (Den Haag: Nijhoff, 1954). Both these commentators severely objure Aristotle for his misinterpretation of the chora in order to problematize his notions of the ἕυλε to ὕποκειμενον.

180 51e.
this point that they are inadequate to a complete rational account. The problem is that the eternal forms cannot of themselves generate copies. Furthermore, on the other side, the generated copies (eidolon) cannot of themselves sustain existence since they are constantly in the process of cyclical transformation. One is Being eternally the Same; the Other - with the same name - is generated, sensible, and mutable. A third, an intermediary, is needed.

In paragraph §52, Plato uses the term chora (χώρα), space, for the first time in the *Timaeus*. The chora is “eternal and indestructible” therefore participates in the ideal Forms. Nevertheless, space is apprehended by a “spurious” reasoning which is nonetheless not available to the senses. This kind of reasoning corresponds also to the between, differing in origin and nature, from both true opinion and intelligence. This reasoning is spurious precisely because it cannot be apprehended by the senses, not being sensible. As such space, chora, cannot be perceived. As discussed in §51, “things-in-themselves” are apprehended by intelligence involving truth and rational argument, and things of sensation are apprehended through perception involving “persuasion” by reason and true opinion. Yet space is neither of these. The chora is the third and is apprehended by a “spurious reason” (τὸ δὲ ἀλογον) a-logon, unaided by the senses. This “spurious reason” is also difficult to understand. It is like apprehension in a kind of dream, Plato says – a dream that appeals allusively to the Allegory of the Cave in the *Republic*. Yet because of this dream state, it is difficult to make true distinctions about the eternal reality, the moving shadows that are

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181 52a9. τρίτον δὲ αὐτὸ γένος ὁν τὸ τῆς χώρας For the variations on the Greek word chora, see Brandwood, Leonard; A Word Index to Plato (Leeds: W.S. Maney & Sons, 1976) pp.965-966. Prior to this use, chora was used in a pedestrian sense meaning quite simply territory, region, neighborhood, country, settlement. Most helpfully, Algra; op cit, p. 30-38, reminds us that the ancient Greek conceptions of space are grounded in the language of common usage. He carefully attempts to delineate the various determinations of space and place – chora, topos, kenon – in these most ancient texts. Nevertheless, Algra correctly warns against the interpretations of chora as either matter or space, being colored by contemporary and twentieth century concepts of space and time that are incompatible with the Greek conceptions, conceptions which are far from stable or consistent in themselves.

182 51e4 and 52b. cf. Taylor; op cit, p.344-5.
copies and that which is necessary in order to bring all that comes-to-be into existence.

In paragraph §51 of the Timaeus, Plato is again careful to distinguish between true opinion (doxa), and intelligence (noesis), differing in origin and nature. Intimated at the beginning of the Timaeus, the discourse refers to the night before, (before the discussion of the beginning), to a discussion similar to the Republic, which outlines the proper procedure in attaining the Ideal. Whilst Nous is true reason attributed to the gods and a few men, true opinion/knowledge is shared by men through persuasion. Yet these men and gods must approach the class of the intelligible through the use of hypotheses, hypotheses that are not of themselves “first principles”, arché, but “stepping-stones and starting-points”. A systematic procedure of inquiry is necessary in order to determine what really is. The objects of inquiry are not the mere semblance of things (eidolon) – even geometry as the most valorized study by the academy was merely “dreaming of Being”. The assumptions necessarily made in understanding (dianoia), although intelligible, must not be taken to be an “absolute beginning” but a place on which to stand – “hypotheses, underpinnings, footings, and springboards” – from which to ascend carefully step by step to the true “origin of all”. For example, geometrical demonstrations, although dealing with ideal forms, beginning from a hypothesis and proceeding to understanding, still “lies somewhere between belief and intelligence”. Nevertheless, only the dialectical method is capable of ascending upward from an intelligible footing or foundation, to the ultimate “first principle”, arché. All other methods are concerned with true opinion, with becomings, with what can be moved by persuasion. For unless the gods and those few men proceed carefully to the arché, they will not possess intelligence (noesis) or knowledge (episteme). In the end, only the dialectician who had ascended to the first principle is capable of giving an “exact account of the true

183 Republic §511b.
184 Republic §533b.
185 Republic §533c.
186 Republic §511b-c. The problem then becomes for the dialecticos, to bring the forms and ideal mathematical objects back into the images in the realm of the becoming.
essence of each thing”.\textsuperscript{187} The following is the four-fold schema iterated in the \textit{Republic}:

<table>
<thead>
<tr>
<th>Forms</th>
<th>Knowledge (episteme)/intelligence (noesis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. Objects</td>
<td>understanding (dianoia)/thinking</td>
</tr>
<tr>
<td>Visible Objects</td>
<td>belief (pistia)/opinion (doxa)</td>
</tr>
<tr>
<td>Images</td>
<td>conjecture/picture thought (eikasia)</td>
</tr>
</tbody>
</table>

Intelligence (\textit{noesis}) and true opinion (\textit{doxa}) differ in origin and nature. However, the \textit{Timaeus} is original in that the dialogue introduces the necessity of the \textbf{third} for the first time. At the end of his concise summation of the intelligible forms-sensible objects problematic he concludes: “...my verdict is that being and space and generation, these \textbf{three}, existed in their three ways before heaven...”.\textsuperscript{188} The reason why the \textit{Timaeus} is so important is precisely because it attempts to address some of the unresolved problems of the earlier dialogues - the transition from the immutable Forms to the sensible particulars in constant flux.

\textbf{Arché as Space}

Given that the chora is neither material nor ideal, what is its nature? Up to this point, the \textit{Timaeus} has made several analogies: nurse, mother, womb, mixing bowl, receptacle, base for unguents, gold, wax tablet, intermediate. Now, in this place, in attempting to describe the nature and origin of this ontologically critical third kind, Plato will employ perhaps the most confusing yet promising of all analogies: place, room, situation, space, home.

\begin{itemize}
  \item \textsuperscript{187} \textit{Republic} §533d.
  \item \textsuperscript{188} 52d.
\end{itemize}
“And there is a third nature, which is space and is eternal, and admits not of destruction and provides a home for all created things… (52b).”

Significantly, Jowett’s translation states that the chora “provides a home” (ἐδραν δὲ παρεχον) or hearth, or ground for generated beings. This word, ἐδραν (hedran) is translated alternatively by Cornford as “providing the situation”; that is to say, the “situatedness” that is similar to the ideal in that the chora is not apprehended by sense, and yet does not generate and degenerate. Images (eιδολον) must come-into-being in some way, and “grasp existence”; therefore the chora is necessary in order to enable becoming, without which sensible objects could have no existence. Consequently, the chora could be said to not only “give place”, “provide a home”, or situate, but to give being to becomings.

Obviously, Plato says, in order for something to exist it must exist someplace. The chora “gives place” and enables generation for everything that comes-to-be. Notably, Plato emphatically states that all generated beings, in order to exist must be situated at a site. We “say of all existence that it must of necessity be in some place (τόπο) and occupy a space (χώρα), but what is neither in heaven nor in earth has no existence (εἶναι)”. The chora gives first the situation of all existence. Yet we must remember that the chora is also prior to all determinations of existence/essence. The chora is the third.

Space as chora is not physical/material, but primordial, allowing the sensual realm to come-to-be, including its topos, belonging to its as its proper place. The material existence is intrinsically conjoined with

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189 52b.
190 cf. Cornford; op cit, p.192 and Taylor; op cit, p.342. From ἑδρα meaning seat, headquarters, dwelling, abode of the gods, foundation; and ἑδρέω meaning to situate, to sit, to reside or have one’s own headquarters. This translation also evokes the connotations of the chora (χώρα) in a proto-philosophical sense as home country, land or region. The chora is the home or beginning of all situatedness. Alternatively, Miller translates this phrase as “provides a place”, op cit, p.12.
191 52b.
its place. Occupying the place of giving place, the chora is compared to a winnowing basket by Plato, shaking and sorting the chaos in order to bring order. The chora takes in or receives the chaotic material traces to be sorted. Yet, the chora is often confused with the chaos. However, emphatically, the chora gives place, and thereby gives existence, bringing into becoming all sensible qualities of the universe without herself being affected by or containing the material. Rather, everything becomes something rather than nothing due to the chora “giving space”. Profoundly, the images of the Forms as a “moving shadow of something else”, come into existence in the chora - the necessary nurse of becoming.

Images of the Forms, qualities “like” or “traces” of fire, air, water, and earth come into the receptacle and shake up the “receiving vessel” until they are separated and ordered into various regions. All the constituent elements (kind or genus is the word Plato uses), change position in this process and due to the motion of receptacle take on the their own proper form and settle in their own place. The chora - swaying and sorting, winnowing and separating - enables the kinds to become in all their diversity. Consequently, the chora is critically necessary in the process not only of bringing equilibrium to the disordered universe, but also enabling the ideal to become the images/copies/sensible/visible world. Yet the chora remains inviolate like a virgin nurse. Although “effected” by the forms, taking on moistness from water and inflammation from fire, she remains to receive, intact. The forms become images through the chora; nevertheless, she retains her ontological innateness. Plato emphatically maintains that the

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192 52e.
193 52c.
194 52d. and also 57c: “...all things are changing their place, for by the motion of the receiving vessel (γάρα) the bulk of each class is distributed into its proper place, but those thing which become unlike themselves and like other things are hurried by the shaking into the place of the things to which they grow like.”
195 69b translation Lee. “As we have said at the beginning, these things were in disorder till god introduced measurable relations, internal and external, among them to the degree and extent that they were capable of proportion and measurement. For at first they stood in no such relations, except by chance, nor was there anything that deserved the names - fire, water, and the rest - which we now use. But he reduced them to order, and then put together this universe out of them, a single living creature containing in itself all other living things mortal and immortal.”
images and space are two different kinds. The copies are not “in” the chora, for they could not be “one and two at the same time”. “Two not one” is to say that the chora does not take on the properties of generated beings, rather is the facilitator of becoming whilst retaining her own “kind” (genos).

At this point, Timaeus stops in order to “retrace his steps”. He begins again. Somewhere well into his dialogue he wishes to return to the starting point. After gaining a likely account of the origins of the universe and the necessary building blocks, he summarizes the dialogue to this point emphasizing the divine cause of all creation. Each created thing has its own proper place, a proper harmonious relation not only with itself, but also with all other created things. Although only in the final paragraphs on the chora, is the chora finally called “space”, we should still gather together the meanings of chora elsewhere in the dialogue within a network of harmonious relations: chora as a proper place, one’s own country, settlement, region, territory, district, native soil, nation, heimat. In the Timaeus, χώρα chora takes on the meanings of the analogies of nurse, mother, womb, mixing bowl, receptacle, base for unguents, gold, wax tablet, and the intermediate in trying to come to terms with the third kind. Finally, the chora herself finds her proper place when she attains the third, space.

Yet in the end, Plato reminds us:

My verdict, in short, may be stated as follows. There were, before the world came into existence, being, space, and becoming, three distinct realities.

Οὗτος μὲν οὖν δὴ παρὰ τῆς ἐμῆς ψήφου λογισθείς ἐν κεφαλαίῳ δεδόθω λόγος ὅν τε καὶ χώραν καὶ γένεσιν εἶναι τρία τριχή, καὶ πρὶν οὐρανον γενέσθαι.

196 52c7.
197 69a-b.
198 Brandwood; op cit, pp.965-966. χώρα Timaeus 23b8 place; χώραν (to the chora); Timaeus 19a5 “take the places”, 22e2 “land”, 52b4 place/space +topos, 52d3 space, 53a9 “distinct places”, 79d6 “to its own place”, 83a4 “natural sources” being it natural place; χώρας (of the chora) Timaeus 57a8, 57c1 changing place, proper place, 82a3; χώρας (choras, plural) Laws 950d4 “territory”.
199 52d. translation Lee. Alternatively, Cornford’s translation: “Let this, then, be given as the tale summed according to my judgment: that there are Being, Space, Becoming - three distinct things - even before the Heaven came into being.” Cornford; op cit, p.197.
Notably, this is no “likely account”. His verdict, his judgment of the ontological status and the origin of the universe is a λόγος. The highest form of knowledge is reserved for this assessment: the three are distinct.

**In the End as in the Beginning**

Yet what is the chora? To answer is to say that the chora is not an is, not a being of any kind, not even a non-being, or a becoming. The origin, arché, in the sense of the beginning reaches back to a place that is prior to existence - back to the arché which is the three-fold genos of being, space, and becoming. Space is primordial. Space is not that which is simply devoid of matter, the “left-over” substance or remainder of the cosmos. Space is not ontological, not empty or contained, or bounded - but prior to all determinations of the material, and all classifications of Being. Consequently, the chora can only be classed as the kind (genos) prior to all classifications. Chora is - in the end as in the beginning - the escape from all determinations, the perfect perplexity, the place from which all philosophy begins. The chora is the third kind, alongside being and becoming...these three.

Indeed, the arché or origin is not an abyss, a chasm (chorismos) as has been suggested by Heidegger and others. Neither is it “non-
being”. In order to be non-being, *chora/arché* would have to be the “Other” of being. Yet chora stands at the beginning as the third term, *triton genos*, on equal “footing” as it were, with both being (*ousia*) and becoming (*genesis*).

Yet, perhaps, in the end, the *arché* is not the beginning, but rather the ever-present search for origins. Was this not the first principle? Was this not precisely philosophy?

So, now, to begin, again.

Or, as Kierkegaard has suggested, how to stop? How to stop beginning again?

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3. The reiteration of the *three* (*ein Dreifaches*), the interlocking three-fold of: being, unconcealment, appearance (p.109).

THE ARCHITECTONIC AS CONTINUUM: ATOMS, INDIVISIBLES, INFINITY - READING ARISTOTLE’S PHYSICS

The physical world is bound together by a general type of relatedness which constitutes it into an extensive continuum.

Whitehead

In the great whirlpool of forces man stands with the conceit that this whirlpool is rational and has a rational aim: an error!

Nietzsche

The door represents...how separating and connecting are only two sides of precisely the same act. The human being who first erected a hut...cut a portion of the continuity and infinity of space and arranged this into a particular unity in accordance with a single meaning.

Simmel

The architectonic of Aristotle is remarkable and singular in the history of philosophy. Not only is it comprehensive, but it truly attempts to describe a continuum of not only phenomena, but also a unity of substantial particulars. This chapter takes up firstly a discussion of two of Aristotle’s predecessors apart from Plato, that is to say Heraclitus and Parmenides, the philosopher of the flux, and the philosopher of the unchanging One. These positions are fruitful ground for Aristotle, and against this background he develops his arguments on infinite divisibility, the phenomenal continuum, and the infinite. Being and Unity are One, but in a radically different “One” than that of Parmenides. Aristotle’s continuum encompasses not only the

phenomenal magnitudes, but also the limits of time and place; not only the discrete in mathematics, but the infinite “unlimited” universe as a sphere. And, in the end, there is no end, for unlike Parmenides, the cycle of generation and corruption is infinitely never-ending continuity.

**Aristotle’s Predecessors**

Drawing a line in the continuum, in order to understand Aristotle regarding the fundamental issues of atoms, indivisibles, and infinity, a brief examination of those schools of thought which Aristotle himself inherited from antiquity is necessary. The writings of the predecessors of Aristotle\textsuperscript{205} in their original form are for the most part lost, and known to us only through secondary sources, the most prevalent of which is Aristotle himself. Of course, much of what is known from these thinkers are fragments, often from sources hostile to the arguments. Obviously the most important predecessor to the thought of Aristotle is Plato, which will be taken up within the larger argument upon examination of each issue directly pertaining to the philosophy of Plato. Firstly, the thought of Parmenides and his followers, as well as Heraclitus, is necessary in order to form a backdrop for the discussion at hand. Aristotle addresses and refutes - in primarily the *Physics*, *De Caelo*, and *On Generation and Corruption*, but also the *Metaphysics* - these three prominent positions from the Pre-Socratics: flux, monism, and multiplicity which is to say Heraclitus, Parmenides, and his eventual followers the Atomists, Democritus and Leucippus, as well as Zeno.

**The Problem of Flux in the Continuum**

The ancient Greeks, as indeed we still do today, observed the world about them and saw that everything was seemingly changing all the time. So what, if anything, is permanent? Heraclitus most notably was the philosopher of the flux, with a radical view of the world in a constant state of ephemeral mutability. Heraclitus (~500 B.C.) held

\textsuperscript{205} cf. Taylor, A.E.; *Aristotle on his Predecessors* (La Salle, Illinois: Open Court, 1969)p.29. “Perhaps the greatest of the many obligations which human thought owes to Aristotle and his school is that they were the first thinkers to realize at all adequately the importance of systematic historical research into the evolution of ideas and institutions.”
the position that to be is to change; any sort of observation of things as the same is a matter of consistency rather than of permanence. Although profoundly influential to this day, he was known as a hermit, with no direct followers, or school.\footnote{Kahn, Charles, H.; \textit{The Art and Thought of Heraclitus} (Cambridge: Cambridge UP, 1979)p.4ff. “The high point of Heraclitus’ philosophical influence was reached a generation later in the work of Zeno, the founder of the Stoic school in the early third century B.C., and in that of Zeno’s successor Cleanthes.” All the standard numbering of the fragments is from Diels, Hermann; \textit{Die Fragmente der Vorsokratiker}, 6\textsuperscript{th} ed. with W. Kranz (Berlin: 1951).} His most well-known fragment states: “Those who step into the same river have different waters flowing ever upon them”.\footnote{From the translation of Kathleen Freeman; \textit{Ancilla To the Pre-Socratic Philosophers} (Cambridge: Harvard UP, 1983)p.25. Fragment 12. (D.12, M.40a).} The more commonly known citation from Heraclitus, “One cannot step into the same river twice”, is attributed to Cratylus’ account in Plato’s \textit{Cratylus} 402a.\footnote{(D.91, M.40c) cf. Kahn; \textit{op cit}, p.168-9.} This fragment addresses the continual mutability of not only the river, but the man who steps into it. The fragment goes on to say: “...nor can one grasp any mortal substance in a stable condition, but it scatters and again gathers; it forms and dissolves, and approaches and departs”.\footnote{(D.91, M.40c) Plutarch \textit{De E apud Delphous} 392B quoted in Kahn; \textit{op cit}, p.53.} For Heraclitus, being is continuous change, in a state of perpetual flux. Nevertheless, the state of flux will not in turn imply randomness or inconsistency. In Fragment 59, he describes how things come together, form wholes and then return: “Couples are things whole and things not whole, what is drawn together and what is drawn asunder, the harmonious and the discordant. The one is made up of all things, and all things issue from the one”.\footnote{From the translation of Burnet, John; \textit{Early Greek Philosophy} (London: A.C. Black & Sons, Ltd., 1920)p.137. The word “couplings” (\textit{sullapsies} - syllapsies) is variously translated by Kahn as “graspings” but also goes on to bring out the meanings of grasping as “ascertaining”, bringing together, connections, assemblages, coming together. Kahn; \textit{op cit}, p.281-286.} Indeed, Heraclitus speaks of a “one” that makes up all things, from which all things come and to which all things return. This “one” is the primordial element of fire.

All things come from fire and are united in various combinations and aggregations, flowing and mutating, and then are
“measured out” into other forms of fire. Nevertheless, importantly, as Burnet points out, Heraclitus does not presuppose a mere “something from which opposites could be ‘separated out’, but something which of its own nature would pass into everything else, while everything else would pass in turn into it”\(^{211}\). Fundamentally, the element of fire for Heraclitus is radically different from both Aristotle’s *substrate*, and Plato’s *chora*. Furthermore, fire neither is born, nor dies. Only one element, fire, and one principle regulating the orderly universe (*logos*), the eternal structure of the world, exists as the “one”. Just as the sun is ever-lasting, says Heraclitus, “the sun is new everyday”\(^{212}\). In Fragment 16 he asks the question: “How will one hide from that which never sets?”\(^{213}\) Fire is both that which never changes – being neither born nor dying – and indeed, constant becoming. Change is not random, but ordered according to *logos*, all things happening in an appointed time by necessity.\(^{214}\) For Heraclitus, the underlying and embedded element of all things is fire, and in this sense he could be considered to be a monist. However, a monist in a radically different way to Parmenides: for Heraclitus “all things flow” (*panta rhei*); for Parmenides, “all things are one” (*hen panta einai*). Nevertheless, it must be remembered, that for Heraclitus the cosmos is ordered according to a “universal *logos*”, a governing principle, albeit a cosmos in unceasing flux.

**The Fullness of Being**

In radical contradistinction to the never-ending flux of Heraclitus’ cosmos, is the immutable, non-generative, incorruptible, and partless “Way of Truth” of Parmenides (5th century B.C.). Any appearance of multiplicity and movement is just that – appearance and illusion. Parmenides writes in his philosophical poem to his pupil Zeno, an allegory of an itinerant philosopher on the path of true inquiry. Travelling upon a cart lead by the immortal goddesses, the philosopher

\(^{211}\) Burnet; *op cit*, p.145.


\(^{214}\) (D.A5) Simplicius, in *Physiconum* 23, 38. quoted in Kahn; *op cit*, p.49.
approaches two great gates. The goddess explains that there are two paths of inquiry: one is the way of belief; the other is the way of truth. The way of belief is guided by the common opinions of men, unreliable and untrustworthy as a possible access to the truth. Indeed, all phenomena are unreliable as a way to truth. All sensory perception is seen to be contradictory and variable, while all true being is unchangeable, permanent, motionless, and homogeneous.

Rather, *logos* is the only true path.\(^{215}\) All things that exist either are, or they are not. “All that is, together forms the being.”\(^{216}\) (\(\varepsilon\sigma\tau\iota\nu \; \eta \; \sigma\omicron\upsilon\kappa\; \varepsilon\sigma\tau\iota\nu\)) writes Parmenides. Nothing falls outside the realm of being; being is one, and being is all. Therefore, being is a unity that cannot be divided since it is all alike (\(\omicron\iota\delta\epsilon\; \delta\iota\alpha\iota\rho\iota\epsilon\tau\omicron\nu\; \varepsilon\sigma\tau\iota\nu\; \epsilon\pi\epsilon\iota\; \pi\alpha\nu\; \varepsilon\sigma\tau\iota\nu\; \omicron\mu\; \iota\omicron\omicron\)).\(^{217}\) Multiplicity is merely an illusion of phenomena, that is to say, mere sense perception that is ephemeral. On the other hand, Being is in reality, “All” - indivisible and homogeneous. Only Being exists.

The only other alternative, Not-being,\(^{218}\) (\(\tau\omicron\omicron\; \omicron\omicron\epsilon\omicron\nu\omicron\omicron\\OMICRON\omicron\omicron\)) is unthinkable. “What can be thought is only the thought that ‘it is’ (\(\tau\omicron\omicron\; \omicron\omicron\epsilon\omicron\nu\omicron\omicron\))”.\(^{219}\) In other words, that which is not cannot be thought on principle, so Not-

\(^{215}\) Yet, we must not presuppose that the *logos* of Parmenides is the same sort of *logos* in the sense that Heraclitus uses the term. For Heraclitus, *logos* is that which is “common”. Burnet points out that in Parmenides, this use of *logos* “is the earliest instance of \(\lambda\omicron\omicron\gamma\omicron\omicron\) in the sense of (dialectical) argument which Socrates made familiar.” cf. Burnet; \(\textit{op cit}\), p.173 note 1, and p.133 note 1: *logos* “neither means a discourse addressed to Heraclitus nor yet ‘reason’.”

\(^{216}\) Translation from Freeman; \(\textit{op cit}\), p.44. (Fragment 7-8). Or Kahn: “it is all full of what is.” Or Burnet, “all is full of Being”.

\(^{217}\) Fragment 8, l.22, Simplicius \textit{On Physics} 145, 23 from fragment 347-8 in Kirk, G.S. and Raven, J.E.; \textit{The PreSocratic Philosophers} (Cambridge: Cambridge UP, 1964)p.275. “Nor is it divisible, since it is all alike; nor is there more here and less there, which would prevent it from cleaving together, but it is all full of what is. So it is all continuous; for what is clings close to what is.”

\(^{218}\) Not-Being is variously translated as “nothing”, “nothingness”, or “non-being”. I prefer “Not-being” (\(\text{to me on}\)) because it is conforming to the Greek form in this text for being (\(\text{to on}\)). Furthermore, Burnet reminds us that, in fact, \(\tau\omicron\omicron\; \omicron\omicron\epsilon\omicron\nu\omicron\omicron\\OMICRON\omicron\omicron\) “must not be translated simply as ‘Being’, \(\text{das Sein}\) or \(\text{l’être}\). It is [rather], ‘what is’, \(\text{das Seiende, ce qui est}\). As to (\(\tau\omicron\omicron\)) \(\epsilon\iota\nu\nu\iota\) it does not occur, and hardly could occur at this date.” cf. Burnet; \(\textit{op cit}\), p.178 note 4.

\(^{219}\) Fragment 8, 1.34 from Simplicius \textit{On Physics} 146,7 quoted in Kirk and Raven; \textit{ibid}. p.277.
being is untenable, neither “expressible nor thinkable”, for indeed nothing can come from what is non-existent. “All is full of Being”, neither coming-to-be nor passing-away; consequently, there is no true reality involved in phenomena - change, movement, generation and corruption, place, or time being mere illusion. Furthermore, since being is one, being is indivisible, homogeneous: “there is no room for anything but itself”. Being is continuous, permitting none other. Obviously, the Parmenidean account of “one” being, is being of one continuous piece, immovable, eternal and without end. Nothing exists outside of being. Nevertheless, in so completely making the true reality full of being, Parmenides fully denies change and movement as mere illusion. Most importantly, Parmenides couples thought itself with being. To think upon the way of truth, is to be.221

The Atomist’s Defense of the Parmenidean One

Yet one must admit, the very strength of the way of truth in Parmenides, “being is one”, opened him to criticism. His contemporaries still wanted an account of motion and change in the phenomenal world, and Parmenides’ dismissal of phenomena as mere “illusion”, and “Not-being” did not satisfy his critics. His loyal pupils, consequently, came to his defense. These attempts took two primary forms: the Atomists and the paradoxes of Zeno.

Responding to the criticisms of Parmenides, Democritus (~460 B.C.) became one of the first Greek thinkers on the concept of the indivisible, the atom. Democritus’ beginning point was the Parmenidean denial of multiplicity and change in being.222 His older associate Leucippus had personally fraternized with Parmenides,
and both were intent upon following his metaphysics. Yet, he sought to explain the phenomena of change and motion. In doing so, Democritus maintained that “Being is One”, yet that “One” would be composed of a number of beings, each of which was in turn, indeed, unchangeable and indivisible. The name he gave to these various beings was the indivisible, or “uncuttable”, i.e. atoms. In addition, the other most important variation on Parmenidean metaphysics proposed by the Atomists, was the idea that both Being and Not-being existed. Parmenides had ontologically rejected the possibility of Not-being, but Democritus proposed a specific kind of Not-being, that is to say, a void not occupied by Being. From fragment 9: “…atoms and void (alone) exist in reality…we know no thing accurately in reality but only as it changes according to the bodily condition and the constitution of those things that flow upon (the body) and impinge upon it”.\(^{223}\) Obviously, for change to occur, beings must change location. For this motion to be possible, a void in the fullness of Being had to be present in order for beings to move into it and/or through it. Democritus preserved the unchangeable nature of Being in the Parmenidean account, but Being was now made up of smaller “beings”. Change was explained as the aggregation or segregation of these atoms causing generation and destruction. Alteration was merely the change in position or arrangement, not a substantial change in “Being”, which remained unchangeable, inviolate, and indivisible.\(^{224}\) Being remained “one kind”.

With this account of Being, the Democritean form of Atomism could be taken up to explain movement in four respects. Firstly, an atom as an indivisible, is a unity that is a whole; that is to say, atoms are simple substances from which all other bodies were composites. Secondly, atoms can be neither created nor destroyed, thus maintaining the Parmenidean premise that nothing can come from Not-being. Thirdly, as an indestructible, the atom is what remained

\(^{223}\) From the translation of Fragment 9, Freeman; \textit{op cit}, p.93.

constant through change, as permanent and solid (i.e., containing no void places). Fourthly, an atom as the uncuttable, maintains the Parmenidean principle of the “One” because infinite divisibility eventually leads to a state where the entity looses not only its quantity, but also its properties. As such, the infinitely divisible becomes “nothing”, thereby violating the principle of “Being is One”.

Nevertheless, this explanation of change can be seen to be a serious violence to Parmenidean metaphysics. Parmenides states that “Being is One”; yet, Democritus is committed to a Being as an aggregation of “beings” that he calls atoms. Parmenides states that “All is full of Being”; yet Democritus postulates a kind of Not-being, the void, where atoms aggregate in order to explain the possibility of movement, change, and variation in phenomena. These smaller units of atoms in the void also lead to a problem of cohesion. For Parmenides, Being is continuous - “Being is close to Being” with nothing coming in between Being, everything held by the “bonds of Necessity”. With the smaller atomistic units of Being, on the other hand, the explanation of the bonds necessary to hold together the aggregation will leave a point of vulnerability that Aristotle will exploit in his criticism and eventual rejection of Atomism.

Notably, the Atomists preserve the same characteristics of atoms that exist in the Parmenidean “Being”: atoms are indivisible, solid, and homogeneous. The atoms form aggregates of material being by colliding, and either repelling each other, or “intertwining” to form complex bodies. The atoms differ only in size and shape - not in substance. Variation in phenomena occurs simply through the movement, arrangement, and position of these atoms. In this way, the Atomists are able to preserve the homogeneous, unchangeable Being of Parmenides whilst also accounting for change and variation. The atoms are indivisible yet are infinitely varied in shapes and size. The specific round-shaped atoms constitute the soul-atoms, which are distributed throughout a human body, yet concentrate in aggregates in the mind.

Yet most importantly, for Democritus, the Parmenidean notions of the immutability of Being and the essence of Being remain
intact. In following Parmenides so closely, Democritus constitutes his atoms as part and parcel of the “One” Being. Being was still One, but it was a “One” that is a collection of smaller “ones”, made up of atomic beings. As such, the atom of Democritus is also an ontological principle attempting to explain change and plurality in phenomena. Nevertheless, it must be remembered that even in atomic aggregates that come together and eventually disperse to go on to form other aggregates, the atoms always retain their indivisible, immutable being and individuality. Atoms and the void are an alternative account for the Parmenidean One being that provides an explanation of change in phenomena.

Aristotle’s Critique of Parmenides

One of the main aspects of Parmenides’ argument of “All that is, is one Being”, is the fact that you could never, in fact, prove that Not-Being exists. Not-Being is per definition unknowable and one of Aristotle’s main objections to Parmenides, in postulating “Being is One”, is that he took Being only in one sense.225 Being can have many senses: substance, quantity, quality, or other categories.226 Just as Being has many senses, Aristotle says, so did Not-Being.227 Aristotle argues that even to say, “Being is One”, the is that is not, albeit indeterminate, can conceivably still be something. This Not-Being can be a mere potentiality of Being, or a category of opposition to Being itself. In short, even Not-Being could be a particular thing. In Physics 187a7-10 Aristotle writes: “there is no reason why [not-being], even if it cannot be without qualification, should not be something or other [for]...who understands ‘being itself’ otherwise than as being some particular thing?”228 Mary Louise Gill explains:

225 cf. primarily Metaphysics 1089a1-1090a2 and Physics 185a20-187a12.
226 cf. especially the Categories. Also Metaphysics 1089a7. See also Sophistical Refutations 182b24-32; “…for some think that Being and One mean the same; while others solve the arguments of Zeno and Parmenides by asserting that one and being are used in a number of ways…”.
227 Metaphysics 1089a16.
Parmenides denied the possibility of change because, on his view, for coming-to-be to occur, something must come to be from nothing. Aristotle agrees with his predecessor in excluding such absolute emergence, yet accommodates change by insisting that coming-to-be, although involving replacement, also involves continuity.\textsuperscript{229}

As argued in \textit{On Generation and Corruption}, Aristotle explains that the coming-to-be of something must be generated from something in a continuous cyclical process. The most important argument against Parmenides notion of the “One”, is not in fact against motion as such; rather, the metaphysical necessity for continuity.

In addition, Aristotle argues, there are many ways for the One to manifest.\textsuperscript{230} All is not similar everywhere; Being manifests in a multiplicity of ways, although in turn, each of the many can itself be a “One”,\textsuperscript{231} a unity. Sharing the same “One”, Being is common to all. In addition, Being can be thought of as the underlying foundation of both the One and the Many.\textsuperscript{232} The many can be called “One” when related to the same thing, that is to say, Being,\textsuperscript{233} or to one source.\textsuperscript{234} There are, subsequently, many ways to be “One”: each individual may be a “One”; Being can be the commonality between all the “Ones”, or Being can be said in many senses.

However, Parmenides obviously means that Being and One are essentially the same. Yet Aristotle found the “One” to be highly

\textsuperscript{229} Gill, Mary Louise; \textit{Aristotle on Substance: The Paradox of Unity} (Princeton: Princeton UP, 1989)p.7. Gill gives the references to \textit{Physics} 190a13-21; 190b9-17; 191a23-31; 191b13-17; \textit{OGC} 317b11-18.
\textsuperscript{230} cf. \textit{Metaphysics}, Book 5.6 for the various ways in which being is “one”.
\textsuperscript{231} \textit{Metaphysics} 1001b6-7.
\textsuperscript{232} \textit{Metaphysics} 1001a9, also \textit{Physics} 185a31-21: Two differing translations give a slightly different meaning to this passage due to the various determinations of \textit{hupokeimenon} as subject, substance, and substrate. “For none of the others can exist independently except substance; for everything is predicated of substance as subject.” trans. Barnes (Princeton: Princeton UP, 1995). OR, “Nothing can exist separately except reality; everything else is said of reality as underlying things.” trans. Charlton (Oxford: Clarendon Press, 1970).
\textsuperscript{233} \textit{Metaphysics} 1003a33-34.
\textsuperscript{234} \textit{Metaphysics} 1003b5-10.
ambiguous. So Aristotle asks, how can a thing be called “One”? And he outlines three possibilities. Firstly, a thing can be a continuum. For Aristotle, the continuous is divisible ad infinitum, so that an aggregate of atoms would not constitute a continuum, rather a mere collection of things. Secondly, an indivisible is “One” in that it is undivided and whole. Another possibility could be an indivisible of non-extended things, such as the Ideas; for example, “One” idea of justice. Thirdly, things can be “One” in analogy as in when we say “x” and “y” are “one and the same”, or most importantly for Parmenides, when “One” and “Being” are having the same sense, and are in essence identical. So for Parmenides, if “All is One”, all that is participates in Being. However, this is not a sufficient premise for Aristotle. The conclusion that there existed only one thing, or existed in a singular manner, or existed for only one reason, does not necessarily follow. There is no reason why saying “Being is One” would not necessarily allow a multiplicity of beings said in many ways. “Being itself is unity itself”, Aristotle said in *Metaphysics* III, 1001a.

After these metaphysical refutations, Aristotle ultimately asserts the futility of arguing with Parmenides with regard to Physics, which is by definition the study of the principles, causes and elements of the Many, not the “One”. Indeed, “...to investigate whether what exists is “One” and motionless [as Parmenides asserted] is not a contribution to the science of nature”. Not only do physical things quite simply change, but also to say, “All is One” would imply a single material principle underlying physical phenomena. Aristotle accuses Parmenides of removing “generation and destruction from the world altogether. Nothing that is they said, is generated or destroyed, and our conviction to the contrary is illusion”. In the *Physics*, he sets out the two possibilities implied in Parmenides position: a thing is generated

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235 *Physics* i.1 and i.2.
236 *Physics* 185a21-22.
237 *Physics* 185b6-25.
238 *Physics* 186a32-186b5.
239 *Physics* 184b27-185a1.
240 De Caelo 298b14-16.
241 *Physics* 191a25-34.
either from Being or Not-Being. Nothing could come directly from Being, Aristotle said, because it already exists. Obviously, nothing could come from Not-Being for there is nothing present in Not-Being that could come-to-be.\(^{242}\) Parmenides concludes, inaccurately according to Aristotle, that therefore only a “One” is possible, denying multiplicity, and rendering generation and change unthinkable. Although appealing in its sheer simplicity, Parmenides’ way of truth: “All is One”, proves to be untenable to Aristotle.

**Aristotle’s Account of Change in the Continuum**

Although Aristotle rejects the Parmenidean argument “All is One” permitting no change, he must, in turn, give an account of diversity and change in phenomena, explaining the causes of this coming-to-be and passing-away, and that which underlies these changes. Aristotle’s criticism of his predecessors centers around two issues: the nature of the substrate or possible fundamental elements as a source of generation, and the fact that each of his predecessors in their own way had defined generation and change too narrowly, or not at all.\(^{243}\) For Aristotle, “there are six kinds of change: generation, destruction,

\(^{242}\) *Physics* 191b13-14: “We hold that nothing can be said *simpliciter* [a particular something] to come to be from what is not. Yet we do maintain that a thing may come to be from what is not in a qualified sense...For it comes to be from the privation - which is in itself not-being - which is not there.” Translation Algra; *op cit*, pp.110-116. And *Physics* 192a25-34 (for a discussion of sterésis). Also, C.J.F. Williams in his Introduction to Aristotle’s *De Generatione et Corruptione* (Oxford: Clarendon, 1982)pp.xxiv, provides an extensive etymological discussion of Aristotle’s term (ἀπλῶς) haplōs, *simpliciter*. These terms circulate around the fine distinctions between “being something” and “having become some particular thing”. In OGC 317b16-18, Aristotle differentiates: “In one way things come-to-be out of that which has no unqualified being (ἐκ με οντος haplōs) in another way they always come-to-be out of what is (ἐκ οντος); for there must be a pre-existence of that which potentially is, but actually is not, in being, and this is described in both ways.” Translation from Randall, John Herman Jr.; *Aristotle* (New York: Columbia UP, 1960)p.211: “The question remains, is there any genesis haplōs, simply or unqualifiedly, or is genesis always a coming to be ‘something’ out of ‘something’ (ἐκ τινος καί τι)? For sheer genesis, sheer coming-into-being out of non-being (ἐκ με οντος), and that would seem to make ‘non-being’ a something out of which things could come-to-be.”

\(^{243}\) *Physics* 191a25-35. Aristotle states that the first philosophers were mislead by their inexperience, or understood the problem inadequately as in *Physics* 191b35.
increase, diminution, alteration, and locomotion”. These changes are arranged into four groups: substantial change (genesis/phthora), quantitative change (auxesis/phthisis), qualitative change (alloiôsis), and localized motion or change of place (phora/kinesis). Every change, with the exception of locomotion, is a substantial change, the actualization of a potential. Only generation and corruption are substantial changes; that is to say, a change from “this” into “that”.

Because the Physics has phenomena as its object of study, the entirety of this text can be thought of as an interrogation into change in itself: change in substance, location, or qualities. The Physics, Aristotle states, is the study of beings in motion and change, that which is, and becomes, that which is non-existent coming-into-being and then passing away. In Physics II, Aristotle even defines physis as precisely the impulse to motion or the arché of change. Aristotle searches for first principles, so that, for example, if one asks about movement, then in turn one must ask the nature of place since movement is through place, and of time since this change happens in time. In interrogating first principles, archai, an investigation into the constituent parts or elements becomes also necessary. And finally in Book VIII of the Physics, as well as in On Generation and Corruption, Aristotle asks about the cause of all change, identifying two causes: either an impulse or beginning of motion, or a material cause. Aristotle proposes a scheme of “matter” (hule) and the “form” of being (eidos) coming together from potentiality (dunamis) into actuality (energeia) in order to account for phenomenal change.

Generation and corruption involve a substantial change from the potential to the actual; whereas displacement is motion caused from

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244 Categories 15a14-15. Elsewhere in Physics III.i, he classes four different kinds of change: quantity, quality, substance and place. See also, OGC 317b7-10.

245 OGC 317a21-22.

246 OGC 317b33-318a2.

247 cf. Metaphysics 1045b16-23: “But as has been said, the proximate matter and the form are one the same thing, the one potentially, the other actually. Therefore to ask the cause of their being one is like asking the cause of unity in general; for each thing is a unity, and the potential and the actual are somehow one. Therefore, there is no other cause here unless there is something which caused the movement from potentiality into actuality. And all things which have no matter are without qualification essentially unities.”

248 OGC 318a25-318b33.

249 OGC 320a12-17.
without (the mover and the moved),\textsuperscript{250} involving a change in location or place. Aristotle accuses the Atomists of confusing these categories of change: the accidental and the substantial.\textsuperscript{251} For the Atomists, all change is attributed to mere aggregation/segregation, the dynamic assembling of different configurations of the atomic magnitudes.\textsuperscript{252} These subsequent “figures” (\textit{eidos}) would be as a result infinite in number, accounting for variety in phenomena.\textsuperscript{253} Democritus and Leucippus explain generation and destruction through mechanical, not substantial means. Yet this account is insufficient for Aristotle.

Although the term \textit{alloiôsis} is often translated into English as “change” or “alteration”, Aristotle makes a distinction between his predecessors and himself regarding generation. In the position of the material monists, the elemental (\textit{stoicheion}) is a kind of original mix that changes or alters (\textit{alloiôsis}) into another form. As Jacques Brunschwig explains: “As is well known, Aristotle defines \textit{alloiôsis} (\textit{alloios}) as a special case of non-substantial change (of \textit{gênesis} as opposed to \textit{gênesis}); namely, \textit{qualitative} change, as distinct from quantitative change (growth and diminution) and local change (motion in place)”.\textsuperscript{254}

Yet, what “is it” that changes exactly? In \textit{On Generation and Corruption}, as usual Aristotle sets out the position of his adversaries in order to critique it. On one the hand, his predecessors would explain change as \textit{alloiôsis}, the quantitative or qualitative alteration of material elements (\textit{stoicheia}) that change formally. Aristotle, argues on the other hand, the most crucial change that needs explanation is the substantial, giving an account of a substratum (\textit{tò òpoei'menon}) as formless underlying which must become an actuality through the process of generation.

\textsuperscript{250} cf. Randall; \textit{op cit}, p.190-1. Randall is careful to point out the peculiarities of Aristotle’s terminology, and the structure of the Greek language. “The first point”, he explains, “is that in Greek one does not say, a thing ‘moves’, rather one says the thing ‘is moved’...The second point is Aristotle’s usage as to the locus of motion and the action of the mover...it is fundamental for Aristotle that the motion is in the thing moved, the action has its locus in the thing acted upon. The motion is the actualization of the thing moved (\textit{to kineton}) under the influence of the mover (\textit{hypo tou kinetikou}).”

\textsuperscript{251} OGC 317a1-32.

\textsuperscript{252} OGC 315b5-24.

\textsuperscript{253} OGC 315b9-11.

\textsuperscript{254} Brunschwig, Jacques; “GC I.1: A False Start?” in de Haas and Mansfeld; \textit{op cit}, p.32.
The term that is used by his predecessors is “element” _stoicheia_, not _hule_ (material/literally “wood”) as with Aristotle. In contrast, for Aristotle the material, _hule_, cannot in fact exist apart from “form”, _eidos_. Although Aristotle was anxious to set his own position apart from that of his predecessors, Aristotle was quite firm in rejecting any account other than a substrate that then would come-into-being.

Aristotle asks: “Further, why should there always be becoming, and what is the cause of becoming? – this no one tells us”.255 Basically, there are four possibilities: genesis is from Not-Being (ἐκ μὴ ὄν); genesis is from what exists, Being (ἐκ τὸ ὄν); genesis is from some kind of lack or privation, _sterēsis_ (στερήσις);256 or, genesis from a potentiality (δυνάμις) actualizing into phenomena.257 The Parmenidean premise, “All is One” also means that every alteration or change remains outside of the realm of possibility. Although they correctly argued that something cannot in principle come from nothing, nor can something come-to-be from some “thing” for this would entail it remaining the same, their conclusion in rejecting multiplicity and change in phenomena is false according to Aristotle. Both possibilities seem impossible.258

What might be the cause of this coming-to-be and passing-away, and from what does it spring? In _On Generation and Corruption_ I.8, Aristotle rehearses the possibility of genesis from a material cause, that nonetheless is engaging in a never-ending and never-failing cycle of becoming from Being to Not-Being, and then back again to Being. Aristotle explains that the coming-to-be of something must be generated from something in a continuous cyclical process, where corruption or degeneration are seen as merely a substantial

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255 _Metaphysics_ 1075b17-18.
256 _Physics_ 191b13ff. _sterēsis_ as a term is also used in _Physics_ 215a11 to mean “undifferentiated, limitless, void” and in _Physics_ 192a3 and 192a25-43 to mean a shortage or “privation” of matter, and in _Physics_ 201a5 to mean form or lack of form, which is not to say an opposition or contrast between these two terms. In these contexts, _sterēsis_ pertains to that particular kind of change, the fourth kind, locomotion, and not generation and corruption, or substantial change as we are discussing here.
258 _Physics_ 191a25-34.
state where some particular being cannot be actualized as itself.  

Obviously, when generated beings come-into-being and pass-away, they do not pass away into nothing. This source of becoming would have long ago been exhausted, if it did not participate in the never-failing cycle of generation and corruption. Aristotle dismisses the only other possibility; namely, that the source of becoming is infinite on the grounds that “nothing is actually infinite but only potentially so for the purpose of division, so that there would have to be only one kind of coming-to-be, namely one which never fails...”. Although the cycle of generation and corruption is infinitely never-ending and unceasing, the substrate from which generated beings come into actuality is not infinite. Algra explicates:

...the paradox of genesis continuing while things perish into not-being ceases to exist [when seen as a cycle of generation and corruption]. The amount of coming to be from not-being will always match the amount of perishing into not-being (on any interpretation of not-being, i.e. whether not-being is taken to be a hupokeimenon or not). So it is understandable after all that coming to be never fails.

In On Generation and Corruption, Aristotle permits Not-Being (τὸ μὴ ὄν) as part of the cyclical continuum infinitely proceeding from Being to Not-Being and back again in a process of existents coming-into-being from potentiality into actuality. Either Not-Being can be seen as potential Being, as is popularly believed, where “the coming-to-be of one thing is always a passing-away of another, and the passing-away of one thing is always another’s coming-to-be”, or as an absolute Not-being from which some particular thing comes-to-be out of nothing, and consequently returns to Not-Being. However, for Aristotle, in contrast, all coming-to-be involves the generation of substance out of non-substance, that is to say, “unqualified” absolute non-being simpliciter, ἐκ μὴ ὄντος ἀπλῶς, Aristotle makes a “distinction

259 OGC 318a13-25.
261 Algra; op cit, p.109.
262 OGC 319a20.
263 OGC 317b7-8. By “unqualified” he means the primary within each category or the universal.
between existing as a potentiality and existing as an actuality". Particular things might come-to-be out of either “unqualified” Being or out of “what is”, for in one way or another a potentiality must exist in order to bring about generated beings into actuality. This account of genesis implies that substantial change comes-to-be out of a kind of substance, and thus is never in fact an absolute genesis from nothing, but a constant potentiality of coming-into-being of some actualized phenomena. Aristotle sums up his position by saying: “nevertheless, coming-to-be simpliciter, i.e. absolutely, is not defined by aggregation and segregation, as some say; nor is change in what is continuous the same as alteration...Coming-to-be and ceasing-to-be simpliciter occur... when something changes from ‘this’ to ‘that’ as a whole”.

Subsequently, two primary questions are addressed in these manuscripts: what is the nature of change, and what is the substance of that change. For Aristotle, the material substratum ὑλὴ τὸ ὑποκείμενον (hulé to hupokeimenon) is the cause of why coming-to-be is a continuous process. Exactly what the substratum is, in Aristotelian scholarship, is still open to many interpretations. Algra states: “After all, today the politically correct view appears to be that there is no such thing as prime matter in Aristotle at all, and that this is in fact how it should be, the notion itself being basically un-Aristotelian, or even intrinsically incoherent”. Indeed, attributions of “prima materia” are from two primary sources: the Neo-Platonist Philoponus in the 6th century A.D., and the medieval Scholastic Thomas Aquinas.

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264 Physics 191b27-29.
265 OGC 317b15-25.
266 OGC 317a17-24.
267 OGC 319a17-22.
269 Algra; op cit, p.91ff. Algra explicates the material substrate ὑλὴ τὸ ὑποκείμενον (hulé to hupokeimenon) as ground for the “that which becomes something”, (ἀπλῶς, haplós), most frequently translated in the scholarship as simpliciter. Furthermore, “not-being simpliciter” (τὸ ἀπλῶς μὴ ὑπερείμενον) would mean a “universal denial of everything, so that that which comes-to-be must come-to-be from nothing.”(OGC 317b12). This denial is obviously not Aristotle’s position.
Nevertheless, Algra offers a more subtle account of On Generation and Corruption I.3, arguing that in fact Aristotle does not need “prime matter” in order to render his argument of substantial change comprehensible. Furthermore, the use of the term “prime matter” or “prima materia” by both philologists and historians of philosophy is more than misleading.\(^\text{271}\) When Aristotle speaks of proto-hule, this term is used specifically with regard to an interpretation of Plato’s concept of the chora in the Timaeus.\(^\text{272}\) And, as argued in the previous chapter, this interpretation is an altogether too materialist interpretation.\(^\text{273}\)

The substratum, then, the hulé to hupokeimenon in On Generation and Corruption, is not a perfectly transparent concept.\(^\text{274}\) Yet clearly Aristotle is in radical contrast to both the materialism of the Atomists, as well as the pluralism of Anaxagoras and Empedocles.\(^\text{275}\) The substratum is not matter, not elemental, and non-sensible. The

\(^{271}\) For comprehensive accounts of the present state of affairs regarding the meaning of “prime matter” in contemporary scholarship, see: Gill; op cit, pp.243-252. And Williams; op cit, pp.211-219 for the various interpretations specific to On Generation and Corruption.

\(^{272}\) OGC 329a15-24. cf. Broadie, Sarah; “GC I.4: Distinguishing Alteration” in de Haas and Mansfeld; op cit, p.137, note 49. Nonetheless, Williams; op cit, pp.211-219, gives a detailed list of various passages of the OGC which would lead one to interpret matter as either a material element, or as a purely non-perceptible, non-sensible underlying. Either interpretation, given the passages chosen for emphasis, is seemingly possible.

\(^{273}\) Algra points out the notable difference, however, between the to en hôi, the “that-in-which” of Plato in comparison to the ex hou, the “that-out-of-which” or “that-from-which” of Aristotle. Algra; op cit, p.92


\(^{275}\) cf. Metaphysics 1029a26-30. “For those who adopt this point of view [that substance is predicated of matter], then, it follows that matter is substance. But this is impossible; for both separability and individuality are thought to belong chiefly to substance. And so form and the compound of form and matter would be thought to be substance, rather than matter. The substance compounded of both, i.e. of matter and shape may
substratum, the hupokeimenon is the underlying, remaining the same, yet manifesting as always different beings, imperishable, and indeed not itself coming-to-be and passing-away. Aristotle writes of his predecessors: “For their substratum at any particular moment is the same, but their being is not the same”. The substratum is potentiality. The substratum is not the one being from which all other elements are constituted, rather, the cause of generation.

Yet just as we seem to understand the hulé to hupokeimenon as non-sensible, Aristotle writes:

Matter (ōlη), in the most proper sense of the term, is to be identified with the substratum (tò ὀποκείμενον) which is receptive of coming-to-be (γενέσεως) and passing-away (φθοράς); but the substratum of the remaining kinds of change is also, in a certain sense, matter, because all these substrata are receptive of contrarieties of some kind.

This passage certainly gives an impression of the hupokeimenon as a material substrate receptive of genesis that is similar to Plato’s account of the chora. The substratum receives and excepts all the

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276 OGC 319b4-5. And Physics 192a31-32.
277 cf. e.g. Lang, Helen S.; The Order of Nature in Aristotle’s Physics: Place and the Elements (Cambridge: Cambridge UP, 1998) pp. 50-54. In a section entitled, “Nature as Form or Matter”, Lang attempts to lay out the problem of interpretation of matter in Aristotle. Although Aristotle unequivocally states the form and matter are inseparable by nature, Lang argues that understanding form and matter independently of Aristotle’s account of motion is untenable, which is to say, independent of the other components in the account: form/matter move from the potential into the actual. “Matter is potential and is moved by form because it is actively oriented toward its proper form.” (p. 53). To interpret hule as some sort of original element that is shaped, substantially unchanged, is to give Aristotle a materialist coloring. Nature is neither form nor matter, but precisely the substratum actively moving from potentiality to actuality. Lang cites Aristotle’s Physics 194b8-9: “Matter is among things which are in relation to some thing; for there is a different matter for different form.”
278 OGC 320a2-4. Matter and form are inseparable. cf. OGC 329a24-30.
279 Cleary, John J.; Aristotle and Mathematics: Aporetic Method in Cosmology and Metaphysics (Leiden: Brill, 1995) p. 109, and p. 121. “It is noteworthy that Aristotle does not... posit some ‘prime matter’ from which the elements might be generated, as a substitute for the Receptacle in the Timaeus.” (p. 109). Cleary goes on to say that Aristotle in On Generation
contrarieties, that is to say all the oppositional pairs of elements postulated by Aristotle’s predecessors, both the material monists and the pluralists, as well as the oppositions of form/non-form, being/non-being. More importantly, this statement comes at the conclusion of the long discourse on the two central questions: what is the nature of change, and what is the substance of that change. Aristotle then writes: “Let this, then, be our definitive position on the question of genesis, does it exist or not, and if so, how does it exist and how does it differ from mere ‘alteration’?” Consequently, this statement on “matter is substratum” carries more import since it comes at the final determination of this long discourse. Yet, how should we interpret this seemingly contradictory sentence?

Sarah Broadie explains: “On the traditional view, Aristotle presents us with three *hupokeimena* in substantial change; the imperceptible one that remains throughout, and those that respectively perish, and [those that] come to be. In relation to what, then, are these latter two, the perceptible ones, *hupokeimena*? To non-substantial attributes and non-substantial changes actual or potential, of course”.

*and Corruption* I.7 “refers to the Receptacle (τὸ παντὸς) in the *Timaeus*, as if to say that even Plato himself recognized the true character of a material substratum, in spite of his mistaken theory of the elements. In every case, he argues, the substratum ought to be without form or shape (ἄειδες καὶ ἄμορφον) like the Receptacle, especially if it is to be similarly capable of being ordered.” (p.121).

Charleton in his commentary of Aristotle’s Physics I, and II; *op cit*, p.81-84, also suggests that Aristotle’s “coming-to-be from what is not”, specifically “lack” (*sterésis*), is closely identified conceptually with the *chora* as receptacle in 191a36-192a2. Yet this interpretation of Plato’s *chora* as “lack” or the “non-being” is as much of an error as attribution to prime matter. The Platonic Forms could precisely be seen as the “father”, the fullness of Being whilst the *chora* is the mother that gives birth to the generated becomings. Charleton notes: “Aristotle’s account of Plato’s position in this chapter has been severely criticised by Cherniss (pp. 84-6 and elsewhere; see also Ross, p. 566), who holds that Timaean space is a receptacle, not a material substratum, and that Aristotle has simply foisted his own conception of prime matter on to Plato.” (p.84). Of course, Charleton himself will deny that Aristotle even had a conception of prime matter. (*cf*. Appendix to Aristotle’s Physics I, and II; *op cit*, p.129-145.) and *cf.* Cherniss, H.F.; *Aristotle’s Criticism of Plato and the Academy* (Baltimore: Johns Hopkins UP, 1944).

OGC 320a6-8. Elsewhere “definitive position” is translated by “distinctions made” (Ross) or “our way of deciding the questions” (Williams).

Broadie; *op cit*, p.125.
In fact, to speak of the *hupokeimenon* as perceptible, would be to classify it with the type of change that Aristotle calls “alteration”, as opposed to substantial change, “genesis”. Seemingly, then, various interpretations are possible of the *hulé to hupokeimenon*. One is the never-changing, non-sensible *underlying* that is the first material cause of change. The other is the “never-failing” eternal cycle of coming-to-be and passing-away that Aristotle wrote about in 318a13-25. So, the phrase “receptive of contrarieties of some kind” could not only mean the contrary elements of fire and water, for example, but also the contraries of the very coming-to-be and passing-away of the material substrate.\(^{283}\) Nevertheless, a strong argument for the non-sensible or non-material interpretation of the *hupokeimenon* would be the explication in the *Metaphysics*\(^{284}\) where the *underlying* is classed with the substantial: essences, the universal, genus, and the *hupokeimenon*. Or, perhaps it is both. “It follows, then,” Aristotle argues, “that substance has two senses, (a) the ultimate substratum, which is no longer predicated of anything else, and (b) that which is a ‘this’ and separable – and of this nature is the shape or form of each thing”.\(^{285}\)

Yet in the senses of the *hupokeimenon* as that which receives, and that which is the material cause of *genesis* and *phthora*, or being

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\(^{283}\) OGC 329a29-31. cf. Charles, David; “Simple Genesis and Prime Matter” in de Haas and Mansfeld; *op cit*, p.158. “Aristotle...notes that what is capable of being a perceptual body will always exist with a contrary (329a25-6). So, he can now characterize prime matter in a more complex way as that which is capable of being a perceptual body of a given (elemental) type. Such matter (the abstract object) does not itself have any contrary as part of its nature, although it cannot exist without having some contrary or other...”. Also, Gill explicates: “So elemental matter is not an ingredient (or set of ingredients), and elemental form is not an organization of the ingredients. When Aristotle speaks of elemental ‘matter’ and ‘form’, he uses these notions simply to specify the item that plays the role of matter and the item that plays the role of form in an elemental transformation. Thus the item that persists through an elemental change can be called ‘matter’, and the item that results from the replacement can be called ‘form’. And so, on my account, one contrary (the *σύμβολον* that persists) can be called the ‘matter’ for the pair of contraries exchanged, and the contraries exchanged can be called ‘privation’ and ‘form’.” Gill; *op cit*, p.243.

\(^{284}\) *Metaphysics* 1028b33-5. “The word ‘substance’ is applied, if not in more senses, still at least to four main objects; for both the essence and the universal and the genus are thought to be the substance of each thing, and fourthly, the substratum.”

\(^{285}\) *Metaphysics* 1017b23-25.
potentially capable of coming-to-be and passing-away, his discussion of the other two factors in his matter-form/potentiality-actuality schema become critical; namely, the potentiality (\textit{dunamis}) of what is generated, and the actuality (\textit{energeia}) of sensible phenomena. The “actuality” is the fulfillment, and yet cannot be thought of separate from movement.\footnote{Metaphysics 1047a30. In \textit{The Order of Nature}, Lang privileges motion over the other types of change because her primary topic is place.} Potentiality, as capacity, is that which potentially is, yet has not yet come-to-be. This capacity is not to say that what is potentially capable of being does not exist, rather it does not exist actually. The potentiality (\textit{dunamis}) of what is generated is described in \textit{De Caelo} as “the single power which interpenetrates all things”, forcing agreement between disparate elements into the ordered cosmos.\footnote{De Caelo 396b29.} The potentiality (\textit{dunamis}) is the power or force that brings the phenomenal into actuality, into fulfillment.\footnote{cf. Metaphysics 1048b35-1049b1. For the many ways of thinking potentiality; namely, “... in the cases in which the source of the becoming is in the very thing which suffers change, all those things are said to be potentially something else, which will be it of themselves if nothing external hinders them.”(1049a12-14).}

Decisively, \textbf{Nature is becoming}. Indeed, Aristotle says that nature is synonymous with \textit{genesis}; in fact in Greek, the word nature is etymologically tied to the word \textit{γένεσις}.\footnote{Physics 193b12-15. See as well, the note from Wickstead and Cornford on page 114 of the Loeb edition of \textit{Physics} I-IV. In Charlton’s commentary on this passage in \textit{Aristotle’s Physics I, II; op cit}, p.91, he explains that “Aristotle offers an obscure argument based on the Greek word for nature, \textit{physis}. He might be taking it as a possible word for birth; it is so used by Empedocles, DK 31 B8. In that case his point is that \textit{physis} in the sense in which it is used for a process, i.e. in the sense of birth, is \textit{physis} of the form, e.g. a man, not of the matter e.g. menses. Alternatively, as most commentators suppose, he is making play with the fact that \textit{physis} comes from a verb which in the passive means ‘to be born’ or ‘to grow’ (cf. the Latin \textit{nature}). Suggesting, then, that \textit{physis} might be used as a process, sc. Growth (or perhaps simply – the text is ambiguous – for coming to be), he says that nature ought to be what this process is a process towards, not what it is a process from, and what it is a process towards is the form.”} Without having to precisely define the nature of the material, the substratum, holding the underlying as potentiality, the Aristotelian account focuses upon generation – upon the actualization of a potential, upon the \textit{physis} which is by nature altering, moving, and changing. The true path
to nature is through the study of coming-to-be, the process of how a potentiality becomes an actuality. Aristotle’s criticism of his predecessors revolves around two issues: what is the nature of the substrate, was it elemental material or indivisible units, potentiality or non-being? And furthermore, is change indeed defined all too narrowly, or as the case with Parmenides and his followers, not at all?

**Zeno’s Paradoxes on the Impossibility of Motion**

The specific account of change called locomotion, or displacement from one place to another, was most decidedly taken up by Zeno in his proofs on the impossibility of motion. Zeno, just as some of the Atomists, was a former pupil of Parmenides. In fact, the poem of Parmenides on the way of truth was written to Zeno. As a student of Parmenides, Zeno also held the proposition that “All is One”. He, like the Atomists, undertook a defense of Parmenides against the pluralists, yet he took a different approach in providing a proof of the One. His proofs were intended to show the inconsistencies in the argument and the illogic of the conclusions in the positions that held multiplicity to be the true reality, and the seeming impossibility of motion. Motion, and indeed change generally, was in the Parmenidean account, impossible. In order to defend his teacher, he cleverly provides proofs that paradoxically show the absurdities of the common sense position.

The first proofs deal with the composition of the continuum from an infinity of points. Either the continuum is composed of non-extended points that are non-material entities, or the continuum is composed of spatially extended units. Each line segment (interval) is a finite quantity, yet is made up of an infinity of points. Each line segment is infinitely divisible; between every point is an infinity of other points. Zeno argues that “the Many”, if having no size (non-extended points), then they cannot exist. On the other hand, if “the Many”

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290 Kirk and Raven; *op cit*, p.287. “The hypotheses to which he especially turned his destructive talents were two, namely plurality and motion, which were unquestioningly accepted by all except the Eleatics themselves; but for all that, his arguments may well have been aimed particularly at the Pythagoreans.”

291 cf. Freeman; *op cit*, p.47. from Zeno’s *Epicheiremata* (Arguments/Attacks) in the second half of the manuscript.
have a certain size, mass and distance from other parts, then when added together they become infinitely great and when subtracted they become “so small as to have no size”, therefore becoming nothing. As a result, Zeno is able to disprove the position of multiplicity by deriving two contradictory conclusions – plurality being both infinitely great as well as so small as to be nothing - from the same proposition.

Four paradoxes on motion from Zeno survive from antiquity, commonly known as the racetrack or stadium paradox, Achilles and the tortoise, the flying arrow, and the moving rows. Two main paradoxes concern us here, showing that the conclusions on the positions of multiplicity are contrary, both as infinite divisibility and as atomistic units, which is to say intervals of time or indivisible units of space. Zeno proposes the following “racetrack” paradox: a man attempts to transverse from point A to point B, but in doing so, he must first go half way. Yet before he gets to half way, he must go half way to that point, and then half way again, ad infinitum. With each step, he is only ever able to go half way. In the end, he never is able to arrive at point B because the path on which he must walk is composed of an infinitely divisible space that must be transversed in a finite period of time. With each finite step, the man must paradoxically span infinity. Therefore, we are forced to conclude that motion is impossible. The paradox of the walking man shows the logical inconsistency of infinite divisibility of space.

Secondly, in order to critique the atomistic approach to place and time, Zeno proposes the paradox of the arrow shot into the air. If space is composed of indivisible segments, and time is composed of autonomous instants (time-atoms), then the arrow’s trajectory would

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293 A simpler version of the famous tortoise and the hare paradox. cf. Lee; op cit. p.45-49. Citing the following sources: Aristotle Physics 239b14 and 263a5; Simplicius, 1013.4 ad 239b10 and 1289.5 ad 263a5; Philoponus, 802.31 ad 233a21; Themistius, 186.30 ad 233a21; and finally Aristotle On Indivisible Lines 968a18.

294 cf. Lee; op cit. p.53-55. Citing the following sources: Aristotle Physics 239b5 and 239 b30; Simplicius 1015.19 ad 239b30 and 1011.19 ad 239b5 and 1034.4; Philoponus, 816.30 ad 239b5; and Themistius, 199.4 ad 239b1.
be a succession of discrete positions displacing sequentially over time. Yet the paradox shows that the arrow initially at position A and then at position B, then at position C, etc. would find the arrow occupying a position equal to its length before taking up the following position. Therefore, the arrow doesn’t really continuously move at all, but is constantly at rest in a succession of positions of atomistic space and time. Again we are forced to conclude that motion is impossible. Zeno is able to prove with his paradoxes the absurdity of space and time composed either of infinite divisibility or atomistic segments. In doing so, he reinforces the thesis of Parmenides that “All is One” through the backward proofs of showing the contradictions implied in the propositions of atomistic units or parts in phenomena. In the end, Zeno concludes that motion is impossible, not by denying phenomena, but by deducing contrary conclusions from the arguments of the adversaries of Parmenides. For Zeno, as for his teacher Parmenides: Being is One, continuous and indivisible, permitting no void or motion.

These paradoxes remain intact even today\(^{295}\) - even in non-Euclidean geometry. The great contradiction remains as to how place and time are comprised of non-extended points and durationless limits, or on the other hand, coherent atomistic units. “In brief”, Lee explains:

Zeno [attacked] a system which made the fundamental error of identifying or at any rate confusing the characteristics of point, unit and atom. And against [the position of plurality] his attack [was] perfectly valid. He produce[d] his contradictions by playing off the contradictory characteristics of point and unit-atom against each other and showing them incompatible.\(^{296}\)

Obviously these paradoxes, which come down to us from the secondary sources of Plato, Aristotle, and Simplicius, are quite infuriatingly elusive. Grappling with these paradoxes would lead Aristotle to reject Atomism. The racetrack paradox he rejects on the


\(^{296}\) Lee; *op cit.* p.34.
grounds of the fact that logically, if space where infinitely divisible, then so must be time. The paradox rests on the assumption that an infinitely divisible space must be transversed in a finite amount of time. As such, not only would the man never arrive, motion is logically impossible. Yet Aristotle points out that both place and time must be continuous, either both being infinite in respect to infinite divisibility or in respect to their extrema, forming discrete units. In short, place can not be infinite, and time finite. Notably, Aristotle does not actually solve the paradox. In addressing the paradoxes, he points out the inherent contradictions in them and made clarifying distinctions in the types of infinity, the “potential” and the “actual”, both remaining incommensurable. Thus the paradox remains: the geometric points are mere potential parts of an infinity, whilst the physical material that comprises place are actual parts of a continuum.

**Zeno and Aristotle’s Categories**

Although in the *Physics*, Aristotle makes a detailed defense against Zeno’s paradoxes; the primary argument is twofold: an argument against indivisibles, that is to say, units of time or space; and the potential division of the material continuum. Aristotle’s criticism of atomistic units basically centers upon the lack of distinction between

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297 *Physics* 233a14-31.
299 In *Physics* 231b18-9, he says “The same reasoning applies to magnitude, to time and to motion: either all of these are composed of indivisibles and are divisible into indivisibles, or none.” See also *Physics* 238b18-22.
300 White, Michael J.; *The Continuous and the Discrete: Ancient Physical Theories from a Contemporary Perspective* (Oxford: Oxford UP, 1992). “For Aristotle, a fundamental ontological principle is that what is infinitely divisible and continuous cannot be constituted from what is, in an intuitive sense, discrete....It is only in the latter part of the nineteenth century that the development of set theory made attractive such an ontology of continua.” (p.vi).
301 Simplicius; *On Physics*; 1013,3-14.
302 *Physics* V;9 and IV;2,3,4 and VIII;8. Yet if both time and place are infinitely divisible, motion is still impossible. It would take an infinity of time to transverse an infinity of divisible place; this qualifies as a “potential” infinity for Aristotle, but still does not get our man over the line in actuality.
mathematical and physical continua. In the racetrack paradox, for example, the man must transverse an infinitely divisible place in a finite amount of time. Aristotle will address these distinctions between potential and actual infinities in On Generation and Corruption, as well as an elaboration of qualities in the Categories. In the Categories 4b20-21 he states: “Of quantities some are discrete, others [are] continuous; and some are composed of parts which have position in relation to one another, others are not composed of parts which have position”. The continuous includes geometrical lines, surfaces, and planes; but also includes both “time” and “place”. The discrete, on the other hand, includes numbers and language (words). They are called discrete because they are independent entities who do not “share a common boundary”. On the contrary, the continuous is precisely characterized by the joining together of the component parts with a common boundary. Aristotle gives as an example, time: the present “now” in time is that which joins both past and future in a boundary. Both time, place, and magnitude make up a continuity because their boundaries join together, a position that Aristotle will emphatically argue in the Physics VI (along with being infinitely divisible) as we shall see. Concerning lines, surfaces and planes (geometrical bodies), Aristotle defines these geometrically with respect to the boundary conditions. Two lines are joined together by a point, two planes by a line, and two three-dimensional figures by a plane.

Aristotle attempts a clarification between the mathematical and the physical, and between the potential and actual infinities. Nevertheless, the correspondence between the continuous and the

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303 Yet a continuity in the time needed to transverse a given distance, is not necessarily to say a continuity in change/locomotion.

304 Categories 4b20-5a14.

305 Physics 219a28.

306 cf. Furley, David; “The Greek Commentators’ Treatment of Aristotle’s Theory of the Continuous” in Kretzmann, Norman (ed.); Infinity and Continuity in Ancient and Medieval Thought (Ithaca, N.Y.: Cornell UP, 1982)p.18. Furley points out the difficulties, already found in antiquity, with the way in which parts make up a continuity in Aristotle’s account in the Categories.
discrete remains problematic, as Boyer points out in *The History of Calculus*:

Zeno’s arguments and the difficulty of incommensurability had also a more general effect on mathematics: in order to retain logical precision, it was necessary to give up the abortive Pythagorean effort to identify the domains of number and geometry, and to abandon also the premature Democritean attempt to explain the continuous in terms of the discrete. It is, however, impossible satisfactorily to interpret the world of nature and the realm of geometry...without superimposing upon them a framework of discrete multiplicity; without ordering, by means of number, the heterogeneity of impressions received by the senses; and without at every point comparing non-identical elements. Thought itself is possible only in terms of a plurality of elements. As a consequence, the concept of discreteness cannot be excluded completely from the study of geometry. The continuous is to be interpreted in terms of successive subdivision, that is to say, in terms of the discrete...³⁰⁷.

Of course, the incommensurability of the discrete and the continuous reflects the larger aporia between geometric points and material substance composed of points; indeed, between being and phenomena.³⁰⁸ Yet it is through Aristotle’s critique of Atomism that the crux of the matter comes to the fore - the ordering of the continuum in any way consistent with the demands of both mathematics and physical material.

**Aristotle’s Critique of Atomism**

On physical grounds, Aristotle denied the void/Not-Being as a material cause of existence.³⁰⁹ Much of what we historically know of the Atomists comes from Aristotle in the *Metaphysics*, the *Physics*, as well as *On Generation and Corruption*. The natural minima³¹⁰ for Aristotle were

³⁰⁹ *Metaphysics* 985b4; OGC 325a, 317a.
quite simply the division of physical material until such a point that it can no longer be divided and still retain the qualities of the whole physical material. This is to say neither a mathematical infinitely small, nor an atomistic indivisible whole, but a limit short of divisibility to nothing. Therefore, for Aristotle, a very important distinction exists between mathematical division as the “potentially infinite” and physical separation as to what is “actually” divisible.

Aristotle makes objections in several places to Atomism. Firstly, in On Generation and Corruption, Aristotle interrogates the nature of alteration in a physical continuum. Is alteration caused by the aggregation and segregation of atomistic particles or change within a continuous whole? What, if anything, will be left over after dividing a physical body into it’s constituent parts? If division is possible, then in principle division is possible anywhere in the body. This division, proceeding until the parts become infinitely small, will result in one of three instances. Either the parts will be mere points, or the division will proceed until there is absolutely nothing, or some kind of “indivisible” part will remain. In the case of a point or a “nothing”, these will both give the problem of composition out of nothing. Obviously, the physical continuum cannot be composed out of points, which have no magnitude; or from nothings which produce only the absurdity of composition from nothing. Yet potentially a third possibility exists: a physical body could be divided into it’s constituent parts separated by a sort of interstitial gap where the actual division could take place, resulting in an “indivisible” part or body with a certain magnitude. These magnitudes are necessary as the component parts in the continuum - the separation or corruption, and eventual generation or aggregation of phenomenon. In so arguing, Aristotle has cleverly set up the position of Atomism, yet his intention is to knock the argument down. In On Generation and Corruption 317a12-14, he states: “there is segregation and aggregation, but neither into atoms

nor from atoms”. In rejecting Atomism, Aristotle must give another account for generation and corruption as well as the composition of the continuum. But here arises a paradox for Aristotle.

If a body is divisible everywhere, then in principle it can be divided ad infinitum - every part divided into further divisions. Yet logically “…there [must be] a limit, beyond which the ‘breaking up’ cannot proceed”, otherwise the body will approach either a fragment without size or a point without magnitude. However, what if we attempt to retain some unity of physicality and make a division precisely where the “indivisible” constituent part lies? Precisely at this place, where the body “is one and continuous not merely in virtue of contact” is division at this place in principle impossible. Only at the connecting points between the two impenetrable wholes - the place where contact is made - is division possible. Consequently, Aristotle concludes that division is either potential, which is to say mathematically divisible at every point; or division is actual, which is to say the physical division of

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312 OGC 317a12-14. Or alternatively from the translation by H.H. Joachim of On Generation and Corruption 316a-317a. in Kretzmann; op cit, Appendix A, pp.318-321. “Hence there are both association and dissociation, though neither into, and out of, atomic magnitudes (for that involves many impossibilities)...”.

313 OGC 316b29-32. Or Joachim: “…the process of dividing up a body part by part is not a breaking up which could continue ad infinitum; nor can a body be simultaneously divided out of every point (for that is not possible) but only up to a certain limit.”

314 cf. Furley, David; “The Greek Commentators' Treatment of Aristotle” in Kretzmann; op cit, p.27. Furley characterizes the problem in this way: “Partless units can make up neither a magnitude composed of parts that are continuous with each other nor one composed of parts in contact. Thus a continuous line cannot be composed of points, since the parts of a continuous magnitude, according to Aristotle’s definition, have extremities that are one, and points, being partless, have no extremity different from themselves. Similarly, they cannot have extremities that are together and so cannot compose a larger magnitude by contact.”

315 Physics 255a13. translation Hardie and Gaye in Barnes. Of course continuity in the continuum becomes all the more critical when considering continuous motion. Aristotle goes on to say: “Again, how can anything continuous and naturally unified move itself? In so far as a thing is one and continuous not merely in virtue of contact, it is impassive: it is only in so far as a thing is divided that are part of it is by nature active and another passive. Therefore none of these things move themselves (for they are naturally unified), nor does anything else that is continuous: in each case the move must be separate from the moved...”
a phenomenal whole that has a limit before which it becomes nothing or divided to such an extent as to no longer be an unity. The continuum is not divisible everywhere in actuality. “For magnitudes are not divisible through and through if, on the contrary, there are indivisible solids or planes...”, then they are not continuous. The fallacy of Aristotle’s argument in criticizing the Atomists is to assume that “divisible somewhere” is automatically to say “divisible everywhere” at the same time. Although it has been argued that the distinctions between mathematically potential divisibility and physically actual divisibility had already been made in the Pre-Socratics, Aristotle concentrates his argument on the connection between the whole parts, and thereby defined the contact between them and the nature of the “limit”.

Specifically with regard to On Generation and Corruption, the problem of the aggregation and subsequent separation of wholes becomes impossible in the case of potential division everywhere. Division \textit{ad infinitum} creates mathematical points without magnitude,
and without magnitude these points cannot compose a corporeal substance. Division is potentially possible everywhere along a continuum since the division corresponds to a limit entity, and not a physical border between two autonomous (impassive) bodies. Division is only physically (actually) possible between the contact points or border between two atoms. A mathematical continuum is divisible everywhere because a point is not next to a point because points have no magnitude; therefore there are no pre-existing divisions along the line. Obviously, because points have no magnitude, there can be no physical composition, but there is unlimited divisibility in a mathematical continuum. Aristotle clearly says: “even if all points be put together, they will not make any magnitude”. In a physical continuum, on the other hand, a magnitude cannot be divisible everywhere because this would destroy its unity, its “Atomism” or uncuttable limit. Therefore, phenomena are made up of parts, their divisions being along the separations actually possible between constituent magnitudes.

Concerning the question of how these magnitudes then constitute a continuum, On Generation and Corruption can be somewhat obscure. In this manuscript, Aristotle tries to be rigorous about where exactly division is possible. Succinctly stated, in a continuum, a “limit” or point of contact always separates a point. A point cannot be next to a point because always there is some possible further division between them. For earlier he says: “And every contact is always a contact of two somethings, i.e. there was always something besides the contact or the division or the point”. Yet what is this something? In the Physics he explicates it: “...everything continuous is such that there is something between its limits described by the same name as itself”. This is to say that between any limit is always another limit (“having the same name”). Between every two points is an infinity of further points and possible divisions. In this way, for Aristotle, a “limit” becomes critical as a point of contact between “two somethings”. As such, sharing a

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320 OGC 316a30. translation by H.H. Joachim
321 OGC 317a2-18. translation by Joachim.
322 OGC 316b6-7. translation by Joachim.
323 Physics 234a8-10.
boundary, they comprise the same substance, constituting a unified continuum.

Aristotle’s *Physics* V & VI more completely elucidates the issues of the continuum. Aristotle’s criticism of the ancient Greek discussions or manuscript fragments of the physical continuum address primarily three separate issues: the constituent parts of the whole, continuity, and cohesion between the parts. At the foundation of the considerations is still the appearance of change in phenomena. Aristotle defines the ways in which parts can be in relation to each other.\(^{324}\) Primarily, separate things or parts can be “together” or “separate” in the sense that they occupy the same place. Now, Aristotle does not mean occupying the same place in the sense of physically inhabiting the same place; rather, for example, citizens as individual (or atomistic) beings occupying the agora together. These individuals could also theoretically be “touching” whilst still maintaining their separate identities. Furthermore, he defines “successive” (not touching); “contiguous” (successive, but touching); and finally “continuous” (a bounded or held together whole) in order to elucidate the problem of the continuum.

How, then, do the constituent parts of the continuum form a whole? The conditions of “between” and “next-in-succession” have in common that there are at least three terms involved. However, in the condition of “between” there is a continuity without a break, e.g. points along a line, or two words following one another in a sentence, or two notes on a scale. “Next-in-succession” (ἐφεξής), on the other hand, contains “nothing of its own kind” in between the terms,\(^{325}\) nothing of its own kind, for example - a unit between unit, or a house between houses. However, “contiguous” (ἐχώμενον) elements would be successive, but touching; for example, two houses right next to each

\(^{324}\) *Physics* 226b18-229a6 and *Physics* 231a21-232a23.

\(^{325}\) Numbers constitute an example of “next-in-succession”; they do not touch yet there is a logical progression. In *Physics* 227a26-33, Aristotle is quick to criticize the Pythagorean position of monads/units that are composed of points, creating an “unnatural union” between numbers as levels of abstraction and indivisible magnitudes. From the point of view of ancient Greek mathematics, “There can always be something between points (for all lines are intermediate between points), whereas it is not necessary that there should be anything between units; for there is nothing between the numbers one and two.”
other. “Continuous” (συνεχές) elements, on the other hand, would not only be touching, but would share a boundary (ὅρος) or extremity (περας). In Greek terminology, the boundary is the limit or beginning point and integral to an object, so that any two elements that share or participate in each other’s extremities, would necessarily be a continuum, a whole. To provide an illustrative analogy: “successive” would be like two houses with an alley in between; “contiguous” would be two houses next to each other touching, yet with their separating walls independent of each other; and finally, “continuous” would be two houses next to each other not only touching but sharing a party wall, so that in fact they are inseparable, actually constituting a whole. Obviously, for Aristotle, only the whole constituting a union sharing extremities can be a continuum. In order for the elements to be a continuous whole, held together by either “rivet”, “glue”, “contact”, or “organic union”, the components must coalesce. Only things touching and sharing a common extremity can truly constitute a continuum. This condition prohibits, of course, any sort of Atomism, or any indivisible that preserves its own boundaries. At most atoms can be attached due to a contact (ἀπτόμενον) that constitutes at best a contiguous relationship. In contrast, all magnitudes, Aristotle argues, are both continuous and infinitely divisible.

In conclusion, Aristotle believes emphatically in the continuum made up of - not indivisible parts - but two consecutive parts with a limit or boundary that is shared. Furthermore, the infinite for Aristotle is always possible, but possible only potentially, not in actuality. The

\[326\] Physics 227a15-17.

\[327\] The issue of boundaries is also paramount when discussing the issues of generation and “coming about”. “We must inquire what it is that holds things together so that after what has come about there are objects that are coming about. Or is it clear that what is coming about is not next to what has come about? For neither is what came about next to what came about; for they are limits and atomic. So just as points are not next to one another, neither are things that come about; for both are indivisible. Thus neither is what coming about next to what has come about, for the same reason: for what is coming about is divisible, but what has come about is indivisible. So just as a line is related to a point, in the same way what is coming about is related to what has come about; for infinitely many things that have come about inhere in what is coming about.” Posterior Analytics 95b3-11. Obviously, a common boundary must also unite the continuum as it generates itself.
infinite for Aristotle is “that which cannot be gone through”, without end and without limit. Thus, mathematically any magnitude can be divided *ad infinitum* into infinitely small parts, and can be thought of as successively large to infinity. However, he denies infinity in actual existence. All continua - magnitude, time, and motion - are infinitely divisible. Succinctly, Aristotle’s position could be summed up as: infinite divisibility of the continuum.

*Euclid’s Elements*

Aristotle’s definitions of infinite divisibility involving points being limits (*peras-horos*), preceded the systematic description of point and line collected in the geometry of Euclid’s *Elements*. The texts known as the *Elements* are not to be considered as a solely original work; rather a compilation of systematic proofs known at the period of roughly the 300 B.C. timeframe. Euclid lived and worked roughly a generation after Aristotle. Although this collection is prior to the texts we have been discussing from Aristotle, their systematic and comprehensive nature is helpful in elucidating the problem of the continuum.

In Euclid, geometry is a rigorous system, proceeding from definitions to various geometric constructions. However, this mathematical method is neither pragmatic nor metaphysical; rather an entirely abstract system, a “spatial intuition”. Obviously, other cultures prior to the ancient Greeks, both the Babylonians and the Egyptians, had a systematic mathematics, but this specific formulation was a deductive one from first principles, or *archai*. By *Elements*, Euclid would mean both the summation of all geometrical knowledge

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328 *Physics* 206b16-207a1. cf. Cleary; *op cit*, p.78. “...there are two ways in which continua may be called infinite; i.e. either in respect of division (*katá diáfréseon*) or in their extremities (*tοις ἐκχάτοις*).”


330 cf. Burnet; *op cit*, p.106. “...while it is quite safe to attribute the substance of the early books of Euclid to the early Pythagoreans, his arithmetical method is certainly not theirs. [H]e operates with lines instead of with units, and it can therefore be applied to relations which are not capable of being expressed as equations between rational numbers.”


332 Boyer; *op cit*, pp.45-47.
up to that point, as well as the foundational act of establishing first premises, or principles, ἀρχαί.333 The deductive reasoning proceeds from definitions to proofs that generate geometrical constructions elaborating the postulates and propositions. Of course, this way of proceeding means that the demonstrations as first principles can only be proven consistent within the system of geometry. Working back to a pure archai, or foundational definition, the attempt is made always to define the terms, e.g. point, line, plane without an appeal to other definitions. Of course, Aristotle is correct in his criticism of this methodology - all of the definitions are not independent of each other.334 For example, a plane surface is defined with help from earlier definitions of lines; lines are defined by using the earlier definitions of points, and so forth. Yet this method of procedure is both comprehensive and constructive, entailing a system of demonstration and proofs. Most importantly, when a later confusion arising between mathematical and physical entities threatens to engulf the whole discussion,335 it is critical to remember that these

333 Let us note in passing that Aristotle had difficulty establishing whether geometrical objects had substance and constituted a first principle. cf. Metaphysics 1060b6-30. As Szabo has explained, not only the methodology but also the terminology was far from agreed upon in the early Greek mathematics. Generally speaking, ἀρχαί were taken to be the “unproved mathematical assumption” or foundation. Szabo states that “...in post-Euclidean times at least, there was no unanimity about how various mathematical principles were to be classified. Indeed,...total confusion and vagueness prevailed amongst mathematicians after Aristotle as far as the terminology relating to ἀρχαί were concerned, and that even the later commentators on Euclid and Archimedes who sought to introduce a precise Aristotelian terminology were unable to clear it up....In the Elements, definitions are always called ἀποκροτοχής.” cf. Szabo, Arpad; The Beginnings of Greek Mathematics (Dordrecht: Reidel, 1978)p.223.

334 cf. e.g., Aristotle; Topics 141b5-22. And Posterior Analytics 76a31-36, 76b3-11, 92b15-18, 92b35-38, 93b21-28. This sort of proof, in Aristotle’s opinion, proceeds from definition through to geometric constructions, where “the cause and the fact appear together.” Heath notes that “it would appear that this was not the definition given in earlier textbooks; for Aristotle (Topics VI:4, 141b20), in speaking of ‘the definitions’ of point, line, and surface, says that they all define the prior by means of the posterior, a point as an extremity of a line, a line of a surface, and a surface of a solid.” Heath’s commentaries Euclid in Elements p.155. cf. Cleary; op cit, p.179, pp.184-6, and p.332.

335 cf. White; The Continuous and the Discrete, op cit, especially Paragraph 11: “Spatial Magnitude, Time, and Motion: Alternatives to Aristotelianism”: “Owing to the close relation between physical sciences and geometry – a relation that was, in some respects, closer in antiquity than it is now – this refusal to countenance the application of the
constructions proceed from first principles; that is to say that they make no appeal to experience, although a drawn diagram is often an integral part to the geometrical proof.

The procedure of the *Elements* is as follows:\footnote{With the exception that Book II goes straight from Definitions to Propositions. One must remember that these Euclidean definitions (臾οι) are archai in the sense that they cannot be proven by reason; rather, they must be presupposed as definitive of this system of geometry.}{336}

1. Definitions
2. Postulates
3. Common Notions (Axioms)
4. Propositions (with proofs and theorems).
5. Lemmata

The system of definitions for Euclid begins with the foundational definitions of point, line, and figure. All other postulates, axioms, and propositions derive from this pure archai, or foundation. The Euclidean definition of point from Book I is as follows: **Definition 1:** A *point* is that which has no part.\footnote{Heath’s commentaries Euclid in *Elements*, p.155.}{337} Remarkably, the Greek word used here for *point*, *semeion* (suffix:ιον), means sign, indication, point of space, a mathematical symbol, a trace, or a mark by which a thing is known. In Greek, *meros* (μέρος) means a part in a whole, or a side of a geometrical figure.\footnote{ibid, pp.155-156.}{338} In Euclid’s geometry, a mathematical symbol or representation “has no parts”, an indication of place that has no dimension.\footnote{Metaphysics 1016b18-30, 1085a4-5 and 1085a18-20. Also in Metaphysics 1001b5-25, Aristotle argues that numbers are the only indivisibles although when added together, will increase to infinity without making the size greater, just as points on a line. Yet in *de
as a mathematical symbol or sign describes more accurately Euclid’s definition that a point should have “thingness”, without having parts. A point very simply has no parts because it has no magnitude. A point is a placeholder, a marker on a line without itself having magnitude. With this translation, the mathematical indication of semeion as “point” has position without having magnitude.340

Indeed, according to Proclus341 (A.D. 410-485), the Pythagoreans offered the first definition of a “point”: monas proslabousa thesin (μονᾶς προσλαβοῦσα θέσιν) - a monad having position. The Greek “thesis” means position, place, situation, or post. Therefore, this pre-Euclidean definition of a point has the indication of place that we find later in Euclid with the use of the word meros meaning place, part, or side. A monad also is indivisible, in the sense of a unit having no material dimension. The definition of a point is a monad assuming position:342 monas proslabousa thesin. Indeed, a monad becomes a point when it “takes up a place or post”.343 Due to the immateriality of the point, according to Heiberg,344 Aristotle will gradually replace his earlier

Anima, he admits two senses to the word “indivisible”, meaning “either ‘not capable of being divided’ or ‘not actually divided’, for an “object has no actual parts until it has been divided....But that which thought thinks of and the time in which it thinks are in this case divisible only incidentally and not as such. For in them too there is something indivisible (though, it may be, not separable) which gives unity to the time and the whole of length; and this is found equally in every continuum whether temporal or spatial.” De Anima 430a7-22. Any continuum, being a unity and a whole, is indivisible in the sense of the thought of undivided place or time. Yet, in actuality all continua, according to Aristotle, whether they are geometrical objects or place and time, are infinitely divisible.

340 cf. White; op cit, p.11-15.
342 According to T.L. Heath in The History of Greek Mathematics, vol.1, p.69, 166, & 293. the Pythagoreans defined a monad as a unity having position and thickness. cf. Aristotle; Metaphysics 1080b18-32.
343 Heath; History, op cit, p.69. In de Anima 409a6, speaking of the Platonists, the Greek stigmē στίγμη is a point, or a unit with position. In Aristotle’s Metaphysics 1084b25, speaking of the Pythagoreans, stigmē athetos στιγμῆ ἄθετος is a unit - that is to say, a point without position. Furthermore, μονᾶς θέσιν ἔχουσα refers to a unit or point having position.
344 Heath quotes Heiberg’s conjectures from “Mathematisches zu Aristotles' Abhandlungen zur Geschichte der Mathematischen Wissenschaften, XVIII (1904)p.8. Heath; op cit, p.156. Heath translated from the Heiberg text and also frequently follows him in his commentary.
term for point, \[\text{στιγμή}\] stigmé/punctum, with the Euclidean term of \[\text{σημεῖον}\] semeion that not only emphasizes the non-materiality of the point, but gathers in itself the meanings of “sign”, “mathematical symbol”, and “point of place”. The Greek used here for point, semeion, also is translated often as “position”. Therefore, in Euclidean terms, a point is a unity without parts, but inseparable from place and position.

However, Plato, according to Aristotle, objected to the definition of the point being a monad with position. Rather, he called a point “the beginning of a line” (arché grammes), that which is the generating point for all magnitude, or the “extremity of a line” (péras grammes), that which is the boundary for a line, taken up in Euclid’s Definition 3: “The extremities of a line are points”. [\(\Gamma\rho\alpha\mu\iota\mu\varepsilon\varsigma\ \delta\varepsilon\ \pi\varepsilon\rho\alpha\tau\alpha\ \sigma\mu\varepsilon\iota\a]. A point “takes up its place” at the beginning (arché grammes) or at the limit (péras grammes) of a line. Yet here is the paradox that has yet to be solved since ancient times: how do points

Heath explains “that it was due to Plato’s influence that the word for ‘point’ generally used by Aristotle (\[\text{στιγμή}\]) was replaced by \[\text{σημεῖον}\] (the regular term used by Euclid, Archimedes and later writers), the latter term (nota = conventional mark) probably being considered more suitable than \[\text{στιγμή}\] (a puncture) which might appear to claim greater reality for a point. Aristotle’s conception of a point as that which is indivisible and has position is further illustrated by such observations as that a point is not a body (De caelo II.13, 296a17) and has no weight (ibid III.i, 299a30); again we can make no distinction between a point and the place (τόπος) where it is (Physics IV.i, 209a11). He finds the usual difficulty in accounting for the transition from the indivisible, or infinitely small, to the finite or divisible magnitude. A point being indivisible, no accumulation of points, however far it may be carried, can give us anything divisible, whereas of course a line is a divisible magnitude. Hence he holds that points cannot make up anything continuous like a line; a point cannot be continuous with point. (OGC 317a10) and a line is not made up of points (Physics 220a1-21 and 231b6ff).” Heath; op cit, p.156. See also Heiberg; Litterargischlichtliche studien über Eckliid (1882) and Loria, Gino; Le Scienze esatte nell’ antica Grecia (Milano: Ulrico Hoopi, 1914).

345 cf. for example Sorabji’s translation of Aristotle, OGC, 317a1: “But there is not more than one point (stigma) anywhere [in succession],...for position (semeion) is not next to position, nor point (stigma) to point, that is, division to division or contact to contact.” In Sorabji; Time, Creation, and the Continuum, op cit, p.338.

346 By way of comparison, Euclid’s Definition 13: A boundary (horos) is that which is an extremity (peras) of anything.

347 cf. Physics 220a9-13. “Here, too, there is a correspondence with the point; for the point also both connects and terminates the length - it is the beginning of one and the end of
make up a line (as a continuous set of points), which in turn make up the boundaries for planes (figura), which in turn make up the limits for shapes (forma)? A point is not a body and subsequently is immaterial and unable to be added together to generate a line.

Similarly, when one looks to the next Euclidean Definition 2: A line is breadthless length, seemingly a paradox arises. Euclid denies both breadth and depth; a line has only one dimension. How is it possible that a line, composed of points, has no breadth? Euclid never explicitly states in either his definitions or postulates that a line is composed of points, and logically this would be impossible to deduce since a point has neither magnitude nor materiality. A point only has “position”.348 For Euclid, the point is the beginning of magnitude; that is, the origin of the length of a line. Aristotle also concurred that a line is not made up of points;349 furthermore, “a point cannot be continuous with a point”.350 Aristotle rehearses the idea from his predecessors that it is possible that moving lines perhaps generate a surface,351 yet concedes that a boundary or surface has no thickness.352 A surface is bounded by lines, but not made up of them.

**Points and Units**

Since Aristotle concurred that a line is not made up of points, the notion of a boundary or extremity becomes critical in the generation of mathematical magnitude. However, it must be emphasized that a point, lacking materiality, per definition cannot be continuous with another point because it has no magnitude. For Aristotle, something without magnitude cannot make up a continuum. As Heath explains, “in Euclid of course, (δρος), limit or boundary, is defined as the another.” In this passage as well, a comparison is made between a point on a line and the “now” in time as a continuity.

348 *Physics* 215b18ff. “And in the same way there is no such thing as the proportion between a line and a point, because, since a point is no part of a line, taking a point is not taking any of the line.” Translation Wicksteed and Cornford.

349 *Metaphysics* 1001b19 and *Physics* 215b18.

350 *OGC* 317a8-12.

351 *de Anima* 409a4-6.

352 When the boundary or surface has no thickness, stacking them up to form a figure results in the famous “lacunae problem”.
extremity, \( \pi\varepsilon\rho\alpha\varsigma \), of a thing, while ‘figure’ is that which is contained by one or more boundaries”.\(^{353}\) Whereas \( \pi\varepsilon\rho\alpha\varsigma \) is used directly concerning the limits of figures, \( \delta\rho\alpha\varsigma \) as the boundary, or landmark, is also used to mean “the definition” or “term”. According to Heath, we have in Plato and Aristotle \( \delta\rho\alpha\varsigma \) used in the sense of standard or determining principle....and closely connected with this in the sense of definition (\( \delta\rhoi\sigma\mu\omicron\omicron\varsigma \)), particularly in the *Topics*.\(^{354}\) Similarly, in Aristotle’s *Physics* IV, 3; 210b32-35 and 211a23-38, a place, \( \tau\omicron\omicron\upsilon\sigma\varsigma \), is defined by what “surrounds” it. This surrounding or extremity of the place is not separable from the place, but equal to and continuous with it. The place is literally defined by its limit. Conclusively, in both physical manifestations of place and this system of geometry, the dual meaning of \( \varsigma\rho\omicron\alpha\varsigma \) and \( \pi\varepsilon\alpha\varsigma \) as both definition and boundary are critical in understanding not only the determination of geometrical constructions but integral to the definition or delimitation of the constructions. To say “limit” is to delimit or to define.\(^{355}\) Aristotle, in discussing the Platonists, asked in the *Metaphysics*:

Further, from what principle will the presence of points in the line be derived? Plato even used to object to this class of things as being a geometrical fiction. He called the indivisible lines the principle of lines - and he used to lay this down often. Yet these must have a limit; therefore the argument from which the existence of the line follows proves also the existence of the point.\(^{356}\)

Nevertheless, in order to maintain consistency in the system of geometry, a point has only position and no magnitude; therefore

\(^{353}\) Heath; *History of Greek Mathematics* v.1, p.293 According to Heath, Aristotle also uses the words \( \delta\rho\alpha\varsigma \) [boundary] a limit, rule, standard, measure, and boundary stone, a boundary, landmark \( \pi\varepsilon\rho\alpha\varsigma \) [extremity] end, limit, boundary, end, object, an end, completion that may be crossed, passable as synonymous terms. cf. Heath’s commentaries on Euclid’s *Elements*, p.182-3.

\(^{354}\) Heath; *op cit*, commentaries on *Elements* p.143.

\(^{355}\) cf. Szabo; *op cit*, p.256: “The Greek word for ‘to define’ (\( \delta\rho\iota\xi\sigma\theta\alpha\varsigma \)) actually means to mark off. A definition was intended to mark off the Form or \( \varepsilon\iota\delta\omicron\alpha\varsigma \) of an object from that which it was not and in this way secure the consistency of the Form in question.”

\(^{356}\) *Metaphysics* 992a19-24. In this section of the text, Aristotle sets out the position of Plato, only to refute it.
it is merely the origin or beginning or generating point for the length of a line or the limit in its potential division. In the archai system of geometry as well as phenomenal material, the question seems to be of the first, archaic, indivisible thing or unity. In this passage, Aristotle seems to derive the existence of a point from the existence of a line. For Plato, the emphasis is on the principle of lines as an indivisible segment of line. He rejects the notion of point except as the generating point of magnitude.

Consequently, Plato also had postulated a sort of atomistic minimally small unit of line segment making up the length of the line. Yet Aristotle argues these minimal lines could in turn also be further reduced to points. In the following passage, Aristotle interrogates the “one” as the first unit of measure, as well as the beginning point (archē) of all that is knowable:

...the “one”, then, is the beginning of the knowable regarding each class....But everywhere the “one” is indivisible either in quantity or in kind. That which is indivisible in quantity and qua quantity is called a **unit** if it is not divisible in any dimension and is without position, a **point** if it is not divisible in any dimension and has position, a line if it is divisible in one dimension, a plane if in two, a body if divisible in quantity in all - i.e. in three-dimensions....That which has not position a unit, that which has position a point.357

Most importantly, the indivisibility of a point or unit/monad also has to do with its status as an essential ontological object. The “one” is the beginning, not only as generating point for further geometrical objects - the point extended into dimension as a line - but also the beginning of number and the origin of genus. The “one” is the beginning of all that is knowable. Yet critically, Aristotle makes a distinction between a point (stigmē/semeion) and a unit (monas) although both are indivisibles in the sense of their immateriality. A monad has neither magnitude nor position; a point, also without magnitude, does indeed have position.358

357 *Metaphysics* 1016b18-30.
358 cf. Sorabji; “Atoms and Time Atoms”, in Kretzmann; op cit, p.37. “...an atom is not the same as a point or instant. Points and instants are indivisible because they have no length
Yet this indivisible unit, point/monad, is also an attempt to solve the problem of the correspondence between physical things, mathematical numbers, and geometrical objects such as a point, line and surface. When Aristotle speaks of “one” in the Book XIII of the *Metaphysics*, he intends the “one” as a positionless unit, a starting point.\(^{359}\) This “one” as a unit of measurement, *i.e.* number, is not without its problematic aspects with respect to its correspondence to both geometry and physical things.\(^{360}\) Quite simply stated, how can the number “5” for example, as a unity, correspond to the aggregate of five things as a plurality? Similarly, objects of geometry; *e.g.* point, lines, surfaces - have “attributes of magnitude but magnitude does not consist in these”\(^{361}\). Although Aristotle warns against confusing the categories of substance - Ideal Forms and mathematical numbers\(^{362}\) - he most adamantly objects to their separation from sensible substance. Nevertheless, in *Metaphysics* Book II, he cautions: “the minute accuracy of mathematics is not to be demanded in all cases, but only in the case of things which have no matter. Therefore its method is not that of natural science; for presumably all nature has matter”.\(^{363}\) As Aristotle says in the *Physics*: “…the relations between the natural sciences and

\(^{359}\) White; *op cit* p.12. White points out that “Although there are some subtle and significant nuances to signification, the following terms are all used by Aristotle to designate points: *stigmē* (‘speck’, a common mathematical term), *sēmeion* (‘position’, a term also used mathematically), *tome* (‘cut’), *diairesis* (‘division’), and *aphē* (‘contact’). Of course, lines themselves are limits or divisions of surfaces, while surfaces are limits/divisions of bodies.” cf. *Metaphysics* 1060b12ff.

\(^{360}\) cf. especially *Metaphysics* 1080b36-1086b12. “First let us inquire if the units are comparable or non-comparable.”

\(^{361}\) *Metaphysics* 1085a21.

\(^{362}\) *Metaphysics* 987b14-17: “Further, besides sensible things and Forms [according to Plato’s Doctrine] he says there are the objects of mathematics, which occupy an intermediate position, differing from sensible things in being eternal and unchangeable, from Forms in that there are many alike, while the Form itself is in each case unique.” Also *Metaphysics* 1090a3-1090b4 the Pythagoreans believed “each number is an Idea…and saw many attributes of numbers belonging to sensible bodies.”

\(^{363}\) *Metaphysics* 995a15-17.
geometries are ‘reciprocal’; geometry investigates physical lines but not
\textit{qua} physical\textsuperscript{364}.

Undoubtedly, to consider geometry as essentially divorced
from any material object is essentially problematic. A correspondence
between numbers and things, or between geometrical constructions
and mathematical manipulation is of course, possible\textsuperscript{365}. Yet a
line is an abstract idea without thickness and cannot be made to
conform to any empirical situation. This incommensurability is
often overlooked, especially after the advent of modernity when the
wholesale application of mathematical quantification to sensible
objects enabled an eventual reduction to geometrical objects such as
points with trajectories described as traces of lines\textsuperscript{366}. Nevertheless, the
problem of the correspondence remains between mathematics and the
phenomenal.

We have established that a point has position, but no magnitude;
however, this brings us to the critical question: Is a point substance?
Aristotle asks pointedly in, the \textit{Metaphysics}: “Further, whether numbers
and lines and figures and points are a kind of substance or not, and if
they are substances whether they are separate from sensible things or
present in them? With regard to all these matters not only is it hard
to get possession of the truth, but it is not easy even to think out the
difficulties well”.\textsuperscript{367} Later in Book VII, he elaborates:

Some think the limits of body, i.e. surface, line, point, and unit, are
substances, and more so than body or the solid. Further, some do not
think there is anything substantial besides sensible things, but others
think there are eternal substances which are more in number and
more real, e.g. Plato posited two kinds of substance - the Forms and
the objects of mathematics - as well as a third kind, \textit{viz.} the substance
of sensible bodies.\textsuperscript{368}

\textsuperscript{364} \textit{Physics} 194a10.
\textsuperscript{365} cf. Szabo; \textit{op cit}, 216ff. Szabo carefully traces in the origins of Greek mathematics in
antiquity, the turn from geometry and mathematics as an empirical, practical method, to
a geometry of ideal forms and indirect proofs, neither of which would have been possible
he argues, without Eleatic philosophy. Yet with this abstraction, the incommensurability
of numbers to lines became part of the system of Greek mathematics.
\textsuperscript{366} Dijksterhuis, E.J.; \textit{The Mechanization of the World Picture} translated by C. Dikshoorn
\textsuperscript{367} \textit{Metaphysics} 996a14-17.
\textsuperscript{368} \textit{Metaphysics} 1028b16-21.
The question of substance revolves around the issue of whether everything that has Being also necessarily has spatial magnitude. The consequence of this premise would make all existence corporeal. The point (or monad as the originary indivisible unit), in turn, having no magnitude, would have no substance. Similarly, Aristotle says “numbers cannot be a substance”. Yet Plato clearly posited the objects of mathematics as a category of substance. But how, Aristotle asks, could any magnitude proceed, whether as a numerical entity, or geometrical, or sensible substance from an indivisible unity with no magnitude?

Obviously, a body is not the same as a point, “for it will have parts”. Conversely, a point cannot be as a body because it has no qualities or form, and has no weight. Clearly, to have corporeality is to have magnitude. In addition, both points and bodies have “place”. A strong correspondence occurs between place and the position of a point in geometry. Most importantly, not only is a point defined by its position; indeed, there is no differentiation between point and its place. In *Physics IV*: “But when we come to a point, we cannot make a distinction between it and its place. Hence if the place of a point is not different from the point, no more will that of any of the others be different, and place will not be something different from each of them”. Perhaps it is counterintuitive that no distinction can be made between a point and its position or place, but a “place” cannot itself be a body with magnitude, due to the fact a “place” cannot be extended in three-dimensions. Just as a point is inseparable from its position, each material body has its own “place”, its own position. “Place” is itself not a thing; nor is place a kind of void thing that “gives space” to objects.

369 *Metaphysics* 1001b3.
370 *de Caelo* 296a17.
371 *OGC* 320b15-17.
372 *de Caelo* 299a28-29.
373 Alternatively in the translation from Wickstead *Physics* 209a7-10. “Now a ‘place’ as such, has the three dimensions of length, breadth, and depth, which determine the limits of all bodies; but it cannot itself be a body, for if a ‘body’ were in a ‘place’ and the place itself were a body, two bodies would coincide….We cannot distinguish between a point and its own position…”.
374 *Physics* 209a10-13.
“Place” itself cannot occupy,\textsuperscript{375} rather is a limit. Its parts join together at one common boundary with objects, thus further characterizing place as a continuous quantity.\textsuperscript{376}

Nevertheless, beyond a point, objects of geometry also have magnitude. A seemingly impassable aporia exists in the question: are bodies, numbers, and points indeed substances? On the one hand, numerical relations and ratios are mere predicates of being, not substances\textsuperscript{377} in themselves. Yet bodies contain parts and more elemental properties; not to mention that bodies come-to-be and pass-away. As such, a body would be a mere “instance of substance”. Points, lines, and planes do not degenerate; they limit and form the boundaries for bodies. As such, they could qualify as substances, the first principles of being. A point does not come-to-be or pass-away since only material substances degenerate. As such, a point as a geometrical object belongs to the category of universal substance.\textsuperscript{378} “But if this is admitted,” Aristotle concedes, “that lines and points are substance more than bodies, but we do not see to what sort of bodies these could belong (for they cannot be in perceptible bodies), there can be no substance”.\textsuperscript{379} In the end, it only remains for Aristotle to acknowledge that “it baffles us to say what being is and what the substance of things is”.\textsuperscript{380}

In conclusion, Aristotle posited that a monad (unit) is a substance \textit{without} position; a point is a substance \textit{with} position.\textsuperscript{381} A

\textsuperscript{375} Physics 210a5-9.
\textsuperscript{376} Categories 4b20-25.
\textsuperscript{377} Remember that for Aristotle, all change in the continuum is substantial alteration.
\textsuperscript{378} Metaphysics 1044b21-28. “Since some things are and are not, without coming to be and ceasing to be, e.g. points, if they can be said to be, and in general forms,...not all contraries can come from one another....Nor has everything matter, but only those things which come to be and change into one another. Those things which, without ever being in course of changing, are or are not, have no matter.”
\textsuperscript{379} Metaphysics 1002a14-17.
\textsuperscript{380} Metaphysics 1002a27-28.
\textsuperscript{381} Posterior Analytics 87a36 and 88a33. Also de Anima 409a5-6 where a point is defined as a unit with position, \textit{μονάς θεσιν ἐχουσα} (monas thesin echousa) monad with position; and Metaphysics 1084b26, “for the unit is a point without position.” \textit{στιγμὴ ἀθέτος} (stigné athetos). See also Metaphysics 1085b31-34: “Nor again can \textit{parts of a distance be indivisible}
point has no body, no material, and no weight. For Euclid to say point, semeion, is to give a monad position. Aristotle, prior to Euclid, concurs with the characterization of “point” by saying that a point has position with no magnitude. No distinction can be made between a point and the place (topos) where it is. And making things more complicated, infinite divisibility and common boundaries between parts define a continuum, although the parts do not necessarily have position, such as in the case of the continuum of time.382 However, Aristotle offered a consistent account of the continuum - both the infinitely small and the potentially infinitely large. Euclid, on the other hand, avoided “the ideas of variability, continuity, and infinity [because they] could not be rigorously established”383 in his system of geometry.

**Aristotle and the Continuum**

Whilst the geometry of a line with its extremities as points/limits is indeed a continuum, for Aristotle, the most important categories of the continua are place and time, as well as the infinite. All magnitude is continuous, yet infinitely divisible.384 As continua, place and time are structurally inseparable from the geometrical considerations of point and line. Just as a point cannot be next to a point because of infinite divisibility of a line - there being always something between any two points capable of further division - both place and time do not contain indivisible units, or any other irreducible component for Aristotle. With “respect of size, there is no minimum; for every line parts, as the parts of plurality out of which the units are said to be made are indivisible; for number consists of indivisibles, but magnitudes do not.”

382 cf. Furley, David J.; “The Greek Commentators’ Treatment of Aristotle”, in Kretzmann; *op cit*, p.23: “Aristotle is caught in a dilemma of his own making: he must deny that the extremity of a body has a place if he is to avoid the conclusion that nothing can be distinguished from its own place; but he must affirm it if he is to hold on to his definitions of together, in contact, and continuous.”

383 Boyer; *op cit*, p.47.

384 *Physics* 219a10-11.

385 See *Physics* 232b23-25, OGC 337a22-35, *Metaphysics* 1020a29-32, *Metaphysics* 1071b8-12, and *De Caelo* 268a6-28: “Now a continuum is that which is divisible into parts always capable of subdivision, and a body is that which is every way divisible. A magnitude if divisible one way is a line, if two ways a surface, and if three a body....All magnitudes, then, which are divisible are also continuous.”
is divided *ad infinitum*”. 386 All continua, then, are capable of further subdivision into the infinitely small, and into in principle an infinite number of parts. Poignantly Aristotle asks: “how is extension, i.e. a *continuum*, to be produced out of unextended parts? For number will not, either as mover or as form, produce a *continuum*”. 387

In the *Categories*, 388 Aristotle makes an important analogy between the geometrical line as a continuous quantity and other extended magnitudes that are continua, especially time and place. As in *On Generation and Corruption*, the line has a “common boundary” as a point that both unites and differentiates. A line as a boundary joins a plane figure; a plane joins together three-dimensional bodies. By extension, any body in the continuum, including spatial and temporal bodies, are joined together at a common boundary. As a boundary, the limit also has position by definition. Obviously, however, time cannot have position in a spatial sense; rather, time has a “certain order” where the limit of time can be relatively “before” or “after” other demarcations. But because time for Aristotle does not have “time-atoms”, time does not “endure”. With only position as such, time is a mathematical ordering of the temporal continuum.

Just as a line is not made up of points, time is not made up of “nows”. Nor is the “now” part of time; 389 rather, the “now” is a limit, not an indivisible part or interval. The “now” cannot be summed up to comprise time, rather the “now” or instant is merely an attribute of time. The “now” is never a thing, rather merely a boundary, 390 infinite in number. 391 As a boundary, the “now” remains ever-present as the same in the continuum, yet is the “link” in time that is everywhere the same; 392 thus, always differing. The “now” both connects and divides 393 the continuum.

386 *Physics* 219a29-30.
387 *Metaphysics* 1075b29-30.
388 *Categories* 4b36-5a37.
389 *Physics* 220a19.
390 *Physics* 220a22.
391 *Physics* 237a15.
392 *Physics* 223b11.
393 *Physics* 222a10-17. Or also *Physics* 220a9-11. “Here, too, there is a correspondence with the point; for the point also both connects and terminates the length - it is the beginning of one and the end of another.”
In this dual function, Aristotle says, “time, then, also is both made continuous by the ‘now’ and divided at it”\textsuperscript{394}. The “now” just gets “carried along” the continuum, always different. Aristotle wrote: “The ‘now’ is the link of time, as has been said (for it connects past and future time), and it is a limit of time (for it is the beginning of the one and the end of the other)”.\textsuperscript{395} Just as in geometry concerning a point on a line, a point has position but no magnitude; similarly, the “now” has position but no interval - no thickness, no duration\textsuperscript{396} in the continuum of time. As with a line, number\textsuperscript{397} is superimposed upon the continuum in order to make a possible relational structure in which we can speak of “before” and “after” within the continuous flux. The “now” is indivisible in the same way as a point is indivisible - it is a boundary or limit\textsuperscript{398} without magnitude. Furthermore, time, like a line, is an interval that is infinitely divisible. It is precisely through the “now” in time that is continuous, yet these limits can never be an assemblage of units gathered together to compose a whole.\textsuperscript{399}

**Place**

In addition, place is a continuum.\textsuperscript{400} Yet what is place, (τόπος) precisely? Is place form, matter, void, or limit? Aristotle in Physics IV, takes each determination of place and examines each in its turn.

\textsuperscript{394} Physics 220a5.
\textsuperscript{395} Physics 222a10-13.
\textsuperscript{396} Categories 5a26-27. “Nor with the parts of a time either; for none of the parts of a time endures, and how could what is not enduring have any position?”
\textsuperscript{397} This correspondence is inherently problematic since number, as the only true indivisible unit according to Aristotle, must be made to translate that which is infinitely divisible. Number is “discrete”, not continuous. cf. Categories 4b22-5a14. Therefore, even though Aristotle states that time is the measure of motion, numbers are not “parts” of a specific interval of time, rather laid down upon it in order to mark off as a limit the eternal “now” that infinitely slips from presence. Time is not movement, but inseparable from it.
\textsuperscript{398} Physics 220a9-10.
\textsuperscript{399} De Caelo 300a12-18.
\textsuperscript{400} Physics IV: iv. For an extensive treatment on Aristotelian place, see Lang, Helen S.; The Order of Nature in Aristotle’s Physics: Place and the Elements (Cambridge: Cambridge UP, 1998) especially pp.1-121. Morison, Benjamin; On Location: Aristotle’s Concept of Place (Oxford: Oxford UP, 2002). Algra, Keimpe; Concepts of Space in Greek Thought (Leiden:
Firstly, a place could be considered to be a specific place for something, or a kind of general place that is common to all.\footnote{Physics 209a31-35.} For example, one could say: “the earth is the proper place for heavy objects”, or “the sky is the place for birds”. Yet place is most commonly thought of as the form/matter of a thing. Form (\textit{morphē}) and matter (\textit{hule}) are inseparable from each other in Aristotle’s schema. The form/matter is determined by its distinguishing characteristics, its \textit{eidos}; but the very specificity of a thing is determined through its place. Aristotle described the limit of a body as “its immediate envelope”, that which embraces or the limit that contains.\footnote{Physics 209b1-5.} Each body could be determined in its place by its “own” belonging to itself, specific determination. To every body belongs its own limit. Nevertheless, Aristotle was careful to say that this immediate proximate envelope was not to be confused with the mere matter of the object. Matter, of itself, without its \textit{eidos}, or form-giving determination, is not an actuality. Matter, explains Aristotle, is precisely what is thought to be “the factor that is bounded and determined by the form, as a surface or other limit, moulds and determines; for it is just that which is in itself undetermined, but capable of being determined, that we mean by matter”.\footnote{Physics 209b10-12. translation Wicksteed and Cornford.}

Aristotle explained that Plato, in not only the \textit{Timaeus} but also the so-called \textit{Unwritten Teachings} that only came down historically in fragmented second-hand reports, that Plato’s concept of the \textit{chora} conjoined the factors of “matter” and “room”, or place-giving.\footnote{Physics 209b14ff.} The exact determination of what place is, is exceedingly difficult, occupying the place of “the very apex of speculative thought”.\footnote{Physics 209b20. translation Wicksteed and Cornford.} At least, Aristotle says, Plato made an attempt to define “space” as \textit{chora}. Yet Aristotle’s account of Plato’s \textit{chora} is too closely identified with the material determinations of things, merging the receptacle into generated material beings in an altogether facile manner, as discussed Brill, 1995)especially pp.121-191. Edward Hussey’s commentary to Aristotle; Aristotle’s \textit{Physics: Books III and IV} (Oxford: Clarendon Press, 1983).
in the previous chapter. In Aristotle’s account of Plato’s *chora*, space (*chora*) gives room for place (*topos*), in fact being one and the same thing. A space merely provides a place for things. Yet, not only is this an inaccurate account of Plato, Aristotle will reject the form/matter determinations of place himself.

Aristotle rejects the possibility that place is either form or matter due to the fact that form/matter must be separable from its place. For example, if place is thought to be like a vessel, “place” cannot be an integral part of the vessel itself, so intrinsically bound up with the container that “place” is not only determinative of it, but also moves about with the thing. Although a body has its own “place”, the place is indeed separable from it, allowing it to be free to move about. Although a defining factor, place cannot itself be a body that occupies place, or takes up space in extension. A “place” cannot be extended in three-dimensions. For instance, if a body with three-dimensions occupies a place, then the place itself cannot have extension because both the body and the place would coincide, resulting in the two things (body and place) residing in the same “place”. This coincidence is obviously impossible. Each material body has its own “place”, its own position. Conclusively, “place” is itself not a thing; nor is place a kind of void thing that “gives space” to objects.

So Aristotle asks, is “place” form, matter, void, or limit? He rejects determinations of place as form/matter on the grounds that place must be separable from a body extended in three-dimensions. Next, the issue of the void must be dismissed as an accurate determination of place. Aristotle denies the void as “place” chiefly and emphatically because of his refutation of Atomism. The Atomists’ account is of two interdependent features: single elemental units called atoms, and the void space that is a completely vacant empty container for those atoms. The refutation of atomistic units, as we saw above, is predicated upon divisibility in the continuum. The refutation of the void space is, in turn, made upon two grounds: one, motion in the void; and two, the continuous structure of place.

Firstly, the issue of motion is most important since the very discussion of place is grounded in Aristotle’s discussion of change
generally and local motion specifically; that is to say, displacement over time through place. The Atomists held that the void is a place where there was nothing; Aristotle held that even if a body is not in its place, it was invalid to say that there was absolutely nothing in the interstitial place. Just because nothing is sensibly perceptible in the place, does not mean that the place is an empty container. For example, the Atomists argue that without void spaces, there would be no empty places for bodies to move into, concluding that motion would then be impossible. Aristotle’s counter argument is that precisely a continuous material structure without interruptions or breaches is necessary in order to insure continuous motion, in order simply to say something is passing from this place to that place. Aristotle writes: “But not even movement in respect of place involves a void; for bodies may simultaneously make room for one another, though there is no interval separate and apart from the bodies that are in movement. And this is plain even in the rotation of continuous things, as in that of liquids”.\(^{406}\) Obviously, Aristotle argues, just as a cube can displace water in a basin, so can air be displaced by a moving projectile even though this displacement is not perceptible.\(^{407}\) The continuous structure of place is the critical feature of Aristotelian place.

To summarize the rejection of the void by Aristotle, then, place as void has existence of its own\(^ {408}\) for the Atomists, as one of the two interdependent features. Void is an absence of atomistic bodies; an interval in place. Yet the argument from the Atomists that motion would be impossible without a void, is refuted by Aristotle. The other chief feature of the void-atom model, is the discontinuity of place involved in the container filled with disparate units. So now an examination of the issues of the interval and limit with respect to place, will be the final definitive determination of place for Aristotle.

\(^{406}\) *Physics* 214a29-33. translation by Hardy and Gaye. OR, “…for things can simultaneously give place to each other without there being any intervenient dimensionality sejunct from the moving bodies, as is evident in the case of the rotation of continuously coherent bodies…” translation from Wicksteed and Cornford.

\(^{407}\) *Physics* 216a27-30.

\(^{408}\) *Physics* 214a22. Aristotle’s argument against the Atomists’ premise that place is an independent existent occupied by extended bodies.
If place is not form/matter, nor extended bodies in a void container, is place then, the interval between things? The notion of the interval can easily be dispensed with on the same grounds as the void and atoms. No gap in the material continuum, no vacancy in place is accepted in Aristotle’s account of the continuum. The notion of the limit, peras, in 211b14-212a7 is exceedingly complex and subtle. Specifically at 211b12, he says: “…for the limiting surfaces of the embracing and the embraced coincide.” (ἐν ταύτῳ γὰρ τὰ ἐσχατα τοῦ περιέχοντος καὶ τοῦ περιεχομένον). Place, for Aristotle, is the immediately adjacent, adjoining limit of the surrounding. He gives the example of a bucket of water. If you pour out the water, obviously air would rush in to replace the water. The bucket itself is determined by its own limit of form/matter, holding together the eidos of its proper material actuality. As an extended actualized body, it can move in place and time. Yet confronting the body is always “place”, coming up to meet it constantly and continuously. “Place” is always there as the immediate limit, never changing. As such, place never moves. “Place” is the surrounding limit, periechomenon, of the limited body itself, periechontos. Place is the surrounding, the limit encircling. The final definition of place that Aristotle gives is: place is “the innermost motionless boundary of what contains it”. Yet wherever a body is positioned (topos), place (topos) comes to meet it, as surrounding, environing, limit (periechomenon). Place is not the interval between the limits of the surrounding body and the body itself; place is the limit of the surrounding. Place begins precisely where the limit of the body ends.

409 Physics 211b20-29 and Physics 212a18-30. Aristotle gave also the more conceptually difficult analogy of a boat going down a river. The boat is defined by its own limit, yet the surrounding river does not change. This analogy is of course more difficult to visualize because the river does move and flow. Yet the river, as a whole, is the limit of surrounding environs for the boat, the first immediate limit of what constitutes place for Aristotle. cf. Hussey, op cit, p.113: “What the distinction above all shows is that for Aristotle locomotion is, in the primary sense, change of position relative to immediate surroundings, and not relative to any absolute landmarks.”

410 Physics 212a21-22. translation Hardie and Gaye. OR translation from Wicksteed and Cornford: “Thus whatever fixed enviroring surface we take our reckoning from will be the place.” τὸ τοῦ περιέχοντος πέρας…τοῖς ἐστιν ὁ τόπος.
Although seemingly paradoxical, place does not move. “Place necessarily is...the boundary of the containing body at which it is in contact with the contained body”. The contained or limited body can be moved through place, but place itself is the environing limit and is always next to, present alongside, motionless and unchangeable. Because place is the first limit of the surrounding, topos is continuous with or always together with the boundary of the body. Place, topos, is motionless in the sense of being incapable of motion independently of the limit of the body. However, place is necessarily separable from the body, yet continuous with the extended body.

In addition, paradoxically for Aristotle, the universe has no place, and is a-topic in fact. “Every body in the universe is always in some place, in some determinate position. But the universe as a whole cannot be said to be in any place; it is literally nowhere. For it is not related to anything else, and hence has no position or topos”. Because the determination of place for Aristotle is the limit immediately exterior to the limit of a body, the universe as a whole cannot have a place. There is literally nothing outside the universe as a sphere, and consequently no boundary or limit outside it is even thinkable. The universe has no surrounding limit; no environing border; the universe is One, no place, a-topic.

To conclude, place, therefore, is not a thing, not a matter/form. Neither is place a void emptiness. Place is not space. Place is
the surrounding envelope, the limit that is next to the limit that defines a body, the adjacent environing. This limiting implies, consequently, that every place begins as limit from a specific individual body. Furthermore, since place is not a thing, and particularly determined by its position with regard to the universe as a whole, place is a relation. Place is both particular to the beginning limit of a body, yet is in relation with bodies in common in a system. Yet emphatically, place must be separable from a body in Aristotle's account; this separation is between the limit of the body itself, periechontos somatos (212a7),

416 This separation between limits would effectively mean that limit is next to limit; therefore strictly speaking an interval or contiguous relation. The precise word that Aristotle uses here (211b32) is συνεχής, sometimes translated as “continuous”, but elsewhere (226b19-24) distinguished from the contiguous. Specifically regarding Physics 211a23, Hussey; op cit, p.114 argues that this “difficulty may also seem to threaten what Aristotle says about contact. ‘The extremes of things which are in contact are in the same spot’ (literally ‘in the same’); compare Physics V.3, 226b21-23: those things are in contact of which the extremes are ‘together’ (hama), and ‘together’ means ‘in one primary place’. Yet on the definition of place to be given, it will turn out that boundaries cannot themselves be in places at all, since they are themselves the only places that they could be in; it seems circular here, to justify an account of what the place of a body is by a concept of contact which presupposes the notion of place. These difficulties suggest that Aristotle needs a notion of location which is wider than that of place…”. Although Aristotle’s definition of place undoubtedly contradicts earlier determinations of contiguity and continuity, he obviously does not mean an actual interval between body and place, a division or disconnection, or state of lacking unity as a continuum. In saying that the limit of the body and the limit of the surrounding are “alongside”, he undoubtedly argues for the material and “place” to be a continuum on par with time. However, Lang points to the very important last two sentences of Physics IV, 212a28-30, which she translates as: “…what is surrounding, is thought to be some surface and like a vessel. Again, place is together with the object for the limits are together with the limited.” Lang; op cit, p.103 and note 98 where she acknowledges that the prevalent scholarship is far from agreement on these two sentences. Cornford, she says, “thinks this line does not belong here, but his view is criticized and rejected by Ross.” Also Wicksteed and Cornford in notes to this passage justify their translation of “in keeping pace with” arguing that “those who take it to mean ‘coinciding with’ have to apologize for the phrase as an inaccuracy. But it would be worse than an inaccuracy, for it would be a surrender of Aristotle’s whole case, since according to him the ‘thing contained’ emphatically does not coincide throughout with its place. It is [precisely] the error he is most anxious to refute.”p.315, note b. in Aristotle; Physics I-V translated by P.H. Wicksteed and F.M. Cornford, Loeb Classics (Cambridge, Mass.: Harvard UP, 1929/1996).
and the surrounding limit called place, *periechontos peras* (212a21). Furthermore, because the universe has no external referent, it literally is not located in relation to a surrounding limit or place. The universe is perfectly contained. *Topos* must always have something outside it in order to situate it. “Place” must be separable from an object and immovable.

For Aristotle, any body must be situated somewhere and must have a limit. Given that every body has its own proper site or location, and what is proper to the part would be proper to the whole. The universe is comprised of heterogeneous parts, each singularly constituted, each with its proper situation, and each distinguishable from all others. The universe is a unity that comprises a continuum where each part is in continuous contact with other parts. Aristotle concludes: “Now whatever is ‘somewhere’ is in a place; and whatever is in a place is ‘somewhere’...a place means being ‘somewhere’.” Indeed, every “place” has its “place”, and every body as part of the whole has its own proper situation, distinguishable from all others. Place, like time, for Aristotle, is a continuum.

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417 The limit of the body itself, *periechontos somatos* περιέχοντος σώματος (212a7), and the surrounding limit called place, *periechontos peras* περιέχοντος πέρας (212a21).

418 *Physics* 205a10-12. Lang points out that in fact the “where”, *pou* (ποù), is the term that occurs when Aristotle discusses the categories of being, e.g. *Categories* 1b26, 2a1, 9, 10b23, 11b11; OGC 317b10; *Metaphysics* 1017a26. Lang; *op cit*, pp.67-68 esp. notes 2 and 3 where she explicates the various translations and interpretations of the “where”. She cites Hoffmann, Philippe; “Les Catégories où et quand chez Aristote et Simplicius” in *Concepts et catégories dans la pensée antique: Études publiées sous la direction de Pierre Aubenque* (Paris: Vrin, 1980)pp.217-245. “Although [ποù, *pou*] is sometimes [wrongly] translated ‘place’ [τόπος, *topos*], Aristotle’s analysis of the problem of ‘where’ things are here in *Physics IV*, reveals the important distinction between ‘where’ [ποù] and ‘place’ [τόπος]. Everyone agrees, Aristotle argues, that all things that are must be ‘somewhere’; hence the inclusion of ποù in the categories. And neither here nor elsewhere does Aristotle argue for this category; rather, he asserts it as both necessary and universally agreed upon. But ‘where’ things are raises the question ‘what is the where of things?’...”. Hoffmann, p.218-220 cited by Lang; *op cit*, p.67-8.

419 *Physics* 206a1-6. translation Wicksteed and Cornford.
**Infinitely…To Apeiron**

Aristotle discusses the infinite primarily in *Physics* III.iv-viii, saying, “the infinite exhibits itself in different ways...”. In the science of nature, infinity is the most important continuous thing, then place, time, and motion. The infinite, for Aristotle, is the possibility of infinity in number, time, magnitude, or the limit of the universe. But it is a non-symmetrical sort of infinite.

For Aristotle, the infinite could mean several things: the infinite could be that which cannot be transversed, διελθεῖν; or the infinite could be something where there was no getting to the end of it, τὸ διάξοδον ἔχον ἀτελεύτητον; or the infinite could be literally, “that which cannot be gone through”, ἀδιέξιφτος; or the infinite could be an absence of a limit, or an “unlimited”, ἀπειρόν, in the sense of either an infinitely multiplied or infinitely divided magnitude; or the infinite could be infinite expanse, λαμβανόμενον, in the sense of the ever-present “possibility of more”, or being taken after another.

This later possibility would be to say only that something was in the process of becoming actual, for example “the day”, wherein the infinite possibility of another day does not exhaust the potential

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420 “The infinite (to apeiron)” according to Randall, “has the form of an adjective”. Randall, *op cit*, p.192. τὸ ἀπειρόν.
421 *Physics* 204a24 and 205a26. For the study of infinity, see *Physics* 202b30-208a4 and *Metaphysics* 1066a35-1067a37 for the senses in which “infinite” is used.
422 *Physics* 200b17-20.
423 Regarding the infinite in number, see *Metaphysics* 1083b24-1085b2. In *Physics* 203b31-35, Aristotle admits “the problem of the infinite is difficult.” The discussion of the unlimited in mathematics lay “beyond our present scope”, so that in this text specifically, the infinite is discussed solely with regard to the sensible magnitudes. Obviously, he said, numbers cannot be divisible beyond a unit, but can always be increased by addition indefinitely. (207b15-20). In the case of geometry, for Aristotle, the geometers in practice have no need of the infinite because they can always take a line of any length they so desire. “So the question under discussion does not affect their demonstrations...”. (207b27-35). translation Wicksteed and Cornford.
424 *Physics* 207b22. cf. Sorabji; *Time, Creation, and the Continuum*, *op cit*, pp.211-213. See also Cleary; *op cit*, p. 80-85, where he briefly outlines five sorts of infinity from Aristotle’s predecessors with whom he was in dialogue.
425 *Physics* 206a26-34. τὸ αἰὲν ἄλλο καὶ ἄλλο λαμβάνεται.
possibility of another day continuously becoming actual. Yet in the end, for Aristotle there is no actual infinity; only a potential infinite is thinkable. Nothing that is in the phenomenal continuum is ever actually infinite.

Aristotle discussed in the *Physics* III, the infinite with regard to five phenomena: 1. Time 2. Magnitude 3. Matter 4. The Cosmos, and 5. Imagined objects or ideas, including mathematics. In order to describe the five systematically, since they are non-symmetrical, each will be taken up separately.

Firstly, time: Most importantly time, as a continuum, is infinitely divisible into the limit of “now”. Yet the “now” is not part of time; neither is time composed of “nows”. Time and the possibility of time stretch infinitely back into the past and infinitely into the future as if a line. Yet in the infinity of time in the sense of eternity, time is without limit. If time had limits, with a definite beginning and end, time could not be said to exist strictly speaking. Time, is the measure of the before and after. Consequently, “time and movement are indeed unlimited, but only as processes, and we cannot even suppose their successive stretches to exist”. If, for example, time had always existed, then “what has changed must already have changed an infinite number of times”. But Aristotle does not admit a beginning to time or to the universe, for what is generated also has the possibility of corruption. This unlimited character of time is not to say that the world does not change; rather, the cosmos is continually and cyclically becoming.

The universe was always, and will always be. Aristotle writes in the *Metaphysics* 1071b7-12: “Nor can time come into being or cease to

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426 *Physics* 207b15-25.
427 *Physics* 207a33-207b22. And OGC 318a20-23: “...since nothing is actually infinite by only potentially so, for the purposes of division.”
428 *Physics* 203b17ff.
429 *Physics* 208a20-22. translation Wicksteed and Cornford.
430 *Physics* 237a16. translation Wicksteed and Cornford.
431 *Metaphysics* 1071b7-8.
be; for there could not be a before and an after if time did not exist”.\footnote{Movement, as displacement in time through place, is also continuous; he goes on to say in \textit{Metaphysics} 1071b7-12: “Movement also is continuous, then, in the sense in which time is; for time is either the same thing as movement or an attribute of movement. And there is no continuous movement except movement in place, and of this only that which is circular is continuous.”\cite{Physics208a20-22.}}

Time, quite decisively, cannot itself generate and corrupt; therefore, in principle there is neither a beginning nor an end to time in the universe. Potentially, infinite time exists because it is a continuum; yet time is never completely actualized because as a whole it is only present as the limit of the “now”. The “limit” to the “unlimited” must be imposed by Aristotle in order to avoid the problem that occurs when you have an infinite time regressing into an infinity of the future - the many-worlds problem compounded by the factor of infinity times infinity. The “present” would, as a consequence, always be infinity plus “present” time. All events in time can potentially occur, but not “at the same time”. So, the infinity of time, albeit only possible as a thought of never-ending time,\footnote{cf. Hussey, Edward; “Notes” to Aristotle \textit{Physics}; Books III and IV (Oxford: Clarendon, 1983)p.90-91.} or eternity, does not exist as a completed, actualized whole.

Secondly, magnitude: Infinite divisibility of magnitude was absolutely necessary as explicated in previous sections, in order to defeat Atomism. Matter or the phenomenal continuum was infinitely divisible; that is to say, infinity existed in the ever-smaller dimension. The infinitely small was a mathematical point as a limit or continuous boundary. Any material continuum is divisible \textit{ad infinitum}, never exhausting potential division; however, no sensible magnitude is infinitely expansive, for nothing can be greater than the world itself.\footnote{Physics 207b23ff.}

Indeed, Aristotle is careful to point out that the infinite does not apply equally to both magnitudes.\footnote{\textit{Physics} 207b23ff.} Although potentially there is always something smaller, there is a limit to the infinitely large. For Aristotle,
there is no magnitude of unlimited greatness.\textsuperscript{436} As a consequence, an unequal correspondence occurs between the infinitely small and the infinitely great. The largest magnitude, in fact, the universe as a whole, as the last limit, the bound which is always limited. The infinitely large is infinite only in the sense that it is “that which cannot be gone through”. Yet nothing phenomenal can be unlimited in the sense of multiplication for it would “have to transcend the entire universe.” A magnitude is never infinitely extendible quite simply because the addition or expansion of such bodies infinitely would ultimately arrive at the point that the universe could no longer contain them. Obviously, an infinite number of bodies infinitely added together would extend beyond the bounds of the universe.

In the case of number, there is always “a ‘possibility of more’, \textit{λαμβανόμενον}, inexhaustible and incapable of completion, ...always in the making but never made...”.\textsuperscript{437} In 206b, Aristotle quite clearly states that although the addition of magnitudes can be thought of in conjunction with the division of material, the addition of magnitudes has a “definite limit”, never extending beyond the actual magnitude, for to go beyond the limit of the universe is impossible. One can quite simply never be beyond the outer limit, outside of what is per definition “whole” and “one”.

Thirdly, matter: Decisively, for Aristotle in contradistinction to his predecessors, there is no infinite quantity of matter available for composition into a material continuum. The cyclical repetition of generation and corruption is infinite; the actual number of bodies is finite. His predecessors had considered the infinite as an entity in itself, but for Aristotle the “unlimited” does not consist of an independent substance, rather is solely a potentiality of continua or an attribute of sensible objects. There is not an infinite, inexhaustible amount of matter from which sensible things come – an infinite “storage” of elements, or atoms, or matter, available for generation into beings\textsuperscript{438}

\textsuperscript{436} \textit{Physics} 207b5. \\
\textsuperscript{437} \textit{Physics} 207b13-17. translation Wicksteed and Cornford. \\
\textsuperscript{438} \textit{Physics} 203b16-7, \textit{Physics} 208a8-11. cf. \textit{Physics} 204b15-205a9 for the extended argument concerning simple and compound substances.
- rather they are re-cycled as it were, in a process of generation and corruption. The “unlimited” is the “never-failing” cycle of coming-to-be and passing-away, not the quantity of matter itself. “Infinity exists through a process of one thing coming into being after another”.

Fourthly, the cosmos: In the continuum as defined by Aristotle, there is an infinite slippage of the “limit” of the “unlimited”, a moving of the boundary of the limit up to the point where the limit is absolute. This limit is the ultimate limit of literally the boundary of the cosmological universe. For Aristotle, the cosmos is contained in the spheres. So, although one could in principle infinitely go beyond any boundary or limit, in the case of the universe, one reaches the ultimate limit. In fact, Aristotle says, in precisely this case, the infinite or “unlimited is really the exact opposite of its usual description; for it is not that ‘beyond which there is nothing’, but ‘what is always beyond’;” that is to say, that which is beyond any definable limit. The universe is not infinite, but whole, one, or completed. And in this sense – the infinite as one, all-encompassing whole - the universe, albeit finite, can be said to contain the infinite. To call infinity, “that which cannot be gone through” \( \alpha \delta i \varepsilon i \phi \tau o c \), is to say that the cosmos is never complete, never at an end. Nevertheless, this genetic aspect to infinity will have the consequence that infinity will always be potential, and never completely actual. The cosmos itself is bounded by an outer limit simply because there is no “beyond” the universe. An infinite body is simply a contradiction, for Aristotle, “...for nothing can be limited except by something else beyond its limit”.

Aristotle’s predecessors, in fact, spoke of the infinity as arché, as the first principle, the material cause of all genesis, as the beginning of motion, of all potentiality. This origin is indeed the boundless. But what is infinite cannot be a “part”; the universe is whole or one. In short, a limit must be imposed on the “unlimited” so as “not to go

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439 Sorabji; Time, Creation and the Continuum, op cit, p.211: Aristotle “uses the future tense when he says that in something infinitely divisible there will be a smaller division...”. Sorabji gives the references of Physics 206a21-23, 206a30-33, 207b14.

440 Physics 207a1-3. See “note c” on page 252 of the Wicksteed and Cornford translation; that is to say, the beyond is “beyond any definable limit.”

441 Physics 203b20-23. translation Wicksteed and Cornford.
through”; nothing is outside the universe. This limit is the bound or end of the universe itself for nothing is outside it. The universe can be said to be “indivisible” in this sense of the “unlimited”, and still be precisely a unity. The universe cannot be divided into smaller universes but is incisively a “whole”, a “one”. This “indivisible” does not contradict the infinitely small divisions possible between any two “somethings”. Rather, the universe is an infinite whole. Although a continuum, thus with magnitude, any magnitude can ostensibly be a plurality. So even though the universe as a spherical shaped object, is a mathematically limited or bounded object, it has a limit of indivisibility - i.e. there is a limit at which it can no longer be divided as a unity. In the cosmological sphere every point is equi-distant from its surface to the center. However, precisely in the case of the universe, it is singular, and as a particular individual with no other, the universe is an indivisible unity. The infinite is literally, “that which cannot be gone through”, adiēxiφτος. A sphere is precisely finite, in the observable finite orbits of the heavenly bodies. The cosmos is not an infinite, but a whole. The All is all-embracing, or containing.

Fifthly, imagined objects or ideas: For example, in numerical series or geometrical figures, mathematically, what can be thought is infinite. “The imagination”, said Aristotle, “can always conceive a ‘beyond’ reaching out from any limit…”. As such there is no limit to what can be thought. Conversely, however, “it is contradictory and impossible that the unknowable (ἄγνωστον) and undefined

442 Physics 207a12.
443 Physics 207a20-25.
444 cf. Boyer; op cit, p.41: “Such a view of number could not be reconciled with the infinite divisibility of continuous magnitude which Aristotle upheld so vigorously. When, then, Aristotle distinguished two kinds of (potential) infinite - one in the direction of successive addition, or the infinitely large, and the other in the direction of successive subdivision, or the infinitely small - we find the behavior of number to be different from that of magnitude: ‘...in the direction of largeness it is always possible to think of a larger number....Hence this infinite is potential, ...and not a permanent actuality but consists in a process of coming to be, like time...With magnitudes the contrary holds. What is continuous is divided ad infinitum, but there is no infinite in the direction of increase. For the size, which it can potentially be, it can also actually be.’” Boyer cites Physics 220a.
The architectonic as continuum

(ἀόριστον) should embrace and define anything’.446 As a whole, what is knowable is without limit; indeed, a limit to thinking the “unlimited” is unimaginable. Thinking is without limit, inexhaustible. The infinite itself, as a principle,447 has no beginning and no end. Nevertheless, in the infinitely small, such as with numbers, something less than nothing is unthinkable. So there is a limit to the infinitely divisible with the ideal. Although thinking the ideal is never-ending, unlimited; an ideal less than nothing is never possible.

In the end, concerning the infinitely, to apeiron, in Aristotle, the universe is “infinite” and “indivisible”, πέρας ἀδιαιρέτον but this created problems that even in antiquity were obvious.448 The main problem concerning the continuum arises when you turn infinity around - from the infinitely divisible that Aristotle needs to defeat Atomism - to the potentially extendible that he needs in order to defeat the “Anaxagoras problem”, where within an infinite number of bodies there exists infinite parts; and within any part exists an infinity of worlds. The infinitely large is only a potential infinite for Aristotle: “nothing is actually infinite but only potentially so for the purpose of division”.449

To sum up, the infinite is quite a complex aspect of phenomena for Aristotle, meaning several things, and often non-symmetrical. The infinite could be that which cannot be transversed, or the “no getting to the end of it”, or “that which cannot be gone through”, or the absence of a limit, or an “unlimited”, or finally, the ever-present “possibility of more”. With time, infinite divisibility is paired with the “unlimited” regarding time, never beginning or ending. Magnitudes, as a phenomenal continuum, as well, are also infinitely divisible, yet permit no increase. In the cosmos, it is impossible to exceed the limit of magnitude because in this case, the opposite of the usual

446 Physics 207a30-33. translation Wicksteed and Cornford.
447 Physics 203b10ff.
448 Metaphysics 1091a15-18: “...for they [the Pythagoreans] obviously say that when the one had been constructed, whether out of planes or of surface or of seed or of elements which they cannot express; immediately the nearest part of the unlimited began to be drawn in and limited by the limit.” chaos – without boundaries; cosmos – orderly arrangement.
449 Physics 318a23. See also Metaphysics 1066a35-1069a15.
meaning of “unlimited” applies. The universe is one, and as such is the ultimate, absolute limit; hence, not divisible per definition. In fact, all continua are potentially, but never actually infinite.\textsuperscript{450} And in the case of the ideal, numbers, and mathematics, conceivably there is no limit beyond which could be thought; however, anything less than nothing, is simply unthinkable. The infinite is potential, never actual. In short, for Aristotle concerning the infinite, the universe was finite. Infinity is a continuum; that is to say “susceptible of division without limit.” Yet, the cosmos is quite simply indivisible.

The infinite and the continua are intimately linked, in fact, for Aristotle, the infinite is the first continuity, the first in the sense of the infinitely divisible, and the first in the sense that the universe presents itself as a whole in the continuum.\textsuperscript{451} In the science of nature, infinity is the most important continuous thing, then place, time, motion, and magnitude. The universe is one phenomenal continuum.

\textbf{The Continuum is One}

As argued above, material or phenomenal continua include generation, time, place, motion, magnitude, and infinity. The first continuum is the infinite. In other important ways, Aristotle shows that as a continuous magnitude, any continuum constitutes a whole, or a unity, or a “one”. In the \textit{Metaphysics} v.6, specifically, Aristotle elaborates the ways in which things can be called “one”.\textsuperscript{452} Of these ways, things can be “one” by virtue of a continuity by nature or a continuity by art. For example, a collection or bundle or aggregate can be one continuity by art, albeit inferior to a continuity by nature. A continuum by nature is “one” when it is indivisible in the sense of one whole, differing neither in kind nor substance. Aggregates of things are merely in contact; they do not constitute a unity or continuum. Aristotle states that things are “one” when they are indivisible and whole. This statement is seemingly contradictory when time and place, as well as other continua, are infinitely divisible. However, here Aristotle means indivisible in the

\textsuperscript{450} Physics 207a33-207b22.  
\textsuperscript{451} Physics 200b17-20.  
\textsuperscript{452} Metaphysics 1015b35-1017a6.
sense of “one” whole. So, for example, even though time and place are not made of atomic parts, they constitute an “indivisible”; that is to say, they “do not admit division”; in terms of separate segments of time or place. Furthermore, all continua are “one” if their motion is indivisible. Aristotle concludes: “things, then, that are continuous in any way are called one...”. Consequently, although Aristotle is careful to define the continuum in terms of the infinitely divisible, they are “indivisible” in the sense that they also constitute a true metaphysical unity, whole or oneness. The continuum is one.

Not only are phenomena a continuum, as we have seen, but also substance itself could be considered a sort of continuity. Although strictly speaking for Aristotle, something without magnitude cannot make up a continuum, substance is both the underlying substratum and particular individuals, \( \omega \sigma \alpha i \). Aristotle states: “...substance has two senses – (a). the ultimate substratum, which is no longer predicated of anything else, and (b). that which is a ‘this’ and separable – and of this nature is the shape or form of each thing”. John Cleary, for example, explicates that Aristotle in *Metaphysics* XII explains how:

substance is the first thing in the universe, no matter how we conceive the All (\( \tau \delta \pi \alpha n \)) to be structured. If we take the universe to be a kind of whole (\( \omega c \delta \lambda o n \) \( \tau i \)), for instance, Aristotle claims (1069a19ff) that substance would be the first part (\( \pi r w t o n \mu e r o c \)). And, even if we should assume the universe to be serially ordered (\( \tau \omega \) \( \epsilon f e \xi \eta c s \)), substance would still be prior to quality and quantity. Substance is the underlying constituent of the All and the particular concrete individual thing, (\( \tau \delta e \tau i \)). Substance is not Forms or triangles such as with Plato, or mathematical objects, or sensible elements. The compound of form and matter are substance, “for both separability and individuality are thought to belong chiefly
to substance”. Yet the continuity of substance is a difficult question. The substratum persists as the potentiality of the concrete actualized composite form/matter, the ‘this’ that Aristotle defines as substance. Nevertheless, Aristotle also maintains that “in general nothing that is common is substance, for substance does not belong to anything but itself”.

Can substance be considered to be one continuity? In *Metaphysics* V.6, Aristotle outlines the ways in which things can be said to be one: 1). things, then, that are continuous in any way are called one; 2). one if the substrate, *hupokeimenon*, does not differ in kind; 3). one if the genus is one, e.g. one genus of an animal; 4). one if the formula is one, or the definition is indistinguishable, e.g. one man *qua* man; 5). one if substance is one in either continuity or form or definition; 6). one if quantity is continuous, or possessing one, or relating to one, that is to say, a whole, e.g. one shoe; or, 7). the essence of one is to be a kind of starting point (*apxē*/*archē*), that is, that which is knowable in each particular thing. Similarly, Aristotle again reiterates that the one is “…naturally continuous, or a whole, or an individual, or a universal”. So although not all unities - as a “one” - can be constituted as a continuum, among those things that are said to be “one”, are the continuous.

Not unfairly, Mary Louise Gill calls Aristotle’s theory of substance a “paradox of unity”, a schema of a “vertical unity” accounting for the

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458 *Metaphysics* 1029a26-7.
459 *Metaphysics* 1040b24.
460 *Metaphysics* 1015b35-1017a6.
461 *Metaphysics* 1052a34-1052b1.
463 cf. Gill; *Aristotle on Substance*, op cit, “Introduction”, pp.3-12, pp.108-110, pp.145-146. Gill’s account roughly mirrors that Aristotelian axis of form-matter/potentiality-actuality. “Aristotle insists upon horizontal unity through generation and destruction to avoid the Parmenidean objection against sheer emergence; horizontal unity, however, as straightforwardly interpreted, deprives the composite [substance] of vertical unity…. Aristotle solves the paradox of unity, not by weakening the demand for vertical unity, but by reinterpreting the demand for horizontal unity.” Gill; op cit, p.241.
unity of composite substances, and an “horizontal unity” accounting for
continuity in substance over time, through generation and corruption.
Gill explains: “On several occasions Aristotle attributes unity to things
whose material parts are continuous. Continuity in an artificial sense
is displayed by things whose parts are bundled or glued or otherwise in
contact, natural continuity by things whose parts are naturally continuous
and whose proper (καθ’ αὐτό) motion is one”.464 Furthermore, Aristotle
explains that even though a phenomenal continuum contains parts,
and a substantial continuity includes being said in many ways, these
continua still constitute a “whole”:

We call a whole that from which is absent none of the parts of which
it is said to be naturally a whole, and that which so contains the things
it contains that they form a unity; and this in two senses – either as
each and all one, or as making up the unity between them....But the
continuous and limited is a whole, when there is a unity consisting of
several parts present in it, especially if they are present only potentially,
but failing this, even if they are present actually. Of these things
themselves, those which are so by nature wholes in a higher degree
than those which are so by art, as we said in the case of unity also,
wholeness being in fact a sort of oneness.465

As a “one”, the continuum is a whole made up of parts466 -
parts of the phenomenal continuum of time, place, magnitude, and
infinity; parts of a substantial continuity that consist of substance as
concrete actualizations of form/matter (τὸ τὸδὲ τι). Most importantly,
substance as substratum accounts for continuity through change,
through generation and corruption. This continuity is what Gill calls
“horizontal unity”:

Aristotle’s construction model might be visualized as a sort of step
pyramid whose topmost platform is the highest-level composite and

464 Gill, M.L.; “Individuals and Individuation in Aristotle” in Scaltsas, T. and Charles, D.
and Gill, M.L. (eds.); op cit, p.61.
465 Metaphysics 1023b26-36.
466 Metaphysics 1023b19-20. Parts in the manner which Aristotle describes in 1023b19-23,
that is to say, the whole is a form composed of the parts, or the component parts “into
which the whole is divided, or which it consists.”
whose base is the ultimate matter. A complete cycle of generation begins from the foundation, advances upwards by steps to reach the height of the edifice, and then proceeds downward by steps on the further side to complete the cycle at the foundation....The construction model accommodates substantial change against the Parmenidean objection that generation is sheer replacement.467

In conclusion, the characteristics of a phenomenal continuum are infinite divisibility, defined by limit, existence as being “somewhere”, and phenomena “made up” of an infinity of parts, yet are a whole. A substantial continuity is comprised of by particular individual substances, by substance as the first in the All, and by substance as the underlying substratum. This continuum of “one” is constituted by substratum from which all particular things arise and pass away, never-failing, and remaining always. A continuum is of one beginning, archê; and one cause which is substance itself. Most importantly, a thing can be called one if its substance is one in either continuity, form or definition.468 A continuum is called “one” when it is a unified whole. In this way, Aristotle’s architectonic can be said to be both a phenomenal continuum and a substantial continuity. Nevertheless, this continuum is not seamless. In phenomena the continuous is not always equivalent; in substance, the substrate is the underlying, yet substance remains per definition for Aristotle, the concrete actualized individual.

From Aristotle to the Seventeenth Century (a little jump)
The Aristotelian account of the indivisible, the infinite, and the continuum survived through to the seventeenth century. However, with Philoponus in the 6th century and the medieval Scholastic Thomas Aquinas (1225-1274), Aristotle’s hulê to hupokeimenon was interpreted as “prima materia”, an interpretation that has proven difficult to eradicate.469 With the Arab/Spanish Aristotelian commentator Averroes (1126-

467 Gill; Aristotle on Substance, op cit, pp.108-9.
468 Metaphysics 1016b8-10.
there were some developments in the thought of the natural minima. “Averroes gives careful attention to the very important distinction between physical and mathematical divisibility, which is the foundation of the theory of natural minima”.470 Furthermore, another important influence was Pierre Gassendi (1592-1665), who through his translations and commentaries on Diogenes Laertius and Epicurus, perpetuated concepts of early Greek Atomism.471 Most of the aspects that characterized the ancient Greek Atomists’ account remained intact, with the exception that Gassendi denied self-movement, or *sui generis* to the atoms. Instead, atoms were in his view, created by God and finite in number. Descartes, on the other hand, would reject Democritus’ atomic theory mainly because the Greek atoms did not possess qualities, and the idea of the void differed from Descartes postulates of matter in extension.472 But the seventeenth century also meant the waning of the influence of Aristotelian philosophy. As van Melsen explains: “provisionally the fall of Aristotle meant only that his place was taken by philosophic mechanism either in the classical form of Democritus or in that of Descartes”.473 The seventeenth century revival of Atomism was due chiefly to the rise of mechanism. An atom is an elemental particle that easily gives itself to mathematical manipulation. Precisely the lack of qualities of the atom becomes the atoms’ virtues from a mechanistic point of view. All variation can be effectively reduced to a mathematical point, and change of position can be described by the emerging mathematics, including the invention by both Newton and Leibniz of differential calculus. The atom makes an ideal “building block”.

Obviously, to trace the exact influence of Aristotle on the emerging science of the seventeenth century is beyond the scope of

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473 van Melsen; *op cit*, p.111.
this book. Yet, let us remember that Atomism began with an attempt to metaphysically explain phenomenal change. And most importantly, a lack of distinction between mathematical or abstract minima, and materially small particles remains in the seventeenth century, and will certainly have to be kept in mind when discussing Leibniz on the minima, and indeed, the monad.

“The fairest universe is but a dust-heap piled up at random.”

Heraclitus⁴⁷⁵

“Inanimate and animate things are not juxtaposed as two separate regions. Nor are they laminated one on top of the other. Rather, they are represented as interwoven in one vast nexus of Becoming.”

Heidegger⁴⁷⁶

“Ontology will drive me mad, its labyrinths are nefarious.”

Goethe⁴⁷⁷

The philosophy of Leibniz can be read in many ways: as an historical document in the history of ideas, or as a source that can be refolded into the discourse of contemporary philosophical concerns. Specifically in this chapter, I wish to explore the possible consequences of the Leibnizian monadological view on the transcendent structures of metaphysics. In earlier chapters, the architectonic structure of Plato’s metaphysics was shown to be a tripartite structure with the figure of the chora as an intermediary between being and becoming. Aristotle’s metaphysical structure is a continuum, with the phenomenal world being infinitely divisible. The architectonic of Leibniz, on the other hand, is commonly thought of as a transcendent structure with God at the apex of a complex network of monads, the intelligentia supramundana.

However, the privileged position of God in the hierarchy of Being can be considered as a “special case monad”. Subsequently, the place of being, the onto-topology of Leibnizian philosophy, changes into a metaphysic without a necessary transcendent structure. The ontological structure flattens out in a radical notion of concomitance, leaving God as a special case monad in a system of intersubstantial connectivity where transcendence is merely a special case of immanence.

Whereas the reading of Plato in the first chapter primarily entailed an exegesis of one text, the task here is more complex, reading Leibniz’s extensive correspondence alongside the Discourse on Metaphysics and the Monadology, in order to ascertain the extent of the

479 The following volumes of Leibniz papers will be cited:
A = Gottfried Wilhelm Leibniz: Sämtliche Schriften und Briefe (Darmstadt und Berlin: Deutsche Akademie der Wissenschaften zu Berlin, 1923-).
LCC = The Leibniz-Clarke Correspondence edited and introduced by H.G. Alexander (Manchester: Manchester UP, 1956).
inter-agreement between things. Leibniz will rehearse many attempts to provide a structurally reliable relationship between the monad and the entire universe, between the metaphysical and the phenomenal. For Leibniz, the continuum is composed of monadic atoms that are substances whilst denying sensible atomism. Space, time, and motion are infinitely divisible; they are not real for Leibniz, rather “well-founded phenomena”.

After briefly outlining the Leibnizian theory of monadic substance, I will bring to the fore the integral notions of intersubstantiality, the interdependence implied in the *predicatum inest subiecto*, the theory of concomitance where the individual points-of-view of each monad become critical for the representation of the universe, and finally the various attempts to account for coherence in order for Leibniz to preserve a unity *per se*. Following an explanation of substantial unity, I take up Leibniz’s investigations into what he calls “the second labyrinth”, the phenomenal continuum. In doing so, I hope to demonstrate that Leibniz achieves metaphysical unity in a variety of ways, some more successful than others, yet as whole, his commitment to reason, the order of nature, and a unified vision of the universe constitutes a singular and remarkable onto-topological structure. An immanent and dynamic architectonic emerges, a structure that manages to account for both the changeable character of phenomena, and the unchanging nature of being.

**The Labyrinth**

In the Preface of the *Theodicy* (1710), Leibniz sets out the two great mysteries of philosophy: the first labyrinth consisting of the origin of good and evil, the question of free will, and metaphysical issues of necessity; and the second labyrinth consisting of the more phenomenal


issues of continuity and indivisibles - the so-called “composition of the continuum” including questions of space, time and motion. The first labyrinth, he states, “perplexes almost all the human race, the other exercises philosophers only”. These two labyrinths were to occupy his entire lifetime’s endeavors. The Theodicy, the only full-length work he published in his lifetime, deals with the first labyrinth. Issues concerning the second labyrinth are treated in literally hundreds of fragments, thought experiments, and sections of letters in his correspondence. This reading of Leibniz attempts to follow the thread through the second labyrinth. It does not propose to resolve these questions, nor indeed to emerge from the abysmal depths unscathed. Leibniz himself would inquire after these mysteries for more than fifty years. In the following account of his philosophy, an attempt will be made to layout the terrain of inquiry, to map out the labyrinth. In contrast to the predominant historical methodology, this reading will not seek to reveal the inconsistencies in his philosophy, or blame Leibniz for unresolved problems. He attempts, but does not resolve problems that concerned philosophy both before and after him: the relation of things to each other, the order of the universe, the relation of the body to the soul/mind, and indeed the cause and reason for all things. In this reading, I will search for the aspects of his thought – in published work, but more often than not in letters and fragments – that show a consistency of thought, a uniformity of concern, or a continuity in the inquiry that pervades the philosophy of Leibniz. I will not blame him for failing to do what no other philosopher has ever been able to do – to provide an answer for the labyrinth of the continuum. Consequently, the key concept will be unity and consistency – all through his work, Leibniz

480 GP VI, 29/T 53. Earlier he had set out an enumeration of the “secrets of things” in a short fragment thought to be composed in the spring of 1676, entitled, “Guilielmus Pacidius on the Secrets of Things” (A, 77/DSR 88-91) Item 6 and 7: “6). The first labyrinth, or, on fate, fortune, freedom. 7). The second labyrinth, or, on the composition of the continuum, on time, place, and the motion of the atom, on the indivisible and the infinite.” This expression “composition of the continuum” is also found in the Discourse on Metaphysics of 1676, §10. Parkinson notes that Leibniz has taken the phrase “composition of the continuum” from a book by Libert Froidmont, Labynithus, sive de composittone continui (1631). cf. Philosophical Writings, translated and edited by Mary Morris and G.H.R. Parkinson (London: J.M. Dent & Sons, 1990)p.244, note g.
attempted to provide a coherent and reasoned account of metaphysical reality and phenomenal actuality.

**Phenomenal and Metaphysical Atomism**

Early on in his career, Leibniz admits to having been taken up with the idea of atomism. The idea intuitively appealed to him at a time in his philosophical development when he was trying to free himself from the influence of Aristotle. Yet upon further reflection, he realized that matter alone could not be a true unity in and of itself without something substantial. In his turn away from atomism, Leibniz could also be said to position himself decisively in line with substantial unity; i.e. a unity that was both material and metaphysical. In his mature philosophical position, extended raw matter is insufficient to constitute an *unum per se*. Not only is this decisive turn important from the standpoint of Leibniz’s position in contradistinction to the rationalists or mechanists of the seventeenth century, but also in terms of the fact that he rehabilitates something like “substantial forms” from antiquity. Even though he too saw the inadequacies of this notion, he sought a universal principle in order to account for the nature of all things. In antiquity, the doctrine of the forms, from the viewpoint of the seventeenth century, had swung too far to the metaphysical side; yet, from the viewpoint of Leibniz – and herein lies the strength of his mature position – the mechanists had swung too far to the physical side, unable to account for the unity of entities. Although atomism appeals in a spatio-temporal void, it is a mere arrangement or aggregation of

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481 P 116. Leibniz tells the anecdote in “New System of the Nature and Communication of Substances, as well as of the Union Existing Between the Soul and the Body” (c.1695).

482 DM; §11. Mason explains in his Introduction to the *Leibniz-Arnauld Correspondence*: “The term ‘substantial form’ was used by the Scholastics to refer to the goal of a thing’s endeavor, the fully developed state that it tries to realize; movement, and indeed all change, were explained by them in such terms. Such notions were rejected by many seventeenth-century scientists and philosophers, and Leibniz knew that in rehabilitating substantial forms he might seem to be taking a retrograde step. He takes care to add, therefore, that these forms are not to be used to explain particular natural phenomena...[which] must always be explained mathematically or mechanically...”. Leibniz, G.W.; *The Leibniz-Arnauld Correspondence*, edited and translated by H.T. Mason, Introduction by G.H.R. Parkinson (Manchester: Manchester UP, 1967)p.xxv.
the material parts. On the other hand, although Cartesian extension appeals in a geometrical or mathematical description, it does not account for the connection between the body and the mind. The wholeness of living, changing beings is neglected in these accounts. Instead, Leibniz takes up what Aristotle had called first entelechies, that is to say, the unfolded fullness or completeness of an individual entity. Leibniz extends the Aristotelian notion of entelechia, into a “real and animated point, or atom of substance which must embrace some element of form or of activity in order to make a complete being”.

As a consequence, Leibniz proposes a middle way – a way between the pure mechanical materialism of early modern physics, and the metaphysical doctrine of forms from antiquity. This middle way constitutes a true unity for Leibniz – a unity between the substantial and phenomenal, as well as the individual and its universe. Leibniz will then maintain, ultimately, that a unity is something other than a mere mathematical point, or discrete entity, from which no phenomena can be composed. Neither is a unity simply corporeal extension. “Atoms of matter are contrary to reason”, Leibniz emphatically argues, whilst “atoms of substance” are the only true unities without parts.

By 1671, Leibniz had decidedly rejected physical atomism: “Matter is actually divided into an infinity of parts. There are in any given body an infinity of creatures. All bodies cohere in themselves. Certainly all are divisible from the others, but not without resistance. There are no Atoms, or bodies whose parts are never divisible”. Notably, although Leibniz rejects in his mature philosophy the notion of physical atoms, following ultimately in the footsteps of Aristotle in this regard, he maintains throughout his remaining life, a metaphysical

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483 P 121. “New System”. A problem that Descartes himself acknowledged. Leibniz poetically states: “M. Descartes left the field at this stage, as far as we can gather from his writings...”.
485 P 120-1/AG 142. “New System”. The term “metaphysical atom” or “atom of substance” is explicitly used by Leibniz and becomes synonymous with the “monad” in his later work.
atom – or, monad, coming from the Greek monas, or unit. This monad is uncuttable, indivisible, and inviolate, created only by God, and therefore destroyed only by a supernatural power. Furthermore, the concept of the monad is, albeit unchangeable, a dynamic principle, or active force, a metaphysical point that expresses itself, or unfolds itself into phenomenal extension. The monad is the metaphysical point, or center of an active force from which all phenomena begins, the “absolute first principles of the composition of things”. The monad becomes the vital force from which the universe is expressed as the perception/representation of the individual point-of-view.

Consequently, Leibniz explains substantial unity in a manner that negotiates the middle way between antiquity and modernity, and in doing so provides an account for the two labyrinths – the physical continuum, and metaphysical continuity or perfection.

One of the most comprehensive accounts of substantial unity for Leibniz is his short essay of 1695-6, entitled: New System published in the Journal des Savants. Leibniz creates substantial unity in a system of pre-established harmony, where God creates the soul as a real unity, which is to say that it is a metaphysical point/atom from which the expression of this monad flows in perfect conformity or agreement within the universe. Each of these monadic substances is not only a unity in and of itself, but reflects the universe in a singular manner, from a specific point-of-view, participating in the perfect unity which is

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487 Parkinson explicates the fact that the term “monad” was used by Leibniz after 1695, the first instance of which is the letter to the Marquis de l’Hospital, 22 July 1695 (GM II, 295) in P 255; notes introducing “On the Principle of Indiscernibles”.

488 P 121. “New System”.


491 P 122. “New System”.
the entire universe. In this way, the monad expresses the universe from its harmonious soul, and mirrors the universe in its perceptions, thereby creating an interconnection or internal dependence of all created beings with each other through the intermediary of God. Of paramount importance is the fact that for Leibniz, all substances are in perfect agreement. In addition, substance is never extended, namely because corporeal matter does not constitute a substantial unity for Leibniz. Instead, matter is organized around a monad, in a perfect union of the soul and body, and in a mutual relation with every other substance in the universe, but without transmissions between the monads or constant interventions by God. Every monadic substance has free will; indeed, the monad as a substantial unity is self-moved, an "automaton". Furthermore, in spite of being in perfect agreement with all other substances in the universe, the monad is a “world apart”, a metaphysical point or atom that is sufficient unto itself; subsequently, it undergoes no generation or corruption under the influence of any other substance.

In the end, Leibniz decidedly, from his mature philosophy until his death, denies material atomism. Although he closely follows Aristotle in this regard, the rejection of material atomism is for entirely different reasons. As we saw in the previous chapter, Aristotle’s rejection of atomism comes from a critique of Parmenides and Zeno. Leibniz’s rejection is on other metaphysical grounds. Material corporeal being is never a complete, unified substance for him. Nevertheless, Leibniz

492 ibid.
494 P 125-6. “New System”.
495 P 123-7. “New System”.
496 For example, very succinctly stated in GP VII, 309-318/Aiv312/LC 311(1620) A Specimen of Discoveries of the Admirable Secrets of Nature in General (c.1686, uncertain date), quoting from The Labyrinth of the Continuum: Writings on the Continuum Problem, 1672-1686, translated and introduced by Richard T.W. Arthur (New Haven, Conn.: Yale UP, 2001): “Moreover, there are no atoms, but every part again has parts actually divided from each other and excited by different motions, or what follows from this, every body however small has actually infinite parts, and in every grain of powder there is a world of innumerable creatures.” p.317. He goes on to say in a marginal note (L5) that in “any grain of sand is a kind of small system in itself.” p.325.
extends the Aristotelian notion of *entelechia* into a metaphysical atom, a real unified atom of substance, a monad or source point of self-movement and perception, absolutely without parts, and indeed the ultimate first principle constituting the labyrinth of the continuum.497

Thus, the one of the most important aspects of the philosophy of Leibniz is the infinite divisibility in the material continuum intertwined with monadic atomism in the metaphysical continuum. Yet these two realms are in constant dynamic flux, folding and unfolding in a spatio-temporal matrix, in constant communication/nexus with each other. Each of the component parts is both a substantial unity, and reflects as a mirror the entire universe from its individual point-of-view. Thus the labyrinth of the continuum, although just as mysterious and impenetrable as ever, becomes a whole – a unity in the individual, and a whole in inter-monadic relation with the entire universe.

In the following sections, the task is to outline the various ways Leibniz attempted to account for substantial unity, and then, to turn to his investigations into the nature of continuity in the phenomenal or material continuum where space and time are relational and matter is infinitely divisible. Most importantly, for Leibniz, a unity is that which has no parts. In his universal project, including both metaphysics and physics, a unity is attained in metaphysical atomism, a genuine whole, as well as the continuity in the continuum with a harmonious relation to God. Succinctly stated: “the soul is the principle of unity and of consistency and duration; whereas matter is the principle of multiplicity and change”.498

**The Leibnizian Theory of Monadic Substance**

In order to understand the structure of Leibniz’s monad, it is imperative to understand the underlying motive for Leibniz in proposing such a structure. In an historical climate wrought with religious conflict, he sought to thematise the metaphysical distinction between the substance and the will of things divine, and of things human. The more Catholic of his correspondents were most concerned to preserve

497 P 120-1. “New System”.
the divine order of things; the more Protestant, in contrast, were extending the limits of human free will. In precisely what measure are human beings determining their own destiny? One extreme would be the position of Descartes where God creates the world, which afterward functions mechanically. In contrast, Newton’s mechanistic clock metaphor, at the very least, allows periodic intervention and tampering on the part of the divine creator. On the other extreme, Spinoza positions God as the eternal expressive force with human beings purely within the substance of God and their fate - in spite of their actions - predetermined by God. Spinoza’s one substance is untenable to Leibniz in that he wishes to preserve not only the notion of the free creation of God, but the free will of created beings. With Spinoza, God is pure substance and all created beings participate in


500 cf. Garber, Daniel; “Uniting Mechanism and Piety” in Herbert Breger, Jürgen Herbst, and Sven Erdner (eds.); Conference Proceedings of the Internationaler Leibniz-Kongress vol.2 (Hannover: Gottfried Wilhelm Leibniz Gesellschaft, 2006)pp.241-247. Garber argues that even though Leibniz had famously abandoned “substantial forms” in the gardens outside Leipzig when he was fifteen years of age, and turned forward to the mechanist philosophy then developing, these philosophies still relied upon God as efficient cause to a large degree - and rightly so. “There is considerable evidence of Leibniz’s struggles with Spinoza’s thought in reading notes and letters, not to mention the actual visit Leibniz made to the Hague in November 1676, where he met Spinoza and discussed philosophy with him at some length. Spinoza’s necessitarianism made a great impression on the young Leibniz. For Spinoza everything that is possible is actual, and so things couldn’t be other than they are. Indeed, Leibniz came very close to adopting this view...”. Yet Leibniz pulled back from the abyss in the end, for he could not accept Spinoza’s rejection of final causes. See also: Goldenbaum, Ursula; Zwischen Bewunderung und Entsetzen: Leibniz’ frühe Faszination durch Spinoza’s Tractatus theologico-politicus (Delft: Eburon, 2001), and Friedmann, Georges; Leibniz et Spinoza (Paris: Gallimard, 1962). Curley, Edwin and Heinekamp, Albert (eds.); Central Theme: Spinoza and Leibniz (Würzburg: Königshausen en Neumann, 1990).
that one substance. Obviously, when all things are within the realm of God, explaining the particular wills, actions and intentions of human beings becomes difficult. Leibniz proposes a solution between Spinoza’s pure substance, and Descartes’ separation of bodily extension and the mind,\footnote{Descartes states in AT III 665: “Then, as regards the body in particular, we have only the notion of extension, which entails the notions of shape and motion; and as regards the soul on its own, we have only the notion of thought….Lastly, as regards soul and body together, we have only the notion of their union, on which depends our notion of the soul’s power \textit{[force]} to move the body, and the body’s power to act on the soul and cause its sensations and passions.” Letter to Princess Elizabeth, 21 May 1643, translation from Cottingham, Stoothoff, Murdoch and Kenny in \textit{The Philosophical Writings of Descartes} Volume III, \textit{The Correspondence} (Cambridge: Cambridge UP, 1991)p.218. cf. Fichant, Michel; \textit{Science et métaphysique dans Descartes et Leibniz} (Paris: PUF, 1998). Belaval, Yvon; \textit{Leibniz critique de Descartes} (Academic Dissertation, Paris: Gallimard, 1960). Verbeek, Theo; \textit{Descartes and the Dutch: Early Reactions to Cartesian Philosophy 1637-1650} (Carbondale, IL: Southern Illinois UP, 1992).} and Newton’s winding of the mechanism. Leibniz, in contrast, proposes an individual substance called the monad which is a unified whole in a metaphysical continuum.

The theory of monadic substance of Leibniz is a concept that developed over the course of his philosophical work, yet can still be said to be primarily answering the ontological distinctions put in place by Scholasticism. In the \textit{Monadology} of 1714,\footnote{GP VI, 607-23.} Leibniz explicates the monad in its most developed formulation. The divine creator brings monads into being; consequently, they can neither be modified nor destroyed by any other created thing. In contrast to the Scholastic notion that likenesses of things can detach themselves and enter into the substance of the other, “the monads have no windows through which anything may come in or go out”\footnote{\textit{Monadology} §7.}. The Medieval theory of \textit{species sensibilis} assumed that perception was a matter of something going out from the eye to the object, in place of light reflecting off an object and entering the eye in order to excite nerve endings on the retina.\footnote{Various optical theories of perception, and thus of cognition, from antiquity to the middle ages, explained the sense of vision by the “\textit{species sensibilis}” (similitude of sensibles), or images that travel through the medium of air (or ether) from the object proper through to the eye of the perceiver, to subsequently be cognized by the mind or soul. Precisely the extent to which the object itself gave off luminous rays of “\textit{species}”, or “likenesses” to...}
Eibniz says that monads “have no windows”, he is addressing precisely this theory of perception – nothing proceeds out of the window of the eye into the phenomenal world. Nevertheless, changes or modifications do come about in the monads, although only through an internal principle,⁵⁰⁵ the action of which is called appetition. Desire (l’appetit) is the internal force of the monad or motivating principle for Leibniz during this time period. The monad is always striving, yearning for perception and expression, which may be said to be unique, albeit not perfect, in its motivation and degree of connectivity.⁵⁰⁶ In this way Leibniz accounts for not only the substance of the monad, but its capacity for change. Substantial change cannot be explained mechanically. Radically, in the activities of monadic simple substance, only their perceptions and their

be received by the eye (intromission); or that the eyes themselves emitted a visual cone projecting onto the object (extramission), remained a highly contested topic for hundreds of years. Already in antiquity Empedocles, Euclid, and Galen had an extramission optical theory. Plato, in primarily the dialogues of the Timaeus, Theaetetus, and Meno, explicata a theory of visual “fire” that went out from the eye to intermingle with daylight, reflecting off the object, and returning to the soul to form a mirror image. Aristotle, in contrast, had a version of an intramission theory, refuting the Lucretian theories of atomistic or corpuscular steams emanating from objects in discrete units. Augustinus postulated in his extramission theory, that the “species” would, through intention, reach out from the pupil in the eye, to the sensible object. The Stoics gave the “species sensibilis” the form of a visual cone, while others saw the little “images” or simulacra as perspectively multiplied visual rays. Islamic scholars, including Al-Kindi, Hunan bin Ishaq (extramission), and al-Razi, Al-Farabi, Alvicenna, and Al-Hazen, not to mention Averroes (intromission), are considered to be the most important scholars on the issue of optics leading up to the Renaissance. The seventeenth century saw the explosion of optical theories: Bacon, Leonardo da Vinci, Galileo, Kepler, Scheiner, Willis, Grimaldi, Descartes and Newton. Indeed, Descartes, in AT 7:37 states: “all ideas are, as it were, the images of things”; ideas are like images in that they represent things. Newton, of course, held a corpuscular theory of optics, that he named “photons”. In short, the Leibnizian monad having “no windows” must be seen against this historical background of the “species sensibilis”, denying in fact both the extramission and intromission theories of perception. See the following excellent sources on the history of optics and visual perception: Lindberg, David Charles; Theories of Vision from Al-Kindi to Kepler (Chicago: University of Chicago Press, 1976). Tachau, Katherine H.; Vision and Certitude in the Age of Ockham: Optics, Epistemology and the Foundations of Semantics 1250-1345 (Leiden: Brill, 1988). Machamer, Peter K. and Turnbull, Robert G. (eds.); Studies in Perception (Columbus, Ohio: Ohio State UP, 1978). Sabra, A.I.; Theories of Light from Descartes to Newton (Cambridge: Cambridge UP, 1981).

⁵⁰⁵ Monadology §11.
⁵⁰⁶ Monadology §15.
changes are found internally. The monad, as a dynamic substance with the capacity to change internally in its perceptions, is physically unaffected by anything external because it has no material body with “windows”. As such, it must be remembered that the monad is not only autonomous and unique, but qualified by a changeable manifoldness that constitutes its specific nature as well as the plurality and variety of simple substances. In fact, the nature of the monad is, for Leibniz, a manifold plurality with no divisible parts, “a multiplicity in the unity”. All monads have in themselves a certain perfection and self-sufficiency (in that they are the source of their own internal activities) and may be called entelechies, simple created substances.

Yet the ultimate reason for things is not this internal force interior to the monad, but an exterior and necessary substance. Although the potentiality of change is characteristic of the simple substance of the monad, the details of this potentiality lie with the fountain-head of the internal forces, that is to say in Leibniz’s terms, God. As such God “stands in” as ultimate reason and perfection. God is the supreme substance within the system of monadic simple substances, containing everything. The monads may be autonomous, unique substances, yet the supreme substance of God is unique, universal, and necessary. God is the guarantor of harmonic relations, of continuous sufficient relations, and pure sequences of possible being between the autonomous entelechies. Monads are distinguished as substances in that they derive perfection through the influence of the supreme substance, God, yet are limited and imperfect in their own natures.

In the metaphysical system of Leibniz, God is the source not only of existence, but essences as well. God is the necessary substance,
the ultimate reason for all things, including the diversity of change and phenomena which are eminent. Yet God exists, as sufficient reason, in an interconnected substantial relationship with all created things, which are the other monads. Although various monads differ in their degrees of individuation or perfection, each was created by, and thus is determined by, the perfection of God. As such, God does not determine the world and the monads reflected in it; rather, God is the possibility of perfection as the most perfect being, the limits within which the monads operate and have their being. God’s perfection is “absolutely infinite” for Leibniz. Consequently, although every specific occurrence in the diversity of phenomena cannot be said to be “harmonious”, the monad always exists with a pre-established structure of harmony constituted by God where everything contributes to the whole. Even in his perfection, God too fits into the necessary structure of pre-established harmony, albeit as the guarantor of this harmony.

God can know the reason behind every cause with complete clarity and certainty without having specifically caused all contingent truth. Conversely, individual created beings cannot know with certainty the reasons of a freely choosing God. A harmonious inter-relationship exists between God and his creations, yet Leibniz still does not rule out the possibility of divine intervention or the free will of individuals. Whereas both God and the monads are free, the scope of possibility of the monads is circumspect; they can only act or unfold their individuality within the subset of possibilities pre-established in the system of concomitance. No particular entity can wholly determine consequences in the universe as a whole, yet all is connected. “There is only one God, [Leibniz says], and this God is sufficient.”

513 Monadology §38: “And that is why the ultimate reason of things must be in a necessary substance in which the diversity of changes is only eminent, as in its source. That is what we call God.”


515 Monadology §39: “Since this substance is sufficient reason for all this diversity, which is utterly interconnected, there is only one God, and this God is sufficient.” emphasis in the original.
Here it is to be asked why a perfect, infinite creator would create imperfect and limited created things, monads? God is the source of not only existence but essence as well. Or as Leibniz clearly states in the *Monadology*:

For it must needs be that if there is a reality in essences or in possibilities or indeed in the eternal truths, this reality is based upon something existent and actual, and consequently, in the existence of the necessary Being in whom essence includes existence or in whom possibility is sufficient to produce actuality.516

Only God is a necessary Being and necessarily exists. As sub-species of substance, the monads lend their contingent existence from a necessary and supreme substance; that is to say, God. “God alone is the ultimate unity or the original simple substance, of which all created or derivative Monads are the products, and arise, so to speak, through the continual outflashings (fulgurare)517 of the divinity from moment to moment, limited by the receptivity of the creature to whom limitation is an essential”.518 Here it would appear when Leibniz states that God is the original simple substance, that an argument can be made that God is also monadic substance, a metaphysical center or point of emanation or fulguration, although privileged by the purity and perfection that is unbounded. The power, will, and knowledge inherent in God also corresponds to the created monads or entelechies, yet these exist in imperfect proportion.519

Although Leibniz has stated that only the supreme substance, God, can influence or change a created substance, they can indeed influence one another, but only in terms of their mutual perception of the universe. Because there is no phenomenal or physical extension for

516 *Monadology* §44.
517 Both Loemker and Garber/Ariew translate the Latin term *fulgurare* as “continual fulgurations of divinity”. The Latin *fulgurare* means an act of lightning, to emit flashes of lightning, or a sudden emission of dazzlingly bright light.
518 *Monadology* §47.
519 *Monadology* §48.
the monad, “one created Monad cannot have a physical influence upon
the inner being of another”.520

Only through the “primal regulation” of all created substances,
can the monad express its own participation in divinity, the existence
and essence of God. Dependence is created, according to Leibniz,
only through this polycentric structure – influences are exerted from
monad to monad, yet only through the concomitance or agreement
or intervention of God. A relation of interdependency exists between
autonomous monadic substances with God as the creator of the system
of inter-substantiality, where a reciprocal relation of action and passion
exists among created things.521 Leibniz reserves the power of divine
intervention for God alone, as he states in Discourse on Metaphysics: “The
extraordinary intervention of God is not excluded in that which our
particular essences express, because their expression includes everything.
Such intervention, however, goes beyond the power of our natural
being or of our distinct expression, because these are finite, and follow
certain subordinate regulations”.522 In short, the monads as entelechies or
individual substances have the free will and spontaneity in a system of

520 Monadology §51.
521 Monadology §52.
522 Discourse on Metaphysics §16.
inter-substantiality that entails both monadic expression and perception, and the continual outpourings and interventions of pure substance, God.

**The Interconnectivity of Monadic Substances**

Yet, the precise nature of the intersubstantial relationships in the intermonadic structure of Leibniz is complex to say the least. Indeed, all things are connected, but how do they effect each other? To what extent do monads cause changes to occur in themselves or the other monads? On the one hand, Leibniz states in the *Discourse of Metaphysics* of 1686 that substantial forms (the precursor to monads), “change nothing in phenomena, and must not be used to explain particular [physical] effects”.523 Quite obviously, monads have no spatial relations since they are not phenomenal. Rather, they do have some kind of ideal spatio-temporal relation due to the perception of the monad of their entire universe, and their expression analogous to “well-founded” phenomena. All phenomena are connected with each other; however, their relations are real, based on the interconnected relations of perceiving monads. Space or time, are not things for Leibniz, only relations. Therefore, one can speak analogously of the distances or simultaneity of intermonadic relations, without indeed meaning a relation in any phenomenal sense. Quite simply, the relation is not spatio-temporal because it is not material. Yet a relation is indeed made as a co-existing simultaneity in the substantial sense through the various perceptions of the monad. As Leibniz explicates in 1695:

It is quite true that in the strict metaphysical sense there is no real influence exerted by one created substance on another, and that all things, with all their realities, are continually produced by the power of God: but to solve these problems it is not enough to make use of the general cause, and to drag in what is called the *deus ex machina*.... it is impossible for the soul or for any other true substance to receive anything from without, except by Divine omnipotence....God first created the soul, and every other real unity, in such a way that everything in it must spring from within itself, by a perfect *spontaneity* with regard to itself, and yet in a perfect *conformity* with things outside.524

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523 *Discourse on Metaphysics* §10.
524 P 121-122. “New System”.
Consequently, the place of God in this system of interrelations becomes critical. God is neither interceding continuously in the universe except in the case of miracles; nor is he absent from the system that operates mechanically. Leibniz explains the interconnections between monads in terms of his theory of pre-established harmony. Indeed, in order to create and to preserve a perfect communication (nexus) of all substances with each other in agreement, a divine or common cause is necessary. In this way, God is the creator of an intermonadic system, within which individual monads freely move and have their existence within the limited scope of their perfection. God can be seen as the apriori creator of this system of interconnectivity. Given that in the Leibnizian system, God has created a perfect world out of an infinity of possible universes, God is the unity of harmonic relations. Monadic substance participates in the unlimited and unbounded essence of God, albeit only “in proportion to their perfection”.

Leibniz is emphatic about maintaining the free will of God. Although individuals cannot know his reasons, God necessarily acts out of his own free will. God must have the freedom to create the best of all possible worlds; nevertheless, the individual must also have free

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525 LCC 12. Letter to Caroline, Princess of Wales, November 1715 (the letter was subsequently meant to be sent onto Clarke). God intercedes only in matters of “grace”, which is to say that God can choose to mediate in the world by performing miracles. Yet this prerogative is spiritual. Otherwise the world, such as it was created by God, proceeds mechanically under the “wants of nature”; in other words, according to mechanical laws.

526 P 124. “New System”.

527 Monadology §48.

528 In his commentary on the Leibniz/Arnauld Correspondence, Robert Sleigh elaborates the position of God’s will in creation with regard to the theologian Arnauld’s objections: “Arnauld would have been convinced that Leibniz’s scheme fared no better than Malebranche’s with respect to a proper account of God’s freedom in creation. The fact is that Arnauld saw item one - the idea that there must be some reason for God’s decision to create, other than simple appeal to his will - as the real culprit. Arnauld referred approvingly to St. Thomas’s thesis that with the exception of his own goodness, God does not will other things necessarily, and that in cases outside of God himself the divine will is determined solely by itself.” Sleigh Jr., R.C.; Leibniz & Arnauld: A Commentary on Their Correspondence (New Haven, Conn.: Yale UP, 1990)pp.46-47. Here it may be admitted that Arnauld denies, following Thomism, that God has any necessary relation to his created beings.
will. Again, Leibniz carefully treads the middle way: God has created the intermonadic system of relations in perfect agreement; the individual monads operate within this system in free will - perceiving, acting, moving and expressing themselves up to the extent of their perfection. Perfection is not a static concept, rather also subject to the free will of the individual. Through free will, the individual either perfects itself further, or degrades itself, in relation to the whole. This free choice, then, constitutes not only an ethic, but also a continuum of perfection that is dynamic, each individual responsible, as it were, for the perfection of its expression. In this way, both the free will and autonomy of the individual are preserved, as well as the interdependence in a continuum of perfection with God being, of course, the most extreme expression of perfection.

Yet here arises a seeming paradox in the Leibnizian schema; namely, how can monads be both autonomous and inseparable - both a world unto themselves and a complete reflection of the universe? In contrast to Descartes, who thought matter and mind to be substantially different, Leibniz maintains that there is a natural conformity or union between the soul and the body, albeit following each their own actions. Yet each one is perfectly fitted to each of the others in a pre-established harmony. The monads do not interact on a material or mechanical level because the monad strictly speaking has no materiality, yet all of them are nonetheless interconnected in that “they are all representations of one and the same universe”.

In conclusion, one of the most important Leibnizian concepts is that of the interconnectivity of monadic substances. Leibniz manages to walk the fine line between abandoning the free will of the individual

529 *Discourse on Metaphysics* §15: “And when each thing exercises its virtue or power, that is to say when it acts, it changes for the better and extends itself in so far as it acts.” However, Leibniz goes on to say that this increase in perfection also entails a diminution in the perfection of others in order to maintain the balance in the pre-established harmony. The implications are profound with regard to a possible ethics. Although Leibniz himself did not explore the significance of this remark, Pauline Phemister questions if moral progress, then, would be possible for Leibniz in her essay, “Progress and Perfection of World and Individual in Leibniz’s Philosophy 1694-1697” in Herbert Breger, Jürgen Herbst, and Sven Erdner (eds.); *Conference Proceedings of the Internationaler Leibniz-Kongress* vol.2 (Hannover: Gottfried Wilhelm Leibniz Gesellschaft, 2006)pp.805-812.

530 *Monadology* §78.
monad, on the one side, and pure mechanism of physical extension, on
the other. Although the monad is in principle inviolate and “uncuttable”
by definition; Leibniz provides an account of interaction, which is to say
the harmonious connection of all things with each other. As he states
early on in the New System: “...so I believe that it is very true to say that
substances act upon one another, provided it is understood that the
one is the cause of changes in the other in consequence of the laws of
harmony”.\textsuperscript{531} In doing so, he guarantees the independence and free will
of the monad whilst at the same time explaining the interdependence of
all things in a unified whole with God as the prime cause. Indeed, Leibniz
consistently emphasizes the relational structure of monadic substance.
The universe is comprised of an intermonadic system of harmonious
relations.

\textbf{The Unity of Monadic Points-of-View}

Another important way in which Leibniz proposes a unified universe, is
through perspectival multiplicity. Leibniz describes this unity as a City
of God where only God has total comprehension, or vision by intuition
\textit{(scientia visionis)} of the entirety of the universe. Crucially, this unified
vision guarantees the system of harmony between substances, thereby
bringing about a correspondence between phenomena.\textsuperscript{532} Only God has
an overall vision, as well as knowledge of every relation between monads,
in all of time. Yet, notably, each monad “expresses” the universe from
its own singular point-of-view.\textsuperscript{533} Each monad is its own universe, yet
has access to the universe as a whole by not only being embedded in
that universe, in an interrelation with all the other monads, but also by
expressing the universe from its own point-of-view.\textsuperscript{534} As such, collectively,
the monads express the totality of the universe.

Leibniz describes this perspectival multiplicity as a plan of a city.
Only God can know the entire plan, both in the past and the future. Yet

\textsuperscript{531} P 127-8. “New System”.
\textsuperscript{532} Monadology §60. Discourse on Metaphysics §32.
\textsuperscript{533} cf. Levin, M.; “Leibniz’s Concept of Point of View” in Studia Leibnitiana Supplementa 12
(1980): 221-228.
\textsuperscript{534} Monadology §62.
each monad “maps out”, as it were, its own neighborhood. Nevertheless, each of these maps overlaps with other maps, making a coordinated and coincident perception of the universe. The more a monad perceives, the more it maps, coming incrementally nearer to the unified vision of God in his perfection. The greater degree of perfection or wisdom of the monad, quite literally, the greater the field of vision or the increased multiplicity of views. Consequently, a consistency is established between knowing and expressing the individual singular world of the monad, and its expression of its own neighborhood from its own point-of-view. Yet each view is always in relation to every other viewpoint, composing a unified whole.

Leibniz explains the reciprocal nature of this relation between monads - not only in perception, but also in reflection or representation: “Now, this interconnection, relationship, or this adaptation of all things to each particular one, and of each one to all the rest, brings it about that every simple substance has relations which express all the others and that it is consequently a perpetual living mirror of the universe”. Each monad expresses a partial area of the whole in dynamic harmony but the “nature of each monad is to represent,” albeit “distinctly only with regards a small part of them, that is to say, as regards those things which are nearest or most in relation to each Monad”. As a result of intercommunication between monads due to their mirroring the entire universe, each will respond to all that happens in the universe in a direct correspondence. Nevertheless, Leibniz admits that a complete knowledge or universal connection of phenomena will remain outside of the possibility of each individual monad. Continuity or agreement in the monad is achieved because every state of this simple substance is positioned between the inevitable consequences of its past while at the same time being pregnant

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535 Monadology §57.
537 Monadology §60.
538 GP VII, 311/P 78. A Specimen of Discoveries About Marvellous Secrets of Nature in General (c.1686): “Nothing happens in one creature of which some exactly corresponding effect does not reach all others.”
with future states. As such, the monad is poised between the actuality of preceding states and the potentiality of states to come, and has an internal consistency not only in the reiteration of substantial states, but with the desire which is the internal force of the monad. Each monad constitutes a “world apart” that is inherently its own causa sui, yet is in turn brought into being by the creator of substance, God, and bears “marks and traces” of its potentiality and actuality. Another important way that Leibniz, in addition to an architectonic of interconnectivity, theorizes the unity of all things in a continuum is through the notion of the unity of monadic points-of-view.

Whilst expressing its own universe, a monad mirrors the larger phenomenal universe. Obviously, this vision of perspectival multiplicity is also dynamic. The mirroring of the monad in its expression represents the universe from its own viewpoint, yet this viewpoint can change - in perfection, in scope, and in its situation. This change in viewpoint would imply, quite simply, that if the expression of the monads changed, so too indeed would the world. The interconnectedness of the monads has the consequence that if a monad were to change, the universe would be a dynamically different place. The world is in flux through perspectival multiplicity, each monad being both radically independent and radically interconnected.

In a letter to Morell in 1698, Leibniz writes: “Since all minds are unities, it can be said that God is the primary unity, expressed by all the others according to their points of view”. God remains the ultimate point from which all things exist. Nevertheless, divinity is expressed collectively by each individual monad’s point-of-view. Or, as Leibniz points out in the Discourse on Metaphysics:

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539 Monadology §22. See also the de Volder correspondence: GP II 248-253/L528.

540 cf. Correspondence with Arnauld. cf: Sleigh; op cit, p.212n.20: “The doctrine of marks and traces occurs in DM §8 and §29, and in the correspondence at LA 39, 47, 57, 78, 98, and 126, among other passages. In a letter to De Volder in 1703, Leibniz formulated the doctrine of marks and traces and said of it: ‘This is the most certain nature of every substance.’ (GP II 251/L 530).”

541 Letter to Morell, Grua 126, cited by Sleigh; op cit p.74.
Now it is God alone (from whom all individuals emanate continually and who sees the universe, not only as they see it; but also in quite a different way from all of them) who is the cause of this correspondence between phenomena, and who brings it about that what is particular to one should be public to all; otherwise there would be no interconnection.\(^{542}\)

As a consequence of this interconnection, each monad that is per definition singular, expresses collectively in fact the universe in its totality, each according to a specific situation \([\text{situm}]\) and point-of-view \([\text{aspectum}]\). While each monad has its own autonomous “point-of-view”, an intersubstantial universal view is possible due to the primal organization of the divine and the composite nature of the infinitely various monadic points-of-view: “...as the city is regarded from different sides appears entirely different, and is, as it were, multiplied perspectively, so, because of the infinite number of the simple substances, there are a similar infinite number of universes which are, nevertheless, only the aspects of a single one, as seen from the special point-of-view of each monad”.\(^{543}\) Herewith, both the greatest variety and the greatest unity are achieved - a manifold plurality. In addition, in the Monadology §83, while discussing the nature of souls, he elaborates:

while souls in general are living mirrors or images of the universe of created things, minds are also images of the Deity himself or of the author of nature. They are capable of knowing the system of the universe, and to imitate it somewhat by means of architectonic patterns, each mind being like a small divinity in its sphere.\(^{544}\)

Yet can God be thought of as a privileged point-of-view in this interconnected relationship? Although the transcendent viewpoint of God can guarantee unity, the intersubstantial adaptation between the monads can provide a connectivity that guarantees the validity of every point-of-view. In this system of interconnectivity, the point-of-view of God

\(^{542}\) Discourse on Metaphysics §28.

\(^{543}\) Monadology §57.

is monadic, in relationship to all the rest. The ontological structure of immanence is created precisely by this interconnection. God becomes in turn sufficient in this pre-established structure if the universal harmony guarantees that every simple substance expresses all the others, with as much perfection as possible.545 God expresses and participates as a special supremely perfect monad in the infinite inter-relationship of monads. Increasing degrees of perfection toward God would be an increasing ability to perceive the whole ontological structure of universal harmony. In principle, if every monad would be able to express the unity of the whole, then every monad would be indeed a deity.546

Conclusively, the Leibnizian monadic system provides the idea that each monad mirrors the entire universe, that each entelechy participates in, expresses, and is related to the whole through its specific point-of-view. And given the free will of the monadic desire (l’appetit), the drive to exist (exigentia existendi), and the internal force that reaches out in yearning to connect to other substances, universal harmony requires each substance to express or adapt to the others.547 Consequently, even though one monad cannot physically react to another without the mediation of God due to the fact that it is immaterial, any internal dynamic change in one monad will be automatically expressed or reflected throughout the whole, perfectly ordered interconnected system of substances. Quite inclusively, Leibniz writes: “The world is composite of all created things”.548 Expression is precisely the relation between all interconnected things.

Yet, a cautionary note is necessary. The monadic structure is most decidedly one of interdependent interconnection where the influence of one upon the other is a system of balance in a harmonic relationship pre-established by God. The only substantial relationship is, in fact, divine. The monad is in principle a metaphysical atom, a substantial unity that is inviolate to outside interventions.549 Nevertheless, in the

545 Monadology §58.
546 Monadology §60.
547 Monadology §52.
548 Quoted by Sleigh; op cit, p.202; note 10. LH IV 7C Bl.70 tentatively dated 1683-1685.
549 GP II, 111-129/L 344. Letter to Arnauld 9 October 1687: “And when I consider only distinct ideas, it seems to me conceivable that divisible phenomena or a plurality of beings can be expressed or represented in a single indivisible being; and this is sufficient for a concept of a perception...”.
harmonic system, changes can take place in its situatedness, in its level of perfection, and indeed in its existence.\textsuperscript{550} As a consequence of these changes, adaptations would need to be made in order to preserve a balance in the harmony and perfection of the universe, “for souls...do not impede one another...”\textsuperscript{551} Leibniz states in A Specimen of Discoveries of the Admirable Secrets of Nature in General of 1686:

From the notion of individual substance it also follows in metaphysical rigor that all the operations of substances, both actions and passions, are spontaneous, and that with the exception of the dependence of creatures on God, no real influence of them on one another is intelligible. For whatever happens to each of them would flow forth from its own nature and notion even if all the others were imagined to be absent, since each one expresses the entire universe. However, that whose expression is more distinct is deemed to act, and that whose expression is more confused to be acted upon, since to act is a perfection, and to be acted upon is an imperfection....indeed, the same phenomena can be explained in infinitely many ways.\textsuperscript{552}

In contrast, phenomenal bodies do, under the laws of mechanics, indeed influence each other.

Every change of any body propagates its effects to bodies however distant; that is to say, all bodies act on and are acted upon by others. Every body is confined by those surrounding it so that its parts do not fly away, and therefore all bodies are engaged in a mutual struggle among themselves, and every single body resists the whole universe of bodies.\textsuperscript{553}

Consequently, even though every monadic substance – what in his mature philosophy will be thought of as a composite substance which

\begin{footnotesize}
\textsuperscript{550} GP II, 47/LA 52. “...and when one says that one substance acts upon the other, the distinct expression of the passive one decreases, and increases in the active one in conformity with the succession of thoughts embraced by its concept. For although every substance is an expression of everything, one is correct in attributing to it in practice only the most distinctive expressions according to its relationship.”

\textsuperscript{551} GP VII, 309-318/Aiv312/LC 319(1624). A Specimen of Discoveries of the Admirable Secrets of Nature in General (c. 1686). Date uncertain.

\textsuperscript{552} GP VII, 309-318/Aiv312/LC 311(1620).

\textsuperscript{553} GP VII, 309-318/Aiv312/LC 323(1626).
\end{footnotesize}
is both soul-like and corporeal – is a universe in itself (indeed an infinity of universes),\textsuperscript{554} it is in a constant mutual interaction with other monads, acting and being acted upon. This writhing, forceful, dynamic explosively emanating whole is a constantly changing the universe.

So although Leibniz states that the “nature of each monad is to represent,” albeit “distinctly only with regards a small part of them, that is to say, as regards those things which are nearest or most in relation to each monad”,\textsuperscript{555} strictly speaking in monadic substance one cannot speak of distances. The relation is “nearest” in the sense that it is more “clear and distinct” in its perception of other monads – in the neighborhood that each individual maps out of the whole known only to God. As a metaphysical unit or atom, a monad has no spatio-temporality, therefore, no phenomenal relationship. However, as a material atom, when monadic substance becomes a composite of the corporeal and the soul-like, then it is subject to mechanical forces, just as other bodies are. Yet, a core, a substantial unity, always remains inviolate for Leibniz, and this monad is created, preserved, and comprehended only completely and perfectly by God. Consequently, although in the New System he states: “It is quite true that in the strict metaphysical sense there is no real influence exerted by one created substance on another...”,\textsuperscript{556} the reality is that all things are emanations or fulgurations of God and are organized in an interrelationship called pre-established harmony. Quite simply, each monad, each created substance is “influenced” in that they are interconnected with all things in the universe. As a result, although he states emphatically that the monad has “absolutely no communication with one another”,\textsuperscript{557} he believes “that it is very true to say that substances act upon one another, provided it is understood that the one is the cause of changes in the other in consequence of the laws of harmony”.\textsuperscript{558} To conclude, then, the monads exist in an

\textsuperscript{554} GP II, 248-253/L 529/AG 175. “Although I say that a substance, even though corporeal, contains an infinity of machines...”. GP VII, 309-318/Aiv312/LC 323(1626). “...in every body there are actually infinitely many bodies...”.

\textsuperscript{555} Monadology §60.

\textsuperscript{556} P 121-122. “New System”.

\textsuperscript{557} P 124. “New System”.

\textsuperscript{558} P 127-8. “New System”.
interconnected pre-established relation of harmony, yet their influence upon one another is indirect, mediated only through God who has the “knowledge” of the entire universe and preserves and regulates the whole. Each monad is a universe of its own, with self-movement and free will, yet in a divine relationship to the whole, and in a measure of its perfection. Or, as Amos Funkenstein has described it: “Monads, their states and their perceptions, are as independent of each other as they are interdependent”.

**Universal Harmony**

Notably, Leroy Loemker points out in his *Struggle for Synthesis*\(^560\) that Leibniz only qualified his notion of “harmony” with the adjective “pre-established” after 1695.\(^561\) In his interpretation of universal harmony, Loemker explicates firstly that pre-existing harmony is “not pre-existing in time, but as eternal cause...”\(^562\) Importantly, Leibniz did not mean by pre-established harmony some kind of determinism, in spite of the fact that the notion of “pre-established” is often erroneously attributed to deistic causes. Rather, pre-established harmony can be thought of as an inherent regulatory structure, harmonizing and meshing various diverse monads. Instead of an ideal of harmony that requires conformity and homogeneity, Leibniz puts forth a notion of harmony that can include the free choice of individuals, as well as the diversity of phenomena.\(^563\)

\(^{559}\) Funkenstein; *op cit*, p.108. Further see Sleigh; *op cit*, p.216, note 61: “Typically, while the idea of a distinction between the rigorous conception of real causality and an ordinary conception of quasi-causality remained fixed in Leibniz’s thinking, the terminology took a beating. Thus, in *Primary Truths* we have: ‘Every created individual substance exerts physical action on, and is acted on by all others...Strictly, it can be said that no created substance exerts metaphysical action on another.’ (C 521 [P 90]). And in the *Theodicy* at §59: ‘Many moderns have recognized that there is no physical communication between the mind and the body, although metaphysical communication always subsists’.”


\(^{562}\) Loemker; *op cit*. pp.198.

Although various monads differ in their degrees of individuation and their contribution by their sequential actions to a unified harmony, each was created by and thus determined by the perfection of God. As such, God does not determine the world, and the monads reflected in it; rather God is the possibility of perfection, the limits within which the monads act, move, and have their being. Consequently, although every specific occurrence cannot be said to be “harmonious”, the monad always exists within a pre-established structure of harmony where everything contributes to the whole.

With this statement, Leibniz goes a step further than his contemporaries. Not only does God as *casua sui* inform and permeate his creations with his perfections, defining their scope within an ultimate harmonious unity, but he participates reflexively in the relation between his existence and the existence (albeit limited as to point-of-view and the extent of their expression) of the various monads.

Nevertheless, Loemker is careful to spell out the various levels of harmony in the order of the universe which occurred in the course of Leibniz’s oeuvre: Firstly, there is the “harmony of God’s thought in creating the best possible universe”. Within the harmony of God’s thought exists the “harmony of God’s perfections where there is a unity in the power or potentiality for plurality”. As a consequence, “God’s thoughts of all possible individuals in all possible worlds”, thereby preserving a consistency in his will. Furthermore, “God’s determination of the compossible individuals and their relations in the best possible world”. Harmony in God’s thought is thus achieved from his own perfection, through to the perfection of his choice of the best possible world, and the perfection of the created monads and their relation with each other and their best possible world. Secondly, there is the “harmony as the consonance or consent of monadic events in the created world”. The monads, although created in harmony with God’s perfection, are not wholly perfect, but unfolding in a process culminating in perfection. The monadic events participate

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in the realization of the harmonic perfection, although the order of events must actualize or complete the harmony of best possible laws. Thirdly, there is “harmony in the perceptions and generalizations of individual self-conscious monads, confirmed by communication with their peers”.

Nonetheless, the most marked aspect of Leibniz’s theory of pre-established harmony is the concomitance of perceptions and the intercommunication between monads as a possible inter-subjectivity, considering the monadology as relational system. Leibniz’s notion of harmony is not a regulative ideal as with Descartes,\(^{566}\) rather a system of “pre-established harmony” where each individual monad not only reflects it’s world, but collectively contributes to the perception of the world in an intermonadic community, a unity in diversity. Each monad, and indeed God himself, is free to choose, yet remains in harmonious inter-relationship with the other substances. Leibniz’s vision of an intermonadic community is not regulated from outside the system, but ensures - if not a perfect world, at least something like an intermediated and balanced world.

**Concept Containment Theory: the Complete Notion of the Individual**

With the architectonic of pre-established harmony describing the interrelationship of substantial entities, Leibniz makes several attempts in the next few decades to precisely define what a monad exactly is. These efforts go from a sort of Scholastic “substantial form”, to simple substance, to the first uses of the term “monad”, to an “organon”, to “composite substance”. In the following pages, an examination of various correspondences between Leibniz and Arnauld, de Volder, and ultimately des Bosses along with shorter essays, will attempt to sketch out his various accounts. The question remains in the continuum of

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\(^{566}\) Daniel Garber explains: “In fact, given Descartes’ radical voluntarism with respect to the eternal truths, God has no aims or goals, strictly speaking. His volitions are free with a freedom of complete indifference. God did not set out to create the world that would be the most perfect; God did not create this world because it is the most perfect one. Rather, it is the most perfect one because God created it.” Garber, Daniel; *Descartes Embodied* (Cambridge: Cambridge UP, 2001)p.162. cf. AT VII 432.
the labyrinth, what are the ontological and phenomenal parts, and how do they fit into a metaphysical unity, into the architectonic of the labyrinth?

Specifically between 1686 and 1687, Leibniz maintained an intermittent correspondence with the reluctant Antoine Arnauld, a French Jesuit. Leibniz had written the *Discourse on Metaphysics* as a sort of summation of his philosophical position at that point, and sought Arnauld's approval and criticisms. Arnauld, for his part, was less than enthusiastic about Leibniz's philosophical propositions, yet maintained the correspondence for a period in the hope that the Protestant Leibniz might convert to Catholicism.\(^{567}\) In vain, as it turned out. The correspondence centers around two central issues: firstly, Leibniz's concept containment theory; and secondly, the precise nature of “expression” and the nature of substance in concomitance, or pre-established harmony. Arnauld was rather alarmed when he read the *Discourse on Metaphysics*, and initially focused only upon §13 of the *Discourse*:

> Since the individual notion of each person includes once and for all everything that will ever happen to him, one sees in it the *apriori* proofs of the truth of each event, or, why one happened rather than another. But these truths, however certain, are nevertheless contingent, being based on the free will of God or his creatures, whose choice always has its reasons, which incline without necessitating.\(^{568}\)

Fundamentally, Arnauld made objections to this paragraph upon theological grounds. What is at stake here? If each individual contains all that will ever happen to it with creation, God then could become superfluous after the moment of creation. Arnauld objects that “everything that has happened since to the human race was and

\(^{567}\) GP II, II/10/LA 138. Letter on 31 August 1687 from Arnauld to their intermediary the Landgrave Ernest of Hesse-Rheinfels: “...M. Leibniz has very curious opinions about physics that seem to me scarcely defensible....It would be preferable if he gave up, at least for a time, this sort of speculation, and applied himself to the greatest business he can have, the choice of the true religion,...It is very much to be feared that death will catch him unprepared unless he has taken a decision that is of such importance for his salvation.”

\(^{568}\) *Discourse on Metaphysics* §13.
is obliged to happen through a fatalistic necessity...". Yet among the various possible worlds and possible individuals created by God, the choice is a necessary cause having been carefully weighed and judged by God to be the best possible world. “Only God, who comprehends the infinite at once, who can see how the one is in the other, and can understand a priori the perfect reason for contingency; in creatures this is supplied a posteriori, by experience". Leibniz points out that his theory, in fact, avoids a radical determinism. God creates all possibilities in the individual concept, yet out of this set of possibles, the individual actualizes a subset by the exercising of his free will.

In Leibniz’s letter to Arnauld of 14 July 1686, he attempts to clear up the misunderstanding concerning the concept that each person involves once and for all, all that will ever happen to him. Arnauld’s objection had primarily and decisively been that this principle would entail an extreme form of fatalism; God, having decided to create human beings as a complete concept, would exclude any possible divine intervention, the consequences of which would be the mere unfolding of the inevitable consequences of that single decision. Leibniz, on the other hand, objects to this interpretation. God chose even more wisely, having weighed the consequences of various choices while preserving a perfect, harmonious relationship in connection with him. Therefore, all the designs for a possible world are “interconnected in accordance with his sovereign wisdom”. God, from his point-of-view can see the infinite complexity of unfolding in time of the universe he chose. He chose a world of perfect harmony with respect to himself and all possible consequences. In fact, Leibniz will go on to say that the “full and comprehensive concepts are represented in the divine understanding, as they are in themselves”. For example, this is to say the concept of God and the concept of Adam as the first man, are in perfect harmony: all predicates of Adam are contained in the individual

569 GP II, 26-34/LA 26. Arnauld to Leibniz 13 May 1686.
570 C 16-24/P 97. Necessary and Contingent Truths (c. 1686)
571 GP II, 48/LA 53. Leibniz to Arnauld, 4-14 July 1686, Hanover.
572 GP II, 49/LA 54. Leibniz to Arnauld, 4-14 July 1686, Hanover.
573 In the correspondence, they take “Adam”, the first man, as an example.
concept of Adam, but all these predicates (including everything that will ever happen to him) are also contained in the concept of God. Therefore, a harmonious inter-relationship exists \textit{apriori} between God and his creations. Yet, the complete concept theory of Leibniz still does not rule out the possibility of divine intervention, a connection that Leibniz considers to be “intrinsic but not at all necessary...[because it is] based on free acts and decrees...these reasons for contingent truths incline without necessitating”.\textsuperscript{574} Therefore, “…the connection between Adam and human events [all that will ever happen to him] is intrinsic, but it is \textit{not} necessary independently of the free decrees of God”.\textsuperscript{575} Leibniz preserves the free will of God, not only in creation, but also in the eventuality of miraculous intercessions. He says:

Certainly, since God can form and in fact does form this complete concept which contains what is sufficient to account for all the phenomena which occur to me, this concept is possible, and it is the genuine complete concept of what I call \textit{myself}, by virtue of which all my predicates pertain to me as their subject. One could therefore prove it in like manner without mentioning God except as much as is necessary to indicate my dependence; but one expresses this truth more strongly in deducing the concept in question from divine knowledge as being it source.\textsuperscript{576}

In counter argument to the theological objections raised by Arnauld, Leibniz preserves the free will of God. God has freely chosen, himself, the best possible world: this is to say, the best possible given all other contingent alternatives; that is \textit{not} to say a perfect world. God can know the reason behind every cause with complete clarity and certainty without having specifically caused all contingent truth, or every actualization. However, individual creations, from their side, cannot know with certainty the decisions made by a freely choosing God. All an individual can know is that God has sufficient reason and has chosen the best of all possible worlds. Man can only choose an alternative that seems to him the best alternative. However, man

\textsuperscript{574} GP II, 46/LA 50/L 333. \textit{Remarks upon M. Arnauld’s Letter}, 1686.
\textsuperscript{575} GP II, 51-58/LA 56. Leibniz to Arnauld, 4-14 July 1686, Hanover.
\textsuperscript{576} GP II, 53/LA 59.
does not necessarily always choose the best alternative; nor, indeed
must any man claim to be guided in every minute action by some
supernatural being. No such certainty is possible in regard to the future
action of an individual, says Leibniz, “otherwise it would be as easy
for us to be prophets as geometers”.\footnote{GP II, 45/LA 50.} Although in Leibniz’s world,
everything has a reason, it is perhaps overly optimistic to assume that
humans would always choose with reason, indeed, choose the best
possible alternative. Leibniz acknowledges somewhat naively that “it is
not physically necessary that a man shall choose a certain alternative,
however attractive and appreciably good it may seem to him, though
there is an extremely strong presumption that he will do so”.\footnote{C 16-24/P 101-2. Necessary and Contingent Truths (c.1686)} In
view of the nature of man, there is no compulsion to choose the most
reasonable alternative. Man, too, inclines without necessitating, and
this inclination is often, quite frankly, not the best possible.

Humans, as created beings, can only know \textit{a posteriori}. Yet
they choose among possibilities created by God, in free will which
was also created by God. Therefore, Leibniz is able to account in his
ty where the concept of the individual is already contained in the
concept of God, for the middle way in human determinism - the way
between a “fatalism beyond necessity” and an human anarchy outside
the influence of the divine.\footnote{In fact, what Leibniz calls in his summary of the \textit{Discourse on Metaphysics} sent to
Arnauld, February 1686, (LA 6) as a “\textit{reconciliation} of two paths, one by way of final
causes, the other by way of efficient causes, in order to satisfy both those who explain
nature mechanically and also those who have recourse to incorporeal natures.”} In the end, only God can account for the
infinite complexity entailed in both the concepts of the individual and
his own divine concept in perfect harmony. Only God is capable of \textit{a priori} knowledge. Importantly, Leibniz seeks to prove that the complete
concept of the individual given by God will sufficiently account for all
that will happen to that individual, yet can retain the free will of the
individual\footnote{cf. Murray, Michael J.; “Spontaneity and Freedom in Leibniz” in Rutherford, Donald
216.} to determine his own fate within this subset of pre-given
possibility.
As such, Leibniz also achieves a kind of unity with the monad itself over time in that each individual contains within itself all that will every happen to it in the past and future state. A monad is an individual substance, pure potentiality. With this theory, Leibniz provides yet another aspect of embeddedness – the soul in the body, the monad in the universe, and with the concept containment theory – the individual concept is embedded in the complete concept of God. “For it is the nature of a singular substance to have a complete notion, in which all the predicates of the same subject are involved...”\(^{581}\) With the concept containment theory, each individual is snugly embedded, for once and for all, in the concept of God, actualizing the possibilities of all that will ever happen to him, created at the beginning. This embeddedness, the predicates contained in the subject, Leibniz compares to the Scholastic concept of \(ut \textit{possit inesse subjecto}\), all possibilities that unfold are \(\textit{apriori}\) “virtually contained”\(^{582}\) in the nature of the individual, not as a characteristic of the thing, but as something inherent to the nature of substance itself.

\textbf{The Intussusception or Unity of the Material and Substantial}

Arnauld tentatively acquiesces\(^{583}\) that perhaps Leibniz has found a middle way, a “reconciliation” between the purely mechanical account, and the absolutely deterministic account of causality. In the closing letters of the correspondence with Arnauld, Leibniz reiterates many of the arguments against a pure materialism, or mechanism, being inadequate to account for true unities. For Leibniz, a substantial unity, or an \(\textit{unum per se}\), must always include a substantial form, otherwise it has no reality in the Platonic sense. Any aggregated substance must necessarily be a composite consisting of simple substances.\(^{584}\) Leibniz

\(^{581}\) GP VII, 309-318/Aiv312/LC 319(1624).
\(^{582}\) Discourse on Metaphysics §13.
\(^{583}\) cf. Leibniz’s Remarks upon Arnauld Letter of May 1686, sent to their intermediary, Count Ernst von Hessen-Rheinfels, GP II, 38/LA 40: “He confesses in good faith that he understood my opinion...”.
states most decidedly: “...there is no multiplicity without true units”. Precisely these simple substances, as true units, are the only real entities for Leibniz, and although organic bodies are a composite, they are always made from simpler substances. Mechanism, he admits, can account for a highly reductionist explanation of phenomena. However, a mathematical description of bodies as pure extension cannot, in his mind, ever account for a true unity. This argument, of course, he had made numerous times, yet failed to fully convince Arnauld, who was inclined toward Cartesian philosophy.

However, in these last pages of the correspondence, an interesting development occurs in the argument. In trying to discount mechanism as not constituting a true unity, Leibniz enumerates the ways in which unities are aggregated, as an *unum per aggregationem*. He outlines three different sorts of aggregates: aggregation by association, aggregation by collection, and aggregation by interweaving. To aggregate means from the Latin *aggregatus*, to add to, or to flock. Yet the gathering together of units or parts – whilst perhaps making a whole – will never make a true unity. Leibniz gives the example of the Dutch East Indies Company as an aggregation that, although perhaps more of a unity than a heap of stones, is still an aggregate by association. Another example of an aggregation by association could be a school of fish, or (in keeping with the etymology of the word aggregation), a flock of birds. Secondly, an aggregation by collection, such as a pile of sand, although a whole, is never a true unity because it has no principle of unity, no glue as it were to hold it together. And finally, even though material could be held together, for example as in a chain, this unity is also a mere aggregation through the interweaving of matter. The links in the chain are intertwined, yet they can be pulled apart even though parts are touching each other in a contiguous or successive manner.

Following Aristotle, parts that are successive or contiguous can never

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585 GP II, 97/LA 121.

586 Importantly, Arnauld “stood in” as a defender of Descartes even though he was by far not without criticism of his arguments. Yet, notably, Arnauld “accepted Descartes’ thesis concerning the mind-body distinction without any reservation.” cf. Sleigh; op cit, p.32.

587 GP II, 101/LA 127 (Figure 2). Leibniz even included a drawing of an interlocking rectilinear spiral in the letter of 30 April 1687 in order to illustrate this point.
constitute a continuum, a unity. The mechanists allowed cohesion through contact between matter, acting and reacting upon each other, but for Leibniz – and indeed Aristotle – contiguity was insufficient.\textsuperscript{588} A unity was only comprised when each component part was made of the same “stuff”.

These ways of aggregation lead Leibniz to call all three - association, collection, and interweaving - mere “unities of contiguity”; that is that they touch, they flock, or they are gathered, but they still do not constitute a true unity because they lack substance. “One will never find,” he reiterates, “any fixed principle for making a genuine substance from many entities by aggregation...”.\textsuperscript{589} In this correspondence with Arnauld, Leibniz argues against the possibility of aggregates constituting a unity.


Furthermore, any apparent unity through aggregation is a temporary state of affairs, being changeable, dependant upon its composition, modification and motive; that is to say, phenomena. Therefore, even though there can be degrees of accidental unity, due to the fact that a substance literally has more connections or relationships than another, and that their states variously succeed each other, only substances have real unity, “all the rest is merely phenomena, abstractions or relationships”. However, these phenomena are not wholly a mental or imaginary impression. In saying that substantial form is necessary in order to constitute a true unity, Leibniz is most decidedly not advocating mind-dependant phenomena. Because all phenomena also contain embedded within, or surrounding a simple or real unity (Leibniz uses both analogies variously), then a radical separation between extended matter and real genuine entities is avoided. In contradistinction to Descartes, all reality is either a true unity, or phenomena constituted out of aggregated substances including genuine entities. This interrelation implies two things: firstly, the content of the unified entities is on a graduated scale, from the most real or genuine entities, to the loosely aggregated, disassociated, or disconnected collections of gross matter. And secondly, extended matter and soul-like genuine substances are not in radical opposition to each other; rather, in dynamic relationship, folding in and out of each other over time due to an infinite number of effects, containing a “world of diversities”. Without a true unity in the aggregation, there is no genuine reality in the Platonic sense. Yet, the constituent parts always exist in relation to other entities.

This gradation of substance interlaced with material substance or phenomena, is not strictly speaking an aggregation, but an intussusception, the drawing in of the phenomenal into the fold of the substantial. One of the definitions of intussusception is

590 GP II, 100/LA 126.
591 GP II, 101/LA 127.
592 I am proposing this term, not Leibniz. Intussusception. Etymology: Latin intus (within) + susceptio (action of undertaking), from suscipere to take up. A drawing in of something from without as in an invagination, or the assimilation of new material and its dispersal among preexistent matter. To fold matter into a pocket or envelope. In-folding.
the assimilation of new material and its dispersal among preexistent matter. This assimilation embraces the dynamic character of substantial form; the material and the substantial are invaginated, not radically separate or opposed to each other. A unity through aggregation would not constitute a true or genuine unity. However, a unity through intussusception, being a folded unity of both the substantial and the material, can constitute a unum per se. Leibniz states:

...nothing is so solid as not to have a degree of fluidity,...Our mind notices or conceives of certain genuine substances which have various modes; these modes embrace relationships with other substances, from which the mind takes the opportunity to link them together in thought and to enter into the account one name for all these things together, which makes for convenience in reasoning. But one must not let oneself be deceived and make of them so many substances or truly real entities; that is only for those who stop at appearances, or those who make realities out of all the abstractions of the mind, and who conceive of number, time, place, movement, shape, perceptible qualities as so many separate entities.593

For Leibniz, the continuum is a question of both/and. Unity is always one entity; that is to say, one real substance. A body as mere extension can never make up a true substantial unity. Yet, on the other hand, Leibniz is an Idealist, so phenomena will never make up a real substance because phenomena are merely a “coherent dream”. In this regard, Leibniz navigates the middle way again; between the ancient concepts of substantial forms and the mechanist’s explanation of nature, between metaphysical realities and physical phenomena. One can always explain phenomena mechanically but,

The assumption of pure extension destroys the whole of this wonderful variety; mass alone (if it were possible to conceive of it) is as much inferior to a substance which is perceptive and a representation of the whole universe according to its point of view and the impressions (or rather relationships) which its body receives mediately or immediately from all others, as a corpse is inferior to an animal or rather as a machine is to a man.594

593 GP II, 101/LA 126-7.
594 GP II, 98/LA 123.
A genuinely real being is comprised by its perception/ expression/representation of the universe, and in this regard a mental thing, but also can be embedded in a corporeal phenomenal body and because at its core is a substantial unity, it can constitute an unum per se. In contrast to a unity through aggregation or a mind-body opposition, even though a composite of a relational/perceptival component is married to a phenomenal component, this is a unity through intussusception, a folded unity or composite of both the substantial and the material.

Yet the possibility of an extended material thing constituting in any way a genuine unity, was far from uncontested. Arnauld had difficulty accepting this argument because he saw Leibniz backed into a corner with regard to all phenomenal extended beings having something soul-like. If all substantial unities per definition were required to have substantial forms in order for them to be considered as unities, then all extended matter, in Leibniz’s account, must also have embedded in it some soul-like genuine entity, albeit upon a graduated scale. If Leibniz, on the other hand, did not want to acquiesce that a rock, for example, had substantial form, then he had to admit all phenomena were merely imaginary or mind-dependant. Both of these positions were precisely untenable for Leibniz:

595 cf. Martha Brandt Bolton; op cit, pp.97-122. Contemporary scholars are also divided as to what exactly is Leibniz’s position here. Most helpful is Brandt Bolton’s footnote no.1 on page 118, where she lists the positions of various Leibniz scholars: on the side of the “theory that the extended matter that pertains to a bodily substance has reality independent of (corresponding to) the perceptual states of souls and soul-like entities include Brown 1984: 136-43; Garber 1985: 27-130; Hartz 1992; and Woolhouse 1993: 54-74. Those who claim that Leibniz held in this period that extended matter is nothing more than coordinated perceptual content of souls include Adams, R.M. 1994: 217-307 and Rutherford 1995: 218-26. Others maintain that in this period Leibniz vacillated between the two positions: Robinet 1986; Wilson 1989; and Hartz 1998. A variant is urged by Sleigh 1990: 110-15.” (Brandt Bolton; p.118n.1). Obviously, my interpretation proposes a middle way, a way I suggest that does not necessarily mean that Leibniz “vacillated”; rather, in my opinion, he was precisely attempting an account between these two extremes of extended matter and mind as a simple substance, an intussusception.
...extended mass considered without entelechies, consisting only of these qualities, is not bodily substance, but an entirely pure phenomenon like the rainbow; therefore philosophers have recognized that it is form which gives determinate being to matter, and those who do not pay attention to that will never emerge from the maze [labyrinth] of the composition of the continuum [de compositione continui], if they once enter it. Only indivisible substances and their different states are absolutely real. This is what Parmenides and Plato and other Ancients have indeed recognized. Besides, I grant that the name of “one” can be given to an assembly of inanimate bodies although no substantial form links them together, just as I can say: there is one rainbow, there is one flock; but it is a phenomenal or notional unity which is not enough for the reality in phenomena. But if one considers as matter of bodily substance not formless mass but a second matter, which is the multiplicity of substances of which the mass is that of the total body, it may be said that these substances are parts of this matter, just as those which enter into our body form part of it, for as our body is the matter, and the soul is the form of our substance, it is the same with other bodily substances.  

This extensive passage in the correspondence summarizes Leibniz’s position with regard to substance. Most importantly, he negotiates the middle way, avoiding a Cartesian split between mind and bodily extension. Just as importantly, he avoids a completely mind-dependant reality. This middle way I have called an intussusceptional unity, a unity per se that aggregates whilst being also substantial, a “multiplicity of substances” constituted by soul-like entities embodied in matter. 

Nevertheless, perhaps Leibniz had gone too far in order to explain to Arnauld his solution of overcoming an account of phenomena being merely extended matter. At this time, Arnauld was already quite elderly and in poor health. He confessed he had neither the time nor energy to spend on such abstract, speculative concerns. Leibniz would write him two more times in vain. The correspondence would never resume. But the fundamental problem of how the soul could be joined to the body whilst avoiding on the one hand, the Cartesian ontological gap; and on the other a mind-

596 GP II, 119-120/LA 152-153.
dependant imaginary world – these problems remained to be taken up with others at later dates. Leibniz would propose other solutions. Yet the intussusception of the material and substantial folds could be seen in various layers of embeddedness: the soul in the body; the monad in the universe; virtuality in the possibility. However, the first intimations of the intussusception of the material and substantial contained in this correspondence would be taken up again in another form: in the notion composite substance, and in the concept of the fold discussed with regard to the second labyrinth of the continuum in the dialogue *Pacidius to Philalethes*.

**Unity of Monadic Substance from Correspondence with de Volder**

Almost fifteen years after the Arnauld correspondence, Leibniz was again confronted with the problem of the extension of bodies in space and the unity of the body with the soul. Upon the Dutchman de Volder’s repeated insistence, time and time again he made an attempt to provide a satisfactory account to his correspondent. One of the most significant letters, which had gone missing and had to be re-sent,\(^{597}\) is the letter then dated Hanover, 20 June 1703. In this period, his notions of substance and the monad were coming into maturity, and would take on the form that will chiefly remain for the rest of his life. The summation of these notions would be the *Monadology*, written in 1714. Still, this account was yet to come. In this time period, the pressing need for an account for the combination and connection between matter and substance was becoming, under the exigent inquiry of de Volder, unavoidable.

In the letter of 20 June 1703, Leibniz explicates that all substance, per definition, has the capacity to act and to “have a tendency”\(^ {598}\). Leibniz evokes his principle of pre-established harmony,
and the principle that the present is always pregnant with the future. Yet, in his correspondence with de Volder, he develops for the first time a concept of the monad motivated by an active power in another attempt to account for the connection between substance and matter.

In the de Volder correspondence, every monad becomes a combination of active and passive components; that is to say, an active soul that motivates the tendencies of the whole and unifies it, and a passive or resistant material component that is finite and changeable. The unity of the two always has a principle of action and unity, a dominant entelechy, and is always a combination of active substance and finite passive material resistance. An individual substance, then, is singular and unique, and not a material or passive entity alone, subject solely to mechanical forces in a spatial vacuum. Every substance is unique because it has within it the principle of diversity, each expressing the entire universe from its own singular point-of-view. The monad can never be purely phenomenal, reducible to a mathematical point in an indifferent spatial system of extension. Precisely the dominant monad in a unified substance determines its uniqueness from all others whilst participating in a pre-established harmony. This “unity in diversity” becomes critical for Leibniz. “Hence it cannot happen in nature”, Leibniz categorically states, “that two bodies are at once perfectly similar and equal”.

Because space and time are co-existent relations to Leibniz, and not something absolute, the location of a thing is also singular.

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599 This specific version of Leibniz’s monad Pauline Phemister calls the “de Volder monad”. For an extended treatment of the Leibniz-Volder correspondence, see Phemister, Pauline; Leibniz and the Natural World: Activity, Passivity and Corporeal Substances in Leibniz’s Philosophy (Dordrecht: Springer, 2005).

600 GP II, 248-53/L 528.

601 GP II, 248-53/L 529. Leibniz says that “…a substance contains an infinity of machines…”.

602 GP II, 248-53/L 529.

603 Loemker clarifies in L 541, note 20: “Space is thus a phenomenon, but spatiality is a fundamental aspect of the functional relationships between coexistent [space] and simultaneous [time] perceptions of the monads.”
A unique substance “expresses” its position and its relation to its environment; a thing is not merely definable by its mathematical coordination against a blank absolute canvas. Two things cannot occupy the same space or time. For Leibniz, atoms are indistinguishable units, or building blocks, not singular entities. Yet the Leibnizian monads are always singular and diverse; always a combination of active entelechies and passive matter; and always in spatio-temporal relation in perfect harmony with their environment. Although singular units, monads are never “alone” in the vast indifference of absolute space and time, subject only to mechanical forces. He states in his letter to de Volder, contrary to the Cartesians:

...given a plenum, it is impossible for matter as it is commonly thought of as formed solely out of the modifications of extension, or if you prefer, out of passive mass, to suffice for filling the universe, but that it is obviously necessary to assume something else in matter from which we may get a principle of change and one by which to distinguish among phenomena; and hence we need some alteration, and therefore some heterogeneity, in matter in addition to increase, diminution, and motion.604

The “something else” in matter is the enduring substance throughout change in the unity of the dominant entelechy or soul.605 For Leibniz, substance is always singular and diverse. Substance is not merely a brute matter subject to mechanical forces, defined by mathematical or discrete means. Furthermore, the active component of the monad, the dominant entelechy or soul, never dies.606 Although as a whole it is subject to movement and change, there is always a core which remains the same. This core, indivisible and perfect, can be neither created nor destroyed mechanically. Only phenomena, as

604 GP II, 248-53/L 529.
605 GP II, 262-65/L 534. “And this enduring something will be a substance only because it is also a monad. In fact, he [Spinoza] could have found an analogy of what he ascribed to the universe as a whole, in each of its parts. Substances are not mere wholes which contain parts formally but total things which contain their partials eminently.”
606 GP II, 248-53/L 529. Leibniz writes to de Volder from Hanover 20 June 1703: “But I do not admit any generation or corruption in substance itself.”
an aggregate of matter, are subject to dissolution and change; indeed, subject to the mechanical forces of inertia, impact and resistance.

Yet Leibniz admits mechanisms. Indeed, he calls the composite substance – matter plus simple substance – an organic machine, machina. As a consequence of his rejection of atomism, he defends divisibility to infinity in the continuum, as did Aristotle. Each corporeal substance, he states, “contains an infinity of machines”, yet this substance is a genuine unity, forming one machine. This unity is in contradistinction to the discrete unities of mathematics; for example, a number “two”, being a discrete unity, yet comprised of an aggregation of parts. For Leibniz, a corporeal substance, albeit composed of an infinity of machines, is at the same time a monadic entelechy, a true unity. Phenomena, on the other hand, are a mere composite of parts, an aggregation, subject to mechanical forces, change, and movement - what he calls “derivative forces”. A true unity, even in an organic machine containing an infinity of machines, is always brought about by the expression of a dominant entelechy. Leibniz emphasizes: “...you will find no true unity if you take away the entelechy”.

This unity of composite substance, in this time period, Leibniz calls a monad. A monad, such as we understand it in the de Volder correspondence, is constituted by passive primitive matter combined with an active force that propels it and motivates its tendencies. Even if an organism is a collection of many (indeed, infinitely many) substances, there will always be a dominant or primary entelechy within the organic machina. Nevertheless, a dominant entelechy cannot influence directly the other substances in the monad. Rather the

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609 L 541, note 25, Loemker explains: “Thus there is no empirical meaning for infinity as applied to discrete existing beings, but only one of indefinite continuation. The continuum of mathematics, on the other hand, applies only to the realm of possibility.”
610 GP II, 248-53/L 529.
611 GP II, 248-53/L 529-231.
612 GP II, 248-53/L 530. “I do not admit any action of substances upon each other in the proper sense, since no reason can be found for one monad influencing another. But in
organic body is an “expression” of the whole, as “the soul is expressed
in the body”, and through the body the expression of the universe. However, change comes about in the monad through an internal
principle, or an active force.

To sum up Leibniz’s consideration of entelechies, monads,
and substances in his correspondence with de Volder of 1703, we
can say the following:
* Each monad is singular and unique.
* Unity in plurality is the principle of the monad.
* Simple substances or monads are inviolable and perfect.
* Only simple substances are true beings, genuine unities.
* "Simple" means lacking in parts.
* The monad reflects the universe from its own point-of-view, being a
mirror of the whole.
* A monad is not extended, for extension is solely corporeal.
* Although not extended spatially, each monad has its “place”, or order-
in-relation, each with a specific relation to all other monads.
* Matter is merely an aggregate, or a well-founded phenomena.
* The phenomenal is subject to mechanical forces, that is to say
“derivative forces” or primitive passive power, otherwise known as
inertia, impact and resistance.

appearances composed of aggregates, which are certainly nothing but phenomena (though
well founded and regulated), no one will deny collision and impact.”

613 GP II, 248-53/L 531.
614 GP VI, 529-38/L559-560. A year before, in 1702, Leibniz had written succinctly in
a small fragment while staying at the summer palace Lützenburg: From Reflections on the
Doctrine of a Single Universal Spirit (1702): Over the doctrine of individual souls: “...the nature of
unities or simple things, with which particular souls are included. This argument compels
us, unavoidably, not merely to admit particular souls but also to affirm that they are
immortal by their nature and as indestructible as the universe and what is more, that each
soul is a mirror of the universe in its own way, without any interruption, and contains in
its depths an order corresponding to that of the universe itself; and that the souls vary and
represent in an infinite number of ways, all different and all true, and thus multiply the
universe, so to speak, as often as possible, and in such a way that they approach divinity as
far as they can in their different degrees and give to the universe all the perfection of which
it is capable.”

615 GP II, 248-59/L 528-533.
*Only phenomena are subject to change, motivated essentially by an internal tendency to change.
*However, these phenomena are embedded with, or an expression of a dominant or primary entelechy.
*An organic machine (a composite substance) contains an infinity of subordinate monads.
*This composite substance or organic machine makes up one substantial unity, which is passive matter guided by or expressed by the dominant monad.
*Every monad is connected in a system of perfect pre-established harmony.

**The Organon/Objectum Distinction**
Also important for understanding bodies, is a passage more than twenty years earlier in Leibniz’s fragment of Summer 1678-Winter 1780-81 entitled, *Metaphysical Definitions and Reflections*: “If two bodies resist one another, and we perceive the action and passion of one as pertaining to us, and those of the other as foreign to us, the former body is called an organ [organon], the latter is called an object [objectum]; but the perception itself is called a sensation [sensus].” Expanding upon other notions in the fragment where Leibniz distinguishes in contradistinction to Descartes between a body [corpus] and a vacuum [vacuum], in purely physical terms, there is not differentiation between a body in space that has consciousness/perception and one that does not. Only when a body has sensation, imagination, memory and judgment does that body attain a degree of perfection that enables it to have perception. For Leibniz, perfection is a sort of continuum with God as the most perfect being, all other beings existing as an inferior degree of perfection. In his small fragment “Intellectual Principles of the Existence of Things”, he uses the famous metaphor of the architect and geometer:

I call more perfect what involves more essence. For perfection is nothing but degree of essence. And therefore above all there exists a Being that contains all perfections, that is, God. Also the world is made

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616 Avi267 (1394)/LC 237.
by God in the most perfect way; and a maximum outlay is achieved with minimum expenditure of place, time, and matter. And of the various ways of forming things, those are preferred which exclude the fewest things from existing, in the same way that a wise architect joins stones in such a way that they take up no more space than they fill, lest they take away space for others...the workings of God are like those of a most excellent geometer who knows how to produce the best constructions for his problems.617

Yet all beings participate in the concept of the harmony in the best of all possible worlds. Consequently, in Leibnizian terms, a body is called an organon when it has the capacity to act and be acted upon,618 and a body that has no action and passion is merely an object (objectum).

Nevertheless, all bodies, whether they are organon or objectum, are “resisting extended things”.619 Bodies then, for Leibniz, are extended, with “extended” meaning “that which has magnitude and situation”.620 Nevertheless, Leibniz’s concepts of “bodies” must be understood against the background of his equally extensive work in mathematics and physics. A “body”, therefore, could be seen in several ways - as a mathematical point with situation and no magnitude, or a projectile traveling a trajectory through space, or a monadic soul.621 Leibniz considers bodies as along a continuum of perfection: the only perfect being which has the capacity to act, yet not be acted upon is God; other less-perfect “bodies” have consciousness – what he calls actions and passions – which is to say, the capacity to act and be acted upon; and still other even less-perfect “bodies” which have no capacity to act, only “resistance” - the capacity to be acted upon because they have magnitude and situation. Consequently, although the opposition between bodies that are “organon” and bodies that are “objectum” would

617 Avi267 (1394)/LC 239. Metaphysical Definitions and Reflections.
618 G VI, 598-60/AG 207. Principles of Nature and Grace of 1714: “A substance”, Leibniz says, is per definition, “a being capable of action.”
619 Avi267 (1393)/LC 237.
620 Avi267 (1394)/LC 237.
initially appear to be a dichotomous relationship, this relation is in fact along a continuum from the most perfect being, God, to the most “resistant” bodies which are not capable of action in and of themselves.

In addition, these bodies must not be seen as static entities. Repeatedly Leibniz emphasizes that the phenomenal world is in constant flux, yet always constitutes a unified continuum. The monadic soul is as an immaterial point in a material or “actual” body. For example, in his correspondence with de Volder, he reiterates the notion of divisibility in the continuum:

From the things I have said it is also obvious that in actual bodies there is only a discrete quantity, that is, a multitude of monads or simple substances, though in any sensible aggregate or one corresponding to phenomena, this may be greater than any given number. But a continuous quantity is something ideal which pertains to possibles and to actualities only insofar as they are possible. A continuum, that is, involves indeterminate parts, while on the other hand, there is nothing indefinite in actual things, in which every division is made that can be made....But we confuse ideal with real substances when we seek for actual parts in the order of possibilities, and indeterminate parts in the aggregate of actual things, and so entangle ourselves in the labyrinth of the continuum and in contradictions that cannot be explained.

The consideration of bodies as along a continuum can also be argued from the fragment, Created Things Are Actually Infinite from Summer 1678-Winter 1680-81, the same period as Metaphysical Definitions and Reflections. In this fragment, Leibniz states that created things are actually infinite because any body can actually be divided infinitely into parts just as a line along a continuum can be divided into an infinite number of points. As Euclid had argued, a point has no magnitude yet has position or situation. As a result, a line is not a composition of points; rather, a line is infinitely divisible. Similarly,

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622 Aiv267(1395)/LC 239. Intellectual Principles of the Existence of Things. What is more perfect, simply has more essence, for Leibniz.
623 GP II, 281-83/L 539. Correspondence with de Volder, 19 January 1706.
624 Aiv266 (1392-3)/LC 235-7.
in the fragment of Created Things Are Actually Infinite, Leibniz states that “more bodies can be found than there are unities in any given number”. A body can be divided into an infinite number of parts. However, this will not say that these parts in themselves constitute a “unity”. A created thing is infinite in the mathematical sense of being infinitely divisible; and a created thing is infinite in the sense that at least its monadic/soul cannot be destroyed by any other than God. In fact, the monadic soul cannot be “acted upon” because it is inviolate and perfect as a true being, a genuine unity.

Similarly, an argument is made by Leibniz for the infinite in the positive dimension, the infinitely expandable universe. In Conspectus for a Little Book on the Elements of Physics he rehearses an argument made also in A Chain of Wonderful Demonstrations About the Universe of December 1676 for space being “indefinitely extended”. As a thought experiment, whatever could be deduced from a small circle, could also be said of a larger one. Indeed, whatever place a sphere occupied could conceivably “be concluded about any another place similar to it”. One could just keep placing the sphere in another place, there being no place logically beyond a place where there is no space. Now, a possible misunderstanding here would be to assume a homogenization of space such as conceived by Newton, among others. Leibniz, although assuming a kind of equivalence in the argument of the indefinitely extended space, thought of space not as an extended thing, but as a relation. Consequently, an object, body, or being placed in space, as it were, is not in a container, or a contained space, but always already in relation to some other object or body. As a result, one could keep moving that object “beyond the bounds” into an infinitely

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625 Aiv266 (1393)/LC 235.
627 A583-5/DSR 106-111. cf. Arthur’s annotations LC 412n.7. If space is homogeneous, Leibniz says, there is no reason why it could not be supposed to be yet more extensive. Indeed, if space is a thought of God, in principle no limitation could be placed upon its determination.
628 Aiv365 (1988)/LC 233. This argument parallels, of course, that of Aristotle on the “unlimited” universe as we saw in the previous chapter.
extended relation. One simply just keeps going because one cannot conceive of any relation that cannot be extended, no matter how far.

Another important, albeit often forgotten, aspect of bodies is that they are “extended, mobile, [and] resistant” (*corpus est extensum, mobile, resistens*). Of course, according to Leibniz what is spatially extended automatically and necessarily must have a situation (*situs*). Bodies, as spatially extended, have both situation and magnitude. Magnitude determines the parts of the body; whereas the situation or place of the thing determines or allows the perception of the thing. In Arthur’s annotations to this fragment, he elucidates the omissions. Leibniz had crossed-out the following: “situation is the form of a thing”, and “is a mode according to which several [entities] can be perceived simultaneously”.

Remembering that Leibniz is a Relationist with regard to space and time, any body in space is given form by its situatedness and formal extension, the only manner in which any phenomenon could be perceived. Notably, Leibniz states that bodies are in addition to being extended and resistant are also mobile. Leibniz’s physics is always a dynamic physics, an ever-changing situatedness within a spatial/temporal relatedness.

In June of 1704, Leibniz reiterates his position on extension to de Volder. Although the Cartesians had failed in his eyes to provide a true account of corporeal substance, considering extension as something absolute and substantial, Leibniz did not consider a body to be *substance per se*. In fact, he states quite categorically already in 1678-9, that a “body is not a substance, but only a mode of being or coherent appearance”. Therefore, Leibniz denies something like “mass” in a primitive sense being anything like a substance.

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632 Aiv316 (1637)/LC 259. from the fragment *A Body is Not Substance* of about 1678-9, date uncertain.
633 In 1695, Leibniz is firmly committed to this proposition, “…material mass is not a substance...” in P 125. “New System”.
on to say, if all of matter is in perpetual flux, any position or extension of matter is merely accidental. Given that Leibniz’s world of spatio-temporal relations is based on monadic perception, substance in the sense of a composite of both active and passive forces, as well as the primary entelechy and matter, are a precondition to any relationship in a phenomenal world. Subsequently, he reminds de Volder that for him:

...extension is an abstraction from the extended and can no more be considered substance than can number or a multitude, for it expresses nothing but a certain non-successive (i.e., unlike duration) but simultaneous diffusion or repetition of some particular nature, or what amounts to the same thing, a multitude of things of this same nature which exist together with some order between them; and it is this nature, I say, which is said to be extended or diffused. The notion of extension is thus relative, or extension is the extension of something....But this nature which is said to be diffused, repeated, and continued is that which constitutes a physical body, and it can be found in no other principle but that of acting and enduring, since no other principle is suggested to us by the phenomena.634

Most importantly for Leibniz, extension must be an extension of something. Yet this something is not phenomenal “mass” without substance, or a raw matter divorced from a soul or a mind. Precisely this “extended from” is from the monad itself which is for Leibniz a composite substance, a unity *per se*, not a mere phenomenal aggregation of matter. The monad is the source of enduring - lacking parts, perceiving, and mirroring the entire universe. Consequently, Leibniz uses a concept of force (or more accurately a combination of active and passive forces) in order to position “situatedness”, not extension, as the Cartesians. The monad is substantial but has no extension; it does however have position, *situs*, or situation. The active principle in the monad is prior to all extension, prior to all phenomenal position. And from this active principle that dominates the whole body – its motion, perception, reason, and tendencies – the monad exists in “a

634 GP II, 268-71/L 536.
certain ordered relation of coexistence with others...”, to quote the important letter to de Volder of 1703 from Hanover. In short, Leibniz does not come from the position of material or passive entities, rather from the situatedness of an active substance that is the force of action and per se an unity, yet in a continuum or relation with all other monadic substances in the universe.

**Specimen Dynamicum: Phenomenal Flux**

Much earlier in the 1690’s, specifically in attempts to engage with Cartesian and Newtonian mechanics, Leibniz already shows a commitment to monadic substance, as well as spatio-temporal relationality, in a phenomenal flux. From Leibniz’s viewpoint, phenomenal extension can never be substantial. With extension, the corporeal body is reduced to a mere mathematical/geometrical point. In his opinion, there is always something prior to extension, some force which is the impetus for phenomenal extension. On the other hand, he also finds the concept of the Scholastics, *conatus*, or the striving to fullness, is also an inadequate account. This striving endeavor accounts neither for the free will of the monad, nor an acknowledgement that the nature of substance is indeed to act, and to move, and to resist. Extension, on its own, provides only an explanation.

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636 The term *conatus* has a long etymology, beginning with the ancient Greeks. In turn, the meaning coming down to Leibniz was codified through Cicero and his contemporaries as meaning the nature of human striving or endeavor. For Thomas Aquinas, *conatus* meant the soul’s desire to know God and its desire to do Good. The Christian Scholastics would interpret *conatus* as the striving specifically for Godly perfection in human nature. However, in the hands of the modern philosophers – Descartes, Newton, and Wolff – *conatus ad motum* or *vis conatus* described the motion of an object, or a concept of mechanical, gravitational, or centrifugal force. An object “endeavored” to follow mechanical laws of motion. For Hobbes, *conatus* was crucial to his theory of emotions, being the “alterations in small interior motions”, a kind of will to survive for all organic beings, as well as contributing to his *Physics*. Similarly, for Spinoza, the endeavor or tendency became essential in his metaphysical project. In his *Ethics*, Proposition III.6: “Each thing, as far as it can by its own power, strives to persevere in its being.” Indeed, the striving is elevated to the essence of the thing. So when Leibniz uses the term *conatus*, we must keep in mind these meanings of the term that he would have been engaging – the motion of objects, and the metaphysical principle of striving and persevering. As usual, Leibniz will attempt to negotiate the middle way between these two positions.
of the “continuation and diffusion of an already presupposed acting and resisting substance”; and the conatus of the Scholastics, on its own, provides only an explanation of the initial divine impetus provided in creation. In order to avoid either a gross occasionalism, or a crude determinism, Leibniz needs an account that “arises from the best possible connection [nexus] of things”. Whilst denying a concept of matter that does not acknowledge the possibility of self-impetus of the substance itself, Leibniz also denies the Scholastic concept of prima materia, or an “hylarchic principle”, employed to explain mechanical phenomenon. The clearest, albeit not the only, statement about matter vs mass comes in a letter to Bernoulli of 1698:

637 GM VI, 234-54/L 435. Specimen Dynamicum: For the Discovery of the Admirable Laws of Nature Concerning Corporeal Forces, Their Mutual Actions, and Their Reduction to their Causes.

638 GM VI, 234-54/L 436.

639 cf. Mercer, Christia; Leibniz’s Metaphysics: Its Origins and Development (Cambridge: Cambridge UP, 2001)p.109,note37: “The schoolmen disagreed as to whether matter had its own essence and hence whether or not it could exist without form....Aquinas thought matter was pure potency, and could not exist without form;...Scotus thought matter had a reality distinct from form and could exist without it;...and Eustachius agreed with Scotus but added a few thoughts of his own...For those seventeenth-century philosophers who wanted to make Aristotle more compatible with the new natural philosophy, the position of the scholastics like Scotus and Eustachius was far more attractive than that of Aquinas.”

640 GM VI, 234-54/L 441. Leibniz on matter (moles) and mass (massa) is not a straightforward matter. As a young man, he writes to his teacher Thomasius: “Matter in itself is devoid of motion. Mind is the principle of all motion, as Aristotle rightly says. For to come to this problem, Aristotle seems nowhere to have imagined any substantial forms which would themselves be the cause of motion in bodies, as the Scholastics understood them.” GM VI, 162-174/L 99. In the 1670’s, Leibniz is still attempting to reconcile Aristotle with the natural philosophies of Hobbes, Boyle, and Descartes. See, for example, On Prime Matter, GP VI ii 279-280/A VI.iiN42/LC343-5. By the time he engages with the mechanists, his vocabulary changes from matter (moles) to mass (massa). Mass becomes that which is in extention, inert and impenetrable, and subject to mechanical forces. Bodies, for Leibniz, are never mere extension, yet always have the ability to act and to move, imbued with active/primary force. Force, not mass, is the key concept for Leibniz. A phenomenon is process; conatus is the beginning of motion. Although one has to point to a specific text in order to correctly speak about Leibniz’s concept of matter, in general one could say that the Scholastic notion of materia prima in the reconcilitory project of Leibniz becomes massa – inert and resistant extended stuff.
With regard to the nature of body...all phenomena in bodies, even the force of elasticity, can be explained mechanically. But the principles of mechanism or of the laws of motion cannot be derived from the consideration of extension and impenetrability alone; and so there must be something else in bodies from whose modification conatus and impetus arise,...By monad I understand a substance truly one, namely, on which is not an aggregate of substances. Matter in itself, or bulk [moles], which you can call primary matter, is not a substance; indeed, it is not an aggregate of substances but something incomplete. Secondary matter, or mass [massa], is not a substance [either], but [a collection of] substances....there is no part of matter in which monads do not exist.641

In fact, the order of things is not a matter purely mechanical, or purely metaphysical, but an intertwining of two “kingdoms”: the one is a kingdom of efficient causes; and the other is a kingdom of final causes, or a realm where “God regulates bodies as machines in an architectural manner according to laws...”.642 Subsequently, Leibniz proposes another interpretation to either the Scholastic or the mechanical notion of conatus; rather, conatus seu nisus,643 a natural force present in all living things embedded there by God, as the innermost nature of all substances which are per definition capable of action. Leibniz’s conatus seu nisus is a force striving for change, and this change is defined in this text as both the self-motivated active/primitive forces in the substantial forms, as well as phenomenal motion in all its diversity - momentum, inertia, gravitation, trajectories, etc. - a similar use of the term to Descartes, Newton, Hobbes, and Huygens. For example, Leibniz also used the term conatus technically to define velocity with direction, and specifically in the case of motion about a fixed center, he uses the expression: “the conatus for receding from the center”.644

In this impulse to striving, Leibniz employs a concept of force in the place of mere geometrical extension. In his Dynamics,645 he

641 GM III 536-537/AG 167. Letter to Johann Bernoulli August-September 1698 (? date uncertain).
642 GM VI, 234-54/L 442.
643 GM VI, 234-54/L 435.
644 GM VI, 234-54/L 437.
645 GM VI, 281-514 Dynamics, which was written in 1695 in response to Descartes and Newton, but never published. The Specimen Dynamicum: For the Discovery of the Admirable
defines two forces: active force and passive force. Of active forces, or power, there are two kinds: the **primitive force** embedded in all corporeal substance, which in Aristotelian terms would be called the **entelechy**, corresponding to the soul or substantial form; and the **secondary or derivative force** which is a result of corporeal interaction and could be called mechanical force. As such, Leibniz sets out a place for mechanism, and indeed a new science of dynamics, that also takes into consideration the self-initiated possibility of motion arising from a monadic substance. In this manuscript, Leibniz also outlines, then, the **derivative forces** which can describe mechanical or corporeal phenomena; i.e., the dead forces of gravitation, material elasticity, centrifugal or centripetal forces; and the so-called living forces [**vis viva**] of motion, inertia, velocity, and acceleration. In contrast to either Descartes or Newton, Leibniz proposes a dynamic vision of the order of things:

I concluded, therefore, that besides purely mathematical principles subject to the imagination, there must be admitted certain metaphysical principles perceptible only by the mind and that a certain higher and so to speak, formal principle must be added to that of material mass, since all the truths about corporeal things cannot be derived from logical and geometrical axioms alone, namely, those of great and small, whole and part, figure and situation, but that there must be added those of cause and effect, action and passion, in order to give a reasonable account of the order of things. Whether we call this principle form, entelechy, or force does not matter provided that we remember that it can be explained intelligibly only through the concept of forces.

The confusion in improperly understanding the nature of substance has, according to Leibniz, lead some mechanical philosophers

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Laws of Nature Concerning Corporeal Forces, Their Mutual Actions, and Their Reduction to their Causes (GM VI, 234-54), is a summary of this longer work, and is considered to be a full statement of his mature theory of dynamics, a science he admits in the opening lines, was still to be fully established.

646 GM VI, 234-54/L 436. See also, P 117. "New System": “Aristotle calls them first entelechies; I call them, more intelligibly perhaps, primitive forces, which contain not only the act, or the fulfillment of possibility, but also an original activity.”

647 GM VI, 234-54/L 441.
into a corner, forced to explain phenomenon by extension alone and placing God in a position of having to guarantee the union between body and mind, as well as the interaction of bodies in an absolute space. This account of affairs, Leibniz rejected for two central reasons. Firstly, space, time and motion were matters of relation for Leibniz, being something like a mental construction, or a well-founded phenomenon, but not in itself real. Space and time are real only in the sense that the Immensum or Eternity of God is real. However, the motion of bodies in the continuum of space is merely a co-existence with others in an ordered relation, while time is merely a relation of simultaneity. In short, all phenomena were in an inter-relationship, but the only things that were truly real were monadic substances as the origin of living forces that impelled-toward extension. The notion of striving, conatus, in the hands of the mechanist philosophers – Descartes, Wolff, and Newton, not to mention partly Hobbes as well – becomes in fact an account of motion for extended objects.

648 GM VI, 234-54/L 445.
649 In Aiii 36 (391)/LC 53-5 Notes on Science and Metaphysics from 18 March 1676, Leibniz defines “Immensum”, or infinity/immensity as God: “Supposing space to have parts – that is to say, so long as it is divided by bodies into empty and full parts of various shapes – it follows that space itself is a whole or entity accidentally, that it is continuously changing and becoming something different….But there is something in space which remains through the changes and this is eternal: it is nothing other than the immensity of God [Immensum], namely, an attribute that is one and indivisible, and at the same time immense. Space is only a consequence of this, as a property is of an essence.”
650 GP II, 64: In Leibniz’s letter to Oldenburg in 1670, he writes: “...striving (conatus), as most correctly observed by Hobbes, is the origin of motion, or what is in motion as a point is in a line.” cf. Mercer; op cit, p.159, note 67: “Because of Leibniz’s use of the term conatus, it is easy to think that Hobbes’ natural philosophy played a more important role in the development of Leibniz’s views at this time than it probably did. Current commentators on Leibniz’s attempts to solve the problem of the continuum disagree about the role that Hobbes played.” Leibniz himself writes to Hobbes in July 1670, GP VII, 572-574/L 106-107: “...it can hardly be explained what cause it is that moves any single body to strive [conor] from center to circumference in every sensible point, or how the reaction of the body struck can alone be the cause of the impetus of the rebound increasing with the impetus of the striking body….I should think that the conatus of the parts toward each other, or the motion through which they press upon each other, would itself suffice to explain the cohesion of bodies…Conatus is the beginning the penetration is the union [or cohesion],” (my emphasis). cf. Bernstein, Howard; “Conatus, Hobbes, and the Young Leibniz” in Studies in the History and Philosophy of Science 11 (1980): 25-37. And Garber,
Force, unlike motion for Leibniz, is a substantial concept, something absolutely real. Motion, like space and time are merely phenomenal, therefore consisting of a relation.\footnote{GM VI, 234-54/L 445. Leibniz was fundamentally opposing Descartes and Newton specifically concerning the conservation of motion. For Leibniz, \textit{conatus} was equivalent to velocity to the Modernists ($v=\frac{ds}{dt}$) whereas the notion of momentum ($mv$) was called \textit{impetus} by Leibniz. \cf Loemker’s note7 and table on L 451.} Furthermore, given the notion of continuity in the continuum, both fluidity and motion are not oppositions; rather, fluidity is but a degree of firmness,\footnote{GM VI, 234-54/L 449.} and rest is but a special case of motion.\footnote{GM VI, 234-54/L 447.} Leibniz sketches out in the \textit{Dynamics}, and the \textit{Specimen Dynamicum}, a spontaneous universe, regulated by God as a machine in an architectural manner, in a continuum that does not contain pure oppositions, rather degrees of rest-motion, and fluidity-firmness.\footnote{cf. Heinekamp, Albert (ed.); \textit{Leibniz’s Dynamica} Studia Leibnitiana Sonderhefte 13 (Stuttgart: Steiner, 1984). cf. Gueroult, Martial; \textit{Leibniz: Dynamique et métaphysique} (Paris: Aubier, 1967). cf. Duchesneau, François; \textit{La dynamique de Leibniz} (Paris: J.Vrin, 1994). cf. Costabel, Pierre; \textit{Leibniz and Dynamics: the Texts of 1692} (Paris: Hermann, etc./ London: Methuen, 1973). Republished as Costabel, Pierre; \textit{Leibniz and Dynamics: the Texts of 1692: textes et commentaires} (Paris: Vrin, 1981). cf. Breger, Herbert; “Elastizität als Strukturprinzip der Materie bei Leibniz” in Heinekamp, A. (ed.); \textit{Leibniz’s Dynamica} Studia Leibnitiana Sonderhefte 13 (1984): 112-121.} In the end, however, the Leibnizian order of the substantial and the phenomenal are continuously intertwined, “interpenetrated”, “permeated”, although the only “real” is substance itself, a force that impelled-toward physical extension. No body can move or change without an embedded impulse, an internal force, to motion; and no body can be phenomenal without a substantial “impelling-toward” physical extension. Both of these senses are what Leibniz meant by \textit{conatus}.

\textbf{Correspondence with Des Bosses: The Problem of Cohesion}

This intertwining of the substantial and the phenomenal results in a composite substance for Leibniz, and in his final years, he investigates the possibility of simple substances co-joined with matter in order to
form a unity. Yet, the question of simple substances is, in fact, not so simple. A closer look at the problem of unity and plurality in the philosophy of Leibniz will have to take into account the fundamental question: “how do ‘things’ hang together?” A unity is per definition that which is without parts. Leibniz provides other kinds of unities: a unity of substance that is alive and a single subject; a unity under the pre-established harmony of God; and a unity between the soul and an organic body joined together with a substantial chain or bond. In *Principles of Nature and Grace Based on Reason* (1714), he states “composites or bodies are multitudes; and simple substances – lives, souls, and minds – are unities….Monads have no parts”.655 Earlier, in his correspondence with de Volder, he categorically states: “...for there can be nothing real in nature except simple substances and the aggregates resulting from them”.656 However, he goes on to admit that in these simple substances, although he had provided an account of perception and the reason for them, i.e. pre-established harmony, he was yet unable to account for the union between the simple substances, monadic souls, and their composites forming organic bodies. This problem of the union of the two, would remain an unresolved problem, to be taken up again in the last years of his life in his correspondence with Des Bosses.

Nonetheless, the principle of cohesion that is necessary in order to achieve unity is a difficult problem. Cohesion, which is to say substantial cohesion, in the writings of Leibniz, was attempted in many ways: as the *monadum vinculum substantiale*, or literally a substantial chain or bond tying together the composite substances; as a continuity of the continuum where “an infinite whole is one”; as harmonizing motion in firmness/fluidity, *conatus* or *vis viva*; as mind as an unextended point with the principle of action in the body and the dominant monad as the “cement”; or as the unifying principle of God as the *Immensum* of Space and Time. Most importantly, for

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656 GP II, 281-83/L 539.
Leibniz, “...man is a being endowed with a true unity given him by his soul...”. Ultimately, Unity is One, but it is a unity in a complex and rich manner.

Between 1706 and 1716, which is to say the last ten years of his life, Leibniz explores a line of thought with respect to bodies in extension, relation, and change in the correspondence he held with the Jesuit professor of theology, Bartholomew des Bosses. Discussion on the problem of transubstantiation gave way to questions concerning the unity of the monadic soul with phenomena in a composite substance. The distinction is made between a simple substance – a unity in itself – and a unity by aggregation which is by necessity in the phenomenal world and therefore subject to change and movement. In a letter dated 30 April 1709, Leibniz discusses the impossibility of a soul passing over into another body, and explicitly compares an organic body to the movement of a ship or a river. The body remains the same whilst at the same time being in perpetual flux; the soul remains always with the body in a continuous unity. In contrast, no portion of extended matter, Leibniz says, can be said to remain the same, with precisely the same properties. As matter, this part of the body can change and eventually degenerate. However, the soul is like a point floating eternally on the wave of flux. “If you consider the question more carefully”, he says, “perhaps you will try to say that a certain point can at least be assigned to the soul. But a point is not a definite part of matter, and even an infinity of points gathered into one will not make extension”. Yet, there can be said to be a certain point, designated as a soul, immaterial, remaining always the same. This point/soul is not extended, not “part” of matter. The organic body is in perpetual flux and change, never being the same from moment to moment; nevertheless, the soul/point is the principle of consistency

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657 GP II, 111-129/L 344. Correspondence with Arnauld. 9 October 1687.
659 GP II, 369-72/L 596-7. Hanover, 30 April 1709.
660 GP II, 369-72/L 597. cf. Aristotle; Physics 215b19: “a line is not made up of points.”
and duration,\textsuperscript{661} and as such, is the continuity in the continuum of space/time like a ship flowing along the river.

Almost three years later in 1712, he reiterates this argument\textsuperscript{662} in an attempt to clarify the problem of corporeal substance. For Leibniz substantial form arises out of a union of monadic entelechies.\textsuperscript{663} Phenomenal matter arises out of the monad, exploding out of the non-material point as an \textit{exigentia} or an \textit{impelling-toward} physical extension, diffusion and resistance. The union of these two – the monadic soul and the corporeal substance – is bestowed upon them by God as a real unifier (\textit{uniente reali}).

![Figure 3: Impelling toward Physical Extension](image)

\textsuperscript{661} Or, more eloquently stated in the \textit{Metaphysical Definitions and Reflections} (LH XXXVII.14, Bl. 16-21) from Summer 1678-Winter 1678-9/LC 245: “The soul is the principle of unity and of consistency and duration; whereas matter is the principle of multiplicity and change.”

\textsuperscript{662} GP II, 435-37/L 600-1/AG 198-9. Hanover, 5 February 1712.

\textsuperscript{663} Leibniz uses an Aristotelian term meaning the actualization of a potentiality. In his correspondence with des Bosses of 12 June 1712, he explicates the nature of monads, “viewed with respect to their essence and disregarding all existence or physical actuality, are indeed substances, and primary complete beings in a metaphysical sense, because they have metaphysical actuality or an entelechy, yet they are not complete in the sense of physical substance, except insofar as and when a dominant entelechy bestows existence and therefore unity to the whole organic mass...”(GP II, 446-7/L 603-4). In Latin, \textit{entelechia}, from the Greek \textit{enteles} (complete), \textit{telos} (end, terminus) and \textit{echein} (to have). Monads are simple substances, but matter is most decidedly not for Leibniz. In his correspondence with de Volder of 1701, he states: “...I once also concluded that there are no atoms, that space is not a substance, and that primary matter itself, or matter separate from all activity, cannot be included among substances.” GP II, 224-28/L 524.
However, any primary matter that arises can also in principle be destroyed when the union ceases to be. This union of the two, Leibniz says, is also in perpetual flux, just as raw matter itself. The difference is that even though the monadic soul may also float from position to position, from moment to moment, it never changes, but remains the same in all occurrences without alteration. He writes to des Bosses in 1712:

The soul remains the same in all its changes, and the same subject persists; in corporeal substance this is not so. We must therefore say one of two things: either bodies are mere phenomena, in which case extension too will be only a phenomenon and only monads will be real, but the union will be supplied in the phenomenon by the action of the perceiving soul; or if faith urges us to assert corporeal substances, substance consists in that unifying reality [realitate unionali] which adds something absolute and hence substantial, even though fluid, to the things united.664

Leibniz’s problem is, however, how the phenomenal body is conjoined into a unity; indeed, how does this conjunction form a true substantial union. Leibniz readily admits that he had not solved this problem, a problem made only more radical by Descartes. Leibniz’s notion of pre-established harmony provided a guarantee of sorts that accounted for the relation between body and soul, but the precise nature of that relation had remained unresolved.665 This metaphysical union, or relation of harmony, is not phenomenal, rather of the same substance. Almost a decade earlier than the correspondence with Des Bosses, he is asking the question of the substantial union between the material and the monad: “After having conceived of a

664 GP II, 435-7/L 600/AG 198. Hanover, 5 February 1712.
665 cf. “Remarks of Author of the System of Pre-established Harmony on a Passage from the Mémoires de Trévoux of March 1704 (1708)”. Written in response to criticisms from René-Joseph de Tournemine. GP VI, 595-6/AG 196-7. Also, Leibniz had admitted to de Volder, remarking on his response to de Tournemine, that although de Tournemine had been willing to accept the doctrine of pre-established harmony, he had pressed for an account of the union between the body and soul, which is to say, prior to 1706. Leibniz then replied: “...this ’metaphysical union’ – I know not what – which the School assumes in addition to their agreement is not a phenomenon and that there is no concept and therefore no knowledge of it. So neither could I think of a reason that might be given for it.” GP II, 281-83/L 538-539/AG 184-5. The Scholastics not only had a supramundane union between the two, but also sought an explanation of the reason for the union. Leibniz confesses to have “no concept and therefore no knowledge of it.”
union and a presence in material things,” he writes, “we judge that there is something I know not what analogous in immaterial things. But to the extent that we cannot conceive those notions further than this, we have only obscure notions of them”.\textsuperscript{666} Leibniz was grappling with the elucidation of a true unity, a \textit{unum per se}, a whole in harmonious relation in a composite substance. The most important example of substantial union, of course, would be a human being, as Leibniz explores in a draft of a letter never actually sent to Des Bosses:

The union which I find some difficulty explaining is that which joins the different simple substances or monads existing in our body with us, such that it makes one thing \textit{unum} from them; nor is it sufficiently clear how, in addition to the existence of individual monads, there may arise a new existing thing, unless they are joined by a continuous bond \textit{continui vinculo}, which the phenomena display to us.\textsuperscript{667}

Although Leibniz had considered the soul or dominant monad to be an enduring union in itself, “a simple and indivisible substance”,\textsuperscript{668} he is at pains to explain how the soul might be joined to a phenomenal body and still constitute a \textit{unum per se}. Obviously, Leibniz is thinking at this point that something substantial must be added to bodies in order to produce a true union, otherwise it would be a mere collection or aggregate, resulting in a bare materiality; i.e., parts gathered together in a heap without reason. Monads, in and of themselves, have no relatedness in position or duration because they are not phenomenal; each is per definition a singular unit, a world unto itself, having no other connection or intercourse except through the mediating influence of God. A monad “has no windows” and needs a metaphysical superabundant relation in order to constitute a genuine whole in an inter-monadic relation or intercourse with other monads. Although parts may be included into a whole, this whole is a mere

\textsuperscript{666}GP VI, 595-6/AG 197.
\textsuperscript{667}LBr 95 Bl.11 quoted in Rutherford, Donald; \textit{Leibniz and the Rational Order of Nature} (Cambridge: Cambridge UP, 1995)p.277. cf. GP II, 369-72/L 598. Hanover, 30 April 1709: “I do not deny some real metaphysical union between the soul and the body, according to which it can be said that the soul is truly in the body [in esse].”
\textsuperscript{668}GP II, 435-37/L 600/AG 198. Hanover, 5 February 1712.
plurality of parts, and is constituted by divisible phenomena. Leibniz, however, needs an account of a unity of monad and organic body that maintains the unity of a composite substance whilst participating in the unity of harmonious relations created by God.

He states in his correspondence with Arnauld in 9 October 1687, that “every individual substance must forever subsist separately, once it has begun to exist....[yet] we must acknowledge something in bodies which is a truly single being, since the matter or extended mass itself can never be other than many beings [plura entia]...” 669 Whereas a mere aggregate can constitutes phenomena, a composite substance, in order to constitute a per se unity, must provide an account of the unity of a monadic soul and an organic body, which is “the machine of nature resulting from monads”. 670

Scattered monads do not come into relation ad hoc, as might arise through any contiguous body, but through the conatus or the tendency of the dominant monad. Leibniz, in this time period, believes that although a monad constitutes a unity in itself as a simple substance, they do not constitute a complete composite substance unless joined with an organic body co-joined with a substantial chain, that “something extra”. A plurality of monads, in this letter, without a superadded metaphysical relation, is still a mere aggregation of monads. 671

Yet, what is a composite substance? In Leibniz’s schema 672 derived from his notes for his correspondence to Des Bosses of 5 February 1712, “Things” are divided into the concrete and the abstract. Of the concrete things, these are further divided into the substantiata, which are aggregates resolved into parts. The other concrete “thing” is the suppositum, which is substance that is alive and is considered to be a single subject. The suppositum is further divided into either simple substance (monads), or composite substance, which he also calls “a

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669 GP II, 111-129/L 342-3. Letter to Arnauld 9 October 1687.
670 GP I, 438-9/AG 200.
671 GP II, 444/L 602/AG 200-1. Hanover, 26 May 1712.
672 cf. Schema derived from the Notes for Leibniz to Des Bosses, 5 February 1712, GP II, 438-9/AG 199-200. See also the diagram that Leibniz himself included in his letter to des Bosses of 19 August 1715. GP II, 506/L 617.
complete composite substance”, (a unity per se). Only an aggregate (substantiata) is resolved into parts. A complete composite substance, although made of component units, is not a mere aggregate. Instead, a unity is formed by the soul as an enduring thing, and the organic body which is resulting from the dominant monad, held together by a substantial chain. In short, an aggregate involves phenomena, the world of change and movement; a complete composite, on the other hand, although not strictly inviolate, cannot be dissolved into parts. So, to follow the arborescent trace, we have:

Things ⇒ concrete things ⇒ suppositum ⇒ composite substance

Therefore, in this schema, a complete composite constitutes a substantial unity, a unum per se, and not a mere aggregate of well-founded phenomena. Consequently, the suppositum is opposed to a unity through aggregation, or a unity strictly taken, without parts.673

In the February 1712 letter to Des Bosses,674 Leibniz announces the real union675 of the two – the monadic soul and the phenomenal body – and provides an account of how simple substances can make up a composite whole substance. The superadded union he calls the monadum substantiale vinculum, the substantial chain of monads.676 A

673 Brandon Look, however, emphasizes the distinction between the monadum substantiale vinculum and the suppositum; that is to say, between a metaphysical unity, and a real unity, or a unity per se. “Strictly speaking”, he argues, “the ‘vinculum substantiale’ will differ from a ‘suppositum’, for the ‘suppositum’, as we have seen, arises from the union of the mind and body, while the ‘vinculum substantiale’ is described later in the correspondence as producing a ‘suppositum’. Nevertheless, some scholars, such as Robinet and Fremont, stress the similarity between the two concepts without truly noting the differences.” cf. Look, Brandon; Leibniz and the ‘Vinculum Substantiale’ Studia Leibnitiana Sonderhefte 30 (Stuttgart: Frank Steiner Verlag, 1999)p.71, note 8.


675 That is to say a real union is a union bestowed upon them by God as a real unifier (uniente reali).

THE ARCHITECTONIC AS LABYRINTH

THINGS

Concrete

Substantiata

(plura entia)
aggregation
resolved into
parts

Suppositum

(unum per se)
substance
unifying reality

Natural

Artificial

Simple

(monads)

Composite

(complete)
unificm reality

Resolved into

Aggregation

Substance

Resolved into

Resolved into

Natural

Artificial

Simple

(monads)

Composite

(complete)
unificm reality

Essential

Additive

Space

Time

Absolute

Relative

(relations)

Connected

unconnected

(devoid of
cohesion)

Organic

Inorganic

Intelligent

(puritas)

Without

Reason

Created

Uncreated

Sentient

Vegative

Angelic

Human

(separated)

(souls) connected
to body

With Reason

Without Reason

Created

Uncreated

Sentient

Vegative

Active

Passive

impetus

(resistence)

natural

(modifications)

qualities

actions

Held together by a substantial chain

(vinculum substantiale)

COMPOSITE SUBSTANCE

monad/entelechy/Soul + organic body/well-founded phenomena

(substantial form + primary matter)

(eternal enduring thing)

organic

resulting from monads

can arise and perish

Schema Derived From Correspondence between Leibniz and Des Bosses
chain or vinculum is not to be understood as separate links as in the example of an intertwining chain that was merely contiguous as in the Arnauld correspondence, a mere unum per aggregationem, but this chain is of “like substance”.

Just as the monads are not “parts” of bodies, or ingredients of phenomena, the link between them is not a separate part. Just as with a line, Leibniz makes the analogy, we cannot say that points “touch each other” as points on a line; similarly, monads have no contiguity in the continuum. This union is the “something more”, just as a line is more than a summation of points. Without this super-attenuated substantial chain, bodies would be nothing other than “well-founded phenomena” acting in agreement. Therefore, Leibniz states, “if a body is a substance, it is the actualization [realisatio] of phenomena proceeding beyond their mere congruence” or harmonious agreement. Since Leibniz denies any relation of the monads except through God – there are no direct dependencies on other monads – an external or transcendent factor must come into play in order to prevent the extension of matter being a mere diffusion that would fall apart without a unifying factor, in this case the monadum substantiale vinculum. Matter alone cannot be a true unity in and of itself without something substantial enfolded into it. Furthermore, in order to constitute a metaphysical continuum, the chain itself must be of “like substance”, i.e. be substantial itself.

677 GP II, 101/LA 127.
678 In order to elucidate the problem of parts in a continuum, Aristotle’s critique of atomism was no doubt critical to Leibniz. Specifically, in On Generation and Corruption as explicated in the previous chapter, the problem of the aggregation and the subsequent separation of wholes are treated with regard to possible division everywhere. Potentially, division ad infinitum creates mathematical points without magnitude, and without magnitude these points cannot compose a corporeal substance. Division is only phenomenally or actually possible between the contact points (contiguity) or the border between two atoms. Aristotle outlines three possibilities for the relationship of parts in a whole: successive (not-touching), contiguous (successive, but touching) and finally continuous (a bounded or held together whole). Obviously, Leibniz needs monads (as an integral substantial whole in and of itself) to be held together in a continuum in order for a monad co-joined with an organic body to be a genuine composite substance.
680 cf. Look; op cit, p.101. Look proposes three possibilities for Leibniz’s conception: as something “substantial-like”, superadded; as a complete composite substance such as in the de Volder correspondence; and as that of the “substantial forms”.
Yet, can the true nature of the *monadum substantiale vinculum* be ascertained from the correspondence with de Bosses? In the letter of 29 May 1716, Leibniz tries to explicate, at least, what the substantial chain is not. The *monadum substantiale vinculum* is not substantial forms, i.e., ideal; is not an order of relations; is not a predicate, or modification, or quality of substance; and is not “in” the monad, rather in both, or in fact “in” neither. If monads were only substance, then the phenomenal continuum would be mere extension. If, on the other hand, monads were somehow “polluted” with matter, then composite substances would become mere aggregates, resolved into parts. Leibniz needs something in-between. Yet, he says, the chain is precisely not “midway between matter and form”. Leibniz is relying upon the *monadum substantiale vinculum* to substantialize phenomena into a composite substance. “Real continuity”, Leibniz states in 1716 at the very end of his life, “can only arise from a substantial chain. If nothing substantial existed beside monads, that is, if composites were mere phenomena, then extension itself would be nothing but a phenomenon resulting from simultaneous and mutually ordered appearances...”. Notably, the cohesive factor needs to be also “substantial-like”, holding together the soul and phenomenal body in a true substantial unity, yet

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683 GP II, 515-512/AG 203. Hanover, 29 May 1716.
not “in” them, because the monads must exist independently without the chain. For Leibniz, material corporeal being is never a complete unified substance. Nevertheless, the *monadum substantiale vinculum* must itself be substantial in order to avoid composite substance being a mere aggregate.

Earlier in his correspondence, of course, Leibniz felt that the pre-established harmony was sufficient as a unifying force. In the wider system of pre-established harmony, relations between composite substances can exist in the following ways: duration which is the order of successive things; position which is the order of co-existing things; or of interaction which is the mutual dependence of monads or mutual action. Above this system of relations is a more perfect relation. Even though every monad or body in phenomenal space perceives the world according to its own viewpoint, God has “the big picture”, and sees everything as it truly is, in its entirety, for all time. God comprehends and intuits every monad and all their relations, both past and present. Obviously, if bodies were only mere phenomena, mere extensions of matter in space, then the world would be only that which appears to the body, without any transcendent reality, each world appearing differently to each organic body. Yet, “the realities of bodies, of space, of motion, and of time seem to consist in the fact that they are phenomena of God, that is, the object of his knowledge by intuition [*scientia visionis*]”.684

Leibniz compares the vision of God to the point-of-view of a singular body as that of a comprehensive ground plan to diverse and multifarious perspective drawings. God sees not only the component parts, the individual monads, but also their relations – their duration, position, interaction and connection. “But over and above these real relations one more perfect relation can be conceived, a relation through which one new substance arises from many substances”.685

This additional relation is not the result of an additive or constructive

684 GP II, 438-9/AG 199. From *Notes for Leibniz to Des Bosses*, 5 February 1712. cf. Donald Rutherford: “Leibniz and the Problem of Monadic Aggregation” *Archiv für Geschichte der Philosophie* 76/1 (1994): 65-90. Rutherford argues that the notion of the *scientia visionis* is a more complete account of composite substance than the *monadum substantiale vinculum*.  
685 GP II, 438-9/AG 199. Hanover, 5 February 1712.
process, but something substantial itself. In this way, a composite substance of soul and body can constitute one subject [*suppositum*], a *unum per se*. Yet it must be admitted, the notion of a substantial chain, the *monadum substantiale vinculum* holding together the phenomenal and substantial, remained merely descriptive. Leibniz was, in the end, unable to fully explicate the nature of the necessary bond.

With the account of the *monadum vinculum substantiale*, according to the prevailing scholarship, Leibniz never had a completely satisfactory account.⁶⁸⁶ Nevertheless, one must take this concept seriously; it was, after all, a sustained investigation comprising more than ten years. Brandon Look has convincingly shown in *Leibniz and the ‘Vinculum Substantiale’*, that the nature of composite substance was a prolonged concern for Leibniz and that a notion of a substantial chain occurred even prior to his correspondence with Des Bosses.⁶⁸⁷ However, in Des Bosses, the Jesuit theologian, he had had a ten year trusted relationship where he could, in his correspondence with him, attempt to provide a solution to one of the most perennial problems in the history of philosophy; i.e. how the phenomenal body is joined to the soul or mind. In this correspondence, as Donald Rutherford has suggested, he could speculate upon a satisfactory solution with a colleague who had promised not to publish the correspondence.⁶⁸⁸

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⁶⁸⁶ See Leroy Loemker’s “Introduction” to *Philosophical Papers and Letters* translated, edited and introduced by Leroy E. Loemker, 2nd Edition (Dordrecht: D. Reidel, 1956)pp.34-35: “This theory has been explained away as an effort on his part to adjust his theories to Jesuit thought by a conception which he himself did not accept, and the tentative quality of his language does much to support this interpretation. It has also been interpreted as a definite movement of Leibniz’s thoughts back to realism and to Scholastic sources....But the interpretation most consistent with his system must regard the substantial chain as a principle of organization...”.

⁶⁸⁷ Look; op cit, p.75. The “...reference to a ‘vinculum’ joining monads, appears a full six years earlier than is commonly thought. As we shall see, this ‘vinculum’ is really an embryonic form of Leibniz’s ‘vinculum substantiale monadum’, and it had a long gestation period. Not only is it the case that the ‘vinculum’ had its origins in this letter from February 1706, but it had another distinct source: Leibniz’s account of the ‘metaphysical union’ of mind and body and the resulting ‘suppositum’.” See also Look, Brandon; “On Substance and Relations in Leibniz’s Correspondence with Des Bosses” in Lodge, Paul (ed.); *Leibniz and His Correspondents* (Cambridge: Cambridge UP, 2004)pp.238-261.

the end, though, Leibniz probably thought that his notion of the pre-established harmony of monads, the summary of which he attempted to set out in his *Monadology*, was the fuller account. Instead of having to provide an explanation of the nature of the interconnection between substances in order to assure a unity *per se*, with his theory of the monads, the monads were already put in perfect agreement when God had created them. The phenomenal body was in perfect harmonious agreement with the monadic soul. In a small undated fragment he set out the two attempts:

Two systems: one of monads, the other of real composites. Real composites are of two sorts: immobile or unchangeable, space; [or] changeable, bodies and these are either aggregates from corporeal substances or substances. Corporeal substances must therefore have something real besides ingredients, or else there will be nothing left except monads. This real superaddition is what makes the substantiality of body.689

In the end, Leibniz was unable to reconcile the problem of the phenomenal and the substantial at the time of his death in 1716. And with him died a less than comprehensive account of cohesion and unity with regard to the *monadum vinculum substantiale*. Yet, the substantial chain was only one attempt to give an account; Leibniz made numerous attempts. Most importantly in the end, one can perceive in his oeuvre, a certain consistency, commitment, or at least a guiding concern for the unity of man with God, unity of man with his own soul, and unity of man with his universe. This was a dream of unity *per se*, a dream of a comprehensive whole, and the ordering principle of reason.

So, in conclusion, although scholarly opinions question the relative importance of the *monadum vinculum substantiale*, Leibniz in fact rehearsed several solutions to the problem of a soul-body enduring union, or a mutual agreement between the monad and its phenomenal body. Most importantly, the principle of pre-established harmony, or concomitance, guaranteed by the Creator that all was in harmonious

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689 LH IV I, 1a, B.7 quoted in Rutherford; *op cit* p.287n.41.
agreement, not only God with his creations, but the soul with its body, and all the monads in an interrelationship. He had of course admitted in his letter to Des Bosses of 26 May 1712, that “it cannot be proved from the principle of harmony that there is anything in bodies besides phenomena”. But then Leibniz had attempted a further explanation. For him, the soul itself was a principle of unity. Leibniz then considered an account of both a simple substance, a monad, and a composite substance, the organic body conjoined with a dominant monad, as a unum per se. The mind, in addition, could be said in its perception of itself and its singular viewpoint upon the universe to provide a unity, where the union of the mind made the relation. This solution was a composite being whose unity was dependent upon a perceiving mind. In his correspondence with de Volder in 1704, Leibniz explored the possible solution of one “machine” with a dominant monad, which is to imply that unity is a matter of relation between monads. In his correspondence with Arnauld, the notion of “expression” was explored, where “the soul...is the form of its body because it is an expression of the phenomena of all other bodies in accordance with their relationship to its own”. And finally, in the last years of his life, in a trusted relationship with Des Bosses, he attempted an account that appears chiefly there: the monadum vinculum substantiale, where he is able to explain substantial form unified into a composite substance.

690 GP II, 444/L 603/AG 201. Hanover, 26 May 1712. He goes on further to say: “For we know on other grounds that the harmony of phenomena in souls does not arise from the influence of bodies, but is pre-established. This would suffice if there were only souls or monads; in this case all real extension would also disappear, not to speak of real motion, whose reality would be reduced to mere changes in phenomena.”

691 GP III, 260-1/AG 289. Although Leibniz held this principle of unity as fundamental, he explicitly wrote this statement in a draft of a letter to Thomas Burnett, 1699. See also Metaphysical Definitions and Reflections, LC 245. Most extensively discussed in his correspondence with de Volder: e.g. GP II, 248-283/L528-539.

692 cf. LH IV, III, 5e, Bl.23 quoted in: Rutherford; op cit p.272. See also the Letter to des Bosses, Hanover, 29 May 1716. GP II, 515-521/AG 203. “For orders, or relations which join two monads, are not in one monad or the other, but equally well in both at the same time, that is, really in neither, but in the mind alone.”

693 GP II, 252/L 530. and GP II, 275.

694 GP II, 58/LA 65-66.
Was this account his final one? Earlier he had been satisfied to explain the composite substance which is the special case of the human being in terms of a guarantee by God for a pre-established harmony. Yet, he too wanted more. While working on the New System of the Nature and Communication of Substances, and of the Union of the Soul and the Body, he writes to Bossuet:

I am working now to put into writing the way that I believe to be unique in explaining intelligibly the union of the soul with the body, without having need of recourse to a special concourse of God or of employing expressly the intervention of the first cause for what occurs ordinarily in secondary causes.695

We will never definitively know which solution was the more complete for him. Yet, the principle of unity permeates his work, in his various attempts to account for the union of the soul and the body as an unum per se, and the harmonious interrelationship of all things. And although the concept of the individual, its real unity, and its free will remained central to Leibniz’s philosophical commitment his entire life, so, too, did the relationship of all individuals in an interrelated continuum as a true unity; remembering, most importantly, Leibniz’s first dissertation in 1663 was on the principle of the individuation.696 Nothing remained outside, alone, in the harmonious universe of Leibniz. All was interconnected.

The Second Labyrinth: the Phenomenal Continuum

Leibniz also strives for a metaphysical unity harmoniously compatible with his physics. Is the phenomenal continuum a bond (vinculum), a net (rete), or a fold (plica)? He maintains this position: the rejection of material atomism coupled with a kind of metaphysical or monadic

695 A, I 10, 143. quoted in Rutherford; op cit p.270. my emphasis.

atomism. This Leibnizian architectonic of the continuum will prove decisive in not only connecting his metaphysic of the monad, but also an intelligible version of his physics in maintaining divisibility to infinity in a phenomenal continuum. This critique opens the path to understanding the special place of the monad in his ontotopology as well as the primary metaphysical notion that all substance is connected.\textsuperscript{697}

In order to trace the development or unfoldment of Leibniz’s notions of the continuum, the collection of manuscripts by Richard T. W. Arthur entitled, \textit{The Labyrinth of the Continuum: Writings on the Continuum Problem 1672-1686},\textsuperscript{698} as well as the earlier collection translated by G.H.R. Parkinson entitled \textit{De Summa Rerum: Metaphysical Papers 1675-1676}\textsuperscript{699} are critical. Most important from the collection \textit{The Labyrinth of the Continuum}, is the dialogue \textit{Pacidius to Philalethes: A First Philosophy of Motion}.\textsuperscript{700} Leibniz establishes in this dialogue - through many twists and turns in the labyrinth - that space and time are not aggregates of points and instants. Paradoxically, Leibniz wrote his dialogue on a first philosophy of motion on a stilled ship while he was travelling on the yacht of Prince Ruprecht von der Pfalz from England to Germany via Rotterdam, the Netherlands in October 1676.\textsuperscript{701} Waiting for good sailing weather, he began work on what he would later call in the \textit{Theodicy}, the

\textsuperscript{697} Monadology §51, §56, §61, §62, §85, §87.
\textsuperscript{700} Aiii78, especially 555, 565-6, 569 and marginalia/ LC 127ff.
\textsuperscript{701} L1 note on draft: “Written on board the ship by which I crossed from England to Holland. October 1676”.
second labyrinth: “on the composition of the continuum, time, place, motion, atoms, the indivisible, and the infinite".\textsuperscript{702} The dialogue takes up various concerns on the topic of the phenomenal continuum, and shows a protracted investigation with regard to Aristotle’s \textit{Physics}. Although Leibniz was a brilliant mathematician/physicist as well as a philosopher, his investigations did not involve empirical experimentation, rather textual exegesis. Subsequently, a narrative analysis of the dialogue \textit{Pacidius to Philalethes: A First Philosophy of Motion} shows not only a familiarity with the \textit{Physics} of Aristotle, but also a remarkable similarity with Plato’s \textit{Timaeus} with regard to the structure of the argument.

Opinions vary as to the precise influence of ancient philosophy upon the thought of Leibniz, but Christia Mercer has done an extensive study on the reception of Aristotle in the Leibnizian metaphysics, entitled \textit{Leibniz’s Metaphysics: Its Origin and Development}.\textsuperscript{703} She carefully outlines the specific debt that Leibniz had to Aristotle in his education under Jakob Thomasius in Leipzig, and then in Jena, under the Professor of Mathematics Erhard Weigel. Both were very influential not only in the early development of Leibniz, but also in his “reconciliation” project; i.e., what Mercer calls a “commitment to a conciliatory eclecticism” that attempted to make compatible the ancient philosophy of namely Plato, Pythagorus, Euclid, and Aristotle, with Christian theology. Yet Weigel, the mathematician, in his commitment to conciliatory eclecticism, not only tried to put natural philosophy on a firm mathematical/geometrical basis, but also accepted for his part, the newly emerging mechanism. Among Weigel’s most important works was his \textit{Analysis Aristotelica ex Euclide Restituta} of 1658.\textsuperscript{704} His valorization of the Euclidean Elements\textsuperscript{705}

\textsuperscript{702} GP VI, 29/T 53.
no doubt influenced Leibniz, for he attempted a reconciliation of the mathematical/geometric method with the scholastic interpretation of Aristotle.706 “By applying the mathematical method,” Mercer explains, “to all the parts of philosophy, Weigel proposes to remove philosophy from its present ‘ruins’ and to construct a single coherent and true system.”707 Nevertheless, Leibniz would have to wait until his Paris years, between 1672-1676, for an extensive investigation into mathematics. Most importantly, Leibniz inherited a view of the world that essentially thought that the universe was geometric or mathematical in its structure.708 To say mathematical is in fact, until Leibniz’s calculus,

the nineteenth century. Certainly by the Middle Ages, the study of Euclid’s Elements had already become obligatory in European colleges. Specifically, Barrow’s translation into Latin, Euclidis Elementorum Libri XV breviter demonstrati of 1655 established the scholarship in geometry.

706 Mercer, Christia; “Aristotelianism at the Core of Leibniz’s Philosophy” in Leijenhorst, Cees and Lüthy, Christoph and Thijssen, Johannes M.M.H. (eds.); The Dynamics of Aristotelian Natural Philosophy from Antiquity to the Seventeenth Century (Leiden: Brill, 2002)pp.413-440. Mercer traces the early influences of Aristotelianism upon Leibniz; that is to say, not only the Aristotle interpreted via the Scholastics, but also the original texts. Leibniz was encouraged to study these texts by his teacher Jakob Thomasius. “Recent scholars of Leibniz”, she argues, “have begun to clarify his relation to Aristotelian thought and to identify the Aristotelian elements in his philosophy. We now understand that he distinguished between the good scholastics and the bad, that he drew upon Aristotelian thought throughout the course of his long philosophical life, and that his notions of matter, form, and corporeal substances have their roots in his Aristotelianism.”(p.414). The most import aspect of Aristotle’s philosophy that he took over, Mercer argues, is the “self-sufficency and activity of created substance.” See also, Mercer, Christia; “Leibniz and his Master: The Correspondence with Jakob Thomasius” in Lodge, Paul (ed.); Leibniz and His Correspondents (Cambridge: Cambridge UP, 2004)pp.10-46.

707 Mercer; Leibniz’s Metaphysics, op cit, p.38.

708 Obviously, in order to understand Leibniz’s position, it is imperative to understand his influences, specifically the hegemony and dominance of geometry as not only a physical science but a metaphysical one as well. As Burtt has said: “The space of geometry appears to have been the space of the real universe to all ancient and medieval thinkers who give any clear clue to their notion of the matter. In the case of the Pythagoreans and Platonists, the identity of the two was important metaphysical doctrine; in the case of other schools, the same assumption seems to have been made, only its bearings were not thought out along cosmological lines. Euclid takes it for granted that physical space, (χώρος) is the realm of geometry; later mathematicians use his terminology, and there is no clear indication anywhere in the available works that anybody thought differently. When some, like Aristotle, defined space in a quite different manner [as peras, horos, or
to say geometry and logic. Neo-Platonism, specifically, considered the universe to be harmoniously ordered and fundamentally structured by geometrical space, both on the level of the cosmos and the atom.

Plato’s precise influence on Leibniz, in contrast, is more difficult to determine.\(^{709}\) Besides a lifelong commitment to a form of Idealism filtered through Neo-Platonism and Scholastic philosophy,\(^{710}\) specific instances of Platonic influence are less predominant than Aristotelian influences.\(^{711}\) His commitment to Idealism is obvious
when he repeatedly states that only monadic substances are real. To take only one example, as he stated in his correspondence to Arnauld: “Only indivisible substances and their different states are absolutely real. This is what Parmenides and Plato and other Ancients have indeed recognized”\(^{712}\). For Leibniz, as for Plato, only the Ideal was real; phenomena were merely “well-founded”. Substance constitutes a real unity; whereas phenomena have parts and can only constitute at best a whole. His commitment to Idealism can further be shown through §26 of the *Discourse on Metaphysics*: “We have in us all ideas; and of Plato’s reminiscence”.\(^{713}\) Through to the middle ages, the chief Platonic dialogues available to scholars would have been the *Meno*, the *Phaedo*, and parts of the *Timaeus*. According to Burtt, during the medieval period,

...the only original work of Plato in the hands of philosophers was the *Timaeus*... [It was] Plato [who] appeared to be the philosopher of nature; Aristotle, who was known only through his logic, seemed like a barren dialectician....When Aristotle captured medieval thought in the thirteenth century, neo-Platonism was not by any means routed, but remained as a somewhat suppressed but still widely influential metaphysical current...\(^{714}\).

However, by 1484 Marsilio Ficino had translated Plato’s complete works into Latin. Most conclusively, nevertheless, already in Leibniz’s letter to his respected teacher Jakob Thomasius of 1669,\(^{715}\)

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\(^{712}\) GP II, 119/LA 153.

\(^{713}\) *Discourse on Metaphysics* §26.

\(^{714}\) Burtt; *op cit*, p.53.

shows him fully engaged in issues surrounding the continuum as well as substantial forms, and providing an extensive understanding of not only Plato, but also Aristotelian’s Physics III and VIII.\textsuperscript{716} Quite obviously, then, the early development of Leibniz entailed a thoroughgoing study of Aristotle, Plato, and Euclid married to a reconciliatory project – an impulse towards harmonizing and consistency that would remain his entire life.\textsuperscript{717}

\textbf{Pacidius to Philalethes: A First Philosophy of Motion}

Specifically, an analysis of the structure of the dialogue of \textit{Pacidius to Philalethes: A First Philosophy of Motion}, reveals a strong familiarity on the part of Leibniz with Plato’s \textit{Timaeus}. Firstly, the argument on the phenomenal continuum is structured in the form of a dialogue between various partners, just as in the Platonic dialogue. Most remarkable is the character of Pacidius that is analogous to the character of Timaeus. The name Pacidius is derived from \textit{pax, pacis} (peace) and \textit{dius/divus} (divine), being a Latin translation of Leibniz’s name: \textit{Gottfried Wilhelm}

\textsuperscript{716} See also, Leijenhorst, Cees and Lüthy, Christoph; “The Erosion of Aristotelianism: Confessional Physics in Early Modern Germany and the Dutch Republic” in Leijenhorst, Cees and Lüthy, Christoph and Thijsse, Johannes M.M.H. (eds.); \textit{The Dynamics of Aristotelian Natural Philosophy from Antiquity to the Seventeenth Century} (Leiden: Brill, 2002)pp.375-411. Leijenhorst and Lüthy carefully trace the influences of Protestant theology specifically in Northern Europe, to a revival of Aristotelianism in the Seventeenth century, just prior to the period of Leibniz. Yet this revival, far from being a pure exegesis of Aristotle, lead to a physics that Aristotle would have never accepted: a kind of material atomism paired with a replacing of Aristotelian “place” with a general notion of three-dimensional “space”. Aristotle, of course, completely rejected atomism, and never had a notion of “space” as such, rather “place”.

\textsuperscript{717} Or, as he expressed in a letter to Nicolas Remond 10 January 1714: “I have tried to uncover and unite the truth buried and scattered under the opinions of all the different philosophical sects, and I believe that I have added something of my own which takes a few steps forward....I discovered Aristotle as a lad and even the Scholastics did not repel me....But then Plato too, and Plotinus, gave me satisfaction not to mention other ancient thinkers....Mechanism finally prevailed and led me to apply myself to mathematics....I flatter myself to have penetrated into the Harmony of these different realms and to have seen that both sides are right provided they do not clash with each other; that everything in nature happens mechanically and at the same time metaphysically but that the source of mechanics is in metaphysics.” GP III, 606-7/L 654-55. Quoted in Mercer; \textit{Leibniz’s Metaphysics, op cit,} p. 59.
Leibniz.\textsuperscript{718} Philalethes would, of course, mean the lover of truth (from the Greek, \textit{philia} + \textit{aletheia}). The characters in \textit{Pacidius to Philalethes} are roughly correspondent to the characters in the Platonic dialogue: Pacidius (presumed to be Leibniz himself), Charinus, a young learned German who had served in the army and was well versed in Geometry and Arithmetic (presumed to be his friend from Paris, Ehrenfried Walther von Tschirnhaus), Theophilus, an older retired businessman (presumed to be his host in Paris, Johann Friedrich Sinold) and finally, Gallutius, the medical expert but non-practicing physician (presumed to be a brother of Leibniz’s friend, Günther Christoph Schelhammer). However, in Leibniz’s dialogue there is no Socratic character per se; Pacidius takes up the role in its various guises, voicing the same objections that Socrates makes in the \textit{Timaeus}.

Of course, the method of inquiry itself is Socratic. Truth is attained through conversation with persons who have reflected independently, and then carefully put forward an argument for discussion. Both rash, unreflective discourse, and written dialogue, are inadequate to the truth.\textsuperscript{719} Only dialectic suffices. Furthermore, the character of Pacidius resists his role as pedagogue. Much encouragement is needed from his dialogue partners in order to overcome his resistance. Many protestations of inadequacy or ignorance are made. When prompted by his companions to produce his meditations on motion, they threaten to pry open his chest of papers if he does not acquiesce. What you will find there, he protests, “instead of the treasure they say is in it, you will find only ashes; instead of elaborate works, a few sheets of paper and some poorly expressed vestiges of hasty reflections, which were only ever saved for the sake of my memory”.\textsuperscript{720} Leibniz, too, feigns incapacity to the task. In the end, his companions readily accept a “partial solution”, just as Timaeus is prepared to give a “likely story”, if only that the rules of a Socratic dialectic be clearly adhered to as the conversation progresses.

\textsuperscript{718} Aiii78/LC 127-9. cf. Arthur’s editorial preface to the \textit{Pacidius to Philalethes}.
\textsuperscript{719} Aiii78/LC 129-131.
\textsuperscript{720} Aiii78 (533)/LC 137.
In addition, Pacidius takes on the role of the Socratic midwife, just as Timaeus did in the *Timaeus*, bringing forth true knowledge in the hearts of men. “As Socrates said, when you are heavy with child in labor, I shall be there in the role of midwife”.\textsuperscript{721} Both Socrates and Leibniz are maieutic, bringing forth the legitimate children of philosophy. Making a true account is a heavy responsibility, but he can make appeals to the Platonic doctrine of anamnesis. As Pacidius says: “I have already told you that you owe your opinions to yourself, and the occasions for them to me”.\textsuperscript{722} The Socratic method is employed in Leibniz’s dialogue, each member must in fact teach himself, recalling upon the occasion of the dialectic that which he already knows.

Similarly concerned with the discovery of true causes and the appropriate method for their discovery, is the “likely story” in the *Timaeus*. “For we will only be able to revive philosophy when we have laid solid foundations for it”,\textsuperscript{723} Leibniz states in the guise of Pacidius. Here again are the perennial concerns not only with sturdy foundations but also with philosophy’s revival. The proper method is a combination of mathematics and reasoning. Pacidius suggests that the application of the methods of deduction from Arithmetic and Geometry are to be applied to problems concerning natural philosophy, just as for Plato philosophy is grounded in geometric apodicity wherever possible. “For geometers, when a problem is proposed, see whether they have enough data for its solution, and pursuing a certain well-tried and definite course, spend a long time unfolding all the conditions of the problem until from among these the one they were looking for drops out of it’s own accord”.\textsuperscript{724} Then in a departure from the *Timaeus*, in the discussion on method, Charinus objects to the application of the methods of Geometry to those of natural philosophy: “...the transition from Geometry to Physics is difficult, and that we need a science of motion.

\textsuperscript{721} Aiii78 (534)/LC 139. The concept of the midwife occurs not only in the *Timaeus*, but also of course in the *Theaetetus*. Leibniz had written a summary of this dialogue in March-April 1676. Aiii20 (283-311). cf. Arthur; op cit, p.404n.14 and n.15.  
\textsuperscript{722} Aiii78 (537)/LC 149. The doctrine of anamnesis occurs both in the *Meno* and the *Timaeus*.  
\textsuperscript{723} Aiii78 (533)/LC 133.  
\textsuperscript{724} Aiii 78 (531)/LC 133-135.
that would connect matter to forms and speculation to practice...”.

Specifically, the application of geometrical method becomes problematic when concerning objects in motion. He explains that when he would design fortifications during his military experience, he could, with practice, imagine the necessary resistance of forces through use of models, both graphic and three-dimensional. However, when he would try to design objects in motion, he was “let down by reasonings”, and was forced to rely upon experimentation only. His method, reliant upon static geometric models, often proved insufficient and resulted in failure. Consequently, Charinus argues vigorously for the development of a method encompassing both experimentation and reason with the “first philosophy of motion” as a true test case.

Yet Pacidius tenaciously holds to the belief that a proper method would be grounded in a Logic, because Logic is a means to attain a “science of general reasons”. His proposed “Physical Logic” would be a bridge between the “incorruptible and eternal per se”, (such as the pure geometry of figures), and the “perishable and corruptible” as constituted most radically in the case of “the science of changes or motions, concerning time, force and action”. Mathematics, logic, and geometry are the means to a proper method. Following Plato, the universe is to be understood as fundamentally geometrical. For Aristotle, the mathematical is a “discrete” object, between the first principles and the sensible. Yet the problem remained for Leibniz – and his early mathematical manuscripts attest to this problem – how to develop a mathematical description that took into account the dynamic nature of phenomena.

725 Aiii78 (531)/LC 135.
726 Aiii 78 (532-3)/LC 137.
Notably, Leibniz searches in the texts written around the period of 1675-1676, for a method as dependable and certain as that of Arithmetic and Geometry. Through strictly following a geometric method, following a specific order of defining the problem, a solution seems to automatically present itself, according to the Platonic doctrine of anamnesis. Yet in the transition from a study of static ideal forms in geometry to a useful description of the phenomenon of motion as is required in physics, Leibniz tries gradually to evolve a method of reasoning which is capable of accomplishing this dynamic. In doing so, he is both inventive and reliant upon the tradition of the Physics of Aristotle, as well as the geometrical method, the various postulates and theorems in the Elements of Euclid.

**Moving On**

Given the fact that motion or any dynamic phenomena is problematic to the inherited mathematics, in the dialogue, Leibniz asks again: “What is motion?” In beginning the discussion on the question motion, Charinus puts forward the thesis that motion is the change of place.²²⁸ In doing so, he in fact rehearses for his assembled colleagues, the argumentation of Aristotle found primarily in Physics IV and V. Charinus states: “I believe motion to be change of place, and I say that there is motion in that body which changes place”.²²⁹ Indeed what might seem self-evident, turns out to be not so easily grasped when, in the course of discussion, the participants are compelled to discover that they must first define what they mean by “motion” (motum), “change” (mutationem loci), “body” (corpore), “place” (locum), or “being in” a body (in eo corpore esse).

To summarize briefly Aristotle’s position as reproduced and discussed in Pacidius to Philalethes: A First Philosophy of Motion: 1). Is change, in fact, to be considered as a change in location or a change in substance? In order to examine this question, they begin with the extreme case of death. At what point does life end and death begin? Here Leibniz in the figure of Pacidius evokes the excluded middle: one

²²⁸ Aiii78 (534)/LC 141.
²²⁹ Aiii78 (534)/LC 141.
cannot be both dead and alive at the same moment. One either exists, or
doesn’t exist. The definitions of contiguity and continuity of Aristotle
are evoked, and the participants in the dialogue decide that change has
“no extrema in common”, therefore is contiguous, as in a point next
to another point; or, in this case, the event of life next to the event of
death.

2). All seems to be solved, until they realize that this would involve
a small leap, or little rests, from one state to another. Would this
moment of change then involve a kind of “momentaneous state”;
or, would the change require a length of time or have some kind of
thickness? This possibility would involve space becoming composed
only of points, and time only of units of moments. They rule out this
possibility mathematically, arriving at the conclusion that “motion is
eternal, and neither begins nor ends”. Change, then, is thought of as
a continuity, with “no moment of transition, or of a mediate state, in
which the body can be said to move, i.e. change place”. This position
is the one that Aristotle arrived at in the Physics: time is a continuum
with the intermediate points being a border (horos), or extremity (peras) of
never ending “nows”. Death, then, would be an extremity, a razor’s edge
between life and death.

3). The never-ending “nows” seems to be the solution, but this position
brings the paradox that motion neither begins, nor ends. In refuting the
position of space composed only of points, and time only of moments, the
never-ending “nows” shifting along the continuum brings with it other
inconsistencies. Pacidius evokes Aristotle’s argument over the actual and
potential divisions to infinity. The space/time continuum is in principle
infinitely divisible, following Aristotle’s rejection of Atomism. However,
in the phenomenal realm, division can potentially be made into possible

730 Aiii78/LC 145.
731 Aiii78/LC 165. As Arthur points out, Leibniz had been studying the Platonic dialogue
of Parmenides with its arguments over “leaps of time” in Zeno’s paradoxes, just prior to
writing this manuscript. LC 404n.18, and 22. cf. “That a Most Perfect Being is Possible,”
Aiii79 (572-74) and DSR 90-95.
732 Aiii78/LC 167.
parts, into a kind of minima. What remains, in the end, is the very important distinction between material and mathematical divisibility – the continuous and the discrete – and, indeed, the unavoidable conclusion that continuous motion is impossible. “No motion remains the same through any space or time however small; thus both space and time will be actually sub-divided to infinity, just as a body is.”

If there exists no “thickness” of time where it is conceivably at rest, and no “point” at which motion can begin or end, then arguably, and paradoxically, one is forced to conclude that continuous motion is impossible, thus giving the argument to Zeno in the end.

Up until this point in the dialogue, Leibniz in the guise of the interlocutor Pacidius, had primarily reproduced the Aristotelian position in a Platonic dialogic narrative form. At Aiii78 (554), he suddenly breaks out with brilliance. He is brought to this inspiration through considerations on the problem with coherence. Indeed, if the continuum is not made of many points, and not made of atoms, but rather made of infinitely divisible phenomena, how does matter cohere? Again Leibniz navigates the middle way: the course between Gassendi’s atoms and Descartes’ minimal points.

**Small Things: Atoms and Points**

The two dominant positions with which Leibniz was engaging at the time of his writing the dialogue in 1676, were a Scholastic rehabilitation of atomism, and a contemporary mechanical philosophy such as that of Descartes. As Daniel Garber explains, the reception of Aristotelian notions of time, place and the continuum had not been seriously challenged until the seventeenth century. Versions of atomism were primarily known through Aristotle – and then in a form that was

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733 Aiii78 (547)/LC 171. “Therefore time will be a aggregate of nothing but moments, and space an aggregate of nothing but points.” And again, one is forced to conclude: “Hence is seems to follow that matter is divided into points: for it is divided into all possible parts, and thus into minima. Therefore body and space will be composed of points.” Aiii78 (554)/LC 183.

734 Aiii78 (566)/LC 209.

critical. The atomistic philosophies of Democritus and Leucippus were revived, however, with the rediscovery of the Epicurean poem De rerum natura by Lucretius in 1417 and published in Latin in 1473. According to Garber, “by the 1630’s and 1640’s ancient atomism had been more or less successfully resurrected...”. Pierre Gassendi’s commentaries on Diogenes Laertius, his most important study of Epicurean atomism, were published in 1649. With Gassendi advocating Atomism, along with other natural philosophers such as Daniel Sennert and Jean Chrysostom Magnen, discussions of the “natural minima” would have profound influences upon seventeenth century thought.

Atomism posits a solid component body of matter from which all other bodies are composite. These elements are not only indivisible per definition, but also unchangeable, neither destroyed when various composites are demolished, nor dissolved substantially into other matter. The primary components of all material matter are corporeal bodies of minimal dimensions and their assembly in various configurations constitute the entire universe against a void background of empty space. The view of the Atomists is very simple: hard solid elements circulating in empty void space.

Although this simplicity is no doubt appealing, both Descartes and Leibniz had their objections. Descartes, too, would come to reject atomism, in his own manner. Most importantly, for Descartes, a corporeal body is per definition extended, which is to say that it is at least potentially divisible. The only limit on this divisibility is not a solid atom, but a minimum, a point of material substance where, in principle, matter would cease to be, so infinitely small as to be indistinguishable by the senses. As geometrical extension, the corporeal

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736 Garber; op cit, p.118.

737 Gassendi, Pierre; Animadversiones in Decimum Librum Diogenis Laertii (1649) and Syntagma Philosophicum (1658). In the Syntagma Philosophicum, he clearly states the “the matter of the world and all the things contained in it is made up of atoms...[from which] all the bodies which exist in the universe are composed.” (Section 1, Bk III, ch.8). For a thoroughgoing treatment of Gassendi, see the canonical Joy, Lynn Sumida; Gassendi the Atomist: Advocate of History in the Age of Science (Cambridge: Cambridge UP, 1987).

738 cf. Letter to Mersenne March 1640 (AT III 36): “there is no quantity that is not divisible into an infinity of parts.” Quoted in Garber; op cit, p. 122.
body is infinitely divisible for Descartes. Or, more accurately, matter is “indefinitely divisible”. Descartes reserves the term “infinite” for God alone.\(^{739}\) He uses the term “indefinitely divisible” for extended corporeal matter. Similarly, Descartes does not abide by empty space, as the Atomists. Starting from point zero, as it were, all space is extended. All space is caught up in the Cartesian grid of geometrical extension, neither void nor empty.

Nevertheless, given this radical notion of corporeal extension, Descartes creates conceptually other problems for himself. He decidedly states that “all places are filled with body and the same parts of matter always fill places of the same size”.\(^{740}\) Yet here he comes up against the precise problem that Aristotle had discussed in the *Physics*, the problem of the container and the contained, the *periechontos peras*. When, in order to explain motion, one body occupies space, it must be displaced in order for some other part of matter to fill the vacated place. This constant replacement of extended corporeal bodies in a conceptually full space only works when the bodies that supplant each other are of equal size. However, the minima are not atomistic, of equal size, in Descartes’ account of space. In elaborate arguments, he attempts to work out how small parts of matter could supplant each other, setting up little vortices, each moving constantly to fill these innumerable volumes.\(^{741}\) In fact, Descartes displaces the Atomist’s solid particle in empty space, with an immense, completely filled up space with no void:

These tiny bodies which enter when a thing is rarified and leave when it condenses, and which pass through the hardest bodies are of the same substance as those which one sees and touches. But it is not necessary to imagine them to be like atoms nor as if they had a certain hardness. Imagine them to be like an extremely fluid and subtle substance, which fills the pores of other bodies.\(^{742}\)

\(^{739}\) Pr I 26, AT V 274 [K242]. cf. Garber; *op cit*, p.339, note 28. Descartes used the term “indefinitely divisible” for extended corporeal matter, but not consistently throughout his writings.

\(^{740}\) Pr II 6, Quoted in Garber; *op cit*, p. 125.

\(^{741}\) e.g. Pr II 34.

\(^{742}\) AT I 139-140 [K 9-10] quoted in Garber; *op cit*, p.122.
Descartes avoids the atomistic void or vacuum because space is per definition corporeal extension in his physics. Nevertheless, this causes the problem conceptually of movement and change in a fully extended space with no void. In *Principles of Philosophy, Part II*, he sketches a diagram of concentric circles in order to explain the replacement of one body by another as it moves in his totally full space.

However, in order to prevent a vacuum, he needs a convoluted system that is difficult to reconcile with diversely sized bodies moving at different speeds. As each body moves into the position held previously by another body, moving in a circular motion, Descartes sketches out a concept of minimal things that is a fluidity of small bodies in precisely defined orbits or vortices. As one part of matter supplants another, each successively fills all the spaces in mutual displacement, disallowing a vacuum. However, in order for each to displace the other, while not necessarily being of the same size, which would imply a kind of atomism, the speed of displacement must vary. Descartes, in short, must pay a high price in order to reject atoms and the void; a price that

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743 Pr II 59.
744 Reproduced by Garber on pp.125-126. Also, Leibniz himself reproduces Descartes diagrams in his dialogue in figure 10, Aiii78 (553)/LC 183.
he himself despairs. A finite mind, he admits, is unable to understand infinite things, certainly those minima that are imperceptibly small.

In the end, Descartes postulates matter as geometrical extension which is “indefinitely divisible” into minima. Every part of matter is at least in principle divisible. Most importantly, this extension of the corporeal body implies a mathematical continuum. Nevertheless, in denying the void of atomism, he creates a monolithic space, of one piece, an isotropy. So even though Descartes has a kind of relativism with respect to space and time, in that all bodies are extended, caught up in a geometrical grid, and therefore can be situated mathematically - it is a strange kind of relativism. In fact, his space is radically absolute. Instead of solid indestructible atoms assembling and re-assembling in a vacuous void, Descartes has an inescapable, suffocatingly-full container of geometric space.745 Quite simply, for Descartes, space is bodily extension, rendering the void moot. Space is, in fact, only corporeal substance that is “indefinitely divisible” into minima of geometric points, into a fluidity of vortices constantly circulating and supplanting each other.

**The Fold** 746

However, both contemporary positions - Gassendi’s atoms and Descartes minima - as Leibniz saw them, posed problems. Whereas an atom is an elemental particle that easily gives itself to mathematical manipulation, the solid particles do not cohere to each other. The ancient Greeks, including Plato of course, already had postulated for their atoms such devices as hooks, rivets, and even glue. Yet none of these mechanical means were ever fully elaborated. For Descartes, all variation could be effectively reduced to a mathematical point, and change of position could be described ultimately in reference to the geometrically extended grid. Yet in rejecting the void, he is left

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745 cf. Aiv 365 (1988)/LC 233 *Conspectus for an Elements of Physics* where Leibniz states: “Descartes, having introduced his subtle matter, did away with the vacuum in name only.”

746 For an extensive treatment, albeit unorthodox, of Leibniz’s notion of the fold, see Deleuze, Gilles; *The Fold: Leibniz and the Baroque*, trans. T.Conley (Minneapolis & London: University of Minnesota Press, 1993).
with minima in prescribed motions, or vortices. In contrast, Leibniz maintains infinite divisibility. As discussed in Pacidius to Philalethes: A First Philosophy of Motion, Leibniz follows closely Aristotle’s critique of Atomism.\(^747\) In order to avoid a space-time continuum where “...time will be an aggregate of nothing but moments, and space an aggregate of nothing but points”,\(^748\) Leibniz maintains the position of infinite divisibility. Yet his sort of divisibility is radical, a divisibility that is not into fluid geometric points such as with Descartes, or into elemental parts or atoms such as with Gassendi, but into extremities or borders within a continuum such as with Aristotle. This infinite division also implies that every material body can be in principle further divided; indeed, Leibniz states that within every world is an infinity of possible worlds. For Leibniz, the world is neither an aggregation of atoms nor a composition of fluid points. In contrast to the mathematical determination of atomistic particles or geometric points, “there is no precise and fixed shape in bodies,” neither uncuttable parts, nor minima, “because of the actual division of the parts to infinity”.\(^749\) In the dialogue Pacidius to Philalethes, Charinus criticizes Descartes:

He ought to have at least explained how in this case matter is not resolved into a powder, so to speak, consisting of points, when it is clear that no point will be left cohering to any of the others, since each one will move in its own right with a motion different from that of any other.\(^750\)

The problem becomes – both for atoms and minima – an issue of cohesion. Uncuttable, small parts circulating or floating in the vacuum, have no means to tie together as aggregates constituting

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\(^749\) Aiv310/LC 297.

material phenomena. Minima circulating in vortices without a void, resolve down to powder points, and are also without cohesion. The material world in these viewpoints either is composed of an aggregation of atomic parts, or an infinity of points. Yet these worlds do not cohere.

Leibniz, in contrast, has no predetermined particles or motions. Bodies have no fixed shape, precisely because all bodies are divisible to infinity. Yet the world hangs together, cohesively, in an altogether more extraordinary way. Leibniz uses the analogy of a pleated piece of fabric or folded sheet of paper in order to describe the space-time continuum.\(^{751}\) In contrast to the solidity of atoms, and the fluidity of Cartesian points, Leibniz proposes a flexible pleat of fabric, or fold. In this body that is flexible everywhere, all the parts since they are divisible to infinity, are cohering with each other.\(^{752}\) Furthermore, each part is a kind of extremity that is a kind of hinge, free to move, resist, and transform at any conceivable place. Leibniz proposes a model that is at once cohering and dynamic. Each sheet, or fabric, folds in various ways, opening up and then pleating back together without being torn into parts. Consequently, the fold is not resolved into points, nor is it comprised of uncuttable parts that need somehow to be mechanically joined. The continuum is a fold, or fabric tunic, where indeed every fold can be further folded into even smaller folds – per definition folded to infinity, indeed, folded one into the other to infinity. Leibniz explains in a marginal note:

> Just as bodies in space form an unbroken connection, and other smaller bodies are interposed inside them in their turn, so that there is no place void of bodies; so in time, while some things last through a momentaneous leap, others meanwhile undergo more subtle changes at some intermediate time, and others between them in their turn. And in these (as it were) blows or vibrations there seems to be a wonderful harmony. At any rate, it is necessary for states to endure for some time or be void of changes. As the endpoints [extrema] of bodies, or points

\(^{751}\) Aiii78 (555) /LC 185ff.

of contact, so the changes of states. Smaller bodies move more quickly in a plenum, larger ones more slowly. Nor is any time or place empty. During any state whatsoever some other things are changing.  

The fold remains, even whilst moved by the waves of its neighboring folds, an extremum that is divisible to infinity in the continuum. Leibniz’s constitution of the continuum begins to look like dynamically undulating origami.

The fold avoids both the cohesion problems of points and atoms, as well as preserving a notion of Aristotelian continuity. However, most extraordinarily, Leibniz also provides an analogy of the space-time continuum that is at once flexible, dynamic, and yet generative and singular. As discussed above, for Aristotle, a continuum is a whole whose limits (extrema) are one. In the fold, even though it may contain smaller folds of various sizes, “bodies are always extended and points never become parts, but always remain mere extremum”. Furthermore, the fold is a continuum of space and time, which is to say that continuous change and free movement is not only possible, but imperative. Motion is continuous in the fold, changing with respect to situation, but also time. Leibniz asks himself in a marginal note: “Why not rather say that the conclusion that things exist only for a moment, and do not exist at an intermediate time, will follow if it is supposed that things do not exist unless they act, and do not act unless they change?” The radical implication of this dynamic folding and unfolding continuum, is not only the fact that movement and change are continuous, but existence is defined by the possibility to act, and indeed to change in an fluid, uninterrupted manner. Let us remember, that in a continuity of space-time, neither space is composed of points, nor is time composed of instants (which is to say there are no time-atoms). So, Leibniz’s analogy of the fold or pleat of matter is also quite brilliant in explaining a model where time, too, is not atomistic. Time is continuous, without “jumps”, “rests” or breaks as it moves. Continuous time, change, and motion become possible if

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753 Aiiii 78/LC 195-7. “L9 in the margin”. *my emphasis*
754 Aiiii 78/LC 187.
755 Aiiii 78/LC 191. L5 in the margin.
it is explained by a process of dynamically folding and unfolding of the material continuum.

Furthermore, neither space, nor time is “empty”. Leibniz, like Descartes, would deny the void of the Atomists. Indeed, because the uncuttable parts of matter are paired conceptually with the vacuum; to reject one is to reject in principle the other.

Figure 6: Leibniz’s Fold; Continuously Unfolding and Re-Folding, Filling up the Entire Universe

The folded pleat of matter is also completely full, but in a completely different way than the Cartesian account. He says: “in any grain of sand whatever there is not just a world, but an infinity of
Leibniz denies the vacuum. Not only is the entire universe filled up with the fold, or rather constituted by the fold, unfolding, and re-folding continuously, but every fold is comprised of even smaller folds. Consequently, one can speak of an intussusception of folded matter.

In addition, one can only speak of bodies as being in a certain place at a certain time, because of the continuous movement and change. Existence, quite radically for Leibniz, is not only constituted by change, but coherence itself is accounted for by continuous and mutual motion in the fold, “...for there is no body which is not acted upon by those around it at every single moment”. Again, in Leibniz’s vision of a harmonious universe, where everything has a reason - space, time, and motion are brought together in one analogy of the dynamic fold. Matter and space are not resolved into points; time or change or motion never happens only to an isolated part of matter; the universe is constantly changing, never staying the same; each body is in principle divisible to infinity, containing yet ever more folds; every extremity of continuous space-time is a border condition that defines the beginning and the end of an unfolding, yet is only in fact a momentaneous state.

To conclude, Leibniz proposes an analogy of the phenomenal world that is a fold or pleat of matter, a world that is continuously and dynamically changing. In doing so, he overcomes atomism and the void with its incumbent problems of cohesion and change. He overcomes the Cartesian geometrical extension with its dissolution to points that cannot cohere or move in a spontaneous way. Yet more remarkably, Leibniz overcomes Aristotle’s distinctions of successive-contiguous-continuous, by providing a dynamic model that makes continuous motion possible. And finally, he overcomes Euclidean geometry of the point-line-solid, with its incumbent paradox of mathematical divisibility versus actual divisibility in the continuum. The universe is a fold within a fold – a pleat that is individuated and singular from moment to moment.

756 Aiii78/LC 211.
757 Aiii78/LC 209.
Coherence through Continuous Motion

So, when at the beginning of the dialogue Pacidius to Philalethes: A First Philosophy of Motion, Charinus puts forward the idea that he believes motion to be a change of place, the participants embark upon a fascinating discussion that not only reproduces Aristotle’s position on place and motion, disputes atomism, rejects Cartesian resolution to points, but most remarkably proposes a radical concept of the constitution of the continuum – the fold. Yet, let us remember that Atomism began with an attempt to metaphysically explain phenomenal change. Upon the stillled ship, Leibniz wrote this dialogue on motion – the most extraordinary account of motion, because motion is precisely what coheres in the phenomenal continuum. Importantly, Pacidius states:

But it will be worthwhile to consider the harmony of matter, time and motion….there is no part of time in which some change or motion does not happen to any part or point of a body. And so no motion stays the same through any space or time however small; thus both space and time will be actually subdivided to infinity, just as a body is. Nor is there any moment of time that is not actually assigned, or which change does not occur, that is, which is not the end of an old or beginning of a new state in some body. This does not mean, however, either that a body or space is divided into points or time into moments, because indivisibles are not parts, but the extrema of parts. And this is why, even though all things are subdivided, they are still not resolved all the way down into minima.758

The mutual harmony and excitation of matter, time and motion provide coherence and continuity. Because there are no parts or points, the continuum is infinitely divided, yet constantly changing and potentially moving. As a result, space and time are not extended things in a vacuum;759 rather, the space-time continuum is defined by its situation relative to an “order of co-existence”. Almost ten years later, he reiterates his commitment to the extrema of space and time, and writes in the Specimen of Discoveries760 of 1686:

758 Aiii78/LC 209-11.
759 Aiii78/LC 211. “So you admit no vacuum in either place or time…?”
760 Aiv 312/LC 302ff. The dating of this fragment is not absolutely certain.
Moreover, there are no atoms, but every part again has parts actually
divided from each other and excited by different motions, or what
follows from this, every body however small has actually infinite parts,
and in every grain of powder there is a world of innumerable creatures....
it also follows from the fact that every portion of matter is agitated by
the motions of the whole universe, and is acted upon by all the other
parts of matter, however distant, in proportion to their distance. And
since every case of being acted upon has some effect, it is necessary for
the particles of this mass that are differently exposed to the actions of
other particles to be set in motion in different directions, and thus for
the mass to be subdivided.\footnote{761}

Precisely the mutual excitations of differing motions and actions
of matter hold the universe together in an undulating, constantly
changing, yet continuous pleat of folded matter. Furthermore, each
body is individuated and singular; in each body is a principle of action,
force or movement. He goes on to write that:

No body is so very small that it is not in turn actually divided into parts
excited by different motions; and therefore in every body there are
actually infinitely many bodies. Every change of any body propagates its
effect to bodies however distant; that is to say, all bodies act on and are
acted upon by all others. Every body is confined by those surrounding
it so that its parts do not fly away, and therefore all bodies are engaged
in a mutual struggle among themselves, and every single body resists
the whole universe of bodies.\footnote{762}

In the end the phenomenal continuum for Leibniz is infinitely
divisible, yet in continuous motion. Motion is relative.\footnote{763} Indeed, for
Leibniz, motion is relative because in the system of each body being part
of the whole universe, one can only say that the body is moving with
respect to some other part of the universe. Remarkably, “one cannot
distinguish exactly which of the bodies is moving”.\footnote{764}

\footnote{761} Aiv312 (1623)/LC 317.
\footnote{762} Aiv 312 (1627)/LC 323.
\footnote{763} Motion is relative, just as space and time are, as we will see below. cf. Gueroult, Martial;
\footnote{764} Aiv 360 (1970-1)/LC 229. February 1677 “Motion is Something Relative”.
No place or moment is permanently definable or assignable. Because time is not a summation of instants, nor space a collection or aggregation of atoms or points, each infinitely divisible part responds to its environment without being torn apart, both acting and reacting in participation with the whole universe. Leibniz is able, finally, to account for continuous motion by saying that “the motion of a moving thing is actually divided into an infinity of other motions, each different from the other,”\(^\text{765}\) in an extrema not divided into parts or points, although that motion is continuously differing over a specific time and place. Whereas Aristotle had posited that place and time were extrema, (and Leibniz had followed), the radicalization of motion also being an extrema in the continuum assured Leibniz of a solution that not only escaped the atomistic units of Gassendi, and the “indefinitely divisible” fluid points of extended matter of Descartes, but also the paradox of the impossibility of continuous motion of Zeno. With Leibniz motion is continuous because everything is forever in relative movement – initiated by bodies themselves,\(^\text{766}\) but also in response to their environment. This environment is one in which all bodies are relative and interrelated to each other. Conclusively, Leibniz states:

Cohesion is in body through itself insofar as everything is one continuum, fluidity comes from motion within it; for insofar as its parts are excited by already differing motions, they are separable. The universe ought to be considered as a continuous fluid, but one containing parts of differing tenacity….There is nothing so fluid that it does not have a cohesion of parts, nor so firm with respect to us that it does not really have some degree of fluidity.\(^\text{767}\)

\(^{765}\) Aiiii 78 (565)/LC 207.

\(^{766}\) Remembering that Leibniz’s account of conatus gave him cohesion in bodies as well as self-active motion. As Mercer explains: “…because matter was taken to be infinitely divisible and because for any part of matter to move, there had to be a mind or active principle to move it, it followed that the arrangements of the parts of the body would be caused by an infinite number of minds. That is, every body has an infinity of parts; for a body to be cohesive, all its parts have to move; for any part to move, there must be a mind-like active principle to move it; therefore, every body will be constituted of an infinity of momentary minds moving bits of matter.” Mercer; op cit, p.267.

\(^{767}\) Aiv312 (1628)/LC 327.
At the end of the dialogue *Pacidius to Philalethes: A First Philosophy of Motion*, when Charinus puts forward the idea that he believes motion to be a change of place, Leibniz concludes that “action is something very different from change”. Ultimately, the continuum is held together by mutual movement – action and reaction - along the lines of extrema in the fold.

The Principle of Unity and Multiplicity

As we saw above, the phenomenal continuum as an extrema of space, time and motion coheres because it is in a system of pre-established harmony in continuous motion, a continuous interplay of forces. Yet we must also remember that the unity in the continuum is guaranteed by the monadic soul constituting a unum per se, as well as an underlying metaphysical principle of the “Immensum” which is God, guaranteeing pre-established harmony. In the *Metaphysical Definitions and Reflections* of the time period 1678-1681, Leibniz emphatically states that the “substantial form, or soul, is the principle of unity and of duration, [and] matter is that of multiplicity and change”. Quite simply, for Leibniz, the phenomenal continuum will always be unassignable and in continuous movement. Although the universe can be said to be a whole continuum - indeed a body can be said to be a continuum in and of itself - nevertheless, phenomena will

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668 Aiii7 (571)/LC 221.

669 In *Notes on Science and Metaphysics* from 18 March 1676, Aiii 36 (391)/LC 53-5. Leibniz defines “Immensum”, or infinity/immensity as God: “But there is something in space which remains through the changes and this is eternal: it is nothing other than the immensity of God [Immensitas Dei], namely, an attribute that is one and indivisible, and at the same time immense. Space is only a consequence of this, as a property is of an essence.”


671 Aiv 267 (1399)/LC 245. See also Arthur’s note 8 on page 414. Originally, Leibniz had written: “...and the soul is the same as substantial form.”

672 Aiv 267 (1401)/LC 249. “The parts of any body constitute one continuum.” cf. Arthur’s note 15 on page 414 where he notes that Leibniz had written further before crossing it out: “And the whole world is one continuum”. Yet one might surmise that the consideration of both the body, as a singular universe in itself as well as the universe as a larger whole, would be consistent with the position of infinite divisibility in the continuum. This position is commonly referred to as the “world within the world” thesis.
never constitute a unity for Leibniz unless imbued with “something more”, that is to say, substantial unity. All “created things are actually infinite” for Leibniz, maintaining infinite divisibility in the phenomenal realm. Within any body is an infinity of universes. But to say “actually infinite” is also to say that within the “created thing” is a principle that never changes, and this principle is the soul which can only be created or destroyed by God. Decidedly, with Leibniz, the phenomenal world is not real – only substances are real. In this regard he follows Plato, although to what extent Leibniz is an Idealist is a matter of scholarly dispute. Nevertheless, in his mature philosophy, Leibniz will write about the labyrinth of the continuum in terms of multiplicity and change, although constituting a whole – a whole body or a whole universe – which are both infinitely divisible in the end.

Subsequently, in the few years following his dialogue *Pacidius to Philalethes: A First Philosophy of Motion*, he sketches out his position with regard to material bodies more broadly in other smaller texts, among which was the *Metaphysical Definitions and Reflections* begun two years later, between the summer of 1678 and the winter of 1680-1681. In these deliberations, he establishes the position that he will hold throughout the rest of his life: the phenomenal world is one of the relations between things in space and time. Space is not a neutral background, fixed and enclosed, in which things have their determination. Rather, a position is assignable to a body only by distinguishing its position with regard to other bodies, the most helpful of which would be those bodies whose

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773 cf. Aiv266 (1392-1393)/LC235-237. The fragment, *Created Things are Actually Infinite*.  
774 cf. LH IV 6, 12f, leaf 22/A iv277 (1463)/LC 257. *Matter and Motion are only Phenomena*. Also, Arthur notes: since “…a body is defined as extended substance (albeit one containing sensation and appetite): but in both pieces Leibniz is offering an account of body that is distinguished from the purely extensive notion of the “Democriteans”. Robert Merrihew Adams believes this piece [A Body is not a Substance] belongs to a putative period during which Leibniz entertained phenomenalism, prior to his rehabilitation of substantial forms, ‘a decision he apparently made in the summer of 1679’.” Yet Arthur argues that, in his opinion, “Leibniz explicitly rejects phenomenalism in Aiv267, and seems to have reintroduced substantial forms by the winter of 1678.” LC 416, note 2. 
775 Notably, Leibniz was undertaking many mathematical investigations during this time period, for example, *On Analysis Situs*, GM V, 178-83/L 254-8. “What is commonly known as mathematical analysis is an analysis of magnitude, not of situation, and as such it pertains directly and immediately to arithmetic but is applicable to geometry only in an indirect
motion is uniform and somewhat retarded, such as planetary motion. In this way, a singular body can be determined as to its position to other simultaneously existing bodies by comparing its situation to what happens before and after. This relation of things with each other, is per definition for Leibniz, time and place, \([\text{tempris et loci}]\).\(^{776}\)

Most importantly, in contrast to the mathematization of space and time by the mechanists, reducing each body to a point-object that can be tied-down in a three-dimensional grid, each thing for Leibniz is a singular and individualized body. For him, “...with the aid of time and place we can also distinguish individuals, and decide which are the same and which are different”.\(^{777}\) He gives the example of two eggs, seemingly precisely the same; yet they are distinguishable from each other – and consequently preserved in their singularity – by their position relative to each other and their “world”. As a consequence – preserving the individual character of bodies in addition to their specific position in space and time – Leibniz defines “world” as “the collection of all bodies that are understood to be in space, i.e. those that have mutual situation...and their various states... at various times”.\(^{778}\) The “world” is in perfect agreement; indeed, obeying certain “laws of nature” as phenomena, yet “[leav[ing] room for human prudence”;\(^{779}\) each body is free to move, both acting and reacting in its environment or “world” in mutual concordance.

The nature of bodies is that of an extended thing in constant motion. Indeed, “no body is perfectly at rest”.\(^{780}\) Remarkably, for Leibniz, because the body is also not an atomistic particle, each part is also actually in motion; that is to say, each part has its own particular

\(^{776}\) Aiv 267 (1397)/LC 243. \(\text{Loci}\) is alternatively translated into English as place, location, or sitution.

\(^{777}\) Aiv 267 (1397)/LC 243.

\(^{778}\) Aiv 267 (1397)/LC 243.

\(^{779}\) Aiv 267 (1398)/LC 245.

\(^{780}\) Aiv 267 (1400)/LC 249.
“local” motion [peculiari motu]. Leibniz’s vision of bodies in this manuscript, is in conformity with his earlier description in the Pacidius to Philalethes of the fold in constant undulating motion. “Every body is organic, i.e. is actually divided into smaller parts endowed with their own particular motions, so that there are no atoms”. Each divisible part is in conformity with the rest, yet agitated by the movements of the whole. The unity in the body is the principle of the soul, or “substantial form”, guaranteeing continuity in the continuum, yet the phenomena are constantly moving and changing in their multifarious multiplicity. If the body had only matter, according to Leibniz, there would be no perfection or principle of continuity; and if the body had only substantial form, there would be no change or multiplicity or variation. This position is the one of his mature philosophy: the rejection of atomism in the phenomenal continuum whilst upholding a metaphysical atomism in the substantial form, or monad.

Each body is in constant motion, and this motion is motivated by the soul, being capable of appetite and sensation. “Every body is actually acting and being acted upon”. So Leibniz provides a vision of the world of mutual participation of all the bodies, each acting and reacting, although each to the extent of its perfection, which as we have seen is also a continuum. Yet not only are the parts of a body divisible to infinity, they constitute one unity, one continuum. The body coheres in space and time, because the motion – albeit constant – is so minimal as to not tear the body apart. Without some kind of violent force, the bodies remain in the fold, so to speak. Leibniz states: “for a unity always lasts as long as it can without destroying multiplicity, and this happens if bodies are understood to be folded rather than divided”, (corpora plicari). Also, already in 1695 in the New System, he stated that the soul is a monad that never dies; it is merely “folded differently”. Most importantly, this fold is a unity that encompasses the body as an

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781 Aiv 267 (1398)/LC 245.
782 Aiv 267 (1398)/LC 245.
783 Aiv 267 (1399)/LC 245.
784 Aiv 267 (1399)/LC 247 and Aiv 267 (1400)/LC 249.
785 Aiv 267 (1401)/LC 251. my emphasis.
786 P 119-120. “New System”.

infinitely divisible fold, within the continuum as “world” as an infinite fold, dynamically moving and changing. Leibniz gives here the example of a vibrating chord: every part vibrates in its own powerful way, having its own specific movement, yet at the same time contributing to the whole. Even though the chord can be divided into parts, each one moving, “a unity must always be joined to a multiplicity”.\(^{787}\) This is to say, again, from the other side, that even though each part of the fold acts and reacts in sensation and perception, as phenomena they obey mechanical laws, yet under the principles of the unity guaranteed by the monadic soul and the \textit{Immensum} which is God.

Furthermore, Leibniz rejects the vacuum. This vacuum that he rejects is not a sensible vacuum, proven or disproved by experimentation;\(^ {788}\) rather, the vacuum as a coherent or intelligible possibility. Obviously, to reject atomism, is also to reject the vacuum. The atom must have a kind of neutral container in which to operate. However, for Leibniz, “there is no place without body, and no time without change”.\(^ {789}\) Strictly speaking, this filled-up space and time is not phenomenal. This is to say, the filled-up space is not Cartesian. Because space and time are relations only, and these relations are constantly changing their positions due to perpetual motion of the bodies, one cannot precisely say that space is filled-up. So when Leibniz states that “there is no place without body, and no time without change”, he means that there are only the relations of space and time. Difficult to think, yet this concept is not a container in which objects move and have their positions. Rather, the world is only relation between things. “For matter too is perpetually becoming one thing after another, since it exists only in relation, as I have shown elsewhere from the principle of individuation of all things”.\(^ {790}\) Matter, space, time, and motion are only phenomena; only substances are real. Consequently, space and

\(^{787}\) Aiv 267 (1401)/LC 251.

\(^{788}\) This fact will become a critical factor when Newton and Clarke disagree with Leibniz over the existence of the vacuum.

\(^{789}\) Aiv 267 (1399)/LC 245.

\(^{790}\) Aiii 36 (392)/LC 55. \textit{Notes on Science and Metaphysics} from 18 March 1676. \textit{cf.} Arthur’s “Introduction”, p.lxix. See also \textit{Mediation on the Principle of Individuation}, Aiii 67 (490-1)/DSR 50-53.
time are not things, but relations. These relations are the only thing that is substantially real. This fact is why Leibniz says that “there is no place without body, and no time without change”.\textsuperscript{791} Without bodies in relation to each other, no determinations of position or successive time would be possible in their “world”, which is an ordered, mutual relation of coexistence. A vacuum as a coherent possibility in relational space is simply nonsensical; space is neither empty nor full because it is in principle not a thing.

Ultimately, Leibniz’s vision is one of Heraclitean flux paired with Parmenedian continuity of being. The “world” as a collection of all bodies in mutual relation - as well as the singular, individuated body - is constantly moving and changing in the folded continuum; nevertheless, the monadic soul is constant throughout all change. Indeed, as Aristotle pointed out in \textit{Physics} IV: “To begin with, then, we must recognize that no speculations as to place would ever have arisen had there been no such thing as movement or change of place. Indeed the chief reason of the persistent tendency to think of heaven itself as having a ‘place’ is that it is always moving”.\textsuperscript{792}

\textbf{Space/Time Relations}

“Space and Time are not things, but real relations”.\textsuperscript{793} This almost formulaic, lucid position is thought to have been written around 1686 in a text called \textit{A Specimen of Discoveries}. With regard to space and time, Leibniz is remarkably consistent throughout his lifetime, although some scholars would differ.\textsuperscript{794} One has only to make a quick sampling of his

\textsuperscript{791} Aiv 267 (1399)/LC 245.

\textsuperscript{792} Aristotle’s \textit{Physics} 211a15-18.

\textsuperscript{793} Aiv312 (1620)/LC 313 (Leibniz’s note 3 in the margin). \textit{A Specimen of Discoveries}, c.1686. (date not exact).

position concerning space/time relations, throughout his various textual essays, correspondence, and fragments, in order to see continuity in the development of his thought. This development will not say, however, that in more than fifty years of thought, that he rigidly maintained some lapidified position that he received during his university training. As a young man, in a letter to his former teacher Jakob Thomasius in April 1669, he is at this point still abiding by the reconciliation project between Aristotle and scholastic philosophy as outlined by his tutors:

Now that we have reconciled the reformed philosophy with Aristotle, it remains to show its truth per se in the same way that the Christian religion can be proved by reason and experience as well as from sacred scripture. It must be proved that there are no entities in the world except mind, space, matter, and motion....Space is a primary extended being or a mathematical body, which contains nothing but three dimensions and is the universal locus of all things. Matter is a secondary extended being, or that which has, in addition to extension or mathematical body also a physical body....So matter is a being which is in space or coextensive with space. Motion is change of [pl]space.\textit{motus est mutatio situs}....Time is nothing but magnitude of motion.\textsuperscript{795}

This letter from 1669, was closely followed by his investigations in the winter of 1670-1, entitled, \textit{On Primary Matter, The Theory of Concrete Motion, and The Theory of Abstract Motion.}\textsuperscript{796} In his Paris years, between 1672-1676, when he extensively studied mathematics and had acquaintances among some of the foremost scholars of his day, he began to develop the positions that he would hold throughout his lifetime. Many of the texts discussed above were the fruits of this period: \textit{Notes on Science and Metaphysics} from 18 March 1676;\textsuperscript{797} On

\textsuperscript{795} GP I, 15-27 and GP IV, 162-174/L 100. from 30 April 1669. \“motus est mutatio situs\” One should note that the term is \“situs\” or situation that is constantly changing, not place \“topos\”. Place, as we have seen in the previous chapter, does not move. Furthermore, space is ideal for Leibniz, cannot change strictly speaking, because it is a relation. But the \“situation\” or situ or relation between phenomenal things can, and indeed do, continuously change.

\textsuperscript{796} L 139. Appendix 1b-1d/LC 338-344. (A VI, ii N40; A VI, ii N41; A VI, ii N42). And “Studies in Physics and the Nature of Body” (c.1671): GP IV, 228-232.

Body, Space and the Continuum from April 1676;\textsuperscript{798} Pacidius to Philalethes: A First Philosophy of Motion from the autumn of 1676;\textsuperscript{799} Conspectus for a Little Book on the Elements of Physics from the period roughly between summer 1678-winter 1679;\textsuperscript{800} Matter and Motion are only Phenomena also roughly from the period 1678-79.\textsuperscript{801} An opportunity to reexamine Euclid’s Elements early in 1679,\textsuperscript{802} provided much inspiration from his mathematical manuscripts as well as the more metaphysical considerations of the phenomenal continuum; for example, texts such as On Analysis Situs, roughly 1679-1680\textsuperscript{803} and Created Things are Actually Infinite, from summer 1678- winter 1681.\textsuperscript{804} Furthermore, the extended investigations of the Metaphysical Definitions and Reflections, between the summer of 1678 and the winter of 1680-1; the Specimen of Discoveries of the Admirable Secrets of Nature in General of 1686;\textsuperscript{805} and There is no Perfect Shape in Bodies from April-October 1686\textsuperscript{806} were important.

In the time period 1680-1684, when he sketches out the “First Truths”, one can see that he firmly had a commitment to the phenomenal nature of matter:

Space, time, extension, and motion are not things, but well-founded modes of our consideration. Extension, motion, and bodies themselves, insofar as they consist in extension and motion alone, are not substances but true phenomena, like rainbows and parhelia.…. For the substance of bodies there is required something which lacks extension; otherwise there would be no principle to account for the reality of the phenomena or for true unity.\textsuperscript{807}
Very clearly, in his crucial letter to Arnauld of 9 October 1687, Leibniz would reiterate unequivocally,

...matter taken for the mass in itself, is only a phenomenon or a well-founded appearance, as are space and time also. [He goes to say that any] mass is not exact or rigorously fixed on account of the actual division of the parts of matter to the infinite....so that far from being constitutive of the body, [a] figure is not even an entirely real and determinate quality outside of thought.808

In 1698, he states the clear position on space and time that he would maintain continuously, restated in many writings up until his death in 1716: “Space, even as time, is nothing other than an order of possible existences, simultaneously in the case of space, or successively in the case of time, and in themselves they have no reality...”809 More eloquently, in 1706, in his correspondence with de Volder as we saw above, he writes the version that will become definitive: “extension is nothing other than the continuous order of coexistence, just as time is the continuous order of successive existence”.810 And, “space, like time, is something not substantial, but ideal...”811 Finally, this version returns towards the end of his life in a letter to Conti from November/December 1715:

Space is the order of co-existents and time is the order of successive existents. They are things true, but ideal, like numbers. Matter itself is not a substance but only substantiatum, a well-founded phenomenon, and which does not mislead one at all if one proceeds by reasoning according to the ideal laws of arithmetic, geometry, dynamics, etc.812

Despite the speculative and experimental character of his thought between his juvenilia, the earlier Paris and Hanover writings, and his later mature work on the issue of the continuum, Leibniz always seeks harmony. In tracing some of the most critical texts up

808 GP II, 111-129/L 343. 4 October 1687.
810 GP II, 221. Letter to de Volder, quoted in Hartz and Cover; op cit, p.498. See also GP II 268-9/L 535-6.
811 GP II 278-9. Letter to de Volder, October 1705. quoted in Hartz and Cover; op cit, p.500 and p.514.
812 LCC 185. Appendix B: Leibniz and Newton to Conti.
to the Clarke correspondence of 1715-1716, I have tried to follow a red thread through the labyrinthine architectonic of Leibniz. This trace shows marked consistency in the continuum, a commitment to a metaphysical and physical unity; yet this is not to say a perfectly unchanging position throughout more than fifty years of his working life, rather a protracted investigation.

This re-creation of the major points that are important with regard to Leibniz’s architectonic of the continuum, leads us to the final years of his life: to the period where he attempted to establish a unum per se, a substantial bond or chain in the correspondence with his trusted friend Des Bosses as we saw above – to the same time period where he attempted to refute absolute space and absolute time in his correspondence with his mistrusted colleagues Clarke and Newton. We now to turn to the last writings he made on the issues of space and time.

Correspondence with Clarke: Relational vs Absolute Space and Time

Some of the most extensive treatment in the writings of Leibniz on matters regarding space and time, are the letters in the correspondence with Clarke, especially the significant Fifth Letter. This correspondence with an adherent, and some might say sycophant, of Isaac Newton, are quite important in the history of philosophy, occurring roughly at the end of Leibniz’s lifetime. It is not my intention here to reproduce the adversarial attitude of Newton with regard to Leibniz. Irreparable

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814 GP VII, 345-440/L 675-721. The English translation The Leibniz-Clarke Correspondence by H.G. Alexander (Manchester: Manchester UP, 1956) will be used unless otherwise noted. Denoted by the abbreviation LCC below.

815 Clarke published the correspondence for the first time a year after Leibniz’s death in 1716: A Collection of Papers which passed between the late learned Mr. Leibnitz and Dr. Clarke in the years 1715 and 1716 relating to the Principles of Natural Philosophy and Religion (London: 1717).
damage was done to Leibniz’s reputation in the jealous dispute over the provenance of the differential calculus. Others have attempted, albeit often not very impartially or neutrally, to make an historical account of the Leibniz-Newton controversy. This controversy is not at issue here; rather, specifically the remarkable position of Leibniz with regard to relational space and time.

First, to briefly sketch out the position of Newton regarding absolute space, the text “Scholium” in the first section entitled “Definitions” of the \textit{Principia} provides an abbreviated overview. Newton straight away establishes the need for a mathematical grounding of matters concerning natural philosophy. So many prejudices, he argues, accompany common and experiential understandings of time, space, place, and motion – being considered only in terms of their relation to other sensible or observable objects. This approach is insufficient in his view; what is needed is a universal, mathematical, and true account which makes no appeal to anything external. Newton

\footnote{cf. e.g.: Hall, A. Rupert; \textit{Philosophers at War: The Quarrel between Newton and Leibniz} (Cambridge: Cambridge UP, 1980). Hall, A. Rupert; “Newton versus Leibniz: From Geometry to Metaphysics” in Cohen, I Bernard and Smith, George E. (eds.); \textit{The Cambridge Companion to Newton}, (Cambridge: Cambridge UP, 2002)pp.431-454. Morrell, Jack B. and Thackray, Arnold; \textit{Gentlemen of Science: Early Correspondence of the British Association for the Advancement of Science} (Oxford: Clarendon, 1981) or (London: UCL, 1984). cf. Bertoloni-Meli, D.; \textit{Equivalence and Priority. Newton versus Leibniz, Including Leibniz’s Unpublished Manuscripts of the Principia} (Oxford: Oxford UP, 1993). Newton, himself, was among the first to throw himself into the fray. He “anonymously” wrote the \textit{Account of the Book entitled Commercium Epistolicum} in 1715 where he defended “Mr. Newton”: “…Mr. Leibniz hath accused him of making gravity a natural or essential property of bodies, and an occult quality and miracle. And by this sort of raillery they are persuading the Germans that Mr. Newton wants judgment, and was not able to invent the infinitesimal method [the calculus]. It must be allowed that these two gentlemen differ very much in philosophy. The one proceeds upon the evidence arising from experiments and phenomena, and stops where such evidence is wanting; the other is taken up with hypotheses, and propounds them, not to be examined by experiments, but to be believed without examination.” Excerpted from, Newton, Isaac; \textit{Philosophical Writings}, edited by Andrew Janiak (Cambridge: Cambridge UP, 2005)p.125.}

then defines his terms, making the distinctions of the absolute, true and mathematical - time, space, place, and motion.

Absolute time, is “of itself”, having no relation indeed with sensible objects; rather absolute time flows unimpeded by the motion of anything external. Absolute time is otherwise known as “duration”, is true and mathematical. Absolute space, is also “of its own nature”, always remaining neutral, unaffected by relation to any object. Indeed, without a single object in the world, absolute space and time would still exist since it has in principle no relation to external objects. Absolute space and time never change, are autonomous mathematical abstractions, and exist independently of things. Place, for Newton is “a part of space”; which is to say the space a body occupies. This concept of place is not the extremity of the body (such as is the case in Aristotle) nor the situation or position of the object (such as is the case with Leibniz). Strictly speaking, “parts of space” cannot be observed unless occupied by a body in a specific place. Newton also develops, somewhat problematically,818 a notion of absolute motion. For him, absolute motion is merely mechanical translation. This account is problematic because then he will in turn have to account for absolute velocity, acceleration, inertia, and rest, distinguishing the causes and effects of these motions. “It is indeed a matter of great difficulty to discover,” he admits, “and effectually to distinguish, the true motions of particular bodies from the apparent; because the parts of that immovable space, in which those motions are performed, do by no means come under the observation of our senses”.819 To summarize, for Newton, space is immovable and time endures unchanged. Consequently, Newton sketches out a vision of absolute space and time that is a sort of neutral background, immutable, from which all relative motions can be measured.

818 cf. Earman, John; World Enough and Space-Time: Absolute versus Relational Theories of Space and Time (Cambridge: MIT Press, 1989)p.13. Newton’s “critics tended to swallow this move but countered correctly that Newton’s sense of absolute motion entails the otiose notions of absolute velocity and absolute change of postion and then concluded incorrectly that they had shown that no sense of absolute, or nonrelational, motion is required.”

Obviously, this neutrality and high level of mathematical abstraction, unencumbered by phenomenal diversity and multiplicity, has no doubt its attractions. This account of absolute space and time, however, also has its problems; the detractors were numerous even in Newton’s day. The problems being not the least the fact that absolute space and time are empirically unverifiable. Because space and time are not sensible, not phenomenal, and not observable, they are, in principle, in contradiction of even his own “Rules of Reasoning in Philosophy”, following the precepts of experimentation derived from phenomena. Newton writes in the Principia:

In experimental philosophy we are to look upon propositions inferred by general induction from phenomena as accurately or very nearly true, not withstanding any contrary hypotheses that may be imagined, till such time as other phenomena occur, by which they may either be made more accurate, or liable to exceptions.

As an intellectual construct, absolute space and time must be taken to be “first principles”. Some of Newton’s clearest accounts of his methodology of philosophy come from a letter to Roger Cotes of 1713:

These principles are deduced from phenomena and made general by induction: which is the highest evidence that a proposition can have in this philosophy. And the word “hypothesis” is here used by me to signify only such a proposition as is not a phenomenon nor deduced from any phenomena but assumed or supposed without experimental proof.

Nevertheless, for Newton, absolute space and time do not have the status of a “hypothesis”; rather he attempts to establish absolute space and time as “in itself”, independent of phenomena, yet

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820 For example, Huygens and Berkeley. cf. Guicciardini, Niccolo; Reading the Principia: The Debate on Newton’s Mathematical Methods for Natural Philosophy from 1687 to 1736 (Cambridge: Cambridge UP, 1999).
822 Correspondence with Roger Cotes, London 28 March 1713, from Newton, Isaac; Philosophical Writings, op cit, p.118.
also deduce absolute space, time, motion, and place mathematically from principles derived from phenomena by induction. Indeed, Newton makes repeated appeals to “empirical evidence” provided by experimentation\textsuperscript{823} – up to and including the famous “bucket argument” used against Leibniz\textsuperscript{824} – assuming that the neutral background provides some kind of measuring stick which is unencumbered by phenomenal observations. Absolute space and time are also not, strictly speaking, “things” since they have no sensibility; rather, they are an abstract, mathematical/geometrical object. They are “matter independent”, yet precisely uphold the continuous/discrete distinction that was maintained from antiquity.

Other objections can be made. Absolute space and time, as a neutral background, assume a kind of “God’s-eyeview” from which

\textsuperscript{823} Ernst Mach, in 1873, was among the first to totally dismiss the methodological grounds of Newton’s project. \textit{cf.} Mach, Ernst; \textit{The Science of Mechanics: A Critical and Historical Account of its Development} trans. McCormack (New York: Open Court, 1902/1974). “It is scarcely necessary to remark that in the reflections here presented Newton has again acted contrary to his expressed intention only to investigate actual facts. No one is competent to predicate things about absolute space and absolute motion; they are pure things of thought, pure mental constructs, that cannot be produced in experience.”p.279ff. See also Reichenbach, Hans; \textit{Die Bewegungslehre von Newton, Leibniz und Huygens} in \textit{Gesammelte Werke}, hrsg. von A. Kamlah, Bd. 3 (Braunschweig/Wiesbaden, 1979)p.410.

\textsuperscript{824} In Clarke’s fourth letter (C.IV.13), in disputing relative motion, and citing Newton’s \textit{Principia}, Scholium, Definition 8, he makes appeals to an experiment entailing a bucket of water suspended from a rope, twisted about its axis, and then released. The water, of course, due to centrifugal force, ascends the sides of the bucket, in a concave shape. This experiment, according to Newton’s propositions of absolute space and time, allegedly proves empirically the existence of absolute accelerations; the water having no effects resulting from the relative proximity or motion of the bucket itself, or indeed from the gravitational influences of planetary motion. By this experiment, Newton claims that every object has its position and motion in an absolute sense, all other objects having no relative effect upon it at all. Quoting Newton from the \textit{Principia}, Scholium, Definition 8: “Therefore, that endeavor does not depend on the change of position of the water with respect to surrounding bodies, and thus true [absolute] circular motion cannot be determined by means of such changes of position. The truly [absolute] circular motion of each revolving body is unique, corresponding to a unique endeavor as its proper and sufficient effect, while relative motions are innumerable in accordance with their varied relations to external bodies and, like relations, are completely lacking in true [or absolute] effects except insofar as they participate in that true and unique motion.” \textit{Principia, op cit}, vol. I, p.10-11. Leibniz unsatisfactorily answered this claim, for Clarke’s feeling, and the matter was left unresolved upon Leibniz’s death in 1716.
to observe absolute motion without becoming dependent on matter. Apart from the obvious hubris of this proposition, the problem becomes that one would then necessarily be “outside” of space, the place external and non-relational from which to measure sensible objects. Conceptually, one would have to ask: where is the place in absolute space and time, “in itself”, from which to observe that which is per definition outside of itself?

Yet, importantly, the question arises as to the very position of God in this absolute space and time. In the *Principia*, Newton explicitly states that God,

...endures always and is present everywhere, and by existing always and everywhere he constitutes duration and space....God is one and the same God always and everywhere. He is omnipresent not only virtually but also substantially; for action requires substance. In him all things are contained and move, but he does not act on them nor they on him. It is agreed that the supreme God necessarily exists, and by the same necessity he is *always* and *everywhere*. It follows that all of him is like himself: he is all eye, all ear, all brain, all arm, all force of sensing, of understanding and of acting but in a way not at all human, in a way not at all corporeal, in a way utterly unknown to us.\(^{825}\)

Consequently, for Newton, God is explicitly *in* space and time whilst at the same time being infinity and duration, the *sensorium* of the world. Significantly, in *De Gravitatione* he also maintains that God exists in space and time; indeed exists necessarily; “whatever is neither everywhere nor anywhere does not exist”.\(^{826}\) To exist is to occupy space and time absolutely. Yet remarkably, Newton also calls space “an affection of being”, stating that “…the quantity of the existence of God is eternal in relation to duration, and infinite in relation to the space in which he is present”.\(^{827}\) Newton maintains that “no being exists or can exist which is not related to space in some way” \(^{828}\) Seemingly, Newton is advocating a relationism, yet he is indeed making an ontological claim

\(^{825}\) *Principia*, Book III, Rule IV, General Scholium. Newton; *Philosophical Writings, op cit*, p.91.

\(^{826}\) Newton; *Philosophical Writings, op cit*, p.25.

\(^{827}\) *ibid*.

\(^{828}\) *ibid*. 
for absolute space and time. What exists, including God, necessarily exists in space and time, to be defined against that abstraction. In a sense, God as infinite occupies all space, and as all duration, endures throughout all time. Clarke, at a certain point in the correspondence with Leibniz will state unequivocally: “He is in all, and through all, as well as above all”.\(^{829}\) Nevertheless, the abstract position from which to determine absolute space and time, exists outside of the framework of phenomena, assuming a position exterior to itself.

These objections – that absolute space and time are empirically unverifiable and conceptually indefensible in terms of being “outside” of space and time – were not the objections that Leibniz made. He had other reasons with which to object. So, after sketching out briefly the position of Newton, the position of relationality of space and time of Leibniz can be explicated with regard to his correspondence with Clarke. Samuel Clarke was himself a philosopher/theologian of significance in the period,\(^ {830}\) but has been historically remembered as the one who defended Newton’s viewpoint via Princess Caroline to Leibniz.

We take up the correspondence in 1716. Many misunderstandings had passed for review at this point; indeed, the two men seemed, in constantly repeating their positions, merely to talk past each other. Most decidedly, the two opposing positions with regard to space and time – the absolute and the relational – were indeed irreconcilable, leaving the prospect of agreement between the two in the realm of impossibility.

**Real Relations**

The objections that Leibniz made to Newton’s notions of absolute time, space, place, and motion were mainly upon metaphysical or rational grounds. Leibniz himself never undertook empirical investigations or scientific experimentation. Indeed, this fact left him perhaps on the far side of the divide when later philosophy was deemed to be “scientific”, which is to say a project of “mathematically deducing from

\(^{829}\) C.II.10/LCC 23.

phenomena by induction”. Yet Leibniz’s arguments were compelling. The objections fell into two separate yet interrelated rational arguments that were for Leibniz the foundation of his metaphysical system: the Principle of the Identity of Indiscernibles, and the Principle of Sufficient Reason.

Leibniz’s Principle of Sufficient Reason states, “that nothing happens without a reason why it should be so, rather than otherwise.” The Principle of the Identity of Indiscernibles states that “in nature, there cannot be two individual things that differ in number alone. For it certainly must be possible to explain why they are different, and that explanation must derive from some difference that they contain”. Remembering, of course, Leibniz’s absolute commitment to the singularity and free will of individuals for metaphysical reasons, he also extends this notion of individuation to phenomena – each individual thing is per definition different. This standpoint is obviously in contradistinction to Newton’s project of mathematical abstraction, which not only sets all objects against a neutral background or environment, but reduces each object to the same, in order to be easily manipulated within the “laws of nature”. Simply stated: where Leibniz attempts to relate all things, each one different; Newton attempts to isolate in absolute space and time, each thing reduced to the same.

Closely related to this commitment that each individual be singular, is the commitment that each thing have its specific situation and reason for being. Consequently, for Leibniz, a reason must be found, or could in principle be found, why a thing is as it is, and not otherwise. Leibniz uses the Principle of the Identity of Indiscernibles and the Principle of Sufficient Reason in the correspondence to refute Newton’s notions of absolute space and time. For Newton, although each body or thing is discernable, it is indistinguishable as an individual; for example, a horse running around a racetrack is not an individual

833 L.II.1/LCC 15-16; L.III.7-8/LCC 27-8; L.IV.1-2, 13-20/LCC 36, 38-9; L.V.1-20, 66-73, 76-77/LCC 55-60, 78-80, 81.
834 C 518-23/P 87-92/AG 32. “Primary Truths”.

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horse, but a mathematical point following an elliptical trajectory. For Leibniz, rationally, the horse must be situated on the racetrack, following certain mechanical laws of acceleration and centrifugal force, yes, but not just a mathematical point; rather existing in the “order of co-existent phenomena”. The horse is a singular being in an environment of other co-existents.

Furthermore, the reason an object or body is individuated and situated in a singular way is not due to the continuous intervention of God. God, as the creator of a system of pre-established harmony, or concomitance, acts necessarily, yet each individual is imbued with free will. Each thing exists in relation to every other thing, in accordance with the perfection of the universe, acting and reacting. Leibniz states already, in the first letter to Clarke written in November 1715: “And I hold, that when God works miracles, he does not do it in order to supply the wants of nature, but those of grace. Whoever thinks otherwise, must needs have a very mean notion of the wisdom and power of God”.\(^835\) Indeed, the issue of the intervention of God in the natural world is the very first argument that Leibniz takes issue with Newton. Newton’s position, in Leibniz’s opinion, would entail the constant tinkering of God in the world, much like a watchmaker – albeit an incompetent craftsman – would need to “wind up his watch from time to time otherwise it would cease to move”.\(^836\) This constant need of intervention in the system profoundly contradicts Leibniz’s position of God as the most perfect being in a system of pre-established harmony, the “beautiful pre-established order”. Indeed, what kind of God would it be who would create a world so imperfect as to need constant maintenance, mending and meddling in order to keep it operative? God, in Leibniz’s view would be a much more skillful craftsman. God only intervenes in the world, “in matters of grace”, in other words to attend to the souls of his creations. Further,

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\(^836\) L.I.4/LCC 11.
the world follows mechanical laws governed by reason, being the most perfect of all possible worlds.

In addition, Leibniz took issue with the idea of Newton that space was the sensorium of God. Because God for Leibniz was pure substance, purely ideal, he could not per definition occupy space. This fact did not contradict his position given that space and time were relational and ideal for Leibniz. If God intervened in the world, it was substantially, not sensibly, phenomenally, or mechanically. Leibniz accuses Newton of the degeneration of religion, making God something sensible and corporeal. Most regrettably, as we saw above, Newton in the Principia, as well as in the Opticks, Query 28 and 31, compares God to a being with organs of sensation.

Precisely the idea that God is the sensorium of the world, arouses Leibniz’s objections in his first letter to Clarke via Princess Caroline: “Sir Isaac Newton says that space is an organ, which God makes use of to perceive things by”.837 God with sensible organs – eye, ear, brain, arm, etc. – would of course imply God was occupying space and time as a corporeal being. Yet in the Queries to the Opticks of 1706, republished with extensive revisions five years after Leibniz’s death, Newton clarifies by saying that God:

...being in all places, is more able by his will to move the bodies within his boundless uniform sensorium, and thereby to form and reform the parts of the universe, than we are by our will to move the parts of our own bodies. And yet we are not to consider the world as the body of God, or the several parts thereof, as the parts of God. He is a uniform being, void of any members or parts,...God has no need of such organs [of sense], he being everywhere present to the things themselves.838

In fact for Newton, God contains all things in that body infinitely, and endures throughout all time eternally, there being no other space and time other than God. The world is absolutely filled by God. In these revisions and explanations, Newton’s position that the sensorium of God was a sort of omniscience in infinite space, was

837 L.I.3/LCC 11.
838 Newton; Philosophical Writings, op cit, p.138-9. Queries to the Opticks of 1721, especially Queries 28 and 31.
not in the end so very far away from Leibniz’s notions of God’s perfect perspectival perceptions, except to say that for Leibniz, God can never “be in space”. God is absolutely not in space and time; God is pure substance therefore non-extended, non-phenomenal. God, for Newton is,

as it were in his sensory [sensorium], sees the things themselves intimately, and thoroughly perceives them, and comprehends them wholly by their immediate presence to himself: of which things the images only carried through the organs of sense into our little sensoriums, are there seen and beheld by that which in us perceives and thinks.839

Yet the real difference – the very objection that Leibniz would hold most strictly – was that one could easily get the impression reading these passages, in spite of Newton’s protests, that God was a body that was a sensible, corporeal being. Clarke tries to convince Leibniz, unsuccessfully, that by the term sensorium, Newton does not mean to imply actual “organs”; rather “the place of sensation”, by analogy “as if it were the sensory”.840 The problem here is how would God perceive his beings without sensory organs? For Newton, God senses the world as if he had sensory organs. Yet paradoxically, even though time for Newton flows equably, without the necessity of objects in that space, including the necessity to perceive those objects by either God or creations, Newton apparently needs the sensorium. Why would absolute space and time be independent of all objects, and yet be in need of divine perception?

In the end both men, however, make claims as to the reasons of God, claims that are indeed truly unverifiable: Leibniz on the grounds of the Principle of Sufficient Reason; and Newton on the grounds of “the wonderful uniformity in the planetary system”, the order established by “he who created them”, and the “counsel of an intelligent agent”.841 Neither Leibniz nor Newton can claim to know the reasons, sufficient or otherwise, of God. They know not the causes, only the effects.

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839 Philosophical Writings, op cit, p.129-130.
840 C.II.3/LCC 21.
841 Philosophical Writings, op cit, p.138.
The Reasonable Place for Things
Given that for Leibniz each body is individuated and situated in a singular way, he uses the Principle of the Identity of Indiscernibles, and the Principle of Sufficient Reason to argue against absolute space and time in another way; namely, that God would follow reason in creating a body in one place rather than another. Although Clarke agrees in principle to Leibniz’s Principle of Sufficient Reason in saying that of course without a cause there can be no effect,\footnote{C.II.1/LCC 20.} in his second reply he interprets this principle in a way that would be conducive to absolute space and time. He argues that the Principle of Sufficient Reason basically comes down to the will of God:

For instance: why this particular system of matter should be created in one particular place, and that in another particular place; when, (all place being absolutely indifferent to all matter), it would have been exactly the same thing \textit{vice versa}, supposing the two systems (or the particles) of matter to be alike; there can be no other reason, but the mere will of God.\footnote{C.II.1/LCC 20-21.}

Leibniz protests. Although he, too, will maintain that God has absolute free will in choosing when and how he created the universe, to suppose that space and time would be indiscernible or indistinguishable is highly objectionable for him. For Leibniz, the idea of absolute space and time, independent of existents, is abhorrent. There would be no \textbf{reason} why a thing would exist at a particular time or at a particular specific place if space and time were absolute and all things could exist in principle at any time or place irregardless of the specificity of situatedness. If the Principle of the Identity of Indiscernibles would hold, then no two things are ever the same, occupying the same spatio-temporal relation. Indeed, for Leibniz, every composite substance is aggregated about its dominant monad with its singular point-of-view from which it expresses itself and mirrors the world. For Newton, in contrast, every point of space and every instance of time is in principle exactly identical. Yet, “to suppose two things indiscernible
is to suppose the same thing under two names" according to the Principle of the Identity of Indiscernibles. And to suppose, he goes on to say, that the universe could have been created differently by God than it actually had been, with an entirely different position and temporality, is indeed unthinkable. To say, for example that all time is equable is to presume that God could have created the universe at any moment, a million years before or after, the universe having no specific "assignable time" in absolute space and time. Leibniz argues:

Space being uniform, there can be neither any external nor internal reason, by which to distinguish its parts, and to make any choice among them. For, any external reason to discern between them can only be grounded upon some internal one. Otherwise we should discern what is indiscernible, or choose without discerning. A will without reason...a God, who should act by such a will, would be a God only in name.

Indeed, not only is a thing perfectly individuated, but there must be a reason, according to the Principle of Sufficient Reason, why it had its co-existent relation there and not somewhere else. For Leibniz, "...every part of matter is actually subdivided into parts differently moved, and no one of them is perfectly like another". Never is there a droplet of water, or a leaf, or two animals exactly alike, nor indeed, radically, any part of those things since matter is infinitely divisible. Each thing has its singularity.

Furthermore, to speak of space being a vacuum is a non sequitur for Leibniz. A vacuum, in a relational account, is non-sensical because there is no such thing as "empty" space. Space is not a thing, it is a

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844 L.IV.6/LCC 37.
845 L.IV.15/LCC 38.
846 L.IV.18/LCC 39.
847 L.V.22/LCC 61.
848 cf. L.V.34/LCC 64-65. and Correspondence with Guericke, GP I, 193. Leibniz did not deny the possibility of a physical vacuum, as shown through the experiments of, for example, Torricelli or Guerike's vacuum pump. Rather, he objected, again, on the basis of arguments of reason consistent with his relational account of space and time. To admit the experimental evidence of a vacuum and transpose this empirical evidence to a general theory of a space and time devoid of "things", empty, immutable and independent of events, is to confuse the order of reasons. Newton, in fact, did not induce his theory of
relation; therefore, it cannot be “empty”. For Leibniz, “extension is nothing other than the continuous order of coexistence, just as time is the continuous order of successive existence”. Consequently, Leibniz contends, if space is extension, then empty space would arguably be the extension of nothing. “But if that space be empty, it will be an attribute without a subject, an extension without any thing extended”. Empty space is literally an empty notion. Furthermore, he adds, if Newton and Clarke insist on space and time being an attribute of God, then God would be forced to occupy nothing; it is “an attribute without a subject”.

Yet by far the most important objection that Leibniz makes against an absolute space and time is a substantial one. For Leibniz, “space, like time, is something not substantial, but ideal…”. The only thing that is real for Leibniz are the monads and their relatedness with each other. Space and time are neither substances nor aggregates of substances. Space and time are not “things”, they are relations. In the correspondence with de Volder, with Des Bosses, and with Arnauld, Leibniz was quite consistent in regard to the phenomena of space and time, and the composition of “composite substances”. As simple substances, unlike phenomena, monads are atomistic; that is to say, indivisible, non-extended, ontological units. “There is nothing simple”, Leibniz reiterates, “...but true monads, which have neither parts nor extension”. Consequently, in relational space and time, only substances are real. However, monads can aggregate with matter to

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absolute space and time from empirical evidence of a vacuum. For an extended scholarly treatment on the issues of the vacuum and empty space, see the theoretical physicist Genz, Henning; *Nothingness: The Science of Empty Space* translated by K. Heusch (Reading, Mass.: Perseus Books, 1999).

849 GP II, 221.


851 GP II 278-9. Letter to de Volder, October 1705.


853 L.V.24/LCC 62.
form a composite substance – or more properly stated, monads express their corporeal body. Yet although these can form a true unity, they are merely “well-founded phenomena”. These extended composite substances are extended in space and time in relation with each other. However, just because they are extended is not to say that they remain in the same place or time, for all phenomena are constantly changing, acting and moving.

Figure 7: The monads “express” themselves into phenomenal extension

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854 GP II 281-283/L 538-9/AG 184-6. Letter to de Volder, 19 January 1706. (plus paragraphs in the first draft never sent to de Volder). Leibniz states that mass and its diffusion result from monads, but space does not, for space and time are orders, not extensions. That is to say, that the monads themselves, as simple substances, have no extension, rather “express” themselves into phenomenal extension. See also, GP IV 393-400; GM VI 98-106/AG 250-256. “On Body and Force, Against the Cartesians”: “Indeed, time adds nothing to duration, nor does space add anything to extension, but just as successive changes are in time, there are different things [varia] in body which can be spread out [diffundt] at the same time. For since extension is a continuous and simultaneous repetition (just as duration is a successive repetition), it follows that whenever the same nature is diffused through many things at the same time...extension is said to have place.” (AG 251).
In summation, the forty-seventh paragraph of the Fifth letter of Leibniz to Clarke, dated 18 August 1716, provides the most comprehensive formulation of Leibniz’s position:

I will here show, how men come to form to themselves the notion of space. They consider that many things exist at once and they observe in them a certain order of co-existence, according to which the relation of one thing to another is more or less simple. This order is their situation or distance. When it happens that one of those co-existent things changes its relation to a multitude of others, which do not change their relation among themselves; and that another thing, newly come, acquires the same relation to the others, as the former had; we then say, it is come into the place of the former; and this change we call a motion in that body, wherein is the immediate cause of the change. And though many, or even all the co-existent things, should change according to certain known rules of direction and swiftness; yet one may always determine the relation of situation, which every co-existent acquires with respect to every other co-existent; and even that relation which any other co-existent would have to this, or which this would have to any other, if it had not changed, or if it had changed any otherwise. And supposing, or feigning, that among those co-existents, there is a sufficient number of them, which have undergone no change; then we may say, that those which have such a relation to those fixed existents, as others had to them before, have now the same place which the others had. And that which comprehends all those places, is called space. Which shows, that in order to have an idea of place and consequently of space, it is sufficient to consider these relations, and the rules of their changes, without needing to fancy any absolute reality out of these things whose situation we consider. And to give a kind of a definition: place is that, which we say is...the relation of co-existence [agreeing perfectly with another co-existent]. Place is that, which is the same in different moments to different existing things, when their relations of co-existence with certain other existents, which are supposed to continue fixed from one of those moments to the other, agree entirely together. And fixed existents are those, in which there has been no cause of any change of the order of their co-existence with others; or (which is the same thing) in which there has been no motion. Lastly, space is that, which results from places taken together.\footnote{L.V.47/LCC 69-70.}
Remarkably, what Leibniz finds to be self-evident, and even desirable – the relationality of co-existents to each other – is precisely what Newton found most objectionable in the Scholium to the eighth definition of the *Principia*. Phenomena are “messy”; they move, they change, they refuse to stay in the same place. Consequently, Newton seeks a mathematical abstraction that is not dependent upon experiential, sensible or relational understandings of time, space, place, and motion. In his notion of absolute space and time, he got what he needed - a universal, mathematical, and true account which makes no appeal to anything external. Yet this account of space and time is highly dependent – dependent on a high level of abstraction from empirical evidence, and dependent on the reduction of objects to points, devoid of specificity.

To conclude, Leibniz refutes Newton/Clarke, not on empirical grounds, but on metaphysical grounds with the *Principle of the Identity of Indiscernibles*, and the *Principle of Sufficient Reason*. The two main objections that Leibniz had towards Newton’s notion of absolute space and time are fact that for him space and time are not substances, rather an order of co-existent relation, and that all substances must be singular and individuated each with its own reason why it would be in a specific space and time and not another. For Newton, the equivalence of any given point in space or instance in time enabled him to manipulate bodies mathematically in an absolute container, free from relatedness with any external object. Although undoubtedly the historical development of a kind of scientific practice that relied upon this highly reductionist account was critical to the intellectual revolutions of the eighteenth and nineteenth centuries, ultimately Newton’s account could not be upheld. But our task here is not to decide who gave the correct account. The fact remains, however, that

the relationist version of space and time, albeit infinitely more complex mathematically, continues to be explored;\textsuperscript{857} for admittedly, Leibniz’s vision of a dynamic, eternally changing system of relatedness appeals to those who would preserve “things” in their individual dignity.

**Leibnizian Onto-topology**

Inquiring into the place of substance and phenomena within the architectonic structure of Leibniz, proceeding diagnostically through the extensive correspondence and various essays in the Leibnizian oeuvre, the onto-topology is made more explicit. For Leibniz, his architectonic is a labyrinthine structure comprising a unity of the substantial and the phenomenal. As argued above, his entire philosophical endeavor can be seen to be one of harmony, reconciliation, and unification. In the end, he transversed as no other philosopher, encyclopedically, the first and second labyrinths of the continuum. Whereas generally speaking, Leibniz’s architectonic was regarded in its Idealism, to be a transcendent structure with God at the apex, the most perfect substance in a world of pre-established harmony. Yet, a more nuanced examination has shown that God is (merely) the most perfect monad in a world that is completely interconnected, all monads together in relation. This relation is precisely substantial and guaranteed by God. Consequently, the position of God in Leibniz’s onto-topology becomes one of a “special case monad”, the architectonic itself flattening out into a more immanent structure. To be transcendent, or above, or beyond Being is impossible when it is impossible to be “outside” of the monadic structure. God is the ultimate perfection in an ontological continuum, in constant interrelatedness with all substances.

\textsuperscript{857} See, for example, Einstein, Albert; “Forward” in Jammer, Max; *Concepts of Space: The History of Theories of Space in Physics*, forward by Albert Einstein, (Cambridge, Mass.: Harvard UP, 1954). Einstein suggests that Newton’s system, although fruitful for 200 years, was preempted by a relationist account from Huygens and Leibniz that was much more descriptive and generative for a Space/Time as an electro-magnetic inertial field. cf. Gagnon, Maurice; “From Relational Space and Time to Relativist Space-Time: Aristotle, Leibniz and Einstein” in Sfendoni-Mentzou, Demetra (ed.); *Aristotle and Contemporary Science* 2 (New York: Lang, 2001)pp.39-50.
Substance is situated within a labyrinthine structure of monads, each one singular, each one particularly individual, each one with its own “place”. Nevertheless, this dynamic structure gives each monad has its own “situatedness” within the whole, and yet is in constant movement and change. Indeed, for Leibniz, the definition of a monad is per se the ability and indeed the necessity to act in free will. Whereas the monad is a metaphysically atomistic unity - immaterial, indestructible, and immutable; the phenomenal world is infinitely divisible and precisely mutable, flexible and generative. Consequently, we can never speak definitively of the determination of phenomena - only its “situatedness” with respect to, in continuous relation with, other monadic aggregates at a particular time and space.

Leibniz’s architectonic is a labyrinth, yet is a maze in which there is nothing outside of the interrelated web of relations between monadic aggregates. All things are connected, whether they want to be or not, whether they are aware of it or not. There is no “outside” from which to “observe” positions of objects, distant and detached, untouched and uninvolved. This original vision of Leibniz is radical in space and time, radical ethically, radical ontologically. The monads are firmly placed “in” space and time. The monad’s fulgurations express themselves into the phenomenal. The monad is connected to its world through by perceptual relation to it from its own point-of-view. For Leibniz, “world” is quite simply the collection of interconnected things in relation which each other, and this relation is that of perception and expression.

If, indeed, every monad is per definition capable of action and reaction, then by every act, the monad changes its world. It changes the world by its very actions, by its very existence. This dynamic has enormous ethical implications. If the world is all interconnected, then everything the monad does not only effects the world, it completely changes the world; the world is quite literally a different “place”.

Leibniz decidedly saw the world as a labyrinthine continuum - as a continuous whole joining the ideal and the real, the metaphysical pre-established harmony with the generative notion of the intussusception/fold/vinculum extending into infinity. The Leibnizian onto-topology
proved decisive in not only connecting an intelligible version of his physics, but also his ontology of the monad, intertwining the substantial and the phenomenal. Admittedly, thinking the enormity of this interconnectedness is arduous, and Leibniz returns time and time again to this problem throughout his lifetime. Repeatedly, he becomes “swamped by the whole stream of difficulties that stem from the composition of the continuum,...dignified by the famous name of the labyrinth”. Indeed, to step courageously into the labyrinth is to risk becoming hopelessly lost, or as Goethe has suggested in Dr. Faustus, quoted above in the epigraph, even to go mad. In the end, Leibniz would never fully escape.

858 Aiii78(548)/ LC 173.
Planes must be constructed and problems posed, just as concepts must be created...concepts are not eternal....

Deleuze and Guattari 859

But poetry that thinks is in truth the topology of Being: This topology tells Being the whereabouts of its actual presence.

Heidegger 860

I am not in space and time, nor do I conceive space and time; I belong to them, my body combines with them and includes them. The scope of this inclusion is the measure of that of my existence; but in any case it can never be all-embracing. The space and time which I inhabit are always in their different ways indeterminate horizons which contain other points of view. The synthesis of both time and space is a task that always has to be performed afresh.

Merleau-Ponty 861

In the beginning, this work asked the question: “Where is Being?” With a methodology in hand, onto-topology, three architectonic structures were examined: Plato’s chora, Aristotle’s continuum, and finally Leibniz’s labyrinth. The attempt to locate Being within an architectonic structure, inquired into the place of Being within the metaphysical and phenomenal continuum, making explicit some of the ontological structures that underpin the metaphysical project of Western metaphysics. Nevertheless, this inquiry was constituted solely

859 Deleuze, Gilles and Guattari, Felix; What is Philosophy? translation Tomlinson and Burchill (London: Verso, 1994)p.27.
by its “commencement and not its conclusion”. The structural analysis that was necessary in order to lay bare the tendency to construct an architectonic inherent in all metaphysics has been begun – begun, perhaps only to always begin again.

This inquiry, entitled The Architectonic of Philosophy, borrowed the term “architectonic” from Kant. In an inspired move, Kant attempted to set philosophy upon a firm foundation. In a critical turn, Kant asked the question of how knowledge itself was possible. His metaphysics was an inquiry into the foundation or conditions of possibility of knowledge as an object of experience. As such, Kant redefined philosophy from speculative metaphysics to an apriori epistemology. Yet there are problems. In spite of an impulse to knowledge based upon apriori reason, Kant’s architectonic edifice rests upon a foundation that itself can be undermined, weakened by structural components that are vulnerable to criticism, in this case, a variant of absolute space and time.

Nonetheless, the architectonic can be seen to be not only as an exclusive feature of Kant’s Critique of Pure Reason alone. This work acknowledges the possibility of a plurality of ontological structures within philosophy. In acknowledging the view of metaphysics as a construction; indeed, metaphysics as the very desire to construct, to delimit, to search for origins, to layout foundations - the plurality of ontological structures can be seen as a kind of historical field liberally populated with all kinds of compositions, some more successful than others.

The Three
In the three architectonics that were examined, several unassailable aspects of their constructions came to the fore. The structural strengths of Plato’s architectonic included most importantly the chora - space, the intermediate, the receptacle, the transformer. The chora as third term took a place in the onto-topology between Being and Becoming in order to mediate between the Ideal and the Sensible. Because both of these realms were so completely a-genetic, or unlike, the realm of the Same and of the Different, somehow a means was necessary
in order to bring generated beings into the sensible or phenomenal realm. Otherwise this realm of Being, of the Ideal, would remain just that — mere idea or form without matter, without the possibility of coming-to-be. As such, chora, space, was central as the in-between, in structurally anchoring the two extremes of Being and Becoming. Space was critical in Plato’s architectonic.

The structural strength of Aristotle’s architectonic was that all phenomena could be seen as a continuum. These continua included mathematics, place, time, magnitude, and infinity. The continuity of infinity, specifically, was non-symmetrical; that is to say, infinitely divisible in the minimal dimension in order to defeat Atomism, yet not infinitely expandable in the vast dimension in order to defeat the Anaxagoras problem of an infinite number of worlds. Furthermore, generation and corruption, coming-to-be and passing-away, were a continuum that was cyclical — a never-ending and never-failing regeneration from Not-Being into qualified Being. Place, also, was a continuum, being the outermost limit of the surrounding or environing limit of a body. And although in detail, there were problems in Aristotle’s account of the extremities of place, he attempted an architectonic that could constitute the world as a whole. Time, on the other hand, did not have the same ontological status for Aristotle. Time in Aristotle’s terms, was the number of motion with respect to earlier and later, the ever-shifting limit of the ever-present “now”, marking-off the delimitations of what is past and what is yet to come. Yet because time is cyclical, it was also paradoxically never beginning and never ending. As a continuum, time is eternal. Aristotle attempted a comprehensive architectonic that accounted for all substance as concrete particulars comprised of an axis of material continuity (matter-form), and an axis of substantial continuity (potential-actual) intersecting. In short, for Aristotle, his architectonic is a continuum.

The structural strength of Leibniz’s architectonic was that he tried both to reconcile that which went before him, and participate in the generation of a modern mechanistic philosophy, as well as a complete renaissance in mathematics. Obviously, this intellectual ambition was exceedingly difficult; Leibniz himself called it the
“second labyrinth of the continuum”, a complex maze that in over sixty years of thought, he would never fully emerge. Nevertheless, in the struggle, he comprised an architectonic that was breathtakingly rich with possibilities. Central in his onto-topology was his notion of the monad, the constitution of which was revised over the course of his philosophical development from a mere unit of simple substance, or “substantial form”, to a dominant monad as a central force unifying a composite substance in various degrees of perfection, from gross matter to the immaterial. Each monad possessed free will, was capable of action and re-action, yet at its substantial core never changed. Each monad expressed itself into extension. For Leibniz, the world was established through monadic perception, from the individual monadic point-of-view, rendering in effect each monad critical to the instituting of the phenomenal world.

Importantly, Leibniz’s architectonic was also a continuum of sorts, yet not an oppositional structure, rather a continuum of perfection with God as the most perfect Being on the one extreme, graduated to the various diverse monads whose degrees of perfection were determined by their own choices made in free will. Leibniz proposed in his Monadology a way of considering objects innately interconnected with each other. With his conception of a composite substance, individual things retain their autonomy, their free will, and yet are gathered together in aggregates in an interconnected relationship. For Leibniz, a “world” is simply an interrelated system of monadic perception. Yet, each monad is a unique individual. A multiplicity of possible aggregations of composites exists alongside an infinity of possible interconnections between monads.

And yet, for Leibniz, the phenomenal and the substantial were never radically separate as such, rather an intertwining, an intussusception, a fold. For Leibniz, the continuum is a question of both/and. Unity is always one entity; that is to say, one real substance. So although the substantial as a monadic atom was indestructible – created by God and subsequently only destroyed by him – the monad was always folded into the dynamically changing phenomenal world, a world of well-founded appearances. Indeed, Leibniz in contradistinction
to most of his contemporaries, located monadic substance as completely impregnated or folded into the world. Yet Leibniz was also an Idealist of sorts – phenomena were never “real”. Leibniz constituted a space and time that was not a “thing”, rather a relation, and in doing so he provided a kind of reconciliation between the eternal Parmenidean “Being is One”, and the Heraclitean dynamic flux. As such, space and time as relations held a critical place in Leibniz’s architectonic of the labyrinth.

**Fluvial Interpretations: The Problem of Point-of-View**

Notably, when Leibniz had argued in the 17th century that there was no absolute space or time by appealing to his Principle of Sufficient Reason and the Principle of the Identity of Indiscernibles, space only had meaning in relation to other bodies in relation to each other. Space and Time were not things; they were relative to our ways of relating to phenomena; that is related to each monadic point-of-view. Consequently, one could only distinguish differences in location, and not substance, since all dispositions were relational and per definition temporary. Nevertheless, as an order of relation, individuals were constantly free to define their world within the limits of their perfection. For Leibniz, space was neither absolute nor “a thing” because spatiality belonged to the world of phenomena, an order of relations.

Yet Leibniz felt compelled to retain the transcendent aspects of his notions of space and time. Although he argued that any Creator who needed to intervene in his creation, had not created a perfect world, God still functioned as a standard, a measuring stick from which all could be related in space and time. In the pre-established harmony, God remained the ultimate point from which all things existed. God was the “correspondence between phenomena”, the systematic means whereby all things were interconnected. Consequently, although absolute space and time did not exist for Leibniz as “real” things, we could in the phenomenal world act as if they did exist, even though the ultimate reality was non-corporeal, consisting of an infinite number of substantial entities called monads. All divisions of space and time were adopted as a matter of convenience. Yet at the basis of this rejection
of absolute space and time was still the transcendent presupposition of an ideal world, an ultimate reality, and a lower unreal world of phenomena and matter. We could with our bodies and intellects create a system of order and causation, nevertheless these systematic strategies were within the transcendent architectonic.

What might a non-hierarchical space devoid of transcendent structures actually look like? This questioning calls for no small amount of imagination and intuition. This space is in a constant state of becoming. The space flattens out—nothing is “higher” than any other thing even though dimension as situatedness exists. Indeed, from which viewpoint can we describe one point in space “higher” than another? The hierarchical structures of a metaphysical architectonic collapse when a God’s-eye-view can no longer impose order from “without”, from without the structure, from without an inertial framework. Without God on high or the intellectual mountaintop of man’s hubris, from where do we look? From which eye do we look out? God, functioning within the system, imposed certain regulation upon which to definitively order the world and guarantee its systematization. What other structures, without a necessary transcendent being, may we embrace instead?

Leibniz had described an active composite substance effecting and effected by a spatial environment. The world was literally a system of relations ordered by the perceiving monad, reflecting its universe. Consequently, the universe is created at every moment, collectively, in a series or repetition of a singular point-of-view. “Point-of-view” clearly becomes a pluralism, yet without lapse, void, or discontinuity. This monadic point-of-view is not a passive subject dominated by a universal or dominant vision. Furthermore, the monad is in dynamic interaction, engaging in a system of interconnectedness with other monads. Yet perfection is precisely defined by Leibniz as the degree

862 Remembering, of course Nietzsche: “Oh, those Greeks! They knew how to live...Those Greeks were superficial - out of profundity. And is not this precisely what we are coming back to, we daredevils of the spirit who have climbed the highest and most dangerous peak of present thought and looked around from up there - we who have looked down from there!” Nietzsche, Friedrich; “Nietzsche contra Wagner” in The Portable Nietzsche translation W. Kaufmann (New York: Viking Press, 1969)p.683.
to which the monad can oversee the entirety of the system, with God as the most perfect Being. Only God as the most perfect monad has the complete picture, the all-inclusive point-of-view in both space and time. In place of fixity come instead mobility, morphosis, modulation, and mutability. We can no longer speak of being in space and time, rather becoming in space and time.

**Constructing the Reticulum**

If one accepts the thesis that ontology can be seen as an architectonic, then the possibility opens up for the generation of new constructions. As a generated architectonic, the ontological structure of the *reticulum* could be productive. The concept of the reticulum is derived not only from Leibnizian metaphysics, but also from the Latin word, *rete* meaning net, or network. Although in contemporary terms this concept is derived from anatomy, meaning a network of nerves or blood vessels, or a system of intersecting fibers, or a genealogical schema, or computer electronic networks, the term can be productive as an onto-topological structure that addresses the critiques of Western metaphysics. As an interwoven relation of parts or elements in the structure, the reticulum provides a model of a unified whole.

In the reticulum, every monadic unit, as an autonomous yet interconnected being, expresses and is expressed; every monad transforms and is impacted by the transformation of other monads; every monad reaches out in desire (*l'appetit*) and freely attaches itself to other monads, changes internally, disperses, and then contributes to the formation of other subsequent aggregates of monadic substance. In contrast to the early Leibniz’s conception of the monad “having no windows”; another account of an active monad in a composite substance becomes a responsive model. Even though each monadic point-of-view can be thought of as self-generating, therefore spontaneous, there is still no complete theory to describe the point of interface with other monads, leading to instability in any notion of causal inter-dependence. For example, Edmund Husserl, inspired by Leibniz, made an attempt in his *Cartesian Meditations* to define the connection with respect to the possibility of separate pluralities.
of monads. For Husserl, only one objective world necessarily exists. Yet, even though there might be a unity of monadic communities, this is not to say that these interconnections necessarily agree. Just as all monads are separate and autonomous, all monadic communities (although belonging to a unity) are not purely “overlapped” upon one another. Husserl states,

This alone is possible: that different groups of monads and different worlds are related to one another as those that may belong to stellar worlds we cannot see are related to us - that is, with ...[those] who lack all actual connections with us. Their worlds, however, are surrounding worlds with open horizons that are de facto, only accidentally, undiscoverable to them.863

The precise nature of the connections between monads is one of the substantial bonds between metaphysical units. This problem is the same that Leibniz had in the end. As with the Leibnizian notions of intersubstantiality and inter-connectivity between monadic substances, the interface between monads in a linked reticulum or relationship is critical.

Without fixedness, without a guaranteed transcendence provided by God, we are faced with a chaotic universe in which all objects in extension are relative to one another, fluctuating, transforming, and eternally mutating. Remembering, of course, that all monads are motivated not only by self-generation, but also affected by interaction with other monads, how can we describe the relational dynamic?

As a model of relations, the architectonic of the reticulum offers a descriptive structural possibility. With the decentralization of space itself, the structure of the reticulum can no longer be seen as geocentric or even heliocentric, but non-centric. As a consequence, relationships between objects must also be described in appropriate way. The model of a poly-centric structure is insufficient because every center is tied into other centers only through a dominant center – in Leibniz’s terms this would entail the necessary inter-dependence of every monad, and

indeed the interception of God in order to create any intermonadic relationship. In order to call into question the interpretation of the monadology as pure transcendence, not only the hierarchical spatial structures of the transcendent “above and below”, but also a flattened out immanent structure, (even if it is an interdependent as opposed to dependent one) needs to be avoided. The reticulum, in converse, proposes a way to describe intersubstantiality as somewhere between independent and interdependent. Each “monadic-site” is its own center and generates its own relatedness with other “centers” as it were. Therefore, a complex set of relations link a site to its environment. Because every site links itself to other sites, each site is already at once interdependent in that every site is linked ultimately to some site. These “monadic-sites” foray into the environment and independently make connections. The relations between sites can then be said to be “independent” because they are self-generated. Each body participates in an operation of continual creation, interconnecting with others in aggregates or monadic communities, unfolding at various accelerations over time, and preserving traces of the past in the infinity of situations in space/time relatedness.

These aggregates or assemblages of monads in the reticulum are constituted from heterogeneous elements, free to aggregate, coming together at certain moments, joining in space, and moving on at differing accelerations. So instead of “building blocks”, monads come together to construct assemblages; that is also to say, constructions that are not permanent ones because at any point in space/time they can disband/dismantle and rejoin/re-aggregate in another configuration. Rather than constructing a metaphysical edifice in a linear temporal fashion, these aggregates of monadic substance form a dynamic serial chain in a multiplicity of becoming, in a multi-dimensional field of interaction.

In this way, complex and diverse elements can be grouped together so that they cooperate. Obviously, an enormous intensity of connections can be made in a hyper-dense environment. Yet organizing these connections need not be rigid. Two or more sites can be connected with a high degree of flexibility. Different levels cross
and overlap, providing cross-connectivity. In contrast, a hierarchical ordering system as is commonly employed, requires all parts to fit into the whole, wherein what does not conform to the whole must be expelled from the system.

The reticulum of monads, on the other hand, is able to organize complex and divergent parts into a whole by the provision of each being connected in some way to at least one other component of the system. In this manner, each individual component retains its singularity and individuality while contributing to a highly complex aggregated reticulum structure. Every node in the reticulum need not be connected with every other - just as long as it is connected somewhere. In addition, these connections need not be permanent; they are also determined in time, therefore can be fleeting and temporary. Each monad is free not only to connect in a manner meaningful to itself (thereby creating meaning spontaneously), but also to terminate and to re-initiate connections at will. Consequently, every assemblage evolves in time, constantly redefining their relation with others. Every monad is its own center, so that one can not even speak of de-centering or even poly-centricity in the ontological structure. The reticulum radically de-centers the architectonic.
Finally, and at the same time, the reticulum as a whole is interdependent because it relates this complexity of interactions in a spatio-temporal interface. The border conditions are not really “limits” in a hard and fast way. The boundary is defined by the self-generation of relations of the part of the site and a mutually responsive relation on the part of the environment. *In so far as each monadic site generates its own relatedness, it is said to “exist”*. The environment in which the site has its relatedness is not a closed system, rather the impossibility of its finitude.

Conclusively, with the architectonic of the reticulum, the possibility of a non-hierarchical and dynamic notion of the monadology has been brought forward into an onto-topology of beings that is a true unity without having to be necessarily transcendent. God does not occupy a place of a Being over and above, or beyond beings - rather, within an intersubstantial, inter-dependent connectivity of monadic sites in a system of reticulance. The place of *ontos* in the reticulum traces the possibility of a sufficient *apriori* that is not necessarily transcendent. Rather, God, or any other transcendent Being exists merely and necessarily connected into the intersubstantial complexity of related monads in a continuum of perfection, not “above” or “beyond” other beings. With the architectonic of the reticulum, the structure flattens out into a radical immanence.

Obviously, the concepts of reticulum – an interrelated structure of autonomous monadic substances each with its own point-of-view - can only be viewed as suggestive and provisional. Yet we stand in a space/time of intervention and creation with the way in which space and time can be said to be constituted and constructed. We cannot escape the architectonic. However, the structures themselves should not be subsumed, rather be made explicit. To engage in a mendacious search for eternal foundations and indestructible building blocks is to accept uncritically the metaphysical presuppositions associated with this constructive enterprise. The architectonic of the reticulum acknowledges the multiplicity of metaphysical constructions, the dynamic nature of becoming, the autonomy of the monadic subject
whilst at the same time providing a unified schema that makes comprehensible a system of interconnectivity.

The Necessary Components of the Reticulum
To summarize the features of the reticulum, the following schema of necessary components is proposed in order to construct a generative architectonic. The reticulum is the interconnection between all things in a continuum. Monadic substances are autonomous, free to determine the nature of its own being within the limits of its created boundaries, capable of dynamic motion, participating in the constant flux. Each monad chooses freely its own relations. The world is constituted in parts through monadic perception, yet is a whole system; whole because of the unity of the architectonic is a non-centric structure, transcendent in that it is a comprehensive systematic or architectonic, not a transcendentalism. Every monadic site is in a system of relation, intersubstantiality. The “world” is per definition precisely this interconnectedness, where each monad is said to exist if it is connected within the reticulum. The reticulum is an immanent field of relations, with nothing “higher” or “lower”, a kind of field of swarming dynamic changing gradation of perfection. This reticulum is a perfectly ethical system because each “act” immediately reflects and influences the “world” as connected system as a whole - constantly generating, never-ending. The reticulum is a fold or pleat in a three-dimensional field, intertwining space/time, and the intussusception of substance/phenomena. Material and substantial are merely extremes of ONE thing, one continuum. Being is One is Becoming, in a never-ending cycle of generation.

In the Beginning…to End
In the beginning we asked, given our study of onto-topology, if another architectonic structure was possible. Through a re-inscription of Leibnizian metaphysics, taking seriously both his dynamic relational concepts of space and the monadic point-of-view reflecting the universe, an ontological structure emerges very much like an immanent reticulum of beings. This onto-topology could be then folded into questions of
the late twentieth-century, yet still advocate a kind of continuum, an
over-arching systematic rationality in order to tie together disparate
elements. Although this architectonic of the reticulum has achieved de-
centralization, it has not escaped from hierarchies, merely incorporated
them with the relational structure.

To conclude, from Plato’s architectonic of the chora, the notion
of the triptych Being-Chora-Becoming, rehabilitates the status of the
three. Not only is the realm of pure ideas necessary for generation, but
also the chora as an intermediary, a receptacle, a transformer. Aristotle,
on the other hand, proposes an architectonic of the continuum. This
continuum can be seen as both a phenomenal continuum of infinity,
time, place, and magnitude; but also a substantial unity of particular
beings, encompassing the “common”. Leibniz, in his architectonic of the
labyrinth, attempts a reconciliation of preceding metaphysical projects.
In transversing the labyrinthine maze, his metaphysics accounts for
both the unchanging nature of being, as well as the dynamic nature of
phenomena. He preserves a notion of the singular, free will, substantial
monad conjoined in a pre-established harmonious world. In all things
he seeks harmony, and through his architectonic of the labyrinth he
attempts a true unity of the substantial and phenomenal by various
means.

In this chapter, a possible generative architectonic is mapped
out, a further addition to the field of metaphysical structures that
populate the historical field of Western philosophy. This architectonic
is not definitive, rather merely another onto-topological possibility.
Obviously, ontological structures are many and varied. Metaphysics
is seemingly a kind of construction, a mecanno set with the structural
members comprised of foundations, edifices, planes, building blocks,
beings, Being, etc.. Any architectonic is necessarily a construction.
Consequently, as a construction, may we propose then another?
Perhaps, then, an onto-topology might also be used not only as an
analytical tool, examining the relationships between elements linked
together in a system, but also generative of an architectonic in a
connected whole that might overcome objectionable features of other
metaphysical structures.
To Begin Again
The reticulum proposed here is another onto-topology: a system of convergence, connection, and confluence. The reticulum is an architectonic structure that is perhaps more immanent, more broadly based, and pluralist whilst at the same time being a singular continuity, a whole. Yet it too will be merely among the many architectonic structures in the metaphysical landscape. For, as Jacques Derrida states: “Everything depends upon how one sets it to work....little by little [he says, we] modify the terrain of our work and thereby produce new configurations...it is essential, systematic, and theoretical. And this in no way minimizes the necessity and relative importance of certain breaks, of [the] appearance and definition of new structures...” 864

So, to begin again, constructing a new architectonic, for this is the foundational occupation of philosophy.

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