

**Aesthetics and Geometry in Proclus, Spinoza, Leibniz,
Kant and Bergson**

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Abstract

The thesis proposes a series of ‘forgotten’ *aesthetic geometries* that are retrieved from metaphysical philosophy. Organised into five chapters, the discussion identifies geometric methods and figures in a series of selected texts from Neoplatonic, post-Cartesian and Kantian thinking.

Chapter 1 situates the argument in an examination of Kant’s Critical philosophy and identifies two kinds of aesthetic and geometric procedure that are constructed in the first and third *Critiques*. In the *Critique of Pure Reason* (1781/1787) Kant constructs geometry as both pure ‘cognition’ (i.e. as intuition) and sense-perception (i.e. space). In the *Critique of Judgment* (1790), however, geometry is a procedure that is generated by the imagination and the reflective subject as a form of aesthetic judgment. Geometric procedure becomes, therefore, an *aesthetic act of construction* that reflects the irreducible unity of the thinking subject and is reconfigured in relation to intuition, limit and unlimit, the soul, imagination and space and time.

This discussion provides the context through which the aesthetic geometric methods and figures in the writings of Proclus, Spinoza, Leibniz and Bergson are explored.

Chapter 2 reveals the synthetic figure of the ‘*fold*’ from Proclus’ (410-485AD) procedure of ‘*unfolding*’ a divine geometry from Euclid’s *Elements*. Chapter 3 proposes an aesthetic ‘*comportment*’ that generates a ‘*passage*’ through Spinoza’s geometric text, the *Ethics* (1677). Chapter 4 examines the analytic and aesthetic

geometric figure of the '*plenum*', which is constructed from an intensive *corporeal* and *incorporeal magnitude* in Leibniz's '*Monadology*' (1714). Chapter 5 proposes that Bergson's text, *Matter and Memory* (1896), reinstates intuition as a '*natural geometry*' or '*life*' in the figure of the '*envelope*'.

The thesis explores, therefore, a geometric tradition in which Kantian aesthetics looks both backwards and forwards, and each method and figure represents a different '*recollection*' of its potential.

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Abbreviations

The following abbreviations are used with reference to the main primary texts discussed in this thesis:

<i>APP</i>	I. Kant, (1798), <i>Anthropology from a Pragmatic Point of View</i> .
<i>CDS</i>	I. Kant, (1768), 'Concerning the ultimate ground of the differentiation of directions in space'.
<i>CE</i>	H. Bergson, (1907), <i>Creative Evolution</i> .
<i>CEE</i>	Proclus, (410-485AD), <i>A Commentary on the First Book of Euclid's Elements</i> .
<i>COJ</i>	I. Kant, (1790), <i>Critique of Judgment</i> .
<i>CPR</i>	I. Kant, (1781/1787), <i>Critique of Pure Reason</i> .
<i>E</i>	B. Spinoza, (1677), <i>Ethics</i> .
<i>IM</i>	H. Bergson, (1903), 'Introduction to Metaphysics'.
<i>M</i>	G. W. Leibniz, (1714), <i>Monadology</i> .
<i>MM</i>	H. Bergson, (1896), <i>Matter and Memory</i> .

Introduction

This thesis explores the construction of geometric methods and geometric figures in a series of philosophical writings in which geometry is expressed, not as scientific method, but as *aesthetic procedures*. It reveals these aesthetic procedures in the writings of Kant, Proclus, Spinoza, Leibniz and Bergson. By examining the extent to which these philosophical texts are imbued with an aesthetic geometric sensibility each text is shown to ‘enact’ a method and figure, which challenges the assumption that geometry constitutes only scientific forms (that is, finite, static and objective measurements of space), and demonstrates that each method and its figure constitutes an aesthetic procedure.¹

The thesis is organised into five chapters, each of which examines a particular philosophical text. Two research questions direct the argument; first, what is the geometric method that is present in each text and, second, what is the figure that is produced by this method? In addition, Kant’s concept of the aesthetic subject provides the pivot through which the aesthetic geometric methods are analysed. By situating the notion of the subject and geometric method in this context the construction of geometric method and figure is revealed in a manner that challenges the association between geometry and linear thinking; first, by disrupting the chronological order of the texts that are examined and; second, by proposing a different notion of ‘origin’ through which to construct geometric thinking.²

The first chapter examines Kant’s demonstration of geometry and aesthetics that are developed in his the *Critique of Pure Reason* (1781/1787) and the *Critique of*

Judgment (1790). It proposes that in the *Critique of Judgment* Kant constructs a relationship between the technical enactments – that is, the act of drawing geometric figures – and the aesthetic subject. Developing from this definition of geometry as an aesthetic ‘action’ or procedure, the discussion suggests that an ontology of aesthetic geometric methods and figures can be traced from Kant’s Critical writings both back to Proclus’ commentary on Euclid’s scientific geometric method and Spinoza and Leibniz’s post-Cartesian philosophies, and forwards to Bergson’s metaphysics of ‘duration’. The relationship between aesthetics and geometry is retrieved as an ontological concern in Neoplatonic philosophy, post-Cartesian philosophy and post-Kantian philosophy.

In chapters 2, 3, 4 and 5 an individual text is analysed in order to define in what ways the aesthetic geometric method is constructed and how it operates. In addition, each chapter analyses the geometric figure that is produced by each respective method and, by examining geometry in the context of a Kantian concept of aesthetic construction, geometric figures such as the fold, passage, plenum or envelope, are also shown to be *enactments of an aesthetic geometry*, rather than diagrammatic objects of scientific or mathematical geometry. A more detailed outline of the chapters demonstrates the structure of each particular method and its respective figure that is constructed.

The research methodology is initially structured in the context of Kant’s writings on geometry and aesthetics in the *Critique of Pure Reason* and the *Critique of Judgment*. In the ‘Transcendental Aesthetic’ of the *Critique of Pure Reason* Kant provides a definition of geometry in the form of two kinds of intuition. On the one

hand geometry is defined as a pure, transcendental intuition and, on the other hand, it is the formal appearance of the 'sense-intuitions' in the form of space (and time). Thus, although geometry is separated from the aesthetic nature of the sense intuitions, as well as space and time, it is nevertheless identified as being an intuition that constitutes a *potential* link between the sensible and transcendental realms that will be developed in the later *Critique*. Intuition, therefore, is explored here as an important aspect of the geometric method and, as will be shown in chapter 5, it provides a particularly vital connection between Kant and Bergson's engagement in geometry.

In the *Critique of Judgment* Kant develops his notion of geometric intuition and the aesthetic powers of the reflective subject, in particular, in relation to the powers of the imagination. In the 'First Introduction', for example, we find that the relationship between geometry and aesthetics is generated through the geometric act of drawing out figures. In this respect, Kant suggests that the imagination encompasses the active and aesthetic aspect of geometric method in its ability to represent an equivalent to the technical tools of constructing geometric figures (e.g. the compass and ruler). Kant's aesthetic subject provides a site through which geometry and aesthetics are re-engaged because the geometric method is embodied into the reflective subject's aesthetic powers of construction; geometry is constitutive of the internal powers of the reflective subject. An alternative model of geometric method is found, therefore, in the shift from the first to the third *Critique* in which the external and objective geometric element becomes developed into an internal, subjective and aesthetic figure.

In addition, this chapter begins the re-engagement of Kant's aesthetic geometry into a broader context of philosophy by exploring the geometric method that Plato provides in his dialogue, the *Meno* (380BC). In this text, Socrates and the slave-boy embody two aspects of the aesthetic geometry, that is, recollection and intuition. On the one hand, the boy represents the pure intuition of memory and, on the other hand, Socrates' enactment of drawing out the geometric figures, which the chapter suggests, previews Kant's 'technical' form of memory in the aesthetic power of the subject's imagination in the *Critique of Judgment*.

Chapter 1, therefore, begins the discussion by drawing out a thread of aesthetic geometry that can be traced between Plato's dialogue and Kant's *Critiques*, retrieving an alternative definition of geometry that exists prior to Euclid's paradigmatic mathematical geometric method of the *Elements*. It establishes the conditions of the aesthetic geometry as a constructive and technical enactment of memory (intuition) in which the geometric figure is both the embodied subject and the drawn line of the geometric figure, representing an important shift from the external and objective method into the embodied subject.

Chapter 2 considers the context of Classical geometry in more detail in its analysis of Proclus' *Commentary on the First Book of Euclid's Elements* (410–485AD), suggesting that Proclus' examination of Euclid's scientific method is *itself* a version of this forgotten geometric method. Proclus' text reveals the Neoplatonic and Pythagorean definitions of geometry in the form of the '*unfolding*' geometric method. In particular, it will be shown that the procedure of unfolding and its figures – the fold/unfold – provide a 'genetic' description of the discursive nature

of geometry. In addition, the method expresses the Stoics' divine notions of limit and unlimit that promote a continuous series of geometric figures. This discussion also explores the nature of the synthetic geometric method, which permits the production of discrete, differentiated figures. Limit is, therefore, derived from a synthetic ontology that, as will be shown below, will counter the analytic geometric method that chapter 4 suggests Leibniz develops in the *Monadology* (1714). For Proclus, however, the geometric method represents a divine and discursive demonstration through which the imagination and the soul are brought into harmony with the understanding. Discursivity, therefore, reconfigures the geometrical enactment of Plato's *Meno* and upholds the irreducible nature of the divine notions of limit and unlimit.

In chapter 2 the geometric method is shown to be discursive, but is an exclusively cognitive act, disembodied from the subject. In chapter 3, however, we find that the notions of limit and unlimit are reconnected with the body and its affects in Spinoza's axiomatic text, the *Ethics* (1677). This text is structured following the scientific definitions of the geometric method and is informed by Descartes' development of an analytic procedure, but examines human emotions. Spinoza does not produce a geometric figure as such, since his purpose is to reveal the acts of the geometric method as an *ethical* process, rather than as a 'technical' procedure. It is suggested, therefore, that an analysis of the text itself reveals the geometric figure, that is, the '*passage*' from understanding the subject to a 'perfect' understanding of God. This figure of the passage arises from examining the way in which the text demonstrates the changes of state in the body and its passions, which act out the

relationship between the divine infinity of God and the body's irreducible limits. In chapter 3, then, Proclus' idealised and divine notions of geometric figures become reconfigured into a series of embodied modes of subjectivity, in particular, through the powers of the emotions. In addition, Spinoza's geometric method is shown to be a synthetic and divine method that is also embodied within the powers of the subject.

Chapter 4 provides a distinct version of this hidden geometry in an analytical form in Leibniz's *Monadology* (1714). This text provides perhaps the most intensive version of the notion of limit in this discussion because limit is not only an external geometric magnitude, but is internally and qualitatively differentiated in the Monad. Thus, the geometric figure represents not just an embodied state, but one in which the notion of limit has been rationally, or intelligibly explained as an internal operation (in contrast to Spinoza's concern with the external expressions or affects). In addition, Leibniz's method and figures are generated from an intensification of an analytic understanding of the subject that, in contrast to Kant's, Proclus' and Spinoza's thinking, is powerful precisely because of its emphasis on limit as an aspect of unlimit. Geometric limit and unlimit are redefined, therefore, in terms of infinite divisibility, in particular, through the notion of '*incorporeal magnitude*'. Such an approach means that a number of geometric figures are generated, including the '*plenum*', a geometrical figure that embodies both the internal differentiation of the Monad and its continuity with the infinite divisibility of the world.

This leads, finally, to chapter 5 in which Bergson's text *Matter and Memory* (1896) is shown to reject the notion of limit and the imagination in the reformulation of a distinct set of metaphysical relations that reflect the psychical and physical

conditions of the active subject. Geometry becomes re-invigorated with its sense-perceptions in the form of memory and intuition. In contrast to the *Critique of Pure Reason*, however, Bergson insists that intuition is formatively concerned with the thinking, living subject. Bergson considers the figure of the ‘*envelope*’ to be the site through which the body acts out the intuitive spatial actions of geometry. In this final chapter, therefore, the initial image of Socrates’ drawing and the boy recollecting the geometric figure is redrawn by Bergson into a topological relationship between the internal psychical activities of the subject and its perception of the external world.

The conclusion reminds the reader of the research questions of this thesis and provides a summary of the different versions of the aesthetic geometric method, drawing out key distinctions between each text. Briefly, it also points towards further research that might be developed in relation to these methods and figures; in particular, a revision of feminist and architectural models of spatio-temporal relations and the notion of ‘figuration’ in modernist art practices (see the note below).

Contextual note

This research project began from a concern with the definitions of geometry in recent Anglo-American Modernist art history, and was an attempt to reflect my previous education and research in art history and philosophy.

In the context of Modernist art history, geometry has been considered to be a problematic system of representation that is understood as being either representative of the a priori idea or the a posteriori object or process; for example, in the debates about Formalist painting and Minimalism between Michael Fried and Rosalind

Krauss. The research began, therefore, by evaluating examples of this problem in the context of Kant's notion of 'aesthetic' and found that Fried and Krauss relied upon notions of aesthetic in which geometry was either, exclusively, a notion of pure intuition (e.g. Michael Fried, 'Shape as Form' in Art and Objecthood: Essays and Reviews, 1998), or a sense-intuition (e.g. Rosalind Krauss, Passages in Modern Sculpture, 1993). In each case, geometry is consigned to a position of a limited aesthetic value.

Having attempted to define the problems of geometry in art historical discourse, the research turned to examine models of geometric method as they are found in philosophical discourse in order to re-assess the nature of geometry as an aesthetic concern. In addition, the second element of the research was an attempt to reconsider the notion of geometry and its figures in the practices of Modernist art works. These included; a conceptual art-work, Duchamp's readymade, Bicycle Wheel (1913); a formalist painting, Frank Stella's Moultonboro III (1966); and a time-based installation, Tall Ships (1992), by Gary Hill. Early chapters of the research attempted to bring a philosophical geometric method into dialogue with one of the above art works; for example, it suggested that Duchamp's practice was pseudo-axiomatic and represented a kind of 'unfolding' in relation to Proclus' figure of the fold. It became increasingly clear during this period, however, that the attempt to bring together the philosophical method and the art practice failed to produce a satisfactory analysis of the art work; rather than the art works being 'adequate' figures of the geometric method they became hand-maidens to the philosophical ideas. It also became apparent, that the scope for geometric figures to be revealed in

Modernist art works was a project that should take place after a clear understanding of how the notion of the geometric figure operates in a philosophical context.

As a result, the research became concerned with the discussions outlined in the introduction; first, by considering the extent to which the aesthetic nature of the philosophical geometric methods generated a series of unique and under-researched figures that, in themselves, provided a stronger demonstration of the scope of aesthetic geometric methods than attempting to use art works as demonstrations of the methods and; second, by examining the extent to which Kant's 'aesthetic' could reconfigure discussions about geometry in Neoplatonic, post-Cartesian and post-Kantian philosophy.

*The reader should note that this thesis also reflects some of the discussions about geometry and aesthetics that Gilles Deleuze's writing has revealed in the history of western philosophy; for example, his interest in Proclus' and Leibniz's fold in *The Fold, Leibniz and the Baroque* (2001 [1988]) and his writing about Spinoza's affirmation of substance in *Spinoza: Practical Philosophy* (1988 [1970]). In addition, the texts *Expressionism in Philosophy: Spinoza* (1997 [1968]), *Difference and Repetition* (1997 [1968]) and *Bergsonism* (1991 [1966]) also demonstrate 'geometric' thinking. Following Deleuze's rigorous engagement in these discussions this thesis is, therefore, informed by his interest in retrieving 'forgotten' ontologies from western philosophy.³*

Chapter 1: Drawing figures

In this chapter geometry and aesthetics are defined through Kant's Critical philosophy. It will be shown that Kant's first and third *Critiques* propose two different kinds of geometry and aesthetic. In the 'Transcendental Aesthetic' of the *Critique of Pure Reason* (1781/1787), geometry is considered to be an ideal knowledge or cognition that is commensurate with the higher realms of a transcendental intuition or aesthetic. Kant tells us that we are able to have access to this cognition in the sense world, but only by means of the sense-intuitions, space and time, which represent the phenomenal forms of the transcendental intuition. In the *Critique of Pure Reason*, therefore, pure geometry is inaccessible to our embodied experiences of space and time; its origins in the metaphysical realms of the immaterial and unextended thought cause it to be at odds with the extended, material and 'inadequate' phenomena of space and time in the world.

In the *Critique of Judgment* (1790), however, a different notion of geometry and aesthetic is generated in which this divide disappears and a continuity of relations is suggested between the external, transcendental and 'pure' geometric space and the embodied, reflective subject that brings geometry into a heterogeneous continuum of spatio-temporal relations. Here, transcendental geometry is transformed into the mental, sensory and bodily actions of the subject in the form of *aesthetic judgment* and the actions of the imagination. Transcendental and empirical forms of geometry, therefore, become connected in the aesthetic acts of the reflective subject.

The chapter begins by examining the construction of geometry, space and time in Kant's first and third *Critiques*. In the *Critique of Pure Reason*, Kant's examination of these relations is an aspect of his analysis of intuition in the form of 'synthetic *a priori* judgments'. In the *Critique of Judgment* geometry, space and time are brought together under the powers of 'reflective judgment'. A 'forgotten' geometric method and figure is therefore reanimated in this discussion. The acting, aesthetic subject of the third *Critique* represents an important 'recollection' of the scope of the geometric method in metaphysical philosophy so that, in the following chapters, the discussion considers Kant's geometric constructions in relation to the geometries of other 'aesthetic' geometries; Proclus' Neoplatonic philosophy, the post-Cartesian philosophies of Spinoza and Leibniz, and Bergson's ontology of duration.

Bridging the shift from the external, spatial geometry of the *Critique of Pure Reason* and the internal, aesthetic geometry of the *Critique of Judgment* the argument also draws from Kant's earlier essay 'Concerning the ultimate ground of the differentiation of directions in space' (1768). In addition, the notion of a productive imagination is shown to be important in Kant's later studies of the human subject in *The Anthropology from a Pragmatic Point of View* (1798), adding weight to the suggestion that Kant's reflective subject is an example of the 'forgotten' aesthetic geometry.

The second part of the chapter then draws out Kant's aesthetic geometric figure in relation to Plato's discussion about geometry, memory and intuition in the *Meno* (380BC), demonstrating that Kant's reflective subject can be linked back to

Plato's discussions about the geometric method, recollection and drawing. The *Meno*, therefore, is seen to present an aesthetic geometry in two accompanying forms; first, as 'recollection' or memory, and second, in the aesthetic act of drawing. Plato attributes these forms to two human figures, the slave-boy and Socrates; on the one hand, the slave-boy embodies an intuitive understanding of geometry that unfolds, and on the other hand, Socrates who draws geometric figures in the sand. Geometry is constructed both as a mental activity and in the actions of the body; it is both extended and unextended, logical and aesthetic, ideal and particular. The subject's capacity for constructing heterogeneous and aesthetic geometric figures is therefore posited in preparation towards an examination of specific geometric figures in the following chapters. As a result, this chapter will also consider some of the principle constituents of the geometric method that construct the analysis in the following chapters; intuition, spatio-temporal relations, unextended and extended matter, the imagination and the soul, and the Stoics' notions of limit and unlimit.

So, in the *Critique of Pure Reason* Kant posits a relationship between the science of geometry and space in the form of intuition, or *a priori* judgments. Geometry represents an *intermediary* knowledge, i.e. it is pure, unextended intuition in a mathematical form. Intuition, however, is also present in the 'sense-intuitions' of space and time. Kant tells us that space is the form of our experience as an 'outer sense' and time is 'inner sense'. Intuition is, therefore, both a pure, absolute knowledge, such as geometry, *and* a form of our sensibility, that is, space and time. As intuitions, geometry, space and time are therefore *a priori* and necessary *and*

irreducible to simple concepts or ideas. Space and time, however, are limited to the status of ‘phenomena’, because they are merely *forms of appearances*, rather than ‘pure intuition’ itself. They are generated out of the extended world of bodies and ideas. Geometry, on the other hand, may be extended bodies or ideas, but it is also immaterial and unextended (i.e. pure). Space and time, therefore, always represent formal and extended manifestations of Kant’s notion of intuition and, as a result, they are prevented from having a continuous relationship with the higher realms of unextended intuition and pure geometry.

As we will see below, it is only when these sense-intuitions become properly embodied in the reflective subject in the *Critique of Judgment* that this link is remade, i.e. spatio-temporal relations become *a priori* and ‘real’ intuitions. The ‘limit’ between the transcendental ideas and the sensed forms are brought together to form a different unity in the *Critique of Judgment*. Here, the relationship between the abstract science – i.e. geometry – and the sense intuitions are unified in the reflective subject, in particular, as a result of the productive powers of the imagination.¹

In the *Critique of Judgment*, therefore, a more productive development of intuition is generated in the form of the reflective subject in which experience is examined, not as a form of reason, but as aesthetic judgment. Geometry and sensibility become linked through a different concept of limit; in particular, in the form of the imagination, in which different geometric figures are generated from within the subject, not determined by an external law of formal classification. It is, for example, a notion of limit that is felt in the movement between the pleasure and displeasure of experiencing the limit of the imagination’s attempt to understand the

sublime. Thus, the transcendental aesthetic, i.e. the critique of non-conceptual forms of understanding, is reconfigured into the aesthetic experiences of the reflective subject. The two, divided forms of intuition that are posited in the first *Critique* are brought together into an active and speculative aesthetic power in the third *Critique*, in part, through the faculty of the imagination.

Kant's promotion of the synthetic, *a priori* difference carries with it, however, a number of consequences that are significant aspects of the geometric method, especially, the relationship between notions of limit and unlimit. For Kant, the emphasis on the 'formal' limits of space and time is a problematic example of these relations. In addition, although the imagination is a productive power, it nevertheless remains tied to the notions of limit as a form of mathematical division and its converse, that is, unlimit as an excessive operation; rather than the promotion of the imagination as a form of the sensibility in a 'genetic' understanding, through which the imagination provides an immanent connection between the subject and the natural world. In the subsequent chapters, however, it will be demonstrated how notions of intuition and geometry construct aesthetic geometries in which there is a continuity of intermediary states (or figures) between pure intuition and absolute geometry and their embodied manifestations; for example, Leibniz and Bergson's notions of perception. First, however, it is necessary to examine the transition in Kant's construction of aesthetic intuition, from the first *Critique* to its manifestation in the reflective subject, in more detail.

Forms of pure intuition

In the *CPR*, Kant brings together scientific cognition (geometry) and forms of the sensibility (space and time) under the same doctrine, that is, in the notion of 'aesthetic'.² In a note to the 'First Part of the Aesthetic' (second edition, 1787), Kant defines the term 'aesthetic' based upon Baumgarten's definition that aesthetics is the 'critique of taste'. But, he notes, that Baumgarten's efforts to bring the beautiful under the premise of 'reason' remain limited because its concepts can only be generated from *a posteriori* evidence. Instead, Kant argues that 'speculative philosophy' requires that sensibility is not merely determined by *a posteriori* empirical evidence but is examined as a transcendental condition. He writes; 'or else share the term with speculative philosophy and take aesthetics partly in a transcendental meaning, partly in a psychological meaning' (*CPR*: A21/B35, 173).

As a result, the sensibilities of space and time constitute extended and empirical experience but are also considered to be *a priori* propositions. In the *CPR* sensibility is therefore examined under its conditions of its extended, *a priori* forms, the intuitions of space and time: later, in the *CoJ* Kant will examine its forms of feeling pleasure and displeasure, again, not as *a posteriori* conditions but as *a priori* conditions.

The Transcendental Aesthetic of the *CPR* defines the elements of a 'speculative philosophy' that are generated in cognition. Geometry, space and time are linked by their relationship to intuition. Each 'element' is evidence, therefore, of synthetic *a priori* judgments. Kant demonstrates the relationship between the metaphysical conditions of experience and the scientific forms of these intuitions and

suggests, in particular, that mathematics is a paradigm of 'pure' reason that is *a priori*, yet confirmed by empirical experience:

Mathematics gives us a splendid example how far we can go with *a priori* cognition independently of experience. Now it is occupied, to be sure, with objects and cognitions only so far as these can be exhibited in intuition. This circumstance, however, is easily overlooked, since the intuition in question can itself be given *a priori*, and thus can hardly be distinguished from a mere pure concept (*CPR*: A5/B9, 129).

But, in a section titled, 'Transcendental Exposition of the Concept of Space', in the second edition, Kant emphasises that it is intuition through which the relationship between geometry and space is primarily constituted, not mathematics; '[g]eometry is a science that determines the properties of space synthetically and yet *a priori*. What, then, must the representation of space be for such a cognition of it to be possible?' Kant tells us it must 'originally be intuition' (*CPR*: B41, 176).

Synthetic and analytic relations

Kant's examination of the forms of experience begins with the proposition that knowledge is possible in two forms; theoretical or empirical cognition (*CPR*: B2, 132). These two forms of knowledge demarcate the division between the pure, analytic *a priori* knowledge that is determined by pure reason (i.e. unextended

matter), and the empirical, synthetic *a posteriori* knowledge that is determined by sensory experience (i.e. extended matter).

These two levels of knowledge, however, are mediated by a third kind of judgment that is *a priori* but is *also* determined by knowledge ‘borrowed’ from experience. This third, intermediate category of knowledge is the *synthetic a priori*, found in forms of reason in which universal truths are proven by *both* unextended and extended concepts, such as geometry and arithmetic; for example, Kant tells us that the necessary and universal elements of a triangle – i.e. its three angles combine to form 180° – can be determined both by a geometric method (unextended ideas) and by experience (extended diagrams or figures) (*CPR*: B9, 140).

Geometry, therefore, is a heterogeneous form of knowledge, insofar as it is constituted by both unextended and extended matter, delivering its objects in both an *a priori* and *a posteriori* form. Kant explains the nature of this formation in the sciences (such as, geometry, philosophy or the ‘critique of pure reason’), in which judgments are generated through a particular ‘method’ of construction that attaches ‘given concepts’ to others ‘completely foreign to them’. These attachments, he continues, are called analytic or synthetic judgments and express *two distinct kinds of relations* or unities between the subject and predicate (*CPR*: A7/ B11, 130). As we will see in the following chapters, the nature of analytic and synthetic relations is a key discussion in each of the methods. In the *CPR*, however, Kant defines the judgments as follows; an analytic judgment defines *an agreement* between the two parts, e.g. B belongs to A, which describes what is *already contained* in the constituent parts. Analytic judgment is, therefore, *determined by identity* or similarity

because B does not introduce any contradiction into the relationship, but is legitimised by virtue of its agreement with A.³ The principle of contradiction, therefore, determines Kant's definition. In contrast, we will find Leibniz construct a quite different notion of 'analytic' judgment in chapter 4, in which the principle of contradiction is transformed into a relation of infinity constituted by intensities or magnitudes that are differentiated internally. For Leibniz, analytic judgment, therefore, is not reducible to a self-same notion of identity in the manner that Kant attributes to it.

For Kant, however, heterogeneity is generated in the externally designated difference of synthetic judgments. A synthetic judgment, Kant writes, is 'ampliative' in which independent concepts are linked through a 'synthetic combination of intuitions'. Synthetic judgments record a non-contradictory relationship in which the principle of agreement is not the primary means of legitimating the relationship, i.e. if A is not self-similar to B, the judgment does not become invalid. Instead, the relationship is a manifestation of the operation that brings the subject and predicate together. Hence, synthetic *a priori* judgments propose a relationship between A and B, not through an additional empirical experience, but in the form of an external or 'pure' mode of knowledge. (In chapters 2, 3 and 5 we will see that Proclus, Spinoza and Bergson also advocate synthetic judgments).

So, Kant tells us that judgments of experience are synthetic, since experience is itself a 'synthetic combination of intuitions'; for example, an extended body is understood to be synthetic if the external predicate of weight is taken into account (*CPR*: A9/B13, 142). Mathematics is also synthetic *a priori* because each of its forms

(geometry and arithmetic) requires an *external* intuition in order to function. In arithmetic; for example, the introduction of an additional operation (e.g. addition, subtraction or the multiplication of numbers) is required in order to produce the relation between elements; and in geometry, two points are related to each other as a result of considering their relationship by means of the direction or length of the line between them. In each case, therefore, an external function or relationship is introduced (*CPR*: B16, 144).

Thus space and time are synthetic *a priori* judgments because each is necessarily determined by an *external intuition*, that is, geometry or arithmetic, respectively. In addition, when these judgments take the form of geometry they represent a distinct class of knowledge that is ‘intermediary’ to the unextended, pure *a priori* analytic judgments and the extended, *a priori and* synthetic judgments. Kant, therefore, constitutes a notion of formal difference and unity (e.g. the geometric figure) that is produced by external operations. As a result, although constructive towards a certain kind of difference, this emphasis on the external and formal attribution of difference produces a number of problems to thinking about time and space that are challenged by the other methods in this thesis, and which Kant himself transforms into *internal* operations (or powers) in the third *Critique*.

Space and time

Kant describes space as an ‘outer sense’ that is ‘a property of our mind’, through which we describe our relationship to the external world. Space determines the magnitude of forms of appearance and the relationship between entities. Time

represents the internal determination of our experiences, that is our experience of our 'inner sense', i.e. our 'soul' (CPR: A23/B38, 157). Space and time, then, are cognitions that are derived from our experience, distinct from concepts, yet producing valid phenomenal understandings of our sensory experience of the external world and our internal experiences. Nor are they reducible to *a posteriori* or empirical concepts, instead they provide the 'ground' through which different places or events can be understood simultaneously or successively.

Kant tells us that space is a metaphysical necessity; 'the condition of the possibility of appearances, not as a determination dependent upon them, and is an *a priori* representation that necessarily grounds outer appearances' (CPR: A24/B39, 158). As a result, its necessity provides the possibility for mathematics, in particular, geometry, for if it were *a posteriori*, 'the first principles of mathematical determination would be nothing but perceptions' (CPR: A24/B39, 158). Spatial intuition, therefore, confirms the purity of geometric intuition, highlighting, perhaps, one of the major problems of Kant's theory of experience, which is an over-arching harmony that is required between the scientific and the metaphysical orders; a harmony which we will find Bergson criticising for its deeply-seated symbolic value, rather than registering a relationship of continuity, change or transformation.

Space, then, is not an idea or category; it is not a 'general concept of relations of things in general, but a pure intuition' (CPR: A25/B39, 158). Space is legitimate insofar as it determines the subject's relationship to other extended entities, but it does not account for the internal sense 'from the human standpoint' or the 'subjective condition':

Space is nothing other than merely the form of all appearances of outer sense, i.e. the subjective condition of sensibility, under which alone outer sense is possible to us (*CPR*: A26/B42, 159).

Thus, Kant writes that space is the form of our sensibility, which produces ‘correlates’ of ‘things in themselves’ in the form of the appearances of external objects, but the sensibility remains unable to ‘cognize the transcendental in experience’ (*CPR*: A42/B60, 168).

Like space, time is a sense-intuition of our sensibility. It is ‘the form of inner sense, i.e. of the intuition of our self and our inner state’ (*CPR*: A33/B50, 163). But it is also ‘the *a priori* formal condition of all appearances in general’, in contrast to space that is ‘the pure form of all outer intuitions’ (*CPR*: A34/B51, 163). Despite time being a pure intuition and, therefore, defined as synthetic *a priori*, Kant distinguishes between it and space. It is a ‘general’ condition for the internal sense, but it is *also* the basis for ‘all actuality of appearances possible’ suggesting a relationship to external sense (*CPR*: A31/B47, 162). It is only time, therefore, which has a relationship to both internal and external sense-intuition and, as we shall see in the following chapters on the fold, passage, plenum and envelope, the scope for this connection between the internal and external forms of sense-intuition is a primary concern in this thesis.

Kant’s insistence upon the formal limits of space and time, however, prevents the (genetic or discursive) continuity of this relationship from being acknowledged,

for example, in the 'Elucidation on Time', the formal definition of limit in differentiating space and time can be seen in the following passage:

Time and space are accordingly two sources of cognition, from which different synthetic cognitions can be drawn *a priori*, of which especially pure mathematics in regard to the conditions of space and its relations provides a splendid example. Both taken together are, namely *the pure forms* of all sensible intuitions, and thereby make possible synthetic *a priori* propositions. But these *a priori* sources of cognition *determine their own boundaries by that very fact [...] namely that they apply to objects only so far as they are considered as appearances, but do not present things in themselves (CPR: A39/B56, 166) [my emphasis].*

Kant's notion of different sense-intuitions promotes a qualitative distinction between space and time, and synthetic *a priori* judgments; however, this is at the expense of the continuity of their relationship between internal and external sense, which is determined by the application of external and finite limits of form so that, under these over-arching terms, geometric space is an extended 'image', cut off from the pure intuition of unextended matter. A 'discursivity' between 'pure' geometry, and geometric space and time is abruptly cut off. In contrast, we will find that Bergson's notion of the 'image' is a highly discursive idea, in both its extended and unextended forms. Kant's notion of formal limit, however, which is generated out of

the synthetic *a priori* underwrites a highly problematic notion of limit that is determined by the division between the sensibility and reason.

So, space and time represent modes of knowledge as intuitions, that is, *a priori*, necessary and universal forms of cognition through which we understand the world around us. They are products of the sensibility through which we are affected by objects external to us; the means by which we experience the world. Produced by the sensibility, intuitions are brought into harmony by the categories of understanding and in this order they become understood as concepts, under the category of form. Thus, insofar as space and time are forms of appearance, the sensory world is linked to absolute intuition. But, Kant insists that space and time are only appearances, or forms of our experience, not pure intuition in itself, registering that the relationship between geometric intuition and spatio-temporal intuition is determined by an exclusively formal and external limit that divides the powers of presentation of the sense-intuitions and the powers of a transcendental geometry.

In the section below, however, we will see that that Kant considered a more discursive relationship between geometry, space and time in an earlier text, in which geometric spatio-temporal relations are constituted in the subject as a series of heterogeneous embodiments.

External and internal differentiations of space

In the earlier essay 'Concerning the ultimate ground of the differentiation of directions in space' (1768), Kant challenges Leibniz's proposition that it is

magnitude, not position, that provides the means by which space is differentiated into different parts.⁴ Kant contests that magnitude is the ‘ground’ for determining relations in space suggesting, instead, that it is ‘direction’ that provides the ‘ground’ for the differentiation of space. Direction, Kant tells us, ‘orientates’ the parts of space and ‘refers to the space outside the thing’ (CDS: 2, 378/365).⁵ Kant wishes to show that ‘absolute space’ has ‘*a reality of its own*’, and he proceeds to prove this by emphasising its three-dimensionality that is derived from our sensible understanding of other bodies in relation *to our own corporeality* (CDS: 2, 379/367).

Internal and external space, therefore, are generated as aspects of direction which is understood both externally *and* internally; the notion of position, in contrast, does not sustain the proof of a continuous and unified reality. When direction is considered within the context of an embodied condition, however, a real set of differences can be identified; for example, our sense of direction has a relationship with the spatial construction of our bodies as left or right orientated (which will be posited by Bergson as an aspect of ‘life’ in his method in chapter 5). Kant identifies various examples of different directions of growth in nature – human hair, snail shells, bean’s growth, the direction of winds according to the lunar cycle and observations of the movements of the south seas – which point to an internal concept of direction in an individual entity *and* direction as a universal, external principle of nature (CDS: 2, 380/368). A continuity between internal and external space in the natural world is, therefore, suggested.

Furthermore, this is a condition linked to the perceptions and the aesthetic sensibility of the subject, in which ‘an immediate connection between feeling and the

mechanical organisation of the human body' are brought together. As a result, 'clear feelings' of difference between the sensory and mechanical attributes of the left and right sides of the body distinguish the particularity of the body despite the apparent 'great external similarity' (CDS: 2, 381/369). In this essay, spatial direction is, therefore, an aesthetic aspect of our sense-intuition.

Kant also tells us that differences discerned between entities or objects need to be understood in relation to 'universal absolute space, as it is conceived by geometers'. In order to make this step, Kant reintroduces the concept of planes, lines and surfaces through which corporeal bodies can be understood to be similar or different. Thus, through this mode, apparently incongruent aspects of bodies or unrelated bodies can be made to appear similar depending upon their relationship on a single plane; for example, despite the impossibility of the surface of one being transferable onto the other, the left and right hand can be viewed as 'similar and equal and yet incongruent' (CDS: 2, 382/370).

In this discussion, therefore, geometric intuition connects a series of synthetic and intermediate states of nature or different extended bodies to suggest a more discursive or genetic relationship between entities. In addition, direction produces both the internal spatial specificity of an embodied entity and its relation with the general order. Space, then, can be both similar and incongruent, derived from both an extended body or from the unextended principles of absolute space. 'Inner differences' are founded upon the difference of position between one aspect of an entity to another, e.g. the different positions of the right and left hands, yet are also related to absolute space. In absolute space they are 'true differences' determined by

the specific constitution of the body. Absolute space, therefore, is not constructed externally of our sensory perception, but is a 'fundamental concept', which grounds any outer concept perception which we might have (CDS: 2, 383/371). Thus, space is both extended as part of the corporeal body, and unextended in the form of absolute space.

In this essay, therefore, space is less clearly drawn as an exclusively external, synthetic *a priori* cognition; rather, its determination as a continuity of relations between the internal incongruence and the external congruence of a body suggests a notion of space that is constituted by distinct 'figures' in a discursive order. This indication of a discursive continuum of spatio-temporal relations is important here, since it will be identified as a significant aspect of the geometric methods of Proclus, Spinoza, Leibniz and Bergson.

So, Kant's examination of direction proposes a notion of spatial 'intuition' in which the subject produces space both in absolute and particular terms; a connection that in the *CPR* is removed. But, as is shown below, it is found in the aesthetic subject of the *Critique of Judgment* when space is understood in relation to the thinking body, i.e., when it is confirmed as an internally produced intuition, it is not reducible to an externally derived form. Instead, Kant emphasises the irreducible difference of the subject in terms of both external and internal space, once again offering the scope for a more discursive set of relations. As has been shown above, however, Kant does not sustain this line of inquiry in the *CPR* since the body is reducible to its *a priori* condition as formal appearance or extension. In this earlier

essay that precedes the *CPR*, however, space is not, exclusively, an externally produced and formal appearance of pure intuition.⁶

Acts of construction

If we turn to the conceptualisation of geometry and spatio-temporal relations in the *Critique of Judgment* we find that this embodied spatial intuition is reformulated to be an aspect of the reflective subject. In particular, in the role of the imagination as an intensive kind of limit, in which the sensibility is given access to ‘pure’ intuition, not through a formal series of appearances, but through the feelings of pleasure and displeasure. Here, Kant emphasises the activities of the imagination as a form of the reflective judgment in the production of concepts of *nature as art*. The imagination is an aspect of the embodied subject that is examined in terms of its powers of enactment. Geometry, therefore, is considered not an objective, cognitive knowledge but as a technical procedure that is brought about through the powers of the imagination.

Kant defines judgment as ‘the ability to *subsume the particular* under the universal’. Reason, in contrast is the ‘ability to *determine* the particular through the universal’ (*CaJ*: 202’). Mediating ‘the connection [*zusammenhang*] between the understanding and reason’ judgment produces a unique kind of concept, that is, ‘the concept of nature as *art*’. It is therefore ‘the concept of the *technic of nature* regarding its *particular* [*besonder*] laws’ (*CaJ*: 203’–204’/392-393). Thus, as we shall see in the discussion that follows, the ability to judge is determined by an aesthetic relation in which geometry, as a scientific or absolute intuition becomes understood in terms

of its nature as a ‘technical’ or artistic condition. This is examined, in particular, in relation to the capacities of the imagination, which provides one of many routes of connection between a judgment and its objects in the *CoJ* (and, as will be shown below, in the later text, the *Anthropology from a Pragmatic Point of View*, 1798). So, whilst the products of the imagination may not be as ‘adequate’ as the understanding’s concepts and its powers remain restricted by the necessity that it agrees with the powers of the understanding, it is nevertheless seen to be a productive faculty of cognition *towards* an artistic or technical understanding of geometry.

The link between the productive imagination and geometry is found, in particular, in a ‘Comment’ to the First Introduction of the *CoJ* in which Kant distinguishes between the theoretical and practical parts of the critical philosophy. Here, the harmony between the imagination and the understanding are brought together in the construction of geometric figures. Kant writes that the imagination’s capacity to ‘produce’ objects arises from the same principles as the understanding, that is, from ‘the nature of things’ (*CoJ*: 198’/388). Kant develops his explanation to examine the relationship between theoretical and practical geometry, suggesting that, whether it is practical, empirical or applied, each ‘part’ of geometry is derived from the same principles of ‘nature’; that is, an absolute or ‘pure’ geometry. Particular geometric figures produced by the imagination are, therefore, ‘special parts’ [*scholia*] of an absolute geometry, brought under the general laws of understanding in reflective judgment. Kant writes:

Hence practical propositions that in their content deal merely with the possibility of a presented object (through voluntary action) are only applications of a complete theoretical cognition and cannot form a special part of a science. A practical geometry as a separate science [of geometry] is an absurdity, no matter how many practical propositions the pure science [of geometry] contains, most of which are problems [for] whose solution [we] need special instruction[s]. The problem of constructing a square by means of a given line and a given right angle is a practical proposition, but [is nevertheless] purely a consequence [drawn] from theory. Similarly, the art of surveying (*[ars] agrimensoria*) can in no way claim the title of practical geometry, and be called a special part of geometry in general; *rather, it belongs to the scholia of geometry, concerning the application of this science to [various] tasks* (CoJ: 198'/388) [my emphasis].

The division of geometry into its genera is considered, therefore, to be part of a metaphysical whole that embraces both its theoretical and empirical forms. In addition, Kant emphasises the *different activities or methods of construction* that produce these different objects; geometry is both the activity of thinking and drawing geometrically, because each is an insufficient explanation on its own. Instead, the scholia represent a particular kind of geometric construction or application so that empirical and applied demonstrations of geometry become understood as parts of a pure or absolute, yet *heterogeneous geometric method*. Furthermore, the continuity

suggested between the transcendental notion of geometry and its sensible figures is a key aspect of this discussion, because as we will see in Spinoza's geometric method, the practical enactment of the 'special parts' or 'scholia' represents an extremely important form of intuition in his geometric method.

In a supplementary note to this passage Kant expands on the nature of how the pure science of geometry is transformed into practical action, which is provided by the powers of the imagination that produces sensible forms of experience, independently of the understanding. *Geometry is, therefore, transformed from a pure theoretical reason (idea) into a series of sensible forms of activity or enactment* that constitute the different forms of 'practical' or applied geometric methods. In addition, it is the imagination's powers that provide the conduit for this passage from 'pure' or mechanical geometric relations to the technical acts of artistic production so that each is brought into harmony with the other to suggest a multiplicitous notion of geometry:

This pure and, precisely because of that purity, sublime, science of geometry seems to comprise some of its dignity if it confesses that on its elementary level it needs *instruments* to construct its concepts, even if only two: compass and ruler. These constructions alone are called geometric, while those of higher geometry are called mechanical, because to construct the concepts of higher geometry we need more complex machines. Yet even when we call compass [*Zirkel*] and ruler [*Lineal*] (*circinus et regular*) instruments, we mean not the actual

instruments, which could never produce those figures [*circle* and (straight) *line*] with mathematical precision, but only the simplest ways [these figures can] be exhibited by our *a priori* imagination, [a power] that no instrument can equal (*CoJ*, Note 6: 198'/388).⁷

Practical geometry is, therefore, a demonstration of the possibility of a theoretical object, but Kant also tells us that '[a]ll other propositions of performance, with whatever science they may be affiliated, we might call *technical* rather than practical [...]. For they belong to the *art* of bringing about something that we want to exist [*sein*]' (*CoJ*: 199'-200'/389-390). Thus, the nature of the geometric demonstration, diagram or figure, are understood as forms of an artistic '*techne*'; that is, a 'proposition of performance', an 'act' or a 'presentation of forms' (*CoJ*: 199'/388).⁸ Once again, it is evident that the scientific nature of geometry becomes connected with the way in which we judge nature, that is 'by analogy with an art', which is a 'subjective relation', rather than an objective, logical or mechanical relation. Judgment is, therefore, a subjective and indeterminate, yet technical power that is derived from nature (*CoJ*: 201'/390).

So, Kant can continue to say that this 'technical' judging is a capacity of 'reflective judgment' in which indeterminate artistic judgments produce a harmonious relationship between the subject and the general laws of nature, rather than a 'mechanical' or instrumental 'schema' (*CoJ*: 214'/402). Furthermore, these natural laws constitute a 'purposiveness' in nature, that is, an *autonomous* 'lawfulness' (*CoJ*: 218'/406). When nature is examined in this way 'we then consider the

purposiveness itself as merely subjective; by the same token, this [purposiveness] neither requires nor produces a determinate concept of the object, and the judgement itself is not a cognitive one. Such a judgment is called an AESTHETIC *judgment of reflection*' (CoJ: 221'/409).

In addition, we find a second aspect of the productive imagination in Kant's theory of reflective judgment; that is, the transformation of the role and function of the dialectic between the finite limit and infinite limitlessness from a scientific discussion into an artistic concern. In relation to aesthetic judgment we find that the imagination operates within the discontinuous harmony of the thinking subject, comprising a unity that threatens the logical drive towards a determinate and unified *a priori* system. As a result, the subject and its experiences (that is, its relationship with the external world) becomes understood as an 'aggregate' of a reflective, aesthetic and autonomous subject *so that geometry and space are released from their formal appearance as intuitions and are embodied into the activities of the thinking, feeling subject.*

Thus, the notion of the geometric figure as a form of the reflective subject becomes a highly excessive and irreducible proposition; and, as we will see in the following chapters, the importance of this shift from the determinate or logical geometric figure to the indeterminate and embodied geometric figure is central to this discussion. Spinoza, for example, promotes the indeterminacy of the subject in his examination of the imagination in the production of images of space and time that the body creates, which are understood as *continuous modifications of a living subject.* Other geometric methods are less concerned with the imagination as a faculty, than

with its counterparts of sensibility, i.e. memory and perception. Leibniz, for example, examines the perception's construction of 'fictional' figures and its limits of 'imperceptibility' in an intensive analytic method. Bergson also considers, not the imagination, but the powers of perception and memory in relation to the 'psychic' condition of the individual to the effect that the production of the geometric figure is shifted away from 'cognitive' powers or faculties to 'psychic' powers that are constituted as both extended and unextended matter, rather than the problematic division of body and mind that arises by considering the imagination to be an aspect of the mind.

In the *CaJ*, however, the imagination is important insofar as it provides the content through which a reflective judgment can be made. Kant tells us that the power of reflective judgment is found in; first, the ability to reflect 'on a given presentation so as to [make] a concept possible' and second, the ability to 'determine an underlying concept by means of a given empirical presentation' (*CaJ*: 211'/399). In addition, returning to the definition of 'aesthetic' in the *CaJ*, we find Kant define it as; 'an ability to judge an object in reference to the free lawfulness of the imagination' (*CaJ*: 241/91). The imagination, therefore, is autonomous insofar as it is 'productive and spontaneous (as the originator of chosen forms of possible intuitions)'. But the link between the imagination and 'determinate [forms] of this object' means that its 'freedom' is only in terms of its productive powers of construction in generating objects or perceptions, since its products are still brought into harmony with the understanding (*CaJ*: 241/91). There remains, therefore, a contradiction between the freedom of the imagination and the lawfulness of the understanding, which requires

harmonisation under the categories of concepts, and the harmony that the teleological judgment allows. The mental *agitation* of production, however, is a crucial aspect of the imagination's powers in the formation of aesthetic judgments; that is, its relationship to the activity of the mind in pleasure and displeasure and the notion of limit. Thus, Kant posits the productive imagination in the *CaJ*, through which sense intuition and geometry are brought into harmony with pure intuition.

In addition, Kant's investigations into the imagination continue beyond the third *Critique*; for example, we find that it is explored in some depth in a later text, the *Anthropology from a Pragmatic Point of View* (1798). Here, the imagination is productive insofar as it can create images (that is, perceptions, notions or projections) that are in harmony with a 'higher level' of cognition. Thus, the *Anthropology* draws out the structure of sensibility, the senses and the imagination in relation to the individual in a way that we will see is implied in the operations of the imagination in the production of reflective judgment in the *CaJ*. In both of these texts, then, the imagination may be considered a 'productive' faculty in its own right. A short discussion of the *Anthropology* highlights some of its capacities in more detail, which will also be useful for considering the role of imagination in the other geometric methods, especially Proclus and Spinoza.

In the first book of the *Anthropology*, 'On the Cognitive Faculty of Self', Kant tells us that the imagination is a mode of the sensibility or the 'faculty of intuitive ideas'. In particular, it is the form of the sensibility, i.e. intuition 'without the presence of the object' (*APP*: §15/40).⁹ The imagination is, therefore, able to produce images or notions of space and time that are derived from an internally

generated sense, independently of external or empirical objects.

The imagination exists in two forms, productive and reproductive; when it is *a priori* and synthetic it is productive. Kant writes that it is the ‘faculty of the original representation of the object (*exhibito originaria*), which consequently precedes experience’ (*APP*: §28/56). Thus the sensibility as a cognition through which forms of appearances might be generated in the *CPR* is developed into a faculty belonging to the embodied subject. In contrast, when the imagination produces images from previously gained ‘empirical perceptions’ Kant tells us its powers are reproductive (*APP*: §28/56). Although, ultimately, Kant considers the knowledge generated by the imagination to be inadequate (in comparison to concepts constructed when the imagination is considered an intuition that produces analogous forms of sense experience, such as space and time), it is not merely confined to an empirical order of objects. But he also notes that the imagination can make forms that are concrete or abstract images, notions or projections, such as ‘corporeal forms’, which are represented by pictorial sensations in space (*APP*: §31/65). Kant suggests, therefore, that the ‘sense’ derived from the imagination may be a faculty that is of a ‘higher level’ than thinking. He explains:

All this is based upon the fact that the imagination, which supplies the content of understanding, that is, content to its concepts for the sake of knowledge, seems to give a reality to its invented notions because of the analogy between them and real perceptions (*APP*: §28/58).

But, since the imagination is always determined by the 'rules of sensibility' (i.e. it does not generate concepts or ideas), it 'provides the material whose association is achieved without consciousness of the rule, consonant with the understanding but not derived from it' (*APP*: §31/67). This capacity for notions determined by perception, however, also indicates the inadequacies of the imagination, in contrast to the efficacy of understanding in producing clear judgments, because it is not analytic or 'pure' reason; rather it is unruly and excessive. As we will see in the *CaJ*, however, it is this very excessiveness that produces an interesting shift from the limitation of form, which determines Kant's aesthetic in the *CPR*.

In §23, 'Book II: Analytic of the Sublime' of the *CaJ*, Kant observes the transition from the power of judging the beautiful to that of judging the sublime. In each case the beautiful and sublime (i.e. liking and the relationship between pleasure and displeasure, respectively) are determined by a judgment of reflection, rather than of sensation or logic. This kind of judgment is, in turn, made intelligible through concepts by virtue of the faculties of reason or understanding, but it is also produced by the imagination, in part because the imagination enables a judgment to be produced without the object being present. Kant writes:

yet we do refer the liking to concepts, though it is indeterminate which concepts these are. Hence the liking is connected with the mere exhibition or power of exhibition, i.e. the imagination, with the result that we regard this power, when an intuition is given us, as

harmonising with the power of concepts, i.e. the understanding or reason, this harmony furthering [the aims of] these. That is also why both kinds of judgment are singular ones that nonetheless proclaim themselves universally valid for all subjects, though what they lay claim to is merely the feeling of pleasure, and not any cognition of the object (*CaJ*: 245/97).

Kant continues to outline the four different modes of judgment that comprise the sublime – quantity or that which is ‘universally valid’; quality or that which is ‘devoid of interest’; relation or that which is subjective and; modality or that which is ‘necessary subjective purposiveness’ – and tells us that the imagination has a role in the production of these judgments; for example, in the production of magnitude as quantity (*CaJ*: 245/98). In so doing, Kant attributes the imagination’s productive capacities to the formation of aesthetic judgment. The imagination’s attempts to comprehend the sublime, such as the division of the sublime into mathematical or dynamic divisions (i.e. ‘sublime objects’), also produces a ‘mental agitation’ that is ‘subjectively purposive’ in the forms of either a cognition or desire. The imagination is, therefore, determined by an aesthetic form of judgment, whereby it produces a ‘harmony’ with reason and understanding. Kant explains the aesthetic nature of the imagination’s efforts to produce mathematical estimations of the sublime, as follows:

the imagination is equal to the task of providing, for any object, a measure that will suffice for this estimation, because the

understanding's numerical concepts can be used in a progression and so can make any measure adequate to any given magnitude. Hence it must be the aesthetic estimation of magnitude where we feel that effort, our imagination's effort to perform a comprehension that surpasses its ability to encompass [*begreifen*] the progressive apprehension in a whole of intuition, and where at the same time we perceive the inadequacy of the imagination [...] (*CaJ*: 256/112).

As a result, we can observe the extent to which Kant's theory of aesthetics in the *CaJ* extends the scientific aesthetic theory of the sensibility of the *CPR* into a theory of embodied pleasure and displeasure. In the 'First Introduction' to the *CaJ*, for example, Kant examines the relationship between pleasure and thinking, writing that 'all the powers of the human mind' cannot be brought into a single unity. Instead, these powers – i.e. cognitive power, the feeling of pleasure and displeasure and the power of desire – are disjunctive and any object that arises from them can only be known as an aggregate of their empirical and theoretical sources (*CaJ*: 206'-207'/395). He writes:

Now the[re is a] connection between the cognition of an object and the feeling of pleasure [or] displeasure in the object's existence, [and in this connection consists] the determination, of the power of desire, to produce the object. But while this link is knowable enough empirically, it is not based on any *a priori* principle; and hence to that

extent the mental power form no system, but only an *aggregate* [...]

But in order for this feeling of pleasure to be connected with the other two powers in a system, this feeling must, as these other two powers do, also rest not on merely empirical bases but on *a priori* principles. Hence for the idea of philosophy as a system we also need *a critique* (even if not a doctrine) *of the feeling of pleasure and displeasure* insofar as its basis is not empirical (*CaJ*: 207'/395).

The presentation of an object relates, therefore, to 'the feeling of pleasure and displeasure', which are inherently dynamic, so that an aesthetic is not determined as a science but as an 'aesthetic of feeling'; for example, the 'presentation of an object' or the 'form of sensibility' are forms that embody 'how the subject is affected' (*CaJ*: 222'/410). The scope of the powers is directed, therefore, not towards the production of objects as conceptual understanding or ideas of reason, but towards a dynamic and indeterminate set of judgments produced by the subject. Kant continues:

judgment refers solely to the subject and does not on its own produce any concepts of objects [...]. Therefore, if the power of judgment is indeed to determine [*bestimmen*] anything on its own, then presumably this can only be the feeling of pleasure; and, conversely, if the feeling of pleasure is indeed to have an *a priori* principle, then

presumably we can find it only in the power of judgment (*CoJ*: 208'/396).

In Kant's Critical philosophy, therefore, we find that the imagination and its limits provide a link to the transcendent in the form of the sublime. The limit between the sensible and intelligible realms becomes a limit-operation in the form of the imagination and the feelings of pleasure and displeasure that it produces; first, the formal, mathematical and external limit is subsumed to an internal, 'agitated' and indeterminate limit in the efforts of the imagination to cognize the magnitude of the sublime. Second, the reflective subject's feelings of pleasure and displeasure represent an intensive notion of limit, rather than an exclusive prohibition of the sensibility between the transcendental and sensible realms, so that the individual is itself constituted by an aesthetic limitlessness or irreducibility between the mathematical magnitude of limit and sensation.

The imagination, therefore, modifies the relationship between limit and sensation into an embodied series of enactments that belong to the 'freely acting individual', such as the feelings of pleasure and displeasure. As a result, limit is an embodied state and can be said to reflect the shift from the objective reality of the mathematical geometric figure into the subjective reality of the reflective subject. For Kant, however, the transcendental relationship between the subject and geometry is still demarcated by the unknowable sublime so that the 'limitlessness' of the subject is registered as an excessive presentation, rather than as the eruption of an immanent power that constitutes the individual. The geometric method and its figure are,

therefore, aspects of the aesthetic powers of the reflective subject insofar as they are enactments of the imagination; however, they remain attendant to Kant's view of the absolute divisions between the powers of the sensibility and Reason or God, that results in a limitation of the subject's powers versus the limitless sublime. Kant's writing does consider this more complex and heterogeneous notion of geometric enactments previously, as seen in his essay 'Concerning the ultimate ground of the differentiation of directions in space', in which the geometric figure is distinguished by its external *and* internal spatial relations.¹⁰

In the following chapters, however, we will encounter philosophers who suggest a more immanent or genetic continuum of geometric relations between man and nature, which advocate the powers of the subject (geometric figure) more strongly as aspects of the aesthetic and intuitive geometric method.¹¹

For the moment, however, we can say that Kant's examinations into aesthetic and geometry in the *CPR* and the *CoJ* are brought together and through which, in particular, the aesthetic subject is constructed. In the following section we will see that Plato offers an enactment of geometric thinking and drawing that is a precursor to Kant's technical acts of construction in the subject. For Kant, the production of geometric figures is engendered in the technical and aesthetic enactments of the imagination. In the *Meno*, however, Plato focuses, not on the role of the imagination, but on memory or recollection in the production of the geometric drawing. We might suggest that Kant's technical enactment represents, therefore, a kind of memory that Plato explores in the activities of drawing and recollection.

Drawing a line¹²

So, by taking the ‘constructive’ aspects of Kant’s aesthetic geometry we are able to suggest a link between the embodied notion of limit in the productive imagination and the technical status of the geometric figure in relation to the act of drawing geometric figures in Plato’s dialogue, the *Meno* (380BC), which itself echoes the *Phaedo*’s proposition that the mathematical diagram is the site for the recollection of memories; ‘If you take a person to a diagram [...] then you can show most clearly that learning is recollection’ (*Phaedo*, 73b, cited in Proclus 1992: 45/37).¹³

The *Meno* examines, principally, the nature of virtue and whether it is learnt or ‘recollected’. During the course of the dialogue, however, Plato demonstrates the nature of virtue by using geometric examples to explore the Stoic principles of limit and unlimit, and the principles of the one and the many. Socrates, for example, explains that virtue is both particular to each person and exists as a ‘single virtue’ that ‘permeates each of them’, developing the point with the analogy of ‘shape’ (Plato: 74b–75d/357-8). Socrates continues, stating that the concept of limit produces a definition of shape; shape is defined as ‘the limit of a solid’ (Plato: 76a/359). For Plato, therefore, limit is equated with an identifiable boundary or end, which supports the notion of the geometric figure as a ‘bounded figure’. Shape, Plato tells us, is limit. But Plato’s identification of shape with limit is problematic, for where limit might produce an ‘intensive’ relationship with infinity (the unlimit) Plato tends to affirm the exactness of formal limits. We will see in the next chapter, however, that Proclus emphasises the discursive nature of shape and limit, not the formation of determinate boundaries.

Geometric figures, then, are used to provide extended ideas about the qualities of virtue, such as its magnitude and limit. But, Plato also considers the geometric method in the act of drawing to constitute a distinct notion of geometric *method* that shifts geometry from a mathematical knowledge into a sensible *enactment*, that is, as intuitive acts. This is presented in two forms; first, the boy's intuitive recollection of geometry and second, Socrates' act of drawing figures in the sand; '*Socrates begins to draw figures in the sand at this feet [...]*' (Plato: 82b/365). Geometric demonstration, therefore, becomes linked to an aesthetic and reflective set of judgments in the figures of Socrates and the boy (Plato: 82b–86b/365-371). The dialogue considers geometric intuition and recollection in the following section:

Socrates: What do you think, Meno? Has he answered with any opinions that were not his own?

Meno: No, they were all his.

Socrates: Yet he did not know, as we agreed a few minutes ago.

Meno: True.

Socrates: But these opinions were somewhere in him, were they not?

Meno: Yes.

Socrates: So a man who does not know has in himself true opinions on a subject without having knowledge.

Meno: It would appear so.

Socrates: At present these opinions, being newly aroused, have a dreamlike quality. But if the same questions are put to him on many

occasions and in different ways, you can see that in the end he will have a knowledge on the subject as accurate as anybody's.

Meno: Probably.

Socrates: This knowledge will not come from teaching but from questioning. He will recover it for himself.

Meno: Yes.

Socrates: And the spontaneous recovery of knowledge that is in him is recollection, isn't it? (Plato: 85c-d/370).

The dialogue presents a logical reasoning of geometric intuition, beginning with the recognition that the ideas belong to the boy, but they are distinct from understanding or reason. Such ideas are indistinct, having a 'dreamlike quality' but they are made clear not from learning but by *questioning*. This, Plato suggests, is 'recollection'. Memory is understood, therefore, to be inherent in the enactments of the geometric method (and which we will find Bergson proposes it in a radical form called 'duration').

So, whilst the dialogue is certainly a demonstration of a series of mathematical operations it is also an enactment of geometric method in Socrates' actions and the boy's recollections. Plato reveals the intuitive basis of knowledge in geometry, that is, the activities of the soul that the boy embodies to suggest that geometry is a discursive *and* immaterial procedure; for example, Socrates explains the nature of the soul as an active and inquisitive form of memory. Socrates says:

Thus the soul, since it is immortal and has been born many times, and has seen all things both here and in the other world, has learned everything that is. So we need not be surprised if it can recall the knowledge of virtue or anything else which, as we see, it once possessed. All nature is akin, and the soul has learned everything, so that when a man has recalled a single piece of knowledge [...] there is no reason why he should not find out all the rest [...] for seeking and learning are in fact nothing but recollection (Plato: 81b/364).

Socrates' enactment of geometric figures also demonstrates the relationship between geometry and the aesthetic actions of the body. Logical geometric knowledge becomes discursive, therefore, in the operations of the soul and memory, but it is also the discursive act of drawing out geometric figures, which demonstrates a shift from geometry as an externally derived and axiomatic order of knowledge to an internal and aesthetic procedure.

Thus, we find that Plato's examination provides an aesthetic and intuitive geometric method from which Kant's aesthetic subject might be drawn and provides the possibility for Kant's thinking to be considered a re-enactment of Plato's metaphysics.¹⁴ Kant's attention to the imagination provides a counterpoint to the description of intuition that Plato provides, through which he develops the technical aesthetic of the geometric act. Plato, on the other hand, considers the soul as the discursive site of memory or intuition through which the geometric method is immanent within the subject.

Conclusion

We can propose, therefore, that a line can be drawn between the *Meno* and the *Critique of Judgment* in which geometry is expressed as an aesthetic ‘act’ of drawing and construction, indicating an overlooked geometric method and figuration. In particular, we find that the relationship between the ‘pure’ science of geometry and the ‘sensible’ act of drawing geometric figures are brought together in the boy’s intuitive grasp of space, Socrates’ drawings in the sand, and the production of geometric figures in the *CoJ* to demonstrate an aesthetic reflective judgment. Between these two encounters we find that the absolute geometric method becomes embodied into the aesthetic powers of the reflective subject. The geometric method is therefore presented both in the body of the reflective subject and in the geometric diagram or figure so that an ‘aesthetic origin’ of geometry is instantiated.

Kant’s Critical philosophy suggests a shift from an external to an internal aesthetic geometry in the first and third *Critique*. First, Kant’s synthetic *a priori* judgment, although radical in positing the particular and *a priori* difference of individual states remains a problematic notion of difference because it is determined by the ‘external’ limit. In keeping with the classical notion of ‘synthetic’ division in mathematics, Kant sustains the exclusive, formal autonomy of an individual. Kant’s critique of the forms of knowledge and their related faculties (reason, understanding, intuition and imagination) in the *CPR* is a major innovation of a neo-Platonic thought. It is, however, contested by the other methods examined in this thesis, which prioritise the importance of the sensibility, i.e. non-cognitive knowledge of the world, such as perception and memory in the writings of Leibniz and Spinoza. Although the

powers of the imagination are promoted, the imagination is still taken to represent a scientific order, i.e. division or limit, rather than in its perceptual capacities.

The possibility of internal or embodied geometric difference is, however, evident in texts such as ‘Concerning the ultimate ground of the differentiation of directions in space’. But Kant does not sustain this possibility in the *CPR* in the development of a ‘pure’ geometric reason and so geometry remains determined by an absolute division between reason and the sensibility. In the *CoJ*, however, the reflective subject retrieves a notion of geometric enactment in which its ‘rules of construction’ generate a speculative and discontinuous unity. In particular, the ‘mathematical’ principles of limit are engendered in the faculty of the imagination to form an intensive limit of feeling and sensation. In addition, the imagination provides an aspect of the reflective judgment that constitutes a ‘technical’ or artistic notion of geometric method and figuration, which is reflected in the intuitive recollection and performed enactments of geometry in Plato’s *Meno*. Ultimately, Kant underestimates the scope of the sense perception and non-cognitive activities of the body in understanding the aesthetic subject. In the following chapters, however, we will find each philosopher generating a method that is both geometric and sensory.

Kant’s Critical philosophy constitutes a key geometric and aesthetic encounter or re-enactment. The first encounter is in the *Critique of Pure Reason* through the concept of intuition. In its second form it is re-enacted in the *Critique of Judgment* through the powers of the reflective subject, in particular, through the technical powers of drawing and construction that the imagination provides. Finally,

this geometric aesthetic is itself retrieved from metaphysical philosophy in the figures of Socrates and the slave-boy in Plato's *Meno*, providing an additional 'enactment' of the aesthetic that re-engages Kant's project with earlier geometric methods. In this chapter we have seen the shift from the two figures of a geometric memory – intuition and recollection – into a technical form of enactment in Kant's reflective judgment. In the next chapter the Classical context of aesthetic geometries is considered in relation to Proclus' method, which is derived from its Platonic and Pythagorean origins and demonstrates a particularly discursive form of geometric enactment.

Chapter 2: Unfolding

For Kant, the geometric aesthetic of the third *Critique* was embodied in the reflective subject. For Proclus, the *geometric aesthetic* is derived from the Stoics' ideas of the divine One, Many, Limit and Unlimit; i.e. geometry is derived from a set of external and 'intelligible' powers, not internally embodied states. Proclus' contribution to the study is valuable, however, since it demonstrates the extent to which these Stoic concepts enable a relationship between geometry and aesthetics that is genetic, serial and continuous in *both* the pure and unobtainable figures of the Gods and the sensible figures of the circle or natural forms. In addition, his text provides a precursor in the shift from the external to the internal geometric method because the external and axiomatic, mathematical 'element' becomes reconfigured as a series of intermediate and immanent figures. Proclus' text also introduces some of the key metaphysical principles that recur throughout this discussion, such as synthetic and analytic figures, the imagination, the soul, limit and unlimit. Thus, Proclus' interpretation is an important counter-point to the perception that Euclid's text is exclusively concerned with the production of rational and scientific principles, demonstrating instead that the *Elements* reflects Classical understandings of *aesthetic geometry*.

This chapter focuses on the aesthetic geometric method and 'figure' that is found in Proclus' (410-485AD) *Commentary on Euclid's Elements* (c.300BC).¹ It considers the geometric procedure and figure of the fold/unfold that are constructed in

the *Commentary* to suggest that they are produced by the discursive movement between the soul and the understanding and operations of the imagination to represent a series of ‘*intermediate*’ figures (as we will see in chapter 4, Leibniz also emphasises the importance of ‘intermediacy’ in a series of figures, but in an analytic form). The procedure of ‘unfolding’ and its *implied* figure, the ‘fold’, are drawn out of an examination of the structure of the text and its geometric ‘elements’ to represent the constituents of an aesthetic geometry. A more complex philosophical understanding of the Neoplatonic geometric method is generated, therefore, in which geometric method and its figures constitute a double movement and series of synthetic figures.

Before examining the text in detail, it is important to note the context of Proclus’ writing in fourth century Greece, in which mathematics and its derivatives, including geometry, are informed by Neoplatonic and Pythagorean metaphysics. In this respect, it is Proclus’ aim to reveal the aesthetic structure of the technical sophistication in Euclid’s work in the philosophical principles upon which it is grounded.² For Proclus, the value of the *Elements* is two-fold; first, its subject matter is a demonstration of ‘the cosmic figures’ derived from Plato’s *Timaeus*, which make it an ‘elementary exposition’ of metaphysical import. Second, its explication of the fundamental origins represents ‘a method of perfecting’ the geometric method in both its scientific and metaphysical potentials. For Proclus, the *Elements* represents, therefore, a paradigm of philosophical and mathematical enquiry in both the manner in which geometry is studied and the mode in which these ‘figures’ are produced (*Commentary* 1992: 71/58).³ (In his Foreword to this edition, Mueller also notes

Proclus' attention to the philosophical basis of Euclid's ambitions [*CEE*: xxx-xxxi]). Euclid is not, however, transformed from a mathematician into a metaphysician, but by emphasising the relationship between Euclid's mathematical propositions and the Platonic and Pythagorean principles from which it is generated, Proclus suggests an overlooked philosophical context through which to reconsider the formation of geometry in the text. The *Commentary* constitutes an important text, therefore, through which to re-evaluate the philosophical status and scope of geometric principles after Plato, and whilst it is a step-by-step explication of Book 1 of the *Elements*, it is the Prologues and the commentary on the Definitions that offer most insight to the metaphysical nature of the geometric method and its figures.⁴

Beginning with an examination of the statement that mathematics is 'imaginative and discursive thinking' this chapter suggests that Proclus' provides a striking precursor to Kant's discussion about the geometric method and imagination outlined in chapter 1 (*CEE*: 18/17). Having considered the definition of 'discursivity' in relation to the understanding, the soul and the imagination, the chapter goes on to explore the role and function of discursivity as an aesthetic geometric procedure in Proclus' thinking. As in Kant's formulation in the *Critique of Judgment*, we find that the imagination in the *Commentary* is a key operation towards forming an aesthetic notion of geometry; for example, it is the most embodied state of mediation between the divine notions of limit and unlimit. Both Proclus and Kant assign the imagination to a position of mediation between the intelligible and sensible realms and each attributes the productive nature of imagination, not so much to its powers of imitation of insensible figures, but to its *powers of division* that are aspects of the

Stoic notions of limit and unlimit. In Proclus' *Commentary*, therefore, these powers constitute an aspect of the discursive 'unfolding' and 'folding' of the geometric method to generate a successive movement through a series of metaphysical orders, in which the divine, insensible principle of unlimit is immanent in the particular, sensible limit (not by means of an imitation of Plato's Ideal forms).⁵

As a result, the chapter suggests that a more discursive relationship between the transcendental realms of *nous* (intellect or intuition) and *diavoia* (understanding) is evident in which the limit and unlimit are sustained in the action of folding and unfolding. In addition, the chapter argues that the status of the 'geometric figure' becomes dramatically altered in a shift from a principle of mathematical certainty that is a finite, 'bounded' and 'contained' synthetic identity, to one that is a synthetic *and infinite* unity. The relationship between the notion of the geometric figure and 'unity' is constituted, not by an emphasis on the different classifications of finite identities, rather as a result of the discursive movement between figures. Thus, we will see that Proclus' affirmation of Pythagorean principles retains the synthetic principles of construction, but situates them within a continuity of different figures.

The chapter also considers the nature of the discursive procedure in terms of its aesthetic form as unfolding or folding. Proclus explicitly develops his theory of geometry in terms of a discursive unfolding, yet we will find that the notion of folding is *implicit* (in contrast to the explicit fold that Leibniz generates). Hence, the chapter suggests that the figure of the fold is present, but it too remains implicit in Proclus' emphasis on the double movement of discursivity and recollection, and in the relationship between the imagination and the soul in which recollection provides

an ‘enfolding’ as a counter-movement to the ‘unfolding’ of the understanding.⁶ But it should also be noted that the procedure and figure of the fold/unfold remain firmly demarcated by idealistic principles, since their discursivity is subject to the authority of the divine One/Many. As a result, the chapter notes that the scope of the imagination to produce mathematical objects remains a logical ‘limit-operation’, rather than representing a power that is generated by a fully embodied and thinking subject. Thus, unlike the autonomous and embodied powers of Spinoza and Leibniz’s ‘infinite substance’, the Pythagorean order does not enable speculative thinking to be generated from an autonomous and sensible order of living things, remaining determined by an ideal order of divine elements. In addition, we find that Proclus only examines the nature of matter insofar as it is a derivative of the higher levels of thought; although the sensible realm is a positive product from the imagination’s harmonious unfolding of the understanding, the soul or *nous*, sense opinion (*doxa*) and matter remain contaminated so that the embodiment of the *nous* (the intellect) in matter is always considered less significant.

Having examined the metaphysical structure of the ‘fold’, the chapter also considers the axiomatic organisation of the text, which reveals an analysis that is deeply embedded in Pythagorean principles of serial progression and notions of the One (i.e. limit and divisibility) and the Many (i.e. unlimit, indivisibility and multiplicity) that represent the highest, unknowable and transcendental realities, but which are *also immanent* in the lower realms and particular entities. As will be discussed below, the scope of the ‘fold’ in manifesting these relationships promotes a key argument in Proclus’ examination of the *Elements* in which geometry becomes a

special site of mediation between the intelligible and the sensible realms *without* recourse to the 'Divided Line' that separates the intellect from the senses.⁷ Thus, the axiom, postulate, proposition, problem, theorem, hypothesis and definition are considered to be *both* transcendent and sensible particulars, rather than merely sensible 'abstractions' of higher forms of idea. In addition, the chapter observes that a series of relations are proposed through the 'common notion' of the figure, which links the highest and the lowest realms. Second, we find that the discursive movement between the understanding and the pure reason of the intellect (*nous*) represents a distinct 'intermediary' position between the pure, immaterial intellect or soul and the sensible images of the imagination or material realm of opinion (*doxa*). Diaonetic thinking demonstrates, therefore, the potential for the intellect to move between the ideal and the particular 'figures' in the form of an 'unfolding' from the 'simple' axiom or point to the complex and 'combined' figure, and the folding that is implied in the immanent relations between the sensible figures and the soul. In addition, discursivity is an activity of the understanding, but it is also generated from the internal irreducibility of the soul and its activities are also demonstrated in the form of the imagination's production of 'enmattered images' that provide an important 'anticipation' to Kant's theory of the imagination in the third *Critique* and the aesthetic geometries of Spinoza, Leibniz and Bergson.

Discursivity

Proclus upholds the Platonic belief that mathematics is discursive; he writes that its methods are 'diaonetic and imaginative thinking' and so it represents a

demonstration of the faculty of understanding (*CEE*: 18/15). He tells us that mathematics' powers situate it at a special level in the order of knowledge in which the intelligible and sensory worlds are brought together through the act of discursive thought (*diavoia*) to form a distinct kind of knowledge. But it is the *aesthetic value* of these powers that Proclus affirms most strongly to suggest a method in which *the relations between* its objects are as important as its forms. In the following sections an examination of these powers – i.e. the *nous*, understanding, soul and the imagination – will reveal the extent to which Proclus' interpretation of geometry constitutes an aesthetic series of unfolding and folding movements between these metaphysical operations.

So, the discursive nature of mathematics is expressed from the beginning of the *Commentary*. Confirming Plato's classification of mathematical knowledge, Proclus emphasises the discursive powers of mathematical demonstration, telling us that by moving from one fact to another in the construction of their respective objects, geometry and arithmetic are deductive procedures generating clear and precise descriptions of the world that mediate between the realms of pure 'intelligence' (*nous*) and the imperfect sense-perception or 'opinions' (*doxa*):

Mathematical being necessarily belongs neither among the first nor among the last and least simple of the kinds of being, but occupies the middle ground between the partless realities – simple, incomposite, and indivisible – and divisible things are characterised by every variety of composition and differentiation [...]. *But the*

discursiveness of [the mathematical] procedure, its dealing with its subjects as extended, and its setting up of different prior principles for different objects – these give to mathematical being a rank below that indivisible nature that is completely grounded in itself (CEE: 4/3) [my emphasis].

Geometric procedure and its figures are attributed with a special kind of autonomy that is intermediate to the unknowable and the extended realms and, as a result of this intermediary nature, geometry brings into harmony the powers of the understanding and the imagination with the self-determined activities of the soul. Geometry lies, therefore, between the imperfect level of sensible, empirical entities and the perfection of insensible, immaterial forms; ‘the intermediate status of mathematical genera and species’ lies ‘between absolutely indivisible realities and the divisible things that come to be in the world of matter’ (CEE: 5/4). Thus, we are reminded that a Neoplatonic order is confirmed in which there are four orders of reality that move in descending order, as follows;

1. the partless, unity of the One (union);
2. the Ideal Forms of Being (*nous*);
3. the *logoi* of Mathematics (*diavoia*);
4. the sensible entities of Becoming(*sens*).⁸

From this schema we can also clarify the Neoplatonic value attributed to the *nous*. For Proclus, the *nous* represents the ideal, insensible forms from which all

sensible ideas are generated and all perceptions are images of these ‘first patterns of all things’ (*CEE*: 16/13). The content of the *nous* is indivisible and non-discursive, an ‘all-at-once-grasping of totality’ (*CEE*: xx). Yet, it also provides the soul with its content and is, in this sense, an ‘external’ source of ideas for the soul (*CEE*: 16/14). As we will see in chapter 5, such a definition appears to foreground Bergson’s concept of intuition in which the soul is conceived as a ‘psychic’ activity that ‘grasps’ reality as an intuition *and as a discursive activity*. But Bergson’s wish to distance himself from Platonic metaphysics, especially the problematic status attributed to perception and matter is, however, a crucial difference between his notion of ‘totality’ that is grounded in a ‘superior empiricism’ and Proclus’ notion of a divine totality.

Since mathematical procedure lies between the simple indivisible forms and divisible nature, Proclus also considers it to be commensurate with the *understanding*, ‘a faculty higher in rank than opinion, but inferior to intellect’ (*CEE*: 12/10). But he distinguishes between the *nous* and the understanding because the understanding’s activities are discursive, writing that the understanding is deductive and unravels the unintelligible and indivisible, pure intellect into intelligible and divisible forms, in *a manner of ‘unfolding’*:

Though second in rank to intellect and the highest knowledge, understanding is more perfect, more exact and purer than opinion. For it traverses and unfolds the measureless content of *Nous* by making articulate its concentrated intellectual insight, and then gathers

together again the things it has distinguished and refers them back to

Nous (CEE: 4/3).

The understanding makes intelligible the unintelligible ‘mathematical ideas’ in the *nous*, and also those of the soul (as will be explained below), to generate the ‘substantial and self-moving’ varieties of mathematics such as geometry and arithmetic. As the explicator of pure intellect it mediates, therefore, between the *nous*’ ‘originating principles’ of ‘partless ideas’ and its own products, the sensible mathematical bodies (CEE: 18/15). This *constant* explicatory or discursive movement further distinguishes mathematical understanding from the *nous*, which is non-discursive, unified, ideal and constant. But Proclus also considers the unfolding movement to be analogous a kind of ‘*life-giving activity*’ or a genetic production of ideas (and, as was shown in Kant’s reflective subject and as will be shown in Spinoza and Bergson’s geometric methods especially, the relationship between notions of life and ‘activity’ is central to this discussion). The discursivity of mathematics, the understanding and the soul, in particular, represent a potentially creative series of activities:⁹

By contrast mathematics, though beginning with reminders from the outside world, ends with the ideas that it has within; it is awakened to activity by lower realities, but its destination is the higher being of forms. Its activity is not motionless, like that of the intellect, but because its motion is not change of place or quality, as is that of the

sense, but a *life-giving activity*, it unfolds and traverses the immaterial cosmos of ideas, now moving from first principles to conclusions, now proceeding in the opposite direction, now advancing from what it already knows to what it seeks to know, and again referring its results back to the principles that are prior in knowledge. Moreover, it is not, like *Nous*, above inquiry because filled from itself, nor is it satisfied, like perception, with matters other than itself; rather it advances through inquiry to discovery and moves from imperfection to perfection (*CEE*: 19/16) [my emphasis].

Like Plato's emphasis on geometric questions in the *Meno*, therefore, Proclus writes that mathematics is in a constant, *double movement* of inquiry, between the higher activities of the soul and the lower levels of sensible ideas. In the form of the understanding, its deductive powers unfold (i.e. re-produce) the indivisible, first principles as the extended and sensible forms. In the form of the soul it is engaged in a more creative and yet, reflective form of production in which the sensible forms are brought together (i.e. 'enfolded'), under the general form of the 'manifold' of ideas. Proclus explains, emphasising this dynamic movement in terms of powers:

And its powers are manifestly of two sorts. Some develop its principles to plurality and open up the multiform paths of speculation, while others assemble the results of these many excursions and refer them back to their native hypotheses [...].

Consequently it is only natural, I think, *that the cognitive powers operating in the general science that deals with these objects should appear as twofold*, some aiming at the unification and collection of the manifold for us, others at dividing the simple into the diverse, the more general into the particular, and the primary ideas into secondary and remoter consequences of the principles (*CEE: 19/16*) [my emphasis].

Extending in two directions, mathematics' procedure unfolds from the purest immaterial idea downwards to the natural and sensory world of matter and, by implication, in an 'enfolding' movement, upwards from its empirical applications, such as mechanics or optics, to the 'unitary and immaterial insights' that comprise its universality (*CEE: 20/17*). The possibility that mathematics is properly speculative is posited, as a result, since it is not derived merely from sense-perception, rather the content of the *nous* and soul that are unfolded by the understanding provide distinct kinds of immaterial ideas that affirm its *a priori* status. (In the following chapter, a brief discussion will outline the importance of Descartes' investigations into rational and analytic definitions of the *a priori* that informs Spinoza and Leibniz's geometric methods). Proclus disagrees, therefore, with the claim that 'mathematical forms' are abstractions 'from material things' or 'common' notions that are derived from sensible entities upholding, instead, the necessity of the soul and *nous* as the origins of mathematical ideas (*CEE: 15/13*). That is not to say that mathematics is completely divorced from the sensible realm, for Proclus strongly affirms the

imagination as the faculty through which mathematics is connected to the sensible world in the production of images or projections, as will be explained in more detail below.

Soul

In order to understand the relationship between the powers that constitute this aesthetic geometry it will be useful to consider the soul and the imagination in more detail. The nature of the *soul* is explained in detail in the first Prologue. Autonomous and ‘self moving’, it is modelled upon Plato’s notion of the ‘world soul’ in the *Timaeus* in which Plato brings the soul and mathematics together in a series of divine mathematical figures. Proclus writes:

Plato constructs the soul out of all the mathematical forms, divides her according to numbers, binds her together with proportions and harmonious ratios, deposits in her the primal principles of figure, the straight line and the circle, and sets the circles in her moving in intelligent fashion. All mathematical are thus present in the soul from the first (*CEE*: 17/14).¹⁰

The soul is a higher being, closely resembling the *nous* in its indivisibility, but as mentioned in the previous section, its importance lies in its value as a ‘higher’ realm of discursivity from which geometric objects and figures are unfolded by the understanding. In a revealing passage on the origin of ideas in the soul, Proclus writes:

the soul draws her concepts both from herself and from *Nous*, that she is herself the company of the forms, which received their constitution from the intelligible patterns but enter spontaneously upon the stage of being. The soul therefore was never a writing-tablet bare of inscriptions; she is a tablet that has always been *inscribed* and is always *writing* itself and being written on by *Nous*. For soul is also *Nous*, *unfolding* herself by virtue of the *Nous* that presides over her, and having become its likeness and external replica. Consequently if *Nous* is everything after the fashion of intellect, so is soul everything after the fashion of soul; if *Nous* is exemplar, soul is copy; if *Nous* is everything, *soul is everything discursively* (CEE: 16/14) [my emphasis].

The soul's discursivity enables mathematics with the status, not just as a form of the forward movement of deduction in the understanding, but also with the attributes of 'recollection' or memory. As a result, the soul's expression of the content of the *nous* is of a more complex nature and so the activity of unfolding provides a progression from the *nous* to the soul, and from the soul to the understanding. The analogy of the soul as a continual site of inscription also attributes discursivity to an aesthetic image that resembles the *Meno's* encounter between the boy's act of recollecting geometric figures and Socrates' 'inscription' of the figures in the sand, as discussed in the previous chapter. The soul's unlimited powers of discursivity and recollection become represented in terms of the activities

of construction (i.e. recollection and inscription) so that mathematical procedures and their figures *themselves* are attributed with the potential for limitless unfoldings. Furthermore, the powers of recollection and writing that are brought together in the discursive act of inscription means that geometry is once again attributed with the technical (i.e. aesthetic) expression of nature and the soul, and as we will see in the following section, these powers are amplified, further, by the productive imagination of diaonetic thinking.

The soul's productive nature is also emphasised in a number of ways. First, Proclus calls it the '*generatrix*' through which the discursive element is produced:

We must therefore posit the soul as the generatrix of mathematical forms and ideas. And if we say that the soul produces them by having their patterns in her own essence and that these offspring are the projections of forms previously existing in her, we shall be in agreement with Plato and shall have found the truth with regard to mathematical being (*CEE*: 13/11).

The geometric figure, then, is both a 'projection' and 'offspring' of the soul, attributing two distinct ideas of production to the operations of the soul. On the one hand, mathematical forms constitute imitations or images of the 'original patterns', on the other hand, they are considered in a 'genetic' fashion that draws attention to Pythagorean notions of continuity and the plenitude of forms. The nature of the geometric figure as a projection will be discussed below in relation to the imagination,

but here attention is drawn to the soul's discursivity, which becomes analogous to biological associations of 'life' and reproduction. As we have seen in an earlier section, Proclus considers this to be an important attribute of mathematic's discursive powers. Thus, in contrast to the understanding, which unfolds the ideas given to it by the *nous*, the soul generates its own ideas as well as receiving them 'from elsewhere' (*CEE*: 16/13-14). Its relationship to Plato's notion of the 'world soul', which is expressed in nature, the world or the cosmos, is also made evident in Proclus' attention to its 'life-giving' qualities. As a result, the notion of soul carries within it the idea of 'plenitude' that we will see is important to each of the geometric methods in which the soul is discussed, in particular, for Spinoza and Leibniz's concepts of substance. Here, however, we should be careful to note that the soul outlined by Proclus is primarily considered an elevated theological state and is not explicitly embodied as the soul of the thinking subject, rather, mathematical learning provides a route through which individuals should strive to reach the higher realms of existence.

This need to confirm the hierarchy of the Platonic order is central to Proclus' argument and informs his concern that discursive learning and recollection are directed towards the 'discovery of pure *nous*' and the possibility of achieving 'the blessed life' (*CEE*: 47/38). Discursivity, learning or recollection, therefore, have an ethical significance that is brought about by the geometric procedure, which arises through the activity of thinking and it is in the activities of the soul that the immaterial, intelligible ideas of the *nous* are unfolded to become most closely associated with a 'psychic' power. As Mueller notes, however, Proclus does not seek to explain this

activity in terms of a fully embodied ‘psychic’ operation (in the manner that we will find developed in Spinoza’s *Ethics*). But the text does suggest a ‘transitional psychic activity’ in two forms; first in mathematics’ powers of discursivity and, second, in the soul’s powers of recollection (*CEE*: xx). The geometric procedure of unfolding bears some similarity to Spinoza’s *Ethics*, insofar as it is directed towards a ‘theological’ pursuit of knowledge. In contrast, the *Ethics* develops this ‘psychic’ movement as an embodied knowledge in the form of a ‘passage’ from the emotions of the individual through to a divine love of God, as will be discussed in more detail in the following chapter.

Imagination

The first chapter examined the production of space, time and geometry as the elements of the synthetic *a priori* and suggested that the *imagination* is a key faculty through which these ideas become formulated as aesthetic geometric figures in Kant’s third *Critique*. Proclus, however, does not consider the imagination, or space and time, to be fully embodied into the individual, thinking subject and so, in this respect, Kant’s examination of the formation of geometry represents a more explicit discussion of the embodied, synthetic *a priori* elements. For Proclus, the imagination represents a productive faculty of thinking that has the power to embody geometric figures and, by implication, the sense-perceptions of space and time in its empirical derivatives, such as mechanics or astronomy, but space and time remain *implicit*, rather than explicit, orders of perception. Nevertheless, as Morrow also notes, the

imagination is the main innovation in Proclus' adaptation of Platonic theory that 'anticipates' Kant's schematism of the imagination and understanding (*CEE*: lix).

The imagination is the second aspect of dianoetic thinking, contributing to the unfolding of the geometry of the *nous*, soul and understanding. Its contribution is distinct because of its relationship to matter, which means that as a source of geometric figures, its activities are always determined by its inherent affinity with the excessive or 'boundless' unlimit, rather than determined by the orderly nature of the limit. (The following sections will examine this relationship in more detail).

The imagination, then, is an embodied faculty of cognition, providing an original connection between its position 'in the body' and the production of images from the external 'undivided centre of life'. Proclus explains:

By contrast the imagination, occupying the central position in the scale of knowing, is moved by itself to put forth what it knows, but because it is *not outside the body*, when it draws its objects out of the undivided center of life, it expresses them in the medium of division, extension and figure (*CEE*: 53/42) [my emphasis].

In his rejection of Aristotle's classification of the imagination as 'passive' *nous*, Proclus suggests the imagination's power lies in its production of the multiplicity of extended beings that comprise mathematics, geometry, 'nature' and life. Its special relationship to extension; that is, it is an embodied cognitive faculty and the scope of its powers that are driven by division and indivisibility give it a

unique role in the unfolding of the geometric method from insensible to sensible form. Proclus writes; '[f]or imagination, both by virtue of its formative activity and because it *has existence with and in the body*, always produces individual pictures that have divisible extension and shape, and everything that it knows has this kind of existence' (*CEE*: 52/41) [my emphasis]. Thus, although the imagination is restricted insofar as it produces images or beings that are extended, rather than immaterial, it is still a necessary faculty of cognition towards fulfilling the dianoetic potential of geometry.

By giving shape to thought the imagination provides an '*intelligible matter*' through which to describe the idea of a geometric figure; it is a kind of mathematical embodiment, therefore, inherently concerned with the potential for divisibility and indivisibility (which will be examined in more detail in the following section in relation to the Pythagorean notion of unlimit that provides the imagination with an irreducible power of geometric figuration, further underscoring its importance in mathematical thinking). Proclus reminds us, however, that the imagination does not produce pure ideas of the intellect, like the understanding and soul. Its images or projections are always secondary to the ideas produced in the understanding and those 'in nature' because 'the idea in the understanding is undivided, so also is the idea in nature' (*CEE*: 54/43). An ideal circle of the understanding is undivided, therefore, without magnitude or extension, yet 'the circle in imagination is divisible, formed, extended – not one only, but one and many, and not a form only, but a form in instances' (*CEE*: 54/43). But Proclus also adds that the 'abstract image' of the circle in the imagination provides a *more adequate* abstraction of the 'sensible' circle

in nature, which 'is inferior in precision, infected with straightness and falls short of the purity of immaterial circles' (*CEE*: 54/43).

The imagination is, therefore, an important mathematical faculty, directed towards the 'blessedness' of a higher understanding, constituting a step towards the divine ideas of pure intellect in its ability to abstract images or projections from sense-objects, in contrast to the internal generation of ideas in the soul and *nous*. It is these abstractions of the sensory world (its images, projections and figures) that confirm its original nature of production, which is determined by its relationship to extended bodies and, potentially, the thinking subject. These powers of the imagination will also be reflected in chapter 3 in Spinoza's examination of the emotions and the embodied abstractions in the journey towards a state of blessedness; for Spinoza, imagined and projected images will comprise aspects of figures towards the 'adequacy' of the 'common notions'. In addition, although Leibniz explores the powers of 'perception' his notion of 'fictional' or 'approximate' figures as aspects of a 'sufficient reason' will also resonate with Proclus' affirmation of the imagination's role in the production of extended mathematical ideas.

Proclus' emphasis on the activities of the imagination reminds us too, of Kant's emphasis on the dynamic nature of the productive imagination in the *Critique of Judgment*, when he tells us that it is directed towards an *activity of life* because, like the soul, its movements are self-generated, in contrast to the 'contents' of the understanding which are, in themselves, static and constant. Proclus explains that the act of shaping matter is a form of producing extended figures in the imagination, noting that 'it is in imagination that the constructions, sectionings, superpositions,

comparisons, additions, and subtractions take place, whereas the contents of our understanding all stand fixed without any generation or change' (*CEE*: 79/64). In addition, the imagination's production of 'intelligible matter' forms the basis of the diversity of forms in nature, life and the sensory world. Proclus explains that the imagination provides a 'common element', generating different magnitudes of a figure or number, such as a series of concentric circles, which are connected by the 'immaterial substratum' of the image of the circle, yet each one distinguished by having a different magnitude (*CEE*: 53/42-3). Once again, the relationship between the acts of shaping and nature are brought together into an aesthetic relationship, anticipating Kant's concern with the 'technical' relationship between nature and art in the third *Critique*.

The imagination has the capacity, therefore, to move in two directions; on the one hand, a movement travelling in the opposite direction to the unfolding of insensible ideas from the *nous*, that is an 'enfolding', which produces general abstractions of the sense-world. On the other hand, it represents an 'unfolding' movement that generates particular, extended images or projections in the sensory world, but is derived from the immaterial ideas of the *nous*. Proclus explains the relationship between the imagination and the understanding as follows:

For the understanding contains the ideas but, being unable to see them when they are wrapped up, unfolds and exposes them and presents them to the imagination sitting in the vestibule; and in the imagination, or with its aid, it explicates its knowledge of them, happy in their

separation from sensible things and finding in *the matter of imagination* a medium apt for receiving its forms (*CEE: 55/44*).

In addition to this activity of embedding insensible matter in sensible matter, the relationship between the imagination and the understanding is also characterised in the form of the imagination as a 'screen' onto which the understanding 'projects' its ideas. In this context, the imagination is a 'passive *nous*', but it is productive insofar as it provides the means through which the 'partless' ideas of the understanding are 'inscribed' into extended forms. Projections or diagrams provide, therefore, a connection between the two faculties (*CEE: 56/45*).¹¹

In the context of the activity of 'projection' between the imagination and the soul, however, the imagination's images or pictures are 'passive' insofar as they are inscriptions of the soul's activity, yet they also represent original demonstrations of the imagination's powers of construction. In addition, the analogy of the imagination as a screen Proclus suggests that the reception of figures from the soul is a more 'reflective' and '*inward*' kind of movement:

Therefore, just as nature stands creatively above the visible figures, so the soul, exercising her capacity to know, projects on the imagination, as a mirror, the ideas of the figures; and the imagination, receiving in pictorial form these impressions of the ideas within the soul, by their means affords the soul an opportunity to turn inward from the pictures and attend to herself (*CEE: 141/113*).

Continuing this analogy of mirror and figure in which the soul looks ‘outside herself’ at the figures of the imagination, Proclus tells us that the soul is ‘struck by the beauty’ of the reflections of herself. Finally, however, the soul rejects these reflections in favour of its ‘own beauty’. Here, then, the imagination and the soul are brought together through the act of recollection (an enfolding) through which the soul distinguishes its own originality from the secondary figures of the imagination. Yet Proclus also acknowledges that both the soul and the imagination have an autonomy to move independently of the other; i.e. they are both ‘self-moving’. Overall, the soul’s abilities of recollection or reflection are more active generators of movement than the projection of figures received onto the screen of the imagination, but we can also suggest that this is a significant discussion in the *Commentary* when the imagination and the ‘reflective subject’ are brought into harmony in a manner that is highly prescient of Kant’s reflective judgment.

Thus, whilst the *Commentary* ‘anticipates’ Kant’s construction of the synthetic *a priori* in which mathematics mediates between the intelligible and the sensible realms, the hierarchy between the two levels is more strongly demarcated in Proclus’ thinking as a movement towards the ‘blessedness’ of the intellectual realm and the foundations of the partless One. Kant’s construction of the sensible realities of space and time provides a more exacting embodiment of the intelligible level, even if it is accessible, ultimately, only through appearances. In addition, Kant’s discussion of the imagination and pleasure and displeasure in the *Critique of Judgment* provides a more grounded psychological description of the ‘double’

movement of unfolding and folding than Proclus' suggests, which enables a subjective *aesthetic* analysis of the imagination, space and time in relation to the insensible and sensible realms, which Proclus does not articulate. But, as the next two sections will show, despite the lack of a fully embodied psychical movement in Proclus' discussion, the basis of his thinking in the Pythagorean notions of limit and unlimit especially, provides a powerful genetic and *aesthetic* connection between the realms.

Limit and unlimit

As indicated in the previous section, the imagination's powers are distinctly mathematical. In this section it will be shown that Proclus' notion of mathematics is profoundly Pythagorean in nature, in particular, in relation to the notions of limit and unlimit, which radically transform the aesthetic nature of the geometric method by grounding its unfolding and enfolding in an irreducible and immanent continuum of the divine.

Limit and unlimit amplify Proclus' Neoplatonic interpretation of metaphysics and science. He tells us that philosophy examines 'everything that is in anyway divisible as well as the nature of the indivisibles that are sovereign over them', while science examines and expounds 'only that indivisible nature which is appropriate to his first principles' (*CEE*: 93/76). So, under Proclus' guidance, Euclid's geometry is a demonstration of the metaphysics of limit and unlimit in the form of dianoetic thinking. Its scientific discursivity of extended geometric figures is amplified by the metaphysical powers of the limit and unlimit operations. In addition, and as Morrow notes, the discursivity of the *Commentary* is itself comprised of disruptive

‘interruptions’ of Pythagorean argument (*CEE*: li). As we will see in the next chapter, these excessive interruptions or disruptive ‘asides’ will also be an important feature of the ‘scholia’ in Spinoza’s *Ethics*.

Geometric discursivity is determined, therefore, by the Pythagorean principles of the One, the Many, the Limit, Unlimit and Mixture. It is an ontology in which the divine principles are also manifest in their original sense in the sensible world; for example, both the divine figure, such as Number, and the sensible world, are constituted by a divine irreducibility (Guthrie 1987: 21). Platonic metaphysics, in contrast, proposes that sensible world is related to the indivisible realm through the mediation of another level, that is, representation or form, so that the ‘contemplation’ of the immanent divine order can only be known through appearances or ‘phenomena’:

It was different for Plato. He adopts the Pythagorean notion that number is the principle of order in the cosmos and life, but number as such to him is not yet a *theion* [divinity]. It points at a purely intelligible Number which is a ‘Form’ [*eidōs*] – no immanent principle of order within the objects, but a transcendent Example. This is the basic difference between the Pythagorean doctrine of number and Plato’s Theory of Forms. Plato’s philosophy is a metaphysic of the transcendent; the Pythagorean philosophy is a metaphysic of the immanent order (de Vogel 1966: 35).

Mathematics in Pythagorean thought constitutes, therefore, an especially direct demonstration of the divine laws; for example, in the operation of ratio. Mueller explains that the regularity of limit can be expressed in the ‘even’ ratio of $2n/n$ (e.g. $2/1$, $4/2$, $6/3$ [...]) and the irregularity of unlimit is expressed in the ‘uneven’ ratio of $n+1/n$ (e.g. $2/1$, $3/2$, $4/3$ [...]) [CEE: xxv-xxvi]. Proclus’ affirmation of the limit and unlimit as ratios also confirms his Neoplatonic inheritance of the divine in the *Timaeus*, in which the world’s soul is also expressed as a series of ratios (Plato 1989: 36a-36b). In addition, it reminds us of the mathematical classification that Plato constructs in the *Republic* that is determined by Pythagorean principles, producing divisions of discrete or continuous things, which are also controlled by either, multiplicity (*plethos*), or magnitude (*megethos*). So, each classification is determined by unlimit; for example, multiplicity cannot be limited to a maximum number (*poson*) and magnitude cannot be limited to a minimum quantity (*pelican*) [CEE: xxvii]. Proclus also underlines the importance of unlimit in the Pythagorean order by distinguishing geometry from arithmetic because magnitude provides the grounds for its ‘irrationality’ and ‘irreducibility’ (CEE: 7/5). As we will see in chapter 4 below, these discussions of ratio, magnitude and multiplicity are important precursors to Leibniz’s investigations into the terms in his analytic geometric method.

Thus, geometry and arithmetic provide a discursive unfolding of the Pythagorean principles of the divine. In addition, the limit and unlimit constitute an irreducible series of ordinary discursive operations, in contrast to the non-discursivity of the ideal forms in the *nous*. As will be shown below, however, the structures of the divine powers tend to be defined in relation to the external powers

of the geometric figure, so that the explanation of how the limit and the unlimit might become 'real' 'transitional psychic activities' is not developed. As indicated in the section above, it is, perhaps, in the faculty of the imagination that these powers are embodied, however, in this respect they are considered 'sensible' rather than divine because they are generated from the 'impure' sources of sense-perception and knowledge of extended beings.

Chapter II of the first Prologue examines the importance of limit and unlimit in generating the discursive drives through which a totality of realities is produced. Derived from 'the indescribable and utterly incomprehensible causation of the One', they are 'all-pervading principles that generate everything from themselves' (*CEE*: 5/4). So, although we find Proclus' concept of the single, original One is consistent with the problems of a 'formless' and unknowable 'infinity', his argument insists upon the discursive *powers* of the Pythagorean principles in the production of immaterial and material realities. The inexpressibility of the One is omitted in favour of the discursivity that mathematics produces; for example, the discursivity between the geometric axioms and elements, which demonstrate the original divine irreducibility of the One (*CEE*: xviii, Note 30).

The limit and unlimit constitute a progression of causal order. Principles 'proceed' from them and 'go forth' into the divisions of the *nous*, soul, understanding and mathematics; for example, the stable existence of the ideal forms is determined by limit, yet their 'variety, generative fertility, and their divine otherness and progression' are drawn from unlimit. Mathematical objects are the limit and unlimit's

‘offspring’, demonstrating their ‘cooperation’ with each other and representing *intermediary* states that ‘proceed’ towards infinity as a series of identifiable ratios under the control of limit (*CEE*: 6/5). But of all the ‘intelligibles’, that is, the ‘higher realities’, unlimit is ‘the first creative cause and generative power of all things’ (*CEE*: 89/73). Thus, Proclus introduces a strong sense of a genetic ‘plenitude’ or development in diaonetic thinking, and an emphasis is placed on a dynamic discursivity grounding the notion of mathematics, to bring it into agreement with Plato’s argument in the *Republic* that mathematics is the highest form of dialectic methods (Plato *Republic*: 543e, cited in *CEE*: 43/35). The geometric unfolding of the Platonic realities, from the One, *nous*, soul, understanding or sensible things, is determined, therefore, by the constitution of identity as limit, however, the *plenitude* of the Pythagorean unlimit that is *immanent* in all realms prevents a divide being instantiated between the transcendental and the sensible realms that the Divided Line of the *Republic* constructs in Book VI.

Magnitude also provides an important aspect of the limit and unlimit in producing the irreducible and extended geometric continuum (and is also a key discussion in chapter 5 in relation to Leibniz’s definition of the Monad and ‘sufficient reason’). Proclus tells us that magnitudes constitute ‘infinite’ divisibility; they are ‘divisible without end’ yet each is ‘bounded’ from one another, providing another form of ratio (*CEE*: 6/5). For extended, geometric objects, magnitude explains the divisibility of matter, yet retains the irreducibility of immaterial, geometric ideas intact (*CEE*: 50/40). Magnitude constitutes, therefore, the nature of the limit and unlimit in extended matter; however, it is not a constituent of unextended ideas in the

understanding, such as the circle, which is ‘one and simple and unextended’. Here magnitude and shape are not produced, ‘for such objects in the understanding are ideas devoid of matter’ (CEE: 54/43). Magnitude is primarily conceived in relation to extended entities, therefore, and so it is an important manifestation of limit and unlimit in the production of the geometric figure by the imagination, as is explored in more detail in the next section.

Imagination, limit and unlimit

Proclus undertakes a lengthy discussion of the metaphysical natures of limit and unlimit, and the imagination in his analysis of Euclid’s first Definition; ‘[a] point is what has no parts’ (Morrow 1996: 86-96/70-78). He distinguishes between the idea of the limit from the idea of what is delimited. Limit produces different kinds of figures; ‘immaterial things’, ‘forms that require matter’ and ‘objects that appear in the imagination’. In immaterial things, limit is the indivisible *unity of the thing in itself*, whereas, in imaginary and material objects it is *the boundary of what is contained by limit*.

Perfection, Proclus states, is found in the simple and primary entities rather than composite substances. Thus, in the immaterial things of the *nous* and soul the conditions of limit constitute the things in themselves; that is, indivisibility, uniformity and unity are attributable to the perfection of their *internal* causes. By contrast, extended forms are determined by *external* causes in which the notion of unity is ‘imported’. For the shapes and objects of the imagination and sensible objects, therefore, boundary or limit is prior to matter; for example, we think of three

dimensional objects by attributing 'planes' to provide a limit or 'containment' to the figure. Two kinds of 'forms' are possible from this relationship of limit and matter; first, forms that can be separated into idea and matter (such as mathematical ideas) that sustain their own agency, that is, unity that arises from 'boundaries existing in themselves' and; second, those forms that are inseparable from matter, which are constituted by limit as 'parts' that are 'filled' with matter. The inherent 'boundlessness' of matter represents a contaminating aspect in the possibility of an autonomous limit-unity being established, therefore, and results in ideas forgoing 'their native simplicity for alien combinations and extensions' (Morrow 1996: 86/71).

Proclus' concern with the metaphysical potential of limit and unlimit also leads him to distinguish between the 'offspring' of limit and unlimit that are generated by the *nous* and soul in relation to the 'point'. He suggests that the point constitutes *an autonomous limit*, 'completely without parts' and yet also 'secretly contains the potentiality of the unlimit'. Significantly, by insisting upon the more radical Pythagorean concept of limit in which matter is constitutive of limit as difference within the monad (rather than an external application of classification or form), it is possible for Proclus to state that the particular, extended, geometric figure is an example of 'self-sufficient' limit; '[t]he point, then being a limit, preserves its character when things participate in it' (CEE: 88/72). The axiomatic point therefore outwardly expresses limit, whilst also *inwardly*, that is, 'secretly' possessing unlimit from which its potential for discursive and indivisible plenitude, 'everywhere' in the cosmos, is derived (CEE: 92/75).

This paradox of the partless limit introduces an important operation in geometric thinking, which Proclus goes on to consider in relation to the imagination's powers (and also precedes the power of 'vice-diction' in Leibniz's discussions, as we will see in chapter 4). Proclus emphasises that the indivisibility of the point is given to the imagination by the *nous* and soul. Once received by the imagination it is shaped and divided into extended matter and, because it has the 'double character of indivisibility and divisibility', the point is understood to be both divided and undivided in 'intervals' (*CEE: 95/78*).

The Pythagorean definition of the point underscores this condition; the point is 'a unit that has position', which arises from it being produced 'in the bosom of the imagination [so that it] is therefore enmattered' (*CEE: 95/77*). Proclus explains that, as a unit (number or arithmetic), it is determined independently of position, whereas as the point (figure or geometry), it is determined by position. The relationship between the point, imagination and embodiment is, therefore, a shift from an abstract intellectual concept of (pure) Number into a concept that is inherently concerned with extension and limit: '[b]y contrast the point is projected in imagination and comes to be, as it were, in a place and embodied in intelligible matter' (*CEE: 96/78*). The faculty of the imagination is central, therefore, to the relationship between limit and unlimit in the geometric method and the point's status as a kind of 'interval'.

(This is an important development in which to note briefly, that space and time are implied as limits of the imagination. The discussion has a resemblance to the discussions about space and time's irreducible unity in Leibniz's Monad and Bergson's discussion of 'perception' in chapters 5 and 6. The succession of

‘impressions’ in time and the simultaneous occupation of space is also implied, which Proclus argues prevents the collapse into pure divisibility. In addition, in the following paragraphs Proclus writes that indivisibility is also a characteristic of time: a discussion, however, that is too large to be expanded here, in detail).¹²

But in answer to the question; ‘how is the indivisible point possible if the imagination is determined by limit, shaping and division?’ Proclus writes ‘that the imagination in its activity is not divisible only, neither is it indivisible’ (*CEE: 95/77*). The imagination is neither, exclusively, divisible or indivisible, rather, it moves ‘from the undivided to the divided, from the unformed to what is formed’. If the imagination was divisible ‘it would be unable to preserve in itself the various impressions of the objects that come to it, since the later ones would obscure those that preceded them – just as no body can at the same time in the same place have a series of shapes, for the earlier ones are erased by the later’. Or, he continues, if it were only indivisible, the imagination would ‘view everything as undivided’, as do the understanding and the soul, and could not ‘exercise form-giving functions’ (*CEE: 95/77*).

An irreducible indivisibility defines the point, Proclus concludes. It is ‘the being’ of the point and, as a result, because it is derived from the point, the line is also determined by partlessness. Limit, therefore, attributes extension in the form of the point or ‘interval’. Proclus writes that; ‘[p]ossessing this double character of divisibility and indivisibility, the imagination contains the point in undivided and intervals in divided fashion’ (*CEE: 95/78*).

This infinite partlessness forms the basis for Proclus' explanation of Definition II in the *Elements*; '[a] line is length without breadth' (CEE, 97/79). Employing the Pythagorean principles of the divine monad, dyad, triad and tetrad Proclus explains the discursivity between one geometric principle and another. Geometric limits are shown to express a confluence of divine states; for example, the point is equated with the monad because it is 'a limit only', but it is also 'twofold' because it is neither 'wholeness nor parts'. In addition, he observes that a 'forthgoing' dialectic between the attributes of the monad and dyad is produced in the definition because the line has parts and is a unity; that is, the line is infinitely divisible since it is an extended entity (monad) and because it is 'extended oneness and generates duality' it also demonstrates the properties of the dyad (CEE: 98/80).

But, ultimately, limit and unlimit are divine states, existing independently of matter and are, therefore, 'intelligible' not sensible 'agents', of extension. As we will see in the following chapters, these definitions will become increasingly 'embodied' in Spinoza and Leibniz's theories of discussions of infinite 'substance'. Now in the following section, limit and unlimit are examined in relation to the discursivity of the geometric objects, elements and figures.

Discursivity of the elements

In this section the axiomatic structure of the text, its elements and figures are examined in more detail, preparing the way for the following chapters on Spinoza and Leibniz in which we will also see that the axiomatic structure of each text contributes to the *aesthetic* form of the geometric method; for example, Spinoza employs it to

emphasise of his 'affirmation' of an indivisible God and Leibniz uses axiomatic statements in order to underpin an infinitely divisible limit.

In the *Commentary*, Proclus writes that mathematical figures are produced in the *nous* as immaterial forms. But the plenitude of an inherent indivisibility in the dianoetic method means that they mediate between the divine and the material worlds. Thus, 'numbers, points, lines, planes, and all their derivatives' mediate between the insensible and sensible objects 'since they are independent of matter', but they also have attributes of extension, insofar as they can be divisible into parts; that is, they have a certain kind of 'mathematical matter' (*CEE*: p. lviii).

Geometric objects are immanent to their method, each determined by the limit and unlimit so that 'unfolding' is itself a form of geometric figure, an expression of the dialectic of the limit and unlimit operations. Dianoetic or 'imaginative and discursive thinking' is, therefore, 'triadic' because it is comprised of a 'mixture' of the three orders of knowledge and their respective cognitive powers; the *nous* or intuition, the understanding or discourse, and sense or opinion are brought together to constitute 'a texture of all these strands' (*CEE*: 35/29). Thus, an inherent continuity underpins the term 'element', Proclus explains:

We call 'elements' those theorems whose understanding leads to the knowledge of the rest and by which the difficulties in them are resolved. As in written language there are certain primal elements, simple and indivisible, to which we give the name [...] and out of which every word is constructed, and every sentence, so also in

geometry as a whole there are certain primary theorems that have the rank of starting-points for the theorems that follow, being implicated in them all and providing demonstrations for many conjunctions of qualities; and these we call 'elements' [...] (*CEE*: 72-73/59-60).

Proclus' promotion of the unlimit as the first 'creative cause' of both simple and complex elements underpins his analysis to reveal the potential of the discontinuity in the discursive geometric method; for example, the discontinuous potential of the figure is evident in Book One of the *Elements* in the form of problems and theorems that provide explanations 'interwoven' into the ends of sections (*CEE*: 82/67). Proclus tells us that problems and theorems represent two different modes of a proposition; problems are 'the *construction of figures*, the division of them into sections, subtractions from and additions to them, and in general the characters that result from such procedures'. Theorems are 'concerned with *demonstrating inherent properties* belonging to each figure' (*CEE*: 77/63) [my emphasis]. Thus, a proposition is a figure, defined by two different modes of operation; construction or demonstration. Furthermore, the theorem is concerned with the general whereas, the problem is concerned with the particular; '[i]n general, then, all cases in which the property is universal, that is, coextensive with the whole of the matter, must be called theorems; but whenever the character is not universal, that is, does not belong to the whole genus of the subject, then it must be called a problem' (*CEE*: 80/65).

Thus, Proclus defines theorems as *analytic* because they contain 'only a given attribute, not its antithesis also', and problems as *synthetic* because they 'admit the

possibility of antithetical predicates in its matter – the attribute sought as well as its opposite’ (*CEE*: 80/65). Problems, then, represent an ampliative figure because their subject matter is comprised of different elements, whilst still being considered as particular versions of propositions. Contained within the different branches and operations of the propositions, therefore, a range of analytic or synthetic figures becomes possible. (The possibility that geometry is both synthetic and analytic remains an important discussion in the following chapters, in which Spinoza and Leibniz offer divergent solutions).

Proclus’ analysis of the diversity of the elements states that, like theorems and problems, axioms and postulates are distinct from each other in a similar fashion. Both axioms and theorems ‘take for granted things that are immediately evident to our knowledge and easily grasped by our untaught understandings’; for example, that a straight line is the shortest distance between two points (*CEE*: 179/140). Second, axioms are ‘clear knowledge without demonstration’, just as theorems are ‘knowing from demonstration’ (*CEE*: 179/140-141). So, axioms and theorems display characteristics of completion and a unitary identity.

Postulates and problems undertake a more speculative form of deduction, assuming that a figure can be posited as a simple idea *without demonstration*; for example, a spiral, or an equilateral triangle, can be easily be assumed without demonstration, but in the *act of drawing* ‘complex motions’ are revealed (*CEE*: 179-181/140-142). Postulates and problems require an *additional act of construction* in order for them to be realised, that is, each is determined by the production of an image or figure; they are determined by the act of figuration, each aided by the

construction or ‘exhibition of a character’. So, although postulates are given the same general character as axioms insofar as they are ‘undemonstrated starting point’, yet they differ because they require an additional construction to be completed. Proclus tells us that postulates are considered to be specific to geometry, therefore, whereas axioms are generic (universal) to all the sciences of quantity and magnitude (*CEE*: 182/142). He concludes that there are three ways of distinguishing between axioms and postulates stating that; a. postulates ‘produce’ and axioms ‘know’; b. postulates are the particular ‘subject matter of geometry’ (for example, drawing is required to prove ‘that all right angles are equal’) and; c. (in agreement with Aristotle), that postulates demonstrate proof, whereas axioms are beyond demonstration (*CEE*: 182-183/142-143). Thus, we can suggest that the postulate and the problem produce a more explicit discursive link to the sense world because they are more complex, requiring demonstration of the unextended idea through *the act of drawing* the extended geometric figure. Once again, like Plato’s *Meno* and Kant’s concern with the technical actions of the imagination, an emphasis on the synthetic act of geometric thinking reveals that an *aesthetic act of construction* is required.

The importance of the multiplicity of the geometric method is further suggested in Proclus’ examination of the elements, the ‘lemma’ and the ‘porism’. A lemma designates ‘any proposition invoked for the purpose of establishing another’ and requires a particular ‘mental aptitude’ which directs two methods of explication: analysis and ‘*diaeresis*’ (division), or the ‘reduction to impossibility’. Proclus considers ‘*diaeresis*’ to be a kind of ‘lemma’ because it ‘does not directly show the thing itself that is wanted but by refuting its contradictory [nature] indirectly

establishes its truth' (*CEE*: 212/166). Thus, a lemma is an intermediate or partial figure and is produced as a result of the difference existing between two other elements.

Second, Proclus defines the 'porism' as a particular kind of problem that designates the liberation of 'some other theorem', and is 'an incidental gain resulting from the scientific demonstration'. It is a kind of by-product, 'bonus' or discovery, therefore, that lies between problems and theorems and is explained in two forms. First, it is 'a theorem whose establishment is an incidental result of the proof of another theorem, a lucky find' and second, it is 'problems whose solution requires discovery, not merely construction or simple theory' (*CEE*: 212/166). A porism is, therefore, a figure produced by speculation or hypothesis, rather than by a deductive and deterministic construction. In addition, like the lemma, it is an *intermediate figure*. Proclus writes:

But to find the centre of a given circle, or the greatest common measure of two given commensurable magnitudes, and the like – these lie in a sense between problems and theorems. For in these inquiries there is no construction of the things sought, but a finding of them. Nor is the procedure purely theoretical; for it is necessary to bring what is sought into view and exhibit it before the eyes (*CEE*: 302/236).

So, even though Proclus endorses the scientific necessity of geometry that is based upon 'self evident' and 'determinate first principles' he repeatedly emphasises the complexity within and between elements and, in particular, the eruptions of difference that are produced in the aesthetic acts of drawing and thinking (*CEE*: 75/61). As a result, we find that the construction of the elements is constituted by multiple, discursive operations that unfold an aesthetic geometric method. In the final section of this chapter we will look more closely at the structure of the figure, in order to show the extent to which it further intensifies these differences within a discursive continuum.

Figure

Section XIV of the Definitions analyses Euclid's term figure; a 'figure is that which is contained by any boundary or boundaries' (*CEE*: 136–146/109-117). Proclus states that it is 'something that results from change, arising from an effect produced in things that are struck, or divided, or decreased, or added to, or altered in form, or affected in any one of various other ways'. To demonstrate the figure's discursivity, Proclus outlines the ascending hierarchy of figures in six levels; 1. the sensible figures of 'art', 2. 'nature's craftsmanship', 3. the 'heavenly bodies' or 'intelligible forms', 4. 'figures of souls', 5. the 'intelligible figures' and finally, 6. the 'unknowable gods'. Figure, then, is a notion that is 'derived from the first causes' of the gods and, although there is an increasing descent from the perfection of the gods to the imperfect material figures, Proclus rejects the Neoplatonic suggestion that sensible figures are incomplete versions of the higher forms, stating that they too

‘contain the primary cause of their products’. Nor does he accept the suggestion that the immaterial figures of souls or intelligible figures ‘lack reality’ (*CEE*: 139-140/111-112). Rather, immaterial and material figures are shown to have a certain kind of self-sufficient agency, similar to the reflective agency of the soul. Each figure contains ‘self-moving ideas’ of ‘other things’ that are external to it, which ‘unfold’ internally in the figure to ‘bring back all things to themselves and enclose them’. Thus, at each level, the figure has the ability to apprehend itself depending upon the magnitude of its powers; for example, the gods have knowledge of the universe, souls have ‘immaterial thought and spontaneous knowledge’ and figures in nature ‘create appearances’ (*CEE*: 141/112).

Having made these distinctions, Proclus explains the relationship between movement and the figure through a Pythagorean principle; ‘[c]learly, then, the self-moved figure is *a priori* to what is moved by another; the partless is prior to the self-moved; and the prior to the partless is the figure which is identical with unity’ (*CEE*: 142/113). The figure becomes multiple in its potential forms, therefore, structured through ‘movement’ in which the divine exists in all states. But although the scope of this movement is restricted to the hierarchical order of perfection in which the sense object will always be less autonomous than the divine, the figure is not reduced to a merely formal categorisation of a ‘static’ identity.

In debating the nature of ‘unity’ in the geometric figure Proclus also reminds us that the figure produced in the imagination is extended and bounded, exhibiting the ‘twofold progression of the limit and the unlimited’ (*CEE*: 143/114). He then considers the validity of Euclid’s definition of figure suggesting that, although it is

contained, the figure is nevertheless considered as a 'whole', rather than a separation of matter and boundary. So, according to Proclus' examination, the self-sufficiency of the figure and 'the powers it contains' are affirmed. (Furthermore, this emphasis on the 'autonomy', 'powers' and 'self-sufficiency' of a heterogeneous series of figures will also be important discussions for Spinoza and Leibniz).

Figure constitutes, therefore, a multiplicity of limits or boundaries in which containment is undermined so that a figure is conceptualised by its own 'self-sufficient' singularity, rather than measured as an imitation of a primary 'genus'. This discursive distinction is also promoted in the emphasis on the relationship between the figure as a successive 'interval' or singularity in the unfolding method. The geometric figure represents a qualitative series of differentials that are 'irreducible' to the reductive notion of a single essence or limit so that the 'primary cause' of the figure becomes, not 'incomplete processes', but a generative power or movement, unfolding between and internally within each figure.

Finally, in a series of definitions of the figure, which we will see recur in the writings of Spinoza and Leibniz especially, Proclus summarises the origins of the idea of figure and suggests that its multiplicity is determined by five conditions. First, the idea of the figure is descended from the limit and unlimit, i.e. it is a 'mixture' of the two and is, therefore, inherently irreducible. Second, it has a unity that is constituted by 'different forms'; for example, the different parts of a circle or rectilinear figure. Third, it 'has the potency of thoroughgoing plurality', exhibiting an infinity of shapes and magnitudes in an unceasing 'unfolding'. So, just as the One is contained in the idea of the figure, circular lines 'are implicated in straight [lines] and straight in

circular'. But, as we will see below, this notion of continuity, though appealing is problematic because of the synthetic nature of the geometric figure (Leibniz, on the other hand, produces a more successful notion of analytic continuity). Fourth, figure is commensurate with the successive development of complexity and the 'inexhaustible' discursivity of arithmetic and number. Fifth, it has a 'secondary' and harmonious internal order of unity which can be divided into similar extended or unextended parts; for example, the division of a triangle or square into smaller versions (*CEE*: 144-145/115-116).

Thus, although there is a transcendental hierarchy of perfection towards the divine limit and unlimit, the concept of boundary or limit is nevertheless immanent to each figure's autonomy (*CEE*: 146/116). Extended geometric objects are *aesthetic* demonstrations of the method's discursive movement, providing the possibility for a continuous unfolding or continuum between the states to be expressed. The geometric figure of the 'fold' is understood, therefore, to be an unlimited, limit operation, however, because it is determined externally by the divine principles of discursivity, limit and unlimit, the scope of internal differentiation remains undeveloped.

Conclusion

Proclus constructs an aesthetic and discursive continuity from Euclid's geometric method and figures in the *Commentary*, however, the nature of the transformative principle of the unfolding is problematic insofar as it is determined by external differences of limit and unlimit that constitutes its 'synthetic' status. We are left with the problem that the geometric figures are derived from synthetic and,

therefore, external differences; for example, difference is reliant upon the external, synthetic status of the limit, unlimit and mixture, which limits the extent to which Proclus can distinguish the *internal changes* that generate different figures. Thus, although each figure is a discrete, differentiated limit within the irreducibility of unlimit, they are determined by the 'external' powers of limit and unlimit. This will be returned to as a key discussion in chapter 5 in which Leibniz provides an analytic order of change to articulate an intelligible transformation between geometric figures, in the form of an *internal and intensive* limit or ratio.

So, to the extent that the figures of unfolding and folding (the fold) are determined by the divine and original causes of the limit and unlimit, they represent discontinuous unities. Pythagorean principles generate the discursivity of geometric figures and elements, counteracting the precedence of a representational and formal order. In addition, the theological, metaphysical and aesthetic powers of these principles suggest a series of discontinuous unities. But, although the discursive movement still upholds the transcendence of the *nous*, World, Soul/Reason in the form of the mystical powers of the limit and unlimit, the actual *internal* changes between its figures are not defined in analytic terms, meaning that the claim that multiplicity exists is still at odds with a clear understanding of the empirical forms of geometry. Sensible beings are imbued with a kind of irreducibility; however, this explanation relies upon a 'mystical' solution, rather than intelligible psychological explanations.

In addition, although the self-sufficiency of figures is suggested, their internal discursivity is not as clearly defined in terms of embodied or human 'psychic

activities'. The importance of an internal folding and unfolding is hinted at, lessening the emphasis on external reason, but the imagination and the soul are primarily characterised as 'logical functions' rather than embodied 'physio-psychic' processes generated by the subject.

Finally, although the 'synthetic' order admits the intermediary status of the geometric figure, such as the mixture, it is not considered in terms of a series of internal differences. Each figure's singularity is a finite identity limit, versus the infinitude of an internal and analytic continuum in which the figure's unity is constructed through synthetic and analytic differences. In the following chapters, however, we will find Spinoza, Leibniz and Bergson propose aesthetic geometries in which the method and figure become fully commensurate with the internal, autonomous irreducibility of the thinking subject.

Chapter 3: Passage

For Spinoza, the geometric method is ‘expressed’ in the axiomatic structure of his text, the *Ethics*.¹ But, in contrast to Proclus’ named procedure of ‘unfolding’, Spinoza does not classify his aesthetic procedure so that the figure of the ‘passage’ proposed in this chapter is not a term that can be found written in the text itself. Rather, it is presented here as a mode of reading or thinking (i.e. engagement) that emerges as the text develops. Passage, therefore, is a kind of ‘comportment’ or ethic that is produced in the reader by the text; the text represents an aesthetic geometric method because it brings the axiomatic scientific method together with the aesthetic experience of reading the text to produce *an ethical subject* or reader. As a result, a ‘forgotten’ aesthetic geometry is configured through the reader’s enactment of (or attentiveness to) modes of living, rather than in the form of a ‘drawn’ or ‘technical’ geometric figure that Proclus or Kant propose.

Before analysing the *Ethics*, however, it will be useful to insert a short ‘scholia’ to explain the context of the geometric method that Spinoza inherits from his readings of Descartes’ philosophy and indicating the extent to which Spinoza’s method engages with Cartesian developments in geometric thinking.²

Geometric method after Descartes

Descartes’ writings on scientific method include the *Discourse on Method* (1637) and the *Principles of Philosophy* (1644) and Spinoza’s understanding of these texts provides a critical, yet respectful, examination of Descartes’ Cartesian

metaphysical principles. In his 'Commentary on Descartes Principles' (1663) Spinoza agrees with Descartes about the value of a proper scientific comportment for providing 'clear and distinct' ideas. Both philosophers view the analytic and synthetic forms of science to be the best way in which understandings about the perfection of God can be reached. Geometry is conceived, first and foremost, as a scientific discipline that provides evidence of clear and distinct ideas about God's perfection.

The importance of the analytic and synthetic method to both philosophers is made evident in Lodewijk Meyer's introduction to Spinoza's Commentary. Meyer cites Descartes' definition of the two methods to distinguish between the different modes in which the mathematical, axiomatic method produces results from 'Definitions, Postulates and Axioms'. Descartes' definition of analytic method in his *Reply to the Second Objections* (1642) is that 'which shows the true way by which the thing was discovered, methodologically, and as it were *a priori*'; and his definition of the synthetic method is that:

which uses a long series of definitions, postulates, axioms and theorems, and problems, so that if a reader denies one of the consequences, the presentation shows him that it is contained immediately in the antecedents, and so forces his assent from him, no matter how stubborn and contrary he may be' (Curley 1985: I, 129, 5-13/226).³

In addition, Meyer notes that Descartes' contribution to the development of the axiomatic method is its modification into the rational, analytic form and its subsequent impact on other sciences and philosophy. Descartes' concern with the analytic and the synthetic methods, therefore, inform Spinoza's *Commentary*.

But, although Meyer considers Descartes' innovations to be concerned with the analytic method, this chapter will emphasise the extent to which Spinoza's method is most strongly defined by the synthetic method, in particular, in his use of the 'scholia'. His *Commentary*, for example, is organised according to Descartes analytic method in the *Principles* but, like the *Ethics*, it also demonstrates Spinoza's own deliberate investigations into the synthetic procedure. The Prolegomenon of the *Commentary* states, for example, that Descartes' analytic method 'brought to light solid foundations for the sciences, and finally, by what means he freed himself from all doubts'; however, Spinoza also highlights the importance of the *synthetic* form of the results that are produced by the mathematical method (Curley 1985: I, 141, 8-9/231). He writes that Descartes' clear and distinct ideas are significant because they do not represent a series of discrete conclusions but '*should all be seen in a single act of contemplation, as in a picture*' (Curley 1985: I, 141, 8-9/231) [my emphasis]. The form of the results has, therefore, an *aesthetic significance* for Spinoza, in addition to their analytic structure.

This attention to the *aesthetic manner* in which the geometric method produces its forms is also evident in Spinoza's emphasis on the different '*modes of thinking*' that constitute Descartes' thinking subject, which provides a key difference between the two philosophers. In the Prolegomenon and repeated throughout the

Commentary Spinoza draws attention to the way in which Descartes' thinking is constituted by different modes of thought, some of which provide clear understanding and some less, depending upon their cause. He writes:

So when he said, I think, all these modes of thinking were understood, viz. *Doubting, understanding, affirming, denying, willing, not willing, imagining and sensing.*

But here the chief things to be noted – because they will be very useful later, when we deal with the distinction between the mind and body – are (i) that these modes of thinking are understood clearly and distinctly without the rest, concerning which there is still doubt, and (ii) that the clear and distinct concept we have of them is made obscure and confused, if we wish to ascribe to them anything concerning which we still doubt (Curley 1985: I, 145, 15-23/234-235).

Later, in his Corollary to Descartes' Proposition 4, Spinoza explains that knowledge of our body is less clear than knowledge of our mind, writing; '[h]ence it is evident that the mind, *or* thinking thing, is better known than the body [...]' (Curley 1985: I, 53, 5-7/242). Thus, although Spinoza recognises that the body is distinct from the mind because it does not produce clear understandings of the subject, it is still a necessary mode of man's existence. In addition, Spinoza follows Descartes' analysis of the 'different degrees of reality, *or being*' to emphasise that the modes in

which an infinite substance exists are not matters of 'accident' but are distinct states of being. Considering Axiom 4 he writes:

This axiom comes to be known just from the contemplation of our ideas, of whose existence we are certain, because they are modes of thinking. For we know how much reality or perfection the idea of substance affirms of a substance, and much the idea of mode affirms of a mode. Hence we necessarily find that the idea of substance contains more objective reality than that of some accident (Curley 1985: I, 155, 1-5/243).

Descartes' clear, analytical distinctions of the different and special parts of the thinking subject is a major source from which Spinoza's geometric method is developed, enabling him to produce both an analytic *and* a synthetic examination of the human subject in the axiomatic or geometric form. But Descartes' and Spinoza's thinking differs most with respect to the definition of substance and the resulting union between the mind and the body (see also, Curley's Preface to the *Commentary* in which he states that the main difference lies in Descartes belief that the mind is a distinct kind of substance [Curley 1985: 221]).⁴ In addition, by highlighting Spinoza's attention to the 'modes' of thinking in Descartes' method in the *Commentary*, we can see how Spinoza develops his notions of the union of the mind and body as particular *modes* of an infinite substance, rather than relegating the body to an unthinking or 'accidental' form of substance.

Geometric method in the *Ethics*

Spinoza's *Ethics* (1677) is a text that provides a distinctly 'human' understanding of the geometric method. Spinoza employs the geometric method in order to demonstrate the proof of God's existence and omnipotence and to provide a 'practical' guide about how to achieve this understanding.⁵ The axiomatic method is considered, therefore, to be a meaningful procedure through which to demonstrate metaphysical, theological and psychological steps towards 'perfection'.

On the one hand, we find that it is confirmed as a scientific procedure, and on the other, it demonstrates the route through which the senses (i.e. emotions) can become a productive aspect of understanding, that is, of a joyful life. The *Ethics* is a significant text, in the very least, because it affirms the possibility of a science of the emotions, constituting an early form of 'psychology' that brings together the scientific form of the geometric method with the mutability of the emotions. Thus, unlike Proclus, who is silent on the details of the senses and their union with the higher ideas, Spinoza proposes that the *aesthetic formation* of geometric ideas is a valuable means through which to *demonstrate the unity* of the immaterial 'mind' and the material 'body' in a study of the senses. In Spinoza's method, therefore, we see precursors to Kant's aesthetics in which the sensibility is considered to be both a meaningful subject of the *a priori* scientific method (cf. Baumgarten's 'aesthetic') and representative of the subject's experiences of pleasure and pain that constitute the passage towards a transcendental notion of the subject. (In addition, reading the *Ethics* is a demanding undertaking for the reader, since he/she is expected to engage

with a text that is technically intense, both as a scientific and an aesthetic experience).⁶

In the previous chapter it was argued that the geometric method was a discursive and synthetic unfolding from the mystical powers of limit and unlimit. Geometric figures were, therefore, comprised of a transcendental multiplicity and sufficiency, driven by Proclus' Pythagorean commitment to the hierarchy of unextended intellect over extended matter. Under these principles infinity was primary, but its source was an immaterial, unknowable infinity (the One). As a result, extended things – e.g. the body, senses and extended Nature – were reduced to impure versions of the pure, higher intellect, and situated into a continuum of figures that were unexplained in terms of the structure of the union between their immaterial and material constituents, the body, soul and mind. Recollecting that Proclus' geometric figure of the fold was implied in the operations of the soul, understanding and the imagination, it also remained limited to a set of ideal elements because it was not explained in relation to its potential as an embodied subject. Thus, the figure of the fold was always an implied action in the discursive 'unfolding'; its acts, although described as intermediary figures, were grounded in an ideal notion of development, synthetic but not yet developed into *a clear union* of unextended and extended substance. In addition, the method tended to represent 'general' ideas of the soul, understanding and imagination that did not describe the transition from the immaterial realm into *a conduct of living*, for example, the discursivity of the soul and its relationship to the imagination was explained through the analogy of representations. The possibility of a 'reason' derived from the emotions was denied and so the

unfolding structure of Proclus' method never made the transition from the abstract to the corporeal figure.

For Spinoza, however, the relationship between the body and mind is central to his metaphysics, positing a notion of unity that is brought about through *inherently embodied* human conditions; the emotions. In addition, infinity is not restricted to the immaterial realms, but is the basis, ultimately, for the single indivisible substance (God as Nature). The possibility of 'real' expressions of a transcendental infinity in multiple and extended beings is central to Spinoza's thinking, as Feldman notes in his introduction to the *Ethics*; 'how does extended substance come about from unextended substance?' and, 'how do the two interact if they are self-sufficient?' (*Ethics* 1992: 9).⁷ As a result, we will see that these questions lead to two persistent levels of metaphysical inquiry in the text: first, a defence of *substance*, not as extension, but as *existence*, which situates God as substance, i.e. *as Nature*, rather than God as an abstract idea that is separated from the material world.

Second, the text examines embodiment in terms of a series of *modes* of existence in which different modes of the multiplicitous substance are underpinned by *the modality* of the axiomatic procedure and the scholastic episodes. As a result of its various modes of expression, therefore, the geometric method is considered to generate intrinsic differences in which each mode is a distinct, self-contained expression. In addition, the 'parallel' attributes of the mind and body are suggested in the 'logical' unfolding of the axiomatic method and the intuitive and 'corporeal' scholia that reflect the indivisible infinity of Spinoza's univocal substance.

Thus, in contrast to Proclus, for whom discursivity is a route of ideal knowledge and relations, discursivity in Spinoza is re-configured into an embodied passage through the sensibility. The *Ethics* provides an examination of the unity between the unextended mind and extended body that are derived from a multiplicitous substance, representing a passage through the emotions in which the union of the immaterial and the material is not just given by the *faculty* of the imagination, but arises from the unruly, excessive affects of the sense-perception and demonstrates the immanent expression of God. Proclus' concept of unfolding passes into a method in which the notion of the figure becomes *the body in process, a lived body or subject*, so that 'truth' and the 'stepping-stone' towards it is presented as a life journey, a theological and a psychological path.⁸

The chapter begins the discussion, therefore, in an examination of the notion of substance in relation to the dialectic of limit and unlimit, in order to demonstrate the text's metaphysical structure and geometric 'discursivity' as it is embodied in God, Nature and man (also noting, briefly the differences between Spinoza and Leibniz's strategies). The chapter then examines the key 'elements' of Spinoza's method that demonstrate this infinite substance – that is, the attributes, modes, affects and 'common notions' – to suggest that Spinoza demonstrates the unfolding of his infinite substance in a step-by-step way, which he describes as '*ordine geometrico demonstrata*' (E: 7).⁹ This discussion also affirms the infinite perfection of God that is laid out in the deductive procedure of the geometric method and points to the importance of 'practical' demonstration in Spinoza's thinking, i.e. how to

achieve a 'perfect' unity between body and mind. This discussion then leads to a brief examination about the development of the imagination and memory in which Proclus' cognitive faculty becomes more closely associated with the 'psychical' operations of Kant's understanding of imagination and Bergson's examination of memory.

Having established the 'elements' of the geometric method, the chapter turns its attention to its textual delivery that represents a passage through the axiomatic and scholastic forms, and considers the manner in which geometric examples are used to provide particularly 'embodied' forms of geometric thinking in the 'scholia'. The chapter suggests, therefore, that the *aesthetic* structure of the text demonstrates the heterogeneous and *internal structure* of the geometric figure of 'passage' and its development between these elements and the scholia (which also extend the text's possibility into a series of 'external' states).

Substance

As noted in the earlier 'scholia' on Descartes, Spinoza's break from the Cartesian tradition is most strongly expressed in his argument for a univocal, yet infinite, substance. Challenging Descartes' postulation that extension and thought are two distinct substances Spinoza proposes that there is one, indivisible substance that immanently manifests the infinity of God in nature and man. The *Ethics* provides, therefore, a continuation of the Stoics' belief in the divine principles of the indivisible One and the Many in the context of seventeenth century debates of finity and infinity, substance and 'atomism'.¹⁰ (It is a text that is informed by the various forms

of these debates, including theories of atomism, bodies and motion in the natural sciences and physics, in addition to aesthetic and metaphysical concerns). This discussion, however, focuses on how Spinoza's theories of substance, attributes, modes and affects embody the transcendental limit and unlimit and suggests that these 'elements' represent a set of geometric and 'aesthetic' conditions.

As this and the following chapter show, both Spinoza and Leibniz tackle the problem of Cartesian substance through the dialectic of the limit and unlimit in relation to its corporeal embodiment. For Spinoza, the solution is found in positing a 'univocal' substance in which the synthetic notions of limit and unlimit are reconstructed as the union of the emotions and the corporeal subject. Leibniz takes a route in the opposite direction in which limit and unlimit become analytic magnitudes of difference. A number of important similarities between the two methods are evident, however;

1. the geometric method is a process that constructs both internal and external relations, but is generated from within the individual subject. For Spinoza, the modalities of human emotions (the affects) enable the subject to understand the external environment and objects and, for Leibniz, the infinite divisibility of the Monad produces a continuum between its interior and exterior;

2. Spinoza's affects and Leibniz's limit generate discursive geometries that are characterised by intensity, rather than logical or mechanical relations of agreement, thereby providing important precedents to Kant's concern with 'feeling' in the *Critique of Judgment*;

3. formal difference is constituted internally and is expressed externally, i.e. it is not derived from an external source.

So, the dialectic between divisibility and indivisibility is the primary generator for Spinoza's axiomatic discussion of substance, which sets out to define the conditions of infinity in relation to a divine notion of the One (*E*: 31). Part 1, 'Concerning God', begins by explaining that finity and infinity are the causes of God and Nature, which affirms the 'divine' origins of the world. In addition, these principles form the basis from which Spinoza constructs a geometric method that unifies God's immaterial infinity with extended or embodied modes of being.

In Definition 1, Spinoza tells us that God 'exists' absolutely and is 'self-caused'. In the following five Definitions and Explication, God's absolute, infinite existence is distinguished from the 'limited' finitude of things, thought or bodies. Although God is unlimited, bodies and things are limited, insofar as one thought will limit another, one body will limit another. Different modes of substance, therefore, cannot affect another kind, so that limit is determined by the nature of substance, rather than the nature of the entity or thing in which it is expressed. So, Definition 3 explains Spinoza's concept of substance:

By substance I mean that which is in itself and is conceived through itself; that is, that the conception of which does not require the conception of another thing from which it has to be formed (*E* 1992: 31).

In contrast to the Neoplatonic belief that the higher realms of intellect, reason, the world and the gods constitute a distinct kind of knowledge that is inaccessible to man, Spinoza's theory of substance provides the ground through which unextended (i.e. thought) and extended matter are derived from one, infinite 'substance'. God, thought and bodies, therefore, share the qualities of substance; that is, each is a 'self-caused' existence in itself, and so Spinoza distinguishes between the infinite substance of God and the limited but *autonomous* divisions of substance into thought and body. Substance, therefore, is constructed under three metaphysical principles; infinity (and finitude), existence and immanence. In particular, because it is relieved of its restrictive definition as 'extension' or matter its essence is posited as *existence* that 'belongs to the nature of substance' (*E*: I, Prop 7/34). Extended matter becomes *one* mode in which substance is expressed, therefore, rather than *the* defining principle by which it is understood. Instead, a multiplicitous notion of substance is considered to be the primary cause of extended *and* unextended beings, and evidence of God's infinite powers; for example, Spinoza writes, '[a]bsolutely infinite substance is indivisible' (*E*: I, Prop 13/39).

Later, in Part III, Spinoza emphasises the necessity of existence, not in relation to the divine, but as a question of *life or duration* in the individual entity. Here, the relationship between existence and substance is given its biological duration in the 'conatus' or the entity's power to strive to exist (which we will find is also crucial to Bergson's 'progressive' philosophy). Spinoza explains:

Therefore, the power of any thing, or the conatus with which it acts or endeavours to act, alone or in conjunction with other things, that is [...], the power or conatus by which it endeavours to persist in its own being, is nothing but the given, or actual, essence of the thing (*E*: III, Prop 7, Proof/108).

The conatus is specific to the finite mode of substance and points to a secondary mode of temporality that is determined by the attribute of body; '[e]ach thing, in so far as it is in itself, endeavours to persist in its own being' (*E*: III, Prop 6/108). God's existence, on the other hand, is not limited; it is infinite. Man's conatus, then, is limited as a duration, determined by the temporality of the body; '[t]he conatus with which each thing endeavours to persist in its own being is nothing but the actual essence of the thing itself' (*E*: III, Prop 7/108). Man and God-as-Nature are again differentiated because of the durational, i.e. limited, 'life-force' that determines man's essence: '[t]he being of substance does not pertain to the essence of man; i.e. substance does not constitute the form (forma) of man' (*E*: II, Prop 10/69). In addition, as this statement suggests, substance is distinct from the extended form of man, while being immanent to mind and body, because it is the principle of existence.

Substance's essence is, once again, confirmed to be existence, not extended matter or form. In addition, extension itself is not determined by the limit of form, but by the limit of a durational existence; i.e. the endeavour to exist. Extended bodies are not eliminated, therefore, from the metaphysical definition of existence and the

bodies that it produces, but are legitimately considered to be one mode of substance's infinite potential. As a result, extended things display the paradox of division and infinity. Infinite substance is, therefore, the primary cause of a triumvirate order of 'existence', the attributes, modes and affects. So, as God or Nature, infinite substance is indivisible, however, in its multiple forms of existence it has discrete and finite limits; for example, our imagination can divide water into parts, but our 'intellectual' understanding of it as a 'substance' considers it to be indivisible. Like Proclus, therefore, Spinoza also considers the imagination to be a key operation in the production of limit, in contrast to the indivisibility of a pure intellect (see below for a detailed discussion). He writes:

We conceive water to be divisible and to have separate parts in so far as it is water, but not in so far as it is corporeal substance. In this latter respect it is not capable of separation or division. Furthermore, water, qua water, comes into existence and goes out of existence; but qua substance it does not come into existence nor go out of existence
(*E*: I, Prop 15, Schol/42).

God is not just an Omnipotent and immaterial power but is also Nature, and Spinoza promotes this immanence further by highlighting its 'creative' or productive activity when he states that; 'God is the immanent, not the transitive, cause of all things' (*E*: I, Prop 18/46). Scholium of Proposition 29 also draws attention to the definition of Nature as a creative cause, distinguishing between its active sense as

producer or 'nature naturing' (*Natura naturans*) and its passive sense as product or 'nature natured' (*Natura naturata*). Nature is defined explicitly in terms of its powers of production and the modes in which these powers are manifest; thus, God's creative cause requires that all attributes 'cannot be conceived without' him and, in turn, attributes themselves are discrete expressions of his 'eternal and infinite essence' (*E*: 52). God as Nature, then, is the immanent cause, expressed in the infinite attributes and modes of existence.¹¹ In addition, immanence generates the singularities of extended substance; for example, the general idea of nature or man, or a particular embodiment of substance, such as an emotion or individual creature or person (the soldier or the peasant).

So, as shown above, substance is consistent with the metaphysical notions of limit and unlimit that form a continuum of metaphysical relations and orders. Both Spinoza and Proclus produce ontologies affirming the notion of an absolute, infinite God/One. The distinction between Proclus and Spinoza is made, however, because Spinoza's dialectic does not sustain the hierarchy of an unextended limit and unlimit over extended limit. Rather, by constituting God, Nature and man as 'self-caused' existences limit and unlimit become embodied into the notion of man himself. Extended bodies are manifestations of this existence, rather than impure derivations of the pure transcendental and immaterial sources. Spinoza's concept of extension is not reduced to an opposing 'materialist' power (although it has been defined as a 'materialist' metaphysics¹²), but it is determined by the infinite nature of existence; i.e. the 'essence' of extension is existence. Spinoza's 'univocal' substance is,

therefore, imbued with the dialectical paradox of limit and unlimit, divisibility and indivisibility, but defines them through examining the unities of unextended and extended materialities.

Attributes, modes and common notions

In the following paragraphs Spinoza's construction of an 'embodied reason' is explored in the form of the triad of interdependent operations (the attributes, modes and common notions), which produce a highly complex union of the different orders of human nature. In geometric terms, the discussion suggests that these operations constitute; a. the strands that unfold from the unity of indivisible substance, and; b. the 'elements' of the method that express the different figurations of unity in a series of increasingly defined stages, developing from the attributes of the mind and body, to the 'modes' of emotions and, finally, to the unity of the 'common notions'. As a result, there is a shift from the logical deduction of a geometric method into one that is both embodied – i.e. intimately concerned with the extended body – and is attributed with 'psychic' powers of transformation (i.e. the emotions). Thus, Spinoza's axiomatic explication of univocal substance provides an embodied and aesthetic expression of geometry.

Substance is first expressed through the two knowable *attributes*, the intellect and the body; each attribute intrinsically embodying both the common and the particular forms of existence. Thus, the complexity of the indivisible substance is made clear and distinct through its divisions (i.e. limits) into attribute, mode and

common notions; however, because division or limit is consistent with the notion of existence and is intrinsic to the entity, it does not collapse into merely formal definitions of form or identity.

Attributes express the essence of God or Nature. Spinoza writes; '[b]y attribute I mean that which the intellect perceives of substance as constituting its essence' (*E*: I, Def 4/31). Prior to modes and affects they express the infinity of substance in its extended and unextended states. Part II examines their structure in detail, highlighting the extent to which they are aspects of God's infinite existence; for example, '[t]hought is an attribute of God; i.e. God is a thinking thing', and '[e]xtension is an attribute of God; i.e. God is an extended thing' (*E*: II, Props 1 and 2/64). Mind and body are distinct, yet unlimited attributes that constitute the unity of God's powers and existence so that, once again, existence (or reality) is reconfirmed as the fundamental ground of substance in all its forms of expression. Spinoza explains; '[t]he more reality or being a thing has, the more attributes it has' (*E*: I, Prop 9/36). Or, 'nothing in Nature is clearer than that each entity must be conceived under some attribute, and the more reality of being it has, the more are its attributes which express necessity, or eternity, and infinity' (*E*: I, Prop 10, Schol/36).

Nevertheless, despite each attribute being autonomous from another attribute, they are brought together under a commonality of 'ideas'. Substance, in the form of the intellect, is continuous with substance in the form of the body so that the 'idea of the mind is united to the mind in the same way as the mind is united to the body' (*E*: II, Prop 21/80). Hence, Spinoza maintains the notion of agreement between different modes of the extended and unextended, because they are a unity that is derived from

an indivisible unity (the univocal substance or idea). In addition, by insisting on a common agreement between two distinct attributes, the discrete singularities of the mind and body are brought into a synthetic union in which neither is conflated with the other, since each expresses a specific capacity of substance.

But Spinoza also distinguishes between the general expression of God and the particular capacities of the attributes in themselves. These are expressed through the *modes* which are ‘the affections of substance; that is, that which is something else and is conceived through something else’ (*E: I, Def 5/31*).

Modes provide a third level of distinction to the universal substance and, once again, the principles of finity and infinity determine the development of particular and infinite modes; ‘[f]rom the necessity of the divine nature there must follow infinite things in infinite ways (*modis*), (that is, everything that can come within the scope of infinite [intellect]’ (*E: I, Prop 16/43*). So, the triadic, causal structure of substance is reconfirmed; developing from the primary, indivisible God or Substance; into the second level of the attributes of mind and body and, finally; to the third level of definite modes:

Every mode which exists necessarily and as infinite must have necessarily followed either from the absolute nature of some attribute of God or from some attribute modified by a modification which exists necessarily and as infinite (*E: I, Prop 23/ 48*).

Modes are finite; for example, as the body and the mind they are two distinct limits of substance's existence. They are also self-caused or autonomous; '[b]y 'body' I understand a mode that expresses in a definite and determinate way God's essence in so far as he is considered as an extended thing' (*E*: II, Def 1/63). Attributes, extension and thought represent general 'essences' of God and Nature, however, modes constitute distinct kinds of ideas (reason, imagination, love, desire or hate, etc.) and bodies (animals, plants, man, woman or the individual, etc.).

But modes also express the unlimited agreement in which Nature and God are unified into a multiplicity of modal types. In one of the most important examples of this agreement Spinoza tells us that the idea of the mind cannot be said to exist unless the parallel state of the body also exists. He writes; '[m]odes of thinking such as love, desire, or whatever emotions are designated by name, do not occur unless there is in the same individual the idea of the thing loved, desired, etc.' (*E*: II, Ax 3/64).

Thus, there is an increasing definition of limit or finitude in the sequence of causal relations. Modes sustain the 'connection' between the different versions, but they also have a greater definition of autonomy than attributes and hence, power. Like Proclus (and, as will be shown for Leibniz and Bergson), there is an increased continuity of change that is generated, in particular, between the different kinds of agreement in different modes of ideas and things. The discursivity of the geometric method, for example, is suggested in the modal continuity of one idea of a circle passing into another idea, or in the passage from one extended form of a circle passing into another (*E*: 67). Although the synthetic 'parallelism' between thought and body is evident – i.e. thinking cannot become extension – there is also a sense in which the

particular differences between the modes become less clearly demarcated as either thought or extension. In particular, the emotions or affects produce the most ambiguous kind of unity that is both expressed as thought and body, and in the case of adequate ideas or common notions, constitute embodied modes of reason.

Discursivity or the step-by-step deduction of the geometric method is augmented, therefore, by the ‘agreement’ or commonality that unlimited substance inheres in the multiple modes. Second, underlined by the creative production of God as Nature (i.e. *Natura Naturans*), an immanent and genetic discursivity is inscribed into the axiomatic procedure of the *Ethics*. But a clear understanding of the agreement between the mind and body still needs to be outlined. Much of Parts II and III explore the union in detail. First, Spinoza states that each is ‘the object of the idea’ of each other, confirming the unity of the affections and the body (*E*: II, Props 12 and 13/71). So, in the Scholium to Proposition 13, he can say that ‘the human Mind is united to the Body’ pausing, however, to note that this can only be proved if there is ‘adequate knowledge of the Nature of the body’ (*E*: 72). This leads him to define the particular nature of the human body in order to cast light on the particular nature of the human mind. It is, he suggests, understood through a principle of proportion (i.e. *ratio*); for example, the ‘proportionate’ activity of the body that is reflected in the mind of its accompanying body.¹³ Developing here, then we see the notion of ‘ratio’ (i.e. reason) in which a unity is produced out of the relationship between two independent aspects, which will also be considered a crucial aspect of Leibniz’s method in the following chapter.

In addition, in Proposition 19, II, Spinoza defines the particular way that the union is constituted, even more closely; i.e. the way in which we can understand the body. He writes that it is in 'the ideas' and the 'perceptions' of the affections 'by which the body is affected' (*E*: 80). Thus, the body is understood through forms of appearances, as ideas and perceptions of 'affections', rather than arising from its nature as an extended thing, which correlates with the human mind's knowledge of itself 'except in so far as it perceives ideas of affections of the body' (*E*: 80-81).

In this context, therefore, we find Spinoza suggesting an intermediary form of knowledge not dissimilar to Kant's theory of forms and appearances. For Spinoza, however, the emphasis on 'expression' provides a more immanent mode of relation than Kant allows, i.e. Spinoza considers the emotions to be the route through which a divine perfection can be attained. Kant, by contrast, considers the emotions to be limited to the sensible realm. Nevertheless, this confluence between Spinoza and Kant is apparent in the aesthetic potential of the emotions, insofar as they represent the movement (passage) between pleasure and pain, as will be shown below. In addition, Spinoza's conception of the imagination bears a strong resemblance to Kant's productive imagination in the third *Critique*.

But the embodied powers of the emotions are, however, only relevant to the unity of the individual's mind and body, and do not mean that the individual has knowledge of other external bodies, unless it is through the 'ideas of affections of its own body' (*E*: II, Prop 25/82-83). As we will see in the following section, these *affects* define man's modal autonomy and internal 'sufficiency', representing a kind of 'sufficient reason' through which the internal and external nature of the individual is

brought into being. Furthermore, like Leibniz's 'sufficient reason', we see the nature of the affects considered in terms of their intensity, introducing an important shift in the powers of demonstration and construction in the geometric method. But, in contrast to Leibniz's concept of the Monad, we find that Spinoza's unity relies on a *synthetic* harmony, whereas, Leibniz's 'sufficient reason' is generated from an *analytic* continuum or unity.

Affects or the emotions represent the unique mode of existence in the human subject and indicate to the unlimited power of the agreements and commonalities that may exist between the attributes and modes. Crucial to the possibility of a harmonious embodied subject, they represent the level in which the agreement between the thinking and extended subject is considered in terms of its capacities for happiness, sadness, agency, passion, activity and passivity.

Parts III and IV conduct an intense explication of the emotions as the particular powers of expression that man embodies. Here, then, the transcendental 'plenitude' of the unlimit is expanded in terms of the 'physio-psychic' condition of man. The emotions represent a set of 'transitive' powers that are continuously and internally produced by the subject, yet they are expressed in its external modes to constitute the active, autonomous subject and the realisation of a 'joyful' life.

Part III presents Spinoza's extended analysis of the emotions as affects, examining their production and duration in the subject through their *activity* in the form of adequate ideas, and *passivity* in the form of inadequate ideas. Spinoza explains these relations further, stating that *adequate ideas* are the embodiment of the

active state, whereas *inadequate ideas* are the embodiment of the passive state. In each case, neither the cause and effect is independent of the other, instead, each reflects the other; for example, the inadequate idea produces the passive state, not because the body leads the mind to passivity due to its limited nature, but because the relationship does not share a commonality. The body is not judged to be an external impurity or obstruction towards an active notion of being (i.e. becoming), but Spinoza does require that it be harmonised into a unity with the emotions in the realisation of perfection. Perfection is the underlying drive, therefore, through which active and passive emotions are brought together in the form of the conatus or the drive for existence.

In themselves, however, the affections do not constitute adequate ideas; rather, they are 'confused' ideas of the body and external entities (*E*: II, Prop 28/83). Propositions 29-31 underline the inadequacy of this confused, fragmentary and discontinuous kind of 'knowledge'. In the following propositions, however, Spinoza explains that ideas and affects do attain a unity and truth when they are constituted in God (*E*: II, Prop 32/85). Adequacy is that which is 'common and proper' between things, so that affects and ideas can be conceived as adequate once they are attributed with a commonality and a definition of limit in relation to 'the whole' (*E*: II, Prop 38-39/87-88).

In addition, the examination of activity and passivity leads Spinoza to consider their manifestation as pleasure and pain that reaffirms a *temporality in the passage from one state to another*, or from an inadequate to an adequate idea. Thus, the duration of the conatus is, in part, defined through the movement between active

and passive emotions. 'Adequate' knowledge, for example, can be produced from inadequate passions and confusion; '[a] passive emotion ceases to be a passive emotion as soon as we form a clear and distinct idea of it', or '[t]here is no affection of the body of which we cannot form a clear and distinct conception' (*E*: V, Props 3 and/204).

In the final development of the 'modalities' Spinoza tells us that adequate ideas constitute the '*common notions*', which are 'those things that can lead us as it were by the hand to the knowledge of the human mind and its utmost blessedness' (*E*: 63).¹⁴ Common notions are the clear, distinct *and* embodied ideas through which we can come to understand the perfection of God and, hence, the axiomatic method (i.e. geometry) provides a step-by-step outline of the agreement between mind and body as expressions of a human 'perfection' or unity. Common notions represent, therefore, the *irreducible unity of the (human) figure* that reflects the perfection of God as an idea (and therefore a reality) in the agreement between an emotion and the body.¹⁵

So, Spinoza inaugurates an agreement between man and God based not merely on the existence or essence of substance, but through the different distinctions of limit and unlimit. In addition, as we pass through his metaphysical levels the definitions of unlimit become more clearly demarcated, to the extent that the emotions are embodied as kinds of 'reason' derived from unlimit, but brought into proportion (ratio) with the body towards a joyful existence. As a result, the notion of agreement is not just determined by a synthetic union, but it is also a consideration of

magnitude, i.e. intensity. Agreement becomes defined in terms of ‘agreeing more’ (i.e. active emotion or happiness), or ‘agreeing less’ (passive emotion or sadness).¹⁶ As a result, Spinoza’s conception of ‘harmony’ is determined by degrees intensity in the emotions that also suggests a kind of agreement that we will find important for Leibniz in the following chapter, which represents a shift from a purely synthetic agreement into an analytic agreement.

Common notions represent the most ‘unified’ form of *geometric figure* in the text, therefore, in which the power of the subject is engendered as an agreement between its immaterial and material modes of existence. In addition, Spinoza insists upon the modes or affections as the primary means through which the knowledge of an infinite unity can be generated, and which *embody* the ‘transitive’ powers of change and duration. A shift takes place, from the *external* activities or powers of the cognitive faculties (especially, the hierarchy between the understanding and the imagination in producing ‘knowledge’ for the affects), to an emphasis on the way in which the human *figure* is constituted by active or passive powers and the extent to which harmony or unity are possible. Thus, the notion of an *internal activity* of each ‘sufficient’ subject is promoted in favour of the external ‘independence’ of the faculties of the understanding and imagination.

The shift from the production of a synthetic unity by means of a ‘mixture’ of states to the ‘affective’ modes that comprise the common notions also represents a greater emphasis on the aesthetic of the ‘sensibility’ that Kant promotes. Common notions are important, therefore, not merely as quantifiable differences between states (such as the differences between a man and horse), but represent *the*

modulation of embodied differences: a kind of adequate and transient ‘reason’ or *figures of ‘passage’*. Thus, their geometric status is not logical but derived from the sensibility because their existence is determined by the continuous change in the emotions. As a result, the relationship between God (i.e. the knowledge or ‘love’ of God) and the mode of expression (i.e. the mode or method) is also continuously and necessarily under transition. So, for Spinoza, the common notions become ‘real’ kinds of embodied knowledge granted a kind of ‘reason’ and registering a range of adequate or inadequate states, so that Spinoza can propose that ‘love’ or ‘desire’ represent embodied expressions of an infinite substance.

Second, they represent a form of aesthetic unity, in which the particular expressions of the indivisible substance are brought into a harmony of understanding with God and constitute a series of indivisible, yet embodied unities. Providing the most complex and unified level of geometric figures – i.e. they are an adequate idea or unity – the common notions’ sufficiency represents the unity of body and mind. That is, *they are the figures through which Spinoza explains the problem of union between unextended and extended matter*. Thus, we also see that there is a shift from the unfolding of understanding, which is an extensive movement ‘down’ from the immaterial idea to the extended body, to its reverse, an intensive ‘enfolding’ in which the unity of God is confirmed as a result of the particular powers (affects) that the common notions embody. Moreover, this ‘enfolding’ also represents a precursor to Kant’s reflective judgment in which knowledge of the universal is developed out of the particular; for example, Spinoza states, ‘[t]he more we understand particular things, the more we understand God’ (*E*: V, Prop 24/214). In contrast to Kant’s

schema of the faculties of the understanding and imagination, however, Spinoza posits the emotions as the ‘powers’ through which knowledge of God can be developed. Thus, we find that Spinoza’s concern with the emotional experience of pleasure and pain represents an aesthetic dynamic of unity and sufficiency.

But, in the context of inadequate ideas and duration – i.e. limit – Spinoza also acknowledges that the *imagination* is significant; for example, its powers of division link it to the inadequate idea. Like Proclus, therefore, Spinoza considers the imagination to be an embodied limit-operation, emphasising that its powers are determined by its corporeality. In the lengthy Scholium of Proposition 15, I, he explains:

I reply that we conceive quantity in two ways, to wit, abstractly, or superficially – in other words, as represented in the imagination – or as substance, which we do only through the intellect. If therefore we consider quantity as it is presented in the imagination – and this is what we more frequently and readily do - we find it to be finite, divisible, and made up of parts. But if we consider it intellectually and conceive it in so far as it is substance – and this is very difficult – then it will be found to be infinite, one, and indivisible, as we have already sufficiently proved [...] (*E*: 42).

In Part II the imagination’s powers and products are examined, in which it is described as ‘a conception of the mind’ that produces ‘images of things that we

imagine' (*E*: 97). The imagination and its products, images or words are 'constituted solely by corporeal motions, far removed from the concept of thought' (*E*: II, Prop 49, Schol/97). As has been explored above, however, ideas are the source of 'commonality' between the mind and the body, which constitute understandings of the mind and body in a unity. The imagination is important, therefore, as one mode of producing ideas and perceptions; but its powers are, ultimately, restricted.

Spinoza also considers the images of absent objects and ideas in which the imagination produces memories of the 'affections' that the body perceives (*E*: II, Prop 17, Coroll and Prop 18, Schol/77-79). Here, imagination provides a common ground between the images of the mind and the perceptions of the body. Spinoza explains that memory is; 'simply a linking of ideas involving the nature of things outside the human body, a linking which occurs in the mind parallel to the order and linking of the affections of the human body' (*E*: 79). The imagination provides, therefore, a continuous link between the internal perceptions and ideas of the body and its exterior and, as we will see later in chapter 5, this continuous *passage* of perceptions and images from the interior to the exterior, is a key aspect of Bergson's discussions about matter and memory.

The geometric method constructed in the *Ethics* suggests, therefore, a shift away from an idealised, divine unfolding in which internal operations remain implicit (because, according to the Neoplatonic belief, embodied perception is less desirable than ideal identity). Instead, Spinoza proposes a series of modes in which the geometric figure is irreducible from its material, bodily expressions; in particular, its

evolution from a multiplicitous substance. Extension is the productive condition of the geometric figure, in particular, in the form of the thinking and emotional subject, so that unity is defined as forms of agreement between distinct kinds of existence, which are 'common' elements of the single, originary substance.

How, then, does the *Ethics* constitute a geometric method? Up until this point in the discussion we have seen that it posits axiomatic propositions towards the construction of an ontology of a univocal, yet modal substance that can be understood as an *extensive* explication. But the common notions also carry in them a shift from an 'unfolding' to the reverse movement, an 'enfolding', in which the general is produced out of the particular. In addition, we have seen that the extensive movement is succeeded by an 'intensive' movement between the emotions; thus, Spinoza's geometric method may be considered as extensive and intensive, unfolded and enfolded.¹⁷ These reverse movements produce an important shift in the development of form that is generated from the particular, rather than the general, and in which the emotions or affects are intrinsic 'origins' in the pursuit of unity, harmony or concord between the mind and the intellect. The geometric method is given a distinct point of departure through the corporeal irreducibility of the emotional subject (not the transcendental immateriality of God). In addition, the emphasis on the powers of an intensive development, i.e. the actions of the emotions, results in variable movement. Thus, the 'form' of the elements underpins the extent to which the dialectic of limit and unlimit provide the diverse commonalities of the method. Form is produced out of the productive powers of the elements, rather than as an externally derived classification or identity. Modes, whether they are active or

passive emotions, are sufficient in themselves to the extent that they are *intermediate* states *on the way* to a state of 'blessedness', but their form is most reflective of the enfolding and unfolding movement between the general, external states of unity and the particular, inner unity of the subject.

In addition, the common notions are akin to the 'all-in-one totalities' of intuition, but are derived from the sense perceptions and body, versus the intellectual step-by-step procedure of the discursive geometric method. Thus, Spinoza's detailed, axiomatic explanation of the common notions is underscored by the irreducibility of the emotions, which are always in duration and at different 'speeds'.¹⁸ In addition, the emotions always 'go forth', since we can have the same emotions, but the sequence of their transition and their duration is always different. Through them the extended body is always a durational experience. We can propose that geometric discursivity in the *Ethics* is the following, therefore;

- a. the relationship between the substance, attributes and modes in an increasingly intensified dialectic of limit and unlimit, i.e. the affections represent the most distinct and intensive forms;
- b. the passage of one emotion into another. Emotions are also determined by the plenitude of unlimit and pass from one into another state. The emotional modes represent the routes through which to get to the common notions, they are the 'stepping stones' to the common notions;
- c. common notions represent the highest state of geometric 'figure' in which pure intellect becomes accessible to the individual, i.e. in the form of the adequate ideas through which we pass. They are produced out of the union between the mind and

body, rather than given as pure intellect from outside and are akin to intuition or the soul;

d. limit becomes internalised (i.e. a physio-psychological discussion); the individual is constituted by the internal limits in the ‘thresholds’ of the emotions and body.

Passage through the text

Hence, as an effect of this method, we find that the experience of reading the *Ethics* requires that we ‘agree’ with the text. Geometry becomes an ‘affective’ or ‘felt’ method; first, as it lays out the nature of the emotions, and; second, because it is intended to lead the reader towards the understanding of God and ‘a joyous life’. Thus, the text brings together geometry and the sensibility in the conjunction between feeling and the scientific geometric method in a rigorous and ‘affective’ document that employs scientific and aesthetic methods to the extent that if the reader does not engage fully – i.e. become ‘affected’ – the scope of its potential remains limited. Thus, the reader is propelled through the text so that it becomes not just a logical experience of geometric order, proposition, analysis and argument, but a felt or embodied sensibility that is intended to endure in us as a ‘practical’ philosophy; *it is an aesthetic experience of the geometric method*. In the last section of the chapter an analysis of some of the aspects of the axiomatic and scholastic structure of the geometric method will underpin this intention, but first it will be useful to be reminded of the metaphysical argument in the text in its *passage* through the five Parts and underlining the ‘ethical’ development of the geometric method.

Part I examines the fundamental structure of the world, in its most essential substance, i.e. *God*. God is the only form in which substance can be equated with absolute certainty with extension, but as a self-determining, internal expression of this ultimate, infinite substance. For Spinoza, the truth of a multiplicitous substance is derived from the existence of God but is infused with nature and physics. The *Ethics* begins, therefore, by positing its own internal constitution in definitions that express the substantial elements and operations of Spinoza's method. Taking each definition in turn reveals the multiplicity of each of these statements, which operate within a geometric method that unfolds and enfolds its project.

The propositions and proofs in Part II provide an analysis of the structure of *man* in the pursuit of an understanding of God through which the transcendental capacities of God become expressed in the fundamental 'structures' of man – i.e. thought and extension. In order for this journey to be achieved, it is necessary for Spinoza to prepare the way to show how these attributes may join together in agreement and to promote as great a sense of joy as possible. An emphasis on the powers of man (i.e. the emotions or affects) is established so that the subsequent two parts of the *Ethics* are an intensive examination of these powers, undertaken by means of a 'practical' method, so that they become the active agents towards the realisation of 'blessedness' in the individual (that is, the reader).

Part III presents the analysis of the modes of the body and mind, i.e. its *affects*, examining the production and relationship between the inadequate idea and the adequate idea. Adequate ideas are the active state between ideas and the body in which each reflects the power of the other. Inadequate ideas produce passivity in

which a confused relationship between the body and mind remains limited by contradiction, so that the body and mind are unaffected by each other and the movement towards an active state of happiness is obstructed. Happiness (i.e. absolute affirmation), therefore, is a form of self-knowledge (self-cause) that is determined by the movement between the 'power-knowledges' of the mind and body which 'bind' its energies towards perfection.

Part IV examines this *perfection* and man's ability to achieve it in a study of man's emotions and his potential in achieving an adequate and ethical life. Here, the embodiment of man's emotions is assessed in relation to the qualitative effects of good and bad, however, the Preface also emphasises how these qualities are themselves expressions of a substantive unity; 'perfection and imperfection are in reality only modes of thinking' (*E: IV, Preface/153*). So, when someone changes states from perfection to a lesser perfection it is not a change of essence 'but that we conceive his power of activity, in so far as this is understood through his nature, to be increased or diminished' (*E: 154*). Spinoza's emphasis is not just on the moral qualities that come from being 'guided solely by reason' but also promotes a reason that is derived from the emotions (*E: 192*). It is, therefore, an argument for 'the right way of living' through a 'practical' examination of the emotions (*E: 195*).

Nevertheless, it is important to recognise that, for Spinoza, the most perfect mode of happiness is 'blessedness', which 'is nothing other than that self-contentment that arises from the intuitive knowledge of God' (*E: IV, Appendix/196*). The common notions represent, therefore, the unity of Desire with Reason to form the 'intuitive knowledge' produced from an agreement between the mind and body.

Embodied reason is, therefore, the mode that is examined in the final Part of the *Ethics*. But it also amplifies 'the method, or way, leading to freedom' because the geometric method becomes an aspect of the continuously changing and embodied activity in the individual, not a totalising set of truths (*E*: 201). Part V represents Spinoza's most explicit challenge to Descartes' 'occultist' confusion of the mind/body relationship, therefore, in which he argues that Descartes' notion of the pineal gland fails to account for a properly embodied state because it gives no clear explanation of the 'union of mind and body' arising from his insistence upon the distinction of two kinds of substance (*E*: 202). Spinoza, on the other hand, liberates this confusion by returning to the primary examination of the mind and body union, demonstrating how blessedness can be realised and affirming the possibility that the subject can be considered with the same qualitative value (or reality) as the divine; for example, he states that passivity is transformed into activity once it becomes an adequate idea (*E*: V, Prop 3/204). So, in Part V, rather than reason and emotion opposing one another, exclusively, Spinoza argues that they are expressions of the same unified substance and are more 'truthful' realities through which to conduct a life. Emotions become intimately tied to reason, rather than being rejected as confused or inadequate.

This is undertaken in a return to the realities that affect the subject, i.e. ideas, images and, ultimately, God. But the limited endurance of the body still remains a fundamental limitation to the scope of human power and hence, perfection, which constitutes an important distinction between the nature of the method (the power to love) and its goal (God). The geometric method might, therefore, be considered the

most 'perfect' human way to strive for blessedness; insofar as it is the most divine expression or manifestation of God it is the 'third kind of knowledge', i.e. intuition, through which the subject can be led to the greatest contentment (*E*: 215). Thus, *the text and its objects become passages through which perfection is made possible*. In addition, the final Part is also a summary of the aesthetic unity that the method produces, insofar as embodied reason represents a 'sensibility' or 'aesthetic'.

Method

In this final section of the chapter we will see that the passage through the text is achieved by Spinoza's delivery of the geometric method in a highly rigorous fashion that comprises of both the scientific axiomatic elements and figures and the 'intuitive' asides of the scholia.

The axiomatic method is used to affirm the *a priori* nature of Spinoza's post-Cartesian project, in which the *a priori* definition of 'clear and distinct' ideas is developed into a discussion about adequate and inadequate ideas. The geometric method becomes a means, therefore, through which perfection is addressed in relation to the scope that a modified mathematical procedure enables for configuring new 'standards' of truth. Furthermore, we find that Spinoza develops Descartes' axiomatic method (that uses sceptical doubt) into an affirmative and 'productive' practice.

As shown in the previous sections, Spinoza uses the axiomatic method to propose a substantial relationship between God, nature and man, so that the notion of the *geometric figure* is concerned with the scope of embodiment as a 'vital'

expression of God. In addition, we also find that Spinoza brings together both the embodied figure with the '*scientific*' figure insofar as the axioms themselves represent different figurations of this relationship; for example, in Part I, the axioms represent the figure of God; in Parts II, III and IV axioms constitute the figure of man and finally, in Part V, they represent the figure of the 'reflective subject' that is an internalised union of God in the subject. Thus, in Part I the axiomatic method provides *affirmation* of the single infinitely expressed substance that is God-or-Nature; in Part II it explicates the specific attributes that belong to man (that is thought and extension); in Part III the power of man's nature, i.e. his expressive potential, is outlined in the analysis of the emotions or affects; in Part IV the relationship between the intellect and the emotions is examined as an issue of moral development, and; finally, in Part V, active self-knowledge of the subject (agency) is explored in relation to the divine in the realisation of a concrete immanence (i.e. the construction of a transcendental subject).

In this respect, the geometric method enables Spinoza to 'invent' a series of *intrinsic geometric figures* – especially, in the form of the common notions – that are the formative elements for understanding God and represent 'real' truths. The axiomatic method generates, therefore, an increasingly concrete series of geometric figures that enable Spinoza to demonstrate the power of God through an increasingly 'embodied' series of divine, scientific, emotional, moral, adequate and inadequate ideas. In the Axioms of Part I; for example, Spinoza employs the scientific figure of the axiom in order to posit a series of embodied, irreducible and aesthetic figures in the following ways:

1. *Modes of singularity in figures*: All beings exist inherently in themselves or in another being, and that being is conceived 'through another thing', and when this is not so, 'through itself'. Thus, being is predicated upon a finitude that is also expressive of an underlying infinity (Axioms 1 and 2).
2. *Expressions of realities as figures*: More than one reality exists at any one time. Any reality (being/entity/form) is an expression of a preceding cause or reality (Axiom 3).
3. *Knowledge of realities and figures*: The greater the knowledge of the realities, i.e. its effect and cause, the greater the scope of the effect. The scope of the being is dependent upon the knowledge of the cause (Axiom 4).
4. *Agreement, individuality and commonality between figures*: When there is nothing in common between things they cannot involve/cause/affect another (Axiom 5). Agreement provides the ground, i.e. the 'truth' of an idea. Ideas, when true, are concrete expressions of other realities, i.e. they are made real in conjunction with other expressions of them. They are, therefore, a kind of internal expression of an external set of relations (Axiom 6).
5. *Limit and infinity of figures*: Limit and unlimit provide the possibility of realities (Axiom 7).

The *axioms* propose, therefore, a series of operations that are specific to each individual figure so that each is an 'unfolding' expression of an absolute infinity but which also embody increasingly concrete demonstrations of finitude (the modes and affects).

In addition, the *propositions* generate the diverse modes of reality – substance, attribute or mode – that express a divine infinity, but which can be explained through logical and discrete statements, situating them into a ‘genetic’ description of geometric figures that also reveals their intrinsic relationship to one another. We can suggest, therefore, that Spinoza’s axiomatic method is a synthetic demonstration of the power of production (creation), from the divine through to an intellectual and embodied subject, and its reverse. As a result, this form of ‘creation-production-demonstration’ suggests a highly reflexive method of delivery in which the geometric method becomes invested with a genetic and immanent status, rather than being understood as a representational or transcendental structure that is un-reflexive of its content. While this ‘genetic’ discursivity reminds us of Proclus’ thinking, the emphasis on the reflexivity of the actions that result from the activities of the emotions will be shown to be a significant aspect of Bergson’s thinking in the last chapter.

This reflexivity is most strongly ‘felt’ in relation to Spinoza’s invention of the *scholia*, which constitute a dramatic shift in the ‘comportment’ of the method from the logic of a scientific procedure into a series of rhetorical ‘interruptions’ or interlocutions.¹⁹ Thus, the *Ethics* is not merely a scientific hypothesis of commonality and agreement, but a series of textual expressions of agreement, disruption or commonality running side-by-side with the deductive scientific method that is reminiscent of the movement between the Pythagorean and Platonic discourses in Proclus’ text. The *scholia*’s specificity lies in their status as embodiments of the passions, affects or emotions and through which the axiomatic argument is further

amplified. As such they represent *figures*, singularities or common notions that expand and intensify the method, confirming its value in the production of multiplicity rather than the uniformity of 'One'. The Scholium to Proposition 15, Part I, for example, presents one of the most forceful arguments about the divinity of extended matter and uses a scientific example of geometry to make its case (*E*: 41-42). Spinoza is concerned, therefore, with revisiting the geometric method (i.e. the figures and modes) in order to emphasise the necessity of an adequate 'truth' with an infinite God, but we also find that he *returns* (an *enfolding*, perhaps) to the mathematical principles of geometry *in order to add weight to an embodied aesthetic of geometry in the scholia*.

Thus, scientific geometric examples enable him to propose a discursive set of relations and to demonstrate the divine in the extended figures because, although they represent mathematical arguments, they also constitute 'scholastic' elements in which they represent *particular embodiments* (i.e. modes) of the geometric figure. Geometric matter is not merely constrained to scientific reality, therefore, but also represents an aesthetic example of the 'common notions', in particular, in the 'scholastic' episodes in which their material status is most prominent. Occurring principally in Parts I and II these examples are used to distinguish the relationship between substance, limit and extension in the production of the common notions; for example, in the first scholium of the text, they comprise an extended proof that 'substance is necessarily infinite', in contrast to the confused or imagined notions that trees talk or that man is derived from stones (*E*: I, Schol 2, Prop 8/34). In this

respect, Spinoza introduces a geometric example to demonstrate the 'eternal truth' of infinite substance, writing:

No definition involves or expresses a fixed number of individuals, since it expresses nothing but the nature of the thing defined. For example, the definition of a triangle expresses nothing other than simply the nature of a triangle, and not a fixed number of triangles (*E*: 35).

Here, therefore, a geometric definition of a triangle is not a quantitative distinction, it does not suggest limit or quantity to the nature of triangles that exist, rather it expresses that intrinsic notion of a triangle which is a *qualitative state*, without expressing limit. The definition of a triangle endorses the limitlessness of God, presenting a mode of knowledge through which a 'sufficient reason' can be produced, rather than understandings that are determined by the limits of the imagination. Re-emphasising the essence of an entity, including a geometric one, Spinoza argues that if Nature were to be determined by notions of 'fixed number' (e.g. that twenty men were to exist), it would need to be demonstrated through external causes, but since existence is the essence of substance it must be intrinsic.

Alternatively, in Proposition 11, I, Spinoza addresses the production of the attributes, which reflect the infinity and causal relation of substance, and in the Proposition's Second Proof a geometric example is used to prove that God necessarily exists as a substance of infinite attributes, which expresses the 'eternal and infinite essence':

For every thing a cause or reason must be assigned either for its existence or for its non-existence. For example, if a triangle exists, there must be a reason, or cause, for its existence. If it does not exist, there must be a reason which prevents it from existing, or which annuls its existence. Now this reason or cause must either be contained in the nature of the thing or be external to it. For example, the reason why a square circle does not exist is indicated by its very nature, in that it involves a contradiction [...]. But the reason for the existence or non-existence of a circle or a triangle does not follow from their nature, but from the order of universal corporeal Nature (*E*: 37).

So, in quick succession, Spinoza incorporates geometric figures into an affirmation of 'corporeal' or 'real' Nature, which suggests that the value of the mathematical figure as a standard of truth is not held apart from the natural order of Nature but is, rather, an *additional expression* of it. Thus, epistemological divisions between mathematical knowledge (and, therefore, merely limited to an ideal form that produces abstract notions of the world) and the sensible realm are brought into 'commonality' through an emphasis on embodied *and* divine realities. This genetic discursivity is also evident in the explanation of the order of ideas and things in the Scholium to Proposition 7, II. Spinoza states that:

Consequently, thinking substance and extended substance are one and the same substance, comprehended now under this attribute, now under

that [...]. For example, a circle existing in Nature and the idea of the existing circle – which is also in God – are one and the same thing, explicated through different attributes [...] (*E*: 67).

In addition, this scholium amplifies the statement that the ‘order and connection of ideas is the same as the order and connection of things’ (*E*: 66). God is the cause of both an unextended idea of the circle and a drawing of a circle, so that the scholium demonstrates that the form of the circle is produced from a continuous series of unextended and extended figures (*E*: 67). Thus, the geometric figure is a ‘formal being’ that expresses the ‘order of the whole of Nature’ or of God, and the geometric procedure is one mode of the immanent expression of the divine, not a just an order of representation.

The geometrical method is presented, therefore, as a ‘volition’ or ‘a mode of thinking’ that is an affirmation of the ‘conception’ or idea; for example, in the Proof to Proposition 49, II, the geometric figure is the affirmation of an idea insofar as the idea of a triangle is an affirmation of its essence, i.e. that a triangle must involve the idea that ‘its three angles are equal to two right angles’ (*E*: 96). As a result, Spinoza suggests that an affirmative mode of thinking belongs to the ‘essence’ of a thing; and so we can say that the geometric figure is affirmative of the order of both ideas and Nature.

In addition, in the Preface to Part III Spinoza addresses the use of the geometric ‘manner’, considering it to be an expression of ‘the universal laws and rules of Nature’. He illustrates this point by stating that emotions ‘follow from the same

necessity and force of Nature as all other particular things'. They are attributed to 'definite causes' or have specific 'properties' that can be understood and may, therefore, be examined in the same manner as God and 'the mind'. To this extent Spinoza considers 'human actions and appetites just as if it were an investigation into lines, planes, or bodies' (*E*: 103). The geometric method is, therefore, removed from its abstract and lofty generalisations, and given the scope to be a meaningful, embodied and particular matter or reality. Spinoza produces a relationship or passage between the text and the reader that constitutes an 'affective' geometry, that is, an intensively expressed procedure through which the text situates the reader into an immanent relationship with God's power; for example, with respect to the scope of the axiomatic method for affirming the power of the emotions.

Conclusion

This chapter has argued that Spinoza develops a notion of the geometric figure as an expression of the subject in its various modes of intellectual, spiritual and emotional embodiment. In addition, these configurations constitute an embodied geometric passage or an aesthetic experience. In particular, not only do Spinoza's common notions express the scope of the aesthetic project of geometry from one mode to another (such as, the passage from the scientific geometric method into the aesthetic), but they also suggest a progressive procedure insofar as they constitute a practical demonstration.²⁰ The geometric method is not limited to a single mode of representation, but is extended into a range of embodiments and these geometric

figures demonstrate a certain kind of passage that can be drawn between mathematical, philosophical and aesthetic series of relations.

The *Ethics* is, therefore, an embodiment of passage as an aesthetic realisation (i.e. it produces an immanence in the forms of an affirmation of a 'passage' through different modes of 'reality' or figures). The journey from the divine to the concrete is staged in five parts that provide a 'practical' philosophy of ethical development in which the scope of the geometric method is incorporated into a complex metaphysical process. Each part develops a path through which the structures and modes of expression in a totality of metaphysical realities are expressed – i.e. nature, God, man, intellect, body and the emotions are examined. In addition, this passage emphasises questions of enactment and comportment – e.g. 'how they work?' – rather than 'what is the object that is produced?' As a result, we find that not only does Spinoza enable the geometric method to be invested with an expressive and productive scope for philosophical enquiry, but he also argues that it is a method through which 'truth' is reinvested with an *internal transcendental* structure.

The geometric method is used as a rigorous procedure through which a unified, yet complex and irreducible, substance is generated. As a result, the scope of the geometric method is shifted from a concern with idealistic truths – which are pre-given and yet are not accessible – to a journey towards God, through a series of embodied and specifically human conditions. A certain kind of reason determines its activities, therefore, but rather than the production of limited identities or representations, the process is infused with a highly speculative notion of nature, God and, hence, man. The geometric method becomes a demonstration of embodied

reason towards a speculative truth, rather than a repetition of a pre-given knowledge, which reflects Spinoza's life that was itself comprised of dangers, risks and confrontations, which meant his own 'journeying' was interspersed with disruptions.

Spinoza represents, therefore, an intermediary position between the thoroughly synthetic geometric method posited by Proclus and Leibniz's analytic method, which will be outlined in the following chapter. The modes present an ambiguous moment in the development of the geometric method, in which the synthetic divisions between mind and body become less distinct as a result of the focus on the intensive movement of the emotions. In addition, we find that Spinoza's concept of the idea (especially, the adequate idea) presents a complex version of 'reason' or an indivisible ratio between the body and mind that is derived from the emotions. Thus, representing a distinct shift in the development of the geometric method, Spinoza's project is brought also into close proximity with Kant's notion of aesthetic judgment and, as will be shown in the last chapter, bears a strong resemblance to Bergson's notion of an 'intuitive' geometric method and figure.

Chapter 4: The Plenum

In Leibniz we find a philosopher whose writings demonstrate an especially intensive examination of geometry in relation to the principles of division and infinity (i.e. limit and unlimit). Leibniz's construction of a unique mathematical form of geometry in Calculus is evidence of the extent to which these principles of quantity are constructed into *a continuum of differential magnitudes of figures*. This chapter suggests that, in addition to these particularly *analytical*, mathematical geometric figures, Leibniz also develops an aesthetic geometric method and aesthetic figures that are imbued with the characteristics of an *infinitely divisible and qualitative notion of magnitude*. Considering these discussions in the *Monadology* (1714) this chapter explores the structure of Leibniz's aesthetic geometry to suggest that it is constituted by two kinds of magnitude that register the inherent *infinite divisibility* of the aesthetic geometric figure (e.g. the plenum); first, *a corporeal magnitude* through which an intensive *extension* is constructed and second, *an incorporeal magnitude*, comprised of the unextended 'forces' of perception and appetite. In addition, these discussions are developed with reference to earlier texts in which the development of the principles can be observed, and suggest that Leibniz's philosophical and scientific writings display an ongoing concern with the nature of limit and unlimit in both mathematical and aesthetic geometric thinking.

As a result, Leibniz's geometric method provides an intermediary between Spinoza's predominantly synthetic method, Kant's reflective subject and Bergson's method of duration, especially as a result of his attention to *the internal constitution*

of limit and unlimit in the form of intensive magnitudes within the subject (or Monad).

Leibniz's method is unique amongst the other geometries examined here in the extent to which he promotes an analytical understanding of the subject, as will be discussed below. In addition, there are other notable threads that run between Leibniz's, Spinoza, Kant and Bergson's texts, most persistent of which is the problem of the unity between body and mind; for example, Leibniz's notion of substance and perception has several traits that are similar to Bergson's ideas of 'matter and memory'. But Leibniz's method is distinct from Bergson's in one important aspect; the place of Reason. Reason, for Leibniz, represents a necessary harmony with the divine, which we will see Bergson consider to be an artificial 'symbolism' that limits the irreducible unity to a pre-given value and, hence, the freedom of the individual is restricted to an intellectual form of ratio. Bergson's solution to the issue will place an even stronger emphasis on the scope of the *internal* 'transcendental' powers of the subject in the form of the psychic activity of memory that suggests the pure and external intellect is relegated to an obsolete symbolism. Leibniz's analysis of the infinitely divisible subject presents, however, an inventive and rigorous predecessor to both Kant and Bergson's thinking of the transcendental subject; in the next chapter, we will see that Bergson's metaphysics of duration is also an engaged critique of geometry in his predecessors, especially, of Kant, Leibniz and Spinoza's understandings of science. In this chapter, however, it will be shown that Leibniz's development of an *internal differentiation of substance* is an important precursor to Bergson's re-thinking of matter and memory.

Recalling the last chapter, we saw that Spinoza's geometric method constructed geometric difference through the indivisible substance and finite modes that affirm geometric infinity insofar as the subject is an irreducible limit. But, as will be shown below, magnitude is a special geometric 'limit' function in Leibniz's writings, in which the notion of divisibility and indivisibility are reconstructed to form a continuously changing series of irreducible and aesthetic figures. Geometry, as a science of magnitudes, therefore, can be described as the construction of bodies that are brought about through the division of bodies into parts. So, according to this scientific definition, Euclid's explication of the point, line, plane or surface represents a series of geometric figures or abstract notions that are constructed through a principle of division into finite bodies. Leibniz, however, amplifies the principle of division or magnitude into a radically new form that is *an aesthetic principle of unity*, which further augments the infinite divisibility of the scientific form. Magnitude becomes, understood not merely as the scientific operation that generates discrete and finite divisibility, but is promoted as a distinctly *aesthetic geometric method*.

In addition, in the previous chapter it was noted that Spinoza's conception of infinite totalities was developed through a synthetic method. In magnitude, however, Leibniz, constructs his discrete, yet infinite, figures through a particularly *analytic* understanding of limit and unlimit; for example, as an analytic mathematical procedure, magnitude produces intermediate states between figures or limits, such as the different calibrations between the curve and the straight line or the curve and the circle; geometry is redefined, therefore, as an analytic procedure of infinite differentiation.

Focusing, therefore, on the notion of an aesthetic geometric magnitude in Leibniz's *Monadology*, this chapter suggests that two forms of the operation are expressed; first, magnitude and substance (that is, extensity) and; second, magnitude in the form of perception and appetite. Magnitude as extension (body) and as a psychic activity (mind) provides, therefore, a unique version of the 'limit operation' that has been outlined in this thesis to construct an *analytic and aesthetic* geometric method and its figures that are characterised by *internal intensities or magnitudes*. Having examined the constituents of Leibniz's aesthetic magnitude, the discussion goes on to consider his principle of 'sufficient reason' in which a qualitative notion of *ratio* (or reason) is produced. Finally, the chapter explores the formulation of this aesthetic magnitude in the geometric figure of the 'plenum' (i.e. the Monad or soul).

The *Monadology* is a demonstration of the geometric method in which the notion of limit is transformed into a concern with an *internal and intensive magnitude*. Leibniz heightens the operation of division in the geometric method so that the finite geometric identities of the whole and part become a continuous plenitude of irreducible singularities; Monads or souls constitute intensive magnitudes. In addition, the chapter also suggests that the Monad constitutes the 'plenum', a geometric figure in which a *qualitative* notion of internal space is generated through the emphasis on a continuum of material and immaterial relations that are both internal and external. The plenum represents, therefore, a kind of topological figure, through which the relationship between the internal structures are continuous with the external form, rather than derived from a finite limit between the interior and exterior that constructs the discrete autonomy of the geometric figure or

Monad. (Topological geometry will become important again in the following chapter, which suggests that Bergson's notion of the 'envelope' is a particularly topological development and bears a strong resemblance to the figure of the plenum).

This chapter also suggests that the text, itself, represents a kind of 'plenum' because it is a space in which the geometric principles of division and identity (i.e. limit, whole and part) are re-thought and its internal differentiation is promoted; for example, the form of the text demonstrates both the continuity of geometric relations between its elements *and* the division into axiomatic sections that operate under the principle of intensive magnitudes, constituting a text that is highly condensed, yet, also extensive, and is reminiscent of the double movements of unfolding and enfolding in Proclus' text. Thus, we find that geometry is reconfigured through an aesthetic magnitude, both in the metaphysical argument and in the form of the text itself. Simple, indivisible and qualitative, internal orders of differentiation are promoted in favour of the scientific geometric methods that generate only external and formal difference. In particular, we will see how Leibniz's concern with the powers of perception and appetite and his principle of 'sufficient reason' generate this intensive and aesthetic magnitude.

Rejecting the dualism that is derived from Cartesian philosophy, the text and its figure of the Monad (or plenum) are constructed as a result of Leibniz's resistance to the opposition between the mind and the body (or movement versus extension); a resistance that was previously expressed in Leibniz's earlier writings on the mechanistic opposition between solid and fluid states.¹ Instead, we find that Leibniz considers mathematics and, especially, geometry to be valuable as a set of

intermediate operations through which its figures are not limited to a reductive, representational identity but are understood to inherently represent the difference or ratio between two individuated states or magnitudes. *Geometry and its figures are promoted to the status of particular differentials, ratios or 'reasons'*, when 'reason' designates a *particular* idea, rather than a general 'truths'. (See, especially the discussions about 'little perceptions' and sufficient reason below).

First, however, a more detailed discussion about the development of a post-Cartesian analytic geometric method will show the extent to which Leibniz provides a particularly original position in this discussion and point to some of the connections that link his concepts with the other methods explored here, especially the shift from a concern with discrete and synthetic figures in a continuum that has been suggested characterises Proclus and Spinoza's methods, to a continuum of discrete, yet analytic figures.

The transition from synthetic to analytic geometry

A brief consideration of the shift from the Neoplatonic, synthetic geometric method to a post-Cartesian, analytic method will help to clarify the differences between Leibniz's method and those of Spinoza and Proclus. Leibniz's geometric method resists a synthetic order of difference in which the identities of its figures are generated out of a series of external limit operations. In the second chapter, for example, we saw that Proclus' definition of the element or limit was intensive, insofar as it produced an infinite notion of the axiom; however, it was still defined by the notion of a synthetic order of difference, attributable to the *a priori* oppositions of

limit and unlimit. Leibniz, however, registers the invention of infinity as an analytic differential, that is, as an intensive limit operation. Its basis in an analytic theory of infinity reflects the re-thinking of atomism in the seventeenth century in which atomism loses its synthetic structure, from the indivisible ‘seed’ of the soul that is surrounded by matter, to become an analytic discussion of infinite differentiation (Arthur 2001: xlviii). It would seem that, for Leibniz, the inheritance of the Pythagorean principles of limit and unlimit enables him to generate unusually ‘analytic’ conclusions about the limit, atom and axiom in which the structure, function and operations of limit and unlimit are radically reformulated, not towards producing exclusively discrete identities, such as the definitive and unchanging external differentiation of limit in the curve and the circle, but towards expressing their relationship through an order of internal *degrees of difference*. Robert Latta’s commentary on Leibniz’s method succinctly highlights this important shift in understanding geometry as a system of infinity *from the synthetic to the analytic* geometric figure and method (Latta 1985). Developments in mathematics in the seventeenth century modify the synthetic relation of external difference and magnitude that underlies geometry in the ancients to become an *internalised* series of differential changes. Latta explains this ‘transition’ from synthetic to analytic geometry, as follows:

Early in the seventeenth century a considerable advance was made in the science of Mathematics, mainly through the work of Kepler, Cavalieri and Descartes. The Geometry of the Greeks was synthetic

or synoptic. It dealt with the ideal figures as discrete wholes, not taking into consideration the possibility of them being analysed into elements, of which they are combinations or functions. Thus the relations of the figures to one another are considered external. Each is what it is: no one is regarded as having in it the possibility of passing into another. A rectilinear figure is one thing; a curvilinear figure is another. The barriers between them are insurmountable, at least by the methods of exact or demonstrative science. Thus a curve is still a curve, however small may be its curvature. A polygon is still a polygon, however numerous may be its sides. And the kinds of curves are each independent of the others. An ellipse is still an ellipse however distant one focus may be from the other.

Kepler's introduction of the notion and name of infinity into Geometry was the beginning of a great change in mathematical models. The geometrical figures of the Greeks were all finite, and therefore capable of representation to the eye, or, in the other words, capable of being pictured [...]. Kepler, in order to attain a greater exactness in the statement of mathematical relations, suggested that finite (or definite) figures might be regarded as consisting of an infinite (or indefinite) number of elements (Latta 1985: 75-76).

An 'intensive notion of substance' is generated, then, when the mathematical principle of division is, literally, made more substantial so that the infinite

relationship between the curve and straight line are demonstrated, rather than the 'purity' of the finite difference in synthetic geometry. As a result, this brings in a shift between the opposition of quality and quantity in which these two modes of difference are brought into a single concept of magnitude that is a qualitatively different kind of agreement, not a 'mixture' as the Stoics propose, but qualitative degrees of difference in a continuum.

As we have seen in the previous chapter, Spinoza also reflects the seventeenth century debate about infinity and its relationship to the problematic Cartesian dualism of the mind and body. The notion of an indivisible, yet multiplicitous, substance provides Spinoza with his solution to the problem in which internal difference is proposed through the finite modes or affects. For Spinoza, unity or 'figure' is synthetic since, although it is indivisible as an irreducible union of modes, it is also determined by a finite notion of limit in each singularity. Leibniz, however, proposes *multiple and infinite substances that generate infinitely divisible unities or figures*. The notion of limit is intensified as a result of its infinity, therefore, (not by means of an indivisibility) that represents an analytic, rather than a synthetic, solution.

Second, it was suggested that Spinoza's concept of substance is predominantly *extensive and modal*, that is, its powers were promoted as discrete external modes. Leibniz, on the other hand, produces a notion of extended bodies or figures that are *intensive and multiple*. Each method resists the Cartesian premise of mechanised substance that reduces limit to the finite divisions of the whole and the part. In addition, in Leibniz's philosophy, this challenge is developed by a heightened

emphasis on an analytical understanding of ‘infinity’, which is both a metaphysical and a mathematical invention, i.e. Calculus.² Leibniz’s theory of Calculus generates a mathematical version of the intensive limit-operation that enables, for example, analytic geometric knowledge to be applied to the development of the physical sciences. (Spinoza, in contrast, invents synthetic geometric ideas that articulate an early form of psychology in the relationship between geometric ideas and sense ideas). Thus, both philosophers adopt a critical position towards the assumed Cartesian split between mind and body and Leibniz’s magnification of division or limit enables notions of geometric intensity to be generated from a rational logic that is itself expressive of a particularly *intensive substance*. In addition, Leibniz’s substance provides a fascinating ‘parallel’ to Spinoza’s conceptualisation of extensive substance, especially because each philosopher’s scepticism of the divisible body is expressed through the affirmation of an inherent immateriality in substance, reflecting Neoplatonic discussions about the soul. Thus, Spinoza proposes the ‘common notions’ as a form of this irreducible unity and Leibniz proposes the Monad (*Entelechy*). In each case the soul is expressed as the site of a complex, irreducible substance that is inherently related to matter, yet independent from it, and constitutes a continuity between extended and unextended matter.

Infinity is immanent in both geometric methods; in the *Ethics* it is understood as an indivisible *condition* of unity in a univocal substance, whilst for Leibniz it is an infinitely divisible *operation* or logic, that is, a notion of unity in which the concept of the infinite is augmented through an intensive analysis of infinitely divisible *substances*. As an analytic operation then, infinity becomes an active principle

through which intensive substances are generated and the connection between the soul and the body is more clearly comprehended as a continuum of *aesthetic and differential magnitudes*.

In Spinoza's modal differentiation, however, the details of the relationship (i.e. cause) between the different affects or emotions remain defined as sensible concepts and are undefined in logical terms. Spinoza attributes causality to the powers mind and body, in which a creative God is immanent, so that the modes register a genetic evolution of differentiation, but are emphasised as attributes of the infinity of God, therefore, accounting less for the incremental changes that take place between the internal and external states or the shift from the sensory to the divine. Thus, because Spinoza posits the indivisibility of the divine One as his premise for extended infinity, which also underpins the principles of movement or causation, the clarity of explanation that an analytic method brings to the understanding of infinity is overlooked. For Leibniz, however, cause is explained as distinctly differentiated internal forces (such as perception and 'appetition', which are immanent in the individual Monad) and the multiplicity of these substances is prioritised over the indivisible One, so that God's powers, although omnipresent, are not the first order of expression.³ Thus, Leibniz's geometric principles of extended and unextended ideas and bodies are characterised by an analytical infinity (i.e. magnitude), rather than by an indivisible modal substance. This demonstrates the extent to which his geometry re-thinks the production of synthetic, absolute truths or bodies, into a procedure that is an analytical and intensive magnitude.⁴

Leibniz's analytic method is also distinct from Kant's notion of geometry in the *Critique of Pure Reason*.⁵ In the first chapter, Kant's concept of analytic and synthetic agreement in the first *Critique* were distinguished; Kant writes that analytic identity is an internal agreement between two related elements and synthetic identity is comprised of an external agreement between two independent elements. For Kant, therefore, qualitative difference is generated in the heterogeneity of a synthetic operation, whilst an analytic operation is homogeneous because there is not an external, i.e. independent, difference. Leibniz, however, adopts the analytic difference as a means through which to generate internal, heterogeneous difference in quantity (i.e. magnitude), thereby preventing the closure of the 'analytic' agreement into a determinate unity. In the *CPR*, therefore, these agreements do not appear to take the Pythagorean notion of limit into account. In the *Critique of Judgment*, however, Kant considers the nature of an infinite and differentiated magnitude in terms of the relationship between limit and the imagination in the production of the sublime, which is similar to Leibniz's concern with 'fictional figures' (see below). Nevertheless, Kant's argument sustains the status of the synthetic limit and the imagination's powers of synthetic production so that the scope of an analytic definition of limit remains under-powerful in his philosophy. For Leibniz, however, the inherent 'ratio' (i.e. the irreducibility of an analytic notion of magnitude) is precisely where the power of his method in constructing geometric figures lies.⁶ But in the aesthetic or reflective subject of the third *Critique* we find more commensurability with Leibniz's notions of geometric figures, in particular, the emphasis on the discrete, yet continuously changing, autonomy of the singularity.

As a result, the *a priori* definitions of quantitative magnitude that persist in the Cartesian and Neoplatonic methods are reconfigured in Leibniz's analytic geometric method into infinitely divisible and qualitative difference. The division of substance and concept into finite entities is broken insofar as the finite indivisibility of limit (i.e. the whole and the part) becomes understood as a series of *relations of magnitude* representing different ratios. Each of the previously necessary geometric relations of whole/part, divisible/indivisible or quality/quantity, become disrupted to form continuously changing multiplicities or differential geometric states. This inauguration of internal difference, in which an irreversible shift is made from quantitative and homogenous (i.e. undifferentiated) magnitude, into qualitatively differentiated or heterogeneous magnitude, radically distinguishes Leibniz's geometric method from his predecessors'. Later in the chapter we will consider Leibniz's amplified differentiation of substance by means of a *qualitative notion of difference* or *incorporeal magnitude* in the form of perception and appetite. First, however, the structure of *corporeal magnitude* needs to be examined in order to explain the corporeal aspects of his aesthetic geometric method and figures.

Corporeal magnitude

Leibniz's examination of magnitude (and incommensurable figures, such as the diagonal) can be traced back to a discussion about incommensurable figures in which he describes magnitude as 'the multiplicity of parts' in the essay 'On the Nature of Corporeal Things' of 1671 (Arthur 2001: 345), and in the essay 'On the Secrets of the Sublime, or On the Supreme Being' of 1676. Magnitude, he writes, is 'the

constitution of a thing by the recognition of which it can be regarded as a whole' (Arthur 2001: lxxii). The Monad is a geometric figure, therefore, that it is constituted out of a long-standing investigation into the principles of magnitude and limit. Moreover, the *Monadology's* exploration of these geometric principles strongly reflects an engagement in geometric thinking that can be drawn from Euclid's *Elements*, Proclus' affirmation of unlimited limit in the axiomatic method and Descartes' development of the analytic method.

In §3, for example, Leibniz calls Monads 'the Elements of things', positing an explicit relationship between the substance of the Monad and Euclid's term 'element' (*Monadology* 1973: 251).⁷ In addition, if we recall Euclid's first element that a 'point is that which has no part' (Heath 1956: 153), we find the paradox of limit and divisibility present in both the notion of the point and the Monad. But it is Leibniz's notion of limit that provides an analytic version of division. Rather than defining the notion of atom, point or element in terms of a discussion about a synthetic relationship of limit and unlimit, Leibniz constitutes the notion of the Monad in terms of an irreducible, analytic magnitude. So, by examining the initial sections of the text we find that the notions of magnitude, infinity and substance produce a highly complex kind of entity or geometric figure in which division or limit are dramatically redefined.

In §1 Leibniz calls the Monad a 'simple' substance 'without parts' and the following sections develop this instantiation of the Monad in relation to magnitude (*M*: 251). It is expressed in the concepts 'aggregate' in §2; in §3 it is 'Atoms of Nature' that are 'neither extension, nor form, nor divisibility'; and 'indissoluble' or

without beginning in §§4-5. Magnitude, then, as a principle of geometric construction, is clearly posited in the first axiomatic statements of the *Monadology*.

The operations of divisibility or limit are complicated so that the notion of limit as the pre-given division in a concept of unity, such as the division into the whole and part, is upset through the introduction of an *expanded and multiple* kind of division. Division becomes a multiplicitous operation, registering limit and unlimit together, rather than the notion of the limit demarcating a divisible magnitude such as a finite whole (e.g. a circle) and its parts (e.g. two semi-circles), *or*; lapsing into 'indivisible' infinity. Thus, both limit and unlimit are constituted through a *procedure of infinite divisibility* and from which geometric figures become more strongly imbued with magnitude and the powers of unlimit and plenitude.

Leibniz's critique of substance, in conjunction with seventeenth century debates of atomism and geometric division, is also clearly indicated in the engagement with mathematical and Cartesian traditions in the text; for example, the notion of the Atom is neither a simple geometric point, nor a concrete, unchanging entity.⁸ Instead, the Monad reflects the Cartesian discussions of unity between material and immaterial capacities (i.e. mind and body are brought together into an infinite unity), that is, it is an expression of an infinite substance or *extensity* in which the indivisibility of the Monad and its corporeality are affirmed. In addition, it reveals the problem of those theories that are constituted through a synthetic division of the whole, part, soul, matter and mind. Importantly, Leibniz constitutes the notion of the simple 'element' or atom, not as an abstract notion, but as an active 'substance' so that 'limit' becomes immanently concerned with concepts of difference in relation to

life in the multiple, 'simple substances'. But neither does he restrict the Monad to a finite, *extended* corporeality, since that would limit it once again to a determinate quantity or magnitude.

Later, in §§40-48, Leibniz examines how God lends another essential expression of a qualitative infinity to the Monad, providing the connection between the Monad's limit and all other realities. In §40, Leibniz states that God is infinite; he is 'a pure sequence of possible being' and contains 'as much reality as possible', and in §43 God is the source of existence and essences: 'the source of whatever there is real in the possible' (*M*: 259-260). But his infinitude is determined not just by the magnitude of everything actual and possible (i.e. the 'immensum'), but in his perfection, as §41 explains:

God is absolutely perfect, perfection being understood as the magnitude of positive reality in the strict sense, when the limitations or the bounds of those things which have them are removed. There where there are no limits, that is to say, in God, perfection is absolutely infinite (*M*: 259-60).⁹

'Created things' are determined by their natural limits, however; for example, the 'natural inertia' of bodies versus the unlimited perfection of God (*M*: §42, 260). Thus, extended beings represent a limit-threshold of magnitude that is determined by their own internal capacities whereas God's infinitude is distinct in having no limit-threshold of perfection. §§45-48 continue this examination of the magnitude of God's

infinite perfection. §47 states, for example, that he is the 'ultimate unity or the original simple substance' from which all other realities are derived (*M*: 261). Like the *Ethics*, therefore, the *Monadology* affirms the primary cause of God to be infinity or unlimit. Leibniz's geometric method, however, emphasises the corporeality of the infinite and *intensive* extension to a greater extent than Spinoza, insofar as the notion of the divine is not the first proposition of the text, rather it is the definition of the Monad's internal magnitude. For Spinoza, however, God is the first principle of infinity that is examined in the text (see also note 3 of this chapter). Later in the chapter, this distinction will also be shown to be important in Leibniz's principle of sufficient reason in which internal ratios are defined as the cause through which man and God are brought into harmony.

So, the Monad represents a notion of substance that is both immaterial and material, intensive, yet also extensive. In addition, its relations are determined not by the production of either, a single divisibility (limit), or an indivisible unity, but as a result of *degrees of an infinite divisibility*. Thus, we find that divisibility and indivisibility also come under the terms of the principle of magnitude, i.e. of a qualitative difference of degree or intensity, rather than limit and unlimit representing two opposing kinds of quantity, which will be important in the discussion about the impossibility or vice-diction of sufficient reason.

In this respect, magnitude is a continuum in itself, generated through an internally differentiated limit, not an external and synthetic difference. The premise of finite division of the whole and part is transformed into a sequence of infinite evolutions in which the Monad represents a geometric figure that can be generated

from a logic of discrete elements, such as the axiom, but is also constitutive of concrete and sensible relations. Magnitude, then, is consistent with the *aesthetic* continuum of the unextended idea into the extended figure, rather than being a purely mathematical determination, since simple and discrete corporealities are shown to be inherently incommensurable and refute the imposition of finite beginnings or ends that are commonly associated with quantitative magnitude.

As magnitude that is inherently concerned with the plenitude of ‘extensity’, (and in contrast to Spinoza’s univocal substance), Leibniz tells us that there are *multiple substances*, rather than one infinite substance. The concept of existence is expressed, therefore, in relation to infinite substances that are divisible into infinite parts. Substance is considered to be infinite, not because of its formal limits, but as a result of its relationship to memory or the soul (i.e. an intensive extensity), so that ‘wholeness’ becomes untenable because the notions of pre-given limits – e.g. beginnings and ends – are unthinkable (this emphasis on the immaterial forces of the Monad also recalls Spinoza’s concern with the conatus and prefigures Bergson’s discussion of duration). Once again the notion of the definite divisibility of the whole or part becomes highly problematic and it is a discussion to which Leibniz returns throughout the *Monadology*; for example, in §8 he writes of the continuous change in the plenum that cannot be reduced to a division of whole and parts (and is discussed in greater detail below). Thus, by positing the notion of multiple ‘simple substances’, such as the Monad or the ‘plenum’, an infinite notion of division and difference is posited in one term that also reinforces the double operation of limit and infinity.

In addition, infinity is prioritised in the statements that the simple substances form ‘aggregates’ or ‘composites’, rather than finite wholes (*M*: §2, 251). Magnitude is significant only in relation to conglomerates or aggregates, not finite entities, because it is concerned with continuous differentiation, rather than being limited to either, the infinitely small (e.g. ‘infinitessimals’) or to the largest quantity (e.g. the ‘immensum’). Instead, as will be shown below, the notion of limit becomes a kind of ‘approximation’ or ‘accident’, rather than a determined or pre-given ‘end’.

Summarising the discussion so far, therefore, we find that the scientific and quantifiable notion of geometric magnitude (represented by the whole and the part, finite limit and indivisible infinity) is untenable in the following ways;

1. it is aligned with the Cartesian notion of a mechanical division of substance that overlooks the possibility of an immaterial extensity;
2. the divisibility into whole identities does not admit the provisionality of a ‘ratio’ or ‘sufficiency’ in the operation of infinite divisibility. Wholeness is an inadequate notion of identity because magnitude is only partially explained, rather than being considered an intensive operation in an infinite continuum, and;
3. the part cannot be a smaller or finite imitation of the whole. So, Leibniz considers the geometric multiplicity of the Monad’s magnitude (i.e. that which defines its unity) to be founded on; a. differential limit or divisible infinity that cannot be reduced to a finite part or whole and; b. infinite divisibility in extended matter and unextended thought.

In addition, because the Monad is promoted as a shift from an abstract principle (i.e. the point) to a metaphysical substance, Leibniz augments the potential

of a connective principle of infinite change by bringing together a highly defined mathematical concept and an ontological enquiry, in order to propose that the Atom and Element are aspects of 'concrete' realities. The Monad constitutes, therefore, the geometric principles of limit and unlimit together with notions of nature and life. As a result the implication of a finite division in Euclid's statements become radically altered into an aesthetic and qualitative discussion. The following section explores these immaterial magnitudes in more detail.

Incorporeal magnitude

We have now looked at the notion of magnitude as substance (extension), however, Leibniz also develops a notion of magnitude as qualitative and incorporeal differences (forces) in the form of perception and appetite.

In the following chapter, we will find that Bergson also constructs an aesthetic geometry in relation to the psychic activities of the individual that on first sight, might be said to be closer to Spinoza's theories of psychic activities than Leibniz's theories of 'internal activities' since Spinoza's emotions represent more developed modes of psychic definition and activity than Leibniz's 'logical' conditions of perception and appetite.¹⁰ Perhaps, however, this is too sharp a distinction because, as will be shown in this section and in the following chapter, Leibniz's theories display a strong resemblance to Bergson's theories of 'matter and memory', which are clearly more developed as psychic activities but have, nevertheless, similar traits of intensive corporeal magnitude that Leibniz proposes in his writings on perception and appetite.¹¹ Although Leibniz grounds infinity in

analytic and mathematical operations, the psychic activities of the Monad prevent it from being merely an inert, yet infinitely divisible, thing. Thus, Leibniz's discussion of perception, appetite and the soul are important constituents of the Monad's geometric aesthetic unity and agency.

Perception is the incorporeal principle of change, which determines the scope of a Monad's unity and represents the condition through which the soul and body are brought into continuity. It is, therefore, a kind of 'magnitude', an intensive limit or ratio; for example, in §14 Leibniz defines it, stating; '[t]he passing condition which involves and represents a multiplicity in the unity, or in the simple substance, is nothing else than what is called Perception' (*M*: §14, 253).

Leibniz then turns his attention to address the mistakes of those Cartesians who consider the consciousness of perceptions to be the defining *attribute* of existence, not *the* founding principle through which existence is given or in which the virtual is a real, independent state (*M*: §14, 253). Perception, for Leibniz, however, resists the Cartesian principle of exclusion between the soul and the body. Furthermore, as a result of the suggestion that the soul and the body are separate from each other, Leibniz accuses the Cartesians of having 'adopted the Scholastic error that souls can exist entirely separated from the bodies, and have even confirmed ill-balanced minds in the belief that souls are mortal' (*M*: 253). The Monad, by contrast, is not a version of division that is, once again, determined by the constituency of the synthetic whole or part. Instead, its perception and, by implication, the soul, exist as a series of embodied intensities. Thus, Leibniz

considers souls to be 'indestructible' as a result of the relationship between the differing intensities of activity (or awareness) that constitute substance and the mind (as we will soon see in the discussion below).

So, Leibniz explicates perception's multiplicitous nature that produces all perceptions, even those of which we are not aware (e.g. dreams), explaining that it constitutes *apperception* or consciousness. Perception is the psychic level of activity through which different levels of harmony and order are produced in different states of intensity; and, in relation to the singular capacities of the Monad, it is not just a symbolic relation but the Monad's capacity for intensification and 'attention' that generates different degrees of harmony (showing that, once again, this discussion bears a striking resemblance to the notion of perception and the virtual that will be examined in Bergson's writings). In addition, Leibniz's figures of 'small perceptions' are continuous with Bergson's concept of memory (see below for further discussion).

Having demonstrated that perception is consciousness in general, Leibniz explains the production of particular degrees of awareness and directed thought in the principle of 'appetition', again emphasising the embodied nature of perception rather than its value as a cognitive operation. *Appetition* is the 'internal principle' that 'brings about the change or the passing from one perception to another' (*M*: §15, 253). This 'desire' (*l'appetit*) strives for 'the whole of perception' but does not attain it; however, in doing so appetite reaches 'new' perceptions.

In §17 Leibniz explains that perception and its appetites are not reducible to symbolic explanations in the form of 'mechanical causes' and the 'figures and motions' that they produce. Here, therefore, we observe the preparation towards

Leibniz's principle of sufficient reason, which will further demonstrate that the mechanics of causal change, such as sequential order and oppositional truths, are inadequate explanations to describe the infinity of the Monad and its internal structures (*M*: §17, 254). Leibniz elaborates, writing that perception and its products are not reducible to a mechanical diagram of magnitudes, parts and wholes, such as the analogy of the internal workings of a mill. Perception, he tells us, is 'sought' in the simple substance (rather than the 'composite' substance or the 'machine') through which the 'internal activities' of perceptions and their changing appetites resist the reductive form of a mechanical or composite set of elements. Perception, therefore, represents an internally differentiated force that reflects Spinoza's discussions of modes and affects, insofar as both are inherently expressive of the 'life' of the unity and are necessarily expressed in qualitatively different thoughts, ideas or images.

In the following passages, Leibniz considers the *qualitative* nature of perception as an *infinitely divisible magnitude* in the form of 'little perceptions'. §21 posits the different qualities of perception in which different states can be observed, and in which Leibniz tells us that these perceptions are 'weak [...] in which nothing stands out distinctively'; for example, the act of 'spinning around' which causes the 'power of perception' to be weakened (*M*: 251). Alternatively, these 'little thoughts' are akin to states of 'undirected' or 'approximate' perception, such as unconsciousness or dreams, in contrast to the suggestion that the loss of consciousness in sleep results in a non-thinking substance (§§21-23).

Perception, then, endures continuously in the Monad, and this continuous

passage through different states of awareness means that any given perception is always *a concatenation of its past and futural states*; '[e]very present state of a simple substance is a natural consequence of its preceding state, in such a way that its present is big with its future' (*M*: §22, 256). So, in §23, Leibniz is able to demonstrate the 'virtuality' of perception when the present perception is understood to be part of a previous perception (that Bergson's discussion of the contraction and expansion of memory will strongly echo). Leibniz writes; 'for one perception can come in a natural way only from another perception, just as a motion can come in a natural way only from a motion' (*M*: §23, 256). In addition, the emergence of perceptions from preceding perceptions is reminiscent of both the enfolding and unfolding of images that was observed in the relationship between the imagination and soul in Proclus' *Commentary*, and the duration of Spinoza's conatus in the embodied subject.

Alternatively, in §25, Leibniz tells us that the perception of the soul 'represents that which goes on in the sense-organs', reinforcing the relationship between the unextended capacities of the soul and the qualitative differences of perceptions that are generated in the sensing body, so that here a 'concatenation' also exists between Leibniz's idea of perceptions and Spinoza's theory of affects because each philosopher posits an intensive, psycho-physical relationship between unextended and extended materialities.

These 'small perceptions' or *memory* represent, therefore, different states of embodied perception in which memory is an internal kind of reason that is not generated as an embodied idea; '[t]he memory furnishes a sort of consecutiveness

which imitates reason but is to be distinguished from it' (*M*: §26, 256). In addition, like Bergson, Leibniz also reflects on the natural sciences and the how memory is expressed in an animal's perceptions; for example, suggesting that animals 'are led by the representation of their memory to expect that which was associated in the preceding perception, and they come to have feelings like those which they had before' (*M*: §26, 256). Thus, in the analogy of a dog remembering the pain that comes from being struck by a stick, Leibniz suggests that 'reason' arises out of representations (i.e. images, 'reasons' or ideas) generated by the memory, which is a unity of a continuous series of perceptions. Here, therefore, the strength of a perception of an image or 'picture' is dependent upon the *magnitude* derived 'from the number of the previous perceptions' (*M*: §27, 257). In this context, perception is proposed as the operation through which action is explained, countering the Cartesian belief that bodily actions are the effects of external mechanical causes, to an understanding of embodied activity that is determined by *autonomous and internal perceptions, memory and appetites*.

Having expressed the corporeal forces that produce the embodied Monad as a series of intensive limits, Leibniz devotes the following sections to a detailed explanation of the incorporeal unity, that is, the *soul*. On the one hand, the soul designates the Monad's nature as a unity, as a 'simple substance', and on the other, it represents the principle of sufficient reason (*ratio*) since it provides the unity of internally produced reason and divine Reason (see the following section, especially). But we have also seen that the Monad is an embodied, perceiving entity and Leibniz makes this connection between a continuously perceiving substance and the

incorporeality of the soul explicit, stating that if we 'designate as soul everything which has perceptions and desires in the general sense that I have just explained, all simple substances or created Monads could be called souls' (*M*: §19, 255).

Thus, for Leibniz, the Monad is a particular unity of perception and appetite, rather than a general class of entity, which requires greater definition, for whilst it is true that a Monad is, in general, a perceiving entity, the previous discussion has emphasised that it is the Monad's capacity for memory, i.e. perceiving as a duration, that distinguishes its definition as a soul from a simple Monad (i.e. *entelechy*). In addition, we will see that the Monad is a corporeal kind of infinity (i.e. sufficient reason), in contrast to the problematic 'potentiality' of infinity that is produced in a 'pure reason' of infinity.¹²

'Soul', then, is really only applicable to those Monads in which perception is more distinct than a general 'feeling'. An entelechy or Monad designates perception whereas a soul has perception that is more defined and produced in part by *memory*; that is, 'the term Soul [refers to] those whose perception is more distinct and is accompanied by memory' (*M*: §19, 255). Thus, in the following §20, the soul is considered to be enduring and as a result confirms the possibility of different states of consciousness such as dreams or fainting. Soul is greater than merely perception as consciousness and can pass through one state into another; that is, the loss of consciousness in dreams, sleep or fantasy is not the removal of consciousness or the loss of existence or soul, but evidence of different kinds of intensity in consciousness in the Monad, rather than a singular kind of Perception (*M*: §20, 255).

In addition, Leibniz also considers the soul to be the infinite unity through

which a special kind of reason is constituted. In §§29-30 he explains that the mind is the 'rational soul' that distinguishes us from 'lower' Monads by 'the knowledge of eternal and necessary truths' (*M*: 257). The rational soul or mind constitutes the faculty of reason that connects us to the 'necessary' laws and 'abstractions' of nature and enables us to perform '*Reflective Acts*'. Moreover, it provides our understanding of God as principle of perfection. Thus, the mind is defined as a particular kind of perceptive reason that situates us into a natural order of infinity and perfection and the reflective acts provide the basis for forming the concept of the self-conscious subject (the 'I'). For Leibniz, then, the soul is the principle of sufficient reason insofar as it generates an aesthetic magnitude that is derived out of the harmony between the internal activities of perception, desire and memory, and the external laws of God and nature.¹³ Like Spinoza, Kant and Bergson, therefore, Leibniz's affirmation of the autonomous thinking subject provides an important continuity between their geometric methods.

The Monad is constituted by self-generated reason or internal action, therefore, rather than being determined by external causes. *Interiority* and the internal activities of the Monad become primary concerns so that Leibniz defines the notion of limit in the Monad in terms of its 'internal activities', intensifying the aesthetic geometric unity of the Monad so that it is neither, reducible to an external notion of form, nor determined by external laws of mechanical cause and effect (*M*: §18, 255). Instead, the intensive, corporeal and *internal* qualities of the Monad are generated through an internal continuum of magnitude. This marks an important shift in the scope of the geometric method on two counts; first, the dominance of the exteriority

of geometry is dramatically recast by the introduction of intensive, internal relations that produce the notion of differentiated figures and limit, thereby undermining the precedence of formal, exterior space and; second, a concrete (i.e. rational) explanation is given for the previously mystical notion of limit (as indivisibility) that was observed in Proclus' method. As a result the notion of limit is brought into an internal and embodied series of relations, rather than remaining an abstract principle of production; for example, §7 contains the famous description of this autonomy, which states that the Monad is completely independent from all external causes or affects:

There is also no way of explaining how a Monad can be altered or changed in its inner being by any other created thing, since there is no possibility of transposition within it, nor can we conceive of any internal movement which can be produced, directed, increased or diminished there within the substance, such as can take place in the case of composites where a change can occur among the parts. The Monads have no windows through which anything may come in or go out (*M*: §7, 251).

The Monad is defined, therefore, by an internal imperative. In addition, the notion of change is released from the mechanical premise of a chain of external cause and effect to an *aesthetic principle of life*. In the following sentences of §7 Leibniz explains the integrity of an internal difference in the Monad by distinguishing a distinct concept of 'attribute' in contrast to Spinoza's modal notion. He writes;

'[t]he Attributes are not liable to detach themselves and make an excursion outside the substance, as could *sensible species* of the Schoolmen. In the same way neither substance nor attribute can enter from without into a Monad' (*M*: 251). So, in contrast to Spinoza's finite modes, Leibniz promotes *the infinite magnitude of internal attributes*. Externality, however, is also a real state, since it is in the external relations between Monads and a natural order to which Spinoza's modes and Leibniz's 'sufficient' reason correspond. The Monad is, then, both extensive and intensive; a singularity or an irreducibly discrete entity with its own agency. §12, for example, introduces the concept of the Monad as '*manifold*', which is an expression of the changing *extensity* of a differential and intensive substance. Leibniz explains that the manifold 'constitutes, so to speak, the specific nature and the variety of the simple substance' (*M*: §12, 253). He continues this explanation in §13:

This manifoldness must involve a multiplicity in the unity or in that which is simple. For since every natural change takes place by degrees, there must be something which changes and something which remains unchanged, and consequently there must be in the simple substance a plurality of conditions and relations, even though it has no parts (*M*: §13, 253).

Change, then, is not just a single, consistent measure of intensity, but is as varied as the multiple states of difference existing within the manifold, rather than being derived from an external force, or dividable into units or parts. The manifold or

continuum, therefore, displays the characteristics of intension and extension that have been observed in Proclus and Spinoza's theories and which will constitute the continuity of duration in Bergson's philosophy.¹⁴

A further correspondence with Spinoza's geometric ideas is evident in Leibniz's examination of the perceptual limits of the body as an intense magnitude and Spinoza's concepts of adequate and inadequate ideas in terms of *action and passivity*. Thus, the Monad's capacity for action is also brought under the condition of intensive magnitude because when a Monad is active, it has 'distinct perceptions' and when it is passive, 'it has confused perceptions' (*M*: §49, 261-262). Active and passive expressions of its forces, 'endeavours' or conatus display its 'perfection', therefore, by transmitting the Monad's internal order of magnitude into external actions of magnitude or limit (§52). In addition, we find the discussions of active and passive forces have geometric scope in the production of '*fictional*' *geometric figures*; for example, the inaccuracy of small perceptions, such as dreams or dizziness, produce infinite figures that are similar to the imperceptible states of change, which are registered as the calibration from a curve to a straight line; that is, 'small perceptions' represent the mathematical invention of 'approximate' or 'indiscernible' figures in Calculus (as will be discussed in the following section in more detail).

Sufficient reason

In the principle of sufficient reason we find Leibniz invent a theory of logic or *ratio* that produces the *aesthetic geometric unity of the Monad or soul*. Underpinning the aesthetic premise of the Monad, sufficient reason operates by means of an

analytic logic to generate the internal, autonomous and reflective 'I' of the Monad, in particular through the shift from a relationship of contradiction to 'impossibility' or 'vice-diction'. Thus, it is the construction of *qualitative reason* in which 'truth' is equated with the idea of the 'best' or most 'fitting' relationship in a continuous series of possibilities. Such a notion of reason means that the predicate and its agreement (such as, the opposites of mind and body, internal or external relations) are brought together, not as quantitative magnitude, but as *a qualitative ratio of different relations*.

Sufficient reason is first expressed in §18 following Leibniz's definitions of Perception and Appetition. Leibniz tells us that the perfection of the Monads is to be understood in terms of their 'sufficiency':

All simple substances or created Monads may be called Entelechies, because they have in themselves a certain perfection [...]. There is in them a sufficiency [...] which makes them the source of *their internal activities*, and renders them, so to speak, incorporeal Automaton (*M*: §18, 254-5) [my emphasis].

Monads are perfect insofar that they have a sufficient source of internal relations that comprise their 'incorporeality'. Sufficiency is equated with the composition of the Monad as substance and immaterial principles so that, in the following sections §§19-28, Leibniz explains sufficiency in terms of a continuum of perceptions, duration and memory; that is, as a sensuous and feeling entity. In §29 he turns to the particular knowledge of self and God – i.e. self-consciousness – which he

designates the 'Rational Soul or the Mind' (*M*: 257). It is through the rational mind that we are able to construct a unity of thinking substance in the form of the 'reflective I'.

Leibniz distinguishes further between the principles through which we produce reason, drawing the distinction between the internal structure of sufficient reason and 'reason' that is gained through the principle of contradiction (*M*: 258). These two principles are explained in §31-32; Leibniz states that contradiction enables us to produce the notions of 'truth' and 'false', whereas, sufficient reason provides us with a contingent notion of truth based upon the fact that the existence of any truth is itself a sign of its own sufficient reason. Truth, under the principle of sufficiency, therefore, becomes a contingent or substantial 'reason' in the existence of a fact. In §33 Leibniz continues, writing that there are two kinds of truth, which are produced by reason – Reasoning and Fact. Reasoning is necessary, whereas facts are contingent, *allowing the existence of the contradictory facts in the same statement*. In addition, he notes that reasoning can be divided into 'simpler ideas and simpler truths' until primary truths are given; for example, in the progression of mathematical or geometric proofs.

§34 is an explanation of the geometric method in terms of an analytical understanding of reason, rather than as a synthetic principle of reason which is determined by the *external division* of contradiction; for example, the analytic relationship between the axiom and the problem is not one of external difference, rather, *in the analytic method there is the principle of change from within*.

Mathematics, Leibniz tells us, 'resolves' speculations into axioms, definitions

or postulates; speculations are not false since they do not 'contradict' the primary principles of axioms, but nor do axioms exclude difference, since they contain internal differences, such as the hypothesis of the speculative problem, so that in §35 Leibniz writes:

There are finally simple ideas of which no definition can be given.

There are also the Axioms and Postulates or, in a word, the primary principles which cannot be proved and, indeed, have no need of proof.

These are identical propositions whose opposites involve express contradictions (*M*: 258).

Thus, if we take Leibniz's critique of the finite axiom and his emphasis on 'infinite divisibility', the geometric 'element' (such as the axiom or proposition) becomes, not a certainty, but a principle that can hold a 'mixture' of differences or contradictions *within itself*, that is, geometric elements and their products are comprised of 'incompossibilities' of contradiction (or, as Deleuze writes, 'vice-diction' [Deleuze 1997: 46]).¹⁵ Geometry becomes, therefore, not a system of finite coherence and the production of 'laws' as finite truths, but *expressive of a continuously changing continuum of internal and 'sufficient' reason*.

Sufficient reason is constructed upon similar principles of sufficiency as Leibniz's reformulation of intensive magnitudes in which a magnitude represents a 'fiction', agglomeration or 'approximation' of truth. Arthur refers briefly to the 'fictional' quality of Leibniz's geometric figures, noting 'the connection of the

doctrine of petites perceptions with the analysis of geometric figures as fictional entities approximated arbitrarily closely by polygons' (Arthur 2001: xxvi). Three consequences arise from this observation; first, more than one geometric figure is produced out of a continuum; second, each figure is connected to 'virtual' or imperceptible, yet embodied, conditions of thought and matter (i.e. the petite perceptions or memory), and; third, fictional figures confirm geometric principles of 'sufficiency' rather than finite perfection.

Thus, the concept of sufficient reason upholds an insistence on the 'substantial form' of the Monad or soul that has the capacity to produce reason through its own activities. Nevertheless, this internal and individuated reason does not exclude a relationship with the 'perfect' and infinite reason of God, which is not merely 'sufficient'. In this respect, sufficient reason is always in relation to an external principle of sufficiency and infinity, rather than limiting the Monad's sufficient reason to an unregulated agency or will.

Sufficient reason, therefore, is not merely necessary for the internal harmony of the Monad, but is also required for discerning the relationship between the individual entity and the external world, God or nature. The internal sufficiency of an entity is always contingent, therefore, to the infinitude (plenitude) of the world, so that the 'truth' of the external world becomes infinitely and immanently enfolded (*implicatio*) within it. §36 states:

But there must be also a sufficient reason for contingent truths or truths of fact; that is to say, for the sequence of the things which

extend throughout the universe of created beings, where the analysis into more particular reasons can be continued into greatest detail without limit because of the immense variety of the things in nature and because of the infinite division of bodies. There is an infinity of figures and of movements, present and past, which enter into the efficient cause of my present writing, and in its final cause there are an infinity of slight tendencies and dispositions of my soul, present and past (*M*: §36, 259).

Such a concept of harmony extends between God as reason and the perception or embodiment of reason, representing two different kinds of perfection, one infinite and one sufficient (*M*: §37, 259). Thus, in §38 sufficient reason is described as 'sufficient' substance, that is, a 'substantial' reason or God. Leibniz explains God's sufficiency in the following passage, §39; '[n]ow, since this substance is a sufficient reason for all the above mentioned details, which are linked together throughout, *there is but one God, and this God is sufficient*' (*M*: 259). Here, then, Leibniz reinforces the harmony of a metaphysical order in which sufficient reason (the embodied, yet Rational Mind) is a more appropriate form of reason, in contrast to the disembodied, pure reason that is exclusive of matter or the body. Instead, sufficiency is originated in the body and its perceptive powers are confirmed through the internal and external harmony of the infinite substance, God. Thus, according to this argument, reason (*ratio*) is produced by a thinking substance, rather than merely representing a product of idealised intellect.

Sufficient reason, therefore, is an *aesthetic geometric principle*, insofar as it is a demonstration of the relationship between the internal and external relations or ratio of discrete and universal infinities so that geometric figures are understood to express a continuum of aesthetic differences of 'reason' (*ratio*). Reason itself, then, becomes understood as a continuum of magnitudes, a kind of limit-operation from within the geometric figure or body, rather than merely an imitation of an external agency, law or 'Reason'.

Thus, sufficient reason is one of Leibniz's logical demonstrations of the powers of the soul, memory, perception and appetition, perfection and sufficiency that produce an infinitely divisible series of 'ratios', ideas or concepts, rather than a logic in which perfection designates the finite idea or body. Leibniz distinguishes between reason and 'sufficient reason' in his demonstration of the structure of Monads as autonomous, incorporeal entities and in so doing reason becomes understood as a differential principle – a ratio – that is not reducible to finite representations. In the following section we will see the manner in which the intensive and extensive qualities of this aesthetic are expressed in the geometric figure of the plenum.

The plenum

Leibniz is the philosopher in this thesis whose method can be said to most clearly generate a continuum of differentiated figures. Arthur has pointed to this continuum (or plenitude) of figures in Leibniz's writings that include the 'net' and the

‘fold’; for example, in an extract titled, ‘On the Origin of Things from Forms’, 1676, Leibniz explains the figure of the net, as follows:

But this universal space is an entity by aggregation, and is continuously variable; in other words, it is a composite of spaces empty and full, like a net, and this net continuously receives another form, and thus changes; but what persists through this change is the immensum itself. But the immensum itself is God insofar as he is thought to be everywhere, i.e. insofar as he contains that perfection or absolute affirmative form which is attributed to things when they are said to be somewhere (Arthur 2001: 121).

According to this text, therefore, infinite change is inherent in the continuous development from one figure to another that is also reflected in the infinity of the immensum (i.e. God or the world). In addition, the figure of the net suggests a metaphor that constantly receives and exchanges states in both a spatial and temporal spectrum.¹⁶ Thus, the infinity of the figure is constructed in relation to a genetic order of infinity represented by the plenitude of the world. This infinity of spatio-temporal relations is also suggested in Leibniz’s earlier writings on the continuum and, especially in his radical invention of the geometric figure that is constituted by imaginary or fictional qualities; for example, Leibniz calls the polygon, a ‘fictitious entity’ that is taken as a kind of ‘ideal limit to a sequence of polygons’ (Arthur 2001: lvi). Alternatively, Arthur notes that in these formulations of 1676 Leibniz writes

that for a body to have unity ‘in space and self-identity and continuity through time’, an ‘immaterial’ principle or ‘something imaginary’ must be involved (Arthur 2001: lxii). Here, the *imagination* is introduced to explain figures that approximate to a given moment in time, since ‘magnitude, shape, and motion all ‘involve something imaginary’”(Arthur 2001: lxii). Thus, we can suggest that immaterial or imaginary figures represent the provisional assignation of place, time or movement to an imperceptible difference. In this respect they are ‘sufficient’ geometric identities, shapes or forms, which approximate with an infinitely continuous unity. ‘Substantial form’ is, therefore, an infinitely divisible spatio-temporal unity that is brought about by immaterial operations, such as the imagination (Arthur 2001: lxii). Leibniz’s earlier writings sustain the importance of the imagination in the construction of geometric figures, however, the imagination is not discussed explicitly in the *Monadology*. But, as we saw in the previous section, the sensibility is represented by perception and appetite, and in the following discussion it will be shown that the figure of the plenum promotes production in the forms of a spatio-temporal relationship that resonates with Bergson’s theory of matter and memory.

The plenum is first mentioned in the *Monadology* in §8 that lays out the nature of its qualities. It is a ‘completely filled space’, i.e. a space that contradicts the existence of the vacuum since it is constituted by matter.¹⁷ Leibniz writes; ‘[f]or instance, if we imagine a *plenum* or completely filled space, where each part receives only the equivalent of its previous motion, one state of things would not be distinguishable from one another’ (*M*: §8, 252). Rather than constructing the plenum as a divisible figure of equivalent finite parts, however, Leibniz reconciles this

contradiction of the 'immaterial' void with the materiality of the spatial figure into a series of material relations, that is, a continuum. In addition, this section is a discussion of qualities or difference, which affirms the notion of intensive magnitude – i.e. the infinitely multiple singularity – arising, not because of an exterior power, but as a result of its internal and differential powers. The qualities of each Monad distinguish one from another, and the plenum's 'paradoxical nature' is an expression of this multiplicity or 'vice-diction', that is, of sufficient reason. The plenum is, therefore, a geometric figure that is immanently related to an intensive substance and an intensive extensity, but is not derived from the external movement of bodies in space.

But it is also a figure that is infinite twice-over; first, it is inherently 'fictional', insofar as it is an unassignable infinity and; second, because of its relationship to material plenitude. Moreover, this logic of immaterial and material continuity is sustained in the geometric figures of the envelope, fold and the plenum throughout the text. Thus, to a greater extent than Proclus and Spinoza, this discussion emphasises that the identification of one figure is insufficient. Instead, Leibniz's method produces a continuum of figures, demonstrating the extent to which the text constitutes an 'analytic' contraction and expansion of geometric states. In addition, the geometric figures (i.e. the Monad or plenum) represent both the *contraction (implicatio)* of all the elements in the text into one idea, and the expansion (*explicatio*) of all these ideas into a unity of impossible statements or elements which, as has been noted above, will be retrieved again in Bergson's theory of the contraction and expansion of memory.

The plenum is also present in Leibniz's earlier writings on the continuum and closely relates to his examination of extended bodies and movement; for example, in the paper 'On Matter, Motion, Minima, and the Continuum' 1675, Leibniz writes:

Now, I conceive everything to be a plenum, i.e. to be matter with various motions, for if some whole infinite mass were understood to be moving with a certain universal motion, this motion could be considered nonexistent. Therefore, supposing the plenitude of things – in other words, supposing there is no part of space that does not contain matter moving with a motion different from an infinity of others – I show that the same quantity of motion is conserved as follows [...] (Arthur 2001: 33).

In his discussion of the heterogeneity of moving bodies Leibniz also makes the discussion of internal difference in the geometric figure possible, since the notion of a homogenous, external movement is considered to be redundant in distinguishing differences between bodies. Latta provides an insightful discussion about the internal forces of movement that constitute the plenum, interpreting the continuum to be comprised of the interrelated forces of appetite and perception *and* the external forces of movement in the world. He writes:

The conception of continuity, however, by implying a *plenum*, escapes the contradictions that are involved in the idea of the void.

But it still has to be shown how change is possible within a *plenum*, or how change can take place without disturbing the continuity of the infinite series of Monads. Any change within a plenum affects every part of it [...]. If, however, the universe be a quantitative plenum, it is impossible to understand how any change could originate within it. It must receive its motion from outside, and must thus be regarded as finite, which again is inconsistent with its reality as a plenum. *Leibniz overcomes this difficulty by regarding the universe, not as an infinite mass occupying all that there is to occupy, but as a continuity or infinite gradation of qualitative differences, each containing within itself the principle of its own changes. He substitutes for an extensive plenum of mass an intensive continuum of force or life [...]* (Latta 1985: 40) [my emphasis].

Latta's explanation agrees with the principle of sufficient reason, that is, the harmony or ratio between the internal activities of the Monad and nature. But this argument also highlights the extent to which the plenum is an intensive and infinite unity that is not determined as a finite space filled with matter, but is *a spatio-temporal figure that is constituted out of an intensive matter*. Interestingly, Latta also continues the discussion of exchange into a section on 'passage' and the 'pre-Cartesian' notion of '*influxus physicus*' or 'the actual passage of elements from the one substance to the other', to explain the relationship between the soul and body. Here, then, we have a concept of passage that reflects the *extensive* passage of affects

in Spinoza's method, but discussed in the context of a method that is '*intensive*' (Latta 1985: 42).

In the *Monadology*, therefore, we find that the plenum is an important figure of sufficient reason, designating both the internal forces of the Monad and the external plenitude of the nature. It expresses the relationship between the world, soul, mind and the body and reflects theories of plenitude in seventeenth century philosophy as Arthur has noted.¹⁸

The plenum represents, therefore, an *aesthetic geometric figure* that is internally differentiated as a result of its material and immaterial forces of activity, not reducing extended matter into a mechanical series of parts, nor determined by motion that is generated from an external source. Instead, change is brought about by the internal forces of movement, such as perception and appetite. The plenum is produced, therefore, in relation to an intensive and *qualitative series of magnitudes or immaterial and material forces*, thus marking an important moment of development towards a truly differential figure.

In addition, it is also an aesthetic geometric figure derived from a 'discursive' plenitude, as was observed in Proclus' method, but reconfigures the general principle of genetic discursivity into the discrete infinity of the Monad itself: thus, it provides a 'natural' or genetic continuity of relations, not through mechanical operations, but as an infinitely connected being to others in the universe. In this respect, the plenum can be considered to be both the figure of the world, and the discrete singularity of the Monad in a continuous spatio-temporal infinity, in which 'every body responds to all that happens in the universe, so that he who saw all, could read in each one

what is happening everywhere' (*M*: §61, 264-5). Both extensive and intensive, it provides, on the one hand, the plenitude of relations between discrete singularities and, on the other hand, the intensive enfolding of the Monad or the soul that can 'read' itself, but 'only what is there represented distinctly'. Against the infinitely connected space of the plenum, the soul 'cannot all at once open up all its folds, because they extend to infinity' (*M*: §61, 265). Thus, in this section, the plenum refers to the discursive movements between figures that also distinguish Leibniz's interpretation of the discursive soul from Proclus' concept of discursivity because the principle of reflection and memory are more strongly associated with the individual. Proclus' concept, in contrast, promotes a general principle of discursivity in the soul.

In the following section, the immanence of the world is further interiorized when Leibniz considers the plenum in relation to the body and the actions of the Monad (that is, a living being). Thus, in §62, the plenum, having been assigned a limit as a Monad or a being with a soul, now becomes understood as the 'universe', which is a representation of the external harmony and once again confirms its infinite unity through internal and external sufficient reason. Recalling Plato's notion of the 'world soul' the Monad is a representation of the universe, yet it is also the embodied soul. Leibniz writes that it is 'more distinctly the body which specially pertains to it, and of which it constitutes the entelechy. *And as the body expresses all the universe through the interconnection of all matter in the plenum*, the soul also represents the whole universe in representing this body, which belongs to it in a particular way' (*M*: §62, 265) [my emphasis]. This self-*conscious* subject is emphasised further in §63

where Leibniz defines the Monad as ‘a living being’; he states, ‘[t]he body belonging to a Monad, which is its entelechy or soul, constitutes together with the entelechy what may be called a *living being*, and with a soul what is called an animal’ (*M*: 265).

Thus, the relationship between the geometric figure of the plenum, matter and the soul constructs the plenum as both a singularity (the Monad), and divisible infinity (the world, God). The plenum is both a differential geometric figure and the corporeal subject, so that the notion of figure itself becomes a continuum or conjunction between scientific geometry and the aesthetic forces of consciousness, constituting an aesthetic and geometric aggregate of ‘sufficient reason’.

Leibniz’s theory of difference is founded upon this principle of self-identity in which matter and space are constructed as non-similar at any point in time; for example, in the plenum, which is matter-filled-space, the notion that identity remains the same over a period of time is impossible. Instead, any ‘identity’ that may be said to unify a body undergoes constant and continuous change. Thus, identity becomes a *differential operation* in an aesthetic geometry and, as a result the ‘perfection’ of a geometric figure (e.g. the ‘perfect’ circle) may be shown to exist, not as an equivalent truth for a sensible figure, but as a registration of the difference or the potential for change between one magnitude and another in a continuum.

The aesthetic geometric method is not concerned, therefore, with the production of equivalents, but *of showing the differences between one Monad’s duration and its individuation from another*. The concepts of identity, figure or form are derived from the principle of a continuous series of changes, marking a shift from the discrete mathematical identity to the aesthetic ‘soul’ or thinking subject. Thus,

identity is not merely an abstract and rational approximation, but becomes embodied because of the individuating powers of perception and appetite that Leibniz emphasises in the connection between the 'fiction' of the geometric figure and in the specificity of the thinking Monad, which is irreducible to quantifiable magnitude. The plenum, therefore, is not constructed in terms of the split between two externally recognisable forms, but through the degrees of difference from within a body or state. It is a revision of the relationship between geometry, nature and limit, which are transformed by the intensification of an infinite and aesthetic geometric magnitude.

As a result, the concepts of space and time are dramatically modified from an order in which space is generated at the expense of temporality into a relationship in which time is immanent. In this new configuration the continuum between space and time is distinguished both in the shift from a quantitative spatial understanding to a qualitative temporal state, and by the emphasis on the infinite, yet continuous, incommensurability that exists between the two modes of perception. Space and time become understood as 'relations', therefore, which will be explored further in relation to Bergson's discussions of heterogeneous space in the next chapter. As aspects of sufficient reason (i.e. still constituted by the harmony with God), however, space and time are constituted by a scientific symbolism that Bergson cannot uphold in his pursuit of a 'progressive' philosophy. Nevertheless, through Leibniz's *analytic and aesthetic geometric method* and figures, space and time might be considered to be intensive magnitudes, rather than opposing finite operations, because they are always in relation to other states and although divisible, they are also expressions of infinity.

Conclusion

Leibniz's aesthetic geometric method demonstrates the scope of an *analytic* procedure that emphasises the operation of an infinite divisibility, which generates a series of aesthetic figures that are aggregates of both immaterial and embodied intensities. In particular, this chapter has explored this procedure in relation to a qualitative notion of magnitude that encompasses the discrete limit of division, but also affirms the necessity of *aesthetic* or qualitative difference in the geometric figure. Thus, the magnitude of the Monad or the plenum is an intensive 'ratio' between the incorporeal and corporeal qualities, representing a uniquely embodied geometric figure.

Highly reflective of the ancient and Cartesian principles of geometry, division and magnitude, Leibniz's aesthetic magnitude enables multiplicity to be generated, rather than a reconstitution of the finite One (Form) or the formless and timeless infinity of the 'Many'; for example, in contrast to Proclus, the geometric figure (or soul) is an intensive extensity (rather than a mystical symbol or supernatural power) that is constructed from the indivisible embodied forces of perception and appetite. Magnitude becomes embodied and *internal*, therefore, in contrast to the discursive, yet general, magnitude of Proclus' unfolding, so that Leibniz's aesthetic geometry is an intermediary between the symbolic powers that Proclus upholds and the intuitive and embodied 'life' that Bergson posits.

In addition, the plenum corresponds with the genetic plenitude of this intensive geometric procedure; first, because it is determined by a discursive division that is intensive and infinite, not by finite limit that produces determinate bodies,

and; second, it is internally and externally differentiated through the multiplicity of extended substances and by the unextended soul's activities of 'perception and appetite'. As a result, the geometric figure represents an infinite unity of the corporeal and incorporeal intensities in a third order of magnitude, i.e. 'sufficient reason', which concentrates magnitude into an embodied reason (*ratio*) in the reflective subject. Furthermore, this emphasis on the production of 'impossibles' or figures that are internally differentiated by forces and limits, highlights the extent to which Leibniz's aesthetic figure or 'reflective I' constitutes an important precedent to Kant's development of the aesthetic subject in the *Critique of Judgment*; Kant's 'aesthetic judgment' is, therefore, reminiscent of the 'impossibility' in Leibniz's 'aesthetic' reason.

The *Monadology* represents, therefore, a unique metaphysics in which a radical version of the geometric principle of magnitude generates qualitative difference in a series of infinite figures and in the immaterial 'forces' of perception and appetite. As a result, Leibniz's method is an important mediator between Spinoza and Bergson's methods in which the autonomy of the geometric figure passes from a principle of an internal, yet finite, limit (i.e. the modes) to a series of internal and infinite continuities (i.e. duration).

In addition, like Spinoza's method, the continuously divisible forms of the plenum and the Monad are reflected in the formal structure of the text insofar as they are constructed out of a series of discrete statements that constitute both entities in themselves and are expressions of a greater plenitude. Unlike his predecessors, however, Leibniz proposes not just one geometric figure, but a series of evolving

forms – the net, envelope, plenum and the fold – that suggest a shift towards a more ‘topological’ notion of geometry in which the relationship between the internal and external conditions become more intensive, not as limit, but in the embodied and intuitive actions of the individual. In the next chapter, therefore, this topological and aesthetic geometric method will be revealed in Bergson’s writings on matter and memory.

Chapter 5: The Envelope

Bergson's philosophical writings emphasise the importance of intuition in relation to the geometric method and strongly reflect the discussions of extensity, intensity, memory, the soul and the body that have been explored in the preceding chapters. In particular, Bergson provides a rigorous critique of scientific geometric thinking in metaphysics and proposes a radical departure from these methods in the notion of the 'living act'. The geometric method is pushed to its most intensive limit to constitute the *aesthetic and intuitive body*.

In earlier chapters it was suggested that Spinoza's notion of the extensive body and Leibniz's intensive body provided innovative geometric solutions to the metaphysical problem of the division between extended and unextended matter. For Bergson, however, the issue of this division is developed even further to include the limits of the geometric method as it is defined by metaphysics. Bergson rejects the *a priori* ground that materialist and idealist thinking require, which produces the exclusive divisions between matter and intellect, and is derived from the traditions of a symbolic metaphysics (especially a Neoplatonic or Kantian metaphysics). Bergson's method not only promotes new concepts within the boundaries of metaphysics, but also *seeks to reconfigure spatio-temporal relations* into a new understanding of 'psychic' realities within a 'progressive' philosophy. But, whilst being highly critical of the limits that form philosophical thinking, Bergson's engagement with a history of metaphysical ideas is also inclusive; for example, Leibniz's notion of infinity and perception are shown to be sympathetic concepts to Bergson's ideas about infinity and perception. As we will see below, however, this

continuity is provisional because of Bergson's insistence upon the 'psychic' duration of the 'active' life, which opposes Leibniz's logical or 'symbolic' concept of infinity. Also, although Bergson rejects the 'ready-made' aspect of geometry – i.e. as an *a priori* diagram – the 'attention' he pays to extensity demonstrates the extent to which the geometric method can be conceived as an immanent aspect of the living body.¹ The discussion below examines this argument, drawing attention to those aspects of Spinoza and Leibniz's theories that provide important precedents to Bergson's theories of memory, extensity, intensity and intuition.

The chapter begins by examining Bergson's intensive revision of geometric relations that constitute much of the 'energetic' impetus of his book, *Matter and Memory* (1896). Geometric and spatio-temporal relations are re-thought through the production of a 'real', i.e. independent, ontology of duration. Yet geometric relations are also necessary constituents of his 'progressive philosophy'; for example, space and time are two minor figures of discussion that are reconfigured into the notions of matter and memory, perception, intuition and, especially duration, 'releasing' them from their exclusivity as scientific concepts to become '*intermediate*' or aesthetic forms of matter and memory. The initial sections of this chapter outline these new constituents in the formation of the 'body-image' in relation to the activities of perception and the two modes of memory, suggesting that these dynamic relations produce the *aesthetic figure* of the '*envelope*'. Thus, *Matter and Memory* produces both a highly intensive critique of the geometric method and a revision of spatio-temporal relations in the promotion of an *aesthetic of duration*.

Second, the chapter considers *Matter and Memory* in relation to later writings, 'Introduction to Metaphysics' (1903) and *Creative Evolution* (1907). In these texts the geometric method becomes more strongly defined as an aesthetic or 'natural' geometry, in which the aesthetic unity of the living body and its acts (derived either from memory or from the habits of the body) are emphasised in the concept of 'extensity'. In addition, the discussion briefly explores Bergson's notions of space and time, in relation to his critique of 'pre-modern' science and the problems of the Cartesian scientific method so that geometry, space and time are defined in terms of a metaphysics of life and intuition, which provides valuable clarification of the meaning of perception and duration in the earlier text. 'Introduction to Metaphysics', for example, presents a crucial moment in the construction of intuition, because it demonstrates the importance of intuition as an aesthetic consideration that has been 'forgotten' by philosophy and science. In this essay Bergson argues that philosophy and 'pre-modern' science have been misled by the insistence on relative truths and symbolic knowledge at the expense of concrete reality and progressive philosophy. Bergson's philosophy might be said to produce, therefore, a radical notion of '*natural geometry*' or 'intuition' in which *geometry is infused with 'lived' expressions of space and time*.

This chapter suggests that Bergson's development of an ontology of time is enabled partly as a result of his sophisticated understanding of geometry, which informs his reconstruction of the relationship between space, time and intuition. In particular, Bergson's understanding of geometric methods in philosophy retrieves Spinoza and Leibniz's concepts of extensity to inform the *topological* potential of

duration. Duration, therefore, produces topological relations between philosophy and the subject that dramatically reconfigure the nature of science, philosophy and life; it is a topological geometric method, through which unique notions of unity are proposed that are lived, rather than pre-given, symbolic harmonies.²

Bergson, therefore, conducts an intensive re-construction of the metaphysical relations of space and time, the self and the world to retrieve forgotten relations that constitute an 'absolute', not symbolic, nature. In addition, questions about the production and the structure of metaphysical relations are framed through *an aesthetic and geometric reconfiguration* of the relations between matter/memory, whole/part, limit/body, quality/quantity, and Bergson shows how (if we think beyond the *form* of these concepts that are inherited from a 'limited' metaphysics) unique and liberating expressions of life can be re-established.

Limit and unlimit

As the preceding chapters have demonstrated the dialectic between the concepts of limit and unlimit, finitude and infinity, are crucial aspects in the 'union' between extended and unextended matter; for example, for Proclus, the unlimit was constituted in the divine infinity of the geometric figure; for Spinoza, an indivisible God was immanent in the modes of the subject and, for Leibniz, the infinite divisibility of limit produced an intensive, yet autonomous, being.

Bergson, too, engages in the 'tension' between limit and unlimit to construct the irreducible notion of the 'living act' that displays a strong correspondence to Spinoza's theories of substance, in particular, because *duration* (i.e. pure memory)

represents the 'virtual' and unlimited infinity in matter (i.e. perception), which constitutes the extensive limit of the living organism.³ Such an emphasis on an *extensive indivisibility* suggests a strong resemblance to Spinoza's concept of extensity or indivisible matter in which the virtual or absolute is attributed to God and is internalised in the form of the 'conatus'. Also, like Spinoza, Bergson considers extended matter in terms of the whole and part, rejecting an analytic basis of difference in magnitude to suggest a *synthetic* aesthetic geometric method.

Bergson's rejection of reason also indicates his affiliation with Spinoza insofar as geometry, space and time become *intermediary aspects of a discursive soul or intuition*, that is, *pure duration*, and Bergson proposes that the intuitive body provides the basis for a different kind of reason. But in his apparent rejection of 'reason' does Bergson also reject *ratio*, or does his concern with 'relations' also correspond with Leibniz's investigations into ratio? As we will see below, ratio is present insofar as the 'relations' between matter (i.e. perception) and memory are brought together into a topology of intuition or aesthetic geometry. So, perhaps we can say that Bergson's procedure constitutes a 'natural' or intuitive reason since ratio (or *magnitude*) is upheld in an aesthetic form, which is reminiscent of both Spinoza's theological notion of harmony between God and the emotions *and* Leibniz's *incorporeal magnitude*.

But what of Leibniz's notion of sufficient reason? In the discussion about scientific method below, it will be shown that Bergson's rejection of the Cartesian analytic method will lead him to reject this form of ratio because it represents the symbolic harmony between a mathematical procedure and God. Yet, we will also see

that Leibniz's concern with the *powers* of perception and memory in a 'psychic' topology is continued in Bergson's thinking, especially because Bergson's notions of perception, aggregate and the continuous intensity of the life in action have similarities to Leibniz's analytic notion of the intensive Monad. Bergson appears, therefore, to accept Leibniz's claim that the psychic forces are both *qualitative and internal* differences, but considers Leibniz's analytic method to be a scientific reduction. In this thesis, however, Leibniz has *also* been considered to affirm an aesthetic and 'transcendental' matter through his intensive notion of perception that produces a continuously changing process. In addition, it has been argued that Leibniz's notion of the 'sufficiency' of perception in the Monad also bears a strong resemblance to Bergson's notion of duration, in particular, because each is *internal and infinitely extensive*. This thesis suggests, therefore, that there are more correspondences between Bergson and Leibniz than Bergson's opposition to 'symbolic' relations might first admit. Finally, we also see that the seventeenth century investigations into the 'unity' of the subject, such as 'sufficient reason' or 'common notions' also have similar 'aesthetic' characteristics to Bergson's duration, further underlining the 'progressive' potential of seventeenth century understandings of extensity. We may conclude that the actions of the body and of memory constitute Bergson's notion of an *intensive extensity* that display principles of both synthetic and analytic geometry derived from Spinoza and Leibniz.

Matter and Memory constitutes a radical form of aesthetic geometric method and aesthetic figure or intuition, in which the living subject *embodies the heterogeneity of extended and unextended memory and duration*. In addition, we find a reprise of

the intensive dialectic between limit and unlimit in Bergson's re-thinking of reason in *Matter and Memory*. On the one hand, the dialectic generates a text that seeks to intensify the limits of metaphysics and, on the other hand, it proposes a highly complex figure (i.e. unity) that is developed out of the relations between the body and its image, internal and external space, the part and the whole and, especially matter and memory.

The text's highly critical engagement with the limits of philosophy also constitutes an intensification of the concept of limit, in which duration (i.e. time) provides an intensive challenge to the conditions of geometry and metaphysics after Kant's proposal that time is a 'repetition' of space in the *Critique of Pure Reason*. By revisiting (or recollecting) seventeenth century concepts of extensity Bergson rejects the *Critique's* proposal that the 'formal' intuitions of space and time cannot be related to the 'pure reason' of geometry. *Matter and Memory* reveals, therefore, the *interiority* of an aesthetic geometry through a highly intensive examination of the metaphysical conditions that produce space and time. Geometry becomes radicalised into an *intensive 'tension' of its internal and external limits* (i.e. the division between external space and internal time) in an account of a 'forgotten' geometry. Thus, the notion of limit is both a fundamental aspect of Bergson's ontology and provides the means for a formidable critical analysis. In this respect, the text's critique of metaphysics operates on three different levels of tension between limit and unlimit;

1. a distinct kind of dualism between unextended and extended matter is produced that challenges the 'symbolic' and 'parallel' metaphysical relations upon which

Spinoza and Leibniz depend (see the Introduction and Chapter I especially, for a defence of a radicalised dualism);

2. a revision of the relations between philosophy and science, in particular, by reconsidering the tensions between quality and quantity and the whole and part (see the Conclusion, especially);

3. the proposition of intuitive or 'psychic' relations between matter and memory by a series of changes of degree (rather than the transformation of extended matter into unextended matter or vice-versa); i.e. matter and memory are neither identical nor equivalent (see Chapters I, II, III and IV, especially).

Extensity and perception

Limit, for Bergson, is not merely adequate in the form of a mathematical or metaphysical explanation of magnitude because, in each case, ratio or difference is constituted by a symbolic value. Nor does he accept that the imagination's powers of division represent a satisfactory account of limit, since it too is determined by division.⁴

Instead, Bergson seeks to define a notion of infinite limit that is produced by the 'psychic' powers of the subject, leading him to re-think the dualistic explanations of unextended and extended matter. Limit, therefore, must be informed by the tension between a series of psychic or material states that construct the subject. Such a revision of the mind/body relations seeks to challenge the 'incomprehensibility' of how 'real' movement and change are produced in the living subject. For Bergson, incomprehension is evidence of a relationship that is determined by symbolic limits

and division, whereas 'clarity' is established through explanations of the 'natural' psychic 'life', not by resorting to a pre-given harmony of rational explanations. Thus, Bergson seeks to promote the *psychic duration of the subject* as the basis for the tension between limit and unlimit.

Like Spinoza and Leibniz, Bergson finds the solution to the symbolic restrictions of scientific thought in the concept of *extensity* and proposes that the relationship between inextensive and extensive matter is re-thought through the removal of the division between perception (mind) and matter (body). The text explores two methods through which extensity is produced: first, an investigation of extensity as perception, that is, the nature of its extension in space in order to produce an understanding of 'action', and; second, a 'subtilizing' or 'dissolving' of extensity into 'affective sensations', that is, the production of inextensive matter or pure memory (*Matter and Memory* 1991: 245).⁵ Bergson writes; '[t]hat which is given, that which is real, is something intermediate between divided extension and pure inextension. It is what we have termed *the extensive*' (*MM*: 245) [my emphasis].

Extended matter is '*pure perception*', therefore, derived from our consciousness, but also affective to it. Absolutely distinct from the soul, matter is nevertheless imbued with duration and action in itself. Extended matter is not, therefore, a duplicate of intuition or memory, but as an aspect of perception or the living body it has its own *inherent extensity*. Bergson writes; 'we eliminate all virtuality, all hidden power, from matter and establish the phenomena of the spirit as an independent reality. But to do this we must leave to matter those qualities which materialists and spiritualists alike strip from it' (*MM*: 72). In contrast, as we will see

below, he criticises materialism and idealism for having confused extensity so that for materialists, matter is a 'representation of the spirit' and for idealists, it is 'the accidental garb of space' (*MM*: 72).

Thus, Bergson defines matter in relation to the psychic activities of the body; for example, promoting the psychic distinctions between our responses and movements that are generated by our nervous system, yet also noting that both matter and perceiving are necessary to our notion of life. In this sense, the body reflects our perception of the exterior world; for example, we respond to external stimulation through a set of 'mechanical, physical and chemical reactions' (*MM*: 28). 'Living matter' represents zones of 'indetermination' or '*cent[res] of real action*' through which conscious perception is produced. In addition, Bergson suggests that the living body perceives and acts as a result of varying intensities of stimulation and activities that demonstrate a reflexive relationship between the perception and action of the organism (*MM*: 31). Perception and the actions of the body that arise from it constitute a continuity between space and time. Bergson explains that '*perception is master of space in the exact measure in which action is master of time*' (*MM*: 32).

In the first instance, therefore, *extensity* is a relationship between space and time that are produced *out of the perceiving and acting body*; the subject is an indeterminate 'unity' of the mental perceptions and the actions of the body, and perception is distinguished as either internally or externally produced extensity because the body represents indeterminate centres of action or 'variable' relations between the organism and the influence of its external environment; that is, *when perception is internal it is called memory, and when it is external it is matter* (*MM*: 33-

34). Memory that is derived from perception, however, is always related to extension since it is only *pure memory that is unextended*, whereas, *perception is always comprised of 'duration'*. Bergson explains how the reconfiguration of perception and memory enables a revision of the problem of extension and inextension:

But, just because we have pushed dualism to an extreme, our analysis has perhaps dissociated its contradictory elements. The theory of pure perception, on the one hand, of pure memory, on the other hand, may thus prepare the way for a reconciliation between the unextended and the extended, between quality and quantity.

To take pure perception first. When we make the cerebral state the beginning of an action, and in no sense the condition of a perception, we place the perceived images of things outside the image of our body, and thus replace perception within the things themselves. But then, our perception being a part of things, things participate in the nature of our perception. *Material extensity is not, cannot any longer be, that composite extensity which is considered in geometry; it indeed resembles rather the undivided extension of our own representation. That is to say, the analysis of pure perception allows us to foreshadow in the idea of extension the possible approach to each other of the extended and unextended (MM: 181-182) [my emphasis].*

The extended and perceiving body is an infinite limit; first, because it is an infinitely variable, reflective 'centre of real action' and; second, because it is internally and externally generated. Extended matter or a spatio-temporal body becomes understood, therefore, as a '*fulcrum of action*' so that geometry is not restricted to a limit-boundary of an extended figure but is considered to be *embodied into the discursive and aesthetic actions of the body* that are generated from the internal memory and external perceptions. Moreover, as one of the most intensive limits that Bergson constructs, extended matter and the presentation of duration provide Bergson with a highly complex concretion of the tension between matter and memory or space and time. He writes:

If matter, so far as extended in space is to be defined (as we believe it must) as a present which is always beginning again, inversely, our present is the very materiality of our existence, that is to say, a system of sensations and movements and nothing else (*MM*: 139).

In the next section, we will see the concretion of this tension expressed in the invention of the 'body image', which also suggests a reconfiguration of the *image* of the reflective subject in the *Critique of Judgment*.

Body image

Bergson intensifies his analysis of the perceiving body in a re-conceptualisation of the notion of 'image', further developing his critique of the

divisions that arise from the symbolic limits of idealist and materialist metaphysics. *An intensive and aesthetic notion* of the body is generated by promoting the body as *a specific kind of image*, through which a transformative and reflexive relationship between the world and the subject are brought together.⁶

In Chapter I Bergson proposes an alternative dualism in the relationship between the image and body, developing the concept of '*body image*' that provides a material site of relationship between the internal aspects of the body (the mind) and the external world (matter). As a result, this theory of image reflects the production of extended realities which are determined by relations; for example, '[a]ll these images act and react upon one another in all their elementary parts according to constant laws which I call the laws of nature' (*MM*: 17). *Images designate 'psychic' relations, therefore, and reflect our different levels of engagement or 'attention to life'*. Such a reflective notion highlights the extent to which Bergson's attempts to re-think 'life', in contrast to the claims that rational and speculative philosophies make for understandings of life (*MM*: 14). Thus, within this aggregate of image relations, the body is necessarily a specific kind of image, known internally by affections and externally by perception. The subject and its relations with the world are created, therefore, through intensive mental processes: the subject is in effect, *an aggregate of images*. Bergson explains; '[a]ll seems to take place as if, in this aggregate of images which I call the universe, nothing really new could happen except through the medium of certain particular images, the type of which is furnished me by my body' (*MM*: 18). In addition, this relationship is one of constant activity, determined by giving to and receiving movement from the 'external world':

My body is, then, in the aggregate of the material world, an image which acts like other images, receiving and giving back movement, with, perhaps, this difference only, that my body appears to choose, within certain limits, the manner in which it shall restore what it receives (*MM*: 19).

But Bergson's notion of the perceiving image is also reminiscent of Kant's reflective subject in the third *Critique*, introducing a confluence that Bergson keeps hidden behind his fierce critique of materialism and idealism in Kant's metaphysical thinking. Bergson suggests that Kant's materialism produces insufficient explanations of the relations between mental phenomena and consciousness, whereas his idealism results in the body understood as a perception of the subject's consciousness. In this *Critique*, Bergson continues, mind, perception and memory remain as 'operations of pure knowledge' that make either, ineffective duplications of an external reality, or inert and disinterested notions of mental production and 'always [neglect] the relation of perception with action and of memory with conduct' (*MM*: 227). Thus, Kant fails to properly account for the relationship between sense and understanding in the *CPR* because his idealism and realism are determined by the exclusion of a 'real' materiality, which prevents the 'reciprocal influence' of a more radically dualistic substance.

But as has been suggested in chapter 1, this disagreement cannot be applied to the *CoJ* in which Kant constructs aesthetic judgments, not cognitive ideas or forms. Thus, aesthetic judgment represents a more sympathetic predecessor to Bergson's

notion of the body-image insofar as it is also concerned with the 'psychic' and physical activities of the individual. In this respect, therefore, aesthetic judgment is more akin to the notion of 'perception' than to cognitive thinking. But, Bergson's wish to disrupt the overriding emphasis on the cognitive ideas that determine materialist and idealist thinking results in a forceful critique of Kant's project, focusing on the problem of 'images' in the first *Critique*, which can only be *forms* of sensations, rather than sensations themselves.

Bergson's evaluation of Kant's Critical philosophy, therefore, rests firmly on it being both an idealism and realism that misrepresents the powers of perception and the body. As an idealism, Bergson suggest it fails to recognise the intermediate links between different sensations by categorising them under the understanding; as a realism he considers that it allows 'no conceivable relation' between the 'thing in itself' and the 'sensuous manifold' so that in each case a homogenous space is constructed as a 'barrier' between the mind and external objects, and perception is determined towards pure knowledge, not action (*MM*: 231). But we should be careful to note that in the third *Critique* images are both forms and sensations, determined by psychic states, which are the agents of change, space and time. So although Bergson appears not to recognise this potential (especially in his resistance to Kant's 'speculative' philosophy) his notion of the 'body-image', which is a discrete, yet irreducible, unity does bear some similarity to Kant's reflective subject. In the following paragraphs, Bergson's emphasis on the construction of this 'body-image' from perception and memory demonstrates the extent to which psychic relations between the body and can be realised, rather than be merely 'speculative'.

Perception is understood as *an activity of the living body* in which the body is a '*perceptive centre*' that is also part of a moving plane, vibrating as part of an 'aggregate' of other images. Bergson explains this activity, writing; 'since there is no material image which does not owe its qualities, its determinations, in short, its existence, to the place which it occupies in the totality of the universe' (*MM*: 228). My perception is, then, only an aspect of these objects with its powers of selection and editing and Bergson writes; '[p]erception, therefore, consists in detaching, from the totality of objects, the possible action of my body upon them. Perception appears, then, as only a choice' (*MM*: 229). Continuing this discussion, he writes that images are not finite. Instead, they 'outrun perception on every side' and it is the work of science and metaphysics to reconstitute these images in order to 'restore' the relationship between the part and the whole. So, like a reprise of Leibniz's perception, the scope of perception is also changed in Bergson's unity from being a constituent of the 'appearance of reality' to a relation in the aggregate of the 'body-image'; that is, 'simply indicating, in the aggregate of things, that which interests my possible action upon them' (*MM*: 230).

In addition, Bergson proposes that, rather than the body-image being constructed as an aspect of a perception of space (e.g. from an anterior spatio-temporal order), the perceiving body is related to a 'homogenous' notion of space only insofar as our actions are 'concrete extensity' (*MM*: 231). Instead, perception and the body are immanent to each other:

To sum up: if we suppose an extended continuum, and, in this continuum, the cent[re] of real action which is represented by our body, its activity will appear to illuminate all those parts of matter with which at each successive moment it can deal [...]. Everything will happen as if we allowed to filter through us that action of external things which is real, in order to arrest and retain that which is virtual: this virtual action of things upon our body and of our body upon things is our perception itself (*MM*: 232).

Thus, our perception of the world is an expression of our relationship to it; that is, our perception 'is a part of things' and the consequence of this order of expression is that 'things participate in the nature of our perception', provoking a radical re-thinking of the relationship between matter and geometry because the division between the intellect and nature is removed (*MM*: 182). But nor is this a return to a pre-given harmony in which there is a symbolic correspondence; instead, perception and the body-image *enact* a highly reflexive engagement with the external world.

But it is not only matter or '*pure perception*' that reconfigures the notion of the subject, because memory also reconfigures the relationship between quality and quantity (*MM*: 182). Thus, in Bergson's retrieval of an irreducible unity (forgotten by homogenous geometry, which denies the immanent and reflexive senses of the subject in the world), perception and memory form an intensive limit or '*variable relation*' that expresses the 'indeterminacy' of the body as a centre of action. He writes;

'[f]rom this indetermination, [...] [w]e have been able to infer the necessity of a perception, that is to say, a variable relation between the living being and the more-or-less distant influence of the objects which interest it' (*MM*: 33). This 'variable relation' he concludes, is 'consciousness', given by memory to perception, because 'there is no perception which is not full of memories' (*MM*: 33). In the following section, therefore, the structure of memory and its forms as habit and duration will be examined in more detail.

Memory

In Chapter II Bergson develops the notion of body-limit as the limit of memory, explaining how memory provides the means through which to bring together mind and matter to be understood as a 'place of passage', rather than as a receptacle for storing images. He writes; '[i]t is then the *place of passage* of movements received and thrown back, a hyphen, a connecting link between the things which act upon me and the things upon which I act – the seat, in a word, of the sensori-motor phenomena' (*MM*: 151-152).

This definition also highlights the absolute difference between sensations and memory. *Memory is not of the body, but as it passes into sensations, it becomes lived by the body* so that the body is the intensive limit (or relation) between its sensations and memory. Matter and memory are, therefore, a radical revision of space-time and perception in which the living body is the intensive limit that links image to sensation (*MM*: 182).

The distinction between perception and memory is also partly evident in the difference between 'external perception', which is the 'pure' form of perception defined independently of its relationship to memory, and perception, which is constructed by memory. Bergson points out, however, that pure perception is always inadequate and requires *memory in perception* to provide a means of determining 'with more precision the point of contact between consciousness and things, between body and spirit' (*MM*: 65). Perception becomes understood as a 'concrete' state that describes the tension between the internal consciousness of the subject and external matter, constituting a kind of *envelope* through which homogenous movement becomes heterogeneous change. In addition, this 'concrete perception' or *body-envelope* is, therefore, 'the living synthesis of pure perception and pure memory', which have different rhythms of duration and internal 'tension' (*MM*: 246). Furthermore, he writes that tension provides the means through which 'to overcome the opposition between quality and quantity [in] the idea of *extension*, that [lies] between the inextended and extended. Extension and tension admit of degrees, multiple but always determined' (*MM*: 247).

Until this point in the discussion, however, the notion of 'pure perception' remains disengaged from the body and from its subjectivity, so that Bergson sets out to demonstrate how this 'consciousness' is not just a geometric principle of concretion, but is a re-thinking that will involve him in '[restoring] to the body its extensity and to perception its duration'. Consciousness, therefore, is reconnected with 'its two subjective elements, affectivity and memory' (*MM*: 233).

Bergson explains these 'elements' in the following pages; *affection*, he writes, represents the internal 'senses' of the body that enter into our perception so that the body's surface constitutes the 'common limit' between our affection and other external bodies to produce both sensations (i.e. feelings) and images (i.e. other objects). The body surface is, therefore, a double site for internal and external relations (*MM*: 233). Or, earlier in the discussion he explains that, '[a]ffection is, then, that part or aspect of the inside of our body which we mix with the image of external bodies; it is what we must first of all subtract from perception to get the image in its purity' (*MM*: 58). But in contrast to perception and sensation being considered different, only insofar as they are different degrees of the same order, 'pure perceptions' or 'images' are the limits from which sensations are produced by the body. Sensations and images are, therefore, considered to be true relations of one another so that sensations 'will then appear as the impurity which is introduced into [the image] being that part of our own body which we project into all others' (*MM*: 234-235). As a result, memory and affection are strongly reminiscent of the powers of the embodied soul in the preceding chapters.

Memory is the key metaphysical innovation through which Bergson produces a dramatic reconfiguration of the relationship between the material and spiritual realities of the subject, and is expressed in two forms: *duration* and *habit*. *Duration* is the principle that confirms the reality of 'life' as a necessity for metaphysics and science, affirming the intuitive basis of life, not as a division between representations and the sense perceptions of space and time (or a repetition of a higher knowledge), but as an intuition that is inherently creative and active; for example, in his

Introduction, Bergson writes that *Matter and Memory* is an affirmation of ‘the reality of the spirit and the reality of matter, and tries to determine the relation of the one to the other by the study of a definite example, that of memory’ (*MM*: 9).

Memory is the relation of ‘the spirit’, which informs any cerebral states, and it produces a distinct set of *inextensive images* from those generated by pure perception; that is, memory does not produce extensive images (*MM*: 235). Bergson writes; ‘[m]emory, inseparable in practice from perception, imports the past into the present, contracts into a single intuition many moments of duration, and thus by a twofold operation compels us, *de facto*, to perceive matter in ourselves, whereas we, *de jure*, perceive matter within matter’ (*MM*: 73). Instead, memory gives intuition to matter through which we might perceive ‘matter in ourselves’, rather than ‘matter within matter’.

Underlining the distinction between matter and memory, Bergson insists that matter cannot in itself be intuition because perception is a ‘choice’ not an intuition; that is, perception or the selection of images arises from a more visible ‘discernment which foreshadows spirit’ (*MM*: 235). Memory, however, is related to the consciousness through which intuition is generated so that the material universe may then be considered ‘a kind of consciousness’ of relations and action between parts. Moreover, in order to ‘touch the reality of spirit’ a continuity between the present and past is required in the form of memory so that matter is abandoned for spirit. Memory is, therefore, a ‘theoretic consequence and the experimental verification of our theory of pure perception’ (*MM*: 235). Bergson identifies two forms of memory

that are 'actualised'; first, those realised through our habits and, second, duration or true memory He explains:

Habit rather than memory, [...] acts our past experience but does not call up its image. The other is the true memory. Coextensive with consciousness, it retains and ranges alongside of each other all our states in the order in which they occur [...]. Truly moving in the past and not, like the first, in an ever renewed present (*MM*: 151).

Thus, these 'cerebral states' are neither the cause nor duplicates of perception; for example, perceived objects are present in pure perception in which 'the perceived object is a present object, a body which modifies our own', whereas memory is concerned with absent objects or images insofar as 'a remembrance is the representation of an *absent* object'. But Bergson also tells us that in order for an image of an absent object to be generated, the *sufficiency* of the body must be even greater (*MM*: 236). Both memory and perception constitute the 'sufficiency' of the body, therefore, through which images are constructed, recalling, once again, the irreducibility of Leibniz's Monad. In the section below this notion of the 'sufficient' body is explored in more detail in relation to *the envelope*, which may be said to constitute an aesthetic geometric figure in *Matter and Memory*.

The envelope

So, the body is a *centre of action* and has the ability to generate 'new action' that represents an intensive aggregation of 'limits'. This constant tension between the

production of internal sensations and external images in the 'body-limit' can be characterised as a topological surface-limit or event in which *interiority and exteriority are an intensive limit*, that is, 'merely the distinction between my body and other bodies', rather than separated by an irreducible difference between the interiority of the body and the external world. Bergson explains:

The distinction between the inside and the outside will then be only a distinction between the part and the whole. There is, first of all, the aggregate of images; and, then, in this aggregate, there are 'cent[re]s of action', from which the interesting images appear to be reflected: thus perceptions are born and actions made ready (*MM*: 47).

Thus, the body surface is constituted by 'the common limit of the external and the internal [and] is the *only portion of space which is both perceived and felt*', a conduit for the transmission of the virtual into real action (*MM*: 57). This topological and aesthetic continuity generates the body, not as a mathematical point in space, but as a 'privileged image' in which 'its virtual actions are complicated by, and impregnated with, real actions, or, in other words, that there is no perception without affection'. Bergson continues, writing that 'affection is, then, that part or aspect of the inside of our body which we mix with the image of external bodies; it is what we must first of all subtract from perception to get the image in its purity' (*MM*: 58).⁷

Chapter IV demonstrates the complexity of this topology, which is comprised of the extreme dualism between the memory and perception that

reconfigures the relationship between the body and soul (i.e. intuition). In addition, this dualism opposes the symbolic parallelism of idealist and materialist metaphysics in which the mental and physical realms are taken as ‘duplicates’ of each other since, for Bergson, the body is neither a pure site of creating perceptions, nor a site of storage of ‘recollections or images’, but becomes ‘*an instrument of action, and of action only*’ (MM: 225-6).

So, in this emphasis on the body as an instrument of duration, we also see a reprise of Kant’s reflective subject and its ‘technical’ powers of memory in the act of constructing geometric figures. In the following section, we will also see that Kant and Bergson are related through Bergson’s construction of the relations between matter and memory and his critique of space and time in *Matter and Memory*. In addition, the chapter will go on to suggest that Bergson’s retrieval of an embodied intuition constitutes an *enfolding* back to Kant and the embodied intuition of the *Meno*.

Space and time

This chapter proposes that one of the relations to be most dramatically reconfigured in *Matter and Memory* is that of space and time. Bergson’s critique of pre-given, symbolic relations in metaphysics enables new concepts of space and time to be generated so that the restriction of time to a formal imitation of space is removed. Instead, by generating a highly specific and qualitatively different notion of time Bergson *also* enables space to be re-thought, constituting a relation that is not determined by equivalence and is liberated from the pre-given harmony of space-time.

So, in his affirmation of the qualitative distinctions between space and an aesthetic geometry in the notion of duration, and in his re-evaluation of their aesthetic 'relations' to each other, Bergson radicalises both the nature of space in relation to time *and* geometry. In addition, this intensive critique affirms that 'intermediary' geometries exist, challenging the assumption that the modern geometries can only be repetitions of an absolute reason. Bergson's analysis suggests, instead, that there are a series of *intermediary geometries* generated between the homogenous and diagrammatic 'intuitions' of space and time and the 'true' aesthetic of 'duration'. As discussed earlier in the chapter, this is partly achieved by limiting space and time to minor figures in *Matter and Memory* and constructing them from an aesthetic discussion of extensity, so that they are expressed independently of the limited planes of 'ready-made' science and metaphysics.⁸

But what value do space and time have? First, we see that they are necessarily homogenous inasmuch as they provide a site for *actualising the virtual duration of memory*. Space and time are necessary aspects of extensity, Bergson tells us, representing elements of concrete perceptions that are situated on the plane of the measured and physical 'diagram'. In this respect, they are constituents of a diagrammatic concretisation of life or 'fulcrums of action'. Bergson writes:

Homogenous space and time are then neither properties of things nor essential conditions of our faculty of knowing them: they *express, in an abstract form, the double work of solidification and of division which we effect* on the moving continuity of the real in order to obtain there a

fulcrum for our action, in order to fix within it starting points for our operation, in short, *to introduce into it real change*. They are the diagrammatic design of our eventual action upon matter (*MM*: 211) [my emphasis].

Space and time are natural effects of our intuition, therefore, and are required *in order for real change to be actualised* by providing the bridge between the virtual and the act and operating (in contrast to Kant's homogenous and restricted intuitions) as discursive functions; thereby constituting a recollection of the first chapter's discussion about the unfolding of the unextended soul into the extended images of the imagination in Proclus' *Commentary*. In this respect, they are aspects of the unfolding of inextensive matter to the extensive matter.

So, Bergson's critique of 'homogeneous' geometry reveals the operations of space and time as 'actualisation' of extensity. But this analysis also enables him to identify the forgotten relations through which a new concept of a *heterogeneous and aesthetic* geometry is produced; that is, the '*natural geometry*' of the body and its relationship to the aggregates of matter and memory, which is the primary site of reconfiguring the relationship between intuition and geometry. In addition, Bergson's acknowledgement that the extended forms of geometry are necessary 'fulcrums', through which space and time can be actualised from their virtual states of pure memory, also constitutes the 'double movement' of realities (from the virtual to the actual and vice-versa), and enables an aesthetic geometry to be identified. As a result, this reflects both the problem of geometry's universalising tendencies, but also points

towards reinvigorating geometry with a qualitative specificity that has been forgotten in post-Kantian metaphysics.

Thus, in his examination of extensive matter Bergson insists upon how matter can be actualised without it being handmaiden to an ‘amorphous and inert space’, thereby positing a relationship between matter and space that is productive and ‘active’; that is, each is constructed in ‘*the act*’. In addition, he suggests that the diagram *mediates* between the liberating procedure of extensive action (or extensity) and the limitations of homogenous space, writing; ‘[i]t might, then, be possible, in a certain measure, to transcend space without stepping out from extensity; and here we should really have a return to the immediate, since we do indeed perceive extensity, whereas space is merely conceived – being a kind of mental diagram’ (*MM*: 187).

This leads Bergson to assess the concept of space and its objects that are constructed in a symbolic scientific method, especially in the Cartesian method, and results in his rejection of the imagination, as an operation of this symbolic limit; for example, he considers the nature of mathematical movement as a hand moves from one point to another, writing that, without the *limit of the imagination* introducing moments of division or ‘halt’, the movement is ‘one’ or a unified ‘passage’, so that movement becomes understood as *the passage of a body in space* (*MM*: 189). Without the imposition of the imagination, ‘real’ movement is generated, therefore, rather than the illusion of fixed points in space. In addition, science’s representation of actions as external and symbolic geometric properties (such as the point and line along which a hand is considered to move) delimits movement to a representational equivalent, rather than attributing it with a ‘real’ condition of extensity. Duration, in

contrast, resists all symbolical representations of its changes of state because it is *irreducible* to measurement or division into instants, however infinite they might be (*MM*: 190). As a result, this discussion recalls Leibniz's theory of the approximate or 'fictional' geometric figure and infinite divisibility. But as noted above, Leibniz's account is ultimately problematic for Bergson, since it upholds the symbolic harmony of God. In contrast, Bergson suggests that space can be an irreducible aspect of 'extensity' and pure movement (rather than a concept that designates either scientific or imagined representations of division), when he writes:

Concrete extensity, that is to say, the diversity of sensible qualities, is not within space; *rather is it space that we thrust into extensity*. Space is not a ground on which real motion is posited; rather it is real motion that deposits space beneath itself. But our imagination, which is preoccupied above all by the convenience of expression and the exigencies of material life, prefers to invert the natural order of the terms [...] (*MM*: 217) [my emphasis].

So, duration is constructed as a fundamental principle of the living body in the movement from the mental state to the idea; from the idea to the image; and from the image to sensation and action. Movement generated from unextended matter, the soul or image, therefore, does not involve a dislocation from extension; instead, the soul (or the virtual) remains part of the continuum and is expressed not in ideal space but

in 'pure' time. Bergson explains this 'passage' between the unextended to the actualised or extended matter-space, as follows:

if there is a gradual passage from the idea to the image and from the image to the sensation; if, in the measure in which it evolves toward actuality, that is to say, toward action, the mental state draws nearer to extension; if, finally, this extension once attained remains undivided and therefore is not out of harmony with the unity of the soul; we can understand that spirit can rest upon matter and, consequently, unite with it in the act of pure perception, yet nevertheless be radically distinct from it. It is distinct from matter in that it is, even, memory, that is to say, a synthesis of past and present with a view to the future [...]. We were right, then when we said, at the beginning of this book, *that the distinction between body and mind must be established in terms not of space but of time* (MM: 220) [my emphasis].

In Chapter II Bergson highlights the extent to which he rejects ideal space in his criticism of the Cartesian dependency upon mechanical relations; for example, suggesting that Cartesians are confused about the structure of movement between the parts and the whole so that a relativity between the terms is introduced, which collapses into concepts of universal movement. Bergson critiques Descartes' scientific method, suggesting that he produces a confused metaphysic because his physical understandings of movement are curtailed by a symbolic set of geometric

relations. Descartes conflates his methods, Bergson argues, handling 'motion as a physicist after having defined it as a geometer' so that it is limited to a symbolic expression of relations. He continues; '[f]or the geometer all movement is relative: which signifies only, in our view, *that none of our mathematical symbols can express the fact that it is the moving body which is in motion rather than the axes or the points to which it is referred*' (MM: 194).

Once again, movement and space are reduced to absolute states and Bergson's critique of 'movement' and motion in this chapter reveals the limitations of an undivided and homogenous principle of space that classical metaphysics and scientific geometry generate. Thus, although the classical traditions of space and time are useful insofar as they provide 'fulcrums' of reality they are always related to a symbolic relationship, rather than a continuous notion of 'life'.

When movement is considered within the modern and *qualitative* sciences, however (e.g. Riemann's topology), Bergson suggests that there is a significant shift from 'the abstract study of motion', to an examination of 'the *concrete changes* occurring in the universe', which properly defines *internal movement*. He writes that movement 'whatever its inner nature, becomes an indisputable reality' (MM: 193). Thus, modern, qualitative science and philosophy break with the symbolic traditions of science and philosophy to enable heterogeneous space-time and 'real movement':

A moving continuity is given to us, in which everything changes and yet remains: why then do we dissociate the two terms, permanence and change, and then represent permanence by bodies and change by

homogeneous movements in space? This is no teaching of immediate intuition; but neither is it a demand of science, for the object of science is, on the contrary, to rediscover the natural articulations of a universe we have carved artificially (*MM*: 197).

In this respect, *Matter and Memory* affirms that science and metaphysics may constitute qualitative time and movement, as a result of promoting the internal relations that challenge the problematic 'ready-made' harmony of classical philosophy and science. These relations of heterogeneous change are determined by the reality of an *intuition* or *aesthetic geometry* that reflects the scope of duration in the modern sciences, and which will be considered to constitute a reprise of a 'natural geometry' in the following sections of this chapter.

Intuition

Intuition is dramatically re-thought in Bergson's philosophy of geometry. As we saw in chapter 1, the *Critique of Pure Reason* restricts intuition to either, a version of 'pure' reason or knowledge, or a *form* of the sensibility. For Bergson, however, intuition is not knowledge, but *the actions of the living and irreducible subject*, reinstated in the unity between the body and memory and liberated from its position as, either a cognitive or a material entity.

Intuition, for Bergson, is concerned with actual, concrete living, rather than symbolic knowledge that is situated into a schema of different modes of understanding the world. In addition, it is increasingly developed as a fundamental

concept throughout his writings on duration or life, opposing the symbolic limit that determines the intuitions of space and time in Kant's *CPR*. Thus, within this reconfiguration of relationships geometry becomes, not a closed system that is relegated exclusively to the symbolic artifice of mathematics and metaphysics, but is reconnected to intuition. *Intuitive geometry* is, therefore, the aesthetic principle that constitutes the reflective and living subject.

In chapter 1, we saw that the relationship between geometry, intuition and the body the *Meno* is implied in Socrates' drawings of geometric figures and the boy's ability to answer questions about their construction. In this chapter, we will see how Bergson amplifies these possibilities by showing how *the intuitive acts of constructing* geometry are expressed; first, in the physical movements of the body (i.e. physical activity), and; second, in the 'recollection' of geometric principles (i.e. a mental activity) that constitute an embodied geometry, memory or absolute intuition. Thus, Bergson underlines the *activity of geometric construction*, not as 'reason', but as '*living*' or '*natural intuition*' because the act of drawing geometric figures is derived from the bodily perceptions of 'habit' as memory. Intuition is not cognitive thinking, but *action* in which space and time are brought together as extensity and duration that also recalls Spinoza's concern with the comportment of the body and the living subject's activities of inhabiting the body. In contrast, as we have seen, Kant's notion of intuition in the *CPR* is a cognitive idea of image-perceptions that are not sensuous, but forms of thought. In the *CaJ*, however, Kant's attention to the act in the 'construction' of geometry is apparent, but here the act remains distinct from

Bergson's because it is mediated by the faculty of the imagination, rather than being part of the sensuous manifold of perception and memory, i.e. the body.

So, Bergson's metaphysics involves a retrieval of intuition in which intuition, as the actions of the body, becomes the discursivity of perception and memory; it is a return to the body as the site of discursivity, undoing the restrictive harmony that ties intuition to the non-discursive intellect or faculty of the *nous*. Discursivity, instead, is both in the body and in the mind, and demonstrates *a way back* to Proclus, Spinoza and Leibniz's notions of extensive and unextensive discursivity.

In addition, intuition is brought into the scope of the aesthetic and thinking subject to represent a fully temporalised and autonomous unity. Intuition remains a transcendental concept but, rather than accepting its formulation as an incomprehensible and non-discursive level of cognition (i.e. the inexplicable 'all-in-one' grasping of an idea), Bergson reveals its *discursive interiors* in the aesthetic subject and in the psychic powers of memory (the soul) and perception. Thus, intuition is not brought back to Kant's understanding in which it is the sense-based forms of an absolute intuition (i.e. space and time) and the absolute, yet inexpressible intuition. Instead, it is a 'union' of discursive and non-discursive activities that constitute the living subject in which the *aesthetic geometric method* and its figures are aspects of this discursivity, not as anterior diagrams, but as aesthetic expressions of intuition's 'natural' orders. So, if we examine *Matter and Memory*, 'Introduction to Metaphysics' and *Creative Evolution*, three forms of intuition are identifiable; a. duration (action); b. philosophy and; c. 'natural geometry' (construction).

In *Matter and Memory* intuition registers the unification of duration, memory and 'life' as a distinct kind of unity, in contrast to the restricted notion of intuition that Kant produces in the *CPR*. For Kant, the sense-intuitions have only empirical powers of presentation and are limited to a symbolic harmony with the transcendental 'thing-in-itself' (*noumenon*); thus, as a constituent of unification or harmonious construction, embodied intuition is always a limited and symbolic function. Bergson, however, seeks to reveal the 'true' nature of intuition in relation to the subject that entails a critique of the intuitions space and time so that, rather than producing formal appearances, intuition is an affirmation of the corporeal acts of construction or unifying acts in life and represents a heightened attention to questions of 'life' and the subject (which was desired by his 'modern' ancestors, Spinoza and Leibniz, but whose theories were ultimately beholden to an inherited symbolism in metaphysics and science⁹). Bergson's notion of intuition and its operations are, however, not harmonised with 'pre-given' metaphysical principles so that notions of the limit, quality, quantity, the whole and the part are all intensively cross-examined to produce, not symbolic equivalents, but intuitive powers that are fundamental constituents of duration and the body as a 'centre of action'.

Intuition is even more explicitly promoted in the later texts 'Introduction to Metaphysics' and *Creative Evolution*. In the former text, intuition is proposed as a *progressive philosophy* and in the latter, it becomes a '*natural*' geometry that is intuitively produced in *the act of drawing geometric figures*; for example, in 'Introduction to Metaphysics' Bergson examines the cause of 'forgetting' intuition in philosophy that results in philosophy's methods lacking a relationship with its

'origins' and failing to express the inherent 'extensity' of its nature. Furthermore, these limited methods are taken to be real truths. Bergson writes; '*[r]elative is symbolic knowledge through pre-existing concepts, which goes from the fixed to the moving, but not so intuitive knowledge which establishes itself in the moving reality and adopts life itself of things. This intuition attains the absolute*' ('Introduction to *Metaphysics*' 1903: 276).¹⁰

Intuition as duration

Bergson's definition of intuition in *Matter and Memory* expresses a topological relationship between the body and duration. Intuition becomes a form of geometry that is generated by Bergson's insistence upon the body as a centre of action and resituates life into the production of philosophy and material realities. Action and life are fundamental concepts in Bergson's philosophy in which a new kind of intuition is produced in the form of duration; the unification of life and intuition is brought together in the notion of the 'act'. The actions of the body demonstrate an inherent relationship to spatialised experience. Duration always has a relationship to space, however, not to the extent that its reality – as duration – is lost. For Bergson, then, the body must always be an active body – a body in action or event – for the link between the body and space to be realised in duration as extensity. Thus, although *Matter and Memory* is concerned with releasing time from the dominant perceptions of space and geometry, it nevertheless provides an innovative notion of geometry that is generated in the immanent relationships between the body, geometry and intuition in the form of duration. Intuition, then, is

defined as a continuum in which geometry is an intermediate 'plane', registering a connection between the body as a site of intuitive action and geometry as an ideal of space. Intuition is representative of 'life' and the actions of the body are the unifying site of intuition, space and time and the duration of the body. Bergson writes:

if our belief in a more or less homogeneous substratum of sensible qualities has any ground, this can only be found in an *act* which makes us seize or divine, *in quality itself*, something which goes beyond sensation, as if this sensation itself were pregnant with details suspected yet unperceived. Its objectivity [...] must then consist [...] precisely in the immense multiplicity of the movements which it executes, so to speak, within itself as a chrysalis. Motionless on the surface, in its very depth it lives and vibrates (*MM*: 204).

As the unifying site, the living body and its actions are understood to be the axis of homogeneous space and time and the axis of multiplicitous duration. Intuition also constitutes, therefore, the topological and continuous unification of these internal and external relations, so that; '[p]ure intuition, external or internal, is that of an *undivided continuity* (*MM*: 183) [my emphasis]. So, in addressing the necessity that spatio-temporal relations are meaningful realities Bergson revitalises the concept of intuition, challenging the 'impotence of speculative reason as Kant has demonstrated it' that divides the *noumenal* from sense perception (*MM*: 184-185). Bergson's solution is to posit an alternative, 'third' intuition; i.e. duration. He explains:

It seemed to us that a third course lay open. This is to replace ourselves in pure duration, of which the flow is continuous and in which we pass insensibly from one state to another: a continuity which is really lived, but artificially decomposed for the greater convenience of customary knowledge [...] (*MM*: 186).

Thus, the connection between geometric space and duration is suggested when Bergson argues that geometric space is an ideal *towards which we move, but never achieve*. Geometry is not to be banned, but is necessary for understanding extensity that is constituted by heterogeneous space and enables intermediary spatio-temporal conditions to be generated between its ideal and the lived duration of experiencing space. Moreover, the section below explores the importance of proper metaphysical relations with respect to Bergson's theory of intuition and its scope for retrieving the connections between duration and philosophy.

Intuitive philosophy

In the essay 'Introduction to Metaphysics' Bergson makes the case for an 'intuitive thinking' that will transform the scope of philosophy into a 'progressive philosophy'. Intuitive thinking is that which has the scope to disrupt the logical artifice of symbolic metaphysical and scientific thought by introducing 'life'. He writes; '[b]ut the simple act which has set analysis in motion and which hides behind

analysis, emanates from a faculty quite different from that of analysing. This is by very definition intuition' (IM: 281).

Intuition, then, is a 'simple act' in which a particular kind of 'philosophising' or thinking is generated that is not reducible to analytic methods. Bergson writes that, although the discipline of philosophy requires logical and analytic reasoning, our intuition is able to reverse this procedure to constitute a progressive philosophy. He writes; 'our mind is able to follow the reverse procedure. It can be installed in the mobile reality, adopt its ceaselessly changing direction, in short, grasp it intuitively' (IM: 275). Continuing, Bergson states that intuition introduces a 'violent' undoing or rupture of the dominant procedure, and enables the generation of 'fluid concepts, capable of following reality in all its windings and of adopting the very movement of the inner life of things' (IM: 275).

The essay's critique of intuition demonstrates the scope of a new unity to be generated, which both *augments* the purposes of modern philosophy and science and *intensifies* their internal structures and external relations to each other. In addition, intuition is intimately concerned with the production of realities. Thus, Bergson is not suggesting that intuition be reinstated in order to remove the work of philosophy or science, rather that it be properly accounted for by each method. He writes:

Science and metaphysics then meet in intuition. A truly intuitive philosophy would realise the union so greatly desired, of metaphysics and science [...]. Its result would be to re-establish the continuity between the intuitions which the various sciences have

obtained at intervals in the course of their history, and which they have obtained only by strokes of genius (IM: 276-277).

In addition, Bergson argues that both modern science and metaphysics have been determined by the ‘understanding’, which is given to fixing, dividing and reconstructing to produce ‘stability either in *relations* or in *things*’. ‘[R]elational concepts’ are produced by science and ‘concepts of things’ in metaphysics, so that the relationship between understanding and the underlying ‘intuition of reality’ is forgotten (IM: 778). But this is also a positive critique, for Bergson shows how each tradition – although failing to acknowledge its relationship to life and intuition – contains real concepts of intuition *within* it; for example, ‘modern’ science has introduced a proper concept of movement and modern philosophy has a latent preoccupation with ‘life’ as duration (IM: 277). These misplaced objectives are captured in the spatio-temporal metaphor of the movements and structures that each discipline makes, such as the ‘tunnelling’ of metaphysics or the construction of bridges by scientists, both of which ‘forget’ the *aesthetic* ‘moving river of things’ that ‘passes between these two works of art without touching them’ (IM: 278). In addition, each discipline’s ‘blindness’ is made more acute by Kant’s intensification of the symbolic operations of science and metaphysics in which each is made independent of external realities, and here Bergson criticises Kant’s misunderstanding of ‘intellectual intuition’ that is motivated towards the relative symbolism of science and the artificial symbolism of metaphysics. A recovered intuition, therefore, provides the necessary corrective for philosophical thinking (IM: 279). In the next

section this 'recovered intuition' is explored in relation to Bergson's discussion about 'natural geometry'.

Natural geometry: intuition as construction

In *Creative Evolution* the notion of intuition becomes more explicitly defined in relation to geometry, duration, space and time in the concept of 'natural geometry' and the act of drawing the geometric figure. *Natural geometry*, therefore, is the body and geometry brought together in the act of intuition so that geometry is explored as a particular form of extensity in which its relationship with intuition is reasserted as an active extension of space.¹¹

Intuition is also a logical extension of a 'natural geometry' so that the conditions of construction in philosophy are reconfigured because *the geometric principle is derived from the body*. Bergson demonstrates this 'recollection' in an examination of the act of drawing geometric figures that challenges the perception that geometry is the handmaiden to logical manufacture and reasoning. As a result, we find that the activities of drawing and recollection do not become reduced to a series of logical demonstrations, but are aspects of an aesthetic and geometric duration.

More obviously, 'natural' geometry is a reprise of Bergson's earlier discussion about the intuitive body as a 'centre of action'; for example, when he writes, '[b]esides consciousness and science, there is life. Beneath the principles of speculation, so carefully analysed by philosophers, there are tendencies of which the study has been neglected, and which are to be explained simply by the necessity of living, that is, of acting [...]' (*MM*: 198). Act is both lived and exists in construction,

therefore, so that the act of producing geometry is expressed through intuition; act represents the concrete construction of an intuitive geometry and it is this notion that Bergson explores in *Creative Evolution* (and which recalls Socrates' act of drawing in the *Meno*).

The act of drawing has a special relation to geometry insofar as the aesthetic act is also inherently tied to the propensity for deductive thinking. But Bergson reminds us that the mind also has the propensity for intuitive thought in the form of duration, which can 'violently' reverse this logical progression of space and time. In this respect, we see the necessity of a psychological power in Bergson's argument, for it is not enough just to propose a different way of thinking as knowledge, but rather *to find a way that is meaningful in reflecting the specificity of the living organism*, thereby resisting the tendency to attribute the same methods of construction (e.g. deductive and inductive thought) to both organic organisms and inorganic matter. Bergson reminds us that geometry is both a pure knowledge, but also exists in an intuitive state in the act of drawing. This relationship between geometry and our faculties is outlined in the first paragraph of a section entitled 'Geometry and Deduction' in which Bergson expresses the powers of geometry as both a step-by-step discursive extensity *and* an intuitive construction of embodied spatio-temporal unities (figures). He writes:

All the operations of our intellect tend to geometry, as to the goal where they find their perfect fulfilment. But, as geometry is necessarily prior to them (since these operations have not as their end

to construct space and cannot do otherwise than take it as given), it is evident that it is a latent geometry, immanent in our idea of space, which is the mainspring of our intellect and the cause of its working. We shall be convinced of this if we consider the two essential functions of intellect, the faculty of deduction and that of induction (*Creative Evolution* 1964: 222).¹²

Geometry's potential for deduction and induction enables Bergson to develop the general discussions about geometry and intuitive acts in *Matter and Memory* into a study of an 'intuitive' relationship between man and space in *Creative Evolution*. But this later text also emphasises the power of intuition as an act of construction, rather than as a mode of knowledge, so that the notion of geometry is understood as a productive sensibility, i.e. an aesthetic. Bergson explains deduction as 'the same movement by which I trace a figure in space engenders its properties: they are visible and tangible in the movement itself; I feel, I see in space the relation of the definition to its consequences, of the premises to the conclusion' (*CE*: 222-223). Deduction generates ideas as part of an ongoing or *infinite* process. Bergson continues, writing; 'all the other concepts of which experience suggests the idea to me are only in part constructible *a priori*; the definition of them is therefore imperfect, and the deductions into which these concepts enter, however closely the conclusion is linked to the premises, participate in this imperfection' (*CE*: 223). Induction, however, enables the construction of *a unity*, an image that is a form of an action. The geometric figure is, therefore, an infinite unity:

But when I trace roughly in the sand the base of a triangle, as I begin to form the two angles at the base, I know positively, and understand absolutely, that if these two angles are equal the sides will be equal also, the figure being then able to be turned over on itself without there being any change whatever. I know it before I have learnt geometry. Thus, prior to the science of geometry, there is a natural geometry whose clearness and evidence surpass the clearness and evidence of other deductions (*CE*: 223).

Thus, infinity (duration or discursivity) prevents the concept from being limited; instead, it becomes an aesthetic condition of construction. Bergson continues; '[y]ou cannot represent this space to yourself without introducing, in the same act, a virtual geometry which will, of itself, degrade itself into logic [...]' (*CE*: 224). Thus, there is both a 'letting go' and the simultaneous notion of a 'goal' or unity:

What appears, from the point of view of the intellect, as an effort, is in itself a letting go [...] on the contrary, if space is the ultimate goal of the mind's movement of *detension*, space cannot be given without positing also logic and geometry, which are along the course of the movement of which pure spatial intuition is the goal' (*CE*: 224).

So we find that geometry and other notions of space – space-acts – are not, therefore, mutually exclusive to each other. Instead, they are tied by the *tension* between a genetic process of intermediate states of concretion in space (e.g. in the act of drawing) and the absolute duration of the body. As we shall see below this ‘double movement’ is one of the most radical manifestations of relations that Bergson promotes in his ‘progressive philosophy’.

Earlier in the chapter it was shown that Bergson explores the tension of ‘double movements’ in Chapter II of *Matter and Memory* in order to produce more complex, heterogeneous notions of space and time. We might suggest that double movement is, therefore, a kind of intuition; for example, when it is used to express the spatio-temporal series and ‘diagram’ of actual perceptions and the virtual. Bergson explains that multiplicity is generated in our perception of external objects, which arises from the movement between perceiving the objects as independent of consciousness and our states of consciousness, which are independent of ‘objective reality’ (*MM*: 143). Alternatively, he writes that space and time are brought into tension between the necessity of space to ‘preserve’ reality and the necessity of time to ‘devour’. Later in the chapter, the double movement is a relation used to express the production of ‘general ideas’ in the movement between the ‘plane of action’ and the ‘plane of pure memory’. Bergson states that; ‘the general idea escapes us as soon as we try to fix it at either of the two extremities. It consists in the double current which goes from the one to the other – always ready either to crystallise into uttered words or to evaporate into memories’ (*MM*: 162). The extremities of memory, in the form of action and dream, are also examined under the term; for example, the capacity

to produce infinitely 'possible *states* of memory', which comprise the 'different planes' of continuity between action and dream (*MM*: 168-170). Once again this movement registers *the continuum of intermediate states that are produced between the body and mind*, in which:

the mind travels unceasingly over the interval comprised between its two extreme limits, the plane of action the plane of dream [...] but the action is not able to become real unless it succeeds in encasing itself in the actual situation, that is to say, in that particular assemblage of circumstances which is due to the particular position of the body in time and space (*MM*: 172).

Thus, geometry cannot only be considered as a pre-given artifice of our idealist natures, nor is it merely a material reduction of these ideas in the natural world, but it is related to intuition and is part of the '*vital elan*', the psychic and lived world of duration, as *an ideal state* that is never achieved. As a result, geometry is released from its problematic role of accountability to ready-made laws and is *given back its relationship* to immanent, intuitive acts and psychic powers in which the *infinite continuum or process is not a logic, but life*.

Thus, the notion of act – as body – in *Matter and Memory* remains a general principle (it is an axiomatic text) that challenges metaphysical principles of *a priori* geometric production. In *Creative Evolution*, however, there is a more explicit

reference to the nature of the discursivity of the geometric method: geometric intuition in *Matter and Memory* remains a latent principle to memory. The genetic scope of the geometric method is more pronounced in the later texts, therefore, as Bergson's promotion of a philosophy of 'life' becomes more dominant; for example, mind, matter and space are explained as 'evolutionary' relations. That is to say, thinking and the ways in which we act are understood to have an affinity to spatialisation so that we might suggest that intuition becomes the ground between habit and space in 'inhabitation':

Thus, the space of our geometry and the spatiality of things are mutually engendered by the reciprocal action and reaction of two terms which are essentially the same, but which move each in the direction inverse of the other. Neither is space so foreign to our nature as we imagine, nor is matter as completely extended in space as our senses and intellect represent it (*CE*: 213-214).

Conclusion

Bergson's writing is given an intensive power partly through his affirmative, yet critical, engagement in the history of philosophy. His examination of Kant's intuition is one of the most intense sites of engagement in which Kant's *Critique of Pure Reason* and its potential relationship between space and time and 'absolute' intuition provide Bergson with insights into new kinds of thinking that Kant fails to develop in the first *Critique*.

Moreover, Bergson radicalises the geometric method to the extent that it becomes an intuitive act that offers an alternative notion of *construction* (in comparison to Kant's notion of construction as it was examined in the first chapter) and we see that, despite the inherent difficulties of Kant's intuition, both he and Bergson share a curiosity about the potential for revising the scope of geometric methods and their production. But it is only Bergson who releases *time from space* and in so doing enables a radically different notion of space to be expressed. For Bergson, then, we find that the construction and the actualisation of time represent intuitive acts and are evidence of a radically intuitive geometric method (in contrast to Kant's 'formal' geometric method that limits the act to either, a mode of unknowable knowledge ideal, or a determinate empirical intuition). In each case, because Kant reduces intuition to a form of 'absolute' knowledge any link between its different kinds is disallowed. In the *CPR* construction for Kant, then, will always fall into two concepts – i.e. different knowledges – that are dependent upon an irreducible abyss of unintelligibility defining their limits and are, therefore, at odds with the evolution of a complex thinking organism.

Nevertheless, the potential that intuition can be brought into a critical, yet properly creative act, fascinates Bergson; one might also suggest that it produces a highly creative relation in Bergson's own metaphysics, insofar as there is a kind of topological relation between his metaphysics and Kant's. Intuition then, is vital to Bergson's 'progressive' notions of space and time.

We have also seen that Bergson is sympathetic to the 'modernity' of Spinoza and Leibniz's methods, especially their development of physics; but Bergson also

criticises them for upholding the symbolic determinations of Cartesian science and metaphysics that perpetuates the *negation* of time and the dominance of a homogenous space (*CE*: 366-374). Bergson points out the limitations of his predecessors' retrieval of the relationship between matter and space, suggesting that seventeenth century metaphysics repeats the limitations of 'ancient metaphysics' and science, so that their pursuit of a proper scientific notion of movement in modern physics – and hence the metaphysical exploration of matter and the soul – is restricted (*CE*: 167).

In addition, Bergson suggests that both Spinoza and Leibniz sustain the pre-given metaphysical harmonies of unintelligible powers – God and the soul – generating a unity of nature that relies upon unexplained relations and exclusions. Bergson's critique of the construction of space and geometry is, therefore, geometric thinking in one of its most original and most intensive forms, and an impressive demonstration of the internal and modern 'origins' of geometry and philosophy. Geometry and its interiors are made intensive not only because Bergson demonstrates the power of re-thinking the interiority of science and metaphysics, but also to the extent that his own method is highly reflective practice in relation to these two disciplines.

In *Matter and Memory*, therefore, space exists as an intuitive aspect, not just in the diagrammatic code or plane of geometry, but as a highly radical notion of matter. Contrary to Kant's suggestion that mathematical geometry is independent of other forms of knowledge, Bergson views it to be inherently related to our

perceptions and our relationship to the external world. The *CPR* shows us how, within the pre-given tradition of metaphysics and science to which Kant is tied, geometry is a highly constructed artifice of their symbolic systems. Bergson, however, resists this *symbolism* and instead posits an alternative relationship between geometry and other kinds of relationships with the world. Geometry is not just a product of pure reason or intellect, rather it is also a product of our intuition, soul and other corporeal powers (that recall Spinoza and Leibniz, especially), demonstrating the rejection of geometry as an outcome of reason or artificial construction. Moreover, the ‘assumed’ correspondence or harmony between matter and geometry is removed in which matter is not restricted to the harmonising effect of a logical geometry or cleaved from a metaphysics of ‘life’.

Bergson, brings the revision of geometric ‘relations’ in philosophy to the forefront of the discussion in a highly critical examination of the symbolic theories of geometry and metaphysics that have perpetually forgotten the meaningful *relations* between philosophy, science and life. Whilst space and time might be logically and materially realised and correspond to one another if they are contained within the limits of metaphysics or the mathematical and material sciences, ‘real’ expression of these relations are elided because they are produced out of symbolic and external differences rather than ‘real’ and internal differences. For Bergson, mechanical or symbolic systems represent these relationships in which no real material or relationship can be realised, and in which spatio-temporal relations remain limited to

representations or 'signs' of intellectual reason, rather than manifesting proper expressions of 'lived' experience.

So, Bergson argues that space and time should be considered, not under the symbolic and closed systems of Platonic or Cartesian symbolism and their respective sciences, but explored instead in terms of 'psychic' necessity. Space becomes, therefore, not more objective, rather it and geometry acquire a more concrete relationship to nature and, hence, are grounded in the reality of a truly temporal life. Space and geometry are attributed with a kind of genetic condition of change that is intimately tied to the experience of life in a manner reminiscent of Spinoza's condition of spatio-temporal relations and extended matter. As we have seen above, Bergson applauds Spinoza's project for reviving the intuitive status of geometry, but is critical of his reliance upon a relativist metaphysics that collapses a potentially liberated expression of the world and life back into a harmony with understanding.

In contrast, Bergson constructs space as an intuition in relation to its manifestation as habit (memory) and the tendency of the organism to orientate and express itself through physical spatialisations that promotes, not a symbolic or scientific geometry, but a 'natural' geometry that is properly intuitive, constructive and reflective of the limits of the body as a centre of action and duration. In addition, in *Creative Evolution*, Bergson suggests that geometry exists, which is reflexive of the living subject, in contrast to the notion of the symbolic geometry that is produced by an ancient metaphysics and underlying 'pre-modern' science. Geometry is, therefore, *interiorised into the actions of the subject*, rather than externalised or repressed, representing a forgotten geometry, which Bergson suggests can be realised once a new

metaphysics of 'intensive quality' is retrieved. Geometry is not merely consigned to being a product of a closed metaphysics or science, but is brought into a 'lived' philosophy (and, although we have seen that Kant's reflective judgement proposes this shift, it remains 'speculative'). In this final chapter, therefore, the notion of relations between geometry, space and time becomes a primary concern for articulating the possibility of a truly progressive philosophy.

Conclusion

This discussion has examined a series of ‘forgotten’ geometric methods in which geometry and aesthetics are brought into an irreducible unity in the form of the aesthetic figure or subject. It has defined the relationship between geometry and aesthetics in Kant’s Critical philosophy, especially with regard to the shift from an objective or pure scientific geometry to a notion of geometry that is generated by the imagination as a reflective judgment. In the *Critique of Judgment*, therefore, an aesthetic notion of geometry becomes concerned, not with the external axiomatic aspects of the method, but with its relationship to the internal, heterogeneous and technical enactment of the method in the form of drawing figures.

The retrieval of this internally differentiated aesthetic geometry then modulates an analysis of aesthetic geometries expressed in a series of philosophies dating from the Classical period of Plato and Proclus’ geometric writings, to the post-Cartesian philosophies of Spinoza and Leibniz and, finally, Bergson’s post-Kantian reappraisal of the living body and the sense-intuitions. Each chapter, therefore, identifies a method and its emergent geometric figure(s) that is generated in one philosophical text.

Two primary research questions have organised this discussion: first, what is an aesthetic geometric method? By focusing on each text in turn, the chapters have defined the structure and nature of ‘enactment’ in each method, and have demonstrated that these methods are varied in a number of ways; for example, Proclus and Spinoza explicitly undertake geometric forms of writing. In contrast,

Kant, Leibniz and Bergson especially, are informed by geometric methods that are internal operations in their respective philosophical arguments, rather than constituting the primary rationale of the text that is outlined by each author. As a result, chapters 1, 4 and 5 drew out the geometric method of the respective texts that do not necessarily follow the authors' own definition of their method. Leibniz, for example, does not explicitly define the *Monadology* as a geometric text, although here it has been argued that its axiomatic qualities are inherently geometric. Alternatively, Bergson's affirmation of duration over space is produced partly through his understanding of the geometric method. In addition, the extent to which his figure of the envelope can be considered to be geometric is evident precisely because of his understanding of the mathematical conditions of space and geometry. Thus, this thesis argued that Bergson's radicalization of the method is generated through his sophisticated understanding of geometric principles.

A summary of the distinctions between the *geometric methods* of each text shows that; first, chapter 1 argued that Kant promotes an intuitive method that is embodied as an aesthetic principle of subjective knowledge in the *Critique of Judgment*. In the *Critique of Pure Reason*, however, the sense-intuitions of space and time remain restricted to symbolic appearances of intuition, rather than providing a fully aesthetic geometric construction. In the second chapter it was demonstrated that Proclus constructs a discursive method through which the external objectivity of the 'element' becomes 'internal'; however, it was also shown that this method is determined by the *externally* originating principles of infinity and the divine so that

the geometric figure of the fold is not fully developed into an aesthetic embodiment. In the third chapter it was proposed that Spinoza retrieves a method in which the passage from man's embodiment of different modes of subjectivity to God's infinity is expressed through an axiomatic text. In addition, it was shown that Spinoza's axiomatic method differs from Leibniz's theories in a number of ways; in particular, Spinoza's discrete 'modal' condition of embodiment represents a synthetic method. In contrast, in chapter 4 it was argued that Leibniz undertakes an analytic method that constructs the internal figuration of the geometric method in an intensified notion of limit, which is expressed as an infinitely divisible infinity or magnitude. As a result, Leibniz's method and its figures, such as the plenum, are not discrete synthetic modes but a series of 'fictional' approximations of spatio-temporal relations. Both chapters, however, emphasise the importance of Leibniz and Spinoza's post-Cartesian philosophies, in the construction and enactment of aesthetic geometric methods, rather than scientific forms.

Finally, chapter 5 argued that Bergson's method returned to the importance of the intuitive and internal geometry of Kant's third *Critique*. Like Spinoza's method it too is an aspect of real embodiment and dynamic relations, however, like Leibniz, it is also concerned with the internal intensification of the powers of perception. Bergson's method demonstrates, therefore, both a departure from the symbolic scientific method of his predecessors and a re-enactment of their thinking.

The second research question considered each method's respective geometric *figure* and the manner in which they were produced. This led each chapter to consider

the definition of each figure as an aesthetic and geometric figuration, and to ask in what ways they are constructed in relation to their respective methods? Again, it was argued that the philosophers' articulation of these figures is distinct so that, for Proclus, the geometric figure of the 'unfolding' was explicitly described as a form of the method, whilst its counterpart, the fold, was implicit in Proclus' *Commentary*. In Kant's *Critique of Judgment*, however, the notion of figure is explicitly described as being 'double' – it is both the drawn figure and the subject – that is, the geometric figure is conceived to be both the aesthetic subject and the enactment of drawing out the geometric figure. For Kant, then, the notion of figure both registered the technical aesthetic of the method and the embodied figure (i.e. the body) of the individual subject. In contrast, although Spinoza's demonstration of the method in the *Ethics* is explicit, his figure is not, and so chapter 3 proposed that the figure of the 'passage' is generated in the structural development of the text itself, rather than a figure that Spinoza constructs, himself. Leibniz's notion of the figure is perhaps the most multiple or differentiated throughout his writings and includes figures such as the fold or net, but here in the *Monadology* it is identified as being the 'plenum'. Thus, we find that Spinoza and Leibniz proposed different relationships between the method and their respective figures; for Spinoza, the method is explicit and the figure is implicit, whereas, for Leibniz, the method is implicitly geometric and the figure is explicitly expressed. Finally, it was shown that, despite his primary affiliation with Spinoza's affirmation of the active body, Bergson's method is reminiscent of Leibniz's insofar as he had an explicit definition of the figure, the 'envelope'. But Bergson's figure also provided a re-enactment of Kant's 'doubling' in which the

figure is both the active, thinking subject *and* the enactment of the geometric procedure.

The geometric figure, therefore, was presented here as an aesthetic aspect of the geometric method, that represented the double ‘acts’ of the geometric method; a. it is the aesthetic event of the method and, b. it is the ‘figure’ of the subject. Thus, the geometric figure is constituted by the embodied subject (its feelings, senses), the imagination (its powers of production), memory *and* the drawn figure. The geometric figure, therefore, constitutes a central element of the project, because a unique ‘figuration’ of spatio-temporal relations is constructed in each of the methods; in particular, in the shift from external element to internal figure. As a result, scientific geometry is reconnected with aesthetic principles of production; for example, in Proclus’ reconfiguration of Euclid’s *Elements* into a discursive method. The term figure is also an aesthetic bridge between the technical procedures of geometry *and* its designation as an irreducible unity in the reflective subject. It is, therefore, a term that reflects geometric intuition in both mathematical and artistic contexts, and registers the heterogeneous geometric figures that are produced by each method examined here. The thesis therefore re-thinks the notion of figuration as the notion of geometric and aesthetic production in which there is a shift from the figure as a diagram into an act or event.

In addition, each of the texts selected presents an interpretation of geometric ideas at a time when geometry provides important contributions to philosophy and to the wider contexts of science and art. Thus, the selected texts provide a series of aesthetic figures that reflect developments in mathematics; for example, Proclus’

commentary engages in Euclid's mathematics; Spinoza and Leibniz's post-Cartesian texts reflect encounters with the analytical geometry of Descartes, and; Bergson's text is written after Riemann's theory of topology. In addition, Kant's theory of the reflective subject provides a site through which science and art are brought together in the aesthetic unity of the figure of the subject, so that a re-examination of aesthetic relations is conducted in which Kant's notion of figure is reconnected to a series of forgotten links in the development of geometry.

This research might be developed in a number of ways; for example, an examination of these aesthetic figures as they might occur in spatial disciplines, such as architecture. In this context the plenum and the envelope could be used to inform theories of spatio-temporal organization in the history and theory of architectural design.¹ The plenum, for example, could be examined in relation to its function as an interstitial space between floors. In addition, recent discussions about 'envelopes' in building design, such as Bernard Tschumi's project *le Fresnoy* in Tourcoing, France, might be examined in relation to Bergson's notion of envelope.²

Second, these discussions enable a re-thinking of feminist theories of space and spatial culture by informing notions of embodiment, scientific method and aesthetics³; for example, this research enables a critique of writing, such as Luce Irigaray's *Speculum of the Other Woman* (1985), which is determined by a scientific notion of geometry and space. Alternatively, it could provide a development from the study of Spinoza's *Ethics* by Moira Gatens in *Imaginary Bodies: Ethics, Power and Corporeality* (1996).

Third, the discussions inform a re-consideration of the divisions between the notions of 'figuration' in abstract and figurative art, and provide a means for re-thinking the aesthetic mediation between these two modes of practice; for example, an understanding of geometry and aesthetics informs discussions about figuration in Modernist art practice which have tended to be determined by scientific notions of geometric method, such as the opposition between Michael Fried and Rosalind Krauss in relation to Formalism and Minimalism in Fried's essay 'Shape and Form' in *Art and Objecthood and other writings* (1998), and Krauss's *Passages in Sculpture* (1993).

This thesis has examined a series of aesthetic geometric procedures, therefore, that challenge dominant understandings of geometry as a scientific method. In re-thinking the notion of the aesthetic figure in relation to a series of geometric principles it has proposed a 'forgotten' ontology of geometric configurations. As a result, each method and its respective figure represent heterogeneous aesthetic geometric principles, which resist being reduced to determinate concepts of space and time.

Notes

Introduction

¹ See, for example, De Morgan's 1848 account of Euclid's geometric principles and cited in the preface of Heath's edition of the *Elements*; '[t]here never has been, and till we see it we never shall believe that there can be, a system of geometry worthy of the name, which has any material departures (we do not speak of *corrections* or *extensions* or *developments*) from the plan laid down by Euclid' (T. Heath, [1956], *Euclid: The Thirteen Books of the Elements*, Volume I, London: Dover Publications, v). Heath expands upon this mathematical emphasis, writing that much 'valuable work' has investigated the axiomatic method subsequently, but that 'once the first principles are disposed of, the body of doctrine contained in the recent text-books of elementary geometry does not, and from the nature of the case cannot, show any substantial differences from that set forth in the *Elements*' (Heath 1956: v). Thus, although Heath's Commentary provides a contextualisation of the Euclid's writings in relation to its Platonic and Pythagorean sources, it is, principally, a revision of a *scientific* geometric method.

² This discussion suggests an alternative notion of geometric method in contrast to Husserl's investigations in 'The Origin of Geometry' [1936] (reprinted in J. Derrida, [1989], *Edmund Husserl's Origin of Geometry: An Introduction*, translated by John P. Leavey, Lincoln and London: University of Nebraska Press). Not only does Kant's aesthetic subject provide an alternative interpretation to Husserl's ontology, but it is also an alternative 'origin' of geometry to Euclid's scientific paradigm.

³ Arising from this, a further research project may exist that examines the extent to which Deleuze's writings are concerned with geometry.

Chapter 1: Drawing Figures

¹ Gary Banham provides a valuable examination of the development of the different aesthetics in Kant's three *Critiques*; for example, assessing the scope of the imagination and synthesis in the first *Critique* and the 'productive imagination' in the third *Critique*. Banham summarises the three roles of the imagination in the first *Critique* as; 'an empirical rule of reproduction which operates through the presentation of images; a transcendental rule of synthesis whether determined as 'figurative' [...] or as constitutive of each level of synthesis [and] a mediating function between sensibility and understanding via schematism'. With respect to the third *Critique*, Banham also notes that the imagination is attributed with 'freedom, as providing rules of taste and in self-restriction intellectual feeling' (G. Banham, [2000], *Kant and the End of Aesthetics*, Basingstoke: Macmillan Press Ltd., 58).

² An abbreviated form of the titles of the *Critiques* will be used from this point onwards in the chapter and in the references. *CPR* refers to I. Kant, (1997), *The Critique of Pure Reason*, edited and translated by Paul Guyer and Allen Wood, Cambridge: Cambridge University Press. *CoJ* refers to I. Kant, (1987), *Critique of Judgment*, translated by Werner S. Pluhar, Indianapolis: Hackett Publishing

Company. References cite the original page number (of the 1781 and/or 1787 editions of the *CPR*, where relevant), followed by the page number from the edition used in this discussion.

³ Michael Dummett provides an analysis of the principle of mathematical form in the synthetic *a priori* in Kant's *CPR* in 'The Philosophy of Mathematics' (in A. Grayling, [ed.], [1998], *Philosophy 2: Further Through the Subject*, Oxford: Oxford University Press, 126-129).

⁴ In chapter 3 the importance of 'parts' or 'scholia' will be examined in more detail in relation to Spinoza's geometric method.

⁵ An abbreviated title (CDS) of the essay is used in references (and reprinted in I. Kant, (1992), *Theoretical Philosophy 1755-1770*, Cambridge Edition I, translated and edited by David Walford in collaboration with Ralf Meerbote, Cambridge: Cambridge University Press). References cite the original page numbers, followed by the page number from the Cambridge edition, for example, (CDS: 2,345/365).

⁶ Gilles Deleuze notes the necessity of an internal intuition of space from which external space can be produced in a certain lineage of neo-Kantian thought, writing; '[i]f, in the forms of intuition, Kant recognised extrinsic differences not reducible to the order of concepts, these are no less 'internal' even though they cannot be regarded as 'intrinsic' by the understanding, and can be represented only in their external relation to space as a whole [...]. In other words, following certain neo-Kantian interpretations, there is a step-by-step, internal, dynamic construction of space which must precede the 'representation' of the whole as a form of exteriority'. In the same passage, Deleuze also notes that such an interpretation places Kant less at odds with Leibniz's writings on space (G. Deleuze, [1997], *Difference and Repetition*, translated by Paul Patton, London: Athlone Press, 26).

⁷ Kant's emphasis on the technical or aesthetic acts of production contrasts with his investigations into mechanical and dynamic relations; for example, in his essay '*Metaphysical Foundations of Natural Science*' (1786), in which geometry and its figures remain determinate (see I. Kant, [1985], *Philosophy of Material Nature*, translated by James W. Ellington, Indianapolis: Hackett Publishing Company).

⁸ Daniel W. Smith has considered the relationship between the imagination and figure in Kant's Critical philosophy in the essay 'Deleuze's Theory of Sensation: Overcoming the Kantian Duality' (in P. Patton, [ed.], [1996], *Deleuze: A Critical Reader*, Oxford: Blackwell Publishers, 29-56).

⁹ An abbreviated form of the title of the *Anthropology* (*APP*) is used in references, citing the section, followed by the page number and refer to I. Kant, (1978), *Anthropology from a Pragmatic Point of View*, translated by Victor Lyle Dowdell, London and Amsterdam: Southern Illinois University Press.

¹⁰ Caygill makes the point that Kant's method is a metaphysical one, i.e. that it is about finding a proper relationship between the intelligible and sensible realities. He writes: '[t]he only way to preserve metaphysics is to establish a procedure for determining the proper relation of the sensible and intelligible realms [...]. Kant offers another analogy, but one which this time he fully develops. He offers the example of spatial orientation, and the nature of directionality. In order to orient ourselves

spatially we must make a distinction between left and right; but how can this distinction be made? In Kant's words, is it transcendental or empirical, in Heidegger's is it ontic or ontological? We shall see in the next section that Heidegger's decision in *Being and Time* to assign this distinction to ontic determination does Kant an injustice, making the difference empirical: it isn't, but then neither is it transcendental [...].'

Caygill continues, writing; '[s]patial orientation rests on a difference which is in a sense outside of and yet underlying spatial orientation. Dropping the spatial metaphors, it assumes a procedure or activity of distinction [...].' Caygill refers back to the *CPR* to ask if spatial orientation is an activity that is not yet defined by the faculties, and he suggests that it is a production of space that is, in some ways, prior to conceptual knowledge. In addition, Caygill states that it is a different kind of judgment, writing that it is 'because this differentiating activity cannot be represented in intuition that Kant calls it a feeling, or an 'affection' of the subject. This indicates that it does not form part of either the sensible or intelligible realms, but is yet essential for this proper calibration [...]' (H. Caygill, [1989], *Art of Judgment*, Oxford: Blackwell Publishers, 198).

¹¹ Caygill has noted that Kant's commitment to the relationship between understanding and the intuitions is, nevertheless, underwritten by an absolute division between intuition and God, the world and the soul, which means that critique is always determined by an external drive or difference (H. Caygill, [1998], *Walter Benjamin: The Colour of Experience*, London: Routledge, 2). Kant's Critical philosophy, therefore, enables a discussion of geometry and aesthetics as aspects of the understanding and intuition, but does not allow for an immanent sufficiency to be attributed to the subject.

¹² Brian Massumi gives an insightful interpretation of drawing and geometry in his essay 'The Diagram as Technique of Existence' (see É. Alliez, and E. von Samsonow, (eds.), [2001], *Chroma Drama, Widerstand der Farbe*, Wein: Turia + Kant, 161-176). He writes, '[I]et the clean blackboard be a sort of Diagram of the original vague potentiality, or at any rate of some early stage of its determination. This blackboard is a continuum of two dimensions, while that which it stands for is a continuum of some indefinite multitude of dimensions. I draw a chalk line on the board [...]. For this white chalk mark is not a *line*, it is a plane figure in Euclid's sense, a *surface*, and the only line that is there is the line which forms the *limit* between the black and the white surface. This discontinuity can only be produced upon that blackboard by the reaction between two continuous surfaces into which it is separated, the white surface and the black surface' (Alliez and Samsonow 2001: 163).

¹³ The following chapter will examine Proclus' attention to the relationship between the discursive nature of the mathematical diagram and memory; for example, in first part of the Prologue he refers to the *Phaedo* and the *Meno* as examples of Plato's theory that recollection is the understanding or 'a part of the soul' that unfolds the ideas it already contains (Proclus, [1992], *A Commentary on the First Book of Euclid's Elements*, translated by Glenn R. Morrow, Princeton: Princeton University Press, 37).

¹⁴ The aesthetic connection between Kant and Plato suggests an alternative 'origin' of geometry in contrast to Husserl's 'Origin of Geometry', which considers it an 'epistemological problem' (Derrida 1989: 180). Husserl recognises that geometry and its modes of production are 'technical' insofar as 'in the life of practical needs certain particularizations of shape stood out and that a technical praxis

always [aimed at] the production of particular preferred shapes and the improvement of them according to certain directions of gradualness' (Derrida 1989: 178). Thus, for Husserl, aesthetics in geometry is considered as an aspect of its 'ideality' or scientific basis, not the nature of its production.

Chapter 2: Unfolding

¹ Morrow's translation is that of Gottfried Friedlein's 1873 text, *Procli Diadochi in Primum Euclidis Elementorum Librum Commentarii ex Recognitione Godofredi Friedlein*, Leipzig, 1873, based upon the Greek text by Simon Grynaeus, Basel, 1533.

² The *Commentary* is comprised of two introductory Prologues and an in-depth analysis of the Book I of the *Elements*.

³ All quotations from the *Commentary* are taken from (Proclus 1992). In references the title is abbreviated to *CEE*, hereafter, and give the Friedlein pagination, followed by Morrow's pagination, for example (*CEE*: 12/10).

⁴ Mueller points out that the final two books of the 15 are now considered not to be by Euclid (*CEE*: xlvii).

⁵ Deleuze notes Proclus' definition of 'series' in relation to the Pythagorean divine notions of the One, Many, limit and unlimit (see, G. Deleuze, [2001], *The Fold: Leibniz and the Baroque*, translated by Tom Conley, London: Athlone Press, 23 and 146). Later in this chapter an elaboration of these principles is given; also, see chapter 4 for a discussion of the infinite and multiple in relation to Leibniz's geometric method and figures.

⁶ Éric Alliez provides a valuable analysis of the fold and Neoplatonism in relation to the construction of the soul and time in Plotinus' philosophy. He distinguishes between three different kinds of folding; 'a. *Greek folding (pli)* of the forces engaged in the relation to others that is constitutive of the relation to self [...]. b. the *Greco-Roman unfolding (dépli)* of the relation to self in power relations [...]. c. the *neoplatonic refolding (repli)* or the self within the whole that puts it outside itself [...]' (É. Alliez, [1996], *Captial Times: Tales from the Conquest of Time, Theory out of Bounds*, Volume 6, translated by Georges van den Abbeele, Minneapolis and London: University of Minnesota Press, 73).

⁷ Plato's theory of the Divided Line in the *Republic*, Book VI, 510-510e, is demarcated by the upper, transcendental realm of Being and the lower sensible realm of Becoming, emphasising the division between the faculties of reason and understanding from the faculty of imagination and sense opinion (see Plato, [1989], *Collected Dialogues of Plato, including the letters*, edited by Edith Hamilton and Huntington Cairns, Princeton: Princeton University Press).

⁸ Ian Mueller provides three useful diagrams that show the different metaphysical schema informing the *Commentary*. They are; figure 1. the order derived from the Divided Line (Plato 1989: *Republic*, Book IV, 441-441e); figure 2. the Neoplatonic order and; figure 3. an alternative order of the soul mediating between the non-sensible and sensible realms (*CEE*: xvii-xviii).

⁹ Proclus, however, attributes the creative power to soul and the reproductive power to understanding. This discussion is also an interesting precursor of philosophical discussions concerned with notions of 'life-force'; for example, Freud's examination of the 'to-and-fro' movement between pleasure and displeasure, or the forces of Eros and Thanatos, in the essay 'Beyond the Pleasure Principle' (1920), (see S. Freud, [1955], *The Standard Edition of the Complete Psychological Works*, Volume 18, translated and edited by James Strachey, London: Hogarth Press and the Institute of Psychoanalysis). Or, Baudrillard's discussion of the economics of force between Eros and Thanatos (in J. Baudrillard, [1993], *Symbolic Exchange and Death*, translated by Iain Hamilton Grant, London: Sage Publications). In each case, concepts of life and death produce notions of production that are characterised by a two-fold movement.

¹⁰ In the *Timaeus* (34-37) Plato describes the world's soul as a mixture of mathematical matter and cosmic powers, a 'strip' divided into parts to form the cosmos and the metaphysical principles of the Existent, the Same and the Different, in constant, autonomous movement. It is conceived as being immaterial and partless, and corporeal and divided (Plato 1989: 1164-1166).

¹¹ Deleuze explores the diagram in relation to Francis Bacon's paintings, writing that: '[t]he diagram is thus the operative set of asignifying and nonrepresentative lines and zones, line-strokes and color-patches. And the operation of the diagram, its function, says Bacon, is to be 'suggestive.' Or, more rigorously, to use language similar to Wittgenstein's, is to introduce 'possibilities of fact' [...]. Because they are destined to give us the Figure, it is all the more important for the traits and color-patches to break with figuration. This is why they are not sufficient in themselves, but must be 'utilized.' They mark out possibilities of fact, but do not constitute a fact (the pictorial fact). In order to be converted into a fact, in order to evolve into a Figure, they must be reinjected into the visual whole; but it is precisely through the action of these marks that the visual whole will cease to be an optical organization; it will give the eye another power, as well as an object that will no longer be figurative' (G. Deleuze, [2003], *Francis Bacon: the logic of sensation*, translated by Daniel W. Smith, London and New York: Continuum, 101-102).

¹² Robin Durie's essay 'The Strange Nature of the Instant' is a valuable examination of this discussion (see R. Durie, [ed.], [2000], *Time and the Instant: Essays in the Physics and Philosophy of Time*, Manchester: Clinamen Press, 1-24).

Chapter 3: Passage

¹ The term 'expression' is used repeatedly by Spinoza in the *Ethics* to underline the immanence of God in substance and its modes; for example, in Part I, Definition 6, he writes; '[b]y God I mean an absolutely infinite being; that is, substance consisting of infinite attributes, each of which expresses eternal and infinite essence' (B. Spinoza, [1992], *Ethics, Treatise on the Emendation of the Intellect and Selected Letters*, edited by Seymour Feldman, Indianapolis and Cambridge: Hackett Publishing Company, 31). This chapter is also informed by Deleuze's examination of the term which, he suggests, emphasises the importance of the internal movements of thought in Spinoza and Leibniz's

post-Cartesian philosophies (see G. Deleuze, [1992], *Expressionism in Philosophy: Spinoza*, translated by Martin Joughin, New York: Zone Books).

Martin Joughin's Preface succinctly summarises this argument, stating; 'Spinoza and Leibniz: two different expressions of 'expressionism in philosophy' characterized in this book as a system of *implicatio* and *explicatio*, enfolding and unfolding, implication and explication, implying and explaining, involving and evolving, enveloping and developing. Two systems of universal folding: Spinoza's unfolded from the bare 'simplicity' of an Infinity into which all things are ultimately folded up, as into a universal map that folds back into a single point; while Leibniz starts from the infinite points in that map, each of which enfolds within its infinitely 'complex' identity all its relations with all other such points, the unfolding of all these infinite relations being the evolution of a Leibnizian Universe' (Deleuze 1992: 5).

² This argument will not, however, extend to evaluate whether Descartes' geometric writings might be considered a 'forgotten' geometry.

³ All citations from the 'Commentary on Descartes' 'Principles of Philosophy' are taken from E. Curley, (ed. and trans.), (1985), *The Collected Works of Spinoza*, Princeton: Princeton University Press. References give the Part, original page and line number, followed by Curley's pagination; for example, (Curley 1985: I, 129, 5-7/226).

⁴ Later this chapter will note Spinoza's criticism of what he calls Descartes' 'occultist' union between the mind and body. In addition, chapter 5 notes Bergson's frustration with Descartes' scientific method that leads him to acknowledge Descartes' skill as a physicist, but to criticise his dependency upon the 'symbolic' limits of modern rational science.

⁵ Deleuze notes that Spinoza constructs the geometric method in relation to a 'way of being', which is reflected in his practical work of polishing optical lenses. Deleuze writes; '[i]n Spinoza's thought, life is not an idea, a matter of theory. It is a way of being, one and the same eternal mode in all its attributes. And it is only from this perspective that the geometric method is fully comprehensible [...]. The geometric method ceases to be a method of intellectual exposition; it is not longer a means of professorial presentation but rather a method of *invention* [...]' (G. Deleuze, [1988], *Spinoza: Practical Philosophy*, translated by Robert Hurley, San Francisco: City Lights Books, 13-14).

⁶ See also Bergson's description of Spinoza's approach as having the impact of a 'dreadnought', in K. Ansell Pearson and J. Mullarkey (eds.), (2002), *Henri Bergson: Key Writings*, London: Continuum, and cited in chapter 5, note 9, below.

⁷ All citations from the *Ethics* are taken from (Spinoza 1992). In references the title is abbreviated to *E*, hereafter. References give the following; Title, Part, Proposition or Definition, Corollary or Scholium, and page number, for example (*E*: I, Prop 7/34).

⁸ See, for example, Martin Joughin's discussion about enfolding/unfolding and *implicatio/explicatio* (Deleuze 1992: 5-7).

⁹ In his introduction, Seymour Feldman writes; 'Spinoza's *Ethics* is perhaps the first purely philosophical treatise that presents its conclusions consistently and completely in an axiomatic

manner. In this respect it is the paradigm of the hypothetical-deductive method suggested by Aristotle in his *Posterior Analytics* as the model for a scientific theory, which until Spinoza was only exemplified by Euclid's geometry' (*E*: 7).

¹⁰ Richard Arthur provides an excellent survey of the development of atomistic theories in which Spinoza and Leibniz participated (see R. Arthur, (ed. and trans.), [2001], *The Labyrinth of the Continuum: Writings on the Continuum Problem, 1672-1686, G W Leibniz, The Yale Leibniz Series*, New Haven and London: Yale University Press).

¹¹ Deleuze notes the confluence between the geometric *plan* and immanent *plane* that is in Spinoza's emphasis on the modal nature of 'life', writing; '[w]hat is involved is no longer the affirmation of a single substance, but rather the laying out of a *common plane of immanence* on which all bodies, all minds, and all individuals are situated. This plane of immanence or consistency is a plan, but not in the sense of a mental design, a project a program; it is a plan in the geometric sense: a section, an intersection, a diagram. Thus to be in the middle of Spinoza is to be on the modal plane, or rather to install oneself on this plane – which implies a mode of living, a way of life' (Deleuze 1988: 199).

¹² Spinoza can be said to be 'materialist' insofar as he anticipates the modern concern with biology and bio-physical definitions of matter. See, for example, (Deleuze 1988: 56-57) and Seymour Feldman's introduction to the *Ethics* (*E*: 12).

¹³ Spinoza continues this discussion into an extended examination of the motion of extended bodies and their constitution as divisible parts, motion, internal and external qualities and capacity to affect other bodies (*E*: 72-76).

¹⁴ See Part II, Proposition 40, Scholium 1 (*E*: 89).

¹⁵ It might be possible to suggest that Spinoza's common notions have some correspondence to Deleuze and Guattari's notion of the 'percept' when they write that the definition of art lies in its attempts to 'create the finite that restores the infinite: it lays out a plane of composition that, in turn, through the actions of aesthetic figures, bears monuments or composite sensations' (G. Deleuze and F. Guattari, [1994], *What is Philosophy?*, translated by Hugh Tomlinson and Graham Burchell, New York and Chichester: Columbia University Press, 197).

¹⁶ Deleuze writes; '[b]ut joyful passions lead us closer to this power [of action], that is, increase or help it; sad passions distance us from it, that is, diminish or hinder it. The primary question of the *Ethics* is thus: What must we do in order to be affected by a maximum of joyful passions?' (Deleuze 1992: 273).

¹⁷ Deleuze notes the historical 'pantheist' tradition in the relationship between the implication and explication (*implicatio/ explicatio*) that produce a synthetic unity – '*complicatio*' – that is underscored by the Neoplatonic principles of 'multiplicity in the One, and of the One in the Many' and noting that the principles of implication and explication do not therefore constitute opposition but synthesis (Deleuze 1992: 16).

¹⁸ Deleuze uses the concept of 'speeds' to register the multiple kinds of activity that are generated in the body by the emotions; for example, of the modes, he writes; '[f]or, concretely, a mode is a

complex relation of speed and slowness, in the body but also in thought, and it is a capacity for affecting or being affected, pertaining to the body or to thought' (Deleuze 1988: 124).

¹⁹ Deleuze writes that the *Ethics* is a twice-written book; the first book is the formal geometric method, the second 'subterranean' book is the 'broken chain of the scholia, a discontinuous volcanic line, a second version underneath the first, expressing all the angers of the heart and setting forth the practical theses of denunciation and liberation' (Deleuze 1992: 28-29).

²⁰ Isabelle Stengers, for example, discusses whether it is possible to think of an ethics of science that might be informed by feminist practice or radical politics and suggests that such a re-thinking of the scope of the scientific method reflects Bergson's inquiry. See I. Stengers, (1997), *Power and Invention: Situating Science, Theory Out of Bounds*, Volume 10, Minneapolis and London: University of Minnesota Press.

Chapter 4: The Plenum

¹ See, for example, Leibniz's writings on the problem of bodies, motion and rest in 'On Matter, Motion, Minima, and the Continuum', 1675 (Arthur 2001: 30-41). In his introduction, Arthur notes that Leibniz gave up 'the ontology of perfect solids and perfect fluids' during this period, suggesting he develops a different ontology in which 'matter has varying degrees of resistance to division, [and] a given body can respond to the actions of the plenum by differing internal divisions, manifested as elasticity.' (Arthur 2001: lxxv).

Much of Arthur's commentary on the problem of the Continuum informs a discussion about geometric method, in particular, the development of Leibniz's concepts of substance, infinite divisibility, and the 'unassignables' or 'indiscernibles'. Arthur's text is especially strong in underpinning Leibniz's ontology of the Monad in conjunction with a rigorous examination of the development of the physical and mathematical sciences in the seventeenth century that directly contributes to developing a concrete and analytic understanding of Leibniz's philosophy, whilst recognizing the inherent labyrinthine nature of his writings in which internal disagreements, correspondence with other writers, progressive changes of opinion and contradiction come together to form a discontinuous, yet continuous philosophy; for example, Leibniz's philosophy of infinity is intimately related to the operations of Geometry. It is another aspect of his interests in the labyrinth of the continuum, such as, his text '*De usu geometriae*' (1676), in which he considers geometry to be the basis for discussions about the 'Continuum', writing; '[o]nly Geometry [...] can provide a thread of the Labyrinth of the Composition of the Continuum, of maximum and minimum, and the unassignable and the infinite, and no one will arrive at a truly solid metaphysics who has not passed through that labyrinth' (cited in Arthur 2001: xxiii).

² In his 'Treatise on Calculus' (1675-76), Leibniz defines calculus as; 'every curvilinear figure is nothing but a polygon with an infinite number of sides, of an infinitely small magnitude.' Arthur explains, 'according to this conception any curve can now be represented as a infinite 'sum' of such differentials [...]. Similarly, the area can be represented as an infinite sum of the products of each ordinate and a differential [...]' (Arthur 2001: liv).

³ This is reflected in the different 'levels' with which the two texts begin; the *Ethics* begins with a definition of the infinite, yet indivisible, substance or God, whereas the *Monadology* begins with an explication of the infinite divisibility (i.e. magnitude) of the Monad.

⁴ As a result, the relationship between quality and quantity becomes the central condition of production, not as an opposition of forces, but as a variation in degrees of intensity in the Monad. Deleuze examines these relations in Leibniz, Kant and Maimon's theories of qualitative difference in (Deleuze 1997: 170-176).

⁵ There is an expanded discussion about Kant's Newtonian understandings of space and time and Leibniz's theories of geometry, space and time that is reflected in Leibniz's correspondence with Samuel Clarke about Newton's theories of space and time, between 1705-1716 (see, H. G. Alexander, [1956], *The Leibniz-Clarke Correspondence*, Manchester: Manchester University Press). This debate, however, is too large to be addressed by this thesis, but it is also noted that Deleuze suggests the differences between Kant and Leibniz's positions are mediated through Salomon Maimon's 'reformulation' of the *CPR* by means of a Leibnizian form of qualitative 'difference'. Deleuze outlines how Maimon overcomes the external difference that constitutes 'the Kantian duality between concept and intuition' by 'showing how inadequate the point of view of conditioning is for a transcendental philosophy: [so that] determinability must be itself conceived as point towards a principle of reciprocal determination' (Deleuze 1997: 173).

⁶ The internal infinity, difference and magnitude also suggests a strong precedent to the Jena Romantics concept of 'fragment', whose magnitude is an excessive unity that challenges the notions of finite extension and agency. See, for example, P. Lacoue-Labarthe and J-L. Nancy, (1988), *The Literary Absolute: the Theory of Literature in German Romanticism*, translated by Philip Barnard and Cheryl Lester, Albany, New York: SUNY.

⁷ All citations from the *Monadology* are taken from the edition, G. W. Leibniz, (1973), *Discourse on Metaphysics, Correspondence with Arnauld, Monadology*, translated by G. R. Montgomery, La Salle, Illinois: Open Court Publishing Company. In references, the title is abbreviated to *M*, hereafter, followed by the section number and page number.

⁸ Arthur writes that the problem of the atom and the void is 'a tangled thread' throughout Leibniz's writings, which develops from his theories of atoms as unextended 'indivisibles' to; 'the insensibly small, very hard particles' such as the 'bullae' and the 'terrellas' [which are] akin to the 'chemical' atoms of Sennert [and represent] 'units of formation' or 'action' in his writings before 1676' (Arthur 2001: xliii-xliv). After 1676, however, Arthur writes that Leibniz embraces 'atomism', positing the 'necessity' of an 'indestructible core'. But with respect to the *Monadology* we find that it goes a step further, reflecting Leibniz's subsequent rejection of atomism for substance, which he calls the 'substantial atom', 'the combination of soul and body' or the 'corporeal substance', in which there is the indivisible soul (Arthur 2001: xlviii).

⁹ Also see p. 37 below, for Leibniz's definition of the immensum from 'On the Origin of Things from Forms' (1676) and cited in Arthur 2001: 121.

¹⁰ Keith Ansell Pearson notes that Bergson's critique of knowledge is a 'philosophy of life', which recalls Spinoza's philosophy of a 'practical way of living' (K. Ansell Pearson, [2002], *Philosophy and the Adventures of the Virtual: Bergson and the Time of Life*, New York and London: Routledge, 17). Ansell Pearson also notes that both Spinoza and Bergson are linked by a commitment to a univocal and transcendental immanence (Ansell Pearson 2002: 103).

¹¹ There are a number of differences between Leibniz and Bergson's concepts of perception and memory: 1. Leibniz provides a particularly strong concept of intensity, however, we will see that Bergson considers perception and its intensity in relation to a much more explicitly defined spatio-temporal order. In this respect, Bergson augments Leibniz's project into a more fully formed topological or geometric project. 2. Bergson considers the relationship between memory and the actions of the individual in relation to an embodied and transcendental 'intuition'. Bergson's thinking, therefore, displays a more psychological mode of interpretation than Leibniz's logic, despite the sufficiency of the Monad that is derived from perception and appetite.

¹² Robin Durie, for example, highlights the extent to which a 'potential' theory of infinity as magnitude is problematic, since it does not admit the corporeality of being (*entelechia*). He cites Aristotle's discussion about the reality of a 'potential' magnitude and the Entelechy in the *Physics*: "To be' means to be potentially [*dynamei*] or to be actually [*entelechia*]; and the infinite is either in addition or in division. It has been stated that magnitude [*megethos*] is not in actual operation infinite [i.e., there is a limit to the actual size things can be]; but it *is* infinite in division – it is not hard to refute indivisible lines – so that it remains for the infinite to be potentially [*dynamei*]. We must not take 'potentially' here in the same way as that in which, if it is possible for this to be a statue, it actually will be a statue, and suppose that there is an infinite which will be in actual operation.' (Aristotle's *Physics III*, 206a, 14ff, cited in Durie 2000: 13).

¹³ The seventeenth century notion of substance provides a distinct shift in the concepts of infinity and magnitude from those that existed in the Ancients philosophy. Durie states that, according to Zeno, a magnitude of an infinite aggregate is impossible, or insufficient, since it is only potentially given (Durie 2000: 13). For Leibniz, however, the notion of aggregate or impossibility is not just demonstrated as a logical idea, but is established as the definition of an intensive and thinking substance that is sufficient.

¹⁴ See, for example, *The Fold* in which the 'amplitude' of the soul (its intension and inflection) is similar to Bergson's memory in which the 'living present' or act is 'essentially variable in both extension and intensity' (Deleuze 2001: 70).

¹⁵ Deleuze writes, '[t]his procedure of the infinitely small, which maintains the distinction between essences (to the extent that one plays the role of inessential to the other), is quite different to contradiction. We should therefore give it a special name, that of 'vice-diction.' (Deleuze 1997: 46).

¹⁶ Arthur suggests that 'metaphor of the net presages that of the folds of matter' (Arthur 2001: 402).

¹⁷ The relationship between space and matter is also evident in the use of the term 'plenum' in architecture, which refers to an interstitial space or void between the floor and the ceiling, and in the

combustion engine, the plenum is a 'chamber' for the circulation of air. Note too Deleuze's opening reference to the operation of folding in relation to the baroque architectural form of interconnected chambers, floors and layers in *The Fold*, writing; 'the Baroque differentiates its folds in two ways, by moving along two infinities, as if infinity were composed of two stages or floors: the pleats of matter, and the folds of the soul' (Deleuze 2001: 3).

¹⁸ Arthur writes that; 'Leibniz was committed to a plenistic physics from the beginning, largely under the influence of Hobbes. But this was the dominant view of his contemporaries, shared by the Cartesians and even atomists like Huygens. It was not displaced in continental Europe until the spread of Newtonianism in the latter part of the eighteenth century' (Arthur 2001: 460).

Chapter 5: The Envelope

¹ There is scope for a study of the concept of the 'ready-made' in relation to Duchamp's work and his interest in geometry; for example, see discussions about 'l'infinite' in M. Sanouillet and E. Peterson, (1973), *The Writings of Marcel Duchamp, Marchand du Sel*, Cambridge and New York: Da Capo Press. See also L. Dalrymple Henderson, (1998), *Duchamp in Context: Science and Technology in the Large Glass and Related Works*, Princeton: Princeton University Press.

² Developments in mathematics and geometry in the nineteenth century focus on the break away from Euclidian geometry, becoming increasingly concerned with the mathematical possibility of a spatial 'fourth dimension' and non-Euclidian principles of space-time. In each case, these geometries sought to disrupt the apparently teleological determination of Euclidian geometry towards ideal truths. Thus, non-Euclidian geometry challenges the axiomatic *a priori* conception of mathematics, in particular, focusing on the possibility of alternative solutions to the 'truth' of Euclid's fifth postulate; '[t]hat, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the straight lines, if produced indefinitely, meet on that side on which are the angles less than two right angles.' (Heath 1956: 155). Gauss, Lobachevsky and Bolyai's theories of lines that will necessarily meet – the lines on a sphere – in the 1820s and 30s lead to Beltrami's 'pseudosphere' in the 1860s which provided an accessible diagram of curved space. Other non-Euclidian geometries took the issue of congruence as evidence that Euclid's geometry did not fully describe spatial relations (for example, the non-congruence of the left and right hand). See, for example, L. Dalrymple Henderson, (1983), *The Fourth dimension and Non-Euclidian Geometry in Modern Art*, Princeton: Princeton University Press.

Most complex of these was Riemann's theory of topological manifolds (explained in his lecture 'On the Hypothesis that Lie at the Foundations of Geometry' of 1854 and published in 1867) that distinguished between bounded and infinite space, and congruence, diverging significantly from Euclidian principles of transformation to produce geometric figures that are 'locally' and 'globally' differentiated.

Lawrence Sklar explains, for example, that 'topological structure' is evident in the intrinsic difference between two surfaces, such as a plane and a cylinder, determined at a local *and* a global level. Sklar explains that at a global level 'the two surfaces differ, even neglecting their embedding in

three-space, in the global properties of *connectivity* determinable by a geometer confined to the surface and ignorant of the embedding.' At a local level they differ if we are given 'free mobility throughout the surface'; for example, 'if we start from a point on a plane and travel along any geodesic (straight line) through that point without ever reversing direction, then we will never return to our initial point. On a cylinder, however, through each point there is a geodesic (the circle around the cylinder through that point) such that if we travel along that geodesic, never reversing direction, we will sooner or later return to our starting point. This shows that *the intrinsic identity* of a [figure, such as a] cylinder and a plane *is a local matter*' (L. Sklar, [1977] *Space, Time and Spacetime*, Berkeley, Los Angeles and London: University of California Press, 41-42) [my emphasis].

³ See, for example, Keith Ansell Pearson, who examines the multiplicity of Bergson's notion of the 'virtual' (Ansell Pearson 2002).

⁴ In his essay 'Laughter: an Essay on the Meaning of the Comic' (1900), Bergson suggests that the imagination abstracts from the particular perception; '[the] artistic imagination [...] simply reveals what we have hidden from ourselves in our perceptual power of condensation which is at the same time an abstraction from the individual to the general' (cited in J. Mullarkey, [1999], *Bergson and Philosophy*, Edinburgh: Edinburgh University Press, 59).

⁵ All quotations are taken from H. Bergson, (1991), *Matter and Memory*, translated by Nancy Margaret Paul and W. Scott Palmer, New York: Zone Books. In references, the title is abbreviated to *MM*, hereafter.

⁶ Mullarkey defines the image as a universal designation of 'the objects of every type of perception' (Mullarkey 1999: 32).

⁷ For an interesting 'psychical' interpretation of topology and the body see Bernard Burgoyne's discussion in his essay 'Autism and Topology', in which he examines the 'weak' topological structures of the autistic child. In note 32 to the essay he writes; '[e]qually topological structure can be obtained by considerations of boundary or frontier. There exists a range of topological notions, all of which can be demonstrated to be equivalent *in having this power to generate the structure of a space*: where there are limitations of the equivalence they raise questions about the foundations of topology and the foundations of mathematics. The equivalent notions include the concepts of neighbourhood, interior, closure, closed set, net, limit, filter and ideal' (B. Burgoyne, [ed.], [2000], *Drawing the Soul: Schemas and Models in Psychoanalysis*, London: Rebus Press, 215) [my emphasis].

⁸ Mullarkey, for example, discusses Bergson's development of heterogeneous notions of space in *Matter and Memory*, in distinction to the 'homogenous' notion of space in the earlier essay 'Time and Free Will' (1888), (Mullarkey 1999: 13).

⁹ See for example, Bergson's impressive analysis of Spinoza's geometric method the *Ethics* in the essay 'Philosophical Intuition' in *The Creative Mind* (1933), which Bergson suggests has 'behind' it the 'subtle' 'lightness' of intuition that elides the conceptual weight of his method. He writes; '[n]evertheless I know of nothing more instructive than the contrast between the form and the a matter of a book like the *Ethics*: on the one hand those tremendous things called Substance, Attribute and

Mode, and the formidable array of theorems with the close network of definitions, corollaries and scholia, and that complication of machinery, that power to crush which causes the beginner, in the presence of the *Ethics*, to be struck with admiration and terror as though he were before a battleship of the Dreadnought class; on the other hand, something subtle, very light and almost airy, which flees at one's approach, but which one cannot look at even from afar, without becoming incapable of attaching oneself to any part whatever of the remainder, even to what is considered essential, even to the distinction between Substance and Attribute, even to the duality of thought and Extension. What we have behind the heavy mass of concepts of Cartesian and Aristotelian parentage is that intuition which was Spinoza's, an intuition which no formula, no matter how simple, can be simple enough to express' (Ansell Pearson and Mullarkey 2002: 236-237).

¹⁰ All quotations are taken from 'Introduction to Metaphysics' (1903), reprinted in (Ansell Pearson and Mullarkey: 2002). In references, the title is abbreviated to IM, hereafter.

¹¹ On intuition and geometry, Mullarkey writes; 'Bergson believes there is no 'simple and geometrical definition of intuition'. He cites the *Creative Mind* in which Bergson writes that a changing reality requires 'views of it that are multiple, complementary and not at all equivalent'. Mullarkey continues; '[i]ntuition entails whatever is required by a subject in a particular context to adjust to the full alterity of that situation as it extends beyond the confines of [the subject's] perspective' (Mullarkey 1999: 159).

¹² All quotations are taken from H. Bergson, (1964), *Creative Evolution*, translated by Arthur Mitchell, London: Macmillan and Company. In references, the title is abbreviated to CE, hereafter.

Conclusion

¹ Massumi has outlined an interesting question in relation to the construction of the architectural drawing or diagram when he writes; '[g]rappling with the question of double architectural vision requires acknowledging that the diagram is a *technique of existence* and that design is always collective. Architecture will always benefit from the application of powers of formal analysis. But its basic medium is not geometry, or topology, or CAD, or design in general, or critique, or any other formalizable field. Its basic medium is the field of *experience*' (Alliez and von Samsonow 2001: 175).

² The architect, Bernard Tschumi and his office have designed a number of projects that develop an architectural notion of the 'envelope'; in particular, *le Fresnoy*, an international arts centre in Tourcoing, France (1991-2) in which a 'folded' roof enveloped two existing buildings (B. Tschumi, [1994], *Event-Cities (Praxis)*, Cambridge Massachusetts and London: MIT Press, 390-523).

In addition, Tschumi develops this strategy of the 'in-between' in the design of a Concert Hall and Exhibition Complex in Rouen (1998-). In relation to this project, Tschumi writes; '[a]rchitecture also can be defined by surfaces, whether continuous or discontinuous, amorphous or obsessively articulated. The very large public assembly space at Rouen is conceived as two envelopes, two event-spaces, one inside the other. Within the inner envelope, the auditorium is programmed according to various venues [...]. Between the two envelopes is the access area [...]. This 'in-between'

is conceived as a large public space, activated by various circulation routes' (B. Tschumi, [2000], *Event-Cities 2*, Cambridge Massachusetts and London: MIT Press, 620).

³ See, for example, Elizabeth Grosz's discussions of spatio-temporal relations and feminist philosophy (E. Grosz, [1998], *Space, Time and Peversion: Essays on the Politics of Bodies*, London and New York: Routledge, 83-101).

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