

**Kant and Force:
Dynamics, Natural Science
and Transcendental Philosophy**

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Abstract

This thesis presents an interpretation of Immanuel Kant's theoretical philosophy in which the notion of 'force' (*Kraft*) is of central importance. My analysis encompasses the full span of Kant's theoretical and natural-scientific writings, from the first publication to the drafts of an unfinished final work. With a close focus on Kant's texts, I explicate their explicit references to force, providing a narrative of the philosophical role and significance of force in the various periods of the Kantian oeuvre. This represents an intervention into Kant scholarship that seeks to correct the marginal role accorded to 'force'. The central problem that emerges through the thesis' attention to force is: how to interpret the simultaneous separation and connection of physical and psychological forces in Kant's mature, critical philosophy? Physical and psychological forces are strictly separated, and yet a common, ontological conception of force underpins these two domains. I show that this issue has its basis in a tradition of philosophical 'dynamics' stemming from Leibniz, which is examined in part one. The three parts of the thesis proceed chronologically through the Kantian oeuvre. Part one reconstructs the historical context of Leibnizian and Newtonian conceptions of force, and presents a narrative of the employment of force in Kant's pre-critical writings, in their relation to the broad problematic of Leibniz's dynamics. Part two explores the account of physical and psychological forces, and the common, ontological notion of force, in the major critical-period discussions. Part three presents the late works, namely the third *Critique* and the *Opus postumum*, as a 'philosophy of force', in which force, with all its necessary ambiguities, plays central roles in Kant's late systematising endeavours. I conclude that the perspective of this thesis makes possible a new understanding of the nature and unity of Kant's philosophical project.

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Es ist sehr gut, den Dogmatiker in Bewegung zu bringen,
daß er nicht glaubt: er sei sicher und seiner Sache gewiß.

[It is very good to bring the dogmatist into motion, so that
he does not believe: he is sure and his matter is certain.]

- Kant, *Metaphysik L₁*

Man kann kein Urteil über Kant abgeben, ohne in jeder Zeile
zu verraten, welche Welt man im eigenen Kopfe trägt.

[One cannot submit any judgement about Kant without
betraying, in every line, which world one carries in one's
own head.]

- Hermann Cohen, *Kants Theorie der Erfahrung*

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Introduction

1. Space, time – and force

An intriguing, seemingly wistful note from Kant's final years, on a handwritten page that is now lost, reads,

From my oldest interleaved Baumgarten philosophy textbook, when Herder was my auditor. Space, time and force. Long before the *Critique*.¹

Here, in his last years of life, Kant reflects back over forty years to the early 1760s, when Johann Gottfried Herder attended his classes. Herder was a favoured student, and Kant allowed him to attend his lectures for free. Later, Kant would disapprove of Herder's philosophical direction; the rift between the philosophers became public in Kant's patronising review of Herder's *Ideen* in the mid-1780s. The 'interleaved Baumgarten' is Kant's copy of Baumgarten's *Metaphysica*, which he used as a textbook for his metaphysics lectures throughout his career.² The concepts to which Kant's late note harks back are space, time and force: *Raum, Zeit und Kraft*.

Several Reflections from the 1760s connect these three concepts and indicate the significance then accorded to them. One states, '[a]ll ideas of metaphysics are analytic except space, time and force' and that '[t]he fundamental concepts of *analysis* are: possibility, impossibility, necessity, contingency, unity, etc.; of *synthesis*: space, time, and force' (R3716: 17:257, 259). Another note, from the same period, declares,

The *principium* of the form of all experiences is space and time. The *principium* of the form of all judgments of pure reason: identity and contradiction. The *principium* of the form of all *a posteriori* judgments of reason: ground and force. (R3717: 17:260)

¹ This note is from *Loses Blatt L1*, a sheet from Kant's *Nachlass* (handwritten remains) that was never fully transcribed. It is from a set of folders of Kant's *Nachlass*, marked A through N, stored in Königsberg and mostly lost in the bombing of WWII. The snippet survives because Erich Adickes quotes it in his editorial notes to R3716 in the *Akademie Ausgabe* (17:257). It is likely to date to the period of 1798-1804, as suggested by two other notes from L1 that survive in the Academy edition: R7319 in the moral philosophy *Nachlass* (19:315-16) and 'L Bl L 1' in the supplements to the *Opus postumum* (23:486). These both suggest that the note in question is late, stemming from the period in which Kant was writing the *Opus postumum*. R7319 (the content of which is distinct to that of the other two L1 notes) is dated by Adickes as summer 1798-1804. I thank Steve Naragon and Werner Stark for much of this information.

² Specifically, Kant seems to refer here to his copy of the 3rd edition (1750) of Baumgarten, rather than the 4th edition (1757): his copy of the latter contains a great deal more annotations and is the source for many of the *Reflexionen*. A copy of the 3rd edition containing Kant's notes was discovered by Werner Stark in 2000; Naragon believes that there is another copy of this edition, lost or waiting to be found, containing further notes from 1753-1763. See <<http://users.manchester.edu/FacStaff/SSNaragon/Kant/Lectures/lecturesListDiscipline.htm#metaphysics>>, accessed 22nd October 2016.

Force is here separated from space and time, as the form of specifically *a posteriori* judgements whereas space and time are the principles of the form of *all* experiences. But the three concepts are then reconnected: '[a]ll combination (in the real sense): space, time, and force' (*ibid.*). The common thread of these passages is that space, time and force are more than merely logical notions: they pertain to something 'real' as opposed to merely logical, and they are synthetic, adding something to a concept in a judgement, rather than merely analytically extracting something already present in a concept.³

Space and time have long been recognised as central to Kant's philosophical innovations. The 'critical turn' of around 1770-80 proposed that space and time were neither confused sensible representations of intelligible relations, as in the Leibnizian tradition, nor an objectively real container of objects of experience, as in the Newtonian view. Rather, they are the 'pure forms of intuition' in which any experience must be grounded. Space and time are subjective, as they are furnished by the structures of our cognition, but also objective, universal and necessary, as they condition any possible experience. Along with the schematised categories of the understanding, their principles, and the unity of apperception, the pure forms of space and time make up the transcendental conditions of experience or of the object in general.

This discovery of transcendental philosophy, and its first steps in limiting the pretensions of pure reason, is the revolutionary philosophical moment of Kant's *Critique of Pure Reason* (1781/7). The *Metaphysik Mrongovius* (1782-3) lecture notes highlight the innovative nature of the critical conception of the forms of intuition: when introducing the notions of space and time, Kant states: '[w]e come now to the important concepts that are of the kind that, once we have been able to unfold their nature, they alter the entire plan of metaphysics, and banish all contradictions that discredited metaphysics' (29:829). What Kant said of space and time in the early 1760s Reflections remains broadly the reason that they are key to the critical renovation of metaphysics. The transcendental logic of the *Critique* differs from general logic in that it has a specific content, 'a manifold of sensibility that lies before it *a priori*' (A77/B102). That is, it is in its relation to the spatio-temporal manifold that transcendental logic is synthetic not analytic, and real not merely logical. Space and time, as commentary on the *Critique* has universally recognised, are central to Kant's radical attempt to prove the possibility of synthetic *a priori* judgements.

³ Kant already holds the distinction between analytic and synthetic judgements, which will be central to the *Critique*, in the early 1760s, as R3716 itself shows; the 1763 *Inquiry* opens with the distinction, with mathematics and philosophy at this time identified as defining their concepts through synthesis and analysis respectively. The distinction between the real and the logical is employed in *Negative Magnitudes* (1763) to distinguish between two types of opposition.

Force – as the third among the triumvirate of concepts that our opening note reflects upon – has received incomparably less attention from interpreters than space and time. This is in part because force is much less centrally thematised in the major critical works. Indeed, Kant’s late note looks back to a time ‘[l]ong before the *Critique*’: the concept of force might be taken to be one of the ‘pre-critical’ remnants of dogmatic metaphysics, and much of the literature has implicitly or explicitly treated ‘force’ in this way. However, the very fact that this late note reflects upon this ‘pre-critical’ concept is a first indication that ‘force’ is not entirely banished from Kant’s mature philosophical vocabulary. Indeed, at the moment of Kant’s nostalgic recollection of the time that Herder was his student, he is working on the drafts that would be left unfinished at his death and collected as the *Opus postumum*. In these late drafts, the notion of force is everywhere. This prompts us to ask: is force really as marginal to the major critical-period works as has been generally assumed?

2. Kant and force: argument of the study

The contention of this thesis is that ‘force’ (*Kraft*) is centrally important across the entire span of Kant’s theoretical philosophy. This importance is rarely explicit or immediately evident, so my account must reconstruct the role of force from passages scattered across the Kantian oeuvre. This force is *both* a physical and a psychological notion, contrary to the prevailing views in the literature. In the critical period, after a break I identify in *Dreams of a Spirit-Seer* (1766), specific physical and psychological forces are strictly separated, and may not be used to explain one another. Nevertheless, a common ontological account of force underpins the use of the term in these two domains. This complex position is the subject of the interpretation in this study. I reconstruct key developments in Kant’s theoretical philosophy as a continuation, albeit transformed, of Leibniz’s unfinished ‘science of dynamics’, insofar as the latter sought to ultimately provide a unified account of metaphysical and physical forces with very broad explanatory potential. Kant’s complex account of force is put to work in the later critical-period works, the third *Critique* and the *Opus postumum*, revealing the importance of force for major aspects of the Kantian philosophy.

We will see that from his earliest publication to the final drafts, Kant incessantly returns to ‘force’, both reflecting on its nature and employing it for diverse philosophical ends. Recognition of this significance is rare, but the editors’ entry for *Kraft* in the recent *Kant-Lexicon* is an exception: ‘[d]uring the almost sixty years of his creative work, Kant grappled [*hat sich ...*

auseinandergesetzt] time and again with the concept of force and specific forces'.⁴ The dictionary entry touches on a number of the themes that this study will address: Kant's repeated employment of 'force', from the pre-critical works to the last drafts; its critical-period definition in terms of substance, accidents and causality; the relation of 'force' and 'faculty' (*Vermögen*); epistemological considerations around the possibility of knowledge of force; and Kant's transformation of the distinction between 'primitive' and 'derivative' forces. These aspects are however treated entirely separately in the entry (naturally, given the limitations of the dictionary genre), and no attempt is made to consider connections between them or situate the differences within Kant's philosophical development.⁵

Such a developmental investigation of the way that force is conceptualised and employed in various contexts, from the first to the last works, an investigation that at once critically interrogates the compatibility of Kant's 'force' with the canonical Kantian philosophical positions, has not previously been conducted. The present study will pursue this. There are three parts to the investigation, which I will detail below. Part one reconstructs the complex historical background and then identifies the *employment* of force in the pre-critical works. Part two presents Kant's singular *account* of force in the critical period. Part three explores Kant's *philosophising* through force in the later works, namely the third *Critique* and the *Opus postumum*. My account therefore proceeds chronologically through the Kantian oeuvre and is attuned to the developmental aspects of 'force'. At the same time, I identify the consistent definitions of force in the critical period, whilst nevertheless closely examining the philosophical difficulties that remain in this account. It is not accidental that 'force' has rarely if ever been made central to interpretations of the critical philosophy: the complexities of Kantian force put core aspects of the critical architecture into question.

Part one provides the key philosophical background to Kantian force: Leibniz's science of dynamics. In what Daniel Garber names his 'middle-period' – i.e., before the late monadological

⁴ 'Kraft' in Marcus Willaschek, Jürgen Stolzenberg, Georg Mohr and Stefano Bacin eds., *Kant-Lexikon* (Berlin: de Gruyter, 2015) vol. 2, p.1289.

⁵ In this way, the new *Kant-Lexikon* entry is not so far from Rudolf Eisler's 1930 *Kant-Lexikon*, which treats 'Kraft' (as it does most terms) as an unchanging and coherent concept across Kant's work, the meaning of which ultimately stems from the definition found in the *Critique* (Eisler, *Kant-Lexikon* (Hildesheim: G. Olms, 1984), pp.309-11). Howard Caygill's *A Kant Dictionary*, which notes that 'philosophical reflection upon the concept of force remained a constant throughout Kant's career', is unique in giving a developmental account that, at the same time, seeks to identify both the consistencies in Kant's unified notion of *Kraft* and the tensions therein. The present study provides a different account of the key historical contexts, the development, and the philosophical significance of Kant's *Kraft*, but nevertheless Caygill's entry provides, alongside the recent *Kant-Lexikon*, a useful starting-point for an initial understanding of the term (Caygill, *A Kant Dictionary* (Oxford: Blackwell, 1995), pp.201-3).

doctrine was fully in place – Leibniz proposed a new science that would extend knowledge not just in physics but also regarding metaphysical problems such as the soul-body relation and the existence of God.⁶ This would be a dynamics of physical and metaphysical forces. My first chapter argues that Leibniz was never able to finish his dynamics to his own satisfaction, and that this was due to a fundamental philosophical difficulty at the heart of the new science: the nature of the relation between ‘primitive’ and ‘derivative’ force. Among other contemporaries, Christian Wolff was unsatisfied with this aspect of Leibniz’s dynamics; I examine Wolff’s account of forces, to show his synthesis of Leibniz’s dynamics with Newtonian conceptions of force. Chapter two then traces the explicit and implicit development of the broad problematic of Leibniz’s unfinished dynamics – that of furthering both physical and metaphysical knowledge through a doctrine of forces – in Kant’s pre-critical works. These early efforts towards a broad dynamics are curtailed in *Dreams of a Spirit-Seer* and the *Inaugural Dissertation* (1770), which enact the first ‘critical’ delimitation of reason through a restriction of knowledge of fundamental forces.

Part two addresses the explicit critical-period discussions of force. In 1766 and 1770 Kant restricts knowledge of forces to those derived from experience, but this does not entail the disappearance of ‘force’ from the critical theoretical philosophy. Chapter three examines Kant’s account of forces (in the plural) in the 1780s. What we would today call ‘ontological’ and ‘epistemological’ issues are now intertwined, in line with the *Critique’s* attention to the conditions of possibility of experience. The notion of primitive or fundamental force is transformed into a limit-concept, as the end of a rational reduction of empirically-given forces to the smallest number. This results in two fundamental forces of bodies in physics, and three fundamental forces of the mind or soul in psychology. Although the critical-era Kant denies that physical forces can be used to explain psychological ones or vice versa, it is notable that the *same* ontological account of force underpins the forces of bodies and minds. Chapter four explores this common, ontological account of force (in the singular). I show that it can be elucidated through underappreciated notions in the *Critique*: that of the predicable or derivative concept, and the ‘empirical criterion’ of force’s activity for the inner and outer senses.

Part three investigates the philosophical significance of ‘force’ in later critical-period works. Kant puts the notion to work in the developments that follow the *Critique’s* securing of the foundations of transcendental philosophy and a legitimate metaphysics. At the same time, the complexities in Kant’s critical concept of force, which emerge in our analysis in part two, remain present in the later use of the notion. Chapter five examines the role played by the forces of reflecting

⁶ Daniel Garber, *Leibniz: Body, Substance, Monad* (Oxford: Oxford University Press, 2009).

Urteilkraft, *Bildungskraft* and *Einbildungskraft* in the third *Critique*'s ventured attempt to unify the critical system. Chapter six explores Kant's attempts to address the 'transition problem' in the drafts left as the *Opus postumum*. Distinct phases in these drafts display alternative attempts to utilise the concept of force to effect the transition from metaphysical foundations to physics. This reveals the return of a heavily modified version of Leibniz's original dynamics project, now filtered through the innovations of Kant's critical philosophy. At the same time, because the late drafts explicitly rework aspects of the *Critiques*, the *Opus postumum* provides further insight into the fundamental significance of force to the critical architecture. These two final chapters illuminate the place of force in Kant's philosophy, as the relational concept *par excellence*: force is located on the threshold of various binaries, most notably that of the subject and the object.

3. *Kraft* and force

A terminological clarification: Kant's *Kraft* (and the Latin *vis*) will always be translated as 'force', not 'power'.⁷ Existing English translations of Kant flit between these two terms. The Cambridge editions use the different English words to make an unacknowledged systematic distinction between two facets of Kant's term *Kraft*. Taking Guyer and Wood's translation of the *Critique of Pure Reason* as the most important case, there are two main cases where *Kraft* is rendered as 'power' not 'force'. One is Kant's idiomatic use of 'one's powers' to refer to one's generic capabilities, in a figure of speech like '*seine Kräfte im Spielgefächte zu üben*', with regard to the battlefield of metaphysics, in the B Preface (Bxv). These idioms are legitimately rendered as 'one's powers'.⁸ However, the second instance in which *Kraft* is translated as 'power' is in Kant's references to the *Kräfte* of the soul or mind (*Seele oder Gemüt*): here, the translation is more questionable.⁹

I follow Corey Dyck and Robert Butts in opposing this imposition of a systematic distinction between two senses of *Kraft* through the employment of different English terms. Dyck points out that 'force', firstly, better captures the active character of *Kraft* (and *vis*), as opposed to the sense of potency contained in 'power'. Kant distinguishes *Kraft* and *Vermögen* (and *vis* and *facultas*) as actual and possible, respectively, as will be seen in chapter three. Secondly, the term 'force' has

⁷ I adhere to this choice to the extent of altering the now-standard translation of the title of the third *Critique* to *Critique of the Force of Judgement*: this may appear jarring, but I believe it is justified by the considerations I mention below, which are central to the thesis.

⁸ Kant uses *Kraft* in this way in the *Critique* at A5/B9, A755/B783 and A790/B818.

⁹ The main examples of this in the *Critique* can be found in the 'Refutation of Mendelssohn's proof of the persistence of the soul', added to the B edition of the Paralogisms (B414, 416), the discussion of the cosmological idea of freedom in the Antinomies (A546-7/B574-5), the Appendix (A642/B670, A648-51/B677-79); and the Doctrine of Method's discussion of hypotheses (A770/B798).

the advantage of being able to be taken both physically *and* metaphysically.¹⁰ This is key to the Leibnizian and Newtonian historical context that will be outlined in part one, and to the characteristics of Kant's 'force' explored in part two. Indeed, to a greater degree than Dyke and the other existing literature, this thesis will make central this double meaning of 'force'. More specifically, this dual physical and metaphysical meaning of the term force, which is key to the pre-Kantian context, is ultimately transformed in Kant's critical period to a dualism of forces in physics and psychology, or of bodies and minds.¹¹

The role of psychology in Kant has long been controversial. Peter Strawson's hugely influential, censorious rehabilitation of Kant for analytical philosophy, *The Bounds of Sense* (1966), dismissed the 'psychological' aspects of the *Critique*, its use of faculties of the mind and even the distinction between passive sensibility and active understanding; for Strawson, these metaphysical remnants must be 'disentangled' from the analytic insights in the *Critique* that are worth retaining.¹² Strawson's interpretation inherits, to a greater degree than is often recognised, key aspects of the Marburg neo-Kantian reading, particularly Hermann Cohen's anti-psychologism.¹³ Recent literature rectifies the Cohen-Strawson bias by showing the centrality of the 'psychological' aspects of the *Critique* for a faithful understanding of its arguments, and even asserting the value of Kant's views on psychology in themselves.¹⁴ However, no study has yet connected the forces of Kant's physics with those of his psychology.¹⁵ A central finding of part

¹⁰ Corey Dyck, *Kant and Rational Psychology* (Oxford: Oxford University Press, 2014), p.200. See also Robert Butts, 'The Methodological Structure of Kant's Metaphysics of Science' in Butts, ed., *Kant's Philosophy of Physical Science: Metaphysische Anfangsgründe der Naturwissenschaft 1786–1986* (Dordrecht: Riedel, 1986), pp.190-1.

¹¹ The standard distinction between 'powers' of the mind and 'forces' of bodies no doubt draws from the terminology of Locke and Hume. But emphasising this distinction occludes the Leibnizian heritage, which is active in Wolff and informs Kant: see chapter one, below.

¹² Peter Strawson, *The Bounds of Sense: An Essay on Kant's Critique of Pure Reason* (London: Routledge, 1989), pp. 19-20, 16.

¹³ See this introduction, below, and Appendix 1.

¹⁴ Patricia Kitcher, *Kant's Transcendental Psychology* (Oxford: Oxford University Press, 1990) and *Kant's Thinker* (Oxford: Oxford University Press, 2011); Stefan Heßbrüggen-Walter, *Die Seele und ihre Vermögen: Kants Metaphysik des Mentalen in der Kritik der reinen Vernunft* (Paderborn: Mentis, 2004); Dyck, *Kant and Rational Psychology*; Antonino Falduto, *The Faculties of the Human Mind and the Case of Moral Feeling in Kant's Philosophy* (Berlin: de Gruyter, 2014).

¹⁵ Recent literature has accorded increasing attention to 'force', but only within one of these two separated domains. Kant's psychological forces have been usefully elucidated and explored by, particularly, Heßbrüggen-Walter and Dyck; the physical forces by, *inter alia*, Michael Friedman (*Kant and the Exact Sciences* (Cambridge, MA: Harvard University Press, 1992); *Kant's Construction of Nature* (Cambridge: Cambridge University Press, 2013)) and Eric Watkins ('Kant on Force and Extension: Critical Appropriations of Leibniz and Newton' in *Between Leibniz, Newton and Kant: Philosophy and Science in the 18th Century*, ed. W. Lefevre (Dordrecht: Kluwer Academic Publishers, 2001) pp. 111-127; 'Forces and Causes in Kant's Early Pre-Critical Writings', *Studies in History and Philosophy of Science* 34 (2003): 5-27). Watkins' *Kant and the Metaphysics of Causality* (Cambridge: Cambridge University Press, 2005) is one of the few works to attend to the forces of both physics and psychology (pp.268-82), but this is in service of a general interest of Kant's theory of causality and does

two is that these forces share the same epistemological aspects, play comparable roles in the critical philosophy, and are structured by the same general, ontological concept of force. It is therefore important that Kant's *Kraft* is consistently translated as 'force'.

4. Periodisation

A second clarification pertains to the terms 'pre-critical', 'critical' and 'post-critical'. I employ a distinction between 'pre-critical' and 'critical', and reject the notion of a 'post-critical' period. My adoption of 'pre-critical' and 'critical' was not without hesitation, although it is near-ubiquitous in Kant commentary. Recent studies have questioned the sharpness of the distinction, identifying numerous elements of continuity between Kant's work of the 1740s to 1770s and that of the 1780s on.¹⁶ I have maintained 'pre-critical' for Kant's work up to the end of the 1770s, with 'critical' designating the work that dates from the publication of the first *Critique*. I use the distinction loosely, and without implying the value judgement (the 'bad' pre-critical and the 'good' critical philosophy) common in much nineteenth- and twentieth-century commentary. A determinate point of transition from the pre-critical to the critical era cannot be found, and my account provides a new way to understand the works often taken to be key to this transition: I present *Dreams of a Spirit-Seer* and the *Inaugural Dissertation* in terms of their limitations on knowledge of fundamental forces, a limitation that is then partially relaxed in the canonical critical works.

The distinction between pre-critical and critical is nevertheless useful in recognising that the publication of the *Critique* marks a turning-point in Kant's philosophical life, for a number of reasons, of which I mention two. Firstly, the turn to an emphasis on the conditions of possibility of objects of experience, which is present in more or less nascent ways in a number of pre-critical texts, becomes centrally thematised for the first time in the *Critique*. Secondly, and more importantly, the idea that the critical philosophy represents a break is key not only to the view of Kant's contemporaries, immediate successors and the majority of his interpreters, but also to Kant's own understanding of his philosophical development. Kant's letters attest to the fact that, with the *Critique*, he considers himself for the first time to have made a genuinely major contribution to philosophy, one which he sought to shore up and defend against detractors for the rest of his career. The near-instant renown gained by the *Critique* – even if this did not mean

not draw out the implications for Kant's use and conception of force. I further discuss Watkins' work at the end of this introduction.

¹⁶ Susan Meld Shell, *The Embodiment of Reason: Kant on Spirit, Generation, and Community* (Chicago: Chicago University Press, 1996); Watkins, *Kant and the Metaphysics of Causality*; Dyke, *Kant and Rational Psychology*.

that it was widely read in detail, and it certainly was not widely understood – meant that Kant had a principal work to defend. He presented it, at least in public discussions outside his circle of friends, as unassailable, and as a secure foundation for future work.

In contrast, I reject the label ‘post-critical’, often applied to the *Opus postumum*.¹⁷ There is much less evidence of a break, in Kant’s own view of his work, between the critical period and the late drafts. The two periods are difficult to temporally distinguish, as the early drafts of the so-called ‘post-critical’ *Opus postumum* are written before the ‘critical’ *Critique of the Force of Judgement*. The question of a ‘post-critical’ period hinges on the contested relation of the *Opus postumum* to the works preceding it.¹⁸ Many recent commentators have claimed that the late drafts can be taken to represent an attempt to ‘fill a gap’ in the critical system; alternatively, the drafts can be understood as Kant’s turn to the ‘doctrinal part’ of his system through a metaphysics of nature. My interpretation synthesises these positions: the *Opus postumum* contains drafts towards a transitional work, between the *Critiques* and the future metaphysics of nature. The projected work sought to systematically extend the critical foundations to empirical natural science: this extension necessitates deeper attention, and entertains radical alterations, to fundamental presuppositions of the critical architecture. Kant at least *sought* a continuity between the critical philosophy and the philosophical developments following the *Metaphysical Foundations* and the third *Critique*. The late drafts, in my view, show that the importance of this continuity was such that Kant was willing to rethink apparently sacred aspects of the critical position, to align the critical foundations with the ensuing developments of his thought. The critical project is therefore neither simply ossified in the *Critiques*, nor disregarded in Kant’s late writings: rather, it is still underway in the *Opus postumum*.

On the one hand, then, I claim that the distinction between pre-critical and critical periods should be maintained because Kant himself considered this a break, and always publicly asserted that the critical position was solid and did not require altering; and on the other hand, that the distinction between critical and post-critical periods should be discarded because the late drafts reveal continued attempts to hone and rethink core aspects of the critical architecture. These

¹⁷ Eckart Förster is said to have coined the label in ‘Kant’s Notion of Philosophy’, *The Monist* 72.2 (1989), p.285; see Bryan Wesley Hall, *The Post-Critical Kant: Understanding the Critical Philosophy through the Opus postumum* (New York: Routledge, 2015), pp.2, 27. It might not be accidental that Förster’s interpretation of the *Opus postumum* emphasises its more Fichtean elements in the doctrine of ‘self-positing’: the ‘post-’ of ‘post-critical’ therefore has a connection to that of ‘post-Kantian’. I will here only mention the *Opus postumum* as an example of what might be designated ‘post-critical’, but there is good reason to include the *Metaphysics of Morals* (1797) and the drafts towards ‘What Real Progress?’ (1793) as later developments along with the *Opus postumum*, however the relation of these later works to the critical texts is understood.

¹⁸ Chapter six will address this question in relation to ‘force’.

claims are not contradictory, in my view, because we should make a distinction between the 'exoteric' and 'esoteric' Kant. In public, and no doubt because the moral philosophy is grounded on the *Critique*, Kant consistently defends the critical philosophy as unassailable, self-contained, and requiring no further supplementation.¹⁹ In private, as the *Opus postumum* amply proves, the later developments in Kant's thought are consistently grounded in the critical structures whilst being unafraid to rework these structures where necessary.²⁰

In the context of this study, this adoption of a loose distinction between the pre-critical and critical periods, and rejection of the artificial distinction between critical and post-critical phases, prepare the ground for the following investigation: the pre-critical 'dynamics' (part one) leads to the development of the critical-period concept of force (part two), which underpins the philosophical use and further development of force in the third *Critique* and the *Opus postumum* (part three). Before turning to the first part, we can briefly consider the marginal position of 'force' in the history of Kant interpretation.

5. Force: an overlooked Kantian problematic?

Why has force not been foregrounded in the prevailing interpretations of Kant? For a discussion of broad trends in post-Kantian philosophy that led to this occlusion, see Appendix 1. We can here note, in summary, two broad reasons. On the one hand, force has been ignored in Kant because the notion is more explicitly central to post-Kantian German idealism. Subsequent philosophers seeking philosophies of force would turn more naturally to Herder, Fichte, Schelling or Hegel, who thematise force within a broadly dynamised conception of philosophy. Much of the more direct treatment of 'force' in German idealism, such as Schelling's *Naturphilosophie*, has clear roots in Kant; but beyond this, I will contend that it is the *problematic* status of force in Kant's philosophy that furnishes it with philosophical interest. It is not problematic in the technical sense given in the *Critique's* chapter on phenomena and noumena or the Refutation of Idealism.²¹ Rather, force cannot be comfortably contained within the structures of critical philosophy, and

¹⁹ See, for example, the 1799 'Declaration concerning Fichte's *Wissenschaftslehre*' (12:370-1).

²⁰ This distinction between an 'exoteric' and 'esoteric' Kant echoes Hegel's terminology in the Preface to the *Science of Logic*; for a brief discussion, see Karin De Boer, 'Transformations of Transcendental Philosophy: Wolff, Kant, and Hegel', *Bulletin of the Hegel Society of Great Britain* 32 (2011): 51-2. The content I ascribe to Kant's 'exoteric' and 'esoteric' positions differs from Hegel's account, however. Hegel's reading will be briefly returned to in chapter five.

²¹ 'I call a concept problematic that contains no contradiction but that is also, as a boundary for given concepts, connected with other cognitions, the objective reality of which can in no way be cognized' (A254/B310). Thus Kant defines 'problematic idealism' as professing 'only our incapacity for proving an existence outside us from our own by means of immediate experience', which in general permits 'no decisive judgement until a sufficient proof has been found' (B274-5).

this awkward status both explains its persistent appearance in Kant's theoretical works, from the latest to the earliest texts, and means it contains nuanced philosophical resources that are lost in post-Kantian uses of the term. This should become apparent over the course of the study.

On the other hand, the occlusion of Kantian force results from the deep influence of neo-Kantianism. The nature of the mid-nineteenth century return to Kant, particularly that of Cohen, is an important ground for the occlusion of force in Kant scholarship. Cohen interprets the *Critique* as an attempt to provide stable grounds for Newtonian science as given 'experience'. At the same time, the Cohen of *Kants Theorie der Erfahrung* (1871) has a strong antipathy to the 'psychologism' in the interpretations of predecessors like Fries, Herbart, Beneke and Lange. Cohen's account rejects the traces of faculty psychology in the *Critique* in favour of its account of the 'objective' logical relations between principles and propositions, a position reiterated by Strawson, as noted above. Cohen's reading has a two-fold consequence for the role of force in Kant. Firstly, the subjective, psychological forces and faculties are treated as dispensable remnants of earlier metaphysics, marginal to the key innovation of transcendental philosophy's grounding of objective natural science. Secondly, any remaining forces in the Kantian philosophy are located in the Newtonian science that it grounds.

The persisting influence of Cohen's neo-Kantianism is evident in the treatment of force by current Kant scholarship. The recent expansion of Anglo-American scholarship on Kant's natural-scientific writings, following pioneering studies by Gerd Buchdahl and Michael Friedman, has usefully focused attention on Kant's relation to the empirical and mathematical sciences.²² However, due in no small measure to Friedman's work, this work has tended to foreground the narrow and historically-dubitable question of Kant's 'Newtonianism'.²³ While subsequent debates on Kant's natural-scientific writings have challenged or nuanced this problematic, it has nevertheless been generally assumed that Kant's conception of force stems from Newton.²⁴ It is no accident that Friedman has a broader interest in (particularly Marburg) neo-Kantianism.²⁵

²² Gerd Buchdahl, *Metaphysics and the Philosophy of Science. The Classical Origins: Descartes to Kant* (Cambridge, MA: MIT Press: 1969); Friedman, *Kant and the Exact Sciences*. The 2012 publication of the *Natural Science* volume in the Cambridge edition of Kant's works has further stimulated work in this area.

²³ Martin Schönfeld, *The Philosophy of the Young Kant: The Precritical Project* (Oxford: Oxford University Press, 2000); Friedman, *Kant's Construction of Nature*; Watkins, 'The early Kant's (anti-) Newtonianism', *Studies in History and Philosophy of Science* 44 (2013), 429-37.

²⁴ Alison Laywine, *Kant's Early Metaphysics and the Origins of the Critical Philosophy* (Atascadero: Ridgeview, 1993); Watkins, *Kant and the Metaphysics of Causality*; Michela Massimi, 'Kant's dynamical theory of matter in 1755, and its debt to speculative Newtonian experimentalism', *Studies in History and Philosophy of Science* 42 (2011): 525-543; cf. Marius Stan, 'Kant's third law of mechanics: The long shadow of Leibniz', *Studies in History and Philosophy of Science* 44 (2013): 493-504.

²⁵ See Friedman, *A Parting of the Ways: Carnap, Cassirer, and Heidegger* (Chicago and LaSalle: Open Court Publishing 2000); *Dynamics of Reason* (Stanford: CSLI Publications, 2001), chapter 1; 'Ernst Cassirer and

Friedman, the preeminent commentator on Kant's *Metaphysical Foundations* in English, shares this interest in neo-Kantianism with Konstantin Pollok, who has written the major commentary on Kant's text in German.²⁶

Not only is it ingrained in the current literature that Kant's physical forces can straightforwardly be designated 'Newtonian', but the Cohen-Strawson separation between Kant's thinking of psychology and physics is also well-established. Although, as mentioned above, there is increasing attention to the psychological side of the critical philosophy, in parallel with the new depth of focus on Kant's natural-scientific work, there has not yet been a study of the relation of Kant's physical and psychological forces. The present work will show that this is surprising, as this connection is not only very explicitly discussed in the metaphysics lecture transcripts, but also appears in the published critical-period texts. In fact, physics and psychology, in their rational forms, are named as the two parts within the umbrella discipline of 'rational physiology', in the sketch of the future system of metaphysics of nature outlined in the *Critique's* Architectonic of Pure Reason.²⁷ This study will therefore attend to the overlooked Kantian doctrine of physiology insofar as we will investigate the unified ground of physics and psychology, which – particularly in the *Critique*, and thus not merely in the ever-deferred metaphysics of nature – makes central use of the concept of force.

The remit of this study is restricted to the theoretical philosophy and does not stretch to the practical domain. In this, I diverge from one of the few commentators who examines Kant's 'force' as both a psychological and physical concept. Melissa Zinkin uses the conception of negative magnitudes from Kant's 1763 essay to explain the function of the feeling of respect as an 'incentive' in the third chapter of the *Critique of Practical Reason* (1787).²⁸ Kant's 'incentives' (*Triebfedern*) have intriguing terminological similarities with the pre-critical elastic force (often

Thomas Kuhn: The Neo-Kantian Tradition in the History and Philosophy of Science' in Makkreel and Luft, eds., *Neo-Kantianism in Contemporary Philosophy* (Bloomington, IN: Indiana University Press, 2009), pp.177-191.

²⁶ See Pollok, 'The 'Transcendental Method': On the Reception of the *Critique of Pure Reason* in Neo-Kantianism', in *Cambridge Companion to Kant's Critique of Pure Reason*, ed. Paul Guyer (Cambridge: Cambridge University Press, 2010), pp. 346-379; and, with Anne Pollok, 'Cassirer's Kant: From the 'Animal Morale' to the 'Animal Symbolicum'', *International Yearbook of German Idealism*, ed. J. Stolzenberg, F. Rush (Berlin: de Gruyter, 2012) vol. 8, pp.282-315.

²⁷ This is not the 'certain physiology of the human understanding' that Kant criticises in Locke (Aix) (on which, see Paul Guyer, 'Kant's Transcendental Idealism and the Limits of Knowledge: Kant's Alternative to Locke's Physiology' in Daniel Garber and Béatrice Longuenesse, eds., *Kant and the Early Moderns* (Princeton, NJ: Princeton University Press, 2008), pp.79-99). Kant's comments in the Preface and Architectonic show that this is the coincidence of a term for two entirely different things.

²⁸ Zinkin, 'Respect for the Law and the Use of Dynamical Terms in Kant's Theory of Moral Motivation', *Archiv für Geschichte der Philosophie* 88.1 (2006): 31-53.

Federkraft) that we examine in chapter one, and the concept of drive (*Trieb*) that appears in chapter five. However, I differ from Zinkin in that, in my view, the structure of Kant's complex physical-psychological notion of force, which part two will outline, is very different to the function of the practical *Triebfeder* (which is ultimately singular: respect for the moral law (5:78)). Respect as the *Triebfeder* is the way the moral law effects the mind in finite human beings, through an effect on subjective feelings.²⁹ Furthermore, although Zinkin helpfully and uniquely insists that Kant's forces are both physical and psychological, I do not agree with her depiction of Kant's negative magnitudes as forces.³⁰ Chapter two will present Kant's negative magnitudes as a conceptual tool for *understanding* forces, rather than *as* forces themselves, contra Zinkin. More generally, I ignore Kant's analogous use of 'force-like' terminology in the practical philosophy, to focus only on the precise concept of *Kraft*; we will see that a specific common structure underpins both the physical and psychological employment of the term.³¹

A small number of studies attend to the concept of force in Kant more generally, aside from its particular physical or psychological manifestations. These do so with regard to restricted problematics, however, such as the notions of the thing-in-itself (Langton), community (Edwards), substance (Hahmann) or causality (Watkins).³² Of these studies, there are particular resonances between the present investigation and Eric Watkins' *Kant and the Metaphysics of Causality* (2005). I will discuss Watkins' work throughout, but the general difference between our approaches is found in the nature of the relation between force and causality. Watkins covers many of the passages in Kant that I will examine, but always ultimately subsumes force to his guiding issue of Kant's understanding of causality.³³ The relation of force and causality is

²⁹ See Stephen Engstrom, 'The Triebfeder of Pure Practical Reason' in Andrews Reath and Jens Timmerman, eds., *Kant's 'Critique of Practical Reason': A Critical Guide* (Cambridge: Cambridge University Press, 2010), pp.90-118.

³⁰ This conflation is apparent in Zinkin, 'Kant on Negative Magnitudes', *Kant-Studien* 103.4 (2012): 397-414.

³¹ The analogous use of such vocabulary in the practical philosophy is most evident in passages from the *Metaphysics of Morals*: 'by analogy with the physical world, attraction and repulsion bind together rational beings (on earth). The principle of mutual love admonishes them constantly to come closer to one another; that of the respect they owe one another, to keep themselves at a distance from one another' (6:449). Similarly, earlier in the text Kant discusses the 'law of a reciprocal coercion' which could be presented in pure intuition a priori, 'by analogy with presenting the possibility of bodies moving freely under the law of the equality of action and reaction' (6:232). The significance of such analogies will not be explored here, but they do not have the systematic import that the structurally consistent concept of *Kraft* has in the domains of the theoretical philosophy on which we will focus. For Kant's own criticisms of the *analogous* use of 'force', see chapter five.

³² Rae Langton, *Kantian Humility: Our Ignorance of Things in Themselves* (Oxford: Clarendon, 1998); Jeffrey Edwards, *Substance, Force, and the Possibility of Knowledge: On Kant's Philosophy of Nature* (Berkeley: University of California Press, 2000); Andree Hahmann, *Kritische Metaphysik der Substanz – Kant im Widerspruch zu Leibniz* (Berlin: de Gruyter, 2009); Watkins, *Kant and the Metaphysics of Causality*.

³³ Force is not always subsumed to the issue of causality in Watkins' work. An earlier essay shows the variety of ways force is employed in Kant's early writings: to explain motion as the activity of substances and to address the mind-body problem in *Living Forces*; to give a metaphysical account of grounds (or causality) in the

complex, and will be explored in chapter four, but a central claim that this study will seek to substantiate is that Kant's 'force' is not reducible to 'causality'. The problematic of force cannot therefore be subsumed to 'Hume's Problem', a determinative issue for much early English-language Kant scholarship. Rather, the thesis will contend that force plays fundamental and ineliminable roles throughout Kant's philosophy, and that the ultimately underdetermined nature of Kantian force is of historical, exegetical and philosophical significance. Force, I will argue, is inherently *liminal*: once we recognise this, the Kantian philosophy appears in a radically new light.

New Elucidation; and to reconcile metaphysical and geometrical conceptions of space in the *Physical Monadology*. Watkins, 'Forces and Causes in Kant's early pre-Critical writings'.

Part One

Dynamics

Part one reconstructs the key elements of the historical background to Kant's philosophical employment of 'force', particularly Leibniz's 'new science of dynamics' and competing Newtonian conceptions of forces, before arguing that Kant's pre-critical theoretical works represent an engagement with the broad problematic of the Leibnizian dynamics. Chapter one provides evidence that Leibniz's dynamics remained unfinished at his death, and contends that this was due to its inability to satisfactorily account for the connection between the metaphysical forces of substance and the physical forces of bodies, and its consequent lack of a unified conception of force. The unfinished nature of Leibniz's dynamics is then traced through the developments in Wolff, who synthesises Newtonian elements with Leibniz's science of forces. Chapter two then turns to Kant's theoretical and natural-scientific works from 1747 to the early 1760s. I argue that these works show increasing ambitions to develop a 'dynamics', of philosophical knowledge on the basis of fundamental forces, and I explore the curtailment of this project in 1766.

Chapter 1

The 'new science of dynamics'

1. Leibniz's dynamics

It cannot be denied that Descartes has contributed some admirable things. Above all, he both rightly restored the study of Plato by leading the mind away from the senses and thereupon also added to it the doubts of the Academy. But he missed the mark because of a certain wavering or a license in making assertions and failed to distinguish the certain from the uncertain. And so he absurdly put the nature of corporeal substance in extension. Nor did he have any sound understanding of the union of soul and body. The cause of these errors was a failure to understand the nature of substance in general. ... The importance of these matters will be particularly apparent from the concept of substance which I offer. This is so fruitful that there follow from it primary truths, even about God and minds and the nature of bodies – truths heretofore known in part though hardly demonstrated, and unknown in part, but of the greatest utility for the future in the other sciences. To give a foretaste of this, I will say for the present that the concept of *forces* or *powers* [*virium seu virtutis*], which the Germans call *Kraft* and the French *la force*, and for whose explanation I have set up a distinct science of *dynamics*, brings the strongest light to bear on our understanding of the true concept of *substance*.

– Leibniz, 'On the correction of metaphysics and the concept of substance' (1694)¹

In the short essay 'On the correction', Leibniz makes his first reference in print to 'dynamics'. Dynamics was one of the many 'new sciences' that Leibniz founded, alongside *scientia infiniti* or the mathematical calculus, *analysis situs* or topology, and *characteristica universalis* or a universal language.² In some cases these remained mere projects or prospectuses for future work; others were fulfilled to varying extents.³ Leibniz's dynamics is typically taken, in both classic Francophone and more recent Anglophone commentary, be completed by Leibniz's late thought. I will argue by contrast that it remained unfinished, and that this was due to philosophical difficulties at the heart of the new science of forces, which Leibniz was never able to resolve.

Leibniz coined the term 'dynamics' in Rome in 1689, where he made it the subject of a major treatise, *Dynamica de Potentia et Legibus Naturae Corporeae*.⁴ Leibniz left the *Dynamica*

¹ Leibniz, *Philosophical Papers and Letters* trans. and ed. by Leroy E. Loemker, 2nd edition (Dordrecht: Kluwer, 1989), p.432-3 (G IV, p.469)

² Gottfried Martin, *Leibniz: Logik und Metaphysik* 2nd edition (Berlin: de Gruyter, 1967), pp.50-72.

³ At one end of the spectrum is the infinitesimal calculus, one of Leibniz's more well-developed projects; at the other is *analysis situs*, one of the more embryonic: the latter is analysed in Vincenzo De Risi, *Geometry and Monadology: Leibniz's Analysis Situs and Philosophy of Space* (Basel: Birkhäuser, 2007).

⁴ The first reference we know of to Leibniz's new science of dynamics is in his correspondence with Baron von Bodenhausen in 1689 (Michel Fichant, *Science et Métaphysique dans Descartes and Leibniz* (Paris: PUF, 1998), p.206; Maria Rosa Antognazza, *Leibniz: An Intellectual Biography* (Cambridge: Cambridge University Press, 2009), pp.303, 316 n137).

manuscript with Baron von Bodenhausen when passing through Florence and tasked him with arranging for it to be printed. Leibniz suspended the printing, however; according to later letters to de l'Hôpital and Johann Bernoulli, this was due to the number of extra thoughts he had developed that he wished to include.⁵ Leibniz produced a number of summaries or 'foretastes' of his dynamics, most famously 'On the Correction' and 'Specimen Dynamicum', published in the *Acta eruditorum* of March 1694 and April 1695 respectively. He was never able to work his *Dynamica* up into a form he thought fit for publication, however, even after the manuscript prepared by Bodenhausen was sent back to him after the latter's death in 1698.⁶

An influential view in the literature is that Leibniz's dynamics reached its completion in his late monadological metaphysics. This was the thesis of Martial Gueroult's classic study, *Leibniz: Dynamique et Métaphysique* (1934). Gueroult contends that physical forces are simply the 'immediate revelation' of substantial or metaphysical forces.⁷ He concludes that, to complete physics, we must 'abandon the observation of material forces to directly address spiritual substances' and 'thus explain the confused [physical forces] by the clear [metaphysical forces]'.⁸ The *Monadology*, on this view, completes the middle-period dynamics by attending to these metaphysical or spiritual forces: the perception and appetite of the monads. The result is a 'culmination [*aboutissement*] of physics in metaphysics'.⁹ Gueroult's position finds its contemporary echo in Robert Adams' and Pauline Phemister's accounts of the middle-period doctrine of forces.¹⁰

Where this view is not held, the question of why the new science of dynamics remained incomplete has not been a central one in the existing literature: Pierre Costabel, for example, follows Leibniz's own account in his letters to l'Hôpital and Bernoulli, and writes that Leibniz failed to complete his dynamics because he was 'beset on the one hand by the difficulty of expressing everything he had in mind on the subject, and on the other hand by the desire to be as exhaustive as possible'.¹¹ In contrast with both common lines of interpretation, I will argue that

⁵ Letter to de l'Hôpital of 13 January 1696 (GM II, p.305); letter to Bernoulli of 8 March 1696 (GM III, pp.259-60).

⁶ Antognazza, *Leibniz: An Intellectual Biography*, p.318 n160.

⁷ Martial Gueroult, *Leibniz: Dynamique et Métaphysique* 2nd edition (Paris: Aubier-Montagne, 1967), p.200.

⁸ *Ibid.*, p.201.

⁹ *Ibid.*, p.208.

¹⁰ Robert Merrihew Adams, *Leibniz: Determinist, Theist, Idealist* (Oxford: Oxford University Press, 1994); Pauline Phemister, *Leibniz and the Natural World: Activity, Passivity and Corporeal Substance in Leibniz's Philosophy* (Dordrecht: Springer, 2005). See my 'Why did Leibniz fail to complete his dynamics?', *British Journal for the History of Philosophy* 25.1 (2017): 22-40, for further discussion of Adams and Phemister.

¹¹ Pierre Costabel, *Leibniz et la dynamique* (Paris: Hermann, 1960), p.29. For Costabel, the 1692 '*Essay de Dynamique*', and therefore the similar text published in the *Journal des Sçavans* in 1693 (GM VI, pp.231-33),

Leibniz's dynamics *should* be considered an unfinished project, but that the reasons are more complex than Costabel allows.

Leibniz's first published reference to his new 'distinct science of *dynamics*' is in 'On the Correction' (1694), cited above. As a 'foretaste' of this science, Leibniz states that the 'concept of *forces* or *powers*', explained by his dynamics, will elucidate the 'true concept of substance' (*ibid.*). The following year in 'Specimen Dynamicum', Leibniz notes that since he first mentioned a 'new science of *dynamics*, which was still to be founded', many people have requested a fuller explanation of it.¹² Having not 'yet found leisure to write a book', Leibniz outlines 'some things which may cast some light' on dynamics. Both parts of 'Specimen Dynamicum', the first part published in the *Acta eruditorum* in 1695 and the second part not published by Leibniz and found by Gerhardt among the Hanover manuscripts, then provide the most developed account of the new science.

Leibniz's later remarks, however, show that he considered these texts of the 1690s to be only summaries or previews of his dynamics, with its full articulation still requiring completion. At the end of the 'New System' of June 1695, dynamics is mentioned in the future tense: Leibniz claims that the metaphysical account of union of soul and body is of use to physics in establishing the laws of motion, 'as my *Dynamics* will be able to show'.¹³ In a 1702 text given the editors' title, 'On Body and Force, Against the Cartesians', Leibniz mentions 'dynamics' and notes, 'I have promised the elements of this latter science, which to this day have not been treated in a satisfactory way anywhere'.¹⁴ Dynamics is here something promised and still to be written. In the 'Conversation of Philarète and Ariste' of 1712/15, Philarète, Leibniz's mouthpiece in the dialogue, gives a brief account of Leibniz's publications on dynamics. He then suggests that dynamics could 'confirm' both the existence of God and the distinction between body and soul. However, 'that would be a more extended discussion, which we do not need to enter into at the present'.¹⁵ Philarète thus hints at future applications of dynamics whilst again deferring them.

remains 'no more than a first attempt' at capturing the full physical *and* metaphysical significance of the new science of dynamics (*ibid.*, p.65).

¹² Leibniz, *Philosophical Papers*, p.435 (GM VI, p.234-5).

¹³ *Ibid.*, p.459 (G IV, p.486).

¹⁴ Leibniz, *Philosophical Essays* trans. and ed. by Roger Ariew and Daniel Garber (Indianapolis: Hackett, 1989), p. 251 (G IV, p.394).

¹⁵ *Ibid.*, p.265 (G VI, p.590).

Leibniz notes with regret in a letter to Bourguet of 20th April 1716 that his historical work is preventing him from attending to his dynamics.¹⁶ In his fifth letter to Clarke of 18th August 1716, sent three months before he died, Leibniz writes, 'I do not undertake here to establish my *Dynamics* or my doctrine of forces; this would not be the proper place for it'.¹⁷ The founding of his dynamics was therefore still on Leibniz's mind in the last months of his life. These late letters continue to propose to propound the long-promised science of dynamics, whilst at once deferring the project's completion. Most explicit is the late letter to Remond of 22nd June 1715, where Leibniz writes: 'My dynamics requires a work of its own, for I have not yet entirely said or communicated what I have to say about it. You are right, sir, to judge that it is in large part the foundation of my system...'.¹⁸ These statements enjoin us to take seriously the idea that Leibniz never completed his dynamics to his satisfaction, and to ask: why was this the case? I will argue that there are two sets of philosophical difficulties within the dynamics that Leibniz was not able to resolve, although he considered them resolvable, were he to be able to commit enough time to his new science. These are the place of dynamics in relation to the disciplines of physics and metaphysics, and, more fundamentally, the relation of primitive and derivative force within the dynamics.

2. The relation of dynamics, physics and metaphysics

As is well-known, the most important early context for Leibniz's development of dynamics is his two-pronged critique of Cartesian metaphysics and physics.¹⁹ In the late 1670s Leibniz begins to formulate his critique of Cartesian substance as bare extension, contending, against Descartes, 'that the nature of body consists, not in extension, but in an action which is related to the extended, for I hold that there can be no body without effort [*conatus*]'.²⁰ Cartesian extension must thus be grounded on a more fundamental effort, striving or activity, which Leibniz conceives

¹⁶ Letter to Louis Bourguet, 20th April 1716, in D VI, p.220: 'Je ne saurois penser à ma Dynamique, ni à d'autres matières de Philosophies ou de Mathématique, avant que d'avoir été débarrassé de mon présent travail historique'.

¹⁷ Leibniz's fifth letter (18th August 1716), §99, in Leibniz and Clarke, *Correspondence* ed. by Roger Ariew (Indianapolis: Hackett, 2000), p.59.

¹⁸ G III, p.645.

¹⁹ Another context is Leibniz's reading of Newton's *Principia* in Vienna in the autumn of 1688: for this, see Howard, 'Why did Leibniz fail to complete his dynamics?'. I argue that Leibniz's reading of Newton is not a central factor in the non-completion of his dynamics, most notably because Leibniz's dynamics, as it appears in the published summaries and foretastes in the mid-1690s, encompasses the metaphysical problematic of substance and truths in psychology and theology as well as physics. What follows shows the significance of Leibniz's two-pronged critique of Descartes, which began in the late 1670s. I concur with Antognazza in that '[a]lthough, strictly speaking, Leibniz's *Dynamica* was born in Rome in 1689, his new creature had been in gestation for more than a decade' (Antognazza, *Leibniz: An Intellectual Biography*, p.303).

²⁰ Leibniz, *Philosophical Papers*, p.274 (A 2.1, p.511).

of as a rehabilitation of the Aristotelian substantial form or entelechy (*ibid.*). In the 1680s, Leibniz begins to codify this 'original *activity*' as a metaphysical 'force'.

Leibniz's first published critique of Descartes was, however, not of the latter's conception of metaphysical substance but of his physics. In 'A brief demonstration of a notable error of Descartes and others concerning a natural law', published in 1686 and summarised in §§17-18 of the 'Discourse on Metaphysics' of the same year, Leibniz criticises Descartes' physical conservation law. What is conserved in bodily collisions, Leibniz argues, is not motion but force. Both Leibniz's metaphysical and physical critiques thus revolve around the need to supplement Descartes' thought with the concept of *force*.

'On the Correction' then returns to the metaphysical critique of Descartes' notion of substance. This first public reference to the 'distinct science of *dynamics*' is, as noted above, in the context of 'bring[ing] the strongest light to bear on our understanding of the true concept of *substance*'.²¹ However, 'Specimen Dynamicum', published the following year, appears to reduce the ambitions of dynamics. Early in the text, Leibniz 'set[s] aside' his 'general and primary considerations' about primitive forces, and states, 'we must now proceed to the doctrine of *derivative forces* and *resistances*' to which apply 'the laws of motion, which are not only known by reason but also verified by sense itself through phenomena'.²² Much of the remainder of 'Specimen Dynamicum' then attends to physical problems of moving bodies, which seem far from the primary metaphysical truths promised in 'On the Correction'.

Leibniz makes implicit reference to this reduced scope of his dynamics in part two of 'Specimen Dynamicum'. He notes, of his new conceptions of force and substance, that

Sometime we shall use this view to throw new light on the union of body and soul. But now we must show that there follow from it wonderful and most useful practical theorems which apply to dynamics, the science which deals particularly with the laws of corporeal forces.²³

In direct contrast with 'On the Correction', dynamics is here defined as the science which deals with corporeal forces, explicitly distinguished from metaphysical issues. Leibniz here defers the properly metaphysical consequences of his dynamics in the broad sense, which, as promised in 'On the Correction', will lead to primary truths about God, minds and so on. The rest of part two of 'Specimen Dynamicum' thus again turns back to concrete problems of physics.

²¹ Leibniz, *Philosophical Papers*, p.433 (G IV, p.469).

²² *Ibid.*, p.437 (GM VI, p.237).

²³ Leibniz, *Philosophical Essays*, p.130 (GM VI, p.247).

It is in the ‘New System of the Nature and Communication of Substances’ (1695), published two months after part one of ‘Specimen Dynamicum’, that Leibniz presents the metaphysical implications of his dynamics. The text opens by recapping the views of the recent essays on dynamics, before turning to the consequences for the connection between body and soul. The position of the science of dynamics here, however, becomes complicated. In the opening paragraph, Leibniz writes that his essays on dynamics are ‘connected’ with his new system of the communication of body and soul.²⁴ This is a weakening of the claims for dynamics, compared to part two of ‘Specimen Dynamicum’ and ‘On the Connection’. In these earlier texts, Leibniz had suggested that dynamics would *itself* lead to ‘primary truths’ in metaphysics and ‘throw new light on the union of body and soul’. Now in the ‘New System’ dynamics is presented not as underpinning Leibniz’s new account of the relation of body and soul, but as merely ‘connected’ to it.

What is the nature of this ‘connection’? In the final paragraph of the ‘New System’ Leibniz *reverses* the connection between dynamics and metaphysics previously outlined in ‘On the Correction’ and Part II of ‘Specimen Dynamicum’. Having presented his view, that the connection of body and soul is regulated in advance by the pre-established harmony installed by God when creating both spiritual and corporeal substances, Leibniz writes,

These considerations, however metaphysical they may seem, have yet another marvellous use in physics, in order to establish the laws of motion, as our *Dynamics* will be able to show.²⁵

Here, then, Leibniz’s metaphysical claims about the pre-established harmony of body and soul will *themselves* be of use in establishing the laws of motion, in his ever-deferred dynamics. This is contrary to the earlier claim that dynamics would elucidate metaphysical truths about body and soul: the hierarchy of dynamics and metaphysics has been reversed.²⁶

Dynamics thus occupies a problematic place in Leibniz’s wider metaphysics: metaphysical principles appear at times to ground, and at other times to be grounded by, his new science of dynamics. Having introduced it as a ‘distinct science’ in ‘On the Correction’, Leibniz appears unable to assign dynamics a stable place in his general metaphysical system. These problems may partially explain Leibniz’s failure to complete his dynamics. However, more significant is

²⁴ *Ibid.*, p.138 (G IV, p.477)

²⁵ *Ibid.*, p.145 (G IV, p.486)

²⁶ It might be contended that dynamics and broader metaphysics are simply intertwined: that the ‘distinct science of dynamics’ would lead to new, more broadly metaphysical knowledge, and that this enhanced wider metaphysics would then lead in turn to further specific discoveries in dynamics, and so on. I argue against this, with reference to the apparent circularities in Leibniz’s statements about the principle of equipollence and the connection of dynamics to theology, in Howard, ‘Why did Leibniz fail to complete his dynamics?’.

that these difficulties can be traced to a split *within* dynamics itself: it is a science of two orders of force, primitive and derivative. This fracture internal to dynamics causes the greatest conceptual difficulties for the new science.

3. Primitive and derivative forces

Leibniz's clearest statement of the proposed science of dynamics is his 1695 'Specimen Dynamicum'. Here, in systematically classifying the forces under attention, Leibniz shows the dual physical and metaphysical focus of the new science. Force is divided into 'active' and 'passive': these are forces that positively *act*, and that negatively *suffer*, respectively. Both active and passive forces are subdivided into 'primitive' and 'derivative'. This classification thus produces four types of force.

The primitive forces of acting and suffering exist on the metaphysical plane. Primitive active force is that of the anti-Cartesian conception of substance: 'nothing but the first entelechy', which 'corresponds to the *soul* or *substantial form*'.²⁷ Primitive passive force is '*materia prima*', the scholastic prime or metaphysical matter 'correctly interpreted'.²⁸ Leibniz therefore aligns the traditional Aristotelian distinction between matter and form with the passive and active primitive forces, respectively. The derivative forces, on the other hand, are those operative in the physics of moving bodies. Derivative active force is that of movement (although it includes merely potential movement or pressure, in dead as compared to living force). Derivative passive force is the resistance or inertia of physical bodies.

As systematically outlined in 'Specimen Dynamicum', the proposed dynamics has both metaphysical and physical aspects in its primitive and derivative forces. What is the connection between these? Maria Rosa Antognazza suggests an answer, writing that,

The notion of force was situated by Leibniz at the interface between physics and metaphysics, as the concept which allowed these two levels of explanation to be welded together into a coherent outlook on reality.²⁹

Force is indeed that which underpins both aspects of Leibniz's dynamics, in line with the two-fold critique of Cartesian physics and metaphysics. However, the precise way in which the metaphysical and physical sides are connected is much more complicated than a simple 'welding together' through force into a whole. Rather, the possibility of dynamics as outlined in 'Specimen

²⁷ Leibniz, *Philosophical Essays*, p.119 (GM VI, p.236).

²⁸ *Ibid.*, p.120 (GM VI, p.237).

²⁹ Antognazza, *Leibniz: An Intellectual Biography*, p.348.

Dynamicum' hinges on there being a comprehensible relation between primitive and derivative forces.

How, then, are the primitive and derivative forces of the metaphysical and physical levels to be connected through a doctrine of force, that is, through dynamics? This issue underpins the difficulties in the relation of dynamics to metaphysics, and is central to the non-completion of Leibniz's dynamics. The complexities in Leibniz's view of the relation of primitive and derivative forces can be seen in three late sets of correspondence, with de Volder, Wolff and Des Bosses. In these three exchanges with very different correspondents, conducted after 1698, Leibniz is pressed on the very relation between primitive and derivative force that we have seen reflects the split between the metaphysical and physical aspects of his dynamics.

The tension in Leibniz's position can be seen in the de Volder correspondence. As Paul Lodge has shown, de Volder's central demand in the letters, put forward with remarkable consistency, is that Leibniz provide an *a priori* proof of the activity of substance.³⁰ Leibniz seems ultimately to have considered this unnecessary.³¹ His most straightforward position is that '[i]f nothing is active from its own nature, then nothing at all will be active'.³² In a note added to a letter from their intermediary, Johann Bernoulli, that presses him on de Volder's demand, Leibniz writes, 'I define substance as that which acts or is acted upon. Whatever can be acted upon can necessarily act as well. Whatever acts is intrinsically active'.³³ Leibniz here simply *defines* substance as active.³⁴ De Volder, whose Cartesianism may have been wavering at the outset of the correspondence but which is solid on this point, considers corporeal substance to be constituted by extension. Leibniz attempts to indirectly convince de Volder by arguing *against* extended substance, but this does not meet de Volder's demand for a proof *for* activity as the basis of substance.³⁵

³⁰ De Volder requests such a proof in fourteen of his eighteen letters: see Paul Lodge, 'The Failure of Leibniz's Correspondence with De Volder', *Leibniz Society Review* 8 (1998), p.49. The demand is made in de Volder's first letter to Leibniz and, as Lodge writes in his editor's introduction, this 'can be seen as fixing his main agenda for the entire correspondence'. Leibniz and B. de Volder, *The Leibniz-De Volder Correspondence: With Selections from the Correspondence Between Leibniz and Johann Bernoulli* trans. and ed. by Paul Lodge (New Haven: Yale University Press, 2013), pp.21, xlvi.

³¹ Lodge, 'The Failure of Leibniz's Correspondence', p.50-1.

³² Leibniz and de Volder, *The Leibniz-De Volder Correspondence*, p.289.

³³ *Ibid.*, p.161.

³⁴ See also the later letter to Bernoulli in which Leibniz refers to his 'foundation of force', and complains, with regard to de Volder's repeated demand: 'what does he require me to demonstrate? Whence this foundation in things comes, perhaps? But then he would surely require a new foundation'. *Ibid.*, p.311. Substance as activity is thus a foundational definition.

³⁵ See Lodge, 'The Failure of Leibniz's Correspondence', pp.51-6 for Leibniz's attack on extended substance.

These irreconcilable notions of substance are a key reason that, as Lodge shows, the correspondence ended as a failure.³⁶ De Volder's refusal to adopt Leibniz's presuppositions pushes the latter, however, to set out aspects of his thought in various instructive ways. One important depiction is of the notion of substance in terms of the primitive forces of the dynamics.³⁷ Five years in, the exchange becomes fractious, with frustration evident in the letters of both correspondents and in their reports to Bernoulli.³⁸ De Volder's dissatisfaction revolves to a large extent around Leibniz's distinction between primitive and derivative force. In his letter of 31st May 1704, de Volder writes, regarding 'that which you call primitive force, from which derivative force arises', that 'I understand nothing about these things except that you insist that all the remaining changes arise from them'.³⁹ He complains more explicitly to Bernoulli that he does not 'expect very great fruit from this debate' because,

Everything will come down to this: that instead of a demonstration of substance from its nature, I will receive his terminology of entelechies, unities, and primitive force that contains all change intrinsically. However, I understand nothing of this except insofar as I have some understanding of derivative force, i.e. quantity and speed.⁴⁰

De Volder, again due to his residual Cartesianism, can understand the mathematisable, derivative forces of phenomena, but finds the notion of a primitive force incomprehensible. This issue represents a sticking-point for the rest of the correspondence. In his final letter of 5th January 1706, de Volder still writes, 'Certainly, I do not seem to understand *primitive force*'.⁴¹

De Volder's perplexity might thus be considered to be on too general a level for him to be able to press Leibniz on the details of the relation of primitive and derivative forces. This is unfortunate, as difficulties around this relation start to appear in Leibniz's letters. In the letter of 20th June 1703, Leibniz distinguishes the primitive forces of monads from the derivative forces of phenomenal bodies, and states,

³⁶ Lodge, 'The Failure of Leibniz's Correspondence', pp.51-2.

³⁷ This begins to appear most explicitly in Leibniz's letter of 20th June 1703, after de Volder sends his thoughts on the 'Réponse' to Bayle: see Leibniz and de Volder, *The Leibniz-De Volder Correspondence*, pp.261-3, discussed below.

³⁸ Lodge highlights this frustration, but focuses on that of de Volder, whom Lodge considers to become 'cynical', from his letter of 31st May 1704 on, due to his perception that Leibniz is failing to address his concerns. However, Leibniz's own exasperation is evident in his earlier letter to de Volder of 21st January 1704 ('So do you not understand what modification means, or active, or passive?') and his follow-up letters to Bernoulli, where he wonders whether 'Mr. De Volder has taken offence at some of the things that I may have said too freely because he seems to have been writing without paying enough attention and to have shown himself to be insufficiently teachable'. Leibniz and de Volder, *The Leibniz-De Volder Correspondence*, pp.xxviii, 287, 295.

³⁹ *Ibid*, p.297.

⁴⁰ *Ibid*, p.299.

⁴¹ *Ibid*, p.329.

I do not admit the action of individual substances on one another, since there appears to be no way by which a monad may influence a monad. But does anyone deny collision and impulse in the appearances of aggregates [i.e., phenomenal bodies]...?⁴²

Derivative and primitive forces are said to differ in that ‘collision and impulse’, and therefore the transfer of forces, take place on the derivative or phenomenal level, while the primitive, metaphysical forces are not transferred beyond the monad. Earlier in the same letter, Leibniz writes that, in physical bodies, ‘everything is indeed explained mechanically, and *masses are understood to impel each other*’.⁴³ We should therefore apparently ‘understand’ bodies to transfer force between them.

However, Leibniz continues, in the later passage,

Meanwhile, I find it to be true in phenomena as well, and in derivative forces, that masses do not so much give other masses new force as determine the force already existing in them, so that a body drives itself away from another by its own force rather than being propelled by the other.⁴⁴

So, having just suggested that masses should be understood ‘to impel each other’, Leibniz now denies that force is actually transferred on the derivative level; rather, determinate direction is simply given to the *preexisting innate force* of the body. In this letter the question is open: what exactly is the process by which this innate force is determined in a collision; how are the phenomenal, derivative forces related to the metaphysical, primitive forces? De Volder does not press Leibniz on this precise issue, because he is utterly unconvinced by the notion of primitive force *tout court*.⁴⁵ A correspondent who shares more of the general grounds of Leibniz’s position is needed in order to interrogate him on the specifics of the relation between the two levels of forces in the dynamics. Christian Wolff is just such a figure.

This issue is indeed precisely the one emphasised by Wolff in letters exchanged with Leibniz from 1708-11. Wolff writes,

If derivative forces are to be considered modifications of primitive forces, an intelligible reason must still be given for this modification ... but I freely admit I cannot yet comprehend it.⁴⁶

⁴² *Ibid.* p.263.

⁴³ *Ibid.* p.261.

⁴⁴ *Ibid.* p.263.

⁴⁵ Regardless, his questioning eventually leads Leibniz to the famous suggestion that primitive force is ‘most intelligible’ because ‘there is something in it that is analogous to that which is in us, namely, perception and appetite’, and even that ‘it should be said that there is nothing in things except simple substances and in them perception and appetite’. *Ibid.* p.307. I discuss the ‘phenomenalism’ of such a position in relation to the Wolff correspondence, below.

⁴⁶ Leibniz and Christian Wolff, *Briefwechsel zwischen Leibniz und Christian Wolff* ed. by C. I. Gerhardt (Halle: H.W. Schmidt, 1860), p.128; quoted in Donald Rutherford, ‘Idealism Declined: Leibniz and Christian Wolff’ in Paul Lodge ed., *Leibniz and his Correspondents* (Cambridge: Cambridge University Press, 2004), p.221.

In his response, Leibniz affirms that all force is innate, and gives an account of the connection between primitive and derivative forces:

Derivative forces ... are modifications of [the] substantial active thing, or primitive force, just as shapes are modifications of a substantial passive thing, namely, matter. It should be known, however, that forces do not pass from body to body, since any body whatever already has in itself the force that it exerts, even if it does not manifest it or convert it into motion of the whole prior to that new modification. For example, when a ball at rest is struck by another, it is moved by an innate force, namely, elastic force, without which there would be no collision. But the elastic force in the body arises from an internal motion invisible to us. And the primitive entelechy itself is modified corresponding to these mechanical or derivative [forces]. Therefore it can be said that force is already present in every body, and it is determined only by modification.⁴⁷

Leibniz thus now denies any transfer of forces, even on the level of derivative force. The movement of two bodies after a collision occurs only due to their innate forces. That is, due to the (derivative) elastic force of the bodies, which arises from primitive force, an 'internal motion invisible to us'.

Leibniz's term is 'modification'. Derivative forces are modifications of the primitive forces constituting the substances aggregated in the bodies. Intriguingly, though, the 'primitive entelechy is itself modified corresponding to these mechanical or derivative [forces]': primitive forces are at the same time modified by derivative ones. Here we see the recurrence of a complex interrelation, now between primitive and derivative force; this might be less charitably considered an incoherent circularity between the two levels of force.

The key issue, which may help clarify this circular relation, is: what is this 'modification'? Wolff's reply to Leibniz asks precisely this.⁴⁸ Terminologically, as Daniel Garber points out, 'modification' is usually used by Leibniz to signify a limitation of primitive force, following seventeenth century vocabulary; Robert Adams notes further that the modification of primitive into derivative force echoes the relation between attribute and mode in Descartes.⁴⁹ Leibniz had thus written to de Volder that modification, which designates 'derivative, i.e., accidental, forces', is 'only a variation of limits'.⁵⁰

⁴⁷ Leibniz and Wolff, *Briefwechsel*, p.130-1; quoted in Rutherford, 'Idealism Declined', p.222.

⁴⁸ Wolff writes, 'I still have this difficulty, that I am not able to conceive distinctly enough how the primitive force is modified, when, e.g., motion is accelerated in a descending heavy object...'. Leibniz and Wolff, *Briefwechsel*, p.136; quoted in Rutherford, 'Idealism Declined', p.222.

⁴⁹ Daniel Garber, 'Leibniz and the Foundations of Physics: the Middle Years' in Kathleen Okruhlik and James Robert Brown eds., *The Natural Philosophy of Leibniz* (Dordrecht: Reidel, 1985), pp.83-4; Adams, *Leibniz*, p.378.

⁵⁰ Leibniz and de Volder, *The Leibniz-De Volder Correspondence*, p.277.

This background serves to emphasise the fact that derivative forces are *derived* from primitive ones. We have gained little clarity, however, on what is actually constituted by this process of limitation or derivation. Wolff, at least, is apparently unconvinced and continues to press Leibniz on how the process of modification might be understood. In his letter of 9th July 1711, Leibniz responds by moving his explanation into a new register. For the first time in the Wolff correspondence, he presents the issue in terms of the monadological metaphysics, writing,

You ask how primitive force is modified ... I respond that the modification of primitive force, which is in the monad itself, cannot be better explained than by explaining how derivative force is changed in the phenomena. For what is exhibited extensively and mechanically in the phenomena is, concentratedly and vitally, in monads.⁵¹

Leibniz's explanation therefore utilises monadic forces, which somehow mirror and ground physical force in the metaphysical realm.

The monad 'is the source of mechanism and a *representation* of mechanical [things]; for phenomena result from monads (which alone are true substances)' (*ibid.*, my emphasis). Leibniz thus suggests that derivative forces are grounded in the primitive ones of the monad; and, through the use of 'representation' (*repraesentatio*), points towards the monadological position of mind-like perceptions and appetitions.⁵² In the context of the Wolff correspondence, Leibniz now opens the door to a 'phenomenalist' reading of the relation of primitive and derivative forces. As Rutherford writes of this passage,

From the perspective of any monad, the derivative forces of bodies are nothing more than features of that monad's representations of a changing physical world. From here it is a small step to conclude that all physical forces are merely phenomenal, and that their grounding in primitive force can be fully explained in terms of the agreement, or harmony, among the contents of monadic perceptions.⁵³

Leibniz has thus moved to a position that encourages the phenomenalist interpretation advocated by readers like Adams, in which the derivative forces are ultimately reducible to primitive, metaphysical ones.⁵⁴

It is striking, in the Wolff correspondence, how long Leibniz resists resorting to a monadological explanation of the relation between primitive and derivative forces, even in 1711 when the monadological perspective was central to Leibniz's metaphysics.⁵⁵ This suggests that the monadological explanation might not be the final word on the relation of primitive and derivative

⁵¹ Leibniz and Wolff, *Briefwechsel*, p.138-9; quoted in Rutherford, 'Idealism Declined', p.223.

⁵² Rutherford, to whom much of my account of the Wolff correspondence is indebted, calls these the 'monadic grounding' and 'perceptual change' theses, respectively. Rutherford, 'Idealism Declined', p.223.

⁵³ Rutherford, 'Idealism Declined', p.225.

⁵⁴ Adams, *Leibniz*, p.217.

⁵⁵ Rutherford's commentary on the correspondence highlights this delay.

forces, and thus that the dynamics should not be too easily folded into the late monadology. Such an interpretation is encouraged by Leibniz's famous explorations of the *vinculum substantiale* in the Des Bosses correspondence.

Following Des Bosses' letter of 28th January 1712, the exchange between Leibniz and his Jesuit interlocutor revolves around the concept of corporeal (or composite) substance. The central letter of the correspondence is Leibniz's of 15th February 1712, in which the idea is introduced of a 'substantial bond' that unifies monads into composite substances.⁵⁶ In the later letters, Leibniz begins to consider the problem of the *vinculum* and the relation of composite substances and monads in terms of the forces of his dynamics. So on 21st April 1714 Leibniz writes,

It is worth considering what can be devised that is suitable for producing reality in phenomena outside of perceiving things, that is, what constitutes composite substance. As far as I can determine, it will have to consist in primitive active and passive power, and it will be what is called the primary matter and substantial form of the composite.⁵⁷

Leibniz here conceives of the *vinculum*, which he is exploring as that which constitutes composite substance, as consisting of the primitive forces.⁵⁸ As in 'Specimen Dynamicum', these passive and active primitive forces are equated with the primary matter and substantial form of the schools.

In Leibniz's final letter to Des Bosses, of 29th May 1716, this is made more explicit and is presented in contrast to the monadological picture:

Composite substance does not consist formally in monads and their subordination, for then it would be a mere aggregate, that is, an accidental being; rather, it consists in primitive active and passive force, from which arise the qualities and the actions and passions of the composite, which are perceived by the senses, if they are assumed to be more than mere phenomena.⁵⁹

Here, primitive forces are ascribed to the composite or corporeal substance. This occurs via the *vinculum*: an earlier passage states that 'primitive active and passive power ... belongs to that

⁵⁶ Brandon Look, 'On Substance and Relations in Leibniz's correspondence with Des Bosses' in Paul Lodge ed., *Leibniz and his Correspondents* (Cambridge: Cambridge University Press, 2004), pp.223-4; Garber, 'What Leibniz really said?' in Garber and Béatrice Longuenesse, *Kant and the Early Moderns* (Princeton: Princeton University Press, 2008), pp.74-5. Brandon Look and Donald Rutherford note in their introduction to the Yale *Leibniz-Des Bosses Correspondence* that the problematic of the *vinculum* emerges earlier, in the light of Tournemine's criticisms of the New System in the *Mémoires de Trevoux* in May and June 1703, and that in a passage deleted from the draft of his second letter to Des Bosses of 14th February 1706 Leibniz notes his difficulty in explaining how monads and our bodies are united if not 'by the bond [*vinculo*] of a continuous [thing] that the phenomena display to us'. Leibniz and B. Des Bosses, *The Leibniz-Des Bosses Correspondence* trans. and ed. by Brandon Look and Donald Rutherford (New Haven: Yale University Press, 2007), pp.xlvii, 23.

⁵⁷ Leibniz and Des Bosses, *The Leibniz-Des Bosses Correspondence*, p.325.

⁵⁸ The translators distinguish *vis* and *potentia* and their cognates through 'force' and 'power' respectively; it seems, as is evident in passages like this, that Leibniz uses the two synonymously. Adams considers the terms to be interchangeable (Adams, *Leibniz*, p.378).

⁵⁹ Leibniz and Des Bosses, *The Leibniz-Des Bosses Correspondence*, p.371.

bond, as the essence of the composite'.⁶⁰ We are thus a great distance from Leibniz's position in the Wolff correspondence. In the latter, the implication was that primitive forces can be understood as those of monadic perceptions, with the derivative forces of physical bodies mirroring these, phenomenally. At the end of the Des Bosses correspondence, Leibniz is now experimenting with a separation of primitive forces from the monads: composite substance does not consist of monads but of the primitive forces, from which arise the phenomenal forces of the movements ('actions and passions') of physical bodies.

The letters to Des Bosses therefore show that Leibniz has not finalised his philosophical explorations at the end of his life. Particularly, the role of primitive and derivative forces in relation to the monadological metaphysics and phenomenal physics has not been finally ascertained. This means that Leibniz's dynamics, as the doctrine of primitive and derivative forces and their connection, remains incomplete. The exchanges with de Volder, Wolff and Des Bosses, from 1698 to 1716, show that in the last phase of his philosophical thought Leibniz was exploring a range of different responses to the problem of the unity of the dynamics: from the aporetic accounts for de Volder, to the apparently reluctant recourse to a monadological explanation for Wolff, to the locating of non-monadic primitive forces in the *vinculum substantiale* for Des Bosses.

My account of Leibniz's unfinished dynamics project contends that it remained incomplete due to a fundamental philosophical difficulty at its heart. Having attended closely to the development of the new science of dynamics from the *Dynamica* of 1689 to the various accounts in the 1690s, it is evident, *pace* the standard understanding, that the monadological metaphysics does not necessarily structure the relation between the forces from the outset. Rather, the connection between primitive and derivative force is the central problem that the dynamics seeks to address. This can be seen in the various accounts of the place of dynamics with regard to physics and metaphysics in the 1690s, and again in Leibniz's late correspondence, where a range of intriguing possible solutions are explored but not conclusively established.⁶¹

From this perspective, we might even say that the monadological metaphysics was, in part, one of a number of attempts to reconcile the dynamics' primitive and derivative levels of force. There is more at stake in the *Monadology*, of course, than its merely being the basis for a monadological explanation of physical forces as an extended mirroring of concentrated monadic forces, as

⁶⁰ *Ibid.*, p.367.

⁶¹ The symmetry between Leibniz's unfinished dynamics and Kant's unfinished *Opus postumum* – which I will present as the continuation of the critical project – will be explored in the following chapters.

outlined in the correspondence with Wolff. But, on the evidence of the development of the dynamics throughout Leibniz's mature work, the problem of the connection of primitive and derivative force was a greater influence on the formulation of the monadological position than is commonly appreciated. That Leibniz did not consider the latter his definitive solution is shown by his ever-present intention to return to and complete his dynamics.

4. Developments of dynamics in Wolff

As we have seen, the question of the relation of primitive and derivative forces was a central one for Wolff in his correspondence with Leibniz. Wolff was never content with the idealist, monadological solution to which Leibniz ultimately turned.⁶² In a letter to Manteuffel of 11th May 1746, Wolff writes that

the Leibnizian monads, on which [Leibniz's] own system is built, are a riddle [*Rätzel*], not yet fully solved and which I may not solve, regardless of whether I could, because for my purposes I do not need to, and so I let these matters lie in their worth or worthlessness [*Werth und Unwerth*].⁶³

It is due to this fundamental disagreement over the need for the specifically Leibnizian monads that Wolff states that Leibniz's system 'begins at a point where mine ends'.⁶⁴ Leibniz's thought, Wolff implies in this fairly late letter, represents a speculative development, proceeding to the 'riddle' of his monadic doctrine, beyond the limits to which Wolff himself is prepared to go.

This already challenges a common view of the relation of Leibniz and Wolff, in which the latter merely 'systematises and vulgarises' his predecessor's philosophy.⁶⁵ Wolff insists on the independence of his own thought, and claims in his *Lebensbeschreibung* that at the time of writing his *Deutsche Metaphysik* (1720) he knew only Leibniz's Theodicy and the controversy with Clarke, and, in the Ontology, Cosmology and Rational Psychology chapters, he took a few Leibnizian concepts and 'unified them with my system'.⁶⁶ Wolff therefore complains that his philosophy is unjustly labelled 'Leibnizian-Wolffian'.⁶⁷

⁶² Rutherford, 'Idealism Declined'.

⁶³ Cited in *Christian Wolff's eigene Lebensbeschreibung* ed. by Heinrich Wuttke in Wolff, *Gesammelte Werke* I.10 (1841; rpt. Hildesheim: Georg Olms Verlag, 1980), p.83. See Charles A. Corr, 'Christian Wolff and Leibniz', *Journal of the History of Ideas*, 36.2 (1975), p.256.

⁶⁴ *Eigene Lebensbeschreibung*, p.82.

⁶⁵ Jean École, 'Cosmologie Wolffienne et dynamique Leibnizienne' in Wolff, *Gesammelte Werke* III.13 (Hildesheim: Georg Olms Verlag, 1988), p.182: École is here arguing against this common view.

⁶⁶ *Eigene Lebensbeschreibung*, p.141-2. See Corr, 'Christian Wolff and Leibniz', pp.242-3.

⁶⁷ *Eigene Lebensbeschreibung*, pp.142, 83.

This independence is perhaps nowhere in evidence so much as in Wolff's thinking of forces. Both Jean École and Louis White Beck point out major divergences from Leibniz in the account of physical forces in Wolff's *Cosmologia generalis* (1731). Most importantly, although Wolff utilises the concept of a simple substance or element, these are distinct from Leibniz's monads. In Latin, Wolff uses *elementa*, *ens simplex* or even *punctum Zenonicum*; in German, *Elementen* or *einfachen Dinge*.⁶⁸ '[I]t is not for nothing', École notes, 'that he does not want to call them monads'.⁶⁹ Leibniz's monads are metaphysical points, endowed with something vital, the 'mind-like' forces of perception and appetition; through these forces, monads represent the world with varying degrees of clarity and obscurity, depending on their place in the monadic hierarchy. The monads do not interact but unfold their immanent principle of change, in pre-established harmony with one another. For Wolff, by contrast, the elements are indivisible physical points,⁷⁰ endowed with a *vis activa* that is also physical in nature.⁷¹ Wolff's physical force is not necessarily a perceptive or appetitive one but is rather, as Beck puts it, 'the momentum of inertia of bodies which macroscopically manifest the forces of the simple substances which comprise them'.⁷²

In the *Cosmologia generalis*, Wolff comes to identify the active force of bodies with *motive force*:

Since the active force [*vis activa*] of bodies is tied to local motion (without which it would be impossible to conceive of corporeal motion), and since all change happens through motion, the active force of bodies is the principle of change ... Because it is clearly tied to local motion, that active force of bodies is called moving force [*vis motrix*].⁷³

The physical nature of Wolff's active force, in contrast with Leibniz's monadological forces, is evident. This force is not immanent as in Leibniz; it is 'independent of the essence of the agent'.⁷⁴ Indeed, as the *Deutsche Metaphysik* states, 'no body can move itself, and thus it must have an external cause if it is to move'.⁷⁵ This means that Wolff's substances are in real, dynamic

⁶⁸ Wolff, *Cosmologia generalis*, in *Gesammelte Werke* I.10 (1731; rpt. Hildesheim: Georg Olms Verlag, 1964), §§215, 219; *Vernünfftige Gedancken von Gott, der Welt und der Seele des Menschen, auch allen Dingen überhaupt*, in *Gesammelte Werke* (1720; rpt. Hildesheim: G. Olms Verlag, 1983), §599.

⁶⁹ École, 'Cosmologie Wolffienne et dynamique Leibnizienne', p.181. See also École, *La Metaphysique de Christian Wolff* in Wolff, *Gesammelte Werke*, Bd. 12.1 (Hildesheim: Georg Olms, 1990), p.238-9.

⁷⁰ Wolff, *Cosmologia generalis*, §§216, 187; École, 'Cosmologie Wolffienne et dynamique Leibnizienne', p.182.

⁷¹ Wolff, *Cosmologia generalis*, §§237, 129-32, 141; École, 'Cosmologie Wolffienne et dynamique Leibnizienne', p.182.

⁷² Beck, *Early German Philosophy: Kant and his Predecessors* (Bristol: Thoemmes Press, 1996), pp.270-1.

Watkins identifies Wolff as agnostic on the question of whether simple substances have representative forces ('On the Necessity and Nature of Simples: Leibniz, Wolff, Baumgarten, and the Pre-Critical Kant', *Oxford Studies in Early Modern Philosophy* 3 (2006): p.281-3).

⁷³ Wolff, *Cosmologia generalis*, §§136-7, quoted in the editors' notes to Kant, *Natural Science* (Cambridge: Cambridge University Press, 2012), p.689n29. The editors note that in §147 the terms are melded: *vis activa sive motrix* (p.693n40).

⁷⁴ Louis White Beck, *Early German Philosophy* (Cambridge, MA.: Harvard University Press, 1969), p.270; summarising Wolff, *Ontologia* in *Gesammelte Werke* II.3 (1729; rpt. Hildesheim: G. Olms Verlag, 1977), §722.

⁷⁵ Wolff, *Vernünfftige Gedancken*, §608.

interaction with each other.⁷⁶ This interaction is governed not by the teleological *nisus* of Leibniz's bodies, but on mechanical lines.⁷⁷ Finally, whereas the late Leibniz insisted that bodies were 'well-founded phenomena' whose forces were grounded on monadological ones, Wolff is agnostic on the question of the reality or phenomenality of the forces of the elements.⁷⁸

In all of these points of divergence, Wolff takes a more physicalist, realist position than Leibniz. In terms of one of the great dividing-lines of early-eighteenth century thought, Wolff's position displays the strong influence of Newtonian notions, in contrast to Leibnizian metaphysics. Thomas Ahnert has shown the extent of Wolff's reading of Newton in the early 1700s: Wolff published anonymous reviews of Newton's *Opticks* in the *Acta eruditorum* in 1705 and 1706, and refers critically to the *Principia* in his *Aerometriae elementa* of 1709. Wolff praised Newton as a geometer and mathematical scientist, but considered his empirical-mathematical results to require metaphysical founding: he was particularly critical of the Newtonian concepts of a vacuum and of action at a distance.⁷⁹ Nevertheless, Wolff's conception of forces can be considered to a great extent a synthesis of Newtonian and Leibnizian ideas. Leibniz's monad becomes a more Newtonian physical atom; immanent forces are replaced with external, transient ones; and perceptive-appetitive metaphysical forces are transformed into a physical active force, even a motive force. Anne-Lise Rey thus notes that Wolff 'assimilates primitive force into inertial force'.⁸⁰

This synthesis can be seen in Wolff's 1734 *Vollständiges Mathematisches Lexicon* which, unlike the 1716 version, contains an entry for '*Kraft*'.⁸¹ Wolff differentiates *Kraft* into 'living' and 'dead' force, acknowledging that he is following Leibniz's account in 'Specimen Dynamicum'. He discusses only the meaning of force 'in mechanics', however, where it is defined as 'that which is capable [*vermögend*] of causing a movement'. Leibniz's living and dead forces can be called 'conserving' and 'moving' force, Wolff notes.⁸² The entry closes by noting that, aside from the

⁷⁶ Beck, *Early German Philosophy*, p.271; Thomas Ahnert, 'Newton and Wolff' in *The Reception of Isaac Newton in Europe*, ed. S. Mandelbrote and H. Pulte (London: Continuum, forthcoming): 'Wolff's elements were physical, not metaphysical entities, and unlike Leibniz's monads interacted with each other'.

⁷⁷ Beck, *Early German Philosophy*, p.271.

⁷⁸ École, 'Cosmologie Wolffienne et dynamique Leibnizienne', p.182.

⁷⁹ Thomas Ahnert, 'Newton and Wolff'.

⁸⁰ Anne-Lise Rey, 'La lecture wolffienne de la dynamique leibnizienne' in Wolff, *Gesammelte Werke* III.102 (Hildesheim: G. Olms Verlag, 2007), p.251. Rey locates this in the letter of 26th June 1711 in the Wolff-Leibniz correspondence.

⁸¹ Wolff, *Vollständiges Mathematisches Lexicon* (Leipzig: Johann Friedrich Gleditschens sel. Sohn, 1734), pp.721-2. Cf. Wolff, *Mathematisches Lexicon* (1716; rpt. Hildesheim: G. Olms Verlag, 1978).

⁸² An alternative distinction is then made between living and lifeless forces, which distinguishes forces of humans and animals from those of air, fire, water and weight, which departs from both Leibniz and Newton, and foreshadows some concerns we will come to address in Kant.

forces mentioned, what pertains to the *Central-Kraften* can be read in the entries for *Vis centrifuga* and *Vis centripeta*. Wolff's general indication that he follows a Leibnizian view of forces is vitiated by the fact that he refers only to the concrete, physical aspects of Leibniz's dynamics: the derivative forces. Although Wolff cites 'Specimen Dynamicum', he does not mention Leibniz's doctrine of primitive and metaphysical forces. This distance from Leibniz is confirmed by the reference to centrifugal and centripetal physical forces, although without mention of Newton.⁸³

Wolff's divergence from Leibniz's account of forces also displays his greater inclination towards Cartesian dualism. Leibniz's dynamics was from the outset an anti-Cartesian physics and metaphysics, and sought to provide a superior, non-Cartesian account of substance, grounded on force rather than extension. The late monadological solution to the dynamics problem is more radically anti-Cartesian than the middle-period prospectuses, in that the fundamental distinction between thinking and extended substance is collapsed on the monadological level, where minds and bodies alike are ultimately constituted by 'mind-like' monads, and where the monads of bodies merely possess less distinct perceptions than spiritual or mental monads. Wolff's unwillingness to adopt Leibniz's monads entails (or is entailed by) a retention of a strict, more Cartesian distinction between bodily and mental forces.⁸⁴ As Richard J. Blackwell notes,

there are two distinct types of force in Wolffian philosophy. On the one hand material bodies possess a motive force which accounts for their physical actions. On the other hand, souls possess a representative force which explains their cognitive actions.⁸⁵

Wolff's well-known insistence that the forces of the soul are reducible to a single *Vorstellungskraft* is thus compatible with his banishment of Leibnizian forces of representation for physical bodies, because he maintains two separate domains of forces: those of physics and those of psychology. The separation can be seen in Wolff's new stark delineation of the disciplines of cosmology and rational and empirical psychology, each with their own chapter in the *Deutsche Metaphysik* and separated in subsequent works.

Blackwell goes on to show, however, that in the cases of both bodies and souls, 'the function of the force is to transform the possibility of doing to actual doing' (ibid.). This follows Wolff's

⁸³ The editors of *Living Forces* in Kant, *Natural Science* discuss Wolff's relation to Newton, and make the claim that Wolff shifts from a more Leibnizian position in the *Deutsche Metaphysik* to a more Newtonian one in *Cosmologia generalis* (p.693n40). I think this is an overstatement and that there is at most a slight change of emphasis: Wolff is consistently independent of Leibniz on the question of forces.

⁸⁴ Andree Hahmann notes in this regard that, after Leibniz's dissolution of Cartesian dualism, 'Wolff created a new dualism. On one side, simple spiritual substances, on the other, the elements of matter, which are also simple, but not endowed with a closer determining force' (Hahmann, *Kritische Metaphysik der Substanz – Kant im Widerspruch zu Leibniz* (Berlin: de Gruyter, 2009), p.70).

⁸⁵ Blackwell, 'Christian Wolff's Doctrine of the Soul', *Journal of the History of Ideas* 22.3 (1961), p.347.

general, ontological conception of force.⁸⁶ Moreover, the 'possibility of relating Wolff's theory of the soul to Newtonian physics is suggested further by what one might call the Wolffian mechanics of the soul. When the force of the soul actuates those things which are possible in its faculties, it follows certain laws'.⁸⁷ The distinction between the forces of bodies and minds is nevertheless underpinned by a common, general concept of force, and in both cases, a general Newtonian concept of a law-like behaviour of force applies.

Wolff's strict distinction between mental and corporeal forces is not only threatened by their common concept of force, but also by tensions internal to the distinction. The rational psychology chapter insists that matter cannot think: to posit that it can would be to 'change its essence, or at the same time give it the essence of another thing from which the thought can come'; the difference between material and spiritual forces constitute the essential difference between matter and soul.⁸⁸ Nevertheless, Wolff's claim that spiritual forces are reduced to a single *Kraft* is 'illustrated with an analogy' from corporeal forces: a flame has only one motive force, due to which it moves, but we give it multiple names due to its various effects: shining, heating, igniting.⁸⁹ Wolff's recourse to an analogy between the otherwise strictly separated domains of bodily and spiritual forces shows the tension in this separation. This is ultimately played out in the question of the connection between body and soul, where Wolff only cautiously affirms pre-established harmony.⁹⁰ These issues around the forces of mind and body, stemming from their being simultaneously separated and yet grounded in a common general conception of force will be significant in Kant, as we shall see.

This discussion of Wolff's transformation of the Leibnizian concepts of force shows the competing influence of Newtonian notions of force in the period prior to Kant. The struggle between Leibnizian and Newtonian positions became particularly evident in the Berlin Academy from 1740, when the Francophile Frederick the Great invited the Newtonians (or at least, outspoken opponents of Leibniz and Wolff) Maupertuis and Euler to the Academy.⁹¹ A broad, eclectic conception of 'Newtonianism' was popular across the German-speaking lands in the eighteenth

⁸⁶ Wolff, *Ontologia*, §§722, 724. This anticipates the common ontological concept of force underpinning the forces of physics and psychology in Kant, as will be discussed in chapter four.

⁸⁷ Blackwell, 'Christian Wolff's Doctrine of the Soul', p.347.

⁸⁸ Wolff, *Vernünfftige Gedancken*, §741. I follow Watkins' translation in *Kant's Critique of Pure Reason: Background Source Materials* (Cambridge: Cambridge University Press, 2009), p.48.

⁸⁹ *Ibid.*, §746.

⁹⁰ See Watkins, *Kant's Metaphysics of Causality*, pp.45-9.

⁹¹ See Ronald S. Calinger 'The Newtonian-Wolffian Controversy: 1740-1759' *Journal of the History of Ideas* 30.3 (1969): 319-330.

century.⁹² It is evident that the categories of ‘Leibnizian’ and ‘Newtonian’ are much less clear than they are commonly taken to be: even Wolff, conjoined with Leibniz in the popular understanding of the ‘Leibnizian-Wolffian philosophy’, had a conception of force that combined Newtonian and Leibnizian features. It will nevertheless be useful to set out a rough but systematic account of Leibnizian and Newtonian conceptions of force, as a framework against which to reconstruct the development of Kant’s own original position.

5. An overview of Leibnizian and Newtonian forces

In employing this framework, I do not wish to suggest that a straightforward dichotomy between Leibnizian metaphysics and Newtonian natural-science should structure our understanding of Kant’s concept of force, as Michael Friedman’s work might lead us to think.⁹³ Both Leibniz and Newton should be understood in terms of the general ‘natural philosophy’ of the era, in which what we now consider ‘physical’, ‘theological’, ‘psychological’ and other concerns are blended together.⁹⁴ Of course, Newton’s work, particularly, is a key moment in the development of the strict divide between metaphysics and natural science that would become ossified in the nineteenth century. In the eighteenth century, however, Newton’s and Leibniz’s work represented alternative approaches to ‘natural philosophy’, distinguished through their differences in method, epistemology and specific philosophical content, rather than through an anachronistic divide between ‘metaphysics’ and ‘natural science’.

Nevertheless, Leibniz’s and Newton’s conceptions of force provide the most instructive context for developments in Kant, because their conceptions are so greatly opposed. Leibniz and Newton have generally polarised positions: regarding the categories through which they understand force; in their general dynamistic or atomistic worldviews and so whether force is immanent or external to bodies; in the reasons they introduce force into their philosophies; in the possibilities for or limitations of the natural-philosophical use of force; in the extent to which force can be known, and so on. These contrasting positions provide a broad framework that sets the parameters of eighteenth century discussions of forces. We can consider Leibniz’s and Newton’s conceptions of force in terms of the nature, number and relationship of forces, and the extent to which and means by which forces are known.

⁹² Ahnert, ‘Newtonianism in the German lands’ in *The Reception of Isaac Newton in Europe*, ed. S. Mandelbrote and H. Pulte (London: Continuum, forthcoming).

⁹³ Friedman defends a ‘Newtonian’ reading of Kant’s whole project, which opposes Leibnizian metaphysics and Newtonian natural-science, in, particularly, *Kant and the Exact Sciences* and *Kant’s Construction of Nature*.

⁹⁴ See Peter Dear, *The Intelligibility of Nature* (Chicago: University of Chicago Press, 2006), pp.8-14.

As discussed above, Leibniz divides force into *primitive* and *derivative*, the former constituting substances in general, the latter being those of physical bodies; both primitive and derivative forces are subdivided into *active* and *passive*. Leibniz was always committed to mechanism on the physical or phenomenal level: bodies should be understood to transfer (derivative) forces between them. At least in the late monadological picture, however, these derivative forces are merely 'well-founded phenomena', grounded on *immanent* primitive or metaphysical forces. In Leibniz's late thought, force is always ultimately internal to substances, which, being windowless, contain the principle for the unfolding of all of their changes. The physical and the metaphysical, or the derivative and primitive forces, are aligned on the basis of Leibniz's pre-established harmony.

The above argued that i) Leibniz's middle-period dynamics remained an unfinished project at Leibniz's death; ii) the monadological metaphysics is not the completion of the dynamics project, but should just be considered one of a number of attempts at resolving its difficulties; the ultimate reduction of physical, derivative forces to the metaphysical, monadological forces of perception and appetite was not the definitive solution to the problematic of the dynamics; iii) the *reason* that the dynamics remained unfinished, and for which the monadological metaphysics can be viewed as one attempted solution, is the difficulty Leibniz faced in providing a comprehensible account of the *relation* between primitive and derivative forces. This opens the *problematic* of the dynamics, which both spurred its development in Leibniz and prevented its completion, and informed successors up to and including the early Kant.

Newton's view of the nature of force is more difficult to outline, due to his much-discussed agnosticism regarding force; but insofar as Newton was received in eighteenth-century Germany, we can identify a two-fold conception. The key aim of the *Principia* is to formulate the attractive force acting between cosmic bodies. Less central to his work, but present in passages in the *Principia* and particularly in the *Opticks*, is a second, repulsive force.⁹⁵ We should note that there is almost no overlap between the Leibnizian and Newtonian ontologies of force. Leibniz's dynamics presents primitive and derivative forces that are active and passive, and so are principles of creating and suffering change. Newton's two forces are both active, in the Leibnizian sense. However, the *Principia* also offers the concepts of impressed force and inherent force or inertia. Impressed force is again active, representing the action that changes the state of a body ('such as percussion, pressure, or centripetal force').⁹⁶ Inherent force, as a body's persevering in

⁹⁵ See chapter two, above.

⁹⁶ Isaac Newton, *The Principia*, trans. by I. Bernard Cohen and Anne Whitman (Berkeley: University of California Press, 1999), p.405.

its state, is both passive and active, 'both resistance and impetus'.⁹⁷ In general, Newton's forces are transeunt: they are not, unlike Leibniz's, ultimately grounded in an inner principle of the body in which they are observed, but are rather external to (atomistic) bodies, operating between them.

Newton's account of our knowledge of force is well-known and central to his influence on the conception of force. In definition 8 Newton states that in using 'attraction', 'impulse' and so on, he is 'considering these forces not from a physical but only from a mathematical point of view':

let the reader beware of thinking that by words of this kind I am anywhere defining a species or mode of action or a physical cause or reason, or that I am attributing forces in a true and physical sense to centres (which are mathematical points) if I happen to say that centres attract or that centres have forces.⁹⁸

Newton's forces, at least on the basis of this and other influential passages, are mathematical not physical.⁹⁹ Newton famously writes in the General Scholium that 'I have explained the phenomena of the heavens and our sea by the force of gravity, but I have not yet assigned a cause to gravity'; having 'not as yet been able to deduce from phenomena the reason for these properties', he will not 'feign hypotheses'.¹⁰⁰ *Hypotheses non fingo* thus becomes key to the Newton's methodological influence. Forces (paradigmatically universal attraction or gravity) name the observable movements of (cosmic) bodies, and are given mathematical form in line with the observed phenomena. The reason for or cause of gravity cannot be deduced from phenomena, and so Newton remains agnostic on this question. Although other texts, from the queries to the *Opticks* to the suspiciously hypothetical (but still ultimately non-committal) musing on 'spirit' that closes the General Scholium, are more ambiguous, the influential position bequeathed by Newton was a stubborn, empirical-scientific neutrality regarding the metaphysical aspects of force.¹⁰¹

⁹⁷ Newton, *The Principia*, p.404. This is because, for example, body A's inertia resists the impressed force of body B, but body B's inertia (in its state of movement) is an impetus to move body A.

⁹⁸ Newton, *The Principia*, p.408.

⁹⁹ Andrew Janiak notes that the reading of '[m]any prominent eighteenth-century Newtonians', influentially took it that Newton in the *Principia* avoids 'invoking action at a distance by denying that gravity is a real force, construing it as a mere calculating device' ('Newton and the Reality of Force', *Journal of the History of Philosophy* 45:1 (2007), p.128. Janiak argues that Newton considered gravity to really exist, and explores the dilemma of his simultaneous denial of action at a distance.

¹⁰⁰ Newton, *The Principia*, p.943.

¹⁰¹ So Clarke, in the correspondence with Leibniz that was vital for much philosophical reception of Newtonian ideas, writes, '[i]t is very unreasonable to call *attraction* a miracle, and an unphilosophical term; after it has been so often distinctly declared, that by that term we do not mean to express the cause of bodies tending toward each other, but barely the effect, or the phenomenon itself, and the laws or proportions of that tendency discovered by experience; whatever be or be not the cause of it' (Clarke's fifth letter in Leibniz and Clarke, *Correspondence*, p.83). For the debate on whether Newton's interest in alchemical 'active principles' has a bearing on his reintroduction of attractive force in the *Principia*, see Betty Jo Teeter Dobbs, *The Janus Faces of Genius: The Role of Alchemy in Newton's Thought* (Cambridge: Cambridge University Press, 1991),

Leibniz's account of our knowledge of force, by contrast, presents force as knowable, in both its primitive and derivative respects: in this way dynamics should entail 'primary truths, even about God and minds and the nature of bodies'. A common interpretation of the late monadological solution is that the nature of the connection between primitive and derivative forces is 'knowable' only insofar as there is pre-established harmony between the metaphysical and physical levels. On my account, this was not the final articulation of the dynamics, and an explanation of the connection between primitive and derivation forces, beyond the recourse to harmony, was still to be provided: in this way, Leibniz's forces are *in principle* fully explainable.

Figure 1 gives an overview of these aspects of Leibniz's and Newton's concepts of force. They provide background to Kant's position, whilst at the same time allowing us to recognise the extent to which Kant's conception of force is a singular one, not fully reducible to either the Leibnizian or Newtonian traditions.

A final important context is the early-modern discussions of forces and faculties as 'occult qualities'. These are imagined entities, invented only to account for otherwise inexplicable relations, and thus providing no explanation but a tautological repetition of the problem. John Locke, for example, writes in the *Essay Concerning Human Understanding* (1689), '[f]or it being asked, what was it that digested the Meat in our stomachs? It was a ready, and very satisfactory Answer, to say, That it was the *digestive Faculty*'.¹⁰² Leibniz similarly writes in the *Nouveaux Essais* (1702-4) that the fabrication of faculties is 'just as if pocket watches told time by some faculty of clockness without the need of wheels, or mills crushed grain by a fractive faculty without the need of anything like millstones'.¹⁰³ Leibniz typically depicted Newton's universal gravitational force as a recourse to occult qualities.¹⁰⁴ Kant was familiar with these critiques of '*termini occulti*': in the Blomberg Logic (early 1770s) these are glossed as 'an explanation *idem per idem*', with the example of the claim that 'the cause of the propagation of men and animals is the *vis plastica*, the force of propagation' (24:81).¹⁰⁵ This context, in which the charge of 'occult

pp.3-5; Dobbs is in part responding to I. Bernard Cohen, 'The Principia, Universal Gravitation, and the 'Newtonian Style', in relation to the Newtonian Revolution in Science' in: Z. Bechler (ed.) *Contemporary Newtonian Research* (Boston: Reidel, 1982), pp. 21-108.

¹⁰² Locke, *Essay Concerning Human Understanding*, ed. by Peter H. Nidditch (Oxford: Carendon Press, 1975), book II, chapter xxi, section 17.

¹⁰³ Leibniz, 'Preface to the *New Essays*' in Ariew and Garber eds., *Philosophical Essays*, p.306.

¹⁰⁴ Leibniz, 'Against Barbaric Physics' in Ariew and Garber eds., *Philosophical Essays*, p.312-20; fifth letter to Clarke, §§127-8, in Leibniz and Clarke, *Correspondence*, p.65.

¹⁰⁵ Already in *Living Forces* Kant criticised the explanation of motion through motive force as 'employing the artifice that the Scholastics exploited when, in investigating the grounds of heat or cold, they resorted to a *vi calorifica* or *fragificiente*' (1:18).

quality' limits the speculative employment of the concept of force, is determinative for the role of force in Kant, as we will see in the next chapter in relation to the work of the 1760s, and in chapter five regarding Kant's critique of Herder in the 1780s.

Fig. 1: Forces in Leibniz and Newton

Force in Leibniz

Nature of forces			Knowability of forces		Unfinished problematic
			Knowable? How?	Knowable for?	
<i>Metaphysical</i>	Primitive active – substantial form	Immanent forces, on basis of inner dynamic principle	Fully, as real; known rationally	Truths in various branches of metaphysics, including theology and psychology as well as physics	Relationship of metaphysical and physical forces. Options: pre-established harmony; derivative forces as phenomenal mirroring of primitive forces; undeveloped suggestion that derivative are grounded in primitive
	Primitive passive – primary matter				
<i>Physical</i>	Derivative active – bodily motion		Fully, as well-founded phenomena; known empirically and mathematically		
	Derivative passive – bodily resistance (impenetrability/inertia)				

Force in Newton

Nature of forces – All physical forces			Knowability of forces	
			Knowable? How?	Knowable for?
Attraction	Active	Transeunt forces, between atomistic bodies	Partially, as presupposition for explaining observed phenomena, without (official) speculation on the metaphysical cause; known mathematically	Natural philosophy, primarily cosmology but also chemistry
Repulsion	Active			
Impressed force (including percussion, pressure, centripetal)	Active			
Inherent force (inertia)	Active/passive			

Chapter 2

Kant's pre-critical dynamics

1. *Thoughts on the True Estimation of Living Forces*

In 1749, after three years' delay in the printing process and with financial help from his uncle, the twenty-five year old Kant published his first book, *Living Forces*. Its explicit intention, as stated in the Preface, is to resolve the 'controversy concerning living forces', otherwise known as the '*vis viva* controversy' (1:14). This dispute was between Cartesians and Leibnizians, regarding the proper measure of force in physical collisions. As Kant acknowledges, the controversy would have been well-known to his intended readership, having been conducted in learned journals since it was initiated by Leibniz in his critique of Cartesian physics in his 'Brief Demonstration' (1:11). The controversy emerged from the ostensibly minor Leibnizian physical critique. The Cartesian position depicts force as measured by the product of the quantity of matter and the velocity: in modern notation, mv . For the Leibnizians, it is the quantity of matter times the *square* of the velocity: mv^2 . Leibniz names the Cartesian measure, mv , 'dead force', and his own measure, mv^2 , 'living force'.¹ Dead force belongs to bodies at rest, such as an object on a table, exerting force with merely *potential* motion; living force belongs to physical bodies with *actual* motion.²

The Preface to *Living Forces* is a remarkable declaration of intellectual independence, and a testament to Kant's youthful brash confidence. The epigram is from Seneca: 'nothing is more imperative than that we should not, like cattle, follow the herd of those who have gone before us, travelling not where one ought to go, but where they have gone'. Kant's self-belief is evident when, a few pages later, he writes,

There is a great deal of presumption in the words: **the truth that the greatest masters of human knowledge have sought in vain to acquire has first presented itself to my understanding**. I do not dare to justify this thought, but I would not like to renounce it either. (1:10)

In 'furnish[ing] several not unwelcome contributions to overcoming one of the greatest divisions that now prevails among European geometers' and, he thought, definitely resolving the *vis viva* controversy, Kant evidently hoped to propel himself into the upper ranks of European letters

¹ Leibniz, 'Specimen Dynamicum', in *Philosophical Papers*, p.438.

² Leibniz's example is of a ball in a tube: when the tube is stationary, the ball has dead force; when the tube is rotated, giving rise to the ball's movement (due to centrifugal force, in modern terminology), the ball has living force ('Specimen Dynamicum', p.438). For a detailed account and analysis of the *vis viva* controversy, see Schönfeld, *The Philosophy of the Young Kant*, chapter 1.

(1:16). He accordingly sent it to Euler, then a member of the Berlin Academy, hoping to gain wider exposure or a famous ally.³

Living Forces certainly did not give Kant the success he hoped for. As the literature has often emphasised, Jean Le Rond d'Alembert provided, almost simultaneously with Kant's effort, a convincing mathematical solution in his *Traité de Dynamique* of 1743.⁴ Kant is unlikely to have read this prior to publishing *Living Forces*.⁵ From its publication, *Living Forces* received a critical reception. It was mocked in an oft-quoted short poem by Lessing in the satirical magazine *Neuestes aus dem Reich des Witzes* in 1751, and received an anonymous critical review in the *Nova Acta Eruditorum* of 1752.⁶ More recently, the standard reading has been that *Living Forces* is a failure, full of argumentative confusions and misunderstandings of the natural-scientific and mathematical subject-matter. Erich Adickes writes that although the book's theme is a natural-scientific one, it 'violates the principles of true natural science much more than even the divine interventions in Newton'; Kant indulges in an 'unscientific game' with 'occult qualities', 'as if we found ourselves in the deepest middle ages'.⁷ Martin Schönfeld judges that '[o]verall, the book was an embarrassment', a 'debacle'. Noting the 'tedium of suffocating proportions' to be found in the major second section of the work, he concludes that *Living Forces* is an 'ill-informed, disorganised, and self-contradictory student paper'.⁸ Adickes and Schönfeld concur in dismissing

³ Kant's letter to Euler of August 23, 1749, in Kant, *Correspondence* (Cambridge: Cambridge University Press, 1999), pp.45-6 (not included in the *Akademie Ausgabe*).

⁴ See Schönfeld, *The Philosophy of the Young Kant*, p.31-34; Herman J. De Vleeschauwer, *The Development of Kantian Thought: The History of a Doctrine* trans. by A.R.C Duncan (London: Thomas Nelson and Sons, 1962), p.19. For detailed accounts in the history of science that nuance this account, see Carolyn Iltis, 'D'Alembert and the Vis Viva Controversy', *Studies in History and Philosophy of Science* 1.2 (1970): 135-44; George Smith, 'The Vis Viva Dispute: A Controversy at the Dawn of Dynamics', *Physics Today* 59 (2006): 31-36.

⁵ Schönfeld argues convincingly in *The Philosophy of the Young Kant* that Kant did not read d'Alembert's solution in the 1740s prior to publishing the *Living Forces*: it is unlikely to have been available in Königsberg, and even if Kant had read it 'he might not have understood it very well', as the first edition was 'a technical and rigorous document' (pp.31, 37). It was only in 1758, nine years after *Living Forces* was published, that d'Alembert added the introductory 'Discours Préliminaire' that outlined, in an accessible manner, his rejection of *vis viva* and his quantitative measure of force.

⁶ It was reviewed more favourably by Mühlman in the *Frankfurtische Gelehrte Zeitung* in 1749, but this journal was relatively minor (and Mühlman was a former student of Kant's). See the editors' introduction to *Living Forces* in Kant, *Natural Science*, p.4.

⁷ Erich Adickes, *Kant als Naturforscher* (Berlin: de Gruyter, 1924-5) vol. 1, pp.137, 81-2.

⁸ Martin Schönfeld, *The Philosophy of the Young Kant: The Precritical Project*. Oxford 2000, pp.36-7, 47, 54. More recently, Schönfeld has given a more generous account in 'Kant's Early Dynamics' in Graham Bird, ed., *A Companion to Kant* (Oxford: Blackwell, 2010). This essay risks going too far the other way: *Living Forces* provides 'the first generalisation of the various and specific inverse-square laws in natural philosophy': those of Kepler, Newton, and even 'Coulomb's later law of electrostatic force' (p.40). Moreover, Kant 'anticipated general relativity' (p.45; see pp.43-5). Schönfeld makes amends for his earlier dismissal of Kant's first book by hailing parts of it as prophetically anticipating later scientific findings. This is not completely convincing: modern scientists could contest Schönfeld's claims with Kant's own retort to Eberhard: 'how many discoveries regarded as new are not now seen with complete clarity in the ancients by skilled interpreters, once they have been shown what they should look for!' (8:187). In any case, Schönfeld's more positive account continues to

Living Forces, quite justifiably, for failing to achieve its stated aim: that of resolving the *vis viva* controversy according to the natural-scientific terms of the disputants in the learned societies. Kant's efforts towards this explicit aim were certainly a failure in comparison with d'Alembert's contemporaneous work.

Alongside the explicit goal of *Living Forces*, however, we can interpret the text more charitably by identifying another, implicit aim. This allows us to explain rather than dismiss the mathematical, scientific and argumentative confusions of the text, and gain insight into philosophical stakes otherwise missed.⁹ Eric Watkins makes such a distinction between the 'official aim' of *Living Forces*, 'namely solving the *vis viva* debate', and the separate 'clarification of a 'metaphysical concept' of force' that necessarily founds this endeavour.¹⁰ Watkins proposes this only in passing, and locates the metaphysical foundation of force only in the first chapter, with the rest of the text dedicated to the 'official aim'. I contend by contrast that the distinction between Kant's explicit and implicit aims is vital for a proper understanding of Kant's first work, and moreover that the examination of notion of force is not restricted to the first chapter, but occurs throughout *Living Forces*. Much commentary, particularly in English, has given disproportionate attention to *Living Forces*' first chapter, which explains the restricted scope of the interpretations.¹¹

evaluate Kant's first work in terms of its *scientific accuracy*: it is this common approach I wish to challenge here.

⁹ The main theme of Adickes' *Kant als Naturforscher* is whether Kant should be considered a natural-scientific researcher, in the sense of using experiments, mathematics and narrowly and unambiguously defined concepts, or whether he is an abstract, philosophical thinker (Bd. 1, pp.vi, 43). It is no surprise to us nowadays that Adickes argues he is the latter and not the former, but as Adickes' literature review shows, this argument needed to be made in the early twentieth-century (pp.1-10). Despite this guiding optic, Adickes generally dismisses *Living Forces* insofar as it fails to provide the natural-scientific argument it promises; he does identify metaphysical points of interest in the text, but does not read these as the covert stakes beneath the veneer of the *vis viva* controversy (pp.139-42). Schönfeld's *The Philosophy of the Young Kant* has even less sensitivity than Adickes to the possibility that Kant's failure to achieve his explicit aim might be a result of his (undoubtedly convoluted) simultaneous attention to other, philosophical topics.

¹⁰ Eric Watkins, 'Forces and Causes in Kant's Early Pre-Critical Writings', *Studies in History and Philosophy of Science* 34 (2003), p.10.

¹¹ Andrew Carpenter, Melissa Zinkin and Susan Meld Shell all read *Living Forces* in terms of the mind-body problem, which is undoubtedly important but which does not capture the focus of Kant's concerns in the whole work. Watkins (here in *Kant and the Metaphysics of Causality*) and Jeffrey Edwards both provide brief discussions of the work in terms of its relevance to problematics stemming more significantly from elsewhere in Kant's corpus: for Watkins, Kant's understanding of causality; for Edwards, the notion of substance in the third Analogy. All these commentators, bar Shell, discuss only the first chapter of *Living Forces*. See Carpenter, 'Kant's First Solution to the Mind/Body Problem', in V. Gerhardt, R. Horstmann, and R. Schumacher eds., *Kant und die Berliner Aufklärung* vol. 2 (Berlin: de Gruyter, 2001), pp.3-12; Zinkin, 'Kant's Precritical Concept of Force and his Refutation of Idealism', in *ibid.*, pp.86-95; Shell, *The Embodiment of Reason*, p.1-3, 10-29; Watkins, *Kant and the Metaphysics of Causality*, p.104-9; Edwards, *Substance, Force, and the Possibility of Knowledge* (Berkeley: University of California Press, 2000), p.73-8.

Kant's implicit aim appears less clearly than his explicit one, of course, but nevertheless he notes in the Preface,

I shall not give a complete exposition of everything pertaining to the doctrine of living and dead forces in these pages, but rather merely outline some minor thoughts, which appear to me to be new, and which promote my *main purpose of improving on the Leibnizian measure of force*. (§15, my emphasis)

Similarly, a later passage sets out the stakes of the work as '[k]nowing with precision what actually defines the concept of force' (§117). This generally implicit 'main purpose' becomes apparent in the major second and third chapters of the text. The second chapter of *Living Forces* strongly criticises the Leibnizian measure of force, claiming that the Cartesian one is *mathematically* correct: 'mathematical reasons will consistently confirm Descartes' law instead of supporting living forces' (§28). Despite Kant's invectives against the Leibnizians in chapter two, his third chapter defends the validity of Leibnizian living force or mv^2 . To do so, Kant distinguishes between a 'body in mathematics' and a 'body in nature': these, he writes, are 'utterly distinct' (§114). The measure by the square of the velocity, inapplicable for bodies in mathematics, is *correct in metaphysics*. These two different conceptions of body mean that mathematics and nature are separate domains, in which the Cartesian and Leibnizian measures can be correctly applied as long as they respect their proper place.

With the benefit of hindsight, we can identify – in Kant's distinction between our knowledge of bodies in mathematics and in metaphysics, and in his claims that the nature of the forces depends on the domain in which they are considered – an early concern with 'epistemological' issues, and the first inklings of what will become the critical philosophy's turn to transcendental conditions of possibility. This is clearest when Kant writes in the second chapter that, although he has defended the Cartesian mv as applicable to bodies in mathematics,

I have not yet for this reason entirely renounced living forces. In the third chapter of this treatise, I shall prove that there really are forces in nature whose measure is the square of the velocity, but with the qualification that they will never be discovered in the way that has been tried up to now, that is, that they will be forever hidden from this type of consideration (namely a mathematical one), and that only a metaphysical investigation, or possibly a special sort of experience, will acquaint us with them. Hence we do not really contest the matter [*Sache*] itself but only the *modum cognoscendi* [mode of cognition]. (§50)

Ernst Cassirer, in one of the few positive interpretations of *Living Forces*, makes this passage central to his account, and concludes that '[w]hat is noteworthy in this maiden paper is that the first step Kant takes into the realm of natural philosophy immediately turns into an inquiry into its method'.¹² Cassirer's account is consciously teleological, emphasising this aspect insofar as it

¹² Ernst Cassirer, *Kant's Life and Thought*, trans. by James Haden (New Haven: Yale University Press, 1981), p.27.

foreshadows the innovations of the first *Critique*.¹³ We gain more insight into Kant's first work, however, by reading it not on such teleological lines, but by interpreting it on its own terms.¹⁴

2. The implicit aim: conceptualising living force

Many of the major argumentative confusions of *Living Forces* result from the distinction between bodies in mathematics and in metaphysics (or nature): the second chapter is devoted to showing the Cartesian measure is correct for the forces of bodies in mathematics, and the third to showing the Leibnizian measure applies to the forces of bodies in metaphysics. Unfortunately, the distinction between mathematics and metaphysics is deeply ambiguous, and Kant's discussion transgresses the boundaries he has himself set. The second, ostensibly mathematical chapter is underpinned throughout by metaphysical principles, particularly the principles of continuity and equivalence of cause and effect. The third chapter, which should be metaphysical, in turn makes use of mathematical demonstrations. Most problematically, Kant employs the *same* example to prove the Cartesian measure correct in chapter two and the Leibnizian one correct in chapter three, despite the fact that these should be restricted to mathematical and metaphysical bodies respectively.¹⁵

More tellingly, although the second and third chapters should be discontinuous, because they attend to the mathematical and metaphysical measures of force, it is notable that the same concept of body appears throughout: bodies are constituted by fundamental elastic forces. In an example in the second chapter, Kant models bodies on springs: these represent the elastic force (*elastische Kraft*) of the bodies, 'which is activated by impact' (§41). When the bodies collide, the springs compress, to the same degree that the stationary body resists being moved. When the springs 'rebound', velocity is imparted to the bodies. Here in the second chapter Kant is defending the Cartesian measure, mv , against a Leibnizian critique. This critique employs an example of a collision between bodies in which force, understood on the Cartesian measure, apparently doubles: this, for the Leibnizian Jacob Herrmann, is 'absurd' (§41). Kant argues that the scenario can however be explained 'without it being necessary to appeal to [Leibnizian] living forces' (§41). The solution rests on the transmission of the elastic forces constituting bodies into motion.

¹³ Noting that both *Living Forces* and the first *Critique* depict themselves as treatises on method, Cassirer suggests that 'the change which the meaning of this designation' undergoes between these two books 'comprises [Kant's] whole philosophy and its development'. Cassirer, *Kant's Life and Thought*, p.28.

¹⁴ For further discussion of the teleological, 'proto-transcendental' interpretation of *Living Forces*, see my 'Modes of cognition, proto-transcendentalism and force in Kant's *Living Forces*' in Violetta L. Waibel and Margit Ruffing, eds., *Akten des 12. Internationalen Kant-Kongresses, Natur und Freiheit' in Wien vom 21.-25. September 2015* (forthcoming).

¹⁵ See §110, §136.

Using Leibniz's own conception of the elasticity of bodies against the Leibnizians, in this case Herrmann, but developing the notion beyond Leibniz, Kant seeks to defend the logical coherence of the Cartesian measure.

Although bodies in mathematics and bodies in nature should be 'utterly distinct', the third chapter continues to model bodies on springs (§§117, 136). Furthermore, in both chapters Kant develops this conception of body to explore *how* the activation of innate elastic force into external motion might take place. This begins in the second chapter, with an example taken directly from Leibniz (§92). Leibniz's 'De causa gravitatis' (*Acta eruditorum*, 1690) provides a complicated scenario of two curved planes and a steelyard, to argue that the Cartesian measure of force leads to perpetual motion. Kant reproduces this to defend the Cartesian measure against Leibniz, by arguing that the scenario, understood according to Descartes' *mv*, need not contravene the law of the equality of cause and effect.¹⁶ Kant's strategy is to distinguish 'triggering' or 'occasioning' (*veranlassen*) from the usual economy of cause and effect. The quantity of force post-collision, therefore, 'has been *triggered* by the force transferred' in the collision, but 'it is still not an *effect* [*Wirkung*] of this force' (§93, my emphasis). Kant insists, '[w]e must very carefully avoid the conflation of these two aspects' (§93). The Cartesian measure is thus made consistent with the principle of the equality of cause and effect, through the claim that the post-collision state is triggered by the collision but is not an effect of it.

The third chapter then develops this conceptual economy of 'triggering', through a complex account of the 'striving' or 'intension' at the heart of bodies (§117). Kant writes that '[m]otion is the outward phenomenon of force, but the striving [or intension] for preserving this motion is the basis of the activity' (§117). Intension comes to mean something like the infinitesimal 'carrier' of elements of motion, which can accumulate in order to ground the transmission of innate force into external motion, and expand an external impetus into a much greater force of motion. As Kant puts it, '[b]y means of its inner drive, the body elevates the externally received impression infinitely higher and to an entirely different type' (§121).

¹⁶ Kant in *Living Forces* is consistently committed to (Leibniz's) 'great law of mechanics that *effectus quilibet aequipollet viribus causae plenae*' (§97). According to Antognazza, this principle is central to Leibniz's development of his conception of force: 'from 1676 onward Leibniz proposed the fundamental principle which paved the way to his new definition of force, namely the principle that the full cause is equipollent to the entire effect' (Antognazza, *Leibniz: An Intellectual Biography*, p.173). Costabel quotes Leibniz's 1687 letter to Bayle in which he states that the 'law of nature which I hold as being most universal and most inviolable' is 'that there is always a perfect equivalence between the full cause and the whole effect' (Costabel, *Leibniz and Dynamics* trans. by R. E. W. Maddison (Paris: Hermann, 1973), p.42).

This conception of intension, striving or drive is used to redefine the dead and living forces of the *vis viva* controversy:

any body that bases its motion sufficiently on itself such that its inner striving sufficiently explains that it will, on its own, preserve the motion that it has, freely, permanently, undiminished, and to infinity, has a force whose measure is the square of its velocity or, as we shall subsequently call it, a living force. (§120)

This means that if a body's motion is grounded purely on its own innate striving, it will have living force, measured by mv^2 . If its motion is not due to its intension but is based on an 'external propulsion', then it has dead force, mv (cf. §119). This gives rise to a new version of the distinction between dead and living force: dead force is an external impetus that needs to be continually replenished; living force is internal and self-sustaining (§120).

Kant's redefinition of living and dead force – the terms at the heart of the controversy in European letters – is central to the implicit, philosophical aim of his first work. The new definitions already appeared in the Preface, in a more accessible way, immediately after Kant's claim that his 'main purpose' is 'improving on the Leibnizian measure of force':

Hence, I divide all motions into two main kinds. One kind has the property of conserving itself in the body to which it is communicated, and of persisting infinitely if no impediment opposes it. The other is an enduring effect of a constantly driving force which does not even require resistance to destroy it, but which depends solely on an external force and disappears as soon as this force ceases to sustain it. An example of the first kind of motion is fired bullets and all projectiles, an example of the second kind is the motion of a ball gently pushed forward by hand, or otherwise all bodies that are carried or pulled with moderate velocity. (§15)

Dead force is exemplified by a ball pushed by hand, which stops moving when no longer pushed; living force is that of a fired bullet that will continue infinitely unless prevented by a collision or another force.¹⁷ The opening of chapter three makes clear that what is at stake is the distinction between force that is only *externally* transmitted (as in the mathematical, Cartesian view) and force that is *internal* to the body (as in Leibniz's metaphysical conception):

Mathematics does not permit its body to have a force unless it is wholly produced by the external cause of its motion. Accordingly, mathematics admits force in the body only insofar as force was caused in it from the outside, and hence one will always find its force to the same degree in the causes of its motion. This is a basic law of mechanics, whose presupposition, however, does not admit any estimation other than the Cartesian. But, as we shall soon show, the body in nature is of

¹⁷ Living force must therefore be understood in the Galilean and Newtonian framework, in which constant motion as much as rest can be a 'state' of a body. Galileo replaced the Aristotelian universe in which all is tendentially at rest, and where a prime mover is required to set things in motion – as outlined in book VIII of the *Physics* – with one in which perpetual, uniform, straight motion can also be a natural state of bodies (see Alfred North Whitehead, *Science in the Modern World*, quoted in I. Bernard Cohen and Richard S. Westfall eds., *Newton* (New York: W.W. Norton, 1995), p.250). See Galileo's *Two New Sciences*, where the fourth day opens with an invitation to 'imagine' an idealised plane without friction, on which a body's motion is 'uniform and perpetual' (*Two New Sciences* trans. by Henry Crew and Alfonso de Salvio (New York: Macmillan, 1914), p.244). Galileo's notion of motion as a state is adopted directly by Newton in his first law of motion: *Corpus omne perseverare in statu*.

an altogether different constitution. That body has the capacity to increase, by itself and in itself, the force awakened externally by the cause of its motion, which means there can be units of force in it that did not originate from the external cause of motion, that may be larger than this cause... (§115)

Again, Kant's new definition of living force as the Leibnizian, metaphysical conception of force as internal and self-sustaining means that the effect can be greater than the cause: as we have seen, Kant uses the terminology of 'triggering' or 'occasioning' to attempt to make this consistent with the principle of the equality of cause and effect. Living force is a self-active, self-sustaining force, internal to the body, that can be greater than the external force that triggers it.

The problem Kant now considers is: how can there be a transition between external, dependent dead force, and internal, self-sustaining living force, without an absolute break? The latter is depicted, with some exaggeration, as 'infinitely larger' than the former (§26). Kant's solution is:

If the same body bases its force partly on itself, but not completely, its force will partly approach living force and be somewhat different from dead force, and there will necessarily still be infinitely many intermediate steps between these two boundaries, completely dead and completely living force, which lead from the one to the other. (§122)

The law of continuity thus leads to a thinking of infinitesimal change: the 'infinitely many ... steps' between the two forces. This must be inspired by the calculus, but is absent from Leibniz's account of living and dead force. The end-point of the transition to living force is a body's basing its force on itself; in the 'interim period', the body can only 'partly' do this. Kant colourfully depicts this interim period:

I call the state in which the force of the body is not yet living but nonetheless progressing to being alive, the **vitalisation** [*Lebendigwerdung*] or *vivification* [*Vivification*] of force. (§123, t.m.)

This 'vivification' is a *process*, in which 'force is elevating itself', so as to provide continuity between dead and living force (§123). It is developed in Kant's complex picture in which 'elements' of intension are accumulated over the period of vivification; these momentarily sustain a body's motion while it gains the capacity, from external impetus, to ground its motion in itself.

3. Dynamics in *Living Forces*

Although *Living Forces* undoubtedly fails to achieve its explicit aim, that of resolving the *vis viva* controversy for the sciences, it can be less quickly dismissed when understood as an attempt to construct a concept (or concepts) of force. Kant's 'living' and 'dead force', we can see on a close reading of the whole text, are to an extent new notions that replace the concepts inherited from the *vis viva* debate. Kant's dead force is 'mathematical' (setting aside now the text's confusions between mathematical and metaphysical notions of body), externally transmitted, and persists

only as long as the external pressure is applied. Living force is 'metaphysical', internal to the body, and persists indefinitely until interrupted by a collision or another force. Dead and living force are measured by mv and mv^2 , respectively, but I would contend that this merely allows Kant to align his work with the *vis viva* debate, in service of his explicit aim, and is of little importance to his implicit aim: due, no doubt, to Kant's greater aptitude for theoretical and conceptual thinking over mathematical reasoning. The explicit aim is connected to Kant's grandstanding claims at the outset of the work and his seeking Euler's approval: it is conceivably tied simply to Kant's will to achieve recognition and future employment in Germany. The implicit aim is more thoroughly metaphysical, and can be understood in terms of Leibniz's dynamics project.

Towards the end of the book, Kant notes that the science of dynamics is yet to be founded:

Herr Wolff intended to provide us with the first foundations of dynamics in his treatise. His enterprise turned out poorly. Hence we do not have any dynamical principles at present from which we could justifiably proceed (§106).

In the final part of the text, Kant proposes a 'new estimation of force', which he proposes as 'the foundation of the true dynamics', and announces: '[n]ow, having laid the foundations of a new estimation of forces, we ought to try to indicate those laws that are specifically connected with it and that constitute, as it were, the framework of a new dynamics' (§§125, 131). We can return here to a consideration of Kant's relation to Wolff, in terms of the Leibnizian and Newtonian conceptions of force introduced in chapter one, to understand Kant's references to a new foundation for dynamics.

Kant's comments on Wolff are specifically targeted at the latter's *Principia dynamica*, published in the journal of the St Petersburg Academy in 1728.¹⁸ This text is a rare instance of Wolff's using Leibniz's term 'dynamics'.¹⁹ In line with Wolff's adoption of only the physical aspects of Leibniz's doctrine of forces, Wolff's *Principia dynamica* is a mathematical and mechanical treatment of the question of living forces. Wolff claims towards the end of the text that he does not doubt at all that 'the principles of dynamics that I propose here conform to Leibniz's thought, principles that

¹⁸ Wolff, *Principia dynamica* in *Commentarii Academiae Scientiarum Imperialis Petropolitanae* vol. 1 (St Petersburg: Academia Scientiarum Imperialis Petropolitanae, 1728), pp.217-238.

¹⁹ The four-volume *Anfangsgründe* covers a wide range of disciplines but dynamics does not feature among its sections. The volumes cover: calculation, geometry, trigonometry, architecture, artillery, fortification, mechanics, hydrostatics, aerometry, hydraulics, optics, catoptics, dioptics, perspective, spherical trigonometry, astronomy, chronology, geography, gnomonics, algebra and calculus. The *Auszug* covers the same topics in abbreviated style, and likewise has no treatment of dynamics; neither has the expanded Latin version of the *Anfangsgründe*, the *Elementa Matheseos Universae* (1742). 'Dynamics' does not feature in the *Mathematisches Lexicon* (1716), unlike 'Mechanica' (translated by Wolff as *die Mechanik oder Bewegungskunst*) and 'Phoronomia' (*die Phoronomie*), which are two other physico-mathematical disciplines that will later feature alongside 'dynamics' in Kant's *Metaphysical Foundations*. Nor does the term appear as an entry in the *Vollständiges Mathematisches Lexicon* (1734).

lay a way to go further'.²⁰ Anne-Lise Rey notes that the question is: in which direction should this further development go? As with Wolff's statements about Leibniz's system developing in a way foreign to his, Wolff's dynamics agrees with Leibniz's on the level of the mechanics of bodies, but does not progress to the metaphysical implications aimed at by Leibniz's dynamics. As Rey puts it, '[t]he reprise of Leibniz's dynamics in the *Principia dynamica* thus appears as a curious testimony [*témoignage*] of a fidelity in relation to the dynamic principles, coexistent with a divergence regarding the definition of substance that expresses itself at the heart of the exchange' between Leibniz and Wolff.²¹

In Kant's opinion, at least in the polemical argument in chapter two of *Living Forces*, Wolff's dynamic principles are incorrect. He claims that Wolff wrongly infers from two movable bodies producing identical effects to two unequal bodies producing equal effects, leading to a 'monstrosity' of a conclusion that is 'definitely not an argument that should be in a mathematical treatise' (§105). Kant clarifies this in a supplement added in the spring or summer of 1747, claiming that Wolff's conclusions amount to saying that 'that unequal *Actiones* can still have equal *Effectus*' (1:137). This is 'a contradiction of a form as perfect as could possibly be devised. ... *Effect* and *Action* are precisely the same, and the sense differs only in that I either refer to what its cause is or consider things apart from this. So Wolff's proposition only amounts to saying that an action could be unequal to itself' (*ibid.*).

The ground of Kant's dismissal of Wolff's text can be seen in the more philosophically substantive critique outlined at the beginning of the first chapter of *Living Forces*. This is a critique of the more Newtonian elements of Wolff's concept of force. Kant approvingly cites Leibniz's conception of corporeal force:

If one looks no further than to what the senses teach, one will consider this force as something communicated solely and entirely from the outside, something the body does not have when it is at rest. With the sole exception of Aristotle, the whole lot of philosophers prior to Leibniz was of this opinion. ... Leibniz, to whom human reason owes so much, was the first to teach that an essential force inheres in a body and belongs to it even prior to extension. *Est aliquid praeter extensionem imo extensione prius* [there is something besides extension or rather prior to extension]; these are his words. (§1)

Kant positions himself squarely against the notion of force as something only communicated externally. The Leibniz quotation is from the opening of 'Specimen Dynamicum'; Kant declares himself fully in support of Leibniz's identification of an essential, immanent force prior to extension, and notes that Leibniz gave this force 'the general name of 'active force'' (§2).

²⁰ Wolff, *Principia dynamica*, p.233.

²¹ Rey, 'La lecture wolffienne', p.253.

Kant goes on to criticise Wolff's Newtonian conception of *motive* force:

if one attributes an essential motive force (*vim motricem*) to the body in order to have a ready answer to the question about the cause of motion, then one is to a certain extent employing the artifice that the Scholastics exploited when, in investigating the grounds of heat or cold, they resorted to a *vi calorifica* or *fragificante* (§2).

That is, motive force is an occult quality, a tautological non-explanation of movement. 'One ought', Kant writes, 'to call the force of a body a *vim activam* as such, rather than a *vim motricem*' (§3). Bodies have active forces rather than the empty notion of motive forces. This is because Kant distinguishes force and motion: it 'is incorrect to describe motion as a kind of action, and thus to attribute to it a force of the same name' (*ibid.*). Motion is not force, because a 'body that is subject to infinitely little resistance, and consequently hardly acts at all, is the body with the most motion' (*ibid.*). The celestial body travelling through Galilean or Newtonian empty space meets almost no resistance, so cannot be said to act or have force. It is only when it collides with something and *loses* its motion that it acts. Kant gives the further example of bodies in a state of rest. The pressure that bodies exert upon the table on which they lie means they are endeavouring to move themselves, but 'since they would not act if they were in motion, one would have to say that, inasmuch as a body acts, it endeavours to attain the state in which it does not act' (*ibid.*).

What is key in this discussion is that Kant equates force with activity, and distinguishes these from movement. A moving body can have no force, if it moves without resistance through space. Kant's specific critique of Wolff's *Principia dynamica* is based on the same rejection of motive force. Wolff's argument has the following presupposition, on Kant's account.

If a man carried a burden over some distance, then everyone would agree that he has done and performed something; now, a body carries its own mass through a space with the force it has in actual motion, and just because of this, its force has done and exerted something. (§104)

It is this analogy that Kant denies: to the contrary, a body can travel unimpeded through space and exert no force, and therefore not been active. On the basis of this fundamentally different conception of force, Kant can claim that Wolff's argument descends into the absurdity of an action being unequal to itself.

Kant's and Wolff's relations to Leibniz's dynamics are in this way diametrically opposed. Wolff adopts the physical side of the dynamics, whilst refusing to follow Leibniz to the metaphysical conceptions of fundamental forces of substance. Kant rejects, in chapter two of *Living Forces* at least, the physical side of the dynamics, while affirming the necessity of an active force constituting substance, instead of a mere motive force of physical substances.

However, in another way, Kant follows Wolff, against Leibniz's late, monadological view. Although Kant insists on a fundamental active force, this is only explained physically. It is not, as in Leibniz, a mere phenomenon, ultimately grounded in intelligible metaphysical forces. The force that underpins Kant's explanations in both the 'mathematical' second chapter and the 'metaphysical' third chapter is an *elastic* and therefore physically comprehensible one. The process of vivification and the notions of triggering and intension are undoubtedly speculative, but they are nevertheless at least an attempt to provide an explanation in physical, not metaphysical terms.

In fact, Kant's attempt to employ physical elasticity to explain the connection between the fundamental active forces of substance and the observed physical forces of bodies echoes Leibniz's own explorations of physical explanations. These appear both in texts that Kant could have read and others that he could not have. Leibniz was well-known for considering all bodies to be elastic.²² In 'On Nature Itself' (1698), published in the *Acta eruditorum* and which Kant therefore could have read, Leibniz writes,

it seems to me that [moving bodies] are moved with equivalent forces, but not with the same force, since each one is set in motion by its own force, namely, by elastic force, when driven back by the body striking it, though this may seem remarkable. (I am not now discussing the cause of this elasticity, nor do I deny that it must be explained mechanically by the motion of a fluid existing in and moving through it.) (L 506)

The internal principle that means that bodies move due to their own, internal force, not due to forces transferred from outside, is elasticity. Leibniz here insists that this must be explained mechanically, and hints at an explanation through a fluid moving through the body, but, as he repeatedly does with the dynamics project itself, Leibniz here indefinitely defers this explanation of the cause of elasticity.²³

In part one of 'Specimen Dynamicum', which Kant read, Leibniz writes, '[n]ot everyone has accepted the proposition which seems certain to me - that rebound or reflection results only from

²² In a letter to Malebranche published in the *Nouvelles de la republique des lettres* of July 1687, Leibniz criticises the 'false hypothesis of the perfect hardness of bodies', arguing that this should be conceived of as an 'infinitely prompt elasticity' (Leibniz, *Philosophical Papers*, p.353).

²³ This tentative explanation intriguingly echoes the ether hypothesis of Leibniz's early physics in the *New Physical Hypothesis* (1671). Cf. Garber, *Body, Substance, Monad*, pp.18-20; Gueroult, *Leibniz*, chapter 1. In a letter to Wolff already quoted, Leibniz offers a different attempt to explain elasticity: 'when a ball at rest is struck by another, it is moved by an innate force, namely, elastic force, without which there would be no collision. But the elastic force in the body arises from an internal motion invisible to us. And the primitive entelechy itself is modified corresponding to these mechanical or derivative [forces]. Therefore it can be said that force is already present in every body, and it is determined only by modification'. Elasticity is again identified as a ground of a body's self-movement, but now grounded on an 'internal motion invisible to us': this is somewhat obscurely connected to the primitive entelechy in Leibniz's account, so the explanatory apparatus is not completely mechanical or physical.

elastic force, that is, from the resistance offered by an internal motion'.²⁴ Part two, unavailable to Kant, affirms more explicitly 'the view which Descartes attacked in his letters and which some great men are even now unwilling to admit – that all rebound arises from elasticity'.²⁵ Leibniz provides there an example of bodies, 'like two inflated balls', colliding and rebounding due to their own elasticity.²⁶ There follows from this what Leibniz calls 'that most admirable principle of all': that, contrary to Descartes' view, *all* bodies are elastic.²⁷ Consequently, one of the 'wonderful and most practical theorems in dynamics' is that '*every passion of a body is of its own accord, that is, arises from an internal force, even if it is on the occasion of something external*'.²⁸ This passion or passive force of resistance arises in a collision, but is due not to the external body that 'occasions' it, but to the internal force of the resisting body. A consequence of this is that '*in impact, both bodies are equally impacted upon, and equally act*'. Leibniz draws the following, striking conclusion from this: 'it is also sufficient for us to derive the passion in one from its own action'.²⁹ In suggesting that the passion of a body can be derived (*derivemus*) from its action, Leibniz indicates a direction that his own monadological solution to the dynamics problematic did not follow. The physical, derivative passive force of bodily resistance, is derived from the metaphysical, primitive active force of substance. Elasticity, in the unpublished second part of 'Specimen Dynamicum', is tentatively proposed as a connection between the primitive and derivative forces.

Kant could only have been aware of a small number of these references, and regardless it is more likely that his ideas on elasticity were influenced by more proximal sources.³⁰ Nevertheless, this

²⁴ Leibniz, *Philosophical Papers*, p.440.

²⁵ *Ibid.*, p.447. Descartes denied this explanation through elastic force in his letters to Mersenne of January 21, February 7, and March 4, 1641.

²⁶ Leibniz, *Philosophical Papers*, p.446.

²⁷ *Ibid.*, p.447. In his 'Thoughts on the Principles of Descartes' Leibniz writes, 'We must recognise that, no matter how hard, every body is nevertheless flexible and elastic to some degree; like a ball inflated with air' (*Philosophical Papers*, p.397).

²⁸ Leibniz, *Philosophical Essays*, p.134. Garber highlights this passage in *Body, Substance, Monad*, pp.202-3.

²⁹ Leibniz, *Philosophical Essays*, p.135 (GM VI p.251): 'sufficit, ut passionem quae in uno est, etiam ab actione quae in ipso est derivemus'.

³⁰ Particularly Johann Bernoulli, who was the intermediary and initiator of the Leibniz-De Volder correspondence. Kant cites Bernoulli numerous times in *Living Forces*. The Leibniz-De Volder exchange began with the issue of elasticity: De Volder thought Leibniz assumed it 'gratuitously' (*The Leibniz-De Volder Correspondence*, p.3). Leibniz explores his notions of elasticity in letters to Bernoulli on the topic of the 1st and 30th September 1698: 'it belongs to the nature of body that all the phenomena of bodies, even elastic force can be named mechanically, but that the principles of mechanism, i.e., of the laws of motion, cannot be derived from the consideration of extension and impenetrability alone' (*ibid.*, p.9); '[w]hen I insist that elastic force is essential to the bodies existing in nature, I do not mean that it should be sought immediately, as it were, from souls or forms. Rather, it arises from the structure of the system of the whole universe. ... [divine wisdom and laws, the principles of dynamics, and the forms created by God]. And so, however small a body may be, there is a much subtler fluid surrounding and permeating it, from which the elasticity of the body comes' (*ibid.*, p.11).

shows more than simply that these ideas were ‘in the air’. Kant responds to the dichotomy between the two sides of Leibniz’s dynamics by proposing a physical explanation, grounded on elastic force. Leibniz had tentatively proposed a similar explanation, and in his middle-period suggested that elasticity could be grounded in a mechanical, physical fluid, but he later drops this tentative physical explanation in favour of the idealistic monadological conception.

Kant’s *Living Forces* is thus a synthesis of Leibnizian, Newtonian and Wolffian currents, in a way that has not typically been recognised. With Leibniz, against Newton and Wolff, Kant affirms an immanent active force of bodies instead of transuent motive forces. With Newton and Wolff against late Leibniz (and, I have suggested, following hints in Leibniz’s middle-period that are dropped in the monadological view), Kant seeks a physical rather than metaphysical explanation for this fundamental force.³¹

Furthermore, a passage that we have not yet addressed in chapter one of *Living Forces* proposes a continuity between bodily and mental forces.³² Kant contends that understanding force as active rather than motive allows us to understand how the soul and matter can influence one another. This should shed ‘more than a little light ... on physical influence’, that is, on the doctrine contending that distinct substances can affect one another (§6). This doctrine opposes pre-established harmony and occasionalism; a version of physical influence was defended by Kant’s teacher, Martin Knutzen.³³ Kant argues that if the body-soul question becomes targeted on the active rather than motive forces of the soul, we can understand how the soul is capable of acting on things outside itself. Likewise, when matter acts, it acts on things spatially connected with it, and the state of the soul is thus changed (§6). Both of these arguments depend on a spatially-located soul. The first claims that the soul is in a location and so, in its action, acts outside its location. This kind of argument will be explicitly questioned by the time of *Dreams of a Spirit-Seer*. Nevertheless, this employment of the concept of force to address *both* physical and mental or spiritual phenomena will be pivotal in the development of dynamics in the subsequent pre-critical works.

³¹ Kant’s specific use of *elasticity* as this physical principle is far from Wolffian, insofar as Wolff diverged from Leibniz and considered there to be inelastic as well as elastic bodies in nature. Ahnert, ‘Newton and Wolff’.

³² Kant discusses the issue of body-soul connection only briefly in §6 of chapter one of *Living Forces*, although it has received disproportionate treatment in the literature, as noted above.

³³ See Watkins, *Kant and the Metaphysics of Causality*, pp.52-72. Manfred Kuehn explores the relation of *Living Forces* to Knutzen (identifying a veiled attack on Knutzen) in ‘Kant’s Teachers in the Exact Sciences’ in Eric Watkins, ed., *Kant and the Sciences* (Oxford: Oxford University Press, 2001), pp.11-30. As Watkins shows, Knutzen’s argument for physical influence is grounded on *moving* forces (pp.54-5). Kant is therefore amending what he takes to be persisting problems in Knutzen’s account of the physical influence between the heterogeneous substances of body and soul, through the general critique of the Wolffian-Newtonian conception of force as motive.

In this passage in *Living Forces*, Kant's position is irreducible to Leibniz, Newton or Wolff. This is not Leibniz's unified model of perceptive-physical forces. Kant goes beyond Newton's restriction of forces to mathematical formulations of physically-observed regularities. Neither does he adopt Wolff's separated spiritual *Vorstellungskraft* of the soul, with a cautiously-positing pre-established harmony with bodies. In Kant's first text, the possibility of gaining knowledge of both mental and physical activities through the concept of force is affirmed, and so Kant pursues the broad conception of a 'dynamics', on my interpretation of Leibniz's unfinished new science.

*

The key conception for our discussion in the remainder of this chapter is this broad sense of a Leibnizian dynamics. Its aims are captured best in the quotation from Leibniz at the head of chapter one, above: dynamics would be a science of *both* metaphysical and physical forces, that ultimately seeks knowledge of 'God and minds and the nature of bodies'. *Living Forces* already shows Kant working within the Leibnizian dynamics problematic, in ways that are far removed from Leibniz's own ultimate attempts to resolve it in the late monadological metaphysics. Nothing less could be expected, given the competing influences, particularly of Newtonianism, as apparent in Wolff's developments of dynamics. We will now trace a broad narrative of the fortunes of Kant's responses to the broad dynamics problematic of the middle-period Leibniz, in Kant's philosophical use of forces in the 1750s and 1760s.³⁴

4. 'Newtonian' forces in the 1750s

Kant's second major work, published on returning to Königsberg after his years tutoring in the surrounding countryside, was the *Universal Natural History* of 1755. This ambitious cosmogony and cosmology is founded on forces. Employing only the 'Newtonian' forces of fundamental

³⁴ The issue of a Kantian 'dynamics' in this sense is all but absent from the literature. One exception is Schönfeld's 'Kant's Early Dynamics', which notes, 'Kant's reflections on dynamics form the starting point of his career' and '[i]n the final two decades of his life, reminiscent of his pre-Critical project, Kant renewed his efforts at joining metaphysics and physics in the *Opus postumum*, and here dynamics returned to centre stage' (p.33). Schönfeld points out that '[s]cholarship has largely ignored the early dynamics' (*ibid.*). A study that examines Kant's final drafts in terms of the metaphysical-physical dynamics I discuss here is Burkhard Tuschling, *Metaphysische und Transzendente Dynamik in Kants Opus postumum* (Berlin: de Gruyter, 1971). Tuschling makes little reference to the Leibnizian context, however. 'Dynamics' features in two studies but as an analogy from Newtonian dynamics, and not in this historical sense: Gerd Buchdahl, *Kant and the Dynamics of Reason: Essays on the Structure of Kant's Philosophy* (Oxford: Blackwell, 1992); Michael Friedman, *Dynamics of Reason*. What Newton called his 'rational mechanics' began in the nineteenth century to be designated 'dynamics', and this is now a commonplace.

attraction and repulsion in matter, Kant seeks to ‘determine those causes that can have contributed to the arrangement of the world system, viewed on the large scale’ (1:230, 234). The work narrates the formation of the universe from an original chaos, and then the emergence of mechanical laws of nature, the distinct planets and their moons, and even the inhabitants of the planets. On his method, Kant states,

I have, after I placed the world in the simplest chaos, made use of no forces other than those of attraction and repulsion to develop the great order of nature, two forces which are equally certain, equally simple, and equally original and universal. They have both been borrowed from Newtonian philosophy. (1:234)

The innovations here, when compared to *Living Forces*, are the addition of attractive force alongside repulsive or elastic force, and the depiction of both forces as ‘Newtonian’.

Attractive force, although obviously not unknown to Kant at the time of his 1747 text, as his passing employment of the inverse-square rule shows, played no part in the thinking of bodies and physical collisions in *Living Forces*. The reference to the inverse-square rule in the first text does not attribute it to Newton and substitutes it into a context distinct from Newton’s action at a distance or attractive force: Kant employs the form of the law to suggest that it is ‘probable’ that the very three-dimensionality of space derives from the inverse-square law that governs interactions between substances (§10). Attraction force in a Newtonian sense only enters into Kant’s published work in his first publication on his return to Königsberg, the short 1754 essay on the ‘Rotation of the Earth on its Axis’. Here, ‘the attraction [*Anziehung*] of the Moon and the Sun’ is nothing less than ‘the universal driving force of nature [*allgemeine Triebwerk der Natur*]’. For Kant, on the basis of this attractive force, ‘Newton has unravelled [nature’s] secrets in a manner that is clear as it is beyond doubt’, providing ‘a secure foundation for which a reliable investigation can be conducted’ (1:186-7). The *New Elucidation* (1755) likewise notes that it is ‘probable’ that ‘Newtonian attraction’ or gravity is ‘the most fundamental law of nature governing matter’ (1:415).³⁵ On the basis of such passages, Martin Schönfeld argues that Kant undergoes a ‘Newtonian conversion’ between *Living Forces* and the ‘Rotation’ essay.³⁶ As discussed in the Introduction above, it is a common presupposition in the literature that Kant’s forces are Newtonian. The picture is, however, more complicated than this.

Kant’s first affirmation of Newton’s philosophy in the ‘Rotation’ essay has a tenor that distinguishes it from Newton’s own language. Kant furnishes Newton with what we could call an

³⁵ Kant suggests that the mutual interconnection of the actions and reactions of substances brings about space and it likely brings about universal attraction, too, showing his interest in developing the Newtonian conception of force beyond Newton, to seek its deeper metaphysical grounds.

³⁶ Schönfeld, *Philosophy of the Young Kant*, pp.79-80.

epistemological and ontological weight. On the one hand, Kant uses Newton as an epistemological foundation: Newtonian forces and the laws of the *Principia* provide a 'secure foundation' for a 'reliable investigation' in Kant's own studies. In this way, the close of the 'Rotation' essay advertises the forthcoming *Universal Natural History* under the title, 'Cosmogony, or an attempt to derive the origin of the universe, the formation of the heavenly bodies and the causes of their motion from the universal laws of motion in matter in accordance with Newton's theory' (1:191). Newtonian mechanics provides a methodological support underpinning the work's cosmogony and cosmology. This is not to say that Kant's method is itself 'Newtonian', however, in any strict sense: the two 1754 'Earth' essays and *Universal Natural History* take a notably non-quantitative approach; mathematics plays less of a role than in Kant's attempted 'mathematical' demonstrations in *Living Forces*.³⁷

On the other hand, in depicting Newtonian attraction as 'the universal driving force of nature' Kant employs gravitational force as an ontological ground that would be anathema to the Newton of the *Principia*. Newton famously refuses to 'feign hypotheses' about the properties and cause of gravity, writing that 'it is enough that gravity really exists and acts according to the laws that we have set forth and is sufficient to explain all the motions of the heavenly bodies and of our sea'.³⁸ In 1754 and 1755, Kant pushes the 'Newtonian' forces beyond Newton's metaphysical agnosticism. The *Universal Natural History* presents what came to be called the 'nebular hypothesis' of the formation of the planetary system out of the originary chaos:

The elements have essential forces [*wesentliche Kräfte*] to put each other to motion and they are a source of life for themselves. Matter immediately endeavours [*ist ... in Bestrebung*] to form itself. ... Nature, however, has still other forces in store which are expressed primarily when matter is dissolved into its particles, by which forces they can repel one another and, by their conflict with the attractive force, bring about that motion that is, as it were, a continuous life in nature. (1:264-5)

The attractive and repulsive forces that are essential to the elements trigger the first formation of matter. These 'elements' evoke Wolff's transformation of Leibniz's monadic points: we will see that such elemental forces will be at stake in Kant's subsequent engagement with the question of physical monads. Here, the elements are self-active, recalling the fundamental elasticity of *Living*

³⁷ Kant uses very little mathematics in the 'Earth' essays and *Universal Natural History*. Schönfeld is drawn to consider the question of Kant's qualitative approach, as it is an obvious threat to his thesis of the 'Newtonian conversion'. Schönfeld concludes that mathematics was no help to the *cosmogony* of *Universal Natural History*, being an investigation into the universe's efficient and final causes. Kant's further rejection of mathematics in the *cosmological* parts of the work is attributed by Schönfeld to the fact that Kant considers his project to work through 'analogies', as human understanding is insufficient in the face of God's infinite cosmos (1:235, 256).

³⁸ Newton, *The Principia*, p.943.

Forces. In this cosmogony, the forces are then inherent in matter, giving it the ‘continuous life’ by which it is characterised in the *Universal Natural History*.

Kant writes, of the two ‘equally original and universal forces’,

They have both been borrowed from Newtonian philosophy. The former [attraction] is now a law of nature that is beyond doubt. The second [repulsion], which Newtonian science is unable to provide with as much clarity as it has for the first, I will assume here only in the sense that no one rejects it, namely in relation to the smallest dispersion of matter as, for instance, in vapours. (1:234-5).

Attraction, which Kant considers to have been proved in Newtonian natural philosophy as ‘beyond doubt’, can thus be used for philosophical ends beyond Newton’s own. Repulsion, as Kant notes, occupies a more problematic place in Newtonian science. There has been disagreement as to what Kant actually means by ‘Newtonian repulsive force’. In William Shea’s view, there is no repulsive force in Newton: it was simply ascribed to Newton by Kant. Shea considers the sources for Kant’s repulsive force to be rather Buffon’s *Histoire Naturelle* and Lucretius’s *De rerum natura*.³⁹ In a note, Schönfeld disagrees, considering Newton’s concept of repulsive force to be a ‘molecular repulsion’.⁴⁰ This is the repulsive force mentioned in Newton’s *Opticks*.

The famous Query 31 of the *Opticks* had a great influence on a Newtonian tradition of experimental and speculative chemistry. It ventures that ‘the Parts of Salt or Vitriol recede from one another, and endeavour to expand themselves, and get as far asunder as the quantity of Water in which they float, will allow’.⁴¹ Newton suggests that this ‘Endeavour’ implies that the particles have a ‘repulsive Force by which they fly from one another’. A later passage notes that ‘Particles ... shaken off from Bodies by Heat or Fermentation’ and beyond the reach of the bodies’ attractive forces can ‘take up above a Million of Times more space’: such ‘vast contraction and Expansion seems unintelligible ... by any other means than a repulsive Power’.⁴² These references to repulsive force, and Newton’s speculations about the ‘elastick force’ of the ether and the ethereal

³⁹ William R. Shea, ‘Filled with Wonder: Kant’s Cosmological Essay, the *Universal Natural History and Theory of the Heavens*’ in Robert E. Butts, ed., *Kant’s Philosophy of Physical Science* (Dordrecht: D. Reidel, 1986), p.115-6.

⁴⁰ Schönfeld, *Philosophy of the Young Kant*, pp.112. Schönfeld cites three Newton texts as examples of Newtonian repulsion: *De aere et Aethere*, Query 31 of the *Opticks*, and the projected book four of the *Opticks*. It is notable that Schönfeld’s first example is a fairly early, unfinished and unpublished manuscript, and his third the drafts of the projected fourth book of the *Opticks* that was never written (Alan E. Shapiro notes that this projected addition was speculative in tone, like the Queries or the earlier ‘Hypothesis of Light’: see Shapiro, ‘Beyond the Dating Game: Watermark Clusters and the Composition of Newton’s *Opticks*’ in Peter M. Harman and Shapiro eds., *The Investigation of Difficult Things: Essays on Newton and the History of the Exact Sciences in Honour of D. T. Whiteside* (Cambridge: Cambridge University Press, 2002), p.211). I thus restrain my discussion to Query 31.

⁴¹ Newton, *Opticks: or a Treatise of the Reflections, Refractions, Inflections and Colours of Light* (New York: Dover, 1952), p.387.

⁴² *Ibid.*, pp.395-6.

particles that 'endeavour to recede from one another' in Query 21, are notably minor in comparison to Newton's discussion and exemplification of the working of the attractive force.⁴³ Whereas Query 31 devotes pages to exemplifying the attractive force, it provides only a handful of references to repulsive force.⁴⁴ Moreover, Newton is not entirely sure that this movement should properly be called a repulsive force: following the first reference to repulsion among the 'Parts of Salt', Newton immediately notes the phenomenon might otherwise be taken to show that the particles 'attract the Water more strongly than they do each other'. He therefore devotes little space to discussing the repulsive force in the *Opticks* and is hesitant about it when doing so. Newton's discussions of repulsive force are clearly peripheral to his work. Kant has reason, then, to opine that 'Newtonian science is unable to provide [repulsive force] with as much clarity as it has for [attractive force]'.

Kant's reference to 'Newtonian science' hints that the significant influence may have come through a Newtonian tradition rather than directly from Newton himself. Michele Massimi investigates one such line of Newtonian influence: a tradition of 'speculative Newtonian experimentalism', which 'dealt with the matter of fire, wondered about the elasticity of air, and believed in an ethereal fluid as the repository of repulsive force (interchangeably with air)'.⁴⁵ Massimi argues that a British and Dutch tradition of Newtonian chemistry, along with Newton's speculations in the Queries to the *Opticks* (particularly Query 31), is a key influence on Kant's account of repulsive force:

The Newton Kant owed a debt to was not necessarily or exclusively the Newton of the first edition of *Principia*, i.e. the Newton that championed the new mathematical physics; but instead the much

⁴³ *Ibid.*, p.352.

⁴⁴ As well as in the references above, Newton posits repulsion as the logically-consequent negation of attraction in Query 31: 'as in Algebra, where affirmative Quantities vanish and cease, there negative ones begin; so in Mechanics, where Attraction ceases, there a repulsive Virtue ought to succeed'. Evidence for such a force is given as the reflections and inflections of rays of light and the production of air and vapour (Newton, *Opticks*, p.395). Kant employs a similar logical derivation of repulsion at the start of *Negative Magnitudes* (2:169): see below. We might also identify repulsion in the 'impulsion' in the Preface to the *Principia*'s first edition, which Newton implies constitutes half of a two-fold way to categorise forces in general: 'we concentrate on aspects of gravity, levity, elastic forces, resistance of fluids, and forces of this sort, whether attractive or impulsive' (Newton, *The Principia*, p.382). Such a two-fold account is not directly outlined further in the *Principia*, however. Michela Massimi notes that Newton's *Principia* can be said to discuss repulsive force in its treatment of the 'centrifugal forces' among particles in an elastic fluid, in Book II, Proposition XXIII, Theorem XVIII. But as Massimi then shows, '[Newton] also added: 'whether elastic fluids do really consist of particles so repelling each other, is a physical question. We have here demonstrated mathematically the property of fluids consisting of particles of this kind, hence philosophers may take occasion to discuss that question'. Newton's mechanics left open this 'physical question', which fell instead under the remit of his theory of matter'. Massimi, 'Kant's dynamical theory of matter in 1755, and its debt to speculative Newtonian experimentalism', *Studies in History and Philosophy of Science* 42 (2011), p.533.

⁴⁵ Massimi, 'Kant's dynamical theory of matter in 1755', p.541.

more controversial Newton of the *Opticks*, who ruminated on chemistry and on the possible ether-mechanism behind chemical phenomena.⁴⁶

This Newton, informing Kant's early conception of forces, was mediated through the subsequent tradition of speculative, experimental Newtonian chemistry and life science, particularly Hales and the Leiden school (including 's Gravesande, Musschenbroek and Boerhaave).⁴⁷ Hales writes in the Preface to *Vegetable Staticks*, which Kant owned in German translation:

there is diffused thro' all natural, mutually attracting bodies, a large proportion of particles, which, as the first great Author of this important discovery, Sir *Isaac Newton* observes, are capable of being thrown off from dense bodies by heat or fermentation into a vigourously elastick and permanently repelling state: And also of returning by fermentation and sometimes without it, into dense bodies; It is by this amphibious property of the air, that the main and principle operations of Nature are carried on.⁴⁸

The 'vigourously elastick and permanently repelling' force of bodies when heated or fermented, along with (a here apparently secondary) attractive force 'of returning' that are central to Hales' chemistry, as they make possible the 'main and principle operations of Nature'. Hales ascribes these forces to Newton, but this must in part be a rhetorical strategy to appropriate the authority enjoyed by Newton in the new scientific circles; Hales develops the passing remarks in the *Opticks* into a much-expanded experimental and speculative project.

Having clarified the nature of the 'Newtonian' forces that Kant employs for broader philosophical ends in the 1750s, we can turn to their use in subsequent texts. *On Fire* (1755), a Latin dissertation written for the philosophy faculty at the university, also makes force the fundamental explanatory ground, this time to explain the nature of fire. Section one argues that the particles of solid bodies are held together and press upon each other through an 'elastic matter' (1:372). This elastic matter is 'the matter of heat', glossed as 'the ether (the matter of light) compressed by a strong attractive (adhesive) force of bodies into their interstices' (1:376, 377). Vapours, which are the elastic matter liberated from this attractive force, then have a great 'elastic force' (*vim elasticam*; 1:382, cf. 1:379-80). Fire is ignited vapour, which 'liberates itself' from the attractive forces presses it into the body's interstices, 'gains incredible force in all directions and without limits, as long as fuel is not lacking' (1:384, 383). The account of fire is thus grounded on the overcoming of the attractive forces of bodies by elastic repulsive forces.

⁴⁶ *Ibid.*

⁴⁷ Massimi focuses particularly on the influence of Hales: 'The central interpretive hypothesis of this paper is that the young Kant, in his pre-Critical theory of matter of 1755, received the Boyle–Newton tradition, with its inherent ambiguity between the mechanical language and the materialistic one, *via* Stephen Hales' (*ibid.*, p.536).

⁴⁸ Stephen Hales, *Vegetable Staticks: or, an Account of some Statical Experiments on the Sap in Vegetables: being an essay towards a Natural History of Vegetation. Also a Specimen of an attempt to analyse the air, by a great variety of chymio-statical experiments; which were read at several meetings before the Royal Society* (London: W. and J. Innys, and T. Woodward, 1727), p.v.

In this short text, Kant attempts to explain a more delimited physical phenomenon than in the *Universal Natural History*, but again puts forces at the centre of his methodology: attractive and repulsive forces are key explanatory principles. The notion of elastic matter in *On Fire* evokes the fundamental elastic force central to *Living Forces*, now synthesised with the repulsive forces of Newtonian chemistry. Kant's concern with elasticity, in various manifestations, is a point of continuity between his first text and those of the 1750s treating natural-scientific topics. Reading *Universal Natural History* alongside *On Fire* encourages us to focus on the former's supplement to chapter seven: 'Universal theory and history of the sun'. The universe of the *Universal Natural History* has been cold up to this point; Kant now considers why the 'middle point of the attraction' in a planetary system has to be a 'fiery body' (1:323). Kant gives the sun's fire the same characteristics that earthly fire possessed in his Latin dissertation: it 'is active out of itself instead of diminishing or exhausting itself by transference ... [it] thereby acquires more strength and fierceness and thus requires only material and feeding for its maintenance in order to continue on and on' (1:324-5). The fire of the sun is fed by the 'elastic force [*Federkraft*] of the liquid element of air', following the nature of fire outlined in *On Fire* (1:326). Kant raises the concern that the sun will use up the air that surrounds it, and so speculates that the sun contains 'deep chasms' or 'caverns' in which air is locked, being periodically released to stoke the sun's fire, and 'matters ... like saltpetre' inside the sun's caverns that 'are inexhaustibly productive of elastic air' (*ibid.*). The *Universal Natural History* takes up the account of fire from the Latin dissertation to explain the inexhaustible, self-active source of heat and life at the centre of the planetary system.

Without dwelling unnecessarily on Kant's early speculations on physical nature, we can note that the philosophical thematic here – the existence of innate principles in bodies that are self-active and are depicted as fundamental elastic or repulsive forces – is continuous with Kant's interests in *Living Forces*. Other texts of the 1750s repeat the theme. Kant's three essays on earthquakes in 1756 were spurred by the Lisbon earthquake of 1 November 1755, an event with wide-ranging philosophical influence; but Kant's interest in the question went beyond the issue of its effect on optimism.⁴⁹ The second essay locates the source of earthquakes in 'subterranean conflagrations', which the third essay calls the 'fire of the subterranean vaults' (1:445, 465). Kant's second essay speculates on the 'beneficial effects from this subterranean fire', one of which is the gentle

⁴⁹ Voltaire's turn against Leibnizian optimism in *Poème sur le désastre de Lisbonne* (1756) and *Candide* (1759) was famously informed by the earthquake. The discussions around optimism were already circulating before the earthquake: in 1753 the Berlin Royal Academy announced its notorious 1755 prize essay question 'On Pope's system: Whatever is, is right', a lightly-camouflaged attack on Leibnizian optimism. For Kant's engagement with these issues, see the announcement of the Autumn 1759 lectures (2:27-35), and Reflections 3703-5 (17:229-39).

warming of the earth from within, the other being that volcanos provide ‘a certain active principle [*wirksames Principium*], volatile salts ... [and] an immeasurable amount of sulphurous vapours’, which ‘enter into the composition of plants, to move and develop them’ (1:456-7). The earthquake essays depict an earth comparable to the sun of the *Universal Natural History*, in that it contains an immanent principle of self-activity.⁵⁰

This theme received its most dramatic presentation in Kant’s 1754 essay on the aging of the earth. Kant considers four possible opinions on the reason for the earth’s aging, and guards against too hastily rejecting the fourth: that ‘the ever-effective force [*stets wirksame Kraft*], which, as it were, constitutes the life of nature, and which, although imperceptible to the eye, is active in all generation and the economy of all three realms of nature, gradually becomes exhausted’ (1:211). This would be a ‘subtle though universally active matter which, in the products of nature, constitutes the active principle’ and Kant contends that this is ‘not so opposed to sound natural science and observation as one might think’ (*ibid.*). This active principle is the *spiritus rector* of the chemists: the ‘active principle in most kinds of salts, the essential part of sulphur’, and so is that which Kant will claim, in his second Earthquake essay, is provided by volcanos to the advantage of plants (1:212). The active principle or ‘Proteus of nature’ is ‘the leading principle of the combustible element of fire, whose forces of attraction and repulsion [*Anziehungs- und Zurückstoßungskräfte*] are so clearly revealed in electricity, which is so well able to overcome the elasticity of air and to generate forms’. One might with ‘some justification ... suppose the existence of a subtle universally active matter, a so-called world spirit’ (*ibid.*).

Although Kant’s language at the close of this very early essay is more unguarded and his chain of analogies more rash than he would later venture, the passage directly connects Kant’s discussions of various physical phenomena to a fundamental, self-active elastic force of the kind conceptualised in *Living Forces*. The Proteus of nature links the matter of fire from *On Fire*, and thus the fire at the centre of the *Universal Natural History*’s universe, with the sulphurous active salts provided by volcanos in the Earthquake essay; this active principle has attractive and repulsive forces, just as the *Universal Natural History* would ascribe only these forces to matter in order to construct the world.

⁵⁰ The 1756 notes on the winds, with which Kant advertised his summer semester lectures of that year, extend this elasticity to the earth’s atmosphere, depicting it as ‘a sea of fluid, elastic material’, with a variable elastic force in proportion to its expansion (1:491, 492). The Preface to the *Universal Natural History* discusses winds, again as movements of air, as a ‘result of its elasticity and mass’, between warmer and cooler regions, here in the context of whether naturalism threatens faith (1:224).

The fact that Kant would later recoil at such a defence of a world-spirit, no matter how cautiously suggested, is not here at issue. Rather, the passage is of interest because it shows a connection between these physical phenomena in the texts of the 1750s, and the concept of elastic force from *Living Forces*. The essays of the 1750s therefore continue the project of a broad Leibnizian dynamics insofar as they seek to explain a range of phenomena on the ultimate basis of force. Rather than simply a series of writings on natural science, the essays can be understood as providing various physical applications of a burgeoning (natural) philosophy of forces. Kant's specific twist on this project, following his interest in *Living Forces*, is the emphasis on a fundamental self-active force, of physical elasticity. This thematic provides a common thread throughout Kant's otherwise oddly heterogeneous early 'natural-scientific' essays.

5. The forthcoming dynamics treatise

This discussion of the natural-scientific texts of the 1750s has drawn Kant's discussions of fire, the sun, earthquakes and wind together with his references to active principles and elasticity, to reconstruct what are nevertheless only oblique and indirect references to a continuation of a dynamics. In texts from 1756 onwards, however, Kant makes more direct references to a forthcoming treatise on dynamics. This would be a continuation of the project announced in *Living Forces*: the 'framework of a new dynamics', understood as the use of forces for a broad philosophical approach to both physical and metaphysical questions.

The *Physical Monadology* (1756) is usually understood to represent a contribution to the early eighteenth-century debates around the possibility of 'physical monads'. These are heretical in relation to Leibniz's own conception of monads, which are by definition immaterial, metaphysical points. As discussed in chapter one, Wolff was dissatisfied with Leibniz's account of the way monads compose bodies, and developed a conception of elements or simple things, which replaced Leibniz's monads. Eric Watkins describes Wolff as 'agnostic' about the nature of elements, particularly on whether all elements have the same kind of force, and whether corporeal bodies might have different primitive forces to souls.⁵¹ Baumgarten develops Wolff's agnosticism into the positive claim that monads are physical points, and indeed impenetrable.⁵²

⁵¹ Watkins, 'On the Necessity and Nature of Simples: Leibniz, Wolff, Baumgarten, and the pre-Critical Kant', *Oxford Studies in Early Modern Philosophy* 3 (2006): 261-314, p.281-2.

⁵² *Ibid.*, pp.263, 293-8. Baumgarten returns to using Leibniz's terminology, but his 'monads' are evidently even further from Leibniz's than are Wolff's 'elements'.

Kant's physical monadology of 1756 thus follows, in broad terms, Baumgarten's radicalisation of Wolff, developing it in certain ways.⁵³ Methodologically, Kant's text is well-known for its attempt to 'mate griffins with horses' and unite metaphysics and geometry (1:475). In terms of the problematic of physical monads, this becomes the specific effort to reconcile the geometrical understanding of space, as infinitely divisible, with the monadological picture, of indivisible simple substances. Kant seeks to argue, from Proposition V on, that monads fill space, yet do not for that reason forfeit their simplicity (1:480). This should be paradoxical, as space is infinitely divisible. Kant tackles the problem by conceiving of the monad as constituted by forces, thus 'fill[ing] the space by the sphere of its activity' (1:481). Proposition VII contends that 'space itself is the orbit of the external presence of its element': the monad, in its activity, creates the space it occupies (*ibid.*). Kant then distinguishes between the external and internal determinations of monads. The external determinations, the monad's spatiality, can be infinitely divided; the internal determinations, the forces of the monad, are not spatial and not divisible.

This standard view of *Physical Monadology* is certainly not incorrect. However, the 'Preliminary Considerations' to the work encourage an account with a different emphasis. These introductory remarks conclude,

Since the principle of all internal actions, in other words, the force which is inherent in the elements, must be a moving force [*motricem esse necesse sit*], and one, indeed, which operates in an outward direction, since it is present to what is external; and since we are unable to conceive of any other force for moving that which is co-present than one which endeavours to repel or attract; and since, furthermore, if we posit only repulsive force, we shall not be able to conceive of the conjunction of elements so that they form compound bodies, but only their diffusion, whereas if we posit only an attractive force we shall only be able to understand their conjunction, but not their determinate extension and space – since all this is the case, we can already in a way understand that anyone who is able to deduce these two principles from the very nature and fundamental properties of the elements will have made a substantial contribution towards explaining the inner nature of bodies. (1:476)

Kant takes it as given that the principle of the action of elements is a moving force, operating outwardly, in the form of either attraction or repulsion, as these are the only conceivable forces. The first clause in the passage (*cum principium omnium internarum actionum s. vim elementorum insitam motricem esse necesse sit*) is an instructive development of Kant's position in *Living Forces*. Whereas the 1747 work dismissed motive forces in favour of active force, these are now conflated, with motive force named the 'principle' of the internal actions of elements. The use of 'Newtonian' mechanical explanation in the earlier essays of the 1750s, even if this stems more from speculative chemistry, has therefore left its mark on Kant's conception of force. The passage

⁵³ *Ibid.*, pp.300-3. Key is that for Kant in 1756, in contrast with Baumgarten, spatial relations depend on causal relations between monads; and these causal relations are understood through the 'Newtonian' forces of attraction and repulsion.

goes on to present the combination of these attractive and repulsive forces as allowing the formation of determinate bodies in space. This means that the 'deduction' of fundamental attractive and repulsive forces 'from the very nature and fundamental properties' of the elements or monads will greatly contribute to our knowledge of bodies. The *Physical Monadology* thus attempts this deduction.⁵⁴

This 'substantial contribution towards explaining the inner nature of bodies', on the basis of a derivation of fundamental repulsive and attractive force from the nature of monads, represents a clear contribution to what we are calling the Leibnizian dynamics project. Is this however the fulfilment of Kant's ambitions towards such a project? The scholium to Proposition X suggests not. After having proved the necessary co-presence of attraction alongside repulsion, Kant writes,

To inquire into the laws governing the two forces in the elements, the repulsive and attractive forces, is an investigation worthy of exercising the most acute minds. It suffices me here to have proved the existence of these forces, and to have done so with the greatest of certainty (1:484).

The continuation of the dynamics project of an exploration of forces would require the identification of the laws governing fundamental repulsion and attraction. Kant here defers this continuation, but cannot resist indicating the direction such research would take: '[b]ut if someone wished to look forwards, as from a great distance, to what belongs to this question...' they would see that, because repulsive force disseminates out like a sphere from a central point, its mathematical formula would be $1/x^3$ (*ibid.*). Likewise, as attractive force draws other bodies to a central point along a straight line, its formula (as in Newton) is $1/x^2$. Kant proposes that attractive and repulsive force thus formulated have a determinate point where they are equal, which constitutes the limit of extension of bodies.⁵⁵ On this view, the *Physical Monadology* represents both a furthering of a dynamics in the Leibnizian sense, and an indication of future

⁵⁴ Section 1 argues that bodies consist of a determinate number of simple elements or monads (Props. I-IV). These monads fill space (Prop. V) through activity (Prop. VI-VII): this activity is impenetrability (Prop. VIII) or fundamental repulsive force. Section 2 seeks to explain 'the most general properties of physical monads' and thereby 'contribute to the understanding of the nature of bodies' (1:483). A second fundamental force in the monad, attraction, is posited alongside impenetrability or repulsion, to explain the determinate extent of bodies (Prop. X). The two fundamental forces have thus apparently been deduced. Furthermore, properties of physical bodies – including contact (Prop. IX), determinate volume (Prop. X), mass or inertial force (Prop. XI), different densities (Prop. XII) and elasticity (Prop. XIII) – are then explained on the basis of the two fundamental forces.

⁵⁵ This analysis is repeated in *Metaphysical Foundations*, again as merely as an indication for a future work (4:518-21), which Kant again cannot resist pre-empting: 'I cannot forebear adding a small preliminary suggestion' (4:518). Kant is here more explicit that the calculation of forces allowing one to construct the determinate concept of matter is a task for mathematics (4:517) and is more cautious about the certainty of his mathematical formulae (4:522-3), claiming that his dynamical theory of matter should not be 'mixed up with the conflicts and doubts that could afflict' the tentatively-proposed laws of the forces.

work to be done: the mathematical determination of the fundamental forces (here monadic) that constitute bodies.

Negative Magnitudes (1763), published seven years later, makes more explicit claims for a forthcoming treatise in dynamics. The work's second section provides examples of the concept of negative magnitudes and the distinction between logical and real opposition. The first example is of the fundamental material forces of impenetrability and attraction; the former, the repulsive force constituting body, is depicted through an image repeated from *Living Forces*: that of the elasticity of a spring (2:179). This image depicts repulsion as 'negative attraction' and thus a 'true force' and 'as much a positive ground as any other motive force in nature' (2:179-80). Kant continues,

And since negative attraction is really true repulsion, it follows that the forces with which the elements are invested and in virtue of which these latter occupy a space, albeit in such a way that they impose limitations even on space itself by means of the conflict of the two forces which are opposed to each other – it follows, I say, that these forces will give rise to the elucidation of many phenomena. And in this matter, I think that I have arrived at knowledge which is distinct and reliable, and which I propose to make known in another treatise. (2:180)

Kant here proposes the imminent publication of a treatise that will offer 'distinct and reliable' knowledge of the two fundamental forces, repulsion and attraction. The forces are newly presented as the negative image of one another, a conception that provides new resources for dynamics, as we will see. This treatise, echoing Leibniz's first account of his proposed dynamics, will elucidate many phenomena on the basis of the forces.

What is this forthcoming treatise on dynamics, in the sense we have defined it, that is forecast in 1763? This question has not, to my knowledge, been answered or even posed in the literature to date. The *Physical Monadology* suggested that the treatise would contain more mathematical detail on the interaction of the fundamental forces. The *New Doctrine of Motion and Rest* (1758), another short pamphlet advertising Kant's lectures, also proposes that further concrete results can be developed on the basis of Kant's principles: this time, in the mechanics of impacts between bodies.⁵⁶ The 'principles' under discussion in this 1758 lecture announcement are somewhat different: the most important are a thoroughly relativistic conception of motion and rest (2:16-19), and a rejection of the force of inertia as a real force (2:19-21). The key proposal in the text

⁵⁶ Kant proposes laws of impact of bodies moving in opposite directions (2:23-5), and writes, '[i]t would be easy to derive the laws of motion in impact for bodies that move in the same direction with unequal velocities, as well as the rules of impact of elastic bodies, from the basic principles employed here. It would also be necessary to set what has been presented here in a clearer light by further explanations. All this could be done if it were possible, with such a wealth of material and in such narrow confines of space, to be both complete as regards content and also expansive as regards expression.' (2:25).

appears to be a method for calculating the forces in collisions in this relativistic system.⁵⁷ We can leave the details aside, however, to note that in both the *New Doctrine* and *Physical Monadology* Kant proposes that the mathematical development of his principles, and application to concrete cases, could be outlined further.

Such an expansion could be taken to constitute at least part of the forthcoming treatise promised in *Negative Magnitudes*. The passage in the 1763 text suggests, however, that the treatise will contain more than simply further mathematical detail, because the analysis of repulsive and attractive force will give rise to many elucidations (*vielen Erläuterungen*). The forecast work should be considered a treatise in dynamics in our broad sense, as it is to provide philosophical knowledge in a range of areas – the content of which we will now turn to – by refining (*läutern*) phenomena to the basic fundamental forces underpinning them.⁵⁸

6. The broader scope of the forecast dynamics

We get an idea of what might constitute such a broader dynamics from Kant's enthusiastic 'Review of Silberschlag's Work: Theory of the Fireball that Appeared on 23 July 1762', published in the *Königsbergische Gelehrte und Politische Zeitung* in 1764. On Kant's account, Silberschlag has an account of corporeal substances that echo Kant's own physical monadology: 'the presence of corporeal substances in space is actually a sphere of activity that has a dynamical sphere and a centre point' (8:450). Silberschlag seeks to establish this, according to Kant, '[t]hrough reasons that seem very significant but insufficiently developed' (*ibid.*). Kant then summarises the physical phenomena that Silberschlag seeks to explain on the basis of his dynamical conception of physical substance:

From the differences between these spheres and the forces that act in them, he derives elasticity, density, the oscillation of the air and the aether, the tone, the light, colours and warmth, and similarly also the attraction of matters, according to the [specific] differences of the substances. All of this is applied to air and its changes... (*ibid.*)

⁵⁷ Kant's proposal is not easy to understand, but it notably attempts to calculate the 'forces ... [with which bodies] will collide' on the basis of *ratios* between masses and velocities, and thus without absolute spaces: '[i]f one thinks of the distance covered between the two bodies, divided by the time, as the sum of the two velocities; if one says that the ratio of the sum of the masses A and B to the mass of the body A is equal to the ratio of the given velocity to the velocity of the body B, this, if it is subtracted from the aforementioned total velocity, will leave the velocity of A [as remainder]. Then one will have distributed the change that has occurred equally between both bodies, and it is with these equal forces that they will collide' (2:19).

⁵⁸ The introductory note to *On Fire* already suggests such a broad dynamics project. Kant writes that his meditations are 'outlines of a theory that, if leisure permits, will supply me with an abundant harvest of writing' (1:371). It seems likely that this larger project is not on the nature of fire but would follow the method of the 1755 essay not its content, and use forces for the explanation of various phenomena, as in the project forecast in *Negative Magnitudes*.

In addition, Silberschlag provides ‘considerable remarks about mists, fog, clouds, and rain’, and divides the regions of air, from lowest to highest: the dust atmosphere, the watery atmosphere, ‘then the phlegmatic and phosphorescent atmosphere, which contains oily, resinous and rubbery parts, and is the workshop of shooting stars, fireballs, and fiery meteors’, and ‘finally, the spiritual atmosphere ... in which the very extensive fiery air, such as the Northern Lights, is produced’ (*ibid.*).

We can take Kant’s enthusiasm for Silberschlag’s treatise as an indication of its proximity to Kant’s own ambitions: the elucidation of many physical phenomena through the forces that are active in a fundamental dynamic conception of substance. Silberschlag’s ‘insufficiently developed’ account might be supplemented by Kant’s own physical monadology, but also by the forecast dynamics treatise. The phenomena that Silberschlag explains are physical, but Kant nevertheless approvingly notes that, in a manner ‘unusual for natural scientists’, Silberschlag ‘feels compelled to take a path into the heights of metaphysics’ (*ibid.*). The direction that Kant’s imminent dynamics treatise might take, judging from his comments on Silberschlag, would thus be both physical and metaphysical, or an attempt at a synthesis of the two, such that the distinction no longer applies.

Negative Magnitudes gives the clearest indications of the content of Kant’s forthcoming dynamics, and the scope Kant may have had in mind for its expansion of philosophical knowledge through a science of forces. *Negative Magnitudes* should be considered an exploration of conceptual tools – namely the concept of negative magnitudes – that can be of use for thinking the relation of forces.⁵⁹ The Preface and section one already suggest this. Kant’s example of an error that can arise from a neglect of the concept of negative magnitudes is Crusius’ misunderstanding of Newton’s claim that attractive force, at an increased distance, turns into repulsive force (2:169).⁶⁰ Section one then introduces ‘real opposition’, the text’s key conceptual innovation: a contradiction that does not result in nothing, as in ‘logical opposition’, but in ‘something (*cogitabile*)’. Kant’s first example of his notion of real opposition is:

The motive force [*Bewegkraft*] of a body in one direction and an equal tendency of the same body in the opposite direction do not contradict each other ... The consequence of such an opposition is rest, which is something (*repraesentabile*). (2:171)

⁵⁹ In this reading I diverge from Melissa Zinkin, as mentioned in the Introduction, who conflates ‘negative magnitudes’ and ‘forces’ in ‘Kant on Negative Magnitudes’ (2012) and ‘Respect for the Law and the Use of Dynamical Terms in Kant’s Theory of Moral Motivation’ (2006).

⁶⁰ This echoes a passage in Newton’s *Opticks*, Query 31, as noted above. Kant’s reference is to Crusius, *Anleitung über natürliche Begebenheiten ordentlich und vorsichtig nachzudencken* (Leipzig, 1749), vol. 2, p.295.

Thus both the general issue of the philosophical use of negative magnitudes, and the specific concept of real opposition, are introduced in terms of the thinking of physical forces. This suggests that the motivation behind this short treatise is to no small extent that of contributing conceptual resources to the thinking of physical dynamics.

The following sections of *Negative Magnitudes* make this aim explicit, *and* broaden the scope of the dynamics that the treatise should serve to support. Section two offers 'philosophical examples' in which negative magnitudes apply; the title of section three shows it seeks to 'prepar[e] the application [*Anwendung*]' of the concept of negative magnitudes 'to the objects of philosophy' (2:179, 2:189). Kant makes his instrumental intention clear:

Galileo's inclined surface, *Huygen's* pendulum clock, *Torricelli's* column of mercury, *Otto Guericke's* atmospheric pump, and *Newton's* glass prism have furnished us with the key to some of the great mysteries of nature. The negative and the positive causality of different forms of matter ... seems to conceal important truths. (2:188)

The concept of negative magnitudes is compared with the natural-scientific apparatuses of Galileo, Huygen et al., as a conceptual tool on a par with these technical ones, for the uncovering of 'important truths' and indeed as Kant goes on to write, 'the universal laws which govern these phenomena' (*ibid.*).⁶¹

Section two outlines four areas of knowledge in which the conceptual 'tools' provided by the concepts of negative magnitudes and real opposition can be applied. These indicate the likely scope of Kant's future work in dynamics, insofar as negative magnitudes allow a deeper understanding of real opposed forces, which are central to the presentation of each of the philosophical domains. The four philosophical domains in which the concept of negative magnitudes can be applied are: 1) ontology (or we might call Kant's 'physical ontology' of the period) (2:179-80), 2) psychology (2:180-2), 3) moral philosophy (2:182-4), 4) natural science

⁶¹ This passage, comparing philosophy to famous technical apparatuses, is echoed in the B Preface to the *Critique* twenty-four years later, in a way that usefully shows Kant's change in emphasis. In the B Preface Kant writes, 'When Galileo rolled balls of a weight chosen by himself down an inclined plane, or when Torricelli made the air bear a weight that he had previously thought to be equal to that of a known column of water, or when in a later time Stahl changed metals into calx and then changed the latter back into metal by first removing something and then putting it back again, a light dawned on all those who study nature. They comprehended that reason has insight only into what it itself produces according to its own design; that it must take the lead with principles for its judgments according to constant laws and compel nature to answer its questions...' (Bxii-xiii). The point of the *Critique's* comparison with experimental method relates to *epistemology*: the principles by means of which reason approaches nature are vital for what it can draw from it, a lesson from the history of experimental natural science that the *Critique* makes central. In *Negative Magnitudes*, by contrast, what is at stake is *direct* progress in the knowledge of nature, with Kant comparing his conceptual resources to the technical apparatuses of experimentalists.

(2:184-8).⁶² The key point to take from Kant's discussion of the four parts of philosophy in which the concept of negative magnitudes can be productively applied is that the model of antagonistic attractive and repulsive forces is applicable not just in natural science or the 'physical ontology' of the forces constituting bodies, but also in psychology and moral philosophy. That is, Kant is employing conceptions of force to explicate *mental* or *spiritual* processes as well as physical ones. This suggests that the scope of Kant's 'dynamics' – of his philosophising through forces – is as wide as that originally proposed by Leibniz.

This extension to forces of the mind is explicitly stated in section three of *Negative Magnitudes*:

If one considers the grounds which form the foundations of the rule which we have here introduced [the generalisation of the foregoing use of negative magnitudes: that every *passing-away* is a *negative coming-to-be* (2:190)] the following point will be instantly noticed: in what concerns the cancellation of an existing something, there can be no difference between the accidents of mental natures [*geistigen Naturen*] and the consequences of effective forces [*wirksamer Kräfte*] in the physical world. (2:191, t.m.)

In both physical nature and in the inner accidents of the soul, cancellation is not mere logical negation but emerges from real opposition: whether 'a true, opposed motive force [*wahre entgegengesetzte Bewegkraft*] of something else' in physical nature or 'a truly active force [*wahrhaftig thätige Kraft*] of exactly *the self-same* thinking subject' (*ibid.*). *Negative Magnitudes* provides a way of considering the forces of bodies and the forces of the mind through a common structure. It is here only the concept of negative magnitudes and the structure of real opposition that allows this, but this can be clearly seen to be a first step in a broader attempt to think the widest range of phenomena, physical and spiritual, through forces.

The only difference between these two domains of forces, Kant notes, 'relates to the different laws governing the two types of being; for the state of matter can only ever be changed by means of an *external* cause, whereas the state of mind can also be changed by means of an *internal* cause'

⁶² Example one concerns the impenetrability of bodies as grounded on the 'true force' of repulsion, considered as 'negative attraction': the conceptual resources thus contribute to the *Physical Monadology's* dynamical conception of material substance (2:180). Example two presents displeasure as a similarly 'positive ground' that cancels pleasure, hence 'negative pleasure' (2:181). Other affects are likewise presented as negative quantities: aversion as negative desire, and so on. Example three shows the application of the concept in moral philosophy: vice as 'negative virtue' (2:182). The relation between the sin of omission (failing to do a good) and the sin of commission (doing evil) is simply a matter of degree. Kant depicts this in terms of a balance of forces: '[t]he situation is like that of a counterweight at the end of a lever', which exerts a 'genuine force' in order for there to be equilibrium; only 'a slight increase of force' shifts the sin of omission to that of commission (2:183). Finally, example four discusses coldness as negative heat; here, Kant utilises the conception of heat from *On Fire* and presents warming and cooling as the 'real passage of the elemental fire', where the latter is a 'subtle and elastic fluid' set in motion by attractive force (2:185). The poles of magnetic bodies provide Kant with a model for understanding this movement, which is then exemplified by the movement of heat in 'underground caverns' and in bodies of air over the earth, familiar interests from Kant's texts of the 1750s (2:186).

(2:191-2). The states of physical bodies are changed only by causes outside the body; those of the soul have both internal and external causes. Other than this, '[t]he necessity of the real opposition, however, always remains the same' (2:192). The structure of opposed forces is common to both bodies and minds, but the domains are here distinguished through whether the forces are both immanent and transient or only immanent. The issue here, of the necessity and manner of distinguishing between physical and mental forces, despite their common grounding in force, will become increasingly significant to our account of forces in the critical period.

The explicit connection of physical and mental forces in *Negative Magnitudes* allows us to recognise earlier appearances of this broadened scope of Kant's philosophical use of forces. The *New Elucidation* (1755) brings together physical and mental forces in what at first sight is a very different context: a discussion of the consequences of the principle of the determining ground. The central consequence is what could be called the general conservation principle, that there is no natural change to the 'quantity of absolute reality in the world', because there is nothing in an effect that was not in its cause (1:407). Kant notes, however, a case that could be easily brought by someone seeking to disprove his general conservation principle (and thus the principle of the determining ground):

Very frequently we see enormous forces issue from an infinitely small initiating cause. How measureless is the explosive force [*vim expansivam*] produced when a spark is put to gunpowder? Or ... how great are the conflagrations, how extensive the destruction of cities, how vast the long-lasting devastations of immense forests which result from a spark when it is nourished by highly flammable materials ... (*ibid.*)

At stake is the possibility that the law of the equality of cause and effect can be transgressed by the explosive force of gunpowder.⁶³ Kant's answer in *New Elucidation* echoes the discussion of the same issue in *On Fire* (1:384).⁶⁴ Both texts repeat what is outlined in more general terms in

⁶³ The issue was mentioned by Leibniz in a letter to Malebranche, published in the *Nouvelles de la republique des lettres*, July, 1687; it was the topic of the Paris Academy of Sciences' prize essay competition of 1738 (L p.353). The Paris Academy prize question, which was won by Euler, with Voltaire among the entrants, is discussed in the editors' notes to Kant, *Natural Science*, p.714n26, and in Adickes, *Kant als Naturforscher* vol. 2, pp.67-8.

⁶⁴ '...the undulatory motion [of flame] would not only propagate itself but from the smallest beginning would set fire to other inflammable materials however great their quantity, and would also gradually communicate to them an equal intensity [of heat]. Although at first glance this phenomenon appears opposed to the basic law of mechanics that the effect is always equal to the cause, nevertheless if one considers [the matter] carefully it is seen that when the least sparks ignite something, this is nothing more than the smallest particles of the inflammable vapor exciting the undulatory motion of the igneous element [of the body ignited]. This igneous element, when lightly confined, liberates itself with great force, excites vibrations in the surrounding mass, and propagates violent motion through the whole. One should not wonder that the effects of a little cause should be so immensely great, for the spring of the confined ether, when freed in this manner from the bonds of attraction, surpasses the effect' (1:383-4).

Living Forces: the calculus of cause and effect must take into account the force that constitutes material substances themselves, their fundamental elasticity. The *New Elucidation* continues,

In these cases, however, the efficient cause of the enormous forces is a cause which lies hidden within the structure of bodies. I refer, namely, to the elastic matter either of air, as in the case of gunpowder (according to the experiments of Hales), or of the igneous matter, as is the case with all inflammable bodies whatever. The efficient cause is, in these cases, unleashed [*manifestatur*], rather than produced, by the tiny stimulus. (1:407-8)

Manifestatur takes the place of *veranlassen* in *Living Forces*: the ‘unleashing’, or triggering or occasioning, of a large effect from a tiny cause, is possible because ‘[e]lastic forces that are compressed together are stored within’ and need only to be ‘stimulated just a little’ for the forces to be released (1:408).

The way Kant develops this thought is key:

Certainly the forces exercised by spirits and the perpetual advances of these forces to higher perfections seem not to be governed by this law. But they are, in my opinion at least, nonetheless subject to [it]. Without doubt, the infinite perception of the entire universe, which is always internally present to the soul, albeit only obscurely, already contains within itself all the reality which must inhere in the thoughts, which are later to be illuminated in a stronger light. (1:408)

In attempting to forestall a second objection – might not the forces of ‘spirits’ present in the ‘infinite perception’ of the soul also exceed the principle of the determining ground or the equality of cause and effect? – Kant claims that the general conservation principle governs both the elastic-explosive forces in physical nature and the ‘infinite but obscure’ forces of the soul.⁶⁵ This conception of mental forces containing the ‘infinite perception of the entire universe ... albeit only obscurely’ was well-known as Leibniz’s late doctrine of obscure representations in the *Monadology*.⁶⁶ Kant’s Leibnizian account of minds depicts mental forces as structurally equivalent to physical ones: in both cases, a huge effect can be triggered from a tiny cause, with a great increase in force. This is because both bodily and spiritual forces can be dormant and

⁶⁵ Similarly, the *Inquiry* equates the forces of the human mind with those of physical nature: ‘The human mind, like any other force of nature, is governed by certain rules’ (2:291). This has its heritage in Wolff’s rational psychology: ‘when the reason for corporeal phenomena is to be given from their structure, the reason must also include the rules of motion; similarly, the laws of sensation, imagination, intellection and appetition must be referred to, when the reason for what pertains in the soul is to be given from the force of representing the universe’ (Wolff, *Psychologia Rationalis* in *Gesammelte Werke* II.6 (1734; rpt. Hildesheim: G. Olms Verlag, 1994), p.529).

⁶⁶ This doctrine is now better-known through the *petites perceptions* of the *New Essays*, but this text was not available to Kant until Raspe published it for the first time in his 1765 edition. In the *Monadology*, published in German in 1720 and Latin in 1721, each monad is a ‘perpetual living mirror of the universe’ (§56) and ‘represents the whole universe’ (§62), but only from its own point of view. The representation in the monad is confused or obscure in relation to the ‘variety of particular things in the whole universe’, and is distinct ‘only as regards a small part of things, namely, those which are either nearest or greatest’ to the monad (§60). Monads cannot represent to themselves their obscure, infinite representation of the whole universe, only their distinct, limited representations: ‘a soul can read in itself only that which is there represented distinctly; it cannot all at once unfold everything that is unfolded in it, for its complexity is infinite’ (§61).

potential, ready to be released, like the caverns of elastic air in the sun of the *Universal Natural History*.

This returns us to *Negative Magnitudes*. The final section explicitly endorses the way that Leibniz's obscure representations connect physical and spiritual forces. A physical example of a body being at rest 'not because there is any lack of motive forces [*Bewegkräfte*], but because there are motive forces acting against each other' is extended to mental forces: '[t]his concept can be extended far beyond the limits of the material world' (2:198-9). The example is that of a man of learning in a moment of relaxation, who, asked generally to share his knowledge with you, will say that his mind is presently empty. 'But stimulate him by asking him a question or expressing a view of your own, and his learning will reveal itself in a series of activities' (*ibid.*). The state of 'mental inactivity' (*Unthätigkeit des Geistes*) is just like the state of rest of a body: mental activity is not logically negated but in real opposition with a counteracting relaxation.

These potential mental forces are then shown, again, to correspond to physical forces.

Thus it is with the thunder which, invented by art for our destruction and carefully preserved in the arsenal of a prince ready for a future war, lies in menacing silence until, touched by a treacherous spark, it explodes in lightening and lays waste to everything around it. Tensions, constantly ready to explode, lay dormant within it, the prisoners of powerful forces of attraction, waiting for the stimulus of a spark of fire, to be released. There is something imposing and, it seems to me, profoundly true in this thought of *Leibniz*: the soul embraces the whole universe with its faculty of representation, though only an infinitesimally tiny part of these representations is clear. ... The force of thought [*Denkungskraft*] possessed by the soul must contain the real grounds of all concepts, in so far as they are supposed to arise in a natural fashion within the soul. (*ibid.*)

This remarkable passage suggests that physical and psychic forces alike can be conceptualised through Leibniz's 'profoundly true' notion of a faculty of obscure representations. Both bodies and minds are conceived of as containing great forces *in potentia*. In both cases, the general conceptual scheme is that of the new conception of living force in *Living Forces*: that of a self-active, spontaneous force of repulsion, which can exceed the stimulus that triggers it, without transgressing the law of the equality of cause and effect. Kant's natural-scientific essays of the 1750s have provided further resources for this conceptualisation, notably in the addition of attractive force, as the principle that holds repulsive forces at bay before they are triggered.

*

The 'treatise' that Kant forecasts in 1763, in which analysis of the fundamental forces of elements 'will give rise to the elucidation of many phenomena' might therefore have included a range of topics. Kant suggests that he wishes to provide further *mathematical* analysis of the interaction of the forces. Elsewhere, he demonstrates an interest in explaining many *physical* phenomena on

the basis of the fundamental forces. In yet other passages, Kant is engaged with the connections between *physical and mental* forces. These are clarified on the common basis of the concept of real opposition, and are connected through their capacity for creating great effects through a small stimulus. This latter characteristic allows Kant to connect physical and mental forces through the Leibnizian faculty of obscure representations, in which great forces are present in potentiality. The concept of living force from Kant's first text – self-active, spontaneous, and exceeding the force that triggers it – remains important to the 1750s-60s 'dynamics problematic'.

Whatever the scope of the forthcoming treatise forecast in *Negative Magnitudes*, the work did not appear. Instead, in 1766, Kant publishes *Dreams of a Spirit-Seer*. This eccentric text shows that the confidence that *Physical Monadology* and *Negative Magnitudes* display in the forecast future dynamics has evaporated in 1766. *Dreams* deserves extended discussion here because it is the moment of Kant's reaction against the dynamics project, it gives indications of the reasons for this, and sets the stage for the role that forces will play in Kant's later philosophy.

7. *Dreams* and the evaporation of Kant's confidence in dynamics

The disavowal of the aims of the broad dynamics project we have reconstructed begins early in the first chapter of *Dreams*. Kant outlines his dynamic account of a body's impenetrability, through 'resistance in the space which it occupies' (2:322). In contrast to the earlier texts, however, the example is now employed in relation to the *limits* of reason and understanding. Thus 'although the resistance which something exercises in the space which it occupies is thus *recognised* [erkannt], to be sure, it is not for that reason *understood* [begriffen]' (*ibid.*). The phenomenon of the impenetrability of material bodies, based on their resistance, can be *empirically* recognised but not *conceptually* grasped. We thus reach the limits of empirical knowledge:

For, like everything else which operates in opposition to an activity, this resistance is a true force. The direction of that force is opposed to the direction indicated by the extended lines of the *approach*. For this reason, this force is a force of *repulsion*, and it must be attributed to matter, and therefore to the elements of matter, as well. Now, every rational being will readily admit that human understanding has reached its limit here. It is experience alone which enables us to perceive that those things which exist in the world, and which we call *material*, possess such a force; but experience does not ever enable us to understand the possibility of such a force. (*ibid.*)

The characteristics of repulsive force that can be recognised from experience – its opposition to the force it opposes, and its applicability to matter and the elements of matter (the parts, as in the physical monads of *Physical Monadology*) – are here *all* that can be understood. The 'possibility' of repulsion, its metaphysical explanation, is beyond the 'limit' of human reason. The project of

determining the limits of human reason, to which the first *Critique* makes such a decisive contribution in 1781, is here prefigured in *Dreams*. Importantly, these limits first appear at the start of *Dreams* in relation to *dynamics*, and to the possibility of complete knowledge of the fundamental forces.

The concluding chapter of *Dreams* expands on this. The issue of 'the determination of the limits imposed upon [science] by the nature of human reason', an explicitly Socratic theme, is initially posed in terms of 'the spirit-nature, freedom, predestination and such like', before being honed once more on the issue of force and substance:

For in the relations of cause and effect, substance and action, philosophy, to start with, serves to unravel the complex phenomena and reduce them to simpler representations. But if one eventually arrives at relations which are fundamental, then the business of philosophy is at an end. It is impossible for reason ever to understand how something can have a cause, or be a force; such relations can only be derived from experience. (2:370)

Again, 'if the fundamental concepts of things as causes, of forces and of actions are not derived from experience, then they are wholly arbitrary, and they admit of neither proof nor refutation' (*ibid.*). Knowledge of fundamental forces can only be empirical: the prospects for the broad metaphysical-physical science of forces are sharply limited.

Kant goes on to distinguish between natural science and what he earlier calls 'pneumatology': here, the consideration of 'pneumatic laws' (2:371). Pneumatology, which was ironically advocated and pushed to absurd limits in the first and second chapters of part one of *Dreams*, is the investigation into the laws of the forces of the immaterial spirit-world.⁶⁷ Here in the final chapter, Kant contends that pneumatological judgements, such as the explanation of the soul's influence on the body, 'can never be anything more than fictions' (*ibid.*). Pneumatology 'assumes the existence of new fundamental relations of cause and effect': as their possibility cannot be known, they are invented 'in a creative or chimaeric fashion'. In natural science, by contrast, 'one does not invent fundamental forces' but rather 'connects the forces, which one already knows through experience, in a manner which is appropriate to the phenomena' and which is capable of proof. Kant's example is Newtonian attraction, which is only revealed in matter through 'observations, after they had been analysed by mathematics' (*ibid.*). With a nod to Leibniz's critique of Newtonian force, Kant writes,

⁶⁷ On Kant's ironic voices in *Dreams*, see the following note. 'Pneumatology' appears in Leibniz's *Nouveaux Essais*, but may have been more familiar to Kant through Crusius' rehabilitation of pneumatology (see Dyke, *Kant and Rational Psychology*, pp.51-2).

If anyone had wished to invent such a property beforehand, without having any proof from experience at his disposal, he would have justly deserved to have been treated as a fool and made the object of mockery. (*ibid.*)

Newton would be immune from Leibniz's mocking accusation that his gravitational force simply rehabilitates an 'occult quality' of the scholastics, because he has not invented this force, but derives it from experience, or from empirical data analysed by mathematics. Kant's earlier use of 'Newtonian' attraction was in name only, adopted outside the context of Newton's empirical-mathematical approach and for purposes that go far beyond Newton's use of fundamental forces as a minimal presupposition for the explanation of observed phenomena. Now, the invocation of Newton more faithfully includes the key epistemological context of the *Principia's* introduction of attractive force, newly adopting its agnosticism about the metaphysical reality of force.

The end of *Dreams'* first chapter gives insight into the problems of the pneumatological exploration of fundamental forces. Kant admits that he is 'very much inclined to assert the existence of immaterial natures in the world, and to place my own soul in the class of these beings' (2:327).⁶⁸ He adds that the community between a spirit and a body is, however, 'mysterious',

⁶⁸ This passage, and my approach here of discussing the first and final chapters alongside one another, requires a note on the thorny question of Kant's rhetorical strategy and use of irony in part one of *Dreams*. Alison Laywine provides the best interpretation of *Dreams'* voices and rhetoric, but I depart from this in some respects. Laywine argues that in chapters one and two, Kant ironically adopts the voice of a naïve 'uncritical metaphysician', whose speculation on rational psychology ultimately reaches the point of 'lunacy' (Laywine, *Kant's Early Metaphysics*, p.86). In chapter three, 'Kant himself must finally step in to restore reason'; in chapter four, the voice of the uncritical metaphysician returns, but now 'properly chastened, to confess his errors and to promise reform' (*ibid.*). This rhetorical strategy is adopted not merely to argue against misguided metaphysicians but to satirically recreate their positions and show the absurdities to which they ultimately lead (*ibid.*, p.93). I consider Laywine's sophisticated account to be broadly correct and invaluable for an understanding of part one of *Dreams*. Where I differ from Laywine is in my sense that Kant is not always in full control of his ironic voice, and so there are passages, within the first two 'ironic' chapters, where Kant breaks from the ironic voice to speak in his own. The passages I discuss here (2:322, 2:327-8), which agree with the conclusions in the final (non-ironic) chapter about the limitations to our knowledge of fundamental forces, are key examples. The style and content of the passage at the end of the first chapter (2:327-8) supports my interpretation. On Laywine's reading, it should be the voice of the uncritical metaphysician who admits he is 'very much inclined to assert the existence of immaterial natures in the world...'. However, Kant adds two long footnotes to the discussion that follows: the first on the 'obscurity' of the reason behind this view 'even to myself', which appears to have something to do with 'the principle of life'; the second to argue that Leibniz's *Vorstellungskraft* should only be dismissed if a better explanation of a substance's 'inner state' is provided (*ibid.*). The thoughtful, non-dogmatic nature of these notes, and the fact of them being substantive footnotes, fit awkwardly with the notion that Kant is here speaking in an ironic voice: exploratory footnotes are not in keeping with an ironic, satirical mode. Furthermore, the professed 'inclination' to consider the soul as having an immaterial nature is in keeping with Kant's view throughout his career. This nuancing of Laywine's account, to acknowledge that Kant's control over his irony is not completely secure, is consistent with Kant's admissions in his letter to Mendelssohn, that he 'had the book printed one page at a time', sending pages to the printer as they were finished, so he 'was not always able to see in advance what ought to be introduced early on in order to facilitate the better understanding of what was to follow at a later stage' (10:71). In these circumstances, it is understandable if there are moments where the complex rhetorical strategy of *Dreams* breaks down and Kant's own voice returns within the otherwise ironic chapters.

and yet at the same time, how natural is this incomprehensibility (*Unbegreiflichkeit*), as our concepts of outer actions are derived from matter, and always connected with the conditions of pressure or impact, which do not take place here? (*ibid.*, t.m.)

'[M]atter in its motion' cannot 'collide with a spirit'; reciprocally, corporeal bodies cannot affect immaterial beings that do not offer impenetrability against them (*ibid.*). Spirits and bodies do not interrelate through collisions, like matter.⁶⁹ Importantly, the reason that we cannot comprehend body-soul interaction is that our conceptions of force (such as pressure and impact) are taken from the *physical* world.

Dreams' view of the possibility of knowledge of forces, and thus of the extent to which force can be used to underpin both physical and metaphysical knowledge, is therefore notably different to that of the earlier pre-critical texts. Kant now claims that our understanding reaches its limit at the 'true force' of repulsion: such a force is empirically recognised but not rationally understood, and we can never understand its possibility (2:322); fundamental forces not derived from experience, like those of pneumatology, are chimaerically invented fictions (2:371); and we cannot understand body-soul interaction, because our conceptions of force are derived from physical forces (2:327).

This position is further solidified in Kant's 1766 letter to Mendelssohn. Kant writes of *Dreams* that 'everything depends on our seeking out data for the problem, *how is the soul present in the world, both in material and in non-material things*' (10:71). This means 'one should detect the force of external agency and the receptivity of suffering from outside in a substance of this kind, of which the union with the human body is only a special case' (*ibid.*, t.m.).⁷⁰ Kant claims that we lack experience of the soul's relationships, and thus of its external force or capacity (*äußere Kraft oder Fähigkeit*), and also that soul-body harmony shows only the reciprocal relation of an inner to an outer activity, not between two outer activities. As in *Dreams*, to understand the activity of

⁶⁹ Kant proposes an answer to this conundrum: spirit operates not on the 'forces which inhere in the elements and in virtue of which they are related to each other', i.e. the repulsion and attraction in and between simple substances, but rather 'operate on the inner principles of their state [*Zustand*]'. All substances have 'some kind of inner activity as the ground of its producing of an external effect', but this is unknowable: 'I cannot specify in what that inner activity consists'. The footnote then argues, as mentioned in the previous note, that Leibniz's *Vorstellungskraft* should only be dismissed if a better explanation of a substance's 'inner state' can be provided (3:328).

⁷⁰ In the Cambridge *Correspondence* Zweig has 'investigate' for 'finden', which seems weaker than Kant's meaning, and he makes other minor changes to the sense. The German is: 'Man soll also die Kraft der äußeren Wirksamkeit und die receptivität von aussen zu leiden bey einer solchen Substanz finden wovon die Vereinigung mit dem menschl. Körper nur eine besondere Art ist'.

the soul through forces is to understand it as an outer relationship, which seems to mean in terms of *physical* movements and forces.⁷¹ Therefore,

one is led to ask whether it is really possible to settle questions about these forces of spiritual substances by means of a priori rational judgments. This investigation resolves itself into another, namely, whether one can by means of rational inferences discover a primitive force [*primitive Kraft*], that is, the primary, fundamental relationship [*erste Grundverhältnis*] of cause to effect. (10:72)

The investigation of *Dreams*, beginning from the question of the soul's real activity, as Kant presents it to Mendelssohn, thus ultimately reduces to the question of whether one can *rationally* reach a primitive force. Kant answers this question with a resounding no: 'since I am certain that this is impossible, it follows that, if these forces are not given in experience, they can only be the product of poetic invention' (*ibid.*). The letter to Mendelssohn makes clearer than *Dreams* that what is at stake is the possibility of rational access to primitive force, and that Kant rejects this.

8. Further limitations in the *Inaugural Dissertation*

The *Inaugural Dissertation* (1770) reinforces the position of *Dreams* by presenting fundamental forces as a cautionary example of 'subreptic axioms'. These axioms are characterised in the final chapter of the *Dissertation*, where Kant gives a preliminary account of the consequences for the method of metaphysics that stem from previous chapters' conclusions on the form and principles of the sensible and intelligible world. The subreptic axioms are 'illusions' or 'prejudices', resulting from the 'confusion of what belongs to the understanding with what is sensitive' (2:412, 415). In general, they take what is sensible (which, following Kant's innovative determinations in the third chapter, is now characterised by its spatio-temporal form) and thus a *condition* of a cognisable object, to be something *objective*, belonging to the understanding (2:412-3). The chapter is to an extent a prototype of the *Critique's* Amphiboly and Dialectic, as it identifies the aspects of cognition that properly belong to sensation and those that belong to the understanding, and guards against their confusion.

Force first appears as an example of the first subreptic axiom, 'whatever is, is somewhere and somewhen': the error of considering everything, even things cognised the by understanding, to be in space and time (2:413-4). This error is behind the 'idle questions' about the place of immaterial substances in the physical world. Kant goes on:

⁷¹ We will return to this issue below. In 1766 Kant does not appear to yet hold the critical position on inner and outer intuitions as temporal and spatial respectively: in the *Inaugural Dissertation* this language is only used to argue that the concept of space is not abstracted from outer sensations but that the latter, by contrast, presuppose the concept of space (2:402): so outer sensations here are sensations of outer, physical objects, rather than the more strictly spatial, as opposed to temporal, intuitions of the *Critique*.

as to what constitutes the external relations of force in the case of immaterial substances, whether those relations be between the immaterial substances themselves or between immaterial substances and bodies: that is quite beyond the human understanding (2:414).⁷²

The forces of the soul are inaccessible to human understanding: the distance from the extended dynamics of bodies and minds, which Kant was exploring in the 1750s and early 1760s, is evident.

The second subreptic axiom extends this limitation on knowledge of *spiritual* forces to a restriction on the positing of *fundamental* forces in general. This axiom is divided in two by Kant, and its second part is: 'whatever is impossible, contradicts itself' (2:415). The subreptic illusion in this case consists in the extension of the true statement that 'whatever simultaneously is and is not' – Kant's (temporal) definition of contradiction – 'is impossible', to the claim that '*everything* that is impossible, simultaneously is and is not' (2:416). This extension is illegitimate because it subjects a concept of the understanding (the possibility or impossibility of a thing) to a condition of sensible cognition (simultaneity, as a relation of time). The problem here is that sensibility and the understanding are not kept isolated from one another. This specific subreptic axiom is true with regard to subjective judgement: we only notice a thing's impossibility if contradictory assertions can be made about it. However, the further error in this case is that of 'treating the subjective conditions of judging as objective', and extrapolating from a law of human judgement to an objective truth.

There is one further consequence of this subreptic axiom. The erroneous claim can be extended to the view that 'whatever does not involve a contradiction is, therefore, possible' (*ibid.*). The philosophical use of forces is a key example of such error:

This is why so many vain fabrications of I know not what forces [*virium*] are invented at pleasure. Freed from the obstacle of inconsistency, they burst forth in a horde from any architectonic mind, or, if you prefer, any mind which inclines to chimeras. (*ibid.*)

This chimeric proliferation of forces is possible as a result of the extension of the second subreptic axiom to the position that anything non-contradictory is possible. Forces are uniquely susceptible to being frivolously conjured up in this context, because, as Kant writes, force is 'nothing else' than the 'relation' of a substance to its accident, or 'a ground to that which is grounded' (*ibid.*). In this relation, it is clear that the two terms (substance and accident, or ground and grounded) are not identical, and that 'force' names the movement between the two.

⁷² Kant then notes that Euler made this point in his *Letters to a German Princess*: see letters XCI and XCII of 10th and 13th January 1761.

Any force could therefore be posited, without being at risk of disproof by the law of contradiction. Kant warns, therefore, that ‘the impossibility of falsely fabricated forces does not depend on contradiction alone’: because ‘force’ is a relation between non-identical things, something more than simply the law of contradiction is required to determine the validity of a force. Consequently, ‘[o]ne may not, therefore, accept any *originary force* [*vim originariam*] as possible unless *it has been given by experience*; nor can its possibility be conceived *a priori* by any perspicacity of the understanding’ (2:416-7).

It appears then, that Kant’s steps towards a dynamics project, which we saw initiated in *Living Forces* and which continued, often covertly, in his analyses of fundamental repulsion in heat, light and air, abruptly ends in *Dreams* and the *Inaugural Dissertation*. Whereas *Physical Monadology* sought to ‘deduce’ fundamental repulsion and attraction ‘from the very nature and fundamental properties of the elements’ and *Negative Magnitudes* promised an imminent ‘elucidation of many phenomena’ on the basis of the fundamental forces, Kant states in *Dreams* that human reason reaches its limit in attempting to understand the possibility of fundamental force; knowledge of fundamental forces, beyond the mathematical analysis of empirically-given forces, is a misguided ‘pneumatology’. The *Inaugural Dissertation* makes clear that fundamental forces should only be taken from experience; their arbitrary invention commits the error of the second subreptic axiom. The first part of *Dreams* thus concludes that ‘the pneumatology of man can be called a theory of his necessary ignorance’ (2:351-2). Attention to the pneumatic laws of the immaterial world, or the seeking of metaphysical knowledge of fundamental forces, can have only negative significance, demonstrating merely our ‘necessary ignorance’ in the face of these topics. Why does Kant so sharply limit knowledge of fundamental force in 1766-1770? To answer this, we must pursue a closer reading of *Dreams*.

9. Reasons for *Dreams*’ rejection of dynamics

I will now seek to show that *Dreams* represents a moment of self-criticism, in which Kant recoils from the direction that his dynamics is taking. The nascent attempts to think the forces of minds and souls as well as bodies, on the basis of a common philosophy of forces, are rejected in the 1766 text: that is, the metaphysical side of the dynamics problematic. The questions of whether *Dreams* is self-critical, and whether it represents a rejection of metaphysics (either Kant’s own earlier pre-critical version or that of previous metaphysicians such as Wolff) have structured the interpretative debate surrounding the 1766 text since its appearance, as J. Colin McQuillan has

recently shown.⁷³ I will first set out the passages that encourage a reading of *Dreams* as self-critical and anti-metaphysical; then I will discuss the debates around these interpretations; before attempting to provide a more nuanced answer, from the perspective of the dynamics project.

One self-critical aspect of *Dreams* can be identified in Kant's ambivalence about Swedenborg. Kant's letter to Charlotte von Knoblauch of 1763 shows Kant's interest in the stories around Swedenborg, his apparent credulity in relation to them, and the lengths to which he went to research Swedenborg's abilities.⁷⁴ In his letter to Mendelssohn of 8th April 1766 Kant admits that, even after publishing *Dreams*, he was in 'a state of conflict on this matter':

As regards the spirit reports, I cannot help but be charmed by stories of this kind, and I cannot rid myself of the suspicion that there is some truth to their validity, regardless of the absurdities in these stories and the fancies and unintelligible notions that infect their rational foundations and undermine their value. (10:70)

As Vaihinger notes, Kant continued to make approving comments about Swedenborg in his metaphysics lectures.⁷⁵ Kant's self-criticism might thus be plausibly targeted at his tendency to be 'charmed' by ideas like Swedenborg's.

A more philosophical self-criticism emerges when Kant describes, in the second chapter of part two, his embarrassment on reading Swedenborg. Here there is no question of an ironic voice: the second part of *Dreams* is a rhetorically straightforward discussion and rejection of the *Arcana coelestia*, followed by a 'practical conclusion' for philosophy. Kant writes,

I find myself in the following unfortunate predicament: the testimony [Swedenborg's description of his visions in *Arcana coelestia*], upon which I have stumbled, and which bears such an uncommon likeness to the philosophical figment of my imagination, looks so desperately deformed and foolish, that I must suppose that the reader will be much more likely to regard my arguments as preposterous because of their affinity with such testimonies than he will be to regard these testimonies as reasonable because of my arguments. (2:359)

What, exactly, is the 'philosophical figment of [Kant's] imagination', which is so closely mirrored in Swedenborg's *Träumereien*? Kant goes on to say it might seem like there is an 'agreement between [Swedenborg] and my system' (*ibid.*). What this 'system' might constitute is far from

⁷³ McQuillan, 'Reading and Misreading Kant's *Dreams of a Spirit-Seer*' *Kant Studies Online* (2015), pp.178-203.

⁷⁴ Letter to Charlotte von Knobloch, August 10th, 1763 (10:43-48). For Kant's investigations into the stories via acquaintances in Stockholm, see Laywine, *Kant's Early Metaphysics*, pp.72-4.

⁷⁵ Hans Vaihinger, *Kommentar zu Kants Kritik der reinen Vernunft*, 2nd edition, vol. 2 (Stuttgart: Union Deutsche Verlagsgesellschaft, 1922), pp.511-3.

immediately evident in the pre-critical work prior to *Dreams*.⁷⁶ Whatever it may be, the passage implies an element of self-criticism in the 1766 work.⁷⁷

Kant anti-metaphysical stance is more explicit. From the third chapter of *Dreams* on, Kant disavows his own 'dogmatic' investigation into spirit-natures in chapters one and two, and thus argues for a delimitation of the pretensions of metaphysics in general. Reading Swedenborg apparently makes Kant conscious of a 'certain affinity' between metaphysicians and spirit-seers; Kant names the former 'dreamers of reason' and the latter 'dreamers of sense' (2:342). In making and developing this parallel, Kant notes that he has rendered 'the deep speculations of the previous chapter ... wholly superfluous' (2:347). In a near-echo of his statement about the limit of knowledge of fundamental forces (as recognisable but not understandable), Kant argues at the end of the fourth chapter that it should now be possible to '*have all sorts of opinions [meinen] about but no longer knowledge [wissen] of spirit-beings*' (2:351). With this, Kant writes, 'I shall now put to one side, as something settled and completed, the whole matter of spirits, an extensive branch of metaphysics' (2:352). Metaphysical speculation about the spirit world is dismissed as 'futile'; again, this is because there is here no empirical element, no sensible data.

Kant's invective against dogmatic metaphysical approaches to the spirit-world is heightened in the second part of *Dreams*. Kant imagines the reader chiding him for having spread Swedenborg's 'fairy-tales' abroad, and responds:

since the philosophy, with which we have prefaced the work, was no less a fairy-story from the *cloud-cuckoo-land* [*Schlaraffenlande*] of metaphysics, I can see nothing improper about having them make an appearance on the stage together. (2:356)

Kant thus appears to recommend a wholesale rejection of metaphysics, as a 'cloud-cuckoo-land' in its isolation from empirical evidence. The self-critical and anti-metaphysical readings can be combined, if we consider Kant to be reacting to the jolt of discovering the proximity between Swedenborg's dreams of sense and elements of Wolffian metaphysical systems in his own earlier work. What is key to such an interpretation, however, is to determine precisely the aspects of Wolffian metaphysics in Kant's previous work that might lead him to self-critically reject it as a dream of reason.

⁷⁶ Kant makes a few passing references to his *System* or *Lehrgebäude* in the *Universal Natural History* (1:222, 228) and the *New Doctrine* (2:20), but these refer only to the subject-matter of each text, and unlike the reference in *Dreams* do not suggest a conception of a unified project. We will come to consider what the 'system' referred to in *Dreams* might be, below.

⁷⁷ Kant's full statement in this passage about these 'seductive comparisons' between his work and Swedenborg's is somewhat opaque: 'I declare, without further ado, either that one must suppose that there is more cleverness and truth in Swedenborg's writings than first appearances would suggest, or that, if there is any agreement between him and my system, it is a matter of pure chance' (2:359).

McQuillan has argued that both the 'self-critical' and the 'anti-metaphysical' interpretations of *Dreams* are 'misreadings'.⁷⁸ McQuillan provides a brief survey of the literature to show that the major interpretations have occupied one or the other of these positions, or both, in the case of Vleeschauwer.⁷⁹ Among recent interpretations, McQuillan identifies Frederick Beiser and Michael Forster as pursuing anti-metaphysical readings, Alison Laywine and Martin Schönfeld self-critical ones.⁸⁰ For McQuillan, three contextual factors – Kant's new renown resulting from his second prize and commendation for *Inquiry* in the 1763 Royal Academy competition; the correspondence with Lambert in 1765; and the correspondence with Mendelssohn in 1766 – mean that *Dreams* should be considered a supplement to Kant's proposed forthcoming work on the *Proper Method of Metaphysics*, as discussed with Lambert. This supplement was 'a cautionary tale on how *not* to do metaphysics', alongside the positive account of the right way to do metaphysics, envisaged for the treatise mentioned to Lambert.⁸¹ The cautionary tale of *Dreams* imitates an illegitimate method of inference from empirical concepts to non-empirical ones (notably 'spirit') in chapters one and two.⁸² It then dismisses this illegitimate method in chapters three and four, offering 'constructive criticism' towards the proper method: this, on McQuillan's account, is the idea that a community of scholars should check their philosophies with one another to avoid excessively singular speculations that are alien to the judgement of others.⁸³

This conclusion is underwhelming, but more problematically it overlooks the strength of Kant's empiricist statements in *Dreams*. McQuillan does not account for the non-ironic passages in which Kant dismisses metaphysics as 'dreams of reason' or which advance a scepticism regarding non-empirically-derived knowledge, and McQuillan avoids engaging with the passages that invite a self-critical reading. He is correct, however, to emphasise that Kant should not be taken to be rejecting metaphysics *in toto*. Alison Laywine concurs (although McQuillan does not note this overlap): in her view, '[f]ar from giving up on metaphysics, Kant was as determined as ever to carry it forward'.⁸⁴ But the further question facing Kant, Laywine continues, was 'how to proceed?'. This question is absent from McQuillan's account: he sets up a false dichotomy of *Dreams* as pro- or anti-metaphysical, and concludes that it is the former. In fact, metaphysics needs to be understood not as a monolithic entity but as a multifaceted branch of knowledge in

⁷⁸ McQuillan, 'Reading and Misreading', p.186.

⁷⁹ *Ibid.*, p.182-3: referring to Vleeschauwer, *The Development of Kantian Thought*, p.38.

⁸⁰ McQuillan, 'Reading and Misreading', p.184-5.

⁸¹ *Ibid.*, p.200.

⁸² *Ibid.*, pp.194-6.

⁸³ *Ibid.*, pp.198-9.

⁸⁴ Laywine, *Kant's Early Metaphysics*, p.103.

both content and method. What is at stake in *Dreams* is not the possibility or impossibility of metaphysics as a whole, but the questions of *which aspects* of metaphysics are illegitimate and *how to proceed* with the legitimate aspects of metaphysics. Likewise, the dichotomy between self-critical and non-self-critical accounts of *Dreams* is misleading. The task for interpretation is not to choose one or the other of these poles, but to identify the particular aspects of his earlier work that Kant is self-critically rejecting.

The problematic of a dynamics, within which I have argued Kant was working, up to *Negative Magnitudes*' forecast of the imminent publication of a treatise on the topic, provides a valuable way to nuance the self-critical and anti-metaphysical readings. The problematic can help determine the various aspects of the earlier work, and by extension prior metaphysics, that Kant sought to reject, to continue, or to amend in *Dreams*.⁸⁵ To start with, we can try to clarify what Kant might have considered his own 'system' prior to *Dreams* and to which Swedenborg's fantasies came embarrassingly close, through the account of Swedenborg's *Arcana coelestia* in the second chapter of part two of *Dreams*. Specifically, we can examine the aspects of Swedenborg's work that Kant chooses to foreground: here, to play on the full title of *Dreams*, we can see Kant's 'system' elucidated by his account of Swedenborg's dreams.

Kant notes that, for Swedenborg, everyone is equally intimately related to the spirit-world; Swedenborg is only unique in that his 'innermost being was opened up' to this relation.

It is clear from the context that this gift is supposed to consist in becoming conscious of the obscure representations [*dunkelen Vorstellungen*] which the soul receives in virtue of its constant connection with the spirit-world. (2:361-2)

It is these 'obscure representations' that are centrally important for Kant's account of Swedenborg. Kant writes of Swedenborg's 'gift' that he

converses with the souls of the departed whenever he pleases, and he reads in their memory (in their faculty of representation [*Vorstellungskraft*]) the state in which they contemplate themselves, seeing it as clearly as if he were looking at it with bodily eyes. (2:363)

Swedenborg can thus read in the memory of the dead – a memory which is also the force or faculty of representation – their representations of themselves and their surroundings. In Kant's summary, Swedenborg's gift is that the obscure representations of his soul have for him a perfect clarity.

⁸⁵ In this account I am close to many of Laywine's claims in *Kant's Early Metaphysics*, but I depart from her in some key and instructive respects, as I will show.

Swedenborg's gift is not limited to communing with the dead, but he can also see the spiritual element in everyday, material things. As this spiritual element exists for Swedenborg – indeed, the totality of spirits is what gives corporeal beings substance – then, for him,

cognition of material things has a double significance: it has an external sense which consists in the relation of matter to itself; and it has an internal sense, in so far as material things, construed as effects, designate [*bezeichnen*] the forces of the spirit-world, which are the causes of those material things. (2:364)

It is this 'inner sense' that Swedenborg wishes to make known to those who are not opened to the spirit-world; this inner sense is an act of reading material things as 'designations' or 'signs' of the fundamental forces in the spirit-world that cause corporeal nature (*ibid.*). Just as Swedenborg 'reads' the memory or faculty of representation of the dead, so he reads material nature as the 'sign' of the causal forces in the spirit-world. Kant's example is significant. In the human body, the parts are related to one another according to 'the laws which govern matter'; however,

in so far as the human body is maintained by the spirit which dwells within it, its various members and their functions [*Funktionen*] have a value which is indicative of the forces of the soul [*Seelenkräfte*]; and it is in virtue of the operation of these forces that the various members come to acquire their form, activity [*Thätigkeit*] and permanency. (*ibid.*)

The parts (*Theile*) of the human are governed by the material laws of nature; but the members (*Gliedmaßen*) indicate or designate the soul's forces. These forces, which *cause* the form, activity and permanency of the members, are connected to the spirit within the body. The 'members' might be considered synonymous with the 'parts', but the difference is that the members have functions, and in this way signify the forces of the soul. As Kant writes, still apparently paraphrasing Swedenborg, 'various forces and abilities [*Kräfte und Fähigkeiten*] constitute that unity which is the soul or the inner person' (2:365).

Inge Jonsson describes Kant's treatment of Swedenborg in *Dreams* as an 'exceptionally summary' one, and notes that Kant must be given 'much of the blame for the distortion of Swedenborg's work that arises when the entire emphasis is placed on the conversations with spirits'.⁸⁶ From a glance at Swedenborg's eight-volume work we can see that Kant is indeed highly selective. The elements of the work that Jonsson highlights include the releasing of the soul at the moment of death and its subsequent abode and activities,⁸⁷ the 'Grand Man', the human form of the universal unit formed by the totality of spirits,⁸⁸ Swedenborg's analysis of the connection between Hebrew

⁸⁶ Jonsson, *Visionary Scientist: The Effects of Science and Philosophy on Swedenborg's Cosmology* trans. by Catherine Djurklou (West Chester: Swedenborg Foundation, 1999), pp.20, 198

⁸⁷ *Ibid.*, p.149-51.

⁸⁸ *Ibid.*, p.151-3.

and the divine,⁸⁹ and the style of the word of God.⁹⁰ Kant's restricted emphasis on the forces (*Kräfte*) of the soul or spirit-world, and his presentation of Swedenborg as an interpreter of obscure representations from the spirit-world, are far from innocent, but rather reflect Kant's philosophical interests.

The account of Swedenborg in *Dreams* foregrounds the question of the relationship between the spirit-world and the material world, and the *forces* that act within and across these two domains. Kant emphasises Swedenborg's 'gift' of reading with clarity the obscure representations of his soul, and his ability to read the signs of the causal activity of the fundamental forces in the spirit-world as they affect material nature.⁹¹ This suggests that the aspect of Kant's previous philosophy (his 'system') that he considered embarrassingly close to Swedenborg's visions was the very direction in which Kant's dynamics was tending between the *New Elucidation* and *Negative Magnitudes*: the attempt to reconcile the fundamental repulsive force of bodies with that of the mind or soul, via Leibniz's faculty of obscure representations. The element of Kant's own philosophy that is unhappily close to Swedenborg, as a Wolffian 'dream of reason', is plausibly the broader dynamics of thinking minds and bodies through a unified conception of force, in which psychical and physical potential self-active forces might be conceptualised through the late-Leibnizian doctrine of obscure representations.

This interpretation comes close to Laywine's, but with an important difference. For Laywine, the most important context through which to understand *Dreams* is not the broad question of the scope of a philosophy of forces, but the question of the proper system of causality: Kant's attempt to ground a 'credible system of real interaction' or physical influx, against the two competing systems of the era, occasionalism and pre-established harmony.⁹² This problematic has the virtue of being more specific than the issue of a broad dynamics of physical and metaphysical forces, and was undoubtedly important.⁹³ It overlaps with my more general considerations of dynamics: as Laywine writes, 'Kant was keen to establish physical influx in rational psychology and general cosmology alike', so his early thinking of physical influx shares with his use of forces an ambition

⁸⁹ *Ibid.*, p.147.

⁹⁰ *Ibid.*, p.182-3.

⁹¹ Laywine has a very good account of the ways in which Swedenborg is a 'prophet of the Leibnizian persuasion' (Laywine, *Kant's Early Metaphysics*, p.56), particularly regarding the leading thread of Laywine's interpretation, systems of causality: 'the content of Swedenborg's angelology differs hardly at all from the natural theology of Leibniz. Certainly, Swedenborg has the distinctive claim to have observed preestablished harmony at work in heaven with his own eyes, but this seems to be his only innovation' (p.68). This is of course also a selective reading of Swedenborg's huge work, but one with a slightly different emphasis to Kant's selective reading, I would contend.

⁹² Laywine, *Kant's Early Metaphysics*, p.3.

⁹³ It also receives detailed treatment in Watkins' *Kant and the Metaphysics of Causality*.

to be applicable in the domains of both bodies and minds. Laywine argues that Kant's early system of physical influx, outlined in the *New Elucidation*, fails in that it has the result that 'the soul must occupy a place'.⁹⁴ This presents Kant with a dilemma: he holds that the soul, as immaterial substance, is not subject to ordinary spatio-temporal conditions, but at the same time it is capable of real interaction with the body.⁹⁵ This means that 'neither experience nor reason can so far teach us much at all – if anything – about the soul and its active forces'.⁹⁶

Laywine's central point is that the warning Kant takes from his reading of Swedenborg is 'about the dangers and follies of subjecting immaterial substances in metaphysics to the ordinary spatio-temporal conditions under which bodies are given to the senses'.⁹⁷ The soul should not be viewed as spatio-temporal, or having characteristics such as impenetrability: this would be a subreptive error, as the *Inaugural Dissertation* will go on to outline. This is entirely correct, but Laywine goes further, in my view erroneously, to argue that this entails that Kant comes to believe in 1766 that we cannot say that souls have any forces at all:

Remember that one of the lessons of Part Two, Chapter Three of *Dreams of a Spirit-Seer* is adapted from Hume's *Enquiry*: we have no ground to say that souls have any kind of power, force or causal efficacy.⁹⁸

Again, 'we cannot justify any talk of special spiritual forces or powers, because so far we have no evidence that such powers really exist'.⁹⁹ For Laywine, the key result of *Dreams* is that the possibility of conceiving of the soul in terms of spiritual forces is removed.

Spiritual forces are banished from philosophy in *Dreams*, on Laywine's account, because 'the ascription of any kind of force to the soul – however spiritual these forces may be – makes the soul an object of the senses, at least for those whose faculty of sensation is sufficiently heightened'.¹⁰⁰ Why must the soul's possession of forces entail its sensible nature? Because, Laywine contends, 'we cannot sensuously imagine the action of spirits on bodies and other spirits except as the result of Newtonian forces'.¹⁰¹ This is defended with a passage from *Dreams*' first chapter, where Kant writes that, were he to posit immaterial substance as having forces completely other than those of the motive forces of bodies, this substance would be unthinkable

⁹⁴ Laywine, *Kant's Early Metaphysics*, p.43. Stefan Heßbrüggen-Walter examines the question of localism of the soul, and identifies the position of *Dreams* as positing the soul as virtually present in the whole body ('Putting Our Soul in Place', *Kant Yearbook* 6/1 (2014): 23-42.

⁹⁵ Laywine, *Kant's Early Metaphysics*, p.54.

⁹⁶ *Ibid.*

⁹⁷ *Ibid.*, p.55.

⁹⁸ *Ibid.*, p.89.

⁹⁹ *Ibid.*, p.98.

¹⁰⁰ *Ibid.*, p.95.

¹⁰¹ *Ibid.*, p.99.

(2:322-3). This passage echoes one from the end of the first chapter, quoted above: 'how natural is this incomprehensibility [of spiritual forces], as our concepts of outer actions are derived from matter...' (2:327). We cannot *conceive* of the forces of the mind or soul, *Dreams* contends, because our conceptions of force are drawn from the physical world.

Kant's claims that the forces of spiritual substance are unthinkable or inconceivable are too quickly read by Laywine as claims that these forces are excised from Kant's metaphysics in 1766. Kant is instead making an epistemological claim about our *access* to these forces. Even *Dreams* and the *Inaugural Dissertation* – which, we will see, delimit our knowledge of force more strictly than the subsequent critical works – do not make claims as strong as Laywine suggests, to the extent of denying the existence of spiritual forces. Rather, *Dreams* asserts, on the one hand, that the forces of souls or minds are different to those of bodies, and, on the other, that we cannot therefore conceive of spiritual forces, because our conception of force is drawn from the physical world. The *Inaugural Dissertation* then goes further in claiming that all *primitive* forces, presumably of bodies as much as minds, cannot be known *a priori* but can only be derived from experience.

It is evident that Laywine's interpretation, in which the existence of spiritual forces entails the spatio-temporality and impenetrability of immaterial substances, is grounded in a *Newtonian* conception of 'force'. Specifically, Laywine takes Kant's conception of force to be 'very much in the spirit' of Newton's 'impressed force', as defined in the *Principia* as the action exerted on a body to change its state.¹⁰² Kant's only conception differs, for Laywine, insofar as it is more abstract and fundamental: a 'dependence in determinations' or 'the agency of one substance at work in another substance'. It thus applies to the forces of souls as well as bodies: '[c]hange of perception in a soul is as much the work of an impressed force as change of speed and direction in a moving body'.¹⁰³ For Laywine, Kant's force echoes Newton's insofar as it acts *transuently*, that is, from one substance or body to another, and it is therefore an *external* force acting on that which is affected, in line with Newton's impressed force, which changes a body's state from outside.

The view that Kant's conception of force, for all its wider sphere of applicability, is essentially reducible to this *Newtonian structure* is a common one in subsequent commentary on forces in Kant. The next part of this thesis will challenge this interpretation, by addressing what is Kant's generally consistent conception of force, which, in my view, cannot be reduced to that of any predecessor. I will therefore recreate Kant's concept of force, which, as Laywine's interpretation

¹⁰² *Ibid.*, p.36.

¹⁰³ *Ibid.*

and subsequent discussions make evident, is a desideratum for understanding Kant's various uses of force in the critical period.

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Part one has sketched a broad narrative about the rise and fall of the 'dynamics problematic' in Kant's pre-critical period. This has its background in Leibniz's unfinished dynamics project, via Wolff's more Newtonian transformation of dynamics. Kant's early work employs 'force' for various philosophical ends; particularly fundamental repulsion, although the 1750s see the addition of an opposed attractive force. In 1756 and 1763 Kant forecasts a future treatise within this broad dynamics problematic; there is evidence to believe that its scope was to include both physical and mental forces. I argued that Kant's reading of Swedenborg led him to curtail precisely this expanded conception of a dynamics. This gives a new perspective on the meaning of *Dreams*, and the aspects of prior metaphysics and Kant's own previous work that the 1766 work self-critically limits.

The *Inaugural Dissertation* bans the *a priori* use of primitive forces in philosophy. This does not mean, however, that Kant's use of the concept of force and forces in his philosophy ends in 1770. On the contrary, forces remain centrally important, but they operate in the background: after the jolt that Kant received from reading Swedenborg, forces are not the explicit subject of the critical works of the 1780s, unlike in the pre-critical attempts towards a 'dynamics'. The critical works reflect on *and* employ the concept of force, within the context of the transcendental concern with the possibility of experience in general. The next chapter will outline Kant's account of the number, nature and knowability of forces in the critical period. Central to these developments is Kant's rethinking of Leibniz's category of primitive or fundamental force.

Part Two

Kant's account of force

The previous part outlined the broad dynamics problematic as an endeavour to attain wide-reaching philosophical knowledge, including of both minds and bodies, through 'force'; and gave an account of the pre-critical Kant first engaging with, and then self-critically rejecting, this problematic. We now turn to the explicit accounts of forces and force in the critical period, from 1780. Chapter three outlines the forces, in the plural, that are discussed in the Critique and the Metaphysical Foundations, particularly. To present the nature of these forces (the distinction between psychological and physical forces, their number, their activity or passivity and immanence or transience), we first consider Kant's transformation of Leibniz's distinction between primitive and derivative force. This is key to the critical period's adaptation of Dreams' restriction on knowledge of fundamental forces, which means a place for forces is retained within the context of transcendental critique. Chapter four examines the common, ontological definition of force, in the singular, which underpins the plurality of forces discussed in chapter three. My reconstruction explains Kant's account of force as a 'predicable' and as the causality of substance for accidents, and identifies the obscurities that remain.

Chapter 3

Nature and knowability of forces

1. Forces in the critical period

Despite the curtailment in *Dreams* and the *Inaugural Dissertation* of the excessive use of forces in philosophy, Kant continues to utilise a range of forces in the critical philosophy. These forces primarily appear in two places: the explanation of physical nature (particularly in the *Metaphysical Foundations*) and of the activities of the mind (particularly in the *Critique*). To understand this, we must first examine the change that the conception of 'primitive' or 'fundamental' force undergoes after 1770.

The *Inaugural Dissertation*, as we have seen, seeks to limit our knowledge of force to those forces given in experience. If we do not, the unhappy result is that

so many vain fabrications of I know not what forces are invented at pleasure. Freed from the obstacle of inconsistency, they burst forth in a horde from any architectonic mind, or, if you prefer, any mind which inclines to chimeras. (2:416)

Because any unknown causal relation can be named a 'force', the term should be used in philosophy only for forces derived from those given in experience: if not, they will proliferate wildly, after the manner of occult qualities. The *Inaugural Dissertation* thus seeks to limit the use of postulated forces to the minimum possible. It is more specifically the positing of *fundamental* forces that is at issue:

One may not, therefore, accept any originary force as possible unless it has been given by experience; nor can its possibility be conceived *a priori* by any perspicacity of the understanding (2:416-7)

Whereas fundamental, originary or primitive force was central to the earlier pre-critical work within the dynamics problematic – in the cosmology of *Universal Natural History* and the *Physical Monadology's* attention to the nature of the elements – *Dreams* rejected access to such fundamental force: at the force of repulsion in the elements, 'human understanding has reached its limit' (2:322). In the letter to Mendelssohn, therefore, regarding 'whether one can by means of rational inferences discover a *primitive* force, that is, the *primary, fundamental* relationship of cause to effect', Kant states: 'I am certain that this is impossible' (10:72, my emphasis).

The works of the critical period appear to retain this sharp restriction on knowledge of fundamental forces. There are three places in the *Critique* where Kant repeats this epistemological limitation. Firstly, the second Analogy briefly includes force in its discussion of causality, and contends that we do not have the slightest *a priori* notion of how, in general, the state of a thing can be altered: that is, we cannot know *a priori* how a state (such as being in motion) can change. ‘For this’, Kant writes, ‘acquaintance with actual forces is required, which can only be given empirically’ (A206-7/B252). This means ‘acquaintance with moving forces, or, what comes to the same thing, with certain successive appearances (as motions) which indicate such forces’. Kant thus retains *Dreams*’ empiricist conception of force: it is simply that which is indicated by successive physical motions, given *a posteriori*.

Secondly, in the Postulates, when discussing the postulate of possibility, Kant guards against the concoction of new forces:

But if one wanted to make entirely new concepts of substances, of forces, and of interactions from the material [*Stoffe*] that perception offers us, without borrowing the example of their connection from experience itself, then one would end up with nothing but figments of the brain [*Hirngespinnste*]... (A222/B269)

Just as in the *Inaugural Dissertation*, force is among those concepts that can only be known *a posteriori*, to prevent the illegitimate invention of multiple forces. As Kant emphasises here, the possibility of force, as one of these ‘invented concepts’, must ‘either be cognised *a posteriori* and empirically or not cognised at all’ (A222/B269-70).

Thirdly, the discussion of hypotheses in the Doctrine of Method states again that ‘we cannot construct *a priori* the least concept of the possibility of dynamical connection’, and the key instance of this illegitimately constructed dynamical connection is, as in *Dreams* and the *Inaugural Dissertation*, fundamental force: ‘[t]hus we are not allowed to think up any sort of new original forces [*ursprüngliche Kräfte*]’ (A770/B798).¹ As in the Postulates, Kant uses the term *Hirngespinnste*: to construct *a priori* the possibility of dynamical connection, such as thinking up new original forces, would be to ‘found reason on empty figments of the brain’. *Hirngespinnste* echoes the ‘philosophical figment of my imagination’, *meiner philosophischen Hirngeburt*, of *Dreams*, where Kant worries about the ‘uncommon likeness’ that Swedenborg’s visions bear to Kant’s own ‘system’ (2:359). In these passages, force can only be known empirically; to posit

¹ Kant’s examples are interesting: these banned original forces would include things like ‘an understanding that is capable of intuiting its object without sense’, i.e., intuitive understanding; and ‘an attractive force without any contact’, i.e. Newtonian attraction in empty space. We will return to the alignment of force with the activity of the understanding, and the fact that it commonly appears in tandem with physical forces of nature, as two aspects of Kant’s understanding of force.

further, original forces is to concoct ‘figments of the brain’. Fundamental forces thus appear still to be rejected in the *Critique*.

Such passages support the view, articulated by Watkins, that the critical-era Kant ‘rejects Leibniz’s primitive forces’.² However, this should not be taken to mean that the concept of primitive force disappears completely in the 1780s. In fact, the distinction between primitive and derivative force continues to play a significant role in Kant’s thinking of force, albeit in a way that transforms the Leibnizian use of the distinction. We can investigate this through the way primitive force (*Grundkraft* or *ursprüngliche Kraft*) is employed and discussed in relation to physical bodies in the *Metaphysical Foundations of Natural Science* (1786), with reference where helpful to the metaphysics lecture notes, before turning to Appendix to the *Critique*, which provides a systematic discussion of the role of primitive force.

2. *Grundkräfte* in the *Metaphysical Foundations*

The close of the Dynamics chapter of the *Metaphysical Foundations* presents the fundamental forces in a way that, at first sight, repeats the restriction on their knowledge demanded by the 1766 and 1770 texts.

It lies altogether beyond the horizon of our reason to comprehend [*einsehen*] original forces [*ursprüngliche Kräfte*] a priori with respect to their possibility; all natural philosophy consists, rather, in the reduction [*Zurückführung*] of given, apparently different forces to a smaller number of forces and powers [*Kräfte und Vermögen*] that explain the actions [*Wirkungen*] of the former, although this reduction [*Reduktion*] proceeds only up to fundamental forces [*Grundkräften*], beyond which our reason cannot go. (4:534)

The possibility of original forces cannot be understood a priori: knowing the metaphysical cause of these forces is beyond the capacity of our reason. The task of philosophy is therefore to reduce or trace back the multitude of empirically-appearing forces to a smaller number. The *Grundkräfte* are simply the limit of this rational reduction of empirical forces.

An example of this process of derivation is given in the Volckmann metaphysics lecture notes (1784-5). Kant claims that the human understanding cannot come to a *vis primitivam*,

but we seek only to reduce the derivative to primitive forces, namely we search as to whether various derivative forces cannot be derived from one. Thus we try [to see] whether in all bodies we do not come upon a fundamental force [*Grundkraft*]; only the diverse heterogeneity makes this impossible, as they ought to thereupon be homogeneous. All physics amounts to the reduction of the various forces ... as far as possible to fundamental forces; the more we can do this, the more we have philosophy, and one therefore finally goes so far as to seek the fundamental forces of substance. Therefore, at first one has as many forces as the effects one is aware of, until one seeks

² Eric Watkins, ‘Kant on Extension and Force’ in *Between Leibniz, Newton and Kant* ed. by Wolfgang Lefèvre (Dordrecht: Kluwer, 2001), p.122.

as far as possible to derive them from a foundation [*Grund*], for e.g. the string of a piano has a tonal [*tönende*] and elastic force, but one can derive the tonal from the elastic. (28:432, m.t.)

As the 'tonal force' of a piano string can be reduced to the more fundamental elastic force, the former is derivative of the latter; the business of philosophy and physics is to achieve such reductions as far as possible. The Mrongovius metaphysics notes (1782-3) present the same idea in more scholastic language: forces produce accidents, and if these accidents differ only logically, not really, then the forces are only logically, not really different, and therefore are derivative. For example, the forces 'to illuminate and to warm' are derivative because they are actually the same force (29:770). Lighting-force may be derivative of heating-force or vice versa; both will ultimately be able to be derived from a more fundamental force.

It is not completely certain, however, what is actually represented by the 'limit' marked by fundamental forces. In the *Metaphysical Foundations*, the reduction 'proceeds only up to fundamental forces, beyond which our reason cannot go'. Does this mean that the fundamental forces are in fact reached, however? The same ambiguity around the limit-concept marked by the *Grundkräfte* is evident in the L₁ metaphysics lecture notes. Kant is recorded as saying, 'one cannot comprehend any fundamental force. One has already philosophised enough if one only *comes up to the fundamental force* [*wenn nur bis auf die Grundkraft kommt*]' (28:280, t.m.).³ If the reduction of derivative forces proceeds or comes up to *Grundkräfte* or a *Grundkraft*, does that mean the fundamental forces are in fact knowable?

Indeed, attraction and repulsion are presented as fundamental forces of matter in the *Metaphysical Foundations*. Kant affirms that matter fills a space through 'a particular moving force' (4:497); this is through the repulsive forces of its parts, otherwise called its own 'expansive force' (*Ausdehnungskraft*) (4:499). Kant makes the fundamental nature of this force clear:

The expansive force of a matter is also called *elasticity*. Now, since it is the basis on which the filling of space rests, as an essential [*wesentliche*] property of all matter, this elasticity must therefore be called *original* [*ursprünglich*], because it can be derived from no other property of matter. All matter is therefore originally elastic. (4:500)

The elasticity, expansive force or repulsion of matter is essential and original, derived from no other property. Coupled with this fundamental repulsive force is the 'second essential fundamental force [*wesentliche Grundkraft*] of matter': attraction (4:508). This is required by the possibility of matter because if only repulsion were present, matter would expand and disperse itself to infinity. On this basis, Kant concludes:

³ The complexity of the notion of a boundary is evident elsewhere in L₁: '[t]he understanding does not go beyond the boundaries of the objects of the senses, but still *up to the boundary*: that is God and the future world' (28:240).

Hence there must somewhere be assumed an original force of matter acting in the opposite direction to the repulsive force, and thus to produce approach, that is, an attractive force. Yet since this attractive force belongs to the possibility of a matter as matter in general, and thus precedes all differences of matter, it may not be ascribed merely to a particular species of matter, but must rather be ascribed to all matter originally and as such. Therefore, an original [*ursprüngliche*] attraction is attributed to all matter, as a fundamental force belonging to its essence [*als zu ihrem Wesen gehörige Grundkraft*]. (4:509)

Both fundamental attraction and repulsion are therefore ‘original’ and ‘essential’; they belong to the essence of matter as such. Kant writes, ‘only an original attraction in conflict with an original repulsion can make possible a determinate degree of the filling of space, and thus matter’ (4:518). We have therefore apparently arrived at the ‘relations that are fundamental’ that Kant sought to banish in *Dreams*.

The nature of the fundamental forces can however be elucidated through the further discussions in *Metaphysical Foundations*, particularly through two epistemological considerations. When the forces are first introduced, Kant states that ‘[o]nly these two moving forces of matter can be *thought*’ (4:498, my emphasis).⁴ It is not a mere figure of speech to say that only these fundamental forces are thinkable: Kant’s discussion goes on to provide a purely logical derivation of the fact that there are two fundamental forces: motion between two parts of matter must be in a straight line between them; the motion between two points on this line can be their approaching each other or removing themselves from one another; the forces causing these motions are named attractive and repulsive force (4:498-9). This rationalist account of the fundamental forces continues in the so-called ‘balancing argument’ already partially quoted.⁵ There could not be only repulsive force without attractive force, as if there were, matter would ‘disperse itself to infinity’ and expand endlessly (4:508); likewise, there could not be attractive force alone without a counteracting repulsion, as this matter would ‘coalesce into a mathematical point’ and collapse into a tiny singularity (4:511). Each force is necessary to prevent matter’s limitless explosion or contraction, and in order for there to be *determinate* matter. The logical derivation of attraction and repulsion, and the balancing argument for them, are both rational, non-empirical defences of the existence of attraction and repulsion as the only two fundamental forces of matter.

Alongside this account of the fundamental forces as *thinkable* is an apparently contrary description of them as *unknowable*. A few pages after the discussion of the balancing argument,

⁴ *Es lassen sich nur diese zwei bewegende Kräfte der Materie denken.*

⁵ The ‘balancing argument’ is named as such in recent English-language scholarship: see Daniel Warren, ‘Kant on attractive and repulsive force. The balancing argument’ in M. Domski and M. Dickson eds., *Discourse on a New Method* (Chicago: Open Court, 2010), pp.193-241. For a further discussion see Sheldon R. Smith, ‘Does Kant have a pre-Newtonian picture of force in the balance argument? An account of how the balance argument works’ *Studies in History and Philosophy of Science* 44 (2013): 470-80.

Kant returns to epistemological issues around the forces. As repulsive force makes itself more immediately felt on the senses, through pressure and impact, is it more fundamental than attraction? (4:510). Kant argues that attraction is indeed equally fundamental, even though it lacks the sensory basis that repulsion seems to have. It would be possible to argue that, although fundamental attraction lacks the immediate sensory counterpart that repulsion has in impenetrability, we can still experience it empirically in falling bodies, in the apparent rotation of the sun and stars, and so on. However, Kant does not make this argument. Rather,

That the possibility of the fundamental forces should be made conceivable [*begreiflich*] is a completely impossible demand; for they are called fundamental forces precisely because they cannot be derived [*abgeleitet*] from any other, that is, they can in no way be conceived [*begriffen*]. But the original attractive force is in no way more *inconceivable* [*unbegreiflicher*] than the original repulsion. (4:513)

Instead of presenting attraction as having a connection to empirical experience, as with repulsion, Kant affirms that both the fundamental forces are *equally incomprehensible*.

This inconceivable, *unbegreiflich* nature of the fundamental forces mean that they cannot be *fully* conceptualised. They are, however, the end-point of a rational derivation from empirically-given forces, to the furthest extent possible, where no more fundamental force can be conceived of which they would be derivative. Daniel Warren argues that the passages we have discussed show Kant's *Grundkräfte* to be unknowable in themselves, and that only their relations are knowable.⁶ For Warren, this entails a 'defence of a broadly Newtonian physics'.⁷ He argues in a note that while the *Metaphysical Foundations* claims to establish that there are fundamental attractive and repulsive forces with 'certain basic properties', it 'does not really claim to establish the corresponding force laws'; moreover, Warren is 'not convinced that the [*Metaphysical Foundations*] should even be regarded as establishing how many fundamental forces – taking this to mean: how many fundamental force laws – there are, beyond having established that there must be at least two'.⁸

In my view, this is to make too much of Kant's statements on the inconceivability of the fundamental forces, at the expense of other passages. On the one hand, Kant proposes, in the remarks to the Dynamics' Proposition 8, ways of conceptualising the action of the fundamental forces, and suggests mathematical formulae on this basis.⁹ This is indeed tentative, and Kant

⁶ Daniel Warren, 'Kant's Dynamics' in Eric Watkins, ed., *Kant and the Sciences* (Oxford: Oxford University Press, 2001), pp.109-10.

⁷ *Ibid.*, p.110.

⁸ *Ibid.*, pp.115-6n18.

⁹ Repulsion is pictured as diverging spherically from a point, attraction as converging on a point, and '[t]hus the original attraction of matter would act in inverse ratio to the squares of the distance at all distances, the original repulsion in inverse ratio to the cubes of the infinitely small distances, and, through such an action and

warns that he would not want his ‘metaphysical treatment of matter’ to be dismissed if it turned out that his inverse-cube law of repulsive force was incorrect (4:522-3). Nevertheless, the Dynamics chapter proposes laws that the ‘purely mathematical task’ of completing the task of constructing the concept of matter may be able to confirm (4:517). On the other hand, these formulae for the fundamental forces and the imagery supporting them repeat the account in *Physical Monadology* thirty years earlier.¹⁰ Kant’s conception of attraction and repulsion as the fundamental physical forces, and the means of deriving their formulae, are long-held. Moreover, these remain the two fundamental physical forces in the drafts of the late *Opus postumum*. The passages from the Dynamics chapter of *Metaphysical Foundations* should thus be taken to show that attraction and repulsion are the end-point of the reduction from empirically-given forces.¹¹

3. *Grundkraft* in the Appendix

The Appendix to the *Critique* provides greatest clarity on the question of the derivation of primitive forces, and simultaneously opens the key issue for our discussion: Kant’s affirmation of the forces of both body and soul. The Appendix discusses the regulative ideas of pure reason; these ideas, as the start of the Dialectic shows, are illusory and based on reason’s propensity to overstep the boundaries provided by the necessary connection of the understanding to sensibility. However, ideas have a ‘good and consequently immanent use’ when considered as *regulative*: not as constituting objects of knowledge, but as a *focus imaginarius* standing beyond empirical cognition that serves to *direct* reason (A624/B670, A644/B672). The primary way that this regulative, heuristic function of ideas works is by providing a ‘systematic’ interconnection of the entire range of the understanding’s cognitions. This ‘unity of reason’ is grounded on the idea of the ‘form of the whole of cognition’ that precedes the parts and conditions their interrelation (A645/B673). Such a regulative idea is a logical not a transcendental principle of reason: it is subjectively and logically necessary as a method, but is not furnished with objective necessity.

reaction of the two fundamental forces, matter filling its space to a determinate degree would be possible’ (4:521).

¹⁰ ‘...the force of impenetrability will be in inverse ratio of the cubes of the distances from the centre of their presence. ... the magnitude of the attraction ... will decrease in the inverse ratio of the spherical surfaces, that is to say, with the inverse square of the distances’ (1:484).

¹¹ *Metaphysics Mrongovius* affirms the basic nature of attraction and repulsion, whilst attempting to square this with the requirement for unity and so ultimately a single force: ‘[i]n natural science one has good reason to regard the attracting and repelling forces as primitive forces. Can there be in one substance many or only one basic force? For our reason there must be several because we cannot reduce everything to one, but the unity of each substance requires that there be only one basic power’ (29:773–822). We will turn next to the notion of the single *Grundkraft* in its regulative use. This quotation will be discussed in section 5, below.

Having set out this conception of regulative ideas, which will be vital to the third *Critique*, Kant proposes ‘to illustrate this through one case in which reason is used’: ‘[a]mong the different kinds of unity according to concepts of the understanding belongs the causality of a substance, which is called *Kraft*’ (A648/B677). Force, here understood as the causality of a substance, is Kant’s primary example of the unity presupposed by reason as a regulative idea.¹² ‘At first glance’, Kant writes, we might assume as many forces as there are effects (*Wirkungen*): but a ‘logical maxim’, the principle of parsimony, encourages us to ‘reduce this apparent variety as much as possible’. The regulative idea guiding reason here is the ‘idea of a **fundamental force** [*Grundkraft*]’. Logic does not ascertain whether such a thing exists, but this idea is ‘at least the problem set by a systematic representation of the manifoldness of forces’ (A649/B677). The way Kant exemplifies his discussion is telling. The various appearances of a substance, implying as many forces as effects, is like the way that various faculties are found in the human mind (e.g. ‘sensation, consciousness, imagination, memory, wit...’). We might try to logically reduce these by combining different *Kräfte* of the mind (as memory might be considered imagination combined with consciousness). Kant’s discussion is in the context of the eighteenth-century German ‘faculty psychology’, in which the nature and number of the faculties of the mind or soul was a central concern.¹³ The *Grundkraft* to which the forces of the mind reduce would be a single cognitive faculty.¹⁴

The idea of a fundamental force, to which the various forces, as causalities of a substance, can be reduced, provides a unity of reason. Kant emphasises again that this is hypothetical, and the idea merely regulative: we should not assert that the *Grundkraft* can be found; it is simply for the ‘benefit of reason’, to bring ‘systematic unity into cognition’ (A649-50/B677-78). This discussion of force as a regulative idea therefore moves the concept of force beyond its treatment in *Dreams* and the *Inaugural Dissertation*. In the earlier texts, force must be reduced only to its empirical referent, in order to prevent reason concocting multiple forces to explain any causal connection; and it is impossible to arrive at fundamental or originary forces. The approach in the Appendix

¹² This definition of force will be discussed in the next chapter.

¹³ For a classic discussion of these debates in Wolff, Sulzer, Mendelssohn, Jacobi, Tetens and others, see Louis White Beck, *Early German Philosophy*. Dieter Henrich’s ‘On the Unity of Subjectivity’ also provides a helpful account, emphasising Crusius’ rejection of Wolff’s single force of the soul (Dieter Henrich, ‘Die Einheit der Subjektivität’, *Philosophische Rundschau* 3 (1955): 28-69; trans. as ‘On the Unity of Subjectivity’ in Richard L. Velkley, ed., *The Unity of Reason: Essays on Kant’s Philosophy* (Cambridge, MA: Harvard University Press, 1994), pp.23-4).

¹⁴ This *Grundkraft* echoes Wolff’s conception of the mind’s faculties as reducible to a single cognitive faculty. See Beck, *Early German Philosophy*, p.268. In the first Introduction to the third *Critique* Kant argues against the Wolffian desire to ‘reduce all faculties to the mere faculty of cognition’ and posits instead the three irreducible lower faculties, stating that the Wolffian ‘attempt to bring unity into the multiplicity of faculties, although undertaken in a genuinely philosophical spirit, is futile’ (20:206).

is more sophisticated: we find ourselves in a situation in which substances have multiple causalities, and our choice is to designate all of these as separate forces, or to attempt to reduce them following the logical maxim of reason. Kant will say later that these might be considered the approaches of those of an empiricist or a speculative frame of mind, respectively (A655/B683).¹⁵

It will have become evident in this examination of primitive force in the *Metaphysical Foundations* and the *Critique's* Appendix that the former text treats the fundamental forces of bodies, the latter primarily the fundamental force of the mind. This is remarkable because, on my account of the pre-critical works, Kant's early attempt to think both the forces of the body and mind led to his embarrassment with his 'system', as uncomfortably close to Swedenborg's visions. Now, in the critical period, despite the restrictions in *Dreams* and the *Inaugural Dissertation* on the knowledge of fundamental forces – which have been transformed into the critical notion of primitive force as a regulative idea – the general issue from the early 'dynamics problematic' has apparently been retained: that of considering bodies and minds in terms of forces. To start to understand this, we need first to explore whether the forces of bodies and of the mind or soul are to be thought through the same concept of force.

4. Forces of the body and the soul

The Appendix, whilst presenting the regulative idea of a *Grundkraft* primarily in terms of the mind, also shows Kant is thinking here of the forces of *both* physics and psychology:

For even without our having attempted to find the unanimity among the many forces, or indeed even when all such attempts to discover it have failed, we nevertheless presuppose that such a thing will be found; and it is not only, as in the case cited, on account of the unity of substance that reason presupposes systematic unity among manifold forces, but rather reason does so even where many forces, though to a certain degree of the same kind, are found, *as with matter in general*, where particular natural laws stand under more general ones; and the parsimony of principles is not merely a principle of economy for reason, but becomes an inner law of its nature. (A650/B678, my emphasis)

Here, the 'case cited' is the regulative unity of the soul in a fundamental force, and Kant explicitly connects this to the case of 'matter in general' (*Materie überhaupt*). Corey Dyck reads this passage as seeking to guard against the confusion of the forces of the mind and the body.¹⁶ The forces of the mind and of bodies are indeed described as two different cases, and bodies are distinguished by having many forces, although 'to a certain degree of the same kind', which we should

¹⁵ The complexities in the Appendix's account of a *Grundkraft* as a regulative idea of reason will be discussed in chapter five, above.

¹⁶ Dyck, *Kant and Rational Psychology*, p.216.

understand as a reference to the degrees of primitivity that differentiate physical forces such as tonal and elastic *Kraft*, or light and warmth. Although the physical and psychological forces are here distinguished from one another, it is significant that this is in the context of a deeper connection, in which both domains of force are subject to the principle of ‘the parsimony of principles’ or the reduction of forces to the smallest possible number of fundamental forces. The passage thus confirms our suspicions that the forces of the mind and of bodies are two domains in which the same general conception of force applies, at least in terms of the epistemological issues Kant is discussing in the Appendix.

Elsewhere in the *Critique*, Kant suggests connections between the corporeal and spiritual conceptions of force. The opening of the Dialectic states, ‘[n]o force of nature [*Kraft der Natur*] can of itself depart from its own laws. Hence [*Daher*] neither the understanding by itself (without the influence of another cause), nor the senses by themselves, can err’ (A294/B350). This implies that the understanding and sensibility can be considered forces of nature.¹⁷ At several points Kant talks of the ‘forces and faculties’ (*Kräfte und Vermögen*) of the soul or mind: in the Refutation of Mendelssohn’s proof of the persistence of the soul, added to the B edition (B416), and in the discussion of the cosmological idea of freedom in the Antinomy (A546/B574).

The metaphysics lectures provide further evidence that the same general concept of force is at work in physics and psychology, and help to clarify Kant’s meaning. As the passage from the Appendix shows and we will see further, this does not mean that the forces of bodies and minds are the same, merely that the same *general* concept of force is at work in both domains. In the introductory remarks to the Psychology section of the L₁ lecture notes (mid-1770s), both physics and psychology are subdivisions of ‘physiology’, a general science of ‘cognition of the objects of senses’ (28:221). Physics is the physiology of outer sense, psychology the physiology of inner sense. The objects of outer sense and of inner sense are both defined in terms of their general character or ‘the general determination of *action*’ that affects the senses (28:222). In physics, this determination of action in the object of outer sense is ‘moving’; in psychology, the determination of action in the object of inner sense is ‘thinking’ (*ibid.*). Kant emphasises this later in the lectures, in a discussion of body-soul interaction: ‘[w]e are thus acquainted only with those forces in the body whose effects are phenomena of outer sense; and in the soul we are acquainted with no other forces than those whose effects are phenomena of inner sense’ (28:279-80). Kant’s

¹⁷ This implication is strengthened in the passage that follows, which presents illusion, insofar as it is the ‘unnoticed influence of sensibility on understanding’, as comprehensible through a parallelogram of forces, as in Newton’s *Principia*. Erroneous judgement should be understood as a ‘diagonal between two forces that determine the judgement in two different directions’: the straight line movement of the understanding is deviated by the tangential force of sensibility (A294-5/B351).

intention is again to distinguish the forces of the body and soul, and here to argue that the grounds of their interaction is not comprehensible: but what is of interest to us is that he conceives of both body and soul through *forces*. ‘Moving’ and ‘thinking’ are two different operations of force: we will come to consider the differences in more detail, but the shared conceptual grounding in force must first be emphasised.

This is evident in the varying locations, across the metaphysics lecture transcripts, of Kant’s general discussions of force: they move between branches of the tree of metaphysics. The L₁ lecture notes define force at the transition point between empirical psychology and rational psychology, noting that this is taught by the (in the L₁ notes absent) ontology section.¹⁸ In the Mrongovius lecture notes the concept of force is employed throughout the psychology, but only in the ontology is it defined; the definition is almost exactly the same as in the L₁ psychology, and it is in the Mrongovius ontology exemplified by the ‘faculty of thinking’.¹⁹ The same concept of force thus moves between ontology and psychology. The L₂ (early 1790s) ontology notes make clear the applicability of the concept of force in both physics and psychology:

All forces are classified into primitive and basic forces and into derivative or derived forces. We attempt to reduce the derivative forces <*vires derivativae*> to the primitive forces. *All physics, of bodies as well as spirits*, the latter of which is called psychology, amounts to this: deriving diverse forces, which we know only through observations, as much as possible from basic forces. (28:564, my emphasis)²⁰

The same concept of force, and the same epistemological approach to the forces, applies to both the mind and to bodies.

It might be objected that the forces of the mind or soul are more often faculties (*facultas, Vermögen*) in contrast with the forces (*vis, Kraft*) of physical bodies. We can clarify this in two ways. Firstly, Kant uses *Kraft* and *Vermögen* interchangeably in relation to the forces of the soul. Thus the L₂ lecture notes state, ‘[t]he forces of the human soul can be reduced to three, namely: (1) *The faculty of cognition*, (2) *the feeling of pleasure and displeasure*, (3) *the faculty of desire*’ (28:584). Fifteen to twenty years earlier, the L₁ notes state, in almost the same wording: ‘the faculty of cognition, the faculty of pleasure and displeasure, and the faculty of desire are basic

¹⁸ ‘[T]he Ontology teaches’ that ‘[f]orce is not what contains in itself the ground of the actual representation, but is rather the relation <*respectus*> of the substance to the accident, insofar as the ground of the actual representations is contained in it’ (28:261).

¹⁹ ‘[F]orce is the relation <*respectus*> of the substance to the accidents, insofar as it contains the ground of their actuality, e.g.: I cannot say that the faculty of thinking within us is the substance itself ... [it is] [t]he relation of the soul to thought insofar as it contains the ground of its actuality’ (29:771).

²⁰ Thus the Mrongovius cosmology notes, in which general physics is treated (see 28:875), advocates a ‘dynamical mode of explanation, when certain basic forces are assumed from which the phenomena are derived’ (29:935).

forces' (28:262). In both cases, the psychological faculties are called both *Vermögen* and *Kräfte*. This terminological equivocation is evident throughout the *Critique*, as noted above.

Secondly, this apparent equivalence of *Vermögen* and *Kraft* is nuanced and explained elsewhere in the transcripts. The Mrongovius ontology states,

Force is a faculty insofar as it suffices for the actuality of an accident. The difference between force and faculty is difficult to determine. Faculty, insofar as it is determined with respect to an effect, is force, and insofar as it is undetermined, *becomes* faculty. Force contains the ground of the actuality of an action, faculty the ground of the possibility of an action. (29:824)

Whilst acknowledging the difficulty of distinguishing force and faculty, the passage very clearly sets out the distinction as that between actuality and possibility. When the ground of an action is undetermined and merely possible, it is a faculty; when this ground is determined and the action is actualised, it is a force. In the Volckmann notes (1784-5), Kant repeats this distinction:

Faculty and force must be distinguished. In faculty we represent to ourselves the possibility of an action, it does not contain the sufficient reason of the action, which is the force, but only its possibility. (28:434)

The same technical characterisations of force and faculty appear in Kant's notes on his copy of Baumgarten's *Metaphysica*.²¹ Indeed, Baumgarten makes the same distinction:

Although positing a faculty and receptivity does not posit action or suffering, nevertheless such is possible when a force in the stricter sense is posited. This will be the complement of a faculty to act, i.e. that which is added to the faculty for the action to come to exist. (§220)²²

Kant thus adopts Baumgarten's distinction between force and faculty, as merely the possibility and actuality of an action.²³ It is thus clear why Kant's faculties of the mind or soul are just as often forces: the latter is simply the actualisation of the former, or its determination with regard to an effect.²⁴

²¹ E3584 (dated by Adickes to 1776-9 or 1780-9) reads, 'Faculty and force, potency – act. Force acts, the faculty does not'. E3582 (1766-77) states, 'The internal possibility of a force is the faculty'. Quoted in Alexander Baumgarten, *Metaphysics* ed. and trans. by Courtney D. Fugate and John Hymers (London: Bloomsbury, 2013), p.140, t.m.

²² I have removed Baumgarten's references to his other propositions for ease of reading.

²³ This distinction is a Wolffian one: '[a] force should not be confounded with a mere faculty: for a faculty is only a possibility of doing something: on the other hand, since a force is a source of alteration, an endeavour to do something must be encountered with a force' (*Deutsche Metaphysik*, §117). See Corey Dyck, 'The Subjective Deduction and the Search for a Fundamental Force', *Kant-Studien* 99 (2008), p.156; and Patricia Kitcher, *Kant's Thinker* (Oxford: Oxford University Press, 2011), p.44.

²⁴ Stefan Heßbrüggen-Walter (*Die Seele und ihre Vermögen*, pp.137-42) and Corey Dyck (*Kant and Rational Psychology*, pp.32-33) provide useful discussions of the distinction and close relation of force and faculty. Heßbrüggen-Walter examines a range of other relevant passages in the *Reflexionen* and lecture transcripts, which concur with my account here. This understanding of the relation of force and faculty clears up what for Patricia Kitcher is a confused or 'fluctuating usage' of the two terms in Kant. Although Kitcher notes the Wolffian background to Kant's terms, she appears not to recognise that the cognitive faculties can be quite consistently called both faculties and forces, and precisely because a force is the actualisation of what in the faculty is just a possibility. Cf. Kitcher, *Kant's Thinker*, p.163.

The lecture notes thus confirm the more implicit suggestion in the published texts, evident in the Appendix's slippage between the forces of soul and body, and in the fact that the Appendix and the *Metaphysical Foundations* apply comparable epistemological considerations to the forces of bodies and the soul: the same *general concept of force* underpins Kant's investigations into both domains. This concept of force is neither primarily physical nor psychological, as is evident from the fact that it is most often discussed in the ontology section of the lecture notes, in line with Baumgarten's discussion of the concept. As Dyck remarks, '[f]or Kant ... force is not (primarily) a physical notion but rather a general metaphysical concept introduced specifically in order to account for the relationship between a substance and its accidents'.²⁵ Before turning to an analysis of this general concept of force in the next chapter, we can summarise the account of forces in Kant's critical-period texts, in relation to the historical background.

5. Kant's account of forces

Chapter one outlined Leibniz's and Newton's accounts of force: the number and nature of forces, and the means by, and ends for, which they are known. Now we can outline the equivalent characteristics of forces in Kant's critical period.

1. Irreducibility of psychological and physical forces

As seen, both minds and bodies are conceived of through forces: does this mean, however, that the number and nature of forces are exactly the same in both domains? The answer is no, as stated most emphatically in the Mrongovius rational psychology: '[a]ll efforts are ... in vain that want to make the faculties of the soul distinct through bodily intuition. *We find not the slightest analogy between thinking and matter*' (29:904, my emphasis). This is of great importance to Kant's critical-period philosophy of forces. We see here the legacy of the break that *Dreams* and the *Inaugural Dissertation* made with the pre-critical attempts towards a dynamics: Kant maintains the insight of *Dreams*, that the physical 'conditions of pressure or impact' do not apply to spiritual or mental forces (2:327). Kant's position is singular and key to an understanding of his use of force from the 1770s on. With Leibniz and against Newton (at least, the Newton of the *Principia*), Kant uses the concept of force to depict and investigate both bodies *and* minds. Against Leibniz (at least, the Leibniz of the *Monadology*), the critical-period Kant denies that bodies and minds can be reduced to a single principle. In the Mrongovius notes Kant identifies Leibniz as

²⁵ Dyck, *Kant and Rational Psychology*, p.200.

committing this error, that of thinking ‘the I, the ultimate subject, can be of the same content as the substrate of matter’: Leibniz held this view because ‘he believed that all monads [the substrates of matter] had forces of representation and the soul also had a force of representation and ... he held the two to be the same’ (29:905-6).²⁶ For Kant, bodies and minds are both conceived of through forces, but these two domains are sharply distinct and irreducible to one another.

2. Single general concept of force

Nevertheless, as shown in our reading of the *Critique*, the *Metaphysical Foundations* and, particularly, the metaphysics lecture transcripts, the *same general concept* of force is at work in Kant’s references to the forces of body and of soul. This is clearest in the fact that the same epistemological considerations apply to the forces in each domain. Furthermore, Kant’s force-concept is neither ultimately psychological nor physical, but ontological, as shown by the location of the majority of the discussions in the metaphysics lectures. The difficulties of Kant’s position here will be explored in the remainder of the thesis: for now, it is enough to emphasise that this position is the one he takes.

3. Primitive/derivative force as an epistemological distinction

Insofar as psychological and physical forces are separated, the Leibnizian distinction between metaphysical and physical forces is in a shallow respect retained, but, more fundamentally, it is collapsed, and reconceived as an epistemological distinction. Kant’s physical forces, for example, are physical through and through. The *Metaphysical Foundations* depicts the forces that *constitute* bodies (in the Dynamics chapter) to be the same as those *between* moving bodies (in the Mechanics chapter): ‘[t]he communication of motion occurs only by means of such moving forces as also inhere in a matter at rest (impenetrability and attraction)’ (4:551). The fundamental attractive and repulsive forces that constitute bodies in the Dynamics chapter are the same as the physical forces between the bodies thus constituted in the Mechanics. With Wolff and Baumgarten and against Leibniz, Kant considers the forces on the most fundamental level of body to still be physical.

Likewise, psychological forces are not to be understood as physical, and cannot be investigated in the same way: the Preface to the *Metaphysical Foundations* thus distinguishes the ‘empirical

²⁶ Dyck quotes this passage in *Kant’s Rational Psychology*, p.217n45; I follow his editorial insertion.

doctrine of the soul' from 'properly so-called natural science' or physics because mathematics cannot be used in psychology: so there can be a 'natural description of the soul, but never a science of the soul' (4:471). Kant's *Anthropology* (published 1798) displays this descriptive approach, which in its fully-developed state would fulfil the predictions of the *Metaphysics* L₁: '[w]ith time there will accordingly be trips undertaken in order to cognise human beings, just as have been undertaken to become acquainted with plants and animals' (28:224). The difference between rational psychology and rational physics is no less stark.²⁷ Psychological and physical forces are two separate domains, but to consider them as metaphysical and physical forces in the Leibnizian senses is mistaken, as both share a general structure of force, in which Leibniz's distinctions are rethought and employed within these separate domains.

4. *Primitive force as a regulative idea*

Leibniz's distinction between primitive (or fundamental) and derivative force is thus retained, but in name only, and with a distinctly Kantian epistemological flavour. 'Primitive' names the forces which are the end-point of a rational reduction of forces to the smallest possible number. 'Derivative' forces are those which are thus identified as reducible to more fundamental forces (such as a piano's string's tonal force, which is more generally its elastic force), or which are able to be cancelled as simply different aspects of a more fundamental force (such as the warming- and lighting-forces of light). This epistemological distinction between primitive and derivative force applies both to psychological and to physical forces. Primitive or fundamental force is a regulative idea, guiding the parsimonious procedure of philosophy, whether attending to physical or psychological forces.

5. *Number of primitive forces*

We can therefore ask: how many fundamental forces are there, in the separate domains of bodies and minds? In physics, Kant consistently posits two, attraction and repulsion. Although the *Metaphysical Foundations* seeks to prove the necessary co-presence of both forces, the complexity of Kant's general view is more evident in the Mrongovius transcript:

In natural science one has good reason to regard the attracting and repelling forces as primitive forces. Can there be in one substance many or only one basic force? For our reason there much be

²⁷ For an investigation into Kant's view of rational psychology see Dyck's *Kant and Rational Psychology*: Dyck refutes the prevailing view of much of the history of Kant commentary, which considers rational psychology to be straightforwardly rejected by the critical-period Kant, and argues that it is reconceived as a completely pure discipline, free of the interrelation with empirical psychology that was central to the Wolffian tradition.

several because we cannot reduce everything to one, but the unity of each substance requires there be only one basic force. (29:773-822)

There are thus two counteracting imperatives of reason at work here. On the one hand, the unity of substance means that there should be a single fundamental force; on the other, our reason's inability to reduce everything to a single force means that there are multiple *Grundkräfte*. Attraction and repulsion are therefore the physical forces that our reason can employ in natural science; there is hypothetically a more fundamental, single force, but the two fundamental forces mark the 'horizon ... beyond which our reason cannot go' (4:534). Furthermore, in *On the Use of Teleological Principles in Philosophy* (1788), Kant argues that it would be a mistake to argue, on the basis that 'repulsion and attraction both stand under the common concept of movement' that 'the sole basic power of matter is moving force' (8:181). This is not legitimate because we would also need to know whether attraction and repulsion 'could also be *derived* from' the concept of movement: this, Kant contends, 'is impossible'.

This complex position also applies to the psychological forces of the soul. As stated in the L₁ metaphysics:

because the soul is indeed a unity ... which the I already proves, then it is obvious that there is only one basic force in the soul, out of which all alterations and determinations arise. But *this is a wholly other question: whether we are capable of deriving all actions of the soul, and its various forces and faculties, from one basic force*. This we are in no way in the position [to do] ... since in the human soul we meet real determinations or accidents of essentially different kinds, the philosopher strives in vain to derive these from one basic force. ... *Accordingly, the faculty of cognition, the faculty of pleasure and displeasure, and the faculty of desire are basic forces*. In vain does one strive to derive all forces of the soul from one ... But the proposition that all diverse actions of a human being must be derived from diverse forces of the soul serves in order to treat empirical psychology all the more systematically. (28:262)

As with physical forces, there are two competing imperatives. On the one hand, the unity of substance (now, thinking rather than corporeal substance) demands we acknowledge a single fundamental force.²⁸ On the other, we are incapable of reaching this, so three *Grundkräfte* structure our knowledge of the soul. Furthermore, Kant states that there is a pragmatic reason for assuming multiple fundamental forces: these allow for a more systematic empirical psychology. At heart, Kant's position is that we have access to two fundamental physical forces, attraction and repulsion; and to three fundamental psychological forces, of cognition, pleasure and displeasure, and desire. The separation between the two domains is evident in the difference in nature of these forces. The question of whether this separation is compatible with the common, ontological notion of force underpinning the two domains will be discussed in the next chapter.

²⁸ 'Substance' here should be understood according to its transformed meaning in the critical philosophy, as will be discussed in the next chapter.

6. Activity, passivity, immanence and transeunt of forces

Finally, how are these Kantian forces characterised in terms of the categories of the Leibnizian and Newtonian traditions: as active or passive, and as immanent or transeunt? On first sight, the physical forces are both active, as a mutually opposed ‘push’ and ‘pull’;²⁹ the psychological forces are uniquely characterised by being both active and passive.³⁰ On closer attention, however, the forces in both domains are both active and passive, and both immanent and transeunt. Kant thus collapses these prior distinctions. The Mrongovius ontology notes give the best account of this:

substance, insofar as its accidents inhere, is in action, and it acts insofar as it is the ground of the actuality of the accidents; that substance suffers (passive) whose accidents inhere through another force. How is this passion possible, since it was said earlier that [substance] is active insofar as its accidents inhere? Every substance is active insofar as its accidents inhere, but also passive, insofar as they inhere through an external force, this is not self-contradictory. E.g. a representation of a trumpet sound inheres in me through an external force, but not alone, for had I no force of representation <*vim repraesentativam*>, then it could be sounded forever and I could not have a representation. ... We can never be merely passive, but rather every passion is at the same time action. (29:822-3)

In this psychological example, the distinction between activity and passivity is essentially collapsed. A representation is always *both* activity and passivity: it is grounded on the internal, immanent force of the perceiving subject, and the external, transeunt force of the affecting object.³¹ It is famously central to Kant’s *Critique* that such both aspects of cognition are present, so as to be neither blind nor empty.

As with thinking substance (under the critical transformation of this terminology, which the next chapter will address), so with corporeal substance. In the *Metaphysical Foundations*, the two fundamental forces are immanent: matter fills space ‘only through an expansive force *of its own*’ (4:499, my emphasis), with this repulsive force limited by its own counteracting attractive force, which ‘cannot originally be sought in the contrary striving of *another* matter’ (4:509, my emphasis). Both the repulsive force and the limiting attractive force are therefore immanent to the body they constitute. They are also transeunt, because the Mechanics’ motive forces are the

²⁹ As the *Metaphysical Foundations* puts it, ‘driving force’ and ‘drawing force’ (4:498).

³⁰ As the L₁ psychology puts it: ‘I feel myself either as *passive* or as *self-active*. What belongs to my faculty so far as I am passive belongs to my lower faculty. What belongs to my faculty so far as I am active belongs to my higher faculty’ (28:228). In both the *Inaugural Dissertation* and the *Critique*, the faculty of cognition is famously divided into sensibility as passive receptivity, and understanding as spontaneous activity (2:392; A50/B74).

³¹ The distinction between active and passive mental forces, and their necessary co-presence, is in Locke’s *Essay*. Locke doubts whether a clear idea of active force (in Locke, ‘power’) can come from the external senses, so it might be ‘worth while to consider here by the way, whether the mind does not receive its *Idea of active power* clearer from reflection on its own Operations, than it doth from any external sensation’ (Locke, *Essay Concerning Human Understanding*, II.xxi.4). Patricia Kitcher cites this passage and relates historical evidence for the influence of Locke on Kant’s philosophical community (Kitcher, *Kant’s Thinker*, pp.18, 15).

same as the forces constituting material substance in the Dynamics: ‘a matter, as moved, can have no moving force except by means of its repulsion or attraction, on which, and with which, it acts immediately in its motion, and thereby *communicates its own inherent motion to another*’ (4:537, my emphasis). The externally-transmitted motive forces of the Mechanics are the very immanent attractive forces that constitute determinate parts of matter in the Dynamics.

Attraction and repulsion, because they are both immanent and transeunt, are at once both active and passive. The forces are active insofar as they act both immanently, constituting a body, and transeuntly, on other bodies. They are passive insofar as a body’s motive forces are the effects of transeunt forces of other bodies, or insofar as a body’s transeunt forces are limited by the active forces of other bodies. Again, this entails the collapse of the distinctions between immanent and transeunt, active and passive. The forces of the Dynamics chapter are mutually limiting: determinate parts of matter or bodies are formed as a result of the limitation of repulsion by attraction, and the limitation of attraction by repulsion, so each both acts upon and is affected by the other: ‘only an original attraction in conflict with the original repulsion can make possible a determinate degree of the filling of space, and thus matter’ (4:518). The forces of the Mechanics are likewise both active and passive, as seen most clearly in the discussion of Kant’s third law: the equality of action and reaction means that action is at once passion in both bodies in a collision.³²

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³² See Kant’s further discussion: ‘[t]here is, however, another law of the equality of action and reaction among matters – namely, a dynamical law – not insofar as one matter communicates its motion to another, but rather as it *imparts this motion originally to it*, and, at the same time, *produces the same in itself through the latter’s resistance*’ (4:548, my emphasis). In emphasising that both self-activity and passivity determine the activity of a substance, I am countering the view, that might be taken from the *New Elucidation*’s discussion of the principle of determining grounds, that alterations in a substance can only arise from external forces. Watkins suggests such a reading when claiming that, for both the pre-critical and critical-period Kant, ‘changes in a substance require the causal efficacy of a distinct substance on the grounds that a substance cannot act on itself so as to change itself’ (Watkins, ‘Kant’s Model of Causality: Causal Powers, Laws, and Kant’s Reply to Hume’, *Journal of the History of Philosophy* 42 (2004), p.463-4). Watkins is fully aware of Kant’s actual position, and distinguishes the inner and outer grounds of a substance’s accidents through the terms ‘substance’ and ‘cause’, respectively: ‘a substance is an inner sufficient ground of its own accidents, whereas a cause is an outer sufficient ground of the accidents that are its effect’ (Watkins, *Kant and the Metaphysics of Causality*, p.261). I find it more helpful to discuss both types of ground in terms of forces, which can be seen to be active, passive, transeunt and immanent. These terms are shown in the L₂ Ontology to all be part of Kant’s thinking of forces: ‘[w]e can cognise the forces of things through alterations. Action is either inner or transeunt. If an inner action is performed, then one says: the substance activates. Transeunt action is also called influence. Suffering obviously corresponds to influence, but not to inner action. Suffering is the inherence of an accident of a substance by a force that is outside it. Interaction is the relation of substances with reciprocal influence’ (28:565).

It should therefore be evident that it makes no sense to describe Kant's forces as either Leibnizian or Newtonian, as in the great part of the literature to date. Kant's position is a singular one that, whilst adopting certain terms and positions from the tradition of accounts of forces, develops these into a complex but consistently-held position. We can turn now to a closer focus on the general, ontological definition of force that underpins the different use of forces in the separate domains of physics and psychology, in order to critically evaluate Kant's position. Can Kant claim that a single concept of force is at work in bodies and minds, whilst insisting that '[w]e find not the slightest analogy between thinking and matter'?

Chapter 4

Kant's ontological account of force

Although Leibniz is justifiably often considered the philosopher for whom 'force' is most central, it is notable that Kant went much further in determining a general account of force, albeit one that has been conspicuously overlooked in the history of interpretation of Kantian philosophy. Kant's account emerges from attempts in the German metaphysical tradition to further explore the concept of force, arguably due to Leibniz's perceived failure to complete his dynamics. Kant's contribution is more far-reaching than the scattered remarks in Baumgarten's *Metaphysica*, for example, but it nevertheless represents a key example of Kant's relation to the previous metaphysical tradition. 'Force' is a prime example of both Kant's debts to and development beyond the 'dogmatic' previous metaphysical textbooks. It provides privileged insight into the still-contested issue of the extent to which Kant either destroys, radically transforms, reforms or continues the prior German metaphysical tradition.¹

Here, I will explore two of the ways Kant defines force in general in the critical period. These are force as a 'predicable', and force as the causal relation of substance for accidents. Both definitions are complex and obscure, as they employ terminology from the tradition of scholastic metaphysics, no longer central to our philosophical vocabulary. These definitions show how 'force' troubles the traditional view of the clean break between Kantian critique and previous dogmatic metaphysics. We will see that 'force' also occupies a problematic place within the critical architecture. For this reason, I refer to Kant's 'definition', 'account' or 'notion' of force rather than 'concept' of force, as the question of whether force is ultimately determined as a concept will come be a key one.

¹ The view that Kant's 'critical turn' amounted to a (near-)complete rejection of the prior metaphysical tradition (or at least that the elements of Kant worth retaining amount to this) has been a commonplace in English-language commentary since at least Strawson's *The Bounds of Sense*. A Scottish school of Kant-interpretation was already more sensitive to the metaphysical inheritance: H. J. Paton, *Kant's Metaphysics of Experience* (London, G. Allen & Unwin, 1936) and W. H. Walsh, *Kant's Criticism of Metaphysics* (Edinburgh: Edinburgh University Press, 1975). In recent years the case for renewed attention to the metaphysical elements of Kant's project has been made by, among others, Karl Ameriks, Karin de Boer and J. Colin McQuillan.

1. Force as a predicable

Just after outlining the table of categories in the *Critique*, Kant notes that there are also, alongside the categories, 'equally pure derivative concepts'. These derivative concepts should be accounted for in a complete system of transcendental philosophy, Kant notes, but the *Critique* will be content merely to mention them. He continues:

If one has the original and primitive concepts [the twelve categories], the derivative and subalternate [*abgeleiteten und subalternen*] ones can easily be added, and the family tree of pure understanding fully illustrated. Since I am concerned here not with the completeness of the system but rather only with the principles for a system, I reserve this supplementation for another job. But one could readily reach this aim if one took the ontological textbooks in hand, and, e.g., under the category of causality, subordinated the predicables [*Prädicabilien*] of force, action, and passion [*der Kraft, der Handlung, des Leidens*]; under that of community, those of presence and resistance; under the predicaments [*Prädicamenten*] of modality those of generation, corruption, alteration, and so on. (CPR A82/B108)

'Force' is therefore one of the derivative concepts or *predicables* that are subordinated to the category (or *predicament*) of causality. The complete cataloguing of the predicables, Kant claims, would be 'a useful and not unpleasant but here dispensable effort' (*ibid.*). Its nature of the derivation of force from causality is key to our investigation. The two terms are often conflated in the literature, but the way that force is *derived* will show its distance from the pure category of causality.²

What does Kant mean by predicaments and predicables?³ In the scholastic logic that Kant here alludes to and transforms, predicaments are the categories, which are then predicated of things. In the *Critique* and the *Prolegomena*, Kant notes that Aristotle's categories are also called predicaments; 'What Real Progress?' mentions that predicament is the scholastic term for Aristotle's categories (20:271-2). In the *Prolegomena* Kant lists the ten Aristotelian categories as he understands them: '1. *Substantia*. 2. *Qualitas*. 3. *Quantitas*. 4. *Relatio*. 5. *Actio*. 6. *Passio*. 7. *Quando*. 8. *Ubi*. 9. *Situs*. 10. *Habitus*.' (4:323).⁴ The predicables in the Aristotelian tradition are

² Watkins' *Kant and the Metaphysics of Causality* provides a recent, important example of the conflation of force and causality; for a brief discussion, see my Introduction, above.

³ As far as I am aware there is no substantive discussion of the notion of 'predicable' in the English-language literature. A debate runs through a series of German works on Kant's natural science, regarding the meaning of a single predicable, movement (*Bewegung*): see Peter Plaass, *Kants Theorie der Naturwissenschaft. Eine Untersuchung zur Vorrede von Kants 'Metaphysischen Anfangsgründen der Naturwissenschaft'* (Göttingen: Vandenhoeck & Ruprecht, 1965); Karen Gloy, *Die Kantische Theorie der Naturwissenschaft. Eine Strukturanalyse ihrer Möglichkeit, ihres Umfangs und ihrer Grenzen* (Berlin: de Gruyter, 1976); Konrad Cramer *Nicht-reine synthetische Urteile a priori. Ein Problem der Transzendentalphilosophie Immanuel Kants* (Heidelberg: Carl Winter, 1985). I thank Karin de Boer for first bringing this debate to my attention. This and other German commentary will be discussed in the following notes.

⁴ Substance, quality, quantity, relation, action, passion, time, place, position, state. Kant also mentions the five post-predicaments that Aristotle added 'later': 'Oppositum, Prius, Simul, Motus, Habere' (opposition, priority, simultaneity, motion, possession), which appear in chapters 10-15 of Aristotle's *Categories*.

then a separate list of the classifications of the possible *relations* in which a predicate may stand to its subject.⁵ That is, they name the relations between a predicate and the subject or that which is predicated.⁶ In Aristotle's *Topics* there are four predicables: definition, property, genus and accident.⁷ Boethius gave the classification that became standard in scholasticism, in which Aristotle's 'definition' was replaced by 'species'.⁸

Kant's predicables – force, action, passion, presence, resistance and so on – are notably different to Aristotle's. The passage in the *Critique* notes that they can be found in the 'ontological textbooks'; the *Prolegomena* gives more detail: the predicables 'can be extracted fairly completely from any good ontology (e.g., Baumgarten's)' (4:325).⁹ Kant is referring to the various 'predicates of being' (*praedicatis entium*) outlined by Baumgarten in part one of the Ontology section of his *Metaphysica*. The complexity here is that Baumgarten's term 'predicate' does not distinguish between predicament and predicable, and he does not make Kant's distinction between primitive concepts (categories, predicaments) and derivative concepts (predicables).¹⁰ Rather, the *Metaphysica* makes a threefold distinction: internal universal predicates (in every thing); internal disjunctive predicates (which come in pairs, only one of which is in every thing); and relative predicates (which pertain to relations between things).¹¹ Many of Baumgarten's predicates feature, with various degrees of transformation, among Kant's categories.¹² Within Baumgarten's discussion of the predicates are also found 'lower' concepts, not accorded a section header of their

⁵ Cf. 'Predicables' in Hugh Chisholm, ed. *Encyclopædia Britannica*, 11th edition (Cambridge: Cambridge University Press, 1911), p.276.

⁶ So for example, in the Aristotelian phrase, 'the human is a rational animal, without feathers, capable of learning grammar', the predicate 'animal' relates to the subject 'human' as its genus, the predicate 'rational' relates to the subject as its difference (differentiating it within its genus), and 'capable of learning grammar' relates to the subject as a property of it.

⁷ *Topics* book 1, chapters 4-6. 'Difference' is also commonly added as a fifth predicable, although Aristotle notes that the 'differentia' should be included in the predicable of genus (101b17-19).

⁸ 'Predicables' in *Encyclopædia Britannica*, *op cit*. The notion of a predicable was most influentially transmitted into Latin scholasticism by Boethius' translation of Porphyry's *Isagoge*; see *Five Texts on the Medieval Problem of Universals*, trans. and ed. Paul V. Spade (Indianapolis: Hackett, 1994).

⁹ Likewise, Kant writes in a letter to Ludwig Heinrich Jakob of 11th September 1787: 'I wish you would try to compose a short system of metaphysics for the time being; I don't have the time to propose a design for it just now. The ontology part of it would begin (without the introduction of any critical ideas) with the concepts of space and time, only insofar as these (as pure intuitions) are the foundation of all experiences. After that, there are four main parts that would follow, containing the concepts of the understanding, divided according to the four classes of categories, each of which constitutes a section. All of them are to be treated merely *analytically*, in accordance with Baumgarten, together with the predicables, their connection with time and space, and how they proceed, just as Baumgarten presents them' (10:494).

¹⁰ In the *Metaphysics* Baumgarten once uses 'predicable' at §50, but this does not have the significance of Kant's use: it is merely a synonym for 'mode', an affection with non-sufficient grounds. Fugate and Hymer's translation erroneously has Baumgarten referring to 'predicable' at §191; this should be 'predicament'.

¹¹ Baumgarten, *Metaphysics*, §6.

¹² For a complete list of Baumgarten's predicates, see the section headers for chapters 1-3 of the *Metaphysica's* Ontology, grouped under internal universal, internal disjunctive, and relative predicates.

own: it is these to which Kant must be referring when he states that the predicables can be found in Baumgarten. 'Force' (*vis*) is discussed within section VII, 'Substance and accident', and VIII, 'State'. Kant's annotations to these pages in his interleaved copy of Baumgarten translate *vis* with *Kraft*.¹³

Kant nevertheless consistently couches his discussion of predicaments and predicables in relation to Aristotle. Aristotle is criticised not only for 'rounding the categories up as he stumbled upon them', and lacking a *principle* (*Principium*) beneath them, but also for erroneously including predicables among his categories, namely, action and passion (A81/B107). Does Kant's understanding of the general meaning of 'predicable' nevertheless still follow the Aristotelian tradition? This can be answered through a passage in the *Prolegomena*, which adds insight into *how* the derivative concepts are derived. Kant says of his procedure in the *Critique*:

I reserved for myself to append in full, under the name of predicables, all the concepts derivable from [the categories] – whether by connecting [*durch Verknüpfung*] them with one another, or with the pure form of appearance (space and time), or with its matter, provided the latter is not yet determined empirically (the object of sensation in general) – just as soon as a system of transcendental philosophy should be achieved, on behalf of which I had, at the time, been concerned only with the critique of reason itself. (4:324)

The first thing to note with regard to this passage is that the notion of *relation* key to Aristotle's predicables is maintained: all predicables are derived *durch Verknüpfung*.¹⁴ Other than this, however, the notion of predicable is transformed on specifically Kantian lines. Kant emphasises this in the *Metaphysics* Mrongrovius: '[w]hen one speaks of categories, predicaments and predicables, one appears to be warming-up the old scholastic philosophy. – But in fact there remains nothing more than the names from Aristotle...' (29:803). 'Predicable' is now used exclusively with regard to the transcendental structures of the *Critique*: the categories, the pure forms of intuition, and the 'matter in general' of the outer senses. As derivative *categories*, predicables are presumably *a priori* elements of cognition, although this will be questioned below.¹⁵

¹³ See E3581-3590 and R3902, 4954, 4056, 4701, 4704, 4824 and 4825.

¹⁴ Bernd Dörflinger foregrounds this aspect in his presentation of predicables as a connective 'and' between two categories, which applies them to each other (Dörflinger's example is cause and effect) whilst retaining their non-equivalence (*Ungleichartigkeit*). This discussion is interesting but in my view misreads Kant's depiction of predicables – a relation between two *different* categories – as a relation between two correlates within a *single* category (e.g. cause and effect, without the relation to substance and accident, which is central to the predicable 'force'). Other commentaries do not pursue this reading: it is founded on Kant's support, in a 1783 letter to Schultz that Dörflinger cites, for Schultz's suggestion that the third of each class of categories 'might well be derived from the preceding two' (10:351). This seems to be a different sense of 'derivation' to that of the predicables. Dörflinger, *Das Leben theoretischer Vernunft: Teleologische und praktische Aspekte der Erfahrungstheorie Kants* (Berlin: de Gruyter, 2000), p 171-3.

¹⁵ Konrad Cramer emphasises the *a priori* nature in a brief discussion of predicables in general, couched in terms of his overall topic of 'non-pure synthetic *a priori* judgements' and specifically the predicable of

Secondly, Kant repeats that the task of enumerating the predicables is still to be completed by the future system of transcendental philosophy that can be built on the foundations of the *Critique*. In the A Preface, this task is presented as more urgent, and more difficult, than his later reference to the ‘useful and not unpleasant but here dispensable’ cataloguing of predicables: Kant states, ‘the comprehensiveness of the system itself requires also that no derivative concepts should be lacking, which, however, cannot be estimated *a priori* in one leap, but must be gradually sought out’ (Axxi).¹⁶ Whether straightforward or gradual, the supplementation of the table of categories with the predicables, and their enumeration, ordering and analysis, was not carried out in Kant’s post-critical work in any obvious way, a point that we will have cause to return to.

Thirdly, we can note that, despite this, Kant here shows how the predicables or derivative categories *would be derived* in such a future system; namely, in one of three ways:

- 1) by connecting the categories with each other;
- 2) by connecting the categories to the pure forms of intuition;
- 3) by connecting the categories to the ‘matter’ of appearance, in general, not yet specifically empirically determined.

There are thus three sets of relations that can give rise to predicables: internal to the understanding; between the understanding and sensibility; or between the understanding and non-empirical ‘matter’ or sensibility’s object in general.¹⁷ From which of these means of derivation is the predicable ‘force’ derived? To answer this, we must turn to the second critical-period definition of force.

movement. Cramer stresses that the connection at A82/B108 is to ‘pure sensibility’, although ‘pure’ is his addition. In line with the problematic of his study, Cramer uses the reference to movement as a predicable to stress its *a priori* nature, in contrast to other references to the empirical nature of movement, but a closer attention to the notion of predicable could have identified it as a further example of Cramer’s theme, the ‘non-pure synthetic *a priori*’. Cramer, *Nicht-reine synthetische Urteile a priori*, pp.155-6.

¹⁶ The entry ‘Prädikabilien’ in Willaschek et al. eds., *Kant-Lexikon* notes the contrast between this systematic necessity and the deferral of presentation of the predicables (p.1828). Elsewhere, Konstantin Pollok notes that Kant’s ‘unusually blithe tone’ in his discussion of the predicables at A81-3/B107-9 is ‘striking and strange’ in comparison with his ‘otherwise systematic rigour’. Pollok concludes in relation to the predicables employed in the *Metaphysical Foundations* (movement, resistance and force) that one must object that Kant ‘did not take into account the connection of categories, predicables and the fundamental metaphysical concepts of the doctrine of body’ (Pollok, *Kants Metaphysische Anfangsgründe der Naturwissenschaft: Ein kritischer Kommentar* (Hamburg: Meiner 2001), p.136-7).

¹⁷ Both the *Critique* and the transcript of the later *Metaphysik Vigilantius* (1794-5) give just the first two of these options: ‘[t]he categories combined either with the *modis* of sensibility or with each other yield a great multitude of derivative *a priori* concepts’ (A82/B108). ‘From the predicaments ... arise the predicables, i.e. those pure concepts of understanding that either are composed out of two or more categories or arise out of the connection of a predicament with a form of sensibility of space and time’ (29:988, also stated 29:984).

2. Force as substance's causality for accidents

In the Appendix to the *Critique*, Kant writes that 'the causality of a substance ... is called 'force'' (A648/B676). This definition is expanded upon in *On the Use of Teleological Principles in Philosophy* (1788):

force ... is not that which contains the ground of the actuality [Wirklichkeit] of the accidents (i.e., the substance) but only the relation of the substance to the accidents insofar as the former contains the ground of the actuality of the latter (8:181)

Almost exactly the same definition of force appears in *On a Discovery*, the response to Eberhard of 1790:

Force is not that which contains the ground of the existence [Existenz] of accidents (for substance contains that); it is rather the concept of the mere relation of substance to the latter, *insofar* as it contains their ground (8:224).

In these very general, ontological definitions, force is the concept of the relation of substance to accidents, insofar as substance is the causal ground of accidents. Why does Kant not straightforwardly say, 'force is the causality of a substance for its accidents'? He does not because this could imply that force causes the accidents. Instead, it is key that force is the concept of the *relation* between substance and accident, insofar as substance causes its accidents.

The response to Eberhard thus insists, '[t]he proposition: 'the thing (the substance) is a force,' instead of the perfectly natural 'substance has a force,' is in conflict with all ontological concepts and, in its consequences, very prejudicial to metaphysics' (*ibid*). *Metaphysik Mrongovius* already located this error in Baumgarten, who writes, '[e]very substance is substantial, and hence is force in both the broader and stricter sense'.¹⁸ Kant claims in the 1782-3 lecture that this conclusion, 'that every substance is a force', is

contrary to all rules of usage: I do not say that substance is force, but rather that it has force, force is the relation <*respectus*> of the substance to accidents, insofar as it contains the ground of their actuality (29:771).

Consistently across the definitions of 1782-3, 1788 and 1790, then, force is just a relation: substance causes accidents and this causality is named force.¹⁹ This second definition of force sheds light on the first: it suggests how the predicable 'force' might be derived. Depicted as the relation of substance to accidents insofar as the former is the causal ground of the latter, force is

¹⁸ Baumgarten, *Metaphysics* §198. I have removed references to other propositions, which gloss 'substantial' as meaning that accidents are able to inhere in the substance (§196); force in the 'broader sense' as 'efficacy, energy, activity' (§197); and force in the 'stricter sense' as the sufficient ground for this activity (§197).

¹⁹ This inherent *relationality* of Kant's predicable again represents that which remains from the meaning of the term in the Aristotelean tradition.

apparently derived through the *first* of the means outlined in the *Prolegomena*: through a connection of two categories. Namely, it appears to result from a combination of the first and second relational categories: ‘substance and accident’ with ‘cause and effect’.²⁰ This means of derivation is not stated explicitly by Kant, so I will for the meantime designate it a hypothesis about the general nature of force.²¹

Here we have a very abstract and general definition of force from the critical period. We can now ask whether this ‘ontological’ account of force can be reconciled with Kant’s accounts of the various forces of bodies and minds that were examined in chapter three. In so doing, we can test the hypothesis that the predicable ‘force’ is derived through a combination of two categories, namely cause and effect with substance and accident. We can also interrogate Kant’s mature account of force to the greatest possible extent, in order to determine its philosophical virtues as well as its insufficiencies, as neither have been explored in the literature to date.

To explore the applicability of Kant’s general, ontological definition of force to the specific forces of bodies and minds, we can turn to the Paralogisms of the *Critique*, in the 1781 and 1787 versions, and the 1786 *Metaphysical Foundations* (with reference to other texts where necessary). The Paralogisms and *Metaphysical Foundations* need to be read alongside one another, however, as it is not the case that the Paralogisms critically treat only the forces of psychology, and the *Metaphysical Foundations* only the forces of physics. Rather, both texts make reference to forces in both domains and constitute an intertwined discussion, illuminating one another on the question of how the general definition of force – as the causality of substance for accidents – is applied to bodies and minds.

3. A naïve position in the metaphysics lectures

We can first however reconstruct, from the L₁ and Mrongovius notes, a simplistic view of the relation between Kant’s general definition of force and its specific manifestations, which provides an instructive counterpart to the more sophisticated position in the *Critique* and *Metaphysical Foundations*. The L₁ Psychology states that there is

a physiology of objects of *outer*, and a physiology of objects of *inner* sense. The physiology of outer sense is *physics*, and the physiology of inner sense is *psychology*. ... The general determination of

²⁰ To give the categories their full titles, it is a combination of ‘Of Inherence and Subsistence (*substantia et accidens*)’ with ‘Of Causality and Dependence (cause and effect)’ (A80/B106).

²¹ Karen Gloy takes this inter-categorical connection of categories to exhaust the meaning of the predicable ‘force’ (Gloy, *Die Kantische Theorie der Naturwissenschaft*, p.160). The following will question this.

action, or the general character of the object of inner sense, is *thinking*; and the general character of the object of outer sense is *moving*. (28:222)

This distinction between the sciences of the objects of the inner and outer sense is ever-present in the critical works, but here Kant adds an account of the 'general determination of action' or 'general character' of these objects: that of inner sense, the soul, is thought; that of outer sense, bodies, is movement.²²

These ideas can be combined with a passage in *Metaphysics M*rongovius. Having stated his usual definition that 'force is the relation of the substance to the accidents, insofar as it contains the ground of its actuality', Kant asks, '[w]hat then is the faculty of thinking?' and replies, '[t]he relation of the soul to thought insofar as it contains the ground of its actuality' (29:771). The general ontological definition of force, in terms of substance and accidents, is here precisely applied to the soul. The soul takes the place of substance; thoughts are the accidents; and the faculty of thinking is the force, through which the soul (partially) causes its thoughts.²³

If thoughts are accidents of the soul *qua* substance, L_1 's account of the 'general determination of action', of the two possible objects of the inner and outer senses, leads us to infer that motions are the accidents of bodies *qua* substance. Therefore, the forces of body and mind could be combined with Kant's general definition of force as follows: substance is conceived in a broadly Cartesian fashion as thinking and corporeal substance, or soul and body. The accidents of these substances are thoughts and motion, respectively. The force – as the causality of the substance for accidents – is, for thinking substance, the faculty of thinking. Analogously, the force of corporeal substance would be its determination of motion.

This account is worth reconstructing from the metaphysics notes, as Kant's mature view does contain greater traces of such a Cartesian dualism than is often noted. Namely, and in line with the strict divide between mental and corporeal forces discussed in chapter three, Kant consistently distinguishes between 'the doctrine of body and the doctrine of the soul, where the first considers extended nature, the second thinking nature' (4:467). This divide, as this passage from the opening of the *Metaphysical Foundations* states, is 'in accordance with the principle division of our senses, where one contains the objects of the outer senses, the other the object of inner sense' (ibid.). The Architectonic in the *Critique's* Doctrine of Method makes the same

²² This latter point is repeated in the *Metaphysical Foundations* (and is discussed below): '[t]he basic determination of something that is to be an object of the outer senses had to be motion, because only thereby can these senses be affected' (4:476).

²³ 'Partially' because substance for Kant is always passive as well as active, and so accidents have external as well as internal grounds: see chapter three, above.

distinction: immanent physiology, as Kant here calls this branch of the full system of metaphysics, is constituted by rational physics and rational psychology, as the *a priori* sciences of the objects of the outer and inner senses respectively (A846/B874).

At the same time, this equation of the soul and body with substance, and thoughts and motions with accidents, is lacking in a number of ways. Kant's position in the published works is more developed than that in the lecture notes; the position in the lecture notes contains more traces of the metaphysical tradition, and in any case required reconstructing from scattered passages.²⁴ The critical concept of substance is more complex than a straightforward equation with soul and body would suggest, and, in turn, accidents cannot thus be directly aligned with thought and motion. Furthermore, the critical account of force is richer than the depiction of the force of thinking substance as its 'faculty for thinking' in the Mrongovius notes: this is simply tautological and thus represents the kind of meaningless occult quality that Kant strenuously sought to avoid in his definition of force.²⁵ We must therefore turn to the published critical-period texts to interrogate the connection that Kant's mature, general notion of force has to the specific forces of bodies and minds.

4. Substance and matter

First, we should consider the relation of 'substance' and 'matter'. In the 'Refutation of Idealism' added to the second (B) edition of the *Critique*, Kant notes,

we do not even have anything persistent on which we could base the concept of a substance, as intuition, except merely **matter**, and even this persistence is not drawn from outer experience but rather presupposed *a priori* as the necessary condition of time-determination. (B278)

Substance is of course a *concept*: with its correlate 'accident' it is one of the categories of the understanding. The table of categories presents *Inhärenz* and *substantia* as equivalent: substance is that in which accidents inhere (A80/B106). The category of substance/inherence has for its corresponding principle, in the first Analogy, 'persistence', *Beharrlichkeit*.²⁶ The 'Refutation of Idealism' here notes that the concept of substance is based on (or, more literally, underlaid by) matter, namely, matter's persistence. This persistence is not drawn from outer intuition but is *a priori*. The implication, however, is that this matter *is* drawn from outer experience, unlike 'persistence' or 'substance'.

²⁴ For relevant aspects of the prior metaphysical tradition, see the discussion of Wolff in chapter one, above.

²⁵ On forces and occult qualities, see chapter one, above.

²⁶ For Kant, 'the proposition that substance persists is a tautology' (A184/B227).

This is confirmed and expanded upon in the discussion of matter and substance in the A Paralogism. Kant writes,

matter, whose community with the soul excites such great reservations, is nothing other than a mere form, or certain mode of representation of an unknown object, through that intuition that one calls outer sense. (A385)

Matter is the form of *outer sense*, which, as we know from the Aesthetic, is the *spatial* aspect of the pure forms of intuition, as opposed to the temporal form of intuition in inner sense (A22-3/B37). The passage continues,

Thus there may well be something outside us, corresponding to this appearance that we call matter; but in the same quality as appearance it is not outside us, but is merely a thought in us, even though this thought, through the sense just named, represents it as being found outside us. (A385, t.m.)

The complexity of Kant's notion of matter is pithily captured here. Matter is that appearance in outer sense, i.e. through the spatial form of intuition, which is *represented* as being outside us (*außer uns*). There may be something outside us that corresponds to this appearance – this would be the thing-in-itself – but the critical position of course rejects knowledge of this *etwas außer uns*.²⁷ Matter is not therefore a transcendently real physical substrate or a thing-in-itself, but an appearance that appears *as* something outside us, i.e. as if it were a transcendently real physical substrate or a thing-in-itself. Kant is so adamant that it is not the latter that he names matter a 'thought': terminologically, 'appearance' much better fits his usual usage, but the idealist terminology here shows his insistence that matter should not be understood in realist terms.

The representations we call matter thus 'belong as much to the thinking subject as other thoughts do' and are not completely different entities from the object of inner sense, the soul (*ibid.*). They have, however, 'this deceptive feature':

since they represent objects in space, they *seem* to cut themselves loose from the soul, as it were, and hover outside it; although space itself, in which they are intuited, is nothing but a representation, whose counterpart in the same quality outside the soul cannot be encountered at all. (A385, my emphasis)

'Matter' is inherently deceptive because its representations, of objects in space, present themselves as if distinct from inner sense or the soul. This is only a problem if we 'hypostatise outer appearances' and sever them from inner appearances (A386). Bodies and motion are 'merely representations in us' (A387).

²⁷ For a helpful distinction between terms that are often conflated under 'thing-in-itself', see Karin de Boer, 'Kant's Multi-Layered Conception of Things in Themselves, Transcendental Objects, and Monads' *Kant-Studien* 105.2 (2014): 221-260. De Boer distinguishes empirically affecting objects from two senses of the transcendental object: that which is posited to unify our representations in the A Deduction and the phenomena and noumena chapters, and that which grounds appearances in the Dialectic.

It is clear why, having been charged with Berkleyan idealism in the Garve-Feder review, Kant excised these passages from the second edition, as they are open to being misinterpreted as straightforwardly idealist.²⁸ The position continues in the B edition, however, albeit slightly less explicitly: regarding the difficulties stemming from ‘the presumed difference in kind between the object of inner sense (the soul) and the object of outer sense’, Kant contends that ‘the two kinds of objects are different not inwardly but only insofar as one of them appears **outwardly** to the other’ (B427). Matter is still not something outside the subject, but is only an appearance of something as if it were external.

At the same time, matter, as the object of the outer senses, is that which is given to, or passively received by, the subject. Kant thus contrasts matter with form: it is the given element that is then actively formed for cognition; and it is this in two ways. On the one hand it operates as a principle guaranteeing an underlying real, non-subjective object for knowledge, contra Berkleyan idealism. In this respect it is the matter for sensation (as opposed to the pure form of space and time as forms of intuition). Kant thus calls the matter of intuition ‘the real in sensation’ (A165/B207) or even ‘the physical’ (A723/B751).²⁹ On the other hand, matter is the material content given through sensation without which knowledge is impossible. In this case, it is the matter for the understanding: it is the sensible manifold with which the categories are synthesised in order for there to be knowledge. Thus in the Amphiboly’s discussion of matter and form Kant writes that ‘[t]he understanding ... demands that something be given first’ (A267/B322-3); this is ‘that in the appearance which corresponds to sensation’ (A20/B34), which Kant argues throughout the *Analytic* is indispensable for properly-grounded knowledge.³⁰

Matter is therefore always opposed to form, as the indeterminate material substrate that is formed by sensibility’s forms of intuition; this then provides the matter for a second enforming: sensible intuitions are the matter formed by the categories into knowledge. In both cases, matter can be considered as the ‘given’, in two different contexts, or as Kant puts it, ‘the determinable in

²⁸ For the review, see Kant, *Prolegomena to Any Future Metaphysics That Will Be Able to Come Forward as Science* trans. by Gary Hatfield (Cambridge: Cambridge University Press, 2004), pp.201-7.

²⁹ This is not to say that matter is a cognition of the thing-in-itself, of course: in the passage in the Anticipations Kant notes immediately that this ‘real in sensation’ is a ‘merely subjective representation, by which one can only be conscious that the subject is affected’ (A165/B207). The reference to ‘the physical’ is caveated as ‘signify[ing] a *something* that is encountered in space and time’ (A723/B751, my emphasis). In both cases, Kant’s precarious position, on which transcendental idealism is predicated, is maintained: there is a real objective substrate underpinning our experience but we can only have general knowledge of its existence, not determinate knowledge of it as an object.

³⁰ The latter position is well summarised at A62-3/B87-8: ‘[experience] alone can give us the matter (objects) to which those pure concepts of the understanding can be applied’.

general' (A266/B322).³¹ Kant stresses that matter 'can never be given in a determinate manner except empirically' (A723/751).³² Matter is the general object of the outer senses, which appears *as is* if it outside us; and in its determinate form it is always empirical. It provides a basis for our thinking the pure concept of substance, but matter and substance occupy very different places in the critical architecture.

The relation between substance and matter appears in Explication 5 of the *Metaphysical Foundations' Dynamics*, which depicts matter as 'material substance':

The concept of a substance means the ultimate subject of existence, that is, that which does not itself belong in turn to the existence of another merely as a predicate. Now matter is the subject of everything that may be counted in space as belonging to the existence of things. For, aside from matter, no other subject would be thinkable except space itself, which, however, is a concept that contains nothing existent at all, but merely the necessary conditions for the external relations of possible objects of the outer senses. Thus matter, as the movable in space, is the substance therein. (4:503)

Kant here employs a more traditional conception of substance – as that which is not the predicate of anything else, or the 'last subject' – rather than the critical category of that in which accidents inhere and which persists.³³ Material substance is such a last subject. Kant continues, 'all parts of matter must likewise be called substances': individual determinate bodies are also material substances (*ibid.*). This apparently contradicts the distinction between matter and substance in the *Critique*, but we see here that Kant uses the term 'substance' in two different ways. Karl Ameriks usefully distinguishes these: on the one hand there is a 'pure definition of substance [as] something 'whose representation cannot be employed as a determination of another thing''; on the other, there is the judgement 'that its appearance is permanent', which is 'an empirical and in that sense a real definition'.³⁴ The first is an ontological conception of substance as the ultimate subject; the second is a cognition of something as 'substantial' or as persisting in the appearance, on the basis of the schematised category of substance.³⁵

Material substances also raise the question of the number of substances. Bryan Wesley Hall identifies this issue in the two formulations of the principle of the first Analogy, as an equivocation

³¹ John E. Smith's useful essay on 'Kant's Doctrine of Matter' in Ernan McMullin, ed., *The Concept of Matter* (Notre Dame, University of Notre Dame Press, 1963), pp.399-411, concludes with regard to matter in the *Critique* that it is identified with 'the *given* in any context' (p.405).

³² The characterisation of matter in this passage could relate to both of its two main senses as just discussed.

³³ For this traditional definition, see Baumgarten: substance is 'something subsisting per se', that which 'can exist, although it is neither in something else, nor the determination of something else' (*Metaphysics*, §191).

³⁴ Karl Ameriks, *Kant's Theory of Mind* 2nd edition (Oxford: Oxford University Press, 2000), pp.66-7.

³⁵ I do not follow Ameriks' hierarchy between the two senses of substance: I see no evidence for the ontological definition of substance as being 'more basic' and 'more genuinely substantial' than the empirical judgement of a thing as substance according to the pure category.

between substances and Substance: ‘relatively enduring empirical objects [which] are substances since they persist through the alteration of their properties’ are contrasted with ‘one sempiternal and omnipresent Substance whose quantum in nature is neither increased nor decreased’.³⁶ The notion of material substances, in my view, complicates this picture: material substance is based on the ontological concept of substance as the ultimate subject, but is not Hall’s single ‘Substance’ as it is only the substance *in space* or in the outer senses, suggesting at least one other ultimate subject (in the inner senses). Furthermore, parts of matter are also plural substances. I consider Hall’s distinction, which crystallises distinctions in numerous previous readings, not to ultimately be an issue at stake in Kant: this will be shown in what follows.³⁷

Matter is therefore distinct from substance: the latter is a pure category, whereas matter is the ‘given’ for sensibility and the understanding. Parts of matter can also be judged to be material substances, or ultimate subjects in space (in the outer senses), the existence of which is dependent on nothing else. Before turning to the equivalent judgements of substantiality in inner senses – that is, what can be said to be substance in the doctrine of the soul – we should consider further implications of the empirical aspect of matter in general: the fact that, although matter is only an appearance that appears *as if* it were external, it nevertheless acts as a guarantee against idealism, because it is ultimately *given* to the outer senses.

5. Matter in general and the empirical criterion

The Preface to the *Metaphysical Foundations* promises a ‘complete analysis of the concept of a matter in general’ (4:472). *Materie überhaupt*, the general object of the outer senses, is ‘carried through’ (*durchgeführt*) the four classes of categories from the *Critique* (4:476). This results in the *Critique*’s four classes of category – Quantity, Quality, Relation and Modality – being reconfigured as Phoronomy, Dynamics, Mechanics and Phenomenology, as the four chapters of the *Metaphysical Foundations*. Each of these chapters sets out from the minimal definition that opens the Phoronomy, of matter as ‘the *movable* in space’ (4:480). The term ‘moveable’, *das Bewegliche*, has a two-fold sense that is significant to Kant’s text. The activity of matter *qua* moveable designates both the capacity of parts of matter for being moved, and their being in motion (and thus moving other parts of matter).³⁸

³⁶ Bryan Wesley Hall, *The Post-Critical Kant*, p.36.

³⁷ Cf. Allison’s ‘backdrop thesis’ (*Kant’s Transcendental Idealism: An Interpretation and Defence* 2nd edition (New Haven: Yale University Press, 2004), pp.237-9) and the positions of Bennett, Strawson, Van Cleve, Westphal, and Rollmann and Hahmann discussed by Hall (*The Post-Critical Kant*, p.61-3n10-11).

³⁸ As John E. Smith writes, *das Bewegliche* is ‘something which is capable of moving or of being moved’; the term ‘embraces both the fact of the motion and a ‘that which’ moves’ (Smith, ‘Kant’s Doctrine of Matter’,

The notion of force enters the text in the Dynamics and Mechanics chapters, and in two different ways. In the Dynamics, force constitutes physical bodies: these are depicted as an equilibrium between repulsive and attractive forces. In the Mechanics, forces act between the bodies thus constituted; these forces are, again, repulsion and attraction, now of bodily motion.³⁹ These constitutive, dynamic forces and motive, mechanical forces are in fact, as we have seen in chapter three, the same: the attractive and repulsive forces, which represent the limit of our capacity for rationally reducing empirically-given forces, both constitute bodies and determine motions between them in collisions.

The relation that the *Metaphysical Foundations* has to the *Critique* – whether the former simply reinforces, supplements, or philosophically goes beyond the latter – is controversial.⁴⁰ For our purposes, Kant's letter to Christian Gottfried Schütz of September 13, 1785, which mentions the forthcoming publication of *Metaphysical Foundations*, gives a useful insight:

Before I can compose the metaphysics of nature that I have promised to do, I had to write something that is in fact a mere application of it but that presupposes an empirical concept. I refer to the metaphysical foundations of the theory of body and, as an appendix to it, the metaphysical foundations of the theory of soul. For the metaphysics [of nature], if it is to be wholly homogeneous, must be a completely pure science. But I wanted to have some concrete examples available to which I could refer in order to make my discourse comprehensible; yet I did not want to bloat the system by including these examples in it. So I finished them this summer, under the title "Metaphysical Foundations of Natural Science"... (10:406)

p.407). Henny Blomme has recently emphasised how complex the task of the *Metaphysical Foundations* is, by providing a clear account of, particularly, why it must be motion that is carried through the categories in the text (Blomme, 'Kant's Conception of Chemistry in the Danziger Physik' in Robert R. Clewis ed., *Reading Kant's Lectures* (Berlin: de Gruyter, 2015), pp.484-501).

³⁹ Otherwise put, the Dynamics and Mechanics chapters add 'new determinations' to the concept of matter in general: respectively, matter's filling space (4:496) and having moving force or communicating motion (4:536). Both of these new determinations are grounded on attractive and repulsive forces. Kant describes his project in *Metaphysical Foundations* as one of adding 'a new determination of this concept' of matter in each chapter, in the Preface (4:477). Watkins presents the text in this way, and argues that the new determination of the Mechanics can be considered to be the communication of motion; see 'The Argumentative Structure of Kant's Metaphysical Foundations of Natural Science', *Journal of the History of Philosophy* 36 (1998), p.582.

⁴⁰ Eckart Förster considers the *Metaphysical Foundations* a necessary supplementation to the *Critique*, to demonstrate the applicability of the categories to objects of outer sense (Förster, *Kant's Final Synthesis: An Essay on the Opus postumum* (Cambridge, MA.: Harvard University Press, 2000), chapter 3). Pollok disagrees insofar as Förster ignores Kant's distinction between transcendental and special metaphysics: were the *Metaphysical Foundations* really the supplementation Förster proposes, they would be part of transcendental metaphysics, like the *Critique*. To the contrary, Pollok emphasises that the 1786 text provides 'sense and meaning' and 'cases *in concreto*', based on an empirical concept, as the first 'concretisation' of the concepts of the understanding (Pollok, *Kants Metaphysische Anfangsgründe der Naturwissenschaft*, pp.2-3n7). Friedman offers an interesting, influential but textually questionable interpretation in which the text seeks to provide metaphysical foundations for Newtonian science's absolute space and mathematisation of nature (Friedman, *Kant's Construction of Nature*).

The publication of the text took place the following Easter; the proposed appendix on the soul had at that point been dropped.⁴¹ What remains stable between the letter to Schütz and the published work is the aim of providing ‘concrete examples’ for the proposed metaphysics of nature. At the end of the *Metaphysical Foundations*’ Preface Kant notes the importance of ‘detaching’ the ‘detailed treatment’ of the metaphysical foundations of the doctrine of body from ‘the general system of metaphysics’ (4:477). Removing this ‘offshoot’ and planting it separately can only help the ‘regular growth’ of the system of metaphysics (*ibid.*). Kant notes that it is remarkable that metaphysics, where it ‘requires examples (intuitions) in order to provide meaning for its pure concepts of the understanding, must always take them from the general doctrine of body’ (4:478). These examples should be presented as a separate treatise, to avoid ‘swelling’ the broader metaphysics with his examples from physics. In this way,

a separated metaphysics of corporeal nature does excellent and indispensable service for *general* metaphysics, in that the former furnishes examples (instances *in concreto*) in which to realise the concepts and propositions of the latter (properly speaking, transcendental philosophy), that is, to give a mere form of thought sense and meaning. (*ibid.*)

Kant thus echoes the sentiments of his letter to Schütz: through its concrete examples, the *Metaphysical Foundations* provides a delimited application of the pure metaphysics of nature on the basis of an empirical concept, which is usefully separated from the system in general.⁴²

The ‘empirical concept’ presupposed by the *Metaphysical Foundations* is matter in general. We can compare this ‘empirical concept’ to a similar notion introduced in the second Analogy: ‘empirical criterion’. The passage in which this appears receives little analysis in the classic commentaries on the second Analogy, no doubt because it appears after what are commonly taken to be Kant’s six attempted proofs of the principle of causality (B233-A202/B247).⁴³ Having

⁴¹ Instead, the published Preface is constructed so as to dismiss the possibility of apodictic empirical knowledge (that is, on the basis of mathematics) of the soul, and to remove psychology from the project of secure metaphysical grounding (4:471).

⁴² Kant gives a similar account in the *Octaventwurf* of the *Opus postumum*, which are sheets dated by the new Academy edition editors to 1796: ‘My *Metaphysical Foundations* etc. already undertook several steps in this field [that of making a transition from metaphysical foundations to physics], but simply as examples of their possible application to cases from experience, in order to make comprehensible by examples what had been stated abstractly’ (21:408).

⁴³ For the ‘six proofs’, see Norman Kemp Smith, *A Commentary to Kant’s Critique of Pure Reason* (Basingstoke: Palgrave Macmillan, 2003), pp.363-377; H. J. Paton, *Kant’s Metaphysic of Experience*, pp.224-261; Henry E. Allison, *Kant’s Transcendental Idealism*, pp.249-50. The reference to force and substance in the second Analogy is not discussed in Kemp Smith or Allison’s books, nor in Guyer’s ‘Kant’s Second Analogy: Objects, Events and Causal Laws’ in Patricia Kitcher, ed., *Kant’s Critique of Pure Reason: Critical Essays* (Lanham: Rowman & Littlefield, 1998), pp.117-144, nor by Arthur Melnick, *Kant’s Analogies of Experience* (Chicago: Chicago University Press, 1974). There are brief discussions of the passage at hand in Paton, *Kant’s Metaphysic of Experience*, pp.281-2, and Walsh, *Kant’s Criticism of Metaphysics*, pp.141-2, both of which are brief and restricted to the issue of causality.

attempted the (multiple) proofs of causality in the second Analogy, Kant provides a sequence of terms stemming from the discussion:

This causality leads to the concept of action [*Handlung*], this to the concept of force, and thereby to the concept of substance. ... Where there is action, consequently activity [*Tätigkeit*] and force, there is also substance, and in this alone must the seat of this fruitful source of appearances be sought. (A204/B249-50)

In two similar formulations, the notion of causality leads, via action, activity and force, to that of substance, and so action is the 'seat' (*Sitz*) of the 'fruitful source of appearances' that is substance. Kant notes, as with his discussion of the predicables, that he will 'leave the detailed discussion of these concepts to a future system of pure reason', and that, again, one can find such discussion in the 'familiar textbooks'. 'Yet', Kant writes, 'I cannot leave untouched the empirical criterion of a substance' (A204/B249). The end of the first Analogy already noted that the following section would discuss 'the empirical criterion of this necessary persistence and with it the substantiality of appearances' (A189/B323). This empirical criterion is therefore important enough to warrant Kant's special attention.

The passage goes on to provide an addition to the first Analogy's proof of the persistence of substance. Action, conceptually tied to activity and force, is a 'sufficient empirical criterion' that 'proves [*beweiset*] substantiality' (A205/B250-51). On the basis of this is the 'certain inference' that 'the primary subject of the causality of all arising and perishing' – that is, substance – 'cannot itself arise and perish', so substance persists (A205/B251). This further proof of the persistence of substance thus requires a definition of substance as being grounded (having its 'seat') in action, activity and force. The problem of connecting action and the persistence of substance would be 'insoluble', Kant writes, if the proof followed 'the usual fashion (proceeding merely analytically with its concepts)' (A205/B250). That is, an *a priori* proof is untenable here, so the second Analogy provides an *a posteriori* proof of the persistence of substance. Action, activity and force thus provide a minimal empirical criterion for this persistence.

It may be objected that activity and force are distinguished by Kant in these passages, but I do not believe this is the case. Action is defined as follows: '[a]ction already signifies the relation of the subject of causality to the effect' (A205/B250). This may be a slightly more general concept than force, because it is not just the relation of substance (or the last subject) to its accidents but of any subject of causality to its effect: it is however nonetheless structurally the same as force. A note in Kant's copy of Baumgarten provides a way to understand the distinction between activity and force: 'three ways are to be thought: substance, accident, and the relation between the two. This relation is either from the accident and is inherence; or from substance, and here either from the

potential ground and is force, or from the active ground and is action'.⁴⁴ This suggests that activity is to force what force is to faculty: an actualisation of potential. The three terms – faculty, force, activity – should therefore be considered different modalities of the same basic concept.

The passages in the Analogies contain the only references in the Kantian corpus to an 'empirical criterion'. Criterion (*Kriterium*) is generally used to refer to the grounds of decision regarding a claim to validity: it appears most often in the *Critique* in the phrase, 'criterion of truth'.⁴⁵ The principle of contradiction, for example, is 'a general though merely negative criterion of truth'; it is a negative, or insufficient, criterion because given objects are additionally required for cognition to have objective reality (A151/B190, A155/B194). The 'empirical criterion' of action, activity and force is therefore something empirically given that proves substantiality. This definition will be fleshed out shortly, with reference to the 'I think'.

Bringing together these passages on matter and substance in the *Critique* and the *Metaphysical Foundations*, we have, in the Refutation, the claim that our knowledge of substance's persistence comes from our experience of matter, and, in the second Analogy, the assertion that action, activity and force are an empirical criterion for substance. Furthermore, the *Metaphysical Foundations'* treatment of an empirical concept, prior to the presentation of the metaphysics of nature, is an analysis of matter in general. These passages suggest that the empirical criterion for our knowledge of the persistence of substance is provided by matter in general, and that this matter is grounded in action, activity and force. That the latter point holds is evident in the Dynamics and Mechanics chapters at least, where two key aspects of matter in general – its filling of space and its motion – result from attractive and repulsive physical forces.

This is the case for the physical forces affecting the outer senses, at least: we can now turn to the equivalent relations in the inner senses.

6. Substance in inner sense

A little-discussed passage in the *Metaphysical Foundations*, the Remark to the first law of the Mechanics chapter, raises this issue. The law transforms the first Analogy (the principle that

⁴⁴ 'trina sunt cogitanda: Substantia, accidens, respectus utriusque. Hic vero vel accidentis et est inhaerentia; vel substantiae et est hic iterum vel potentialis rationis et est vis, vel actuantis et est actio'. R3785, 17:292, quoted in German translation in Heßbrüggen-Walter, *Die Seele und ihre Vermögen*, p.132.

⁴⁵ See 'Kriterium' in Willaschek et al eds., *Kant-Lexicon*, vol. 2, pp.1301-2: 'Kant verwendet das Wort Kriterium (bzw. *Probierstein*) zur Bezeichnung des Entscheidungsgrundes im Hinblick auf die Einlösung eines Geltungsanspruchs'.

substance persists and the total quantity in nature is neither increased nor decreased) into a law of corporeal nature (the total quantity of matter neither increases nor diminishes).⁴⁶ Kant remarks,

What is essential in this proof to the characterisation of the *substance* that is possible only in space, and in accordance with its condition, and thus possible only as an object of the outer senses, is that its quantity cannot be increased or diminished without substance arising or perishing. ...⁴⁷ By contrast, that which is considered as object of inner sense can have a magnitude, as substance, which does not consist of parts external to one another; and its parts therefore, are not substances; and hence their arising or perishing need not be the arising or perishing of a substance... (4:542)⁴⁸

This passage distinguishes the substance of outer senses (material substance), from a substance of inner sense. These, I contend, are judgements of the objects of the inner and outer senses as substances, according to the category of substance.⁴⁹

Substances in outer sense and inner sense differ in terms of whether they can arise and perish, and this is based on whether their parts are external to one another. Matter, Kant continues, is '*in space*' and therefore it results analytically from the concept of matter that matter's parts are spatially external to one another (4:453). These spatially distinct parts are themselves substances, so – as the persistence of substance is unquestionable, being part of its concept – no parts of matter can arise or perish. Now, what is the object of the *inner* senses, as the counterpart of matter? In this passage Kant vacillates between naming it the 'soul' and the '*I*'. On the one hand, that which in the inner senses that can arise and perish is the soul:

consciousness, and thus the clarity of representations in my soul, and therefore the faculty of consciousness, apperception, and even, along with this, the very substance of the soul, have a *degree*, which can be greater or smaller, without any substance at all needing to arise or perish for this purpose. (4:542)

⁴⁶ For a convincing interpretation of the nature of the transformation that the Analogies undergo in the *Metaphysical Foundations* – which presents the text as an extended transcendental argument explaining both how the object of outer senses must be matter or the moveable in space, and how this concept of matter is determined, not primarily by the Principles but by each the categorial headers – see Watkins, 'The Argumentative Structure of Kant's *Metaphysical Foundations of Natural Science*'.

⁴⁷ The reason for this, given in the text skipped here, is that objects of the outer senses have parts *external to one another*, which, if real and moveable, are substance.

⁴⁸ Emphasis Kant's; a second emphasis (on 'does not consist ... one another') removed.

⁴⁹ This is somewhat loosely stated, for Kant writes in the A Paralogism that '[a]s long as we keep inner and outer appearances together with one another, as mere representations in experience, we find nothing absurd and nothing that makes the community of both modes of sense appear strange'. Our difficulties in understanding the community of body and soul, or outer and inner appearances, come about 'as soon as we hypostatise outer appearances, no longer relating them to our thinking subject as representations' but rather considering them as things external to us, subsisting in themselves (A386). My distinction between substance in inner and outer sense is therefore for the purposes of analysis, following Kant's use of this distinction. As Kant writes in this passage, any appearance must ultimately be an appearance in both inner and outer sense.

Whereas matter cannot arise or perish, because its spatially distinct parts are substances, the soul can increase or diminish, because its parts – its representations, faculties, and its very substance – can diminish without substance arising or perishing. On the other hand, we read,

The I, the general correlate of apperception, and itself merely a thought, designates, as a mere prefix, a thing of undetermined meaning – namely, the subject of all predicates – without any condition at all that would distinguish this representation of the subject from that of a something in general: a substance, therefore, of which, by this term, one has no concept of what it may be. (4:542-3)

Both the soul and the I are named ‘substance’, and the I, at least, is substance in the sense of the ‘subject of all predicates’, and so is named substance but without this providing any ‘concept of what it may be’.

This object of inner sense is clarified in the *Critique’s* Paralogisms. We should examine these in order to then consider the relation of ‘force’ to the object of inner sense. The topic of the Paralogisms is the ‘I think’, which is the ‘vehicle of all concepts whatever’ and ‘the sole text of rational psychology’ (A341/B399, A343/B401). Kant distinguishes ‘two kinds of objects [*Gegenstände*] through the nature of our force of representation [*Vorstellungskraft*]: the ‘object of outer sense is called body’ and ‘I, as thinking, am an object of inner sense, and am called soul’ (A342/B400). The object of inner sense is thus the I, which is called soul. This naming of the ‘I think’ as the soul does not entail that ‘soul’ is straightforwardly illusory: Kant considers the doctrine of the soul, or psychology in its empirical and rational aspects, to continue to be a valid endeavour, albeit under strictures imposed on both, particularly on rational psychology, by the results of the Paralogisms. Rather, the terms for the object of inner sense are exactly equivalent, as shown in a later passage: ‘the thinking I, the soul (a name for the transcendental object of inner sense)’ (A361).

Although the details of the Paralogisms are much debated, the general error they seek to correct is clear. The object of inner sense must be the ‘wholly empty representation I ... recognised only through the thoughts that are its predicates, and about which we can never have the least concept’ (A345-6/B404). This is the bare subject of thought: the error of rational psychology is to confer further properties onto it. In general, the illusion of the Paralogisms, as Grier puts it, comes about through surreptitiously thinking the ‘intelligible’ soul as an object ‘to which categories could be synthetically attached’.⁵⁰ The error addressed by the first Paralogism (in both editions) is to give the ‘I think’ or soul the property of substantiality, in the *Critique’s* categorial sense of judging it to

⁵⁰ Michelle Grier, *Kant’s Doctrine of Transcendental Illusion* (Cambridge: Cambridge University Press, 2001), p.144. See R5553, which Grier quotes: ‘unity of apperception, which is subjective, is taken for the unity of the subject as a thing’ (18:224; *ibid.*, p.146). For a close echo of this passage in the *Critique*, see B422.

persist. The discussion in the A edition makes clear the precise relation of the object of inner sense to Kant's conceptions of substance:

Of any thing in general I can say that it is a substance, insofar as I distinguish it from mere predicates and determinations of things. Now in all our thinking the I is the subject, in which thoughts inhere only as determinations, and this I cannot be used as the determination of another thing. Thus everyone must necessarily regard Himself as a substance, but regard his thinking only as accidents of his existence and determinations of his state. (A349)

The 'I think' or soul is thus substance in the *ontological* sense of ultimate subject. Kant then asks, '[b]ut now what sort of use am I to make of this concept of a substance?' and answers that 'I can by no means infer' that this 'I think' endures, arises or perishes (*ibid.*). These properties cannot be inferred from the pure category of substance: so the 'I think' cannot be judged according to the *categorial* sense of substance to be a persisting thing. For such a judgement, in the application of the 'empirically useable concept of a **substance**' we can only 'ground the persistence of a given object on experience', or make use of an empirical given to cognise something as substantial through a synthesis with category of substance. As in the refutation of Mendelssohn added to the B edition, discussed above, we can only ground the concept of a substance on matter, as the given in appearance.

This does not imply that we cannot say that 'the soul is substance'; only that we must be attuned to the difference between the ontological sense of substance as ultimate subject, and the categorial judgement of a thing as substance. The former is valid of the 'I think' or soul, the latter is not:

one can quite well allow the proposition **The soul is substance** to be valid, if only one admits that this concept of ours leads no further, that it cannot teach us any of the usual conclusions of the rationalistic doctrine of the soul, such as, e.g., the everlasting duration of the soul through all alterations, even the human being's death, thus that it signifies a substance only in the idea but not in reality. (A350-1)

The soul is legitimately designated substance in the sense that it is the ultimate subject of thinking, but not substance insofar as further determinations, such as, centrally, persistence, can be legitimately ascribed to it.

In both the outer and inner senses, then, there is substance, in a certain conception of the term. Kant writes, 'in the connection of experience[,] matter as substance in appearance is really given to outer sense, just as the thinking I is given to inner sense, likewise as substance in appearance' (A379). In an experience, or real, empirical cognition, both aspects of our intuition, the inner and outer senses, contribute a substantial element. In outer sense, matter is the given, last subject of spatial intuition; in inner sense, the 'I think' is the empty subject accompanying all cognition.

7. Activity and substance in inner sense

What was said above of the second Analogy's discussion of action, activity, force and substance in relation to material substance can be likewise applied to substance in inner sense. The second Analogy states, we recall, '[w]here there is action, consequently activity and force, there is also substance, and in this alone must the seat of this fruitful source of appearances be sought' (A204/B249-50). Action is 'a sufficient empirical criterion' for substance. Above, we considered this in terms of the matter in general of the outer senses. Such an empirical criterion is present in Kant's plans for the *Metaphysical Foundations*, which is an application of the future metaphysics of nature on the presupposition of the empirical concept of matter in general. A fundamental characteristic of matter in general as the object of the outer senses is therefore activity, or in the *Metaphysical Foundations*, the attractive and repulsive forces at the basis of both the Dynamics and Mechanics chapters.

Now that we have seen that the substance of the inner senses is the soul or 'I think', when conceived according to the restrictions imposed by the Paralogisms, we can consider whether activity and force likewise fundamentally characterise the object of the inner senses. The restriction on the substance of the object of inner sense is that it is only substance in the sense of ultimate logical subject. No further properties – such as immortality, simplicity, personality – can be ascribed *a priori* to this empty subject. The 'mere form of consciousness' that is the I is not however completely empty (A382). Analytically, or following tautologically from its notion, the 'I think' is the *activity of thinking*. It is the 'condition accompanying all thinking' (A398). It 'cognises the categories, and through them all objects, in the absolute unity of apperception, and hence cognises them through itself' (A402, emphasis removed). The '*modi* of self-consciousness in thinking are ... mere *functions*' (B406-7, my emphasis). '[I]n every judgement I am always the **determining** subject of that relation that constitutes the judgement' (B407).

The minimal content of the 'I think' or soul of the Paralogisms is therefore the activity of thinking: as cognition, function and determination. In line with the second Analogy, this activity is the empirical criterion of the 'I think' as substance in inner sense. A footnote to the B Paralogisms sheds further light on the notion of empirical criterion. Kant writes,

it is to be noted that if I have called the proposition 'I think' an empirical proposition, I would not say by this that the I in this proposition is an empirical representation; for it is rather purely intellectual, because it belongs to thinking in general. Only without any empirical representation, which provides the material for thinking, the act I think [*der Actus: Ich denke*] would not take place, and the empirical is only the condition of the application, or use, of the pure intellectual faculty. (B423)

'I think' is an empirical proposition insofar as it is only through the material given by empirical representation that thinking takes place, by which we are able to say, 'I think'.⁵¹ The 'pure intellectual faculty' is only potential (following Kant's distinction between faculty and force discussed in chapter three) until actualised by its 'application, or use' in empirical cognition. Similarly, the activity or force of the 'I think' is the empirical criterion of the persisting substance of inner sense: the activity of empirical cognition proves the persistence of the 'I think' or soul as the empty subject of cognition, as the 'vehicle' accompanying our representations.

Kant expresses the active nature of the 'I think' most explicitly at the end of the B Paralogisms: '[t]hinking, taken in itself, is merely the logical function and hence the sheer spontaneity of combining the manifold of a merely possible intuition' (A428). This is presented as a restriction, and in terms of the Paralogisms of rational psychology it is; but this mere logical function of thinking, as 'sheer spontaneity of combining the manifold' of intuition, also displays the positive content of the 'I think' as activity.⁵² The nature of this activity of the 'I think' is of course outlined by Kant in the *Analytic*. The 'sheer spontaneity of combining the manifold' evokes Heidegger's interpretation, but the *Einbildungskraft* foregrounded in the A Deduction is only one of the forces of the soul.⁵³ As we know from the discussion of the *Metaphysics* lectures, Kant considers the faculty of cognition, the faculty of pleasure and displeasure, and the faculty of desire as basic forces. The faculty of cognition is then subdivided in the *Critique*: into receptive sensibility and spontaneous understanding (A50/B74), or alternatively into sense, imagination, and apperception (A94).

Like matter, the soul or 'I think' is most fundamentally characterised by activity and force.⁵⁴ The claim in the second Analogy – that where there is action, activity and force, there is substance –

⁵¹ For a discussion of this passage, see Allison, *Kant's Transcendental Idealism*, p.354.

⁵² Kitcher's account of apperception similarly presents it as, most fundamentally, activity: '[o]n my interpretation, Kant argues that the power of apperception must consciously combine representations to bring about both cognition and the unity of apperception. ... He characterises it only in terms of the role it must play for cognition to be possible' (*Kant's Thinker*, p.166).

⁵³ Heidegger accorded central significance to the transcendental *Einbildungskraft* of the A Deduction, claiming that it should be considered the unknown 'common root' of sensibility and the understanding, and that Kant 'shrank back' from his discovery of this central, unifying faculty, when downplaying the importance of *Einbildungskraft* in the B Deduction (Martin Heidegger, *Kant and the Problem of Metaphysics* 5th edition, trans. by Richard Taft (Bloomington: Indiana University Press, 1997) pp.24-6, 112-120). Henrich's 'On the Unity of Subjectivity' decisively showed that a more historically-faithful interpretation, attentive to the faculty psychology tradition and the issue of a *Grundkraft* explored above, leads us to recognise that the common root is merely hypothetically posited, and is inherently 'unknown to us'. I discuss the *Einbildungskraft* in the next chapter.

⁵⁴ Watkins brings together Kant's physical and psychological forces, although under his general optic of Kant's theory of causality. He notes, 'what distinguishes activity in consciousness from the activity of forces in physics is the fact that we do have an immediate awareness of the self's synthetic activities, whereas we have no direct awareness of the exercise of Newtonian forces' (*Kant's Metaphysics of Causality*, p.272-3). This

therefore applies to the objects of both the inner and outer senses. Matter *qua* empirical givenness and its forces, as we saw above, can be considered the ‘empirical criterion’ that underpins corporeal substance. The same applies to the soul or I think as the substance *qua* last subject in inner sense: ‘[t]he proposition ‘I think’ or ‘I exist thinking’ ... is grounded on empirical intuition, consequently also on the object thought, as an appearance’ (B428). The forces of matter and soul are disclosed to us only in their empirical activity; but the empirical criterion in both objects is force.⁵⁵

8. The relation of inner and outer substance

These conclusions regarding the forces of the ‘I think’ and matter in general are supported by Kant’s passing discussions of the relation between the objects of the inner and outer senses, and the substances therein. The A edition’s fourth Paralogism and its ‘Observation’ on rational psychology, which are highly abbreviated in the B edition, connect these objects.⁵⁶ The ‘Observation’ notes a ‘remarkable difference’ between the doctrine of the soul and of bodies, or the physiology of inner and outer sense. In rational physics, ‘much can be cognised *a priori* from the mere concept of an extended impenetrable being’, but in rational psychology ‘nothing at all can be cognised *a priori* from the concept of a thinking being’: nothing beyond the mere subject-

difference in the immediacy of access to the forces is nevertheless underpinned by their common ground in activity. Watkins concludes that ‘self-consciousness reveals the very same structure that is explicit in [Kant’s] model of causality’ (p.281). My perspective, focused on the issue of forces rather than causality, adjusts this to emphasise that self-consciousness and physical forces share a common structure.

⁵⁵ One of the few detailed discussions of A204-7/B249-51 and force and activity as an empirical criterion for the persistence of substance is Volker Gerhardt’s ‘Handlung als Verhältnis von Ursache und Wirkung: zur Entwicklung des Handlungsbegriffs bei Kant’ in Gerold Prauss, ed., *Handlungstheorie und Transzendentalphilosophie* (Frankfurt: Vittorio Klostermann, 1986), pp.98-131. Gerhardt notes that Kant’s airy introduction of the empirical criterion belies the fact that ‘in truth it amounts to the unity of the first and second Analogies, and ultimately founds the coherence of the world of experience in general’ (p.111). Gerhardt’s focus in this essay is action, *Handlung*; similar ground is covered to the present study, because Gerhardt follows Kant’s definition of *Handlung* as the ‘relation of the subject of causality to the effect’ (A205/B250). As noted above, I consider the terms to be closely related: action is the action of a force. In my view, there is more evidence across Kant’s writings for considering *Kraft* to be this relation – Gerhardt must rely heavily on this passage in the second Analogy – and *Kraft* is a more philosophically problematic concept than *Handlung*, because its natural-scientific and faculty-psychology heritage mean it is more squarely both a given, *a posteriori* concept and a derivative concept of the understanding (Gerhardt, ‘Handlung als Verhältnis’, p.127).

⁵⁶ The A edition’s long discussion of the paralogism of outer relation is reduced to one paragraph in the B edition. Grier considers Kant to have ‘altered and relocated the argument of the fourth paralogism in the B edition’, and takes the central arguments critiqued to change: ‘[i]n the A edition Kant is clearly concerned with the status of knowledge of the external world, whereas in the B edition the fourth paralogism reflects the rationalist (Cartesian) argument for the independence of the soul’ (Grier, *Kant’s Doctrine of Transcendental Illusion*, p.164). I agree there is a change of central emphasis, but would argue that the issues are connected, and aspects of each are discussed in the A and B editions: both are part of the problem of ‘outer relation’, as Kant titles the fourth paralogism in the A edition. Similarly, there is no ‘Observation’ in the B edition but related ideas are explored after the added refutation of Mendelssohn.

position of the 'I think', that is (A381). The reason for this is that the appearance in outer sense 'has something standing and abiding in it' as a 'substratum grounding the transitory determinations'. This substratum is 'space and ... an appearance in it'. In contrast, the appearance in inner sense, which appears not in the form of space but of time, 'has in it nothing abiding' (*ibid.*). The soul is therefore 'in continual flux', other than the contentless I which is 'the mere form of consciousness' (A381-2).

On the basis of the difference between the outer and inner senses and their forms of intuition – space and time, respectively – there is a central difference between the substrata or underlying substances of physics and psychology: on the one hand, something spatially persisting in the appearance, on the other, a continual flux of appearances where persistence is only *formally* present in the mere subject of the representations. Given this apparently essential difference, the fourth Paralogism, particularly as formulated in the A edition, is vital, as it treats the ideality or reality of objects of outer sense. Kant's answer, against transcendental realism and dogmatic or sceptical idealism, is of course the dual commitment to transcendental idealism and empirical realism (A369-71, A377). This is well-known, but key to our interests is a statement at the end of the section:

I, represented through inner sense in time, and objects in space outside me, are indeed specifically wholly distinct appearances, but they are not therefore thought of as different things. The **transcendental object** that grounds both outer appearances and inner intuition is neither matter nor a thinking being in itself, but rather an unknown ground of those appearances that supply us with our empirical concepts of the former as well as the latter. (A379-80)

Although the appearances in inner and outer sense are completely heterogeneous, they are grounded in a transcendental object, which is the unknown source of the both inner and outer empirical appearances. This is the noumenal ground of the unity of the body and soul, or the two aspects of appearances, matter and the 'I think'.⁵⁷

This noumenal ground of inner and outer appearances is of course unknowable. In the 'Observation' of the A Paralogisms Kant declares that the 'notorious question about the community between what thinks and what is extended' reduces to that of '[h]ow is outer intuition – namely, that of space (the filling of it by shape and motion) – possible at all in a thinking subject?' (A392-3, emphasis removed). It is however

⁵⁷ De Boer rightly emphasises that the transcendental object is non-sensible and non-affecting, and so should not be confused with affecting empirical or material objects ('Kant's Multi-Layered Conception', p.234-8; for a clear statement in the *Critique*, see A372-3). I thus follow de Boer in depicting the transcendental object discussed here in the *Dialectic* as the *ground* of appearances, not as itself a sensibly-affecting object (*ibid.*, pp.248-56). See also Henry Allison, 'Kant's Concept of the Transcendental Object', *Kant-Studien* 59 (1968): pp.165-186.

not possible for any human being to find an answer to this question, and no one will ever fill this gap in our knowledge, but rather only indicate it, by ascribing outer appearances to a transcendental object that is the cause of this species of representations ... (A393)

The transcendental object is only a terminological placeholder for something inherently unknowable: a cause with which ‘we have no acquaintance at all, nor will we ever get a concept of it’ (*ibid.*). Kant continues to say that neither he nor anyone else can make substantive claims ‘about the absolute and inner cause of external and corporeal appearances’ in the subject (A394). The dismissal of knowledge of the transcendental object underpinning both the ‘I think’ and matter is thus clear.

Nevertheless, an equivalent passage in the B Paralogisms, already partially quoted, suggests that the transcendental object should be considered in terms of *force*. Kant again treats the problem of explaining the community of the soul and the body. He notes that ‘in accord with our doctrine’, that is, transcendental idealism, ‘a sufficient reply can ... be given to this problem’ (B427). The difficulty of the issue results from the difference in kind between the objects of inner and outer sense, ‘since to the former only time pertains as the formal condition of its intuition, while to the latter space pertains also’: entailing the apparently essential difference outlined in the ‘Observation’. ‘But’, Kant continues,

if one considers that the two kinds of objects are different not inwardly but only insofar as one of them appears **outwardly** to the other, hence that what grounds the appearance of matter as thing in itself might perhaps not be so different in kind, then the only difficulty remaining is that concerning how a community of substances is possible at all, the resolution of which lies entirely outside the field of psychology, and, as the reader can easily judge from what was said in the Analytic about fundamental forces and faculties, this without doubt also lies outside the field of all human cognition. (B427)

The noumenal ground of substances in inner and outer sense is, as ever, beyond the capacities of human cognition. What are we to make, however, of Kant’s reference to ‘fundamental forces and faculties’? This could be read as merely indicating that the transcendental object is just as unknowable as the fundamental forces and faculties discussed in the Analytic. However, on such a reading, the reference to forces and faculties is superfluous: Kant could have simply written that the transcendental object, or the ground of the community of substances, is unknowable. My interpretative claim is therefore that Kant’s reference to ‘fundamental forces’ betrays the deep relation between force and the unknowable common ground of substances.⁵⁸ The reference is

⁵⁸ De Boer’s discussion of Kant’s transcendental object arrives at a conclusion that supports this reading, similarly identifying noumenal forces grounding the objects of physics and psychology: ‘even though Kant does not exactly conceive of the forces constitutive of material objects as immaterial, he considers them to precede and ground material objects, in other words, to be noumenal rather than phenomenal. Accordingly, he can take them to be on a par with the forces that within the realm of rational psychology emerge as the capacity of the human mind to intuit, think and act’ (de Boer, ‘Kant’s Multi-Layered Conception’, p.255-6).

symptomatic of the significance of force to the ontological ground of the 'I think' and matter in general. We can interpret the passage as indicating that what can be minimally said of the noumenal transcendental object beneath both inner and outer appearances can be found in the discussion of fundamental forces and faculties. Kant's reference to fundamental forces and faculties therefore underlines the ontological significance that we have seen force and activity have for the substance of both the inner and outer senses, or the 'I think' and matter in general.

9. The derivation of the predicable 'force'

We can now turn back to the question of the means of the derivation of 'force'. The *Prolegomena* (4:324) states that the full delineation of the predicable concepts must wait for the future system of metaphysics, but, we recall, notes that predicables can be derived in the following ways:

- 1) by connecting the categories with each other;
- 2) by connecting the categories to the pure forms of intuition;
- 3) by connecting the categories to the 'matter' of appearance, in general, not yet specifically empirically determined.

As we have seen, Kant's definition of force as the causality of substance for accidents implicitly depicts 'force' as derived in the first way, as a combination of the categories of substance and accident with cause and effect. Does this fully capture the roles played by force in the passages we have discussed, primarily from the Paralogisms and the *Metaphysical Foundations*? If force is the empirical criterion for substance – in both the matter in general of the outer senses, and the soul or 'I think' of the inner senses – then it cannot be merely a connection between two pure categories of the understanding. Force is not simply a result of a judgement but implicitly grounds both the object of inner and outer sense.

On this basis, I contend that 'force' is derived not only through the first of the *Prolegomena's* means of connection, but *also* by the second and third. That is, 'force' is not just a connection between two categories. In its role as the activity of the soul or the 'I think', force is also derived through the second means: it names the connection of the categories to the pure forms of intuition, a connection manifested by the various forces of the soul. In its role as the activity of matter, force is derived through the third means: it is the connection between the categories and matter in general, manifested by the forces of matter.

Of course, the full system of metaphysics forecast in the *Prolegomena* and the *Critique*, which would flesh out the categories by delineating the derivation of the predicable categories, was never completed, or at least not to the extent of completing this task. There is therefore a necessary element of speculation as to the means by which Kant thought the predicable 'force'

was to be derived. Nevertheless, the analysis above suggests that all three of the means of derivation apply to 'force'. It should here be evident that force is irreducible to the pure category of causality. Causality occupies a relatively unambiguous place among the categories of the understanding, even if it has prompted copious discussion in the secondary literature, from the classic concern with 'Hume's problem' to Watkins' recent historically-situated account. Force, by contrast, remains in an indeterminate place in the critical architectonic, as a derivative concept to be explained in the future metaphysical system, which, I have argued, may be derived through all three of the means of derivation of the predicables.

As with Leibniz's new science of dynamics, this future clarification of the nature of Kantian force was not carried out. In a further echo of Leibniz's dynamics, 'force' appears to be both central to the task of the future system, and that which remains under-theorised in the absence of the completed science. Therefore, whilst Kant's considerations of force are wide-ranging and rich, the conclusions that I have reconstructed must remain somewhat tentative. If what can be said of the unknown 'empirical criterion' is that it is a fundamental force – with the restrictions on fundamental force that Kant consistently applies – does this furnish us with any positive knowledge of the activity underpinning the objects of both the inner and outer senses, the soul and matter? Force is simply relational, in Kant's mature view: it is the connection of a substance to accidents, insofar as substance causes its accidents. My interpretation contends that *something* can be said of the unknown unifying ground of matter and the soul: that this ground is force. This may yet provide no knowledge, however, because not only do we have no knowledge of the fundamental force, but we also do not know what the fundamental *substance* is that has this fundamental force, as this would be a noumenal thing-in-itself. If elements of the general ambition of a Leibnizian dynamics thus persist in the aspects of the *Critique* we have investigated – that is, philosophising through forces, and connecting the physical and metaphysical on this basis – these elements are certainly on the boundary-line of what can be known *a priori* or justifiably incorporated into the transcendental structures. Kant's critical account of forces – at least in the first *Critique* and connected theoretical works – appears at the limit of what can be said within the critical restrictions.

This is confirmed by the sketch of the future system of metaphysics in the *Critique's* Architectonic. One branch of this future metaphysics of nature, which would be a speculative system of theoretical *a priori* knowledge on the basis of the *Critique's* secure grounding of metaphysics, is rational physiology.⁵⁹ Rational physiology is the science of 'the sum total of given objects', for

⁵⁹ Alongside ontology, rational cosmology and rational theology, in the inherited Wolffian structure of metaphysics.

which there are two kinds of objects: those of outer sense (corporeal nature), and those of inner sense (thinking nature) (A845-6/B873-4). Kant then addresses questions 'which could arouse reservations', the first of which is:

how can I expect an *a priori* cognition and thus a metaphysics of objects that are given to our senses, thus given *a posteriori*? And how is it possible to cognise the nature of things in accordance with *a priori* principles and to arrive at a **rational** physiology? The answer is: We take from experience nothing more than what is necessary to **give** ourselves an object, partly of outer and partly of inner sense. The former is accomplished through the mere concept of matter [*bloßen Begriff Materie*] (impenetrable lifeless extension), the latter through the concept of a thinking being (in the empirically inner representation 'I think'). Otherwise, we must in the entire metaphysics of these objects abstain entirely from any empirical principles that might add any sort of experience beyond the concept in order to judge something about these objects. (A847-8/B875-6)

The question that Kant poses to himself in these final pages of the *Critique* concerns the possibility of this physiological branch of the future system of metaphysics: how will it be possible to have *a priori* knowledge of the *a posteriori*, which a metaphysics of the given objects of nature (physics and psychology) seems to demand? The answer is: the future rational physiology will take a minimal empirical element. Now, it will be evident that this minimal empirical element is just that which this chapter has discussed: the matter in general of the outer senses, and the 'I think' of the inner senses. We identified the 'empirical criterion', in the substance of both these objects, as the action or force underpinning matter and the soul.

The future metaphysical system's construction of *a priori* knowledge of objects given to our senses thus borrows the minimal empirical elements of the activity of the soul and matter. Our investigation has sought to show not only that 'force' is vital for understanding the objects of the inner and outer senses, but even that it appears as the only positive content of what can be said of the common ground of the soul and matter. It is thereby central to the content of the forecast post-critical metaphysics, as a minimal empirical criterion underpinning the future rational physiology. In this way, the full derivation of the predicable concepts in the future system, which Kant suggested could be straightforwardly achieved using Baumgarten, and which he encouraged Jakob to do in his stead, is at least in the case of force a more complex and significant undertaking than Kant allowed.⁶⁰

⁶⁰ Letter to Ludwig Heinrich Jakob, cited above, of 11th September 1787 (10:494). The significance of the undertaking is evidenced in the fact that Kant continues to mention the full derivation of the predicables in the *Opus postumum*: before 1796 (21:457), September-October 1798 (21:165) and April to December 1800 (22:88). The first reference adds an intriguing parenthesis: '*Predicables* (possibility of pure mathesis)'. This connects the predicables to Kant's suggestions in letters that the *Critique* might be used to 'yield something analogous to Leibniz's *ars universalis characteristica combinatoria*' (11:290); cf. 10:351.

Kant's forecast metaphysics of nature, like Leibniz's dynamics, was never to appear in full. We therefore have no physiological part of the metaphysics of nature to explain certain elements of Kant's thinking of forces that remain unclear. These unresolved issues pertain precisely to the location of 'force' at the boundary of the critical philosophy's strictures. Firstly, the notion of force is central to both physics and psychology, although Kant insists that no analogy can be drawn between the forces in either domain, so psychological forces cannot be elucidated through physical ones or vice versa. Physical and psychological forces, or objective and subjective forces, are absolutely distinct but the same general ontological definition of force is at work in both domains; they are grounded in a common notion of force. The objects of inner and outer senses each have a minimal empirical criterion: a force with a common structure. Secondly, and related, the *a priori* or *a posteriori* nature of both physical and psychological forces is unclear. In both domains, 'force' is a predicable, according to its general ontological definition, and so is an *a priori* derivative category, but as a fundamental activity it also provides a minimal *empirical* input for the future rational physiology. There are therefore two tensions that remain in Kant's critical-period notion of force: is it subjective or objective, and is it *a priori* or *a posteriori*?

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Part two has moved from Kant's early, interrupted pre-critical dynamics to the explicit discussions of force in, primarily, the *Critique* and the *Metaphysical Foundations*. Force is at the heart of both Kant's physics and his transcendental psychology, because, I have argued, it is present as the fundamental activity that constitutes matter in general and the 'I think'. Force is a predicate to be explained in the never-completed full system of metaphysics: I have shown that it can be derived through all three of the means of derivation of predicables, and it therefore occupies a deeply indeterminate place in the critical architecture.

In the critical period, the Leibnizian notion of force is subject to a fundamental transformation: Leibniz's taxonomical distinction between primitive and derivative force is transformed into an epistemological distinction, where primitive force is the result of a rational reduction of given, empirical forces, guided by regulative idea of a single fundamental force. Although this is a profound alteration, the broad dynamics project discussed in part one still persists in the critical period. Force continues to underpin Kant's account of both bodies and minds.

The self-critical restriction imposed by *Dreams* has not been completely forgotten in the critical period: there is no equivalent of a *Vorstellungskraft*, a single force that explains physical and mental processes; the specific forces in the separate domains of bodily and mental forces are

irreducible to one another. But there is a common, ontological account of force in general, underpinning the specific forces in Kant's physics and psychology, as outlined in this chapter. This common, ontological notion of force, with all its persisting ambiguities, will be significant to the role of force in the later critical texts discussed in part three. The role that force plays in the third *Critique* and the *Opus postumum* is most importantly connected to the systematising intentions of these texts, particularly insofar as they are oriented towards the full, unified system of metaphysics that Kant sought but was never to complete.

Part Three

Kant's late philosophy of force

Having reconstructed Kant's use of specific forces and common, ontological account of force in the critical period, we now turn to the role of force in later texts. This will allow us to continue to trace the persistence of the dynamics problematic, which has been covertly present in the fundamental basis that we have seen provided by force for matter in general and the 'I think'. Chapter five explores the role of force in the third Critique, in the notions of reflektierende Urteilskraft and Bildungskraft. I argue that the unificatory function of these forces highlights the systematic relation between Einbildungskraft and Bildungskraft, and shows that Kant's critique of Herder's employment of organic forces masks a deeper similarity than Kant wishes to admit. Chapter six gives an account of the role of force in the Opus postumum, on two levels: on the macro-level of broad trends within the sprawling drafts, and on the micro-level of a single manuscript folio. A close reading of draft 'X' from fascicle XI finally presents Kant's attempt to rethink the subject and object of transcendental philosophy in terms of moving forces.

Chapter 5

Force in *Urteilkraft* and *Bildungskraft*

1. Herder and the third *Critique*

In January 1785, Kant published a review of the first volume of his former student Herder's *Ideen zur Philosophie der Geschichte der Menschheit* (1784). The review is highly critical of Herder's attempt to explore the spiritual nature of the human soul on the basis of an 'analogy to natural formations of matter, mainly in its organisation' (8:52). Kant's critique can be taken to be fourfold. Firstly, Kant claims he 'does not understand this inference from the analogy of nature', because the different stages of organisation of nature, from matter to non-human animals to humans, are occupied by 'different beings' (8:53). Kant insists on an absolute difference between matter and the mind, and more fundamentally rejects Herder's analogical approach to the connection between the two. Secondly, he paraphrases Herder as positing an 'invisible realm of effective and self-sufficient forces' working within and animating all matter. For Kant, this use of an invisible realm of organising forces is an attempt 'to explain *what one does not comprehend* from *what one comprehends even less*' (8:54). Herder does not follow Kant's mature treatment of forces, in which fundamental forces are reached only through the rational reduction of given, derivative ones. Instead Herder posits a single, fundamental force at the heart of everything, an 'animating force that organises everything' (8:52). Kant's dismissal evokes the early-modern use of the label 'occult qualities' for the positing of forces or faculties that purport to explain something through the mere positing of an effectuating force: this is tautological and ultimately fails to explain anything.

Thirdly, Kant claims that Herder's unified organic force – 'self-forming in regard to the manifoldness of all organic creatures, and later in accordance with the difference of these organs working through them in different ways', which is thereby 'supposed to constitute the entire distinctiveness of its many genera and species' – is alien to observational science and 'belongs merely to speculative philosophy'; it is therefore 'metaphysics, indeed even a very dogmatic one' (8:54). Herder's simple *positing* of a force ignores the critical strictures that Kant considers himself to have irrefutably proven in the years since Herder was his student. Fourthly, Kant cannot see how an organising, organic force could be conceived as underpinning the faculty of reason:

to try to determine ... how an organisation directed merely to [the end of the physical characteristics of the human] contains the ground of the faculty of reason, in which the animal thereby participates – that obviously surpasses all human reason, whether it wants to grope about on the guiding thread of physiology or fly in the air with those of metaphysics. (8:54-5)

The ground of the faculty of reason is, for Kant, by definition beyond the capacity of human reason; in this way, Herder's *Ideen* are, again, a dogmatic metaphysics without a basis in the critique of its extent and limits.

In sum, these critiques dismiss both Herder's fundamental organising force and his use of analogy to depict the human mind or soul as organised through this force. Herder is unapologetic about his use of analogy. His 1778 'On the Cognition and Sensation of the Human Soul' opens with the claim that our observation of 'the great drama of effective forces in nature' and particularly in inert physical matter leads us to 'feeling similarity with ourselves' in that we are 'enlivening everything with our sensation'.¹ Mass, inertia, motion, elasticity; Newtonian attraction and repulsion as 'love' and 'hate'; warmth, cold and electricity: these are all analogies from human sensation, on Herder's account. 'The sensing human being feels his way into everything, feels everything from out of himself, and imprints it with his image, his impress'.² The use of analogical reasoning and inference is therefore unavoidable: '[i]s there in this 'analogy to the human being' also truth? Human truth, certainly, and as long as I am a human being I have no information about any higher'. The limitations of the human perspective mean that we must understand nature through analogy with ourselves. Herder thus states that '[w]hat we know we know only through analogy'.³ Although Kant's *Critique* makes use of analogical reasoning in the Analogies of Experience, this sense of 'analogy' is limited and technical.⁴ Kant is deeply antipathetic to Herder's more 'poetic' use of analogical reasoning, particularly as it is an analogy from an organic force that he considers scientifically dubious, across a boundary, between material and immaterial nature, that he has been arguing since *Dreams* is unbridgeable.⁵

¹ Herder, 'On the Cognition and Sensation of the Human Soul' in Johann Gottfried von Herder, *Philosophical Writings* trans. and ed. Michael Forster (Cambridge: Cambridge University Press, 2002), p.187.

² *Ibid.*, p.188.

³ *Ibid.* The later *Metakritik* makes Herder's view yet clearer: 'This *analogy of our self* we cannot but apply to everything outside us because we see, hear, understand, act only *through and with our self*. ... *Organisation* is our form, *the essence of understanding and the understood*, without which the understood means nothing to the understanding, without which the understanding also means nothing to itself' (*Eine Metakritik zur Kritik der reinen Vernunft in Sämtliche Werke* ed. Bernard Suphan et al (Berlin: Weidmann'sche Buchhandlung, 1877-1913), vol. 21, pp.100-101, quoted in Hans Adler and Wulf Koepke eds., *A Companion to the Works of Johann Gottfried Herder* (Rochester, NY: Camden House, 2009), p.57).

⁴ 'For Kant, analogical inference is a means of expressing how, given an abstract transcendental principle, that principle can then be appropriately applied to a realm of particular, empirically conditioned appearances'. John Callahan, 'Kant on Analogy' *British Journal for the History of Philosophy* 16.4 (2008), p.748.

⁵ Kant jeers that the philosopher is left seeking Herder's original organising force in the 'fruitful field of his poetic force [*Dichtungskraft*]' (8:54).

From this perspective, then, it appears surprising that Kant's *Critique of the Force of Judgement* (1790) not only seeks to bridge a different but comparable 'incalculable gulf' between the sensible domain of nature treated by the first *Critique's* theoretical philosophy, and the supersensible domain of freedom treated by the second *Critique's* practical philosophy (5:175), but, more strikingly, that the second half of the work contributes to this by adopting and making philosophical use of a concept from the life-scientist Johann Friedrich Blumenbach. This concept is the *Bildungskraft* or 'formative force' used to present organisms in terms of final causality in the 'Critique of Teleological Judgement'. Now, the central philosophical innovation of the third *Critique* is its introduction of the notion of *reflektierende Urteilskraft* or the reflecting force of judgement, as an addition to the forces of the mind employed and analysed in the *Critique's* Analytic.⁶ It is this faculty of judgement, Kant states in both Introductions, that 'mediates the connection' or is the 'intermediary' between the understanding's concept of nature and reason's concept of freedom (20:202, 5:177). This is the famous 'ground of the unity of the supersensible that grounds nature with that which the concept of freedom contains practically' (5:176). This unity provided by *Urteilskraft* enables the one-way influence that the practical domain of freedom must have on the theoretical domain of nature, in order that the ends of practical reason can be realised in the sensible world (*ibid.*). *Bildungskraft*, introduced in the 'Critique of Teleological Judgement' in connection with reflecting judgements on organisms and nature as a whole, must have some relation to this unifying function of *Urteilskraft*.

Our focus on *Kraft* and *Kräfte* in Kant's thought enjoins us to consider the significance of the fact that two *forces* are introduced to resolve some of the multifaceted aims of the third *Critique*: reflecting *Urteilskraft* and *Bildungskraft*. Should these be considered forces in the technical sense discussed above? What is the connection between these two forces? In borrowing Blumenbach's biological force, does Kant risk echoing the illegitimate analogy, from a single organic force to the organising force of the mind, for which he admonishes Herder in 1785? Furthermore, from the perspective of this study, what is at stake is not simply whether Kant commits something like the error he criticises in Herder, but rather the relation that reflecting *Urteilskraft* and *Bildungskraft* have to the unresolved difficulties encountered in our exploration of Kant's account of force: the relation of mental and physical forces, and whether force in general should be considered subjective or objective, and *a priori* or *a posteriori*. In order to address this, we must first elucidate

⁶ In line with my translation of *Kraft* as 'force' throughout, *Urteilskraft* is rendered 'force of judgement'. On this decision, which also leads me to translate the title of the third *Critique* as the *Critique of the Force of Judgement*, see the Introduction, above.

Urteilstkraft, *Bildungskraft*, and the connections between the two and to the other forces already discussed.

2. *Urteilstkraft*

Kant's Preface claims that the *Critique of the Force of Judgement* completes the 'critical enterprise'; it should do so through its complex treatment of reflecting *Urteilstkraft*, in two broad respects: judgements of objects of beauty and sublimity, and of teleology in organisms and nature as a whole (5:170). The third *Critique*, or aspects of it, had been projected much earlier. In 1772, Kant mentioned his intention to write a work on 'the universal principles of feeling, taste, and sensuous desire' in the famous letter to Herz (10:129). The *L₁ Metaphysics* of the mid-1770s provides a 'general classification of the mental faculties' with a major subdivision of '1. *representations*; 2. *desires*, and; 3. the *feeling of pleasure and displeasure*' (28:228). Already here the faculty of desire, which would be treated by the third *Critique*, is located in between those of representations and pleasure and displeasure, which are the topics of the first and second *Critiques*, respectively. Not until 1787, however, does the plan to write a 'critique of taste' return in Kant's correspondence.⁷ This designation of the third *Critique* as primarily engaged with taste and aesthetics was determinative for much of the English-language reception of the text until fairly recently. Modern scholarship, however, foregrounds both halves of the work, attending to the 'Critique of Teleological Judgement' as well as the 'Critique of Aesthetic Judgement'.⁸ It thus illuminates the relationship between these halves, and shows how the work as a whole seeks to achieve Kant's stated goal of bridging the 'incalculable gulf' between the domain of nature and the domain of freedom, for practical reason to be able to actualise the ends of its moral law in the world of nature.⁹ It is the faculty of *Urteilstkraft* that bears the responsibility for effecting this connection.

Urteilstkraft in general is 'the faculty for thinking of the particular as contained under the universal' (5:179). This meaning is already given in the first *Critique*:

⁷ Letter to Schütz of 25th June 1787 (10:490); to Reinhold of 28th and 31st December 1787 (10:514-5). For this background, see Paul Guyer's 'Introduction' to Guyer, ed., *Kant's Critique of the Power of Judgement: Critical Essays* (Lanham: Rowman & Littlefield, 2003), p.vii-viii.

⁸ See the Introduction to Rachel Zuckert, *Kant on Beauty and Biology: An Interpretation of the Critique of Judgment* (Cambridge: Cambridge University Press, 2007).

⁹ Guyer's work in this area provides a convincing account of the systematic intentions of the third *Critique* and the practical ground of its solutions on this front. See Guyer, 'Kant's Principles of Reflecting Judgement' in Guyer, ed., *Kant's Critique of the Power of Judgement*, particularly pp.49-58; 'From Nature to Morality: Kant's New Argument in the 'Critique of Teleological Judgement'' in *Kant's System of Nature and Freedom* (Oxford: Clarendon, 2005), pp.314-342.

If the understanding in general is explained as the faculty of rules, then the *Urteilkraft* is the faculty of subsuming under rules, i.e., of determining whether something stands under a given rule (*casus datae legis* [case of the given law]) or not. (A132/B171)

Urteilkraft is the mental faculty or force of subsuming something under the understanding's pure concepts. The innovation of the third *Critique* is to divide this into determining and reflecting *Urteilkraft*. In determining *Urteilkraft*, the universal is given and the particular is subsumed under it: this is the structure of cognition, or determination of objects of experience, as described in the *Critique's* Analytic. In reflecting *Urteilkraft*, by contrast, only the particular is given, not the universal. This is a judgement in which no universal rule or category is given, and this is because the manifold forms of nature are so diverse that there is no concept for each individual one (5:179, 20:213). The concepts of the understanding are on the highest level of generality, determining only the aspects of quantity, relation and so on of the object in general; the specific objects in physical nature are not determined *in their specificity* by such categorial judgements. The laws determined by reflecting *Urteilkraft* may seem, Kant notes, to 'be contingent as far as the light of *our* understanding goes' but they 'must be regarded as necessary on a principle of the unity of the manifold' (5:180).¹⁰ This principle of the unity of the manifold is given by reflecting *Urteilkraft* to itself (5:181), and is that of the *purposiveness* of nature.

This purposiveness (*Zweckmässigkeit*) is the idea of a teleological development, final causality or end of nature. Kant writes that specific laws of nature

must be considered in terms of the sort of unity they would have if an understanding (even if not ours) had likewise given them for the sake of our faculty of cognition, in order to make possible a system of experience in accordance with particular laws of nature. Not as if in this way such an understanding must really be assumed (for it is only the reflecting force of judgement for which this idea serves as a principle, for reflecting, not for determining); rather this faculty thereby gives a law only to itself, and not to nature. (5:180)

To regard nature as purposive is to conceive of it *as if* it were fashioned for an end by a (divine) understanding, but without this implying any theological commitments, as it is a principle for reflecting *Urteilkraft* itself and does not determine objects of knowledge. The first Introduction calls this 'the technique of nature', which *Urteilkraft* 'makes ... into the principle of its reflection *a priori* ... to be able to reflect in accordance with its own subjective law' (20:214).

Paul Guyer points out that there are at least five different forms of reflecting judgement described in the third *Critique*, namely:

the use of reflecting judgement to search for a system of scientific concepts and laws, described in both versions of the introduction to the work; aesthetic judgement, which takes two forms, namely the judgment of beauty and the judgement on the sublime; and teleological judgement, which also has at least two forms, namely, judgement on the purposive rather than merely mechanical

¹⁰ I quote Meredith's translation of the first passage.

organisation of particular organisms in nature, and the judgement that nature as a whole constitutes a single system with a determinate end.¹¹

These five distinct forms have not often been noted by commentators and create some of the difficulties that have entailed the wide range of interpretative responses to the work. Furthermore, Guyer argues that Kant's notion of a regulative principle of reason, outlined most extensively in the *Critique's* Appendix, provides the best means of understanding reflecting *Urteilkraft*. Regulative principles are opposed to constitutive ones: the latter produce determinate knowledge of objects, whereas the former merely provide a guiding function for the understanding (A644/B672). Regulative and constitutive principles thus align closely with the reflecting and determining forces of the understanding. Guyer identifies three features of regulative principles. Firstly, they aim to systematise: the regulative principle of a *Grundkraft* provides systematic unity to cognition, as we can treat the various forces of the mind as if they stem from a common fundamental force. Secondly, regulative principles make knowledge (or practical activity) possible, and do so as transcendental presuppositions: the idea of God is a presupposition for the rationality of nature.¹² Thirdly, these principles act as a heuristic, guiding our thought or conduct: our investigations in psychology and physics should be guided by the idea of a *Grundkraft* to reduce empirically-given forces to the smallest number possible.¹³ Guyer shows that, although the five forms of reflecting *Urteilkraft* are distinct, they can all be presented as regulative principles in the sense given in the Appendix.

Both reflecting *Urteilkraft* and regulative principles are 'second-order' in that they do not constitute or determine objects but rather, in relation to objects that have been cognised, are used to consciously reflect on these objects.¹⁴ As the first Introduction puts it, to reflect or to consider (*überlegen*) 'is to compare and to hold together given representations either with others or with one's faculty of cognition, in relation to a concept thereby made possible' (20:210). The representations are already 'given' before reflecting *Urteilkraft* and regulative principles work with them. Although they share this second-order, reflective character, there is a difference between the regulative principles of the first *Critique's* Appendix and the third *Critique's* reflecting *Urteilkraft*, one that Guyer does not discuss. Reflecting *Urteilkraft* is a force or faculty of the mind, whereas a regulative principle is employed in a judgement *by* a force or faculty of the mind. In this way it might be compared to the second-order faculties outlined in the *Anthropology*

¹¹ Guyer, 'Kant's Principles of Reflecting Judgment', p.2; see also Guyer, *Kant's System of Nature and Freedom* (Oxford: Clarendon, 2005), pp.293-4.

¹² Likewise, Kant writes, 'the principle of the purposiveness of nature (in the multiplicity of its empirical laws) is a transcendental principle' (5:182).

¹³ Guyer, 'Kant's Principles of Reflecting Judgment', pp.4-5.

¹⁴ As Guyer puts it, regulative principles are 'employed in our conscious *reflection* on our experience of inner states or outer objects' (*ibid.*, p.5). I use 'second-order' as shorthand for this conscious reflection.

(1800), such as foresight, memory, using signs, acumen, wit and divination.¹⁵ However, it has a much greater systematic importance than these faculties. The table of the higher faculties ‘in their systematic unity’ presented in the first and published Introductions promotes *Urteilkraft* to a role comparable to the understanding and reason, as the higher faculty governing cognition in accordance with principles for the faculty of pleasure and displeasure (5:198, 20:245-6). I say ‘comparable’ because whereas reason and the understanding have ‘domains’ of objects over which they legislate – the concepts of nature and freedom, respectively – *Urteilkraft* is distinct from reason and the understanding in that ‘it can claim no field of objects as its domain’ (5:174, 177). *Urteilkraft* is of both minor and major importance in comparison to reason and the understanding: minor in that it does not legislate over a distinct domain of objects, but major in that it is the ‘intermediary between the understanding and reason’ and provides the ground of the unity of the supersensible that grounds both nature and freedom (5:177, 175-6).

The first example of a regulative principle in the Appendix, as discussed in chapter three above, is the use of a *Grundkraft* to guide the systematisation of the various forces of mind and nature for their reduction to the smallest possible number. Reflecting *Urteilkraft*, by contrast, is a force of mind, of comparable significance, but not the same nature, as understanding and reason. It can be classified as a regulative principle, as Guyer demonstrates, but reflecting *Urteilkraft* also *gives itself* a regulative principle: that of purposiveness. This principle of purposiveness operates, in regard to the characteristics of regulative principles, in two main ways. Firstly, it is a second-order principle for reflecting on and systematising representations. These representations, in the third *Critique*, are artistic forms, natural forms that are beautiful or sublime, natural organisms, or the representation of nature as a whole. Purposiveness provides a means of understanding these various forms of representations as if they are organised and as if they were created for an end, by an intelligence: ‘as if’ because purposiveness is a *regulative* principle. Secondly, reflecting *Urteilkraft*’s principle of purposiveness is the means by which it fulfils its systematic role, of showing how theoretical and practical philosophy can be bridged from the practical perspective. An account of how this should function goes beyond our aims here.¹⁶ It is enough to note that

¹⁵ In the L₁ Metaphysics a number of these faculties are discussed as aspects of the ‘higher faculty of cognition’: so wit, acumen, temper and genius are introduced after the understanding and *Urteilkraft* (28:24-5). This shows these ‘anthropological’ faculties are, at least in the late 1770s, considered by Kant to be part of a continuum, from what we have called ‘first-order’ faculties, constituting objects, to ‘second-order’ ones, reflecting on them.

¹⁶ Guyer provides an account of what for him is the ‘culminating argument of the *Critique of the Power of Judgment*, and thus of Kant’s critical philosophy as a whole’: that the use of the regulative concept of purposiveness is ‘for the sake of the ... practical faculty of reason’ (5:375) because the ideal of nature as a single system allows us to satisfy both our intellectual need – in moving towards a systematic comprehension of nature – and our moral need of the highest good – through seeing nature as a system of ends (Guyer, ‘Kant’s Principles of Reflecting Judgment’, pp.51-5). See also Guyer, ‘Organisms and the Unity of Science’ in

purposiveness, as the regulative principle given by reflecting *Urteilkraft* to itself, is that which, Kant believes, enables the various aims of the third *Critique* to be achieved.¹⁷

Reflecting *Urteilkraft* can therefore be considered a regulative principle, but it is also a higher faculty of the mind with central systematic importance. It operates through the regulative principle of purposiveness: of art and – most importantly for Kant’s systematic purposes, showing the discussion of art to ultimately underpin the notion of the organisation of organisms and nature *as if* artistically created by an intelligence for a purpose – of nature.¹⁸ The discussion of the purposiveness of nature takes place through the introduction or adoption of *another* regulative concept: that of the *Bildungskraft* of organisms.

3. *Bildungskraft*

Bildungskraft appears primarily in two places in the ‘Critique of Teleological Judgement’: §§64-5 and §81. In §64 Kant discusses the concept of a ‘natural end’ as central to his rehabilitation of final causality. A thing is a natural end ‘if it is cause and effect of itself’ (5:370). Kant’s example is a tree, which is a natural end in three ways: on the species level, in which the species ‘unceasingly produces itself’ and is thus cause and effect of itself; on the individual level, in which a tree produces itself through growth with an ‘originality’ that cannot be reduced to the ‘mechanism of nature outside of it’ but can be located in the tree’s capacity itself; and between the parts of a tree, in which the leaves and branches, for example, are reciprocally dependent, each preserving the other and thus cause and effect of one another (5:371-2).

§65 then gives the name of ‘organised beings’ to things that are these natural ends. Such organised beings, having ends or teleological causality, transcend mechanical causality; and this is depicted in terms of forces:

An organised being is thus not a mere machine, for that has only a **motive** force [*bewegende Kraft*], while the organised being possesses in itself a **formative** force [*bildende Kraft*], and indeed one that it communicates to the materials, which do not have it (it organises the latter): thus it has a

Kant’s System of Nature and Freedom, pp.86-112, particularly p.90; and ‘From Nature to Morality: Kant’s New Argument in the ‘Critique of Teleological Judgment’ in *ibid.*, pp.314-342.

¹⁷ On purposiveness as key to the unification of the third *Critique*, see Zuckert, *Kant on Beauty and Biology*, p.5 and *passim*. For a further investigation, see Hannah Ginsborg, *The Normativity of Nature: Essays on Kant’s Critique of Judgement* (Oxford: Oxford University Press, 2015). Ginsborg considers ‘purposiveness without purpose’ to be too thin a notion for the unification of the two halves of the third *Critique*, and contends that the common ground should rather be taken to be normativity without norms (p.228ff).

¹⁸ Of course, the natural teleology of the ‘Critique of Teleological Judgement’ cannot be reduced to the example of art, for ‘[o]ne says far too little about nature and its capacity in organized products if one calls this an analogue of art’, as this would be to conceive of an artist outside the organism and nature, whereas organised products organise themselves (5:374).

self-propagating formative force [*sich fortpflanzende bildende Kraft*], which cannot be explained through the capacity for movement [*Bewegungsvermögen*] alone (that is, mechanism). (5:374, t.m.)¹⁹

Formative force is thus distinguished from the merely motive force of mechanical causality, and an organised being is designated as having both. Ina Goy notes that *sich fortpflanzende* could have the meaning of spreading-out or unfolding, or to refer to propagation of plants and animals.²⁰ But, as Goy points out, it is the formative force itself that is here self-propagating. This force should not therefore be understood on an analogy with art, as Kant writes, for that presupposes something external that bestows form on the organism; '[r]ather, it organises itself' (5:374). An 'analogue of life' comes closer to capturing the action of the formative force, which however risks a hylozoistic conception of matter that Kant is always keen to avoid, or conversely returns to the idea of an external artificer if matter is considered to be ensouled. In this passage, Kant calls the property of the self-propagating formative force 'inscrutable': '[s]trictly speaking, the organisation of nature is therefore not analogous with any causality we know' (5:374, 375).

Kant's reference to this action of the formative force, in relation to the 'materials' of a living body to which it gives form, should be understood in relation to the debate between epigenetic and preformationist conceptions of organic development in the eighteenth century. Where preformationist (or, confusingly from a modern perspective, 'evolutionary') positions defended by Albert von Haller and Charles Bonnet claimed that the whole mature organism was present *in nuce* in the embryo, the epigenetic view posited an internal principle that formed homogeneous matter into a specific and differentiated organism. C. F. Wolff's *Theoria generationis* (1759) defended epigenesis against Haller. Blumenbach, by the time of his *Über den Bildungstrieb* of 1781, had also come to advocate an epigenetic account. Epigenesis tended to require some kind of force that would direct the formation of the largely unformed embryo into the mature organism. In Wolff this was a *vis essentialis*; in Blumenbach, as the title of his work shows, it was a *Bildungstrieb* (which he considered to be something distinct from Wolff's essential force).²¹ Kant's 'self-propagating *bildende Kraft*' is therefore within the proto-biological tradition of thinking the force that accompanies and guides the epigenetic development of organisms.

¹⁹ I follow Ina Goy in altering the Cambridge translation's 'to the matter' to the plural 'to the materials' (Goy, 'Kant on Formative Power', *Lebenswelt* 2 (2012), pp.33-5. pp.33-5). As ever, I translate *Kraft* as 'force'.

²⁰ Goy, 'Kant on Formative Power', p.36.

²¹ Much of the literature rehearses this narrative; for a useful concise history of the epigenetic and preformationist positions, see Robert J. Richards, 'Kant and Blumenbach on the *Bildungstrieb*: a historical misunderstanding' in *Studies in History and Philosophy of Biological and Biomedical Sciences*, 31.1 (2000), pp.13-21.

This tradition is more explicitly referred to in Kant's other reference to the formative force in the 'Critique of Teleological Judgement': this time to *Bildungskraft* in §81. In this section Kant discusses the association (*Beigesellung*) of the two kinds of causality under attention in the work: mechanical and teleological causation. Although our 'reason does not comprehend the possibility of a unification of two entirely different kinds of causality', the ground of which lies in the supersensible, nevertheless such an association must hold between the mechanical causality of natural beings and their teleological purposiveness. Given this, there are a number of options for understanding such a relation. Occasionalism posits the continuous invention of God in natural formation; for Kant, 'no one who cares anything for philosophy will assume this system' (5:422). The alternative is 'preestablishment' (*Prästabilm*), into which Kant places the two major strands of biological explanation of the day, preformation and epigenesis. 'No one has done more for the proof of this theory of epigenesis' and its principles and limits, Kant writes, 'than ... Blumenbach' (5:424). As Kant writes in a letter to Blumenbach, what he values in the latter's theory of the *Bildungstrieb* is its contribution towards unifying 'two principles that people have believed to be irreconcilable, namely the physical-mechanistic and the merely teleological way of explaining physical nature' (11:185).

On the third *Critique's* account, the value of Blumenbach's theory is that it begins with organised matter, but natural mechanism retains 'an indeterminable but also unmistakable role under this inscrutable principle of an original organisation' (5:424). The theory apparently provides what Kant seeks, a means of reconciling mechanical and final causality. On account of this 'inscrutable principle of an original organisation', Kant writes, Blumenbach

calls the faculty in the matter in an organised body (in distinction from the merely mechanical **formative force** [*Bildungskraft*] that is present in all matter) a **formative drive** [*Bildungstrieb*] (standing, as it were, under the guidance and direction of that former principle). (*ibid.*)

The formative drive, unlike the formative force, is that faculty of organised matter to form itself according to its original organisation.

There thus appears to be a contradiction between §81 and §65 of the third *Critique*, in relation to *bildende Kraft* or *Bildungskraft*. In §65, organised bodies are distinguished from mere machines by their having, as well as motive force, *bildende Kraft*. In §81, however, *Bildungskraft* is merely mechanical and is present in all matter, not just organised bodies. Does this mean that we should be taking Kant to be making a conceptual distinction between *bildende Kraft* and *Bildungskraft*? If so, the former would be the formative force present in organised beings that characterises them as natural ends or purposive, and the latter would be some kind of unspecified formative force present in all matter, organic and inorganic. However, we can better discern Kant's meaning by

insisting not on a distinction between *bildende* and *Bildungs-*, but between *Kraft* and *Trieb*. The *Bildungstrieb* of §81 occupies the conceptual place of *Bildungskraft* in §65. The ‘inscrutable [*unerforschlichen*] principle of an original organisation’ in §81, through which Blumenbach allows us to understand the association of mechanism and teleology, is just that ‘inscrutable [*unerforschlichen*] property’ of natural beings in §65, which enables them to be organised as natural ends (5:424, 374). The *bildende Kraft* of §65 should technically be called a *Bildungstrieb*, then, as it is named in §81 and in Kant’s letter to Blumenbach.

Kant’s terminological ambiguity appears to stem from Blumenbach’s *Über den Bildungstrieb* itself. In the second edition of 1789, the edition that Kant owned, Blumenbach writes of his conviction that the determinate shape of organisms is initiated and preserved by ‘a lifelong active drive’:

A drive [*Trieb*], which consequently belongs to the vital forces [*Lebenskräften*] but even so is clearly different from the other types of vital force of organised bodies (contractility, irritability, sensibility²² etc.) as from the general physical forces of bodies in general; it seems to be the first, most important force of all conception, nutrition and reproduction, and in order to differentiate it from other vital forces, one can designate it with the name of *Bildungstrieb* (*nisus formativus*).²³

The *Bildungstrieb* is thus one of the vital forces of an organism, but is simultaneously singular, as the first and most important, and so is designated a *Trieb* rather than a *Kraft*. The difficulty in Kant’s text is thus already present in Blumenbach’s: the drive is at once one of the vital forces and must be distinguished, terminologically and in terms of importance and nature, from them. Kant’s *Bildungstrieb*, the faculty of organised matter to form itself according to final causality, should similarly be considered as something other and more fundamental than the mechanical *Bildungskräfte* or vital processes that it underpins. The example of the tree in §64 identifies such vital processes as reproduction, growth and self-preservation of the living organism; the *Bildungstrieb* is the common teleological principle behind these diverse functions (5:371-2).

Kant’s *Bildungstrieb*, on the example of Blumenbach’s text, is the most fundamental force governing the teleological development of organisms; in Kant as in Blumenbach, it is a *Kraft* that is only designated a *Trieb* in order to differentiate it from the less fundamental vital *Kräfte* that derive from it. The relation of *Bildungstrieb* to the derivative vital forces therefore repeats Kant’s general structure of the relation between fundamental and derivative forces, as discussed in chapter three.²⁴ In the following, whilst we can note that Kant generally follows Blumenbach’s

²² Blumenbach writes ‘Sensilität’.

²³ Johann Friedrich Blumenbach, *Über den Bildungstrieb* 2nd ed. (Göttingen: Johann Christian Dieterich, 1789), pp.24-5, my translation. On Kant’s edition of Blumenbach, see Warda, *Kants Bücher*, p.27.

²⁴ The question of the extent to which the *Bildungskraft* should be considered a *Grundkraft* will be addressed below.

terminology by referring to the *Bildungstrieb*, I will refer to it as the *Bildungskraft*, to signal its connection to Kant's thinking of *Kräfte* and his structure of fundamental and derivative forces.²⁵

Before addressing the question of the relation of Kant's *Bildungskraft* to *Urteilkraft* and the other psychological and physical *Kräfte*, we can note the role that *Bildungskraft* plays in the judgement of *nature as a whole*, not just individual organisms, as organised. Indeed, Kant's discussion of individual organisms is fairly minor (§§65-6): the rest of the 'Critique of Teleological Judgement' then turns to the idea of nature in general as organised and purposive. Guyer thus claims that Kant's 'primary purpose' is not the heuristic identification of individual organisms as purposive, but rather these merely introduce 'a conception of systematic purposiveness that we can then apply to nature *as a whole*'.²⁶ What is the relation of the purposiveness of individual organisms to that of nature as a whole? Kant writes that we are necessarily led from the former to the latter:

It is therefore only matter insofar as it is organized that necessarily carries with it the concept of itself as a natural end, since its specific form is at the same time a product of nature. However, this concept *necessarily leads to the idea of the whole of nature as a system in accordance with the rule of ends*, to which idea all of the mechanism of nature in accordance with principles of reason must now be subordinated (at least in order to test natural appearance by this idea). (5:378-9, my emphasis)

Kant goes on to say that having judged individual organisms as purposive 'we may go further', and 'the unity of the supersensible principle must then be considered as valid in the same way not merely for certain species of natural beings but for the whole of nature as a system' (5:380-1). Guyer quotes both of these passages in relation to this issue, but does not make explicit *why* we are necessarily led from the purposiveness of organisms to that of nature as a whole.²⁷

To determine this we can ask: is there a *Bildungskraft*, as that in which we locate the purposiveness of organisms, in nature as a whole? Kant does mention the *bildende Kraft* or *Bildungskraft* of nature in two places, but both references are negative: firstly, as something not

²⁵ Gian Frano Frigo's 'Bildungskraft und Bildungstrieb bei Kant' in Ernst-Otto Onnasch, ed. *Kants Philosophie der Natur: Ihre Entwicklung im Opus postumum und ihre Wirkung* (Berlin: de Gruyter, 2009), pp.9-23, unfortunately confuses rather than clarifies this issue. Frigo claims that '*Bildungskraft*' should refer to the forces of the *Metaphysical Foundations*, and '*Bildungstrieb*' to those of the third *Critique*, and states, in my view completely erroneously, that it is because the *Metaphysical Foundations*' *Grundkräfte* of attraction and repulsion cannot be known empirically – 'because they themselves ground our sensible intuition' – that Kant employs the *Bildungstrieb* in its connection to final causality (p.21). I have seen no other commentators make these claims: a more standard account insists on the singularity of living beings as the reason for Kant's introduction of the *Bildungstrieb*, with this as almost interchangeable with the term *Bildungskraft* (although I contend that the caveats I have indicated should be made); there is no justification for identifying *Bildungskraft* with the forces of the *Metaphysical Foundations*.

²⁶ Guyer, 'Kant's Principles of Reflecting Judgment', pp.49-50.

²⁷ *Ibid.*, 50-1; see also Guyer, 'Organisms and the Unity of Science', pp.88-9.

accounted for by evolutionists or preformationists; and secondly as part of the view of the ‘archaeologist of nature’ who denies organisation and conceives of the ‘maternal womb of the earth’ as giving birth to various, changing species until its ‘fruitful *Bildungskraft*’ ceases and species become ossified (5:423, 419). Neither reference confirms that Kant considers a *Bildungskraft* to be present in nature as a whole. Kant’s affirmation of a *Bildungstrieb* in §81 again locates this in individual organised bodies (5:424).

However, the issue is clarified if we note that the distinction between organisms and nature as a whole, which Guyer makes for exegetical clarity, is actually somewhat misleading. In the passage cited above, an organism or a specific form is a ‘product of nature’, a phrase that Kant uses throughout §§64-6 in discussing organised beings.²⁸ In §65 Kant designates *bildende Kraft* as ‘nature[’s] ... capacity [*Vermögen*] in organised products’ (5:374). Organisms, as products of nature, are organised through the capacity or faculty of nature as a whole. Later this is made more explicit: we ‘may go further’ and judge not only organisms but the whole of nature as purposive ‘once we have discovered in nature a capacity [*Vermögen*] for bringing forth products that can only be conceived by us in accordance with the concept of final causes’ (5:380). The progression from judging organisms as purposive, to conceiving of the whole of nature in this way, is necessary because the former is merely an instance of the latter. Individual organisms are organised and purposive because they are products of nature, and nature has a capacity for producing organised beings.

The continuity between organisms and nature as a whole, which explains why we are led from the purposiveness of the former to that of the latter, therefore arises because both are judged by reflecting *Urteilstkraft* in the same way. More precisely, the relation of part and whole, which characterises the organisation of an individual organism, is repeated in the relation of organisms to nature as a whole. In the case of an organism, the whole and the parts are understood to be reciprocally cause and effect of one another: this is evident in Kant’s three examples of the reproduction, growth and self-preservation of trees (5:371-2).²⁹ This reciprocal causality in fact

²⁸ Kant employs a technical distinction between ‘educt’ and ‘product’, where the former is a rearrangement of pre-given elements, and the latter is the creation of new elements through immanent processes: see 5:423 and 5:371. John Zammito discusses this in relation to the metaphysics lecture notes (28:684 and 29:760-1) in ‘Epigenesis in Kant: Recent Reconsiderations’, *Studies in History and Philosophy of Science* 58 (2016), pp.92-3. Jennifer Mensch characterises ‘educt’ as ‘a thing that preexisted its new form’ and ‘product’ as ‘something newly produced through epigenesis’ (Mensch, *Kant’s Organicism: Epigenesis and the Development of the Critical Philosophy* (Chicago: University of Chicago Press, 2013), p.194n204).

²⁹ Guyer glosses this as follows: ‘[t]hese various forms of reciprocal dependence – the dependence of a whole on its parts but at the same time of the parts on the whole, and the reciprocal dependence of parts on each other – Kant thinks of as cases of reciprocal causation: The whole is both effect and yet cause of its parts, and the parts are both cause and effect of each other’. Guyer, ‘Organisms and the Unity of Science’, p.93.

defines the concept of organism: ‘a thing exists as a natural end if it is cause and effect of itself’; ‘[a]n organised product of nature is that in which everything is an end and reciprocally a means as well’ (5:370, 376). Although it is not spelled out as explicitly as it might be, it is clear that this mutual causality of parts and whole in the organism is a mere subset of the wider reciprocity of parts and the whole in our judgement of *nature*, that is, of organisms as products of nature and the nature that brings them forth. This is what Kant means when he writes that ‘the end of nature must extend to everything that lies in its product’ (5:377). Organisms, as parts of nature, are taken to be purposive *because* the whole of nature should be judged to be so, and the parts and whole are reciprocally cause and effect of each other.³⁰

4. *Bildungskraft*, *Urteilstkraft*, and physical and psychological *Kräfte*

We can now consider the relation between *Bildungskraft* and reflecting *Urteilstkraft*, and how both are related to the forces discussed in the previous chapters. Nature as a whole and its products, organisms, are judged to have a *Bildungskraft* to explain their purposiveness; and this judgement is made *by* reflecting *Urteilstkraft*, as a second-order reflection on representations that gives itself its principle of purposiveness. It is thus key that Kant’s *Bildungskraft* is a heuristic, regulative principle. It functions as a guide for reason’s investigation into organic entities, *as if* they had such a formative drive directing their purposive development. It is in this way that §81 can state that ‘[o]ur reason does not comprehend the possibility of a unification of two entirely different kinds of causality’, and yet then go on to claim that Blumenbach’s account of epigenesis through the *Bildungskraft* provides the best way to understand this alignment of mechanical and teleological causality. The *Bildungskraft* functions for Kant as a regulative principle, and he is therefore not deeply committed to its necessary truth. Accordingly, in his letter to Blumenbach praising his principle, he states of it that ‘[f]actual confirmation is exactly what this union of the

³⁰ This argument is slightly limited insofar as there are non-organic parts of nature, which, although they are parts of an organised nature, are not themselves organised. It is only the organised parts of nature – organisms – that stand in the relation of reciprocal causality with the whole. In the third *Critique* Kant is concerned to avoid the spectre of hylozoism and any implications that inert matter may have an animating principle, which may explain why he avoids explicitly presenting organisms and nature as echoing the parts/whole relationship discussed on the level of individual organisms. As Guyer has discussed, in the *Opus postumum* Kant drops his long-held aversion to an animating principle of inert matter, insofar as he explores the idea that an all-penetrating, animating ether underpins both the *vis viva* of (previously inert) inorganic matter and the *vis vivifica* of organic matter (Guyer, ‘Organisms and the Unity of Science’, pp.91, 102-4). It might also be objected, against my account here, that organisms and nature as a whole fundamentally differ because the whole of nature is a mere regulative idea. However, the infinite complexity of an individual organism, entailing that there will never be a ‘Newton of the blade of grass’, means that the equivalence in the judgement of nature and its organised products still holds: neither the totality of nature nor of the organism can be completely cognised, and are thus judged according to the merely regulative principle of purposiveness.

two principles needs' (11:185). Blumenbach's hypothesis about the formative drive could be bolstered by empirical evidence, which is to say that for Kant it does not have *a priori* necessity.³¹

Robert Richards has argued that Kant's use of *Bildungskraft* (or, to be precise, *Bildungstrieb*) is therefore much further from Blumenbach's than either acknowledged. For Blumenbach, the *Bildungstrieb* was a real, constitutive force or drive that 'directed the formation of anatomical structures and the operations of physiological processes of the organism so that various parts would come into existence and function interactively to achieve the ends of the species'.³² This is entirely different to Kant's use of *Bildungstrieb* as a regulative principle for judging organisms and nature. Blumenbach 'blissfully used the *Bildungstrieb* as part of a constitutively causal account of organisation ... as quite analogous to a mechanistic principle in its explanatory function, something simply unacceptable to Kant'.³³ Richards thus argues that Kant and Blumenbach's apparent agreement on the concept of *Bildungstrieb* was a polemical claim or a 'creative misunderstanding' on both their parts, which allowed each to gain a veneer of credibility from the other's academic discipline.³⁴ For our purposes, this serves to emphasise the regulative status of the *Bildungskraft*, as a judgement, by reflecting *Urteilkraft*, of the ground of the purposiveness of organic nature.

How is reflecting *Urteilkraft* related to the forces discussed in our previous chapters? Although it makes reflective judgements, it is a real force of the mind, insofar as the forces of the mind are real: that is, a condition of the possibility of an aspect of our cognition. As noted, it is one of the higher faculties alongside reason and the understanding, which bridges the two: it has no domain of legislation, that is, it does not constitute objects, but provides second-order reflection on objects already given. Like the other forces of the mind, it is both active and passive, although in a different way. It is passive insofar as it works with given representations; it is active insofar as it creates its own concept, as this is not given for the variety of empirical forms that it judges.³⁵ Through its self-given principle of purposiveness, *Urteilkraft* caters to the needs of the faculties between which it mediates: it regulatively provides a systematic purposiveness for nature for theoretical understanding, and presents nature as a system of ends for practical reason.

³¹ Kant's appreciation of the possibility of empirical verification of Blumenbach's *Bildungstrieb* recalls his critique of Herder's fundamental organic force as lacking this possibility, as it leaves us 'deprived of all experience' (8:54).

³² Richards, 'Kant and Blumenbach on the *Bildungstrieb*', p.19.

³³ *Ibid.*, p.32.

³⁴ *Ibid.*, pp. 12, 32.

³⁵ In contrast, the understanding, for example, is passive insofar as it works with given intuitions of sensibility, rather than representations; the understanding is the active or spontaneous element of cognition in determinative judgement's subsumption of the given under concepts.

How is the *Bildungskraft*, as a judgement of nature by reflecting *Urteilstkraft*, related to the forces of body and mind previously discussed? It is unlike *physical* forces as it is apparently not fettered by a contrary force: unlike physical attraction and repulsion, there is no opposed and mutually limiting force. It is however limited *in itself* in that by its very nature it is constrained to necessarily develop towards its end or teleological fulfilment. Of course, this highlights the most essential difference between *Bildungskraft* and the forces of physics: it is not a real force, or derived from one, but is a regulative principle. Does this however mean it is comparable to the *Grundkräfte* of fundamental physical attraction and repulsion? These are of course the *rational* reduction of empirically-given forces to the smallest possible number, but they are still themselves empirically-given. *Bildungskraft* is closer to the *single Grundkraft* of the first *Critique's* Appendix, hypothetically posited as underpinning and unifying fundamental attraction and repulsion in order to guide the scientist's method of reducing forces to the smallest possible number. The *Bildungskraft* is similarly not a result of a reduction of given forces but is a force or drive that is explicitly *posited*, with a heuristic function. It is 'merely a concept', Kant writes, and moreover a concept of our practical reason, which has heuristic value for our judgements in aesthetics and natural science, and for our conception of the unified, practical ground of theoretical and practical philosophy (4:454).

Furthermore, the *Bildungskraft* is clearly different to the forces of the *mind* in that, firstly, it is a specific principle of the teleological development of organisms and thus of nature in general, rather than a psychological force that conditions our cognition in general, and, secondly, it is again a regulative principle with a heuristic function, unlike the forces of the mind which are real conditions of the possibility of knowledge and experience. In the combination of these two characteristics of *Bildungskraft*, however, its distance from the forces of the mind is not so pronounced. *Bildungskraft* is the regulative principle that is judged to be present in nature to explain its purposiveness, the concept that reflecting *Urteilstkraft* gives to itself in its judgements of the manifold forms of nature. It is in the very regulative status of the *Bildungskraft* – which distinguishes Kant's use of the term from Blumenbach's – that it is an element of cognition, of second-order reflection on nature that ultimately, at least as Guyer argues, is in service of our practical activity.

The status of the *Bildungskraft* is therefore not so straightforward. It is a force ascribed to beings in nature, but as a regulative concept it is an element of cognition, and it thereby contributes to the systematic function Kant ascribes to *Urteilstkraft* in general. Insofar as the judgement of organisms as having a *Bildungskraft* allows nature as a whole to be seen as purposive and

organised, the *Bildungskraft* has a unifying function for our cognitions of nature, in service of the ends of theoretical and practical reason. The problematic of the objective or subjective status of force therefore reappears here in the third *Critique*. Moreover, we will come to bring into question the designation of the *Bildungskraft* as straightforwardly regulative.

5. Biological forces and the forces of the mind

We can now step back to consider the place of *Bildungskraft* in its relation to Kant's philosophical use of concepts from the nascent life sciences of the eighteenth century, in order to give an account of the systematic function of the force in relation to the transcendental structures of the first *Critique*. I would identify three 'levels' on which commentary tends to locate itself, regarding Kant's employment of biological concepts. The first level focuses on Kant's views on biology itself. This literature discusses Kant's position on debates around preformation and epigenesis, and his attempt to mediate between these through 'natural predispositions' or *Keime* and *Anlagen*.³⁶ Connected to this are Kant's writings on 'race', which are rightly receiving increasing scrutiny.³⁷ In addition to Kant's views on the biology of his day, commentary on this level attends to the effects of Kant's regulative doctrine on the practice of the life sciences, in Kant's or our time. Most scholarship on Kant's use of biological terminology is located on this level.³⁸

The second level explores Kant's metaphor of the 'epigenesis of reason' as a depiction of the critical model of cognition as modelled on the epigenetic development of organisms. This interpretation identifies a parallel between models of organic generation and Kant's account of the conditions of possibility of knowledge, in which matter (of intuition), formed on an innate principle (of the categories), according to a form-giving force (the productive imagination),

³⁶ For Kant's theory of natural or original predispositions, see 'Teleological Principles', 8:179, and his review of the second volume of Herder's *Ideen*, 8:62-3, both of which show the connection between Kant's theory and his commitment to the fixity of human races.

³⁷ For pioneering studies in this area, see Emmanuel Chukwudi Eze, 'The Color of Reason: The Idea of 'Race' in Kant's *Anthropology*', in Eze, ed., *Postcolonial African Philosophy: A Critical Reader* (Oxford: Blackwell, 1997), pp.103-131; Robert Bernasconi, 'Who Invented the Concept of Race? Kant's Role in the Enlightenment Construction of Race', in Bernasconi, ed., *Race* (Oxford: Blackwell, 2001). The debate has continued in Pauline Kleingeld, 'Kant's Second Thoughts on Race', *Philosophical Quarterly* 57 (2007): 573-92 and Bernasconi, 'Kant's Third Thoughts on Race' in Stuart Elden and Eduardo Mendieta, eds., *Reading Kant's Geography* (New York: SUNY, 2011); and Eze, *Achieving Our Humanity: The Idea of the Postracial Future* (New York: Routledge, 2001). Justin Smith has recently presented a distinction between, on the one hand, Kant's high-Enlightenment, liberal-racist conception of fixed races, and, on the other, Herder's more Leibnizian conception in which 'racial' characteristics are transformational and the globe might be mapped linguistically rather than phenotypically (Smith, *Nature, Human Nature, and Human Difference: Race in Early Modern Philosophy* (Princeton: Princeton University Press, 2015)).

³⁸ For a paradigmatic recent example, with an extensive bibliography, see Zammito, 'Epigenesis in Kant: Recent Reconsiderations'.

echoes biological generative processes. This is a possible reading of Kant's reference to the 'system of the epigenesis of pure reason', encouraged by the description of the analysis of concepts as a process of following them 'to their first seeds and predispositions [*Keimen und Anlagen*] in the human understanding, where they lie ready, until with the opportunity of experience they are finally developed and exhibited in their clarity by the very same understanding' (B167, A66/B91). This level is treated by part of Jennifer Mensch's *Kant's Organicism* (2013).³⁹

Finally, a third level interprets the 'epigenesis of reason' as a model for the development of the categories themselves, in which the transcendental *a priori* structures of cognition emerge through a process that echoes biological epigenesis. This interpretation runs counter to Kant's general restriction on knowledge of the emergence of the categories, but gains justification through another reading of the discussion of the 'system of the epigenesis of pure reason' at B167-8, and has intriguing consequences for the 'purity' of the pure concepts of the understanding. This level has been explored most extensively by Catherine Malabou in *Avant demain: Épigenèse et rationalité* (2014).⁴⁰

Here, I wish to situate myself on the second level, and expand on the work of Mensch. *Kant's Organicism* identifies a surprising distinction between Kant's claims for the certainty of biological processes of generation on what I have called the first and second levels. On the one hand, Kant ultimately insists on the merely heuristic status of biological theories of organic formation: whilst he takes the predispositional model to be the most defensible, it lacks the absolute certainty that can only be gained through mechanistic explanations, in line with the apodicticity enjoyed by mechanics and physics. With regard to the life sciences themselves, then, Kant never gave up the view that there would never be a 'Newton of the blade of grass'.⁴¹ On the other hand, Kant holds a completely different, positive view of the use of biological processes for explaining the development of *knowledge*. Mensch considers Kant to have 'identif[ied] epigenesis as the model

³⁹ Mensch, *Kant's Organicism*, particularly chapter 4. See also Günter Zöllner, 'Kant on the Generation of Metaphysical Knowledge', in Hariolf Oberer und Gerhard Seel eds., *Kant: Analysen-Probleme-Kritik* (Würzburg: Königshausen & Neumann, 1988), pp.71-90.

⁴⁰ Malabou, *Avant demain: Épigenèse et rationalité* (Paris: PUF, 2014). See also Stella Sandford, 'Spontaneous generation: the fantasy of the birth of concepts in Kant's *Critique of Pure Reason*', *Radical Philosophy* 179 (2013): 15-26. Mensch's *Kant's Organicism*, particularly chapter 7, also turns to this issue.

⁴¹ Mensch, *Kant's Organicism*, p.8. Guyer describes Kant's view on the relation of final and mechanical causality in a way that supports Mensch's position: the heuristic idea of an organism advances biological knowledge by 'identifying processes and functions' that can be explained mechanically, 'even though we (supposedly) know that we will not succeed in fully supplying or comprehending them' due to the complexity of organisms (Guyer, 'Kant's Principles of Reflecting Judgement', p.49). For Kant's 'Newton of the blade of grass' comments, see 5:400; this is continuous with his view in the *Universal Natural History* of 1755: 1:231.

for cognition', and argues that 'epigenesis models had a significant role to play for Kant's theory of cognition, for what one might even go so far as to describe as his epigenesis philosophy of mind'.⁴² This account of the processes of cognition through the model of biological formation was 'an epigenesis far more radical than the one Kant was willing to accord natural organisms via 'transcendental principles''.⁴³ Therefore while Kant was cautious in his attitude to the life sciences themselves – contending that their models of generation were of regulative or heuristic value, insisting that explanation of living beings must ultimately proceed on mechanical lines, and remaining sceptical about the possibility of any such full explanation of complex organisms – he boldly presented his model of cognition, on Mensch's account, through a model from the contemporary life sciences, as an 'epigenesis of reason'.⁴⁴

Mensch's thesis is likewise a bold one. I will not here assess it as a whole, but will examine in more detail a connection that she only briefly discusses.⁴⁵ Mensch notes that prior to the *Critique*, Kant

took the generation of representations to be something requiring a juggling of factors directly parallel to those in play when considering organic generation. There had to be something regular, like a set of rules, guaranteeing uniformity of production. There had to be material content, and there had to be some kind of force, something capable of putting the parts together according to the rules. Finally, there had to be something capable of maintaining the unity, if not the identity, of the whole ... The immediate challenge concerned the specific connections between the various mental faculties in play – the faculty of understanding as home to the rules, sensibility as provider of material content, and *eine bildende Kraft*, a formative power capable of connecting the material to the rules.⁴⁶

In this account of Kant's pre-critical organicist conception of cognition, between the rules of the understanding and the material content of sensibility is located a synthesising *bildende Kraft*. Mensch points to the *Nachlaß* and metaphysics lecture notes as the source for this view, and

⁴² Mensch, *Kant's Organicism*, p.9, 2.

⁴³ *Ibid.*, p.15.

⁴⁴ For an argument providing something of an alternative to Mensch's claims on what I have called the first level, regarding Kant's view of his contemporary biology, see Hein van den Berg 'Kant on Vital Forces: Metaphysical Concerns versus Scientific Practice' in Ernst-Otto Onnasch, ed., *Kants Philosophie der Natur: Ihre Entwicklung im Opus postumum und ihre Wirkung* (Berlin: de Gruyter, 2009), pp.115-136. Van den Berg argues that Kant's attitude towards the use of epigenesis in biology is less negative than typically taken to be, providing an interpretation of Kant's comments on Herder and in the third *Critique* to this effect, and providing passages from the *Opus postumum* that display a positive account of the use of epigenetic explanation. Van den Berg concludes that for Kant epigenesis remains a regulative principle, however, so I do not think that Mensch's account is fundamentally challenged (p.134). On a separate note, we can observe that the general structure of Mensch's argument – that Kant is critical of a specific idea in its natural-scientific use, but has no qualms in using it analogically in his philosophy – is also that of Mai LeQuan's *La Chimie selon Kant*, here in relation to Kant's criticism of chemistry as a science, and use of chemical metaphors in his thought (LeQuan, *La Chimie selon Kant* (Paris: PUF, 2000)).

⁴⁵ I discuss the book as a whole in more detail in my review, 'Sub rosa', *Radical Philosophy* 187 (2014): 49-52.

⁴⁶ Mensch, *Kant's Organicism*, p.9.

discusses the latter.⁴⁷ It is in the L₁ psychology notes that Kant outlines this cognitive *bildende Kraft*. At this point in the mid-1770s, Kant is willing to divide sensibility in two: there are the cognitions arising from receptivity to the ‘impression of the object’, and there are ‘sensible cognitions which arise from the spontaneity of the mind’ (28:230). These spontaneously made intuitions are called cognitions of the ‘*bildende Kraft*’ (*ibid.*). This formative force ‘belongs to sensibility’ and is ‘distinguished from the thinking force, which belongs to the understanding’ (*ibid.*). Under *bildende Kraft*, as species to its genus, are included illustrative force (*Abbildungskraft*), imitative force (*Nachbildungskraft*) and anticipatory force (*Vorbildungskraft*), which, Kant goes on to state, are representations of present, past and future time, respectively (28:230, 235). Further forces and faculties within the *bildende Kraft* are added, including imagination (*Einbildung*), in Baumgarten’s sense of producing images without sensible input, and correlation (*Gegenbildung*) or symbolic representation.⁴⁸ Mensch notes that the ‘work of formation (*Bildung*) serves as the root of Kant’s discussion’ of *bildende Kraft*.⁴⁹

Although Kant initially insists that the cognitive *bildende Kraft* belongs to sensibility, he goes on to identify it with *both* the lower faculty of sensibility *and* the higher faculty of understanding:

All these acts [*actus*] of the *bildende Kraft* can happen *voluntarily* and also *involuntarily*. Insofar as they happen *involuntarily*, they belong wholly to sensibility; but so far as they happen *voluntarily*, they belong to the higher faculty of cognition. (28:237)

The *bildende Kraft* is a force of sensibility when it is involuntary, or in its *a priori* use in forming images, and it is a force of the understanding when accompanied by consciousness as a reflection on representations. Kant therefore states, ‘[w]e have cognitions of objects of intuition by virtue of the *bildende Kraft*, which is *between* the understanding and sensibility’ (28:239, my emphasis). As Mensch notes, this pre-critical account lacks the transcendental imagination that will be added in the critical picture, but the structural role of connecting sensibility and the understanding is here occupied by *bildende Kraft*.⁵⁰ In the *Critique*, Mensch writes, the ‘so-called lower faculty of formation was now explicitly identified’ as the imagination (*Einbildungskraft*) in its reproductive, productive, pure and transcendental forms.⁵¹ Kant’s use of a transformed concept of *Einbildungskraft* in the *Critique*, as a synthesising process between intuitions and concepts,

⁴⁷ *Ibid.*, pp.115-8. The *Nachlaß* reference is to R4811, a note of Kant’s to Baumgarten’s §83 (on the concept of ‘norm’) dated to the early to mid-1770s: it makes a similar distinction to L₁ 28:230, with *bildende Kraft* belonging to intuition rather than to thought (in contrast, the note distinguishes formative from reflecting force, and suggests the former demands a form, the latter a rule).

⁴⁸ Cf. Baumgarten, *Metaphysics* §558: ‘my imaginations are perceptions of things that were formerly present’.

⁴⁹ Mensch, *Kant’s Organicism*, p.116. Heidegger discusses this passage and makes the same point in *Kant and the Problem of Metaphysics*, pp.122-3.

⁵⁰ *Ibid.*, pp.117-8.

⁵¹ *Ibid.*, pp.118-9.

therefore appears in nascent form in the mid-1770s as a *bildende Kraft* between sensibility and the understanding.

Mensch thus valuably identifies a direct development of Kant's notion of cognitive *Einbildungskraft* in the *Critique* (particularly the A edition) from a concept of *bildende Kraft* in the metaphysics lectures. She does not however accord attention to the connection that this implies between the *bildende Kraft*, *Bildungskraft* or *Bildungstrieb* of the third *Critique*, and the *Einbildungskraft* of the first *Critique*. This is no doubt because Mensch makes the provocative decision to discuss Kant's 'organicism' with relatively little reference to Kant's most well-known engagement with biology, that of the third *Critique*.⁵² I would contend, however, that the relation between *Bildungskraft* and *Einbildungskraft* is no mere terminological coincidence. Both formative forces have a unifying function, ultimately in service of the understanding and reason. In the A edition of the *Critique* Kant writes that the *Einbildungskraft* is 'a faculty of a synthesis *a priori*' and that it is

certainly strange, yet from what has been said thus far obvious, that it is only by means of this transcendental function of the imagination that even the affinity of appearances, and with it the association and through the latter finally reproduction in accordance with laws, and consequently experience itself, become possible; for without them no concepts of objects at all would converge into an experience. (A123)

Kant goes on to say that this pure imagination, 'a fundamental faculty of the human soul', 'grounds all cognition *a priori*' and 'necessarily' connects the two 'extremes, namely sensibility and understanding' (A124). Cognitive *Einbildungskraft*, in the A edition, performs the *a priori* unification of the sensible manifold with the categories and makes experience possible.

In comparison, in the third *Critique* the principle of purposiveness, and thus the *Bildungskraft* that we posit with it, performs another unification. In order to investigate the empirical laws of nature, the understanding must 'ground all reflection on nature on an *a priori* principle, the principle, namely, that in accordance with these laws a cognisable order of nature is possible'; furthermore,

This agreement of nature with our faculty of cognition is presupposed *a priori* by the *Urteilkraft* on behalf of its reflection on nature in accordance with empirical laws, while at the same time the understanding recognises it objectively as contingent, and only the force of judgment attributes it to nature as transcendental purposiveness (in relation to the cognitive faculty of the subject): because without presupposing this, we would have no order of nature in accordance with empirical laws, hence no guideline for an experience of this in all its multiplicity and for research into it. (5:185)

⁵² Presumably in order to insist on the importance of biological models outside of Kant's explicit references to the life sciences. Only on pp.142-4 does Mensch 'briefly look at what Kant had to say about organic life itself' and discuss the third *Critique*.

The principle of purposiveness, reflectively judged to be present in the *Bildungskraft* of nature, provides the function of unifying the laws of the understanding with those of nature, by giving systematic order to the latter.

Of course, the great difference between the unifying functions of *Einbildungskraft* and *Bildungskraft* is that the purposiveness stemming from the latter, while presupposed *a priori* by *Urteilkraft*, is from the perspective of the understanding only *contingent*, and even for *Urteilkraft* it is an *a priori* principle in a *subjective* not an objective respect, because reflecting judgement thereby prescribes a law only to itself, not to nature. *Bildungskraft* would be thus regulative, or heuristic, in contrast with the constitutive *Einbildungskraft* of the first *Critique*. However, this distinction can be questioned in two ways, showing further proximities between the *Einbildungskraft* and *Bildungskraft* of the first and third *Critiques*.

Firstly, Kant's distinction between regulative and constitutive principles is a more troubled one than we have thus far noted. As we saw in chapter three, the doctrine of regulative ideas is introduced in the Appendix; however, later passages in the section complicate even this initial presentation:

But if one attends to the transcendental use of the understanding, it is evident that this idea of a fundamental force in general [*einer Grundkraft überhaupt*] does not function merely as a problem for hypothetical use, but pretends [*vorgebe*] to objective reality, so that the systematic unity of a substance's many forces are postulated and an apodictic principle of reason is erected. (A650/B678)

The fundamental force that is the Appendix's example of a regulative idea 'does not function merely' hypothetically, but receives the status of objective reality for the purpose of systematic unity, as an apodictic principle of reason. The ambiguity here bestowed on Kant's paradigmatic example of a regulative principle has been noted by numerous commentators.⁵³ Kant goes on to state, 'we simply have to presuppose the systematic unity of nature as objectively valid and necessary' (A651/B679). The idea of systematic unity provided by the idea of a single *Grundkraft* *has to* be presupposed: but in how strong a sense should we understand *müssen* here? A subsequent passage encourages a reading in which the requirement is a strong one:

⁵³ See Beiser, *German Idealism: The Struggle Against Subjectivism 1781-1801* (Cambridge MA.: Harvard University Press, 2002), p.522: 'Kant himself was never very clear and firm about the distinction between the regulative and constitutive ... Nowhere are his vacillations more apparent than in the Appendix ... Kant ... blurs his distinction between the regulative and the constitutive, reason and understanding, when he states that the assumption of systematicity is necessary for the application of the categories themselves'. More in-depth assessments are in Guyer, 'Reason and Reflective Judgement: Kant on the Significance of Systematicity' in *Kant's System of Nature and Freedom*, pp.11-37, particularly p.22-8; and Allison, 'Is the Critique of Judgment "Post-Critical"?' in *Essays on Kant* (Oxford: Oxford University Press, 2012), pp.165-176, particularly p.167-70.

If among the appearances offering themselves to us there were such great a variety ... that even the most acute human understanding, through comparison of one with another, could not detect the least similarity (a case which can at least be thought), then the logical law of genera would not obtain at all, no concept of a genus, nor any other universal concept, indeed no understanding at all would obtain, since it is the understanding that has to do with such concepts. (A653-4/ B681-2)

The understanding's application of concepts, Kant here suggests, requires the regulative idea of a single *Grundkraft* and the systematic unity it provides for our conception of nature. The systematic unity of nature is thus required for, as Allison puts it, 'virtually any valid employment of the understanding at all'.⁵⁴

The distinction of regulative from constitutive principles does not collapse, but is certainly hereby complicated. In the paradigmatic case of a regulative principle, a *Grundkraft* is not simply hypothetically posited for reflection on nature, but enables 'an apodictic principle of reason [to be] erected': namely, the unity of apperception. Beiser points out that the ambiguity around regulative and constitutive principles bleeds into the third *Critique*, where 'Kant sometimes states that we cannot have a coherent experience without the application of the maxims of reflective judgement itself'.⁵⁵ If we compare the regulative concept of *Bildungskraft* and purposiveness, we can see that it too is raised from being a mere principle for reflection on nature to a much more significant role: namely, enabling a systematic understanding of nature for both theoretical and practical reason, and facilitating the transition from the concept of freedom to that of nature, and thus the connection of the theoretical and practical parts of Kant's philosophy. If the regulative nature of *Bildungskraft* would distinguish it from *Einbildungskraft*, then these hints at its constitutive function undermine this distinction.

Secondly, and correlatively, the *Einbildungskraft* of the A edition of the first *Critique* might not unjustifiably be considered a regulative principle. This 'fundamental faculty' famously appears only when needed to explain the transcendental synthesis in the A edition – the paradigmatic example of Kant 'hunt[ing] through the soul's sack' to pull out a faculty, as Hegel put it – and then all but disappears again in the B edition.⁵⁶ In the A edition, Kant's hesitancy around the role of

⁵⁴ Allison, 'Is the Critique of Judgment "Post-Critical"?' , p.169.

⁵⁵ Beiser, *German Idealism*, p.522; Beiser cites 5:185 as evidence. Kant is a little more cautious in this passage than Beiser suggests, but the ambiguity is certainly there: '[t]his agreement of nature with our faculty of cognition is presupposed *a priori* by the power of judgment in behalf of its reflection on nature in accordance with empirical laws, while at the same time the understanding recognises it objectively as contingent, and only the power of judgement attributes it to nature as transcendental purposiveness (in relation to the cognitive faculty of the subject)'.

⁵⁶ G.W.F. Hegel, *Lectures on the History of Philosophy: Volume III: Medieval and Modern Philosophy* trans. by E.S. Haldane and Frances H. Simson (Lincoln: University of Nebraska Press, 1995), p.443. For the reduced role of the transcendental imagination in the B deduction, see B151-2: it belongs to both sensibility and the

transcendental imagination is evident when he notes it is ‘certainly strange’ that it plays this fundamental unifying role for experience (A123). Long before being echoed in Heidegger’s interpretation, Hegel valorised the *Critique*’s productive imagination as ‘a truly speculative Idea’: what from Hegel’s perspective was an inadvertent virtue of the Kantian function of imagination would be unacceptable to Kant.⁵⁷ This uncomfortable ‘strangeness’ of *Einbildungskraft*’s fundamental significance in the A edition must be the reason for its elision in the B edition. The synthesising role played by the imagination in the A edition is then, in the B edition, given over to the understanding.⁵⁸ Specifically, it is located in ‘original apperception’ or the ‘I think’, also named the ‘transcendental unity of self-consciousness in order to designate the possibility of *a priori* cognition from it’ (B132). Whereas the A edition located the unity of sensibility in the obscure ground of the faculty of productive *Einbildungskraft*, the B edition sought this ‘unity ... someplace higher’: in the unity of apperception as the ‘highest point’ of the understanding and transcendental philosophy (B131, 134n). The A edition’s *Einbildungskraft* as a formative force that synthesises cognitions is therefore only briefly adopted and even then has something of a hypothetical nature. Furthermore, the empty form of the ‘I think’ that replaces it is connected to the discussion of regulative principles in the Appendix, where a transcendental principle of systematic unity is required for the rational unity of the rules of the understanding (A650/B678).

In sum, the distinction between *Bildungskraft* as regulative and *Einbildungskraft* (or an equivalent principle of synthesis) as constitutive is not as clear-cut as it may have initially appeared. The two formative forces, in a number of respects, therefore mirror one another. We can interpret them as representing two attempts to ground the unity of experience through the notion of force. In the case of *Bildungskraft*, this unity is in the object, although this objectivity is undermined by the extent to which the force remains a regulative concept of reflecting judgement. In the case of *Einbildungskraft*, this unity is in the subject, although, as the synthesis it enacts in the A Deduction results in the very objectivity of the object, it cannot merely be called subjective. We thus have two formative forces grounding the unity of experience, of which we might only be able to say that one is ‘more objective’, one ‘more subjective’.

The *Bildungskraft* Kant introduces in the third *Critique* is therefore, in one respect, an inversion of Herder’s ‘invisible realm of effective and self-sufficient forces’. Herder’s fundamental organic

understanding, as in the L₁ metaphysics notes, but now merely synthesises the *sensible* manifold, not forming the unifying ground of sensibility and understanding in general.

⁵⁷ Hegel, *Faith and Knowledge* trans. by Walter Cerf and H. S. Harris (Albany: SUNY Press, 1977), p.71.

⁵⁸ ‘... all combination, whether we are conscious of it or not, whether it is a combination of the manifold of intuition or of several concepts, and in the first case either of sensible or non-sensible intuition, is an *action of the understanding*, which we would designate with the general title **synthesis** ...’ (B130, my emphasis).

force provides a pattern for reason on the analogy with material nature. Kant's *Bildungskraft* provides a pattern for nature according to the needs of reason. Mensch thus concludes that '[w]hen reason saw organic activity in nature, according to Kant, what it was really looking at was itself'.⁵⁹ The *Bildungskraft* of organic bodies contributes to the conception of a systematic unity of nature, which reason (or, as the Appendix suggests, even the understanding) requires for the unification of diverse representations.

In another respect, Kant's criticisms of Herder's fundamental organic force in his 1785 review represent a case of protesting too much. Five years after the review, the third *Critique* claims that reflecting *Urteilkraft* judges organisms to have a *Bildungskraft*, as a non-mechanical, purposive force, which enables us to ascribe systematic unity to organisms and nature as a whole. This is very close to Herder's 'hypothesis of invisible forces, effecting organisation', which Kant dismisses in 1785 as the attempt 'to explain *what one does not comprehend* from *what one comprehends even less*' (8:53-4). The key difference is that Kant's *Bildungskraft* has a regulative role, whereas Herder is apparently making constitutive claims for his organic force. But Kant recognises that Herder's force is a 'hypothesis', and the third *Critique* makes a markedly similar hypothesis, on the basis of a force that seems a similarly occult quality. Moreover, as we have seen, Kant's distinction between regulative and constitutive is not that strong, when the regulative principle of systematic unity stemming from purposiveness and *Bildungskraft* has a transcendental role, needed for empirical knowledge.⁶⁰

We cannot easily accord the discrepancy that appears between Kant's positions in 1785 and 1790 to a change of opinion, perhaps based on his deeper familiarity with contemporary life sciences. I have attempted to show that the pre-critical period contains a notion of *bildende Kraft*, which stands 'between the understanding and sensibility' (28:239). This is in this respect a precursor of the A Deduction's *Einbildungskraft*, and the embryonic pre-critical version serves to highlight the close terminological connection between the first *Critique's* *Einbildungskraft* and the third *Critique's* *Bildungskraft*. As I have argued, both notions serve the function of unifying experience in parts of the critical philosophy, in distinct but comparable ways. We might say that *Einbildungskraft* and *Bildungskraft* both serve to unify experience: the former, on the side of the subject, in a way that is constitutive of experience; the latter, on the side of the object, in a way that is merely regulative for experience. This is however loosely stated, and necessarily so: the

⁵⁹ Mensch, *Kant's Organicism*, p.144.

⁶⁰ Thus Zuckert argues that the principle of purposiveness is 'the a priori, transcendental principle of judgement, a subjective yet necessary condition for the possibility of empirical knowledge' (*Kant on Beauty and Biology*, p.5). Zuckert entirely brackets the notion of *Bildungskraft* or *-trieb*, but its function can easily be substituted into her discussion of teleological judgements of natural purposiveness.

very function of unification performed by *Einbildungskraft* and *Bildungskraft* undermines the distinction between subject and object, and between constitutive and regulative.

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It is the very ambiguity in Kant's general notion of force, as outlined in chapter four, that allows *Einbildungskraft* and *Bildungskraft* to function in their unificatory roles examined in this chapter. The liminality of the general notion of force, as it appeared in our reconstruction, mean that these specific forces are located in between the subjective and objective and the constitutive and regulative, and can thus provide the unifying functions to which they are pressed in the first and third *Critiques*: unifying the sensible manifold with the categories, and unifying diverse empirical representations as regulatively purposive. *Bildungskraft* is also located ambiguously between the *a priori* and *a posteriori*: it can be taken to have an *a priori* transcendental role in unifying diverse representations for our cognition, as in Zuckert's account, but Kant also writes to Blumenbach that it would benefit from empirical confirmation. This further liminal position of force, between the *a priori* and the empirical, will become particularly important to the 'transition project' of the drafts collected as the *Opus postumum*, to which we turn next.

Chapter 6

Philosophy of force in the *Opus postumum*

Kant's final drafts towards an unfinished work, collected as the *Opus postumum*, provide the most sustained example of the philosophical use of force and forces in the Kantian oeuvre. The text is still remarkably little-known, so this chapter will introduce the history, nature and general problematic of the manuscript. At the same time, this presentation of the phases of the drafts will serve to show the importance of one period, that of fascicles X/XI, for the 'philosophy of force' that Kant is exploring. Having situated fascicles X/XI in relation to better-known phases in the *Opus postumum*, I will examine one specific folio within the fascicles, to show Kant's rethinking of core elements of the critical philosophy through force.

1. The text

The *Opus postumum* is a large collection of drafts towards Kant's unfinished final work. It has had a remarkably chequered publication history: the circuitous path taken by the manuscripts in the 130 years between Kant's death and their full publication in 1936-8 – in a problematic edition that is now being newly re-edited – has been reconstructed by Eckart Förster.¹ The interpretative fate of the text has been no less fraught. There has not even been consensus on whether the *Opus postumum* represents a *single* work. Very early interpreters including Albrecht Krause and Hans Vaihinger proposed that it should be considered as two separate texts.² Modern scholarship generally demurs, and in broad terms the problematic of the *Opus postumum* drafts is remarkably

¹ See Förster's introduction to Kant, *Opus postumum* (Cambridge: Cambridge University Press, 1993), pp.xvi-xxiii, and Giovanni Pietro Basile, *Kants Opus postumum und seine Rezeption* (Berlin: De Gruyter, 2013), p.459-498. Buchenau and Lehmann's 1936-38 *Akademie* edition took the highly questionable approach of publishing the *Opus postumum* in the order of the fascicles, rather than following Adickes' dating of the manuscripts, leading to an unhelpfully convoluted text. On the new edition and the latest dating of the drafts, see the website of Berlin-Brandenburgische Akademie der Wissenschaften (<<http://kant.bbaw.de/opus-postumum/>>, accessed 28.10.16). Facsimiles of the manuscript, which I have consulted, are available on the website.

² Krause, a Hamburg pastor and one of the first commentators on the *Opus postumum*, thought the late drafts contained a first work that might be titled 'On the transition from the metaphysical foundations of natural science to physics' and a second work called 'System of pure philosophy in its whole epitome' or 'The highest standpoint of transcendental philosophy: on God, the world, and Man, which connects the two' (see Basile, *Kants Opus postumum*, p.13). Vaihinger also advocated a 'two-work theory': for him, the second manuscript was that in which Kant came closest to the 'fictionalism' proposed in Vaihinger's philosophy of the 'as if', as outlined in his book of 1911, *Die Philosophie des als Ob* (Berlin: Reuther & Reichard, 1911); see Basile, *Kants Opus postumum*, pp.37-41.

coherent, even if the means by which Kant attempts to resolve it, and the philosophical directions in which he is led in attempting to do so, vary wildly.

From the beginning of the *Oktaventwurf*, the relatively early drafts from 1796, the philosophical task at hand is designated as the ‘transition from the metaphysical foundations of natural science to physics’ (21:373, 10).³ Kant is still referring to his project in these exact terms in the depths of the so-called first fascicle (which is chronologically the latest, dating from December 1800 onwards).⁴ Throughout the manuscripts, Kant repeatedly asks: what are the metaphysical foundations of natural science, what is physics, how can the transition between the two take place? Within the scope of this general problematic, however, the drafts display a vast range of approaches, both to the means by which the transition might be effected, and to the way that the two domains in question – the metaphysical foundations of natural science and physics – might be understood.

Scholarship is also divided on the significance of the late drafts. Much older commentary falls between two extremes: either dismissing the drafts as a mere product of the old Kant’s senility, as Kuno Fischer influentially did, or valorising them as incomparably important for an understanding of Kant’s thought.⁵ This latter view found anecdotal support in Kant’s first biographers – his friends and dinner companions in his final years – who report that Kant thought that the project in the *Opus postumum* drafts would be his ‘masterpiece’, his ‘most important work’, and the ‘keystone of his philosophical labour’.⁶ The question of the significance of the late drafts will remain contested, but it cannot be doubted that they provide a unique insight into Kant’s process of philosophising, preserving as they do his daily notes, which contain both

³ Similarly-worded references to the transition problematic appear in two earlier leaves, prior to the *Oktaventwurf*: 21:463-4 and 21:465-6; cf. Förster’s note in Kant, *Opus postumum*, p.257-8n7. In citing the *Opus postumum*, I give the AA reference followed by the page number in Förster’s Cambridge edition, if translated therein; divergences from Förster’s translations are signalled by ‘t.m.’ and, if substantive, discussed in the footnotes.

⁴ See 21:17, 224; 21:87, 250.

⁵ Kuno Fischer, *Geschichte der neuern Philosophie* (Mannheim: Friedrich Bassermann, 1860), vol. 3, p.83; see Förster’s introduction in Kant, *Opus postumum*, p.xviii.

⁶ See Lehmann’s ‘Einleitung’ to the second *Akademie* edition volume of the *Opus postumum*, 22:754-5. Hasse reports that Kant would call his final project ‘sein Hauptwerk, ein Chef d’oeuvre’ (Hasse, *Lezte Aeußerungen Kant’s* (Königsberg: Nicolovius, 1804), p.22). Wasianski writes that Kant held his planned last work to be his ‘wichtigstes’ (Wasianski, *Immanuel Kant in seinen letzten Lebensjahren* (Königsberg: Nicolovius, 1804), p.194). Borowski notes that the project ‘sollte ... der Schlußstein seiner philosophischen Arbeit seyn’ (Borowski, *Darstellung des Lebens und Charakters Immanuel Kants* (Königsberg: Nicolovius, 1804), p.183); Jachmann likewise reports that Kant would speak excitedly of his final work, which should be ‘seiner Äußerung der Schlußstein seines ganzen Lehrgebäudes’ (Jachmann, *Immanuel Kant in Briefen* (Königsberg: Nicolovius, 1804), p.17).

repetitive attempts at single problems and wide-ranging developments across more than a decade of composition.

Moreover, the subject-matter of the drafts is of direct significance to this study. The various manifestations of the ‘transition project’ persistently employ the concept of force and specific forces. As we will see, the transition comes to be depicted as providing an *a priori* system of the moving forces of matter (section 2). This leads Kant to the ‘ether proofs’, where a material substrate is posited, which should carry the moving forces (section 3). Deep conceptual difficulties begin to appear, particularly with regard to the question of whether the ether is hypothetical or actual. A later phase of the drafts then moves from this ‘objective’ ether to consider the ‘subjective’ forces of *Selbstsetzung* or ‘self-positing’ (section 4). I then investigate the drafts in fascicles X/XI, which, I will argue, explore the forces between the object and the subject, constituting a significant rethinking of the critical foundations of the transition project and the place of force therein (section 5 on).

My discussion makes a distinction between five chronological phases in the *Opus postumum* drafts. These periodisations represent simplifications of those developed by Erich Adickes and recently by Förster.⁷ I designate these moments as i) the ‘early work’ of 1786 to May 1799; ii) the ‘ether proofs’ of May to August 1799; iii) the ‘fascicles X/XI’ of August 1799 to April 1800; iv) the ‘*Selbstsetzungslehre*’ of April to December 1800; and v) the ‘last developments’ in fascicles VII and I of December 1800 to February 1803. I will first outline the developments in three moments in this chronology, in order to discuss Kant’s employment of forces therein: the ‘early work’, the ‘ether proofs’ and the ‘*Selbstsetzungslehre*’. The early work allows us to grasp the general problematic of the transition project, and the short-lived approach that Kant employs in these first attempts displays the tensions that will return in the subsequent drafts. The ether proofs then represent what I will call the ‘objective pole’ of Kant’s approach to the transition problematic, and the *Selbstsetzungslehre* represent its ‘subjective pole’.

⁷ In a table of dates appended to the *Akademie* edition of 1936-38, Adickes identified fifteen periods based on his inspection of the manuscripts. Famously, this dating was achieved in a four-week period of work on the manuscripts, which at the time were owned by Albrecht Krause’s widow. In his Cambridge edition, Förster notes that the general order of Adickes’ dating is generally accepted, and amends the exact dating of a few sheets (particularly the earliest and latest drafts) (p.xxvii). Förster’s edition of selections from the *Opus postumum* usefully provides an implicit condensation of Adickes’ dating into seven, thematised periods (see the divisions of the text in the Cambridge edition). I follow the periodisation of Förster’s edition, although I further simplify it by combining Förster’s first and second periods into a single phase of ‘early work’, and his final two periods into what I call the ‘last developments’, thus resulting in five periods.

The ether proofs and the *Selbstsetzungslehre* are the most well-known parts of the *Opus postumum*, but I will argue that the period between these phases, that of fascicles X/XI, demands particular attention. It is not just chronologically but also conceptually *in between* the objective and subjective poles of the *Opus postumum*; it thereby represents the heart of the *Opus postumum*'s thinking of forces.

2. 'Early work': 1786 to May 1799

These early drafts only started to gain attention in relatively recent scholarship: the early attempts at comprehensive accounts of the *Opus postumum* in Vaihinger, Adickes and Lehmann considered the greatest philosophical significance to lie in the final four fascicles: X, XI, VII and I. Tuschling's book of 1971 contended that the early drafts deserved attention, and Förster also gives detailed analysis of these drafts; these in-depth accounts should be consulted to supplement the overview I provide here.

Although Adickes focuses on the later drafts, his pioneering study sought to be comprehensive and so also attends to the early drafts. Adickes is perhaps the commentator who places most emphasis on Kant's thinking of forces in the *Opus postumum*. He writes, 'the concept of moving force (or matter, insofar as it has its own moving force) stands ... at the centre [*Mittelpunkt*] of the science of 'transition''.⁸ For Adickes, however, Kant is centrally concerned with the transition-science in the drafts *prior* to fascicles X/XI. Adickes makes a broad distinction between the 'predominantly natural-scientific and natural-philosophical' drafts of the period prior to fascicles X/XI, and the 'theory of knowledge and metaphysical' drafts of the late fascicles VII and I.⁹ The earlier, natural-philosophical part, for Adickes, contains the drafts towards the transition from the metaphysical foundations of natural science to physics as Kant initially planned it.¹⁰ Fascicles X/XI would thus be neither part of the earlier natural-philosophical transition project nor the later *erkenntnistheoretisch-metaphysischen* drafts. They are instead the location for the 'new deduction' in which Kant treats the problem of 'double affection', which for Adickes (and his contemporaries similarly informed by neo-Kantian concerns, such as Kemp Smith) was key to the *Opus postumum*.¹¹ I consider the problem of 'double affection' to have been imposed by Adickes

⁸ Adickes, *Kants Opus postumum dargestellt und beurteilt* (Berlin: Reuther & Reichard, 1920), p.162.

⁹ Adickes, *Kants Opus postumum*, p.155. This does not entail a 'two-work theory' however: Adickes insists on the 'connection' of the 'new' and 'old' plans of the final drafts (*ibid.*, pp.732-7).

¹⁰ *Ibid.*, p.155. The 18 early loose leaves that Adickes considers to have no relation to the *Opus postumum* are also excluded from the 'natural-philosophical' part of the work as Adickes conceives of it.

¹¹ The issue of 'double affection' stemmed from early twentieth century debates on the problem of affection: are appearances or things-in-themselves the affecting object in sensation, and if the former, how is this consistent with Kant's restriction of the categories (particularly causality) to spatio-temporal appearances?

onto the text; moreover, as noted above, there is plentiful evidence for the continuation of the transition problem (although its nature develops) into the very final drafts.

Regardless of this bias in Adickes' overall interpretation, his emphasis on the centrality of force to the transition project is instructive. He provides a helpful account of the aim of this project in the early fascicles:

The task of the 'transition' is to 'anticipate' all general [*alle überhaupt*] *a priori* thinkable moving forces of matter, and so all their *possible* types, according to mere form, in their principal mutual and opposed connection, and fully present them in a system capable neither of decrease nor increase and projected [*entworfen*] by pure reason on the basis of *a priori* principles, which guarantee and create synthetic unity.¹²

These early drafts, of 1786 to May 1799 – that is, until the *Übergang 1-14* drafts and their famous ether proofs – show the opening problematic to be the *a priori* systemisation of all possible manifestations of moving forces, so as to enact the transition from metaphysical foundations to physics. In fact, it is the *approaches* that Kant explores in his early attempts at thinking through the transition that are particularly illuminating. Kant vacillates between, on the one hand, structuring his project through empirical concepts borrowed from contemporary natural science, and, on the other, using the *a priori* categories of his critical thought. A draft of a 'Preface' in the *Oktaventwurf* shows the tightrope Kant is attempting to walk: there must be, between *a priori* metaphysical foundations and *a posteriori* physics, 'a relationship of the one form of knowledge to the other which rests neither on principles *a priori*, nor on empirical principles, but simply on the transition from one to the other' (21:402-3, 15). The early drafts show the struggle: how not to rely excessively on one or the other form of knowledge?

The *Oktaventwurf* and the early drafts of the 'elementary system' represent a strongly empiricist moment in Kant's approach to the transition.¹³ Empirical or even experimental procedures are organised under the general structure of the four classes of category, as a means of connecting the first *Critique's* categories of experience to concrete physics. Thus physical properties such as weight, heat, material cohesion and crystallisation are grouped under Quantity, Quality and

Adickes favoured 'double affection' whereby things-in-themselves affect the 'I-in-itself', which in turn affects the empirical subject (Adickes, *Kants Lehre von der doppelten Affection unseres Ich: als Schlüssel zu seiner Erkenntnistheorie* (Tübingen: Mohr, 1929); Hall, *The Post-Critical Kant*, pp.158-9). This problematic has largely not been significant to more recent commentary. An exception is Hall, who dedicates the final chapter of *The Post-Critical Kant* to the problem of double affection.

¹² Adickes, *Kants Opus postumum*, p.163.

¹³ This was not the case from the outset: on the loose leaf 39/40, Kant runs through the first three of the classes of category, organising under these some deeply conceptual resources from his earlier theoretical work (e.g., under Quantity, '1) Explanation and division. 2) Origin of the concept. 3) Domain. 4) Principle – then predicables'; under Quality is '1) Explanation and synthetic division. ... Reality, negation and limitation. (Possibility of *dynamics*.)...' (21:457, 7-8)).

Relation. The empiricist tendency of Kant's thought at this point is clearest in the explorations of weighing as the means of knowing the Quantity of matter. In a passage from the penultimate page of the *Oktaventwurf* Kant even writes that the quantity of matter 'can *only* be measured by weighing' (IV:39, 21:408, 19, my emphasis). Kant is led to reflect on the technical mechanisms required for weighing, predominantly the balance or spring (e.g. 22:208, 29). The moving force at stake in the determination of the Quantity of matter through weighing is attraction, and usually for Kant here physical gravitation.

The Quality of matter is generally characterised through the physical properties of fluidity and solidity. Kant, in his empiricist moment here, utilises heat as the measurable quality that determines the fluidity or solidity of bodies (22:213, 32; 22:141, 47). The employment of the empirical property of heat means that caloric begins to play a significant role.¹⁴ Caloric will go on to receive major philosophical attention in the later ether proofs, but in its early appearance in relation to Quality, it must be understood as the empirical-scientific concept that it was at the time: the posited material substance that scientists including Lavoisier thought necessary for explaining heat.¹⁵ The Relation of matter appears as physical cohesion and crystallisation (21:404, 16; 21:410, 21). Kant's classificatory endeavours start to display strains here, as different drafts vacillate between Quality and Relation as the class under which to group certain properties. Crystallisation is thus designated at times under Quality (22:213, 32) and heat appears as the empirical property through which we might understand differences of types of matter under the class of Relation as well as of Quality (21:521, 34).

The category of Modality causes Kant the most problems, as might be expected in an attempt to reconcile empiricist procedures with the relation to the subject: a range of very different notions are subsumed under Modality, or the category is simply left out.¹⁶ The impossibility of exhaustively capturing all possible physical properties in a classificatory system starts to become

¹⁴ Caloric featured in Kant's less systematic discussions of physical properties in the early pages of the *Oktaventwurf* (e.g. 21:378, 12), and of course has a history in Kant's work going back to the lectures on physics of 1785 (29:83-4, 118-28) and the end of the *Critique of the Aesthetic Power of Judgement* (5:348).

¹⁵ Adickes, 'Zur Lehre von der Wärme von Fr. Bacon bis Kant' *Kant-Studien* 27 (1922): 328-368; on Lavoisier, pp.348-9.

¹⁶ Kant's various approaches to the modality of matter include outlining the possibility, actuality and necessity of 'motion at a moment', which leads him back to the old concepts of dead and living force (21:404, 16); to positing necessity as the only relevant modal category (22:188, 50) or, alternatively, only actuality (21:411, 21). The latter draft expands on this account of actuality as the relevant modal category with a cryptic reference to Leibniz's 'Dyadic' and his phrase, 'to derive everything from nothing, suffices one': these are presented as principles for the throughgoing determination of experience in general. The question of the modality of matter therefore leads Kant in various and quite eccentric directions. Often, the category of modality is simply absent, as in the extended and well-developed first and second sheets of the IXth fascicle (22:205-226).

evident.¹⁷ These limitations are evident in a passage from the ‘Elem. Syst. 1-7’ drafts, from October to December 1798. After a discussion of the relation of the moving forces of matter through cohesion, Kant provides a ‘Critical note’:

It may seem that in this section we have greatly transgressed the boundaries of the *a priori* concepts of the moving forces of matter, which together are to form a system, and have drifted into physics as an empirical science (i.e., into chemistry); but one will surely notice that [*breaks off*]

The self-critical note tellingly breaks off, unable to defend the evident proximity of the attempted transition project to empirical physics itself. One pole of the transition – the empirical part, to which it should lead – is at risk of determining the whole project, in these early drafts, to the detriment of the metaphysical foundations from which the transition should depart. Furthermore, Kant’s increasing awareness of the need for systematicity means that the categorisation starts to focus instead on the *moving forces* underpinning these physical properties (here we have reached the point that for Adickes encapsulates the early transition project, in his *précis*). Kant’s classificatory endeavours reach their apex in the drafts dated by Adickes to the end of this phase (February to May 1799), shortly before the turn to the ‘ether proofs’, with the attempt to set out the ‘System of the moving forces of matter’ in their material and formal aspect.¹⁸

The increasing systematic approach results in a move away from the attempt to exhaustively classify empirical procedures, characteristics and forces under the categories, with the problematic being newly codified as one of finding ‘intermediary concepts’. As Kant writes in a passage written between July 1797 and July 1798:

The transition from one science to the other must have certain intermediary concepts [*Zwischenbegriffe*], which are given in the one and are applied in the other, and which thus belong to both territories alike. (21:525, 37)¹⁹

¹⁷ Certain later comments thus read like self-critical reflections on this early moment in the *Opus postumum*: e.g., ‘[t]o take hold of the moving forces of matter empirically, and to collect them fragmentarily, cannot ground a physics as a system’ (22:322, 108).

¹⁸ The ‘material aspects’ of the moving forces include a separation into locomotive and internally moving forces, and then into attraction, repulsion, and, as the change between these two, *oscillatio* or *undulatio*. The latter are sub-divided into pulsations and vibration; and the characteristics of ‘superficial’ and ‘penetrative’ further specify the forces (21:181-2, 58). The ‘formal aspects’ are arranged according to the four classes of category. A note adds the distinction between dead and living force, harking back more than fifty years to the *True Estimation*; these are further specified through their direction, volume, continuity and homo- or heterogeneity (21:182-3, 59). Noting that ‘final causes belong equally to the moving forces of nature’ and that the forces forming both organic and inorganic bodies belong to the ‘combination of these forces in a system’, Kant starts to attempt to incorporate teleological forces of organic bodies in his classification (21:184-5, 60-1). This is a central moment for Lehmann’s interpretation (*Kants Nachlaßwerk*, reprinted in *Beiträge zur Geschichte und Interpretation der Philosophie Kants* (Berlin: De Gruyter, 1969), p.295-6).

¹⁹ A draft that Tuschling and Förster (contra Adickes) date shortly after this shows that this notion of intermediary concepts constitutes a rejection of the reliance on empirical concepts and processes:

The various moving forces of physical bodies are therefore not sufficiently fundamental for the systematic transition, and a search is initiated for a ‘prime mover’ or ‘primitive universal’ behind the moving forces.²⁰ The ether then becomes the first candidate for such a universal in the subsequent *Übergang 1-14* drafts.

3. The ether proofs: May to August 1799

Kant’s ‘*Übergang 1 – 14*’ drafts, or the ether proofs, began to be foregrounded in the commentaries from the 1950s, in the work of Daval in France and Mathieu in Italy.²¹ They remained significant in the interpretations of Hoppe, Tuschling, Edwards, Emundts and Hall.²² Förster’s book, which, in its first three chapters, gives an account of the problem of the last drafts, identifies, in its fourth chapter, the solution in both the ether proofs and the *Selbstsetzungslehre*.²³ Rollman’s recent book offers a close reading of *Übergang 1 – 14*.²⁴ These drafts have therefore been central to most of the major commentaries following Daval and Mathieu, and I will not here enter into the debates that surround them. Rather, I will show how the ether proofs might be considered the ‘objective pole’ of Kant’s attempts to provide the intermediary concepts that effect the transition. Around eight months later, Kant will explore what we can consider to be a corresponding ‘subjective pole’, in the *Selbstsetzungslehre* of April to December 1800. The ‘objective’ and ‘subjective’ nature of Kant’s attempts are deeply in question, as will be seen, so this designation should be taken only as shorthand. I will outline the significance of ‘force’ to this attempt, and will delineate the difficulty that prevents the ether proofs from serving as Kant’s final answer to the transition problem.

‘Between metaphysics and physics there still exists a broad gulf (*hiatus in systemato*) across which the transition cannot be a step but requires a bridge of intermediary concepts which form a distinctive construction. A system can never be constructed out of merely empirical concepts’ (21:476, 40).

²⁰ A marginal note states: ‘That all of these moving forces stand under the system of categories, and that one universal primitively underlies them all’ (21:183, 60). The reason that something more fundamental than the moving forces is required, even in their formal aspect according to the table of categories, is shown in a near-contemporaneous marginal note: ‘The problem is: What is it that first sets the moving forces of matter – taken as a whole – in motion?’ (22:200, 54). A ‘*primum movens*’ is thus sought (22:200, 55).

²¹ Roger Daval, *La métaphysique de Kant. Perspectives sur la métaphysique de Kant d’après la théorie du schématisme* (Paris: PUF, 1951); Vittorio Mathieu, *La filosofia trascendentale e L’Opus postumum di Kant* (Turin: Edizioni di Filosofia, 1958); see Basile, *Kants Opus postumum*, p.125.

²² Hansgeorg Hoppe, *Kants Theorie der Physik: eine Untersuchung über das Opus postumum von Kant* (Frankfurt: Klostermann, 1969), pp.97-114; Burkhard, *Metaphysische und Transzendente Dynamik*; Edwards, *Substance, Force, and the Possibility of Knowledge*, pp. 147-192; Dina Emundts, *Kants Übergangskonzeption im Opus postumum* (Berlin: de Gruyter, 2004), pp. 156-201; Hall, *The Post-Critical Kant*, pp.71-122.

²³ On the ether proofs: Förster, *Kant’s Final Synthesis*, pp.82-101.

²⁴ Veit Justus Rollmann, *Apperzeption und dynamisches Naturgesetz in Kants Opus postumum: Ein Kommentar zu ‘Übergang 1-14’* (Berlin: de Gruyter, 2015).

In the drafts of May to August 1799, the empirical-scientific concept of physical ether or caloric (the substance of heat) gains a new philosophical significance.²⁵ This ether is posited as a new, additional transcendental condition, alongside those familiar from the *Critique*: the categories, the pure forms of intuition, and the transcendental unity of apperception.²⁶ A clear account of how Kant intends to use the concept of ether is given under the header, ‘Theorem’:

Primordially moving matters [*Materien*] presuppose a material [*Stoff*], penetrating and filling the whole of cosmic space, as the condition of the possibility of experience of the moving forces in this space. This primary material [*Urstoff*] is not conceived hypothetically, for the explanation of phenomena; it is, rather, identically contained for reason, as a categorically and *a priori* demonstrable material [*Stoff*], in the transition from the metaphysical foundations of natural science to physics. (21:223, 72)

The ether is the bearer of forces, and so grounds the moving forces of matter and their interconnection. Kant writes that it is ‘a self-subsistent cosmic whole’ that is ‘internally self-moving and serves as the basis of all other moveable matter’ (21:216-7, 68). Insofar as it is self-moving, it provides an answer to Kant’s question in the ‘elementary system’ drafts: ‘What is it that first sets the moving forces of matter – taken as a whole – in motion?’ (22:200, 54). As a presupposed material distributed throughout the universe and penetrating all bodies, the ether is intended to provide the intermediary concept between the metaphysical foundations and physics, which is ‘given in the one and are applied in the other and which thus belong[s] to both territories alike’ (21:525, 37). Kant considers the ether to be ‘given’ in empirical physics: despite its eventual disproof, it was a reputable empirical-scientific concept in the late eighteenth century, and it first appears in the *Opus postumum*, as we have seen, in the empiricist phase of Kant’s reflections.²⁷ It is then ‘applied’ in metaphysics, and so ‘belong[s] to both territories’ in the ether proofs of the transition project. Kant calls ether ‘the intermediary object of perception’: it precludes the notion of empty space and, as ‘a moving force and real material’, provides an intelligible way that moving forces are connected (21:229, 76).

²⁵ Kant generally uses ‘ether’ and ‘caloric’ interchangeably, as Hall notes with reference to 21:218 and elsewhere (Hall, *The Post-Critical Kant*, p.71-2). Kant states that his use of ‘caloric’ in the ether proofs at least is not due to its connection with heat, but in its status as a *medium* for mobile forces: ‘[the] collectively universal world-material ... is called caloric; not because it pertains specifically to the production of heat, but only for the sake of analogy with one of its effects; which is that it (this heating) is incoercible, and communicates itself in contact to other [things] as mere motion’ (21:602, 96).

²⁶ For the ether as a new, material transcendental condition, its relation to the formal *a priori* conditions and discussions of issues, see Alexander Rueger, ‘Brain Water, the Ether, and the Art of Constructing Systems’, *Kant-Studien* 86.1 (1995): 26-41; Hall, *The Post-Critical Kant*, chapter three; Edwards, *Substance, Force, and the Possibility of Knowledge*; Edwards and Schönfeld, ‘Kant’s Material Dynamics and the Field View of Physical Reality’, *Journal of Chinese Philosophy* (2006) 33.1: 109–123.

²⁷ The ether-concept was only decisively disqualified in the late nineteenth- and early twentieth-century: empirically by Michelson and Morley, and theoretically by Einstein.

The singularity of the ether in comparison to the other transcendental conditions of the *Critique* is that it is a material, physical substrate. In this sense, it has a more ‘objective’ status than the pure forms of intuition, the categories and the transcendental unity of apperception. Kant clearly outlines a central issue in relation to this status, early in the ether proof drafts:

The question is whether [the ether] is to be regarded, not just as a *hypothetical material*, in order to explain certain appearances, but as a real world-material – given *a priori* by reason and counting as a principle of the possibility of the experience of the system of moving forces. (21:216, 67)

The stakes of the ether *proofs*, as first conceived, are to show that it is not hypothetical but, like the conditions of the first *Critique*, both *a priori* and *necessary*. The ether proofs, as reconstructed by Hall on the basis of what he takes to be its paradigmatic instance, generally proceed as follows.²⁸ As in the *Critique*, the starting-point is that there *is* a unity of experience. This experience of external objects is an affection of the subject by moving forces; empty spaces do not affect the subject. Analytically, or according to the ‘rule of identity’, there must be an actual object that corresponds to the concept of the unity of experience (21:225, 73). This object could either be the universal all-penetrating ether, or an atomistic whole in which empty spaces separate indivisible physical bodies. The latter, atomistic option would entail that empty spaces *can* affect the subject, which contradicts the earlier assumption; the *reductio* thus concludes that the contrary conclusion holds and there *is* a universal ether.²⁹

Kant repeatedly notes that there is something ‘strange’ or ‘peculiar’ about this mode of proof. This is because the ether as necessary, *a priori* world-material is proved *subjectively*, and ‘derived from the conditions of possible experience’ (21:222, 71). The proofs employ the transcendental argumentation, on the basis of subjective conditions of possibility, that was used in the first *Critique*. Kant makes a number of attempts to resolve the difficulty of this apparently paradoxical ‘subjective’ proof of a necessary, physical material condition, but uncertainty persists in the increasing vacillation in his claims about the hypothetical or actual nature of the ether.

‘*Übergang 4*’ insists, as do most of the ether proofs, that ether ‘is not a *hypothetical material*’ (21:229, 76). But whereas ‘*Übergang 2*’, for example, states that the ‘existence’ of the ether ‘is known *a priori*’, ‘*Übergang 4*’ is more cautious (21:224, 72).³⁰ This world-material, Kant writes,

²⁸ Hall seems justified in attending to what he sees as the most compelling example of the proof rather than attempting, as Förster does, a highly ambitious reconstruction of Kant’s argument from all fourteen versions of the ether deduction (plus material from the critical period). Cf. Hall, *The Post-Critical Kant*, p.95-6 and Förster, *Kant’s Final Synthesis*, p.89-101.

²⁹ This summarises Hall’s reconstruction of *Übergang 11*: see Hall, *The Post-Critical Kant*, p.96-7.

³⁰ Förster contends that it is in ‘*Übergang 2*’, on the seventh sheet of the second fascicle, that ‘the shift in [Kant’s] ether theory – from a merely hypothetical to an *a priori* demonstrable material – takes place suddenly and without warning’, and suggests a precise date range and a reason for this shift (Förster, *Kant’s Final*

is ‘*postulated* as a principle of the possibility of experience’ of the moving forces of matter (21:229, 76). Ether is not hypothetical but is nevertheless postulated: a distinction less strong than elsewhere in the drafts. In a subsequent note to ‘*Übergang 4*’ Kant even proposes that ‘[t]he *hypothesis* of a matter, distributed through the whole of cosmic space ... is only a thought-object (*ens rationis*)’ (21:230-1, 77). It is not self-evident how this thought-object is to be distinguished from a regulative idea, however, and therefore from something ‘feigned for the explanation of certain experiences’, which Kant seeks however to avoid with his concept of the ether (21:229, 76).³¹ But Kant insists that this ‘*hypothesis* of a matter’ is not ‘a merely *hypothetical* material’, and this is precisely because it is a thought-object. It is assumed ‘as a principle of the possibility of experience’ and is as such ‘an inevitable and necessary assumption’ (21:231, 77). Kant here clearly seeks to give the ether the same transcendental importance as the first *Critique*’s conditions of the possibility of experience, but in designating it an ‘assumption’ or a ‘hypothesis’ brings it close to the status of a ‘mere’ regulative idea, as the teleological ideas for the investigation of nature are commonly dubbed in the third *Critique*.³²

In ‘*Übergang 8*’, Kant goes further. The ‘thought’ or ‘principle’ of the whole of the system of moving forces

is subjective, for the world-observer (*cosmotheoros*): a *basis* in idea for all the unified forces which set the matter of the whole of cosmic space in motion. Does not prove the existence of such a material, however, (for example, that which is called the all-penetrating and permanently moving caloric); to this extent, is a hypothetical material. (21:553, 82)

Contrary to the majority of his formulations in the ether proofs, Kant here designates the ether as a hypothetical material. This, as the passage makes explicit, runs counter to the very aim of proving the existence of the ether, which motivates most of the drafts of this period. A later version tries to synthesise these contrasting conceptions, by having the ether ‘initially assumed only hypothetically’, but then, over the course of the proof, shown to be ‘actual, because the concept of it ... makes possible the whole of experience’ (22:553-4, 88-9). The ether-concept is here objectively valid merely as a *principle* for unifying the moving forces of matter.³³ We are

Synthesis, p.93). This obscures the fact that Kant experiments with presenting the ether as hypothetical, in drafts written after ‘*Übergang 2*’, in the passages I will cite.

³¹ For other uses of *ens rationis* or *Gedankending* in the *Opus postumum* (referring to the world-whole, God and the thing-in-itself), see Lehmann, *Beiträge*, pp.193, 362, 387-8.

³² Förster’s interpretation emphasises the ether as an idea of reason (or specifically, an ideal): Förster, *Kant’s Final Synthesis*, p.91-101. See also Rueger, ‘Brain Water’.

³³ ‘Hence, the material must be valid both subjectively, as the basis of the representation [of] the whole of an experience, and objectively, as a principle for the unification of the moving forces of matter’ (22:554, 89).

some distance from the ether as an ‘actual object’ in many of the other proofs, and as reconstructed by Hall.³⁴

The ether proofs thus represent the ‘objective’ pole of Kant’s approach to the transition, but the very objectivity of their orientation causes the proofs deep problems. The proofs represent an attempt to construct an intermediary concept for the transition from the starting-point of its physical side, and so employ what at the time was the empirical natural-scientific notion of the ether. The proofs show the difficulty of taking this initially ‘objective’ concept and applying it in the transition. When reconceived as a ‘principle’, albeit one with objective validity for the unification of moving forces for the possibility of experience, the ether is difficult to distinguish from a subjective (*a priori*, necessary) condition, such as those of the first *Critique*. This is a problem because then Kant is apparently still faced with the issue that motivates the *Opus postumum*: how does the transition from transcendental principles to *a posteriori* physics take place? The ether or caloric cannot simply be one more transcendental condition, but has the singularity of being closely tied to physical materiality.

The ether proofs, the ‘objective’ pole of Kant’s thinking of intermediary concepts, thus founder on their internal difficulties, and so, around eight months later (to skip over the fascicle X/XI drafts, to which we will return), Kant explores what we might consider a contrasting ‘subjective’ pole of his attempt to think the intermediary concepts for the transition: the *Selbstsetzungslehre*.

4. The *Selbstsetzungslehre*: April to December 1800

The so-called *Selbstsetzungslehre* or doctrine of self-positing has been recently foregrounded in Förster’s interpretation. Previously, Adickes’ view was commonplace: that the *Selbstsetzungslehre* was merely Kant’s attempt to include Fichtean themes, as part of the general ‘posito-mania’ in the wake of Fichte’s *Wissenschaftslehre* works of the 1790s. By contrast, Förster considers the doctrine of self-positing to be ‘clearly the culmination of Kant’s last work – if not, as I am inclined to think, of his entire critical philosophy’.³⁵ This echoes some more marginal earlier views: Werkmeister asserts that this phase of the late drafts represents a Fichtean conclusion of Kant’s thought; Lüpsen considers the *Selbstsetzungslehre* to be ‘the systematic centre of the *Opus*

³⁴ In the subsequent *Übergang* 12, the return to an emphasis on the objective, actual nature of the ether is striking: Kant writes that what belongs to experience is ‘objectively given – that is, *actual*. So there *exists*, as an absolute whole, a matter with those attributes, as the *basis* of its moving forces, insofar as they are moving’ (21:601, 95).

³⁵ Förster, *Kant’s Final Synthesis*, p.75.

postumum and an essential development of Kant's transcendental philosophy'.³⁶ The *Selbstsetzungslehre* cannot be located in the manuscripts as easily as the ether proofs: Förster's reconstruction of Kant's argument must draw together a wide range of passages. Although, as Beiser notes, the specific term *Selbstsetzung* never appears in the drafts and *Selbstsetzungslehre* is a 'scholarly anachronism', notions of self-positing are explored through various discussions of the activity of the subject in making, positing, objectifying or constituting itself in the world.³⁷

The problematic of the *Selbstsetzungslehre* is aptly described by Förster as that of showing 'how the I as mere object of thought (*cogitabile*) can become an empirical object given in space and time.³⁸ This is supported by a passage from the VIIth fascicle: Kant writes, 'I am the *cogitabile* according to a principle and likewise the *dabile* as object of my concept' (22:32, 173-4).³⁹ The 'I' is *cogitabile* on the basis of a *formal* principle of the determination of the subject of self-consciousness, or of the positing of a mere formal unity; and then is *dabile* when the *a priori* concept of the unity of aggregated perceptions receives a corresponding object. A later draft presents these two steps as, firstly, self-consciousness, as a 'merely logical act' through which the subject 'makes itself into an object'; and secondly, the determining of this object – i.e., the subject as object for itself – as both '*a priori* intuition and also as *concept*' (22:77, 186).

In addition to these two steps, Förster distinguishes three further steps in the doctrine of self-positing.⁴⁰ This requires much interpretative reconstruction or, arguably, imposition onto the text: there is no single draft in which Kant sets out Förster's five steps. *Pace* Förster, varying numbers of steps (or, often, 'acts') are evident in the drafts of April to December 1800. Most common is simply a 'twofold act', in which apperception 'makes itself into an object of intuition' (22:31, 173).⁴¹ Alongside the prevailing two-step presentation, there are also three- and four-

³⁶ Basile, *Kants Opus postumum*, p.93, summarising Focko Lüpsen, 'Das systematische Grundproblem in Kants opus postumum', *Die Akademie* 1925, Heft 2, pp.68-116; William Henry Werkmeister, *Kant: the Architectonic and Development of His Philosophy* (La Salle: Open Court, 1980), p.202.

³⁷ Beiser, *German Idealism*, p.201. As Beiser notes, "'sich selbst setzen,' 'sich selbst machen,' 'sich selbst darstellen,' 'sich selbst vorhermachen,' 'sich selbst constituieren,' and 'sich selbst zum Object machen,' appear frequently and almost interchangeably' (p.194).

³⁸ Förster, *Kant's Final Synthesis*, p.103.

³⁹ *Cogitabile* and *dabile* are glossed elsewhere as 'thinkable' and 'intuition', respectively (22:104, 198), or as 'the objectivity of representations for sense' and 'the subjectivity of representations through sense' (22:309). See Mathieu, 'Die transzendente Philosophie und die Methode der Physik' in *Forum für Philosophie Bad Homburg*, eds., *Akten des Fünften Internationalen Kant-Kongresses* (Bonn: Bouvier Verlag Herbert Grundmann, 1991), Teil II, p.87.

⁴⁰ This five-step doctrine of self-positing is reconstructed by Förster as follows: 1) the *logical* positing of the subject as object; 2) a *synthetic, ampliative* positing of space and time, which determines the forms of intuition of objects; 3) the *hypostatisation* of space: its filling by the ether; 4) the *insertion* (*Hinlegen*) of the categories into the manifold; 5) the *simple acts* of the subject, and the experience of the reaction of objects, which means the subject is aware of itself as affected and corporeal. Förster, *Kant's Final Synthesis*, pp.103-12.

⁴¹ The two-step process of self-positing is also explored at 22:43-4, 22:178-9 and 22:420, 184.

step accounts.⁴² Where there is a five-step process in the drafts of April to December 1800, it proceeds on different lines to Förster's reconstruction.⁴³ Förster's reconstruction of the first two steps is well-supported by the text, but his subsequent three steps have less textual support and are more strongly interpretative.⁴⁴ We can therefore take the first two to be the heart of the *Selbstsetzungslehre*, insofar as a 'doctrine' of self-positing can be found in the April to December 1800 drafts.

One draft of the two-step procedure of the *Selbstsetzungslehre* runs as follows:

Consciousness of oneself is 1. logical, according to the analytical principle 2. metaphysical, in the coordination (*complexus*) of the manifold given in self-intuition a) through concepts, b) through the construction of concepts that form the intuition of the subject and a mathematical representation. (22:420, 184, t.m.)

The first step is a purely logical self-positing, as the logical subject of experience. This is according to the analytical principle or, as Kant writes earlier on this page, 'according to the rule of identity': the 'I' is consciousness of itself as subject simply due to the indiscernibility of the 'I' and the subject. The second step is a metaphysical coordination (*Zusammenfassung*) of the manifold. This is not the sensible manifold of the first *Critique's* Aesthetic, but a manifold stemming from self-intuition. It has two aspects, corresponding to what the *Critique's* Doctrine of Method identifies as philosophy – the use of concepts – and mathematics – the construction of concepts (A713/B741). An earlier page of the same fascicle states that *apperceptio*, the 'act through which the subject makes itself in general into an object' is 'not a sensible representation' but 'rather, pure intuition' (22:413, 180). The self-intuition of the subject begins in pure intuition, without sensory content, and then even progresses to the construction of construction of concepts for this self-intuition.

The activity of pure thought that emerges in the *Selbstsetzungslehre* drafts, including pure or intellectual intuition and the philosophical construction of concepts, poses a problem for key

⁴² A three-step presentation adds a middle step of the 'posit[ing] of something outside ourselves', an appearance in space and time, 'by which we are affected': 22:418, 183. Later, something like the third step of this presentation is subdivided into two to give four, with the fourth a more expansive progression to 'Synthetic *a priori* propositions (transcendental philosophy)': 22:421, 185.

⁴³ See the five steps in 22:418-9, 183. Steps 1 to 3 cover ground we are now familiar with: logical self-positing is followed by an *a priori* cognition of the 'I' ('through intuition and concept'), in space and time. Step 4 notes that the pure intuition, which is centrally at stake in the *Selbstsetzungslehre*, leads to the main question of the first *Critique*: 'How are synthetic judgements *a priori* possible?' Step 5 then gives the 'solution', which is straightforwardly the critical position: there is a distinction between phenomena and noumena, and objects of the senses are the former, and so appearances, not things in themselves.

⁴⁴ The evidence that is provided in support of the third to fifth steps of Förster's reconstruction is in fact not drawn from the April to December 1800 drafts, but from the earlier fascicles X/XI. We will discuss aspects of these below.

limitations from the critical period. *A priori* or intellectual intuition within the realm of philosophy should be impossible for finite, human understanding, as stated most clearly in §77 of the third *Critique* (5:406). The tensions in this development in the April to December 1800 drafts are evident when compared with the open letter on Fichte's *Wissenschaftslehre*, published in August 1799. There, Kant writes that,

pure theory of science [*Wissenschaftslehre*] is nothing more or less than mere logic, and the principles of logic cannot lead to any material knowledge, since logic, that is to say, pure logic, abstracts from the content of knowledge; the attempt to cull a real object out of logic is a vain effort (12:370).

A *pure* philosophy or Fichtean *Wissenschaftslehre* is merely logic because it is pure thought, abstracted from the (sensible) content of knowledge, and therefore cannot form a real object (*reales Objekt*). In the famous words of the *Critique*, such thought without content is empty (A51/B75).

The problem that Kant's *Selbstsetzungslehre* clearly faces, a few months after the open letter, is: how can the pure act of thinking in the doctrine of self-positing circumvent Kant's own critique of Fichtean pure thought? The answer, I believe, is that the *Selbstsetzungslehre* is only ever a *first moment* in Kant's thought, and must always be followed by further philosophical developments, to avoid its being an empty, rationalist subjectivism. There are two broad directions proposed in the drafts, for the continuation of the transition project after the introduction of the new starting-point in the *Selbstsetzungslehre*. One is that it leads to the position of the critical philosophy, in fairly unchanged terms.⁴⁵ However, in the earlier drafts of fascicle X/XI, which Förster draws on in his reconstruction of a *Selbstsetzungslehre*, Kant also provides an account that begins with the subject's self-positing, and continues to the rethought elementary material of the ether proofs.

The passages proceed consecutively in the manuscript, and look to have been written at the same time. Kant argument is, schematically presented:

1. In a 'first act' the subject determines itself as an object in space and time, apprehends inner and outer intuition, and perceives space and time as sense-objects, not just as empty forms (22:507.12-18, 149);⁴⁶
2. There is a complex of perceptions as an aggregate (22:507.26-7);⁴⁷

⁴⁵ See 22:418-9, 183, discussed in a note above.

⁴⁶ This 'first act' contains both steps of the usual form of the *Selbstsetzungslehre* discussed above. In this reconstruction I quote both page and line numbers of the *Akademie* edition. After the first of these ten steps is a passage that recapitulates a general theme of the transition project: that the *Naturforscher* must have a priori principles that precede any investigation into matter's moving forces (22:507.19-25). This is written in a smaller hand and was probably added later. The subsequent nine steps are continuous in the manuscript.

⁴⁷ Kant writes 'empirical representations of the object with consciousness', which is a common definition of 'perception' in the folio: cf. 22:497, 22:501.

3. These are united, as the effect of moving forces on the subject, in a single representation of the object (22:507.27-8);
4. There can be a system of these perceptions (22:507.29);
5. The representation of space as a sense-object (i.e. in perception) is given *a priori*, and indeed as in a system of action and reaction (22:507.29-31);
6. The four mechanical powers (*Potenzen*) are the moving forces of apprehension (*Apprehension*) and reciprocal reaction (22:508.1-2);
7. There are four acts through which the subject affects itself as object and thinks itself an object in appearance, through perceptions of action and reaction, to a system of empirical representations (22:508.3-6);
8. It is only because space becomes an object of the senses (and so knowledge of it is empirical) that phenomena of matter (*Phänomene der Materie*) are possible (22:508.7-8);
9. Light seems to be this means with respect to the outer; heat with respect to the inner (508.9-10);
10. Space, as object of empirical intuition, is matter in appearance (*Materie in der Erscheinung*), which is distributed to infinity, for space is limitless (22:508.11-13).

These ten steps progress from the aggregate of perceptions (2.) for the subject, which has posited itself (1.), via the unification of this aggregate into a *system* of perceptions, or physics (3., 4.) and a correspondence between mechanical and subjective forces (6., 7.), to an infinitely-distributed matter in appearance (10.). This matter is made possible by space becoming an object of the senses (8.): this sense-object of matter is given *a priori* (5.), as a system of action and reaction, which, again, is the system of physics (4.). From the ‘first act’ of the subject to infinitely distributed matter: this series represents a logically coherent progression from the subject’s original self-positing to the concept of a fundamental, universal matter in appearance, or what was previously the ether concept.

Kant’s argument here, for a means of transition from the subject’s *Selbstsetzung* to the ether-concept, has not hitherto been reconstructed by commentators. Förster does in fact intuit that the first two steps of the *Selbstsetzungslehre* is followed by ‘the assumption of a universally distributed ether’, which he calls the “hypostatisation’ of space’, but his evidence for this is weak, merely quoting a passage from *Übergang 8* of May to August 1799.⁴⁸ This argument from fascicle XI shows Kant’s exploring a continuous argument for a connection between the ether and subjective self-positing; that is, between the focal points of the drafts that bookend fascicles X/XI. This single argument shows Kant moving from the *Selbstsetzungslehre*, as the preliminary activity of the subject, to the universal ether, which in the ether proofs is the bearer of physical forces. The argument goes by way of the *forces of the subject*, in a manner that must for the moment remain obscure, and to which we will return below.

⁴⁸ Förster *Kant’s Final Synthesis*, pp.105, 109-10.

We can now turn to fascicles X/XI, and particularly to the single folio from which Kant's argument here is drawn. My contention is that the draft of fascicles X/XI are of particular value in that they do not rely completely on either the 'objective' and 'subjective' approaches of the ether proofs and the *Selbstsetzungslehre*. These attempts, bookending fascicles X/XI, might be taken to represent overly dogmatic approaches, in which the overwhelming explanatory weight accorded to, first, the material ether and, second, the active subject, results in the internal difficulties that plague these attempts. The ether proofs and *Selbstsetzungslehre* focus respectively on the physical forces of the object and the psychological forces of the subject. These forces are not simply the physical and psychological forces of the critical period, however. There, the fundamental physical forces were attraction and repulsion, and the psychological forces those of cognition, pleasure and displeasure, and desire. In each case, these were the end-point of a reduction of empirically-given forces to the smallest number. Now, in the ether proofs, the moving forces of matter are predominantly attraction and repulsion (although Kant explores the notion of a third, intermediary force), but, most importantly, they are the activity of a single, universal ether or world-material. From the perspective of Kant's thinking of forces, the final drafts here explore the possibility that the single *Grundkraft* that unifies physical forces – which in the canonical critical works was merely a hypothetical idea – might be specified as the ether. As we have seen, the question of whether the ether is hypothetical or real, an idea or a physical substrate, is a fraught one in the ether proofs; but in any case, the drafts represent an attempt to philosophically explore the unifying basis of physical forces, to a much greater extent than Kant previously attempted. Similarly, the *Selbstsetzungslehre* represents an exploration of the fundamental activity of the subject, as a 'first act' that should precede all cognition. This is likewise a deeper consideration of the *Grundkraft* behind (or, in Kant's temporalised vocabulary, appropriate to the subject-matter of inner sense, *before*) the psychological faculties. In both cases, Kant can be seen to be examining the minimal 'empirical criterion' or fundamental activity of matter in general and the 'I think', which we saw in chapter four was fundamental but not interrogated in the critical conception of the forces of substance.

In contrast to the hypostatized 'physical' or 'psychological' approaches of the ether proofs and the *Selbstsetzungslehre*, fascicles X/XI explore *both* the objective and subjective poles of Kant's attempts at effecting the transition, and, importantly, also *the conceptual space in between*, without risking a dogmatic materialism or idealism. This takes place through a renewed attention to the relation of objective and subjective forces. With this, there is a renewal of the problematic that structures many of Kant's theoretical innovations: how to chart a course between the Scylla and Charybdis of empiricism and idealism, between *a posteriori* knowledge and *a priori*

principles. We might thus call fascicles X/XI the ‘transition within the transition’, in which case they should be considered centrally important to the nascent achievement of Kant’s final project.

5. Fascicles X/XI: August 1799 to April 1800

Kant wrote most of the *Opus postumum* on *Bogen*, large sheets of paper folded once to make a folio of four sides. In the fascicle X/XI drafts of August 1799 to April 1800, Kant is in the habit of designating each four-page folio with a sequential letter. The drafts of this period, designated A to Z, then AA and BB, therefore constitute twenty-five attempts at a formulation of a part of the transition project.⁴⁹ We can first take an overview of some of the drafts in the period, to initially see how their position as *philosophically in between* the ether proofs and *Selbstsetzungslehre* is evident in the oscillation between, and loose combination of, the objective and subjective forces of the transition.

Draft ‘O’ continues lines of thinking from the ether proofs, as use is made of a ‘matter [*Materie*] (as elementary material [*Elementarstoff*]) ... inwardly present in all bodies, in substance (caloric [*Wärmestoff*])’. Physics is designated as ‘a doctrinal system of all empirical representations’ (22:384, 120). The draft thus continues to explore the objective approach to the transition. There are also foreshadowings of the *Selbstsetzungslehre*’s subjective approach, however. Kant writes that although the form of the empirical representations that constitute physics is first ‘*given a priori* in appearance’ according to the connection of moving forces, they are then ‘*thought*’ as connected under principles of the possibility of experience that are inserted (*hineingelegt*) into empirical intuition by the subject itself.⁵⁰ The ‘objective’ inclination of the ether proofs is thus here already supplemented by the notion of the subject’s insertion of principles into the sensible manifold. This latter approach will be developed in the *Selbstsetzungslehre*. This subjective pole then represents the starting point for Draft ‘R’, as signalled by its opening lines:

It is not in the fact that the subject is affected empirically by the object (*per receptivitatem*), but that it affects itself (*per spontaneitatem*), that the possibility of the transition ... consists. Physics must make its object itself [*muß ihr Object selbst machen*] (22:405, 121).

⁴⁹ There are twenty-five attempts because, as was customary at the time when alphabetising lists, letters ‘J’ and ‘V’ are not used. Kant has both a BB and BB², but the latter is on the third page of the same folio, so I have counted BB and BB² as one ‘attempt’ (22:448).

⁵⁰ 22:384, 120-1; this dense sentence is worth quoting in full: ‘Physik ist also nicht ein *empirisches System* (denn das wäre in Widerspruch im Begriff) sondern ein Doctrinalsystem aller empirischen Vorstellungen die der Form nach das Verhältnis der bewegenden Kräfte a priori erstlich in der Erscheinung *gegeben* dann aber auch durch den Verstand als in Verbindung unter einem Princip *gedacht* nicht aufgefaßt sondern nach Principien der Möglichkeit der Erfahrung in die empirische Anschauung von dem Subjecte selbst in die Sinnenvorstellung a priori hineingelegt werden’.

The possibility of the transition is here located in the subject's self-affection, and physics designated as a science that makes (rather than passively discovers) its object. In the movement from Draft 'O' to 'R', we therefore see the intermediary position of the fascicle X/XI drafts. Furthermore, some of the drafts of August 1799 to April 1800 also return to the classificatory approach of the early work of 1786 to May 1799: drafts 'D', 'G' and 'I', for example, make renewed efforts to categorise the 'elementary concepts of the moving forces of matter' (22:342, 112).⁵¹

Drafts 'S' and 'T' provide remarkable explorations of the transition problem. The complexity of the issue now facing Kant, between the subjective and objective poles of his thought, is well captured in the opening of the main text of draft 'S':

Perception (empirical representation with consciousness) is merely a relation of the object to the subject insofar as the latter is affected by it: hence, an action or reaction of the moving forces which the subject exercises on itself in apprehension for the sake of sensation, and objects given to it as the material of experience, which can never be anything else other than empirically affecting moving forces, even if the effects are inner... (22:453, 124)⁵²

Which side of the object-subject relation is active, or doing the affecting, here? Kant states *both* that the moving forces are 'exercise[d]' by the subject 'on itself', *and* that objects are '*given*' (underlined in the manuscript) to the subject, with the moving forces of these objects as nothing other than 'empirically affecting', regardless of the 'inner' (or subjective) effects of these forces. The transition project as distilled in the fascicle X/XI drafts must mediate these apparently contradictory positions: moving forces are at once somehow objective, affecting the subject, and exercised by the subject, or self-positing, in the terminology that becomes more central in the *Selbstsetzungslehre*.

The issue is shown more pithily in the 'Theorem' of draft 'T':

⁵¹ Draft 'I' separates these into '1. [Those] which move others without themselves being locomotive – ponderable, coercive, etc. 2. These stand under categories 3. The forces, under the categories, under the universal moving principle of an all-penetrating, etc. matter.' (22:342-3, 112). On the subsequent side, however, Kant's pessimism about such an enterprise returns: 'we cannot specify the primary materials of the moving forces and develop an elementary system of them' (22:344, 113). Draft 'I' then returns to the classificatory mode, insisting again that 'the objects of sense must allow of being specified and divided by genus and species ... according to an objective principle of combination in a system of empirically given natural forces' (22:354, 114). Kant goes as far to claim that '[t]he moving force of matter is now classified': into *materia soluta* and *materia ligata*, and the latter into organic and inorganic bodies, and so on (22:355-6, 115).

⁵² Translation modified. Kant writes: 'Die Wahrnehmung (die empirische Vorstellung mit Bewusstseyn) ist blos Beziehung des Gegenstandes auf das Subject in so fern dieses von jenem afficirt wird: also eine Wirkung oder Gegenwirkung der bewegenden Kräfte die das Subject in der Apprehension an sich selbst zum Behuf der Empfindung ausübt und ihm Gegenstände als das Materiale der Erfahrung *gegeben* werden die immer nichts anders als empirisch afficirende bewegende Kräfte seyn können wenn gleich die Wirkungen auch innerlich sind...' The passage 'und ihm ... innerlich sind' is a marginal note in the manuscript connected to the main text with a sign.

All matter contains a complex of moving forces; and the subject which is affected by them (and his experience of this complex) itself determines these forces which provide the material for experience. (22:474, 133)

The subject is *affected* by the moving forces, but, seemingly paradoxically, it also *determines* these moving forces.⁵³ As Kant writes later in draft ‘T’: ‘Herein lies the *punctum flexus contrarii* [turning point] – the transition to physics, in which the possibility of experience is taught subjectively, and the complex of its objects objectively’ (22:479, 136). Synthesising the subjective and the objective has become the pivotal issue in the transition project. Furthermore, both draft ‘S’ and ‘T’ show that the central concern in this task is the location of the *moving forces*. Indeed, the specific problem at the heart of the August 1799 to April 1800 drafts can be considered to be that of determining whether the moving forces of physics are objective, subjective, or in some way both; and, if the latter is the case, how this might be philosophically conceived.

We will now focus on draft ‘X’ of fascicle XI, to follow Kant’s exploration of these problems in one self-contained folio. The value of attending to a single four-page folio sheet (*Bogen*) is evident in a comment made by Jacqueline Karl, who leads the translation and editing of the new *Akademie* edition of the *Opus postumum*. Karl makes use of Vittorio Mathieu’s account of the structure of the *Opus postumum* manuscript as ‘cell-like [*zellenartigen*]’.⁵⁴ Karl summarises:

The connected [*zusammenhängende*] text is never written beyond the borders of a single sheet [*Bogen*] or a single side [*Seite*].⁵⁵ Consequently, according to Mathieu, the unity of a thought coincides with the pre-given formal unity of the paper (a sheet, a side), so that the sheet or the side

⁵³ The determining – *bestimmen* – evoked here echoes a phrase from Leibniz’s discussions of his dynamics, which Kant could not have read (the letter being in neither Raspe’s nor Dutens’ editions of the 1760s). Leibniz writes to de Volder on 20th June 1703 that ‘I find it to be true in phenomena as well, and in derivative forces, that masses do not so much give other masses new force as *determine* the force already existing in them, so that a body drives itself away from another by its own force rather than being propelled by the other’ (Leibniz and de Volder, *The Leibniz-De Volder Correspondence*, p.263). As discussed in chapter one, the relation between primitive and derivative force in Leibniz represents an impasse for the completion of his dynamics, and Leibniz here claims that colliding physical bodies do not actually transfer their forces to each other, but each body merely determines its own internal force. This allows the derivative, physical forces to echo primitive, metaphysical ones: the latter are not transferred, as Leibniz does ‘not admit the action of individual substances on one another’ (*ibid.*): monads have no windows. The problem of the internality or externality of force and the possibility of the transfer of force, as well as the recourse to the vague notion of a determination of force to attempt to mask the issue, therefore appears both in Leibniz and in Kant’s late draft. This is not to claim that there is some undiscovered direct influence of the Leibniz-de Volder correspondence on Kant, but to indicate a certain continuity in the history of ideas, brought about by the problematic of dynamics: that of the connection of the *a priori* and the *a posteriori*, or metaphysics and physics, through the concept of force.

⁵⁴ Jacqueline Karl, ‘Immanuel Kant – der Autor, der ‘mit der Feder in der Hand’ denkt: Die Arbeitsweise Kants als ein Kriterium für die Neuedition des *Opus postumum*’ in Annette Sell ed., *Editionen – Wandel und Wirkung* (Tübingen: Max Niemeyer Verlag, 2007), p.134; Vittorio Mathieu, *Kants Opus postumum* (Frankfurt: Klostermann, 1989), p.61.

⁵⁵ More specifically, Mathieu notes that Kant never (with only one exception) extended a passage of text beyond the limits of a folio (*Bogen*), and that passages of text are ‘even almost never written beyond the limits of a single page [*Seite*]’. Mathieu, *Kants Opus postumum*, p.62.

has the synoptic function [*synoptische Funktion*] to incorporate the respective self-contained train of thought.⁵⁶

A folio sheet was therefore treated by Kant as a container for a coherent, sustained development of a train of thought. Karl notes that this is confirmed by the manuscript pages, in which the fourth page of a folio is in many cases written in very closely-written lines, in order to fit the thought into the folio.⁵⁷ Following the philological and interpretive insights of Mathieu and Karl, we can treat a single folio sheet in detail, given the ‘synoptic function’ that each plays in the development of the late drafts. This is not to say that each folio is straightforwardly a microcosm of the whole transition project, of course, because clear chronological differences in Kant’s philosophical approach are evident, as signalled above. Rather, given the interpretative difficulties of the *Opus postumum*, a close reading of a folio will provide a valuable insight into one relatively cohesive and self-contained moment of Kant’s thinking. Such an approach might be taken as a hermeneutic model for grasping the immense complexities of Kant’s final text.⁵⁸ As we will ultimately see, this close attention reveals the philosophy of force in the late drafts.

6. The draft ‘X’ manuscript

The format of draft ‘X’ is representative of many of the drafts of fascicle X/XI. It begins, in a large and flowing hand, with an attempt to state the problem to be answered.⁵⁹ ‘The doctrine of the transition from the metaphysical foundations of natural science to physics [twice underlined] contains two ...’ (22:496, 142). Kant first writes that it contains two ‘questions’, then crosses this word out and writes ‘steps’, then crosses this out to replace it with ‘progressions’ (22:496). The sentence continues, ‘of which each, in turn, includes two divisions as themes [*Themata*]’ (22:496, 142, t.m.).⁶⁰ This sentence is then continued in smaller script in the margin, which we can skip over.⁶¹ The doctrine of transition is thus initially presented as having two parts, with each part containing two subdivisions.

⁵⁶ Jacqueline Karl, ‘Immanuel Kant’, p.134.

⁵⁷ *Ibid.* This is indeed the case with draft ‘X’, the sixth folio of the XIth fascicle: the writing of the main text becomes smaller and the lines closer together as the pages progress.

⁵⁸ We might identify a recent tendency towards increasingly focused commentaries: in Förster’s following of Heimsoeth’s advice that ‘a comprehensive understanding of Kant’s final period could come only from a number of short monographical studies of limited, well-defined problems in the text’, and in Rollmann’s commentary, which restricts itself to the *Übergang 1-14* drafts (Förster, *Kant’s Final Synthesis*, p.x; Rollmann, *Apperzeption und dynamisches Naturgesetz*). A commentary at the level of a single folio pushes this tendency further.

⁵⁹ The facsimile of draft ‘X’ is reproduced in Appendix 2. Facsimiles of the *Opus postumum* are available at <<http://kant.bbaw.de/opus-postumum/faksimiles-chronologisch/>>. Draft ‘X’ is designated in the BBAW nomenclature as Convolut XI, Seiten 25-28, here: <http://kant.bbaw.de/opus-postumum/faksimiles-chronologisch/august-1799-bis-april-1800/atct_album_view?b_start:int=72>.

⁶⁰ Diverging from Lehmann, I read *Themata* instead of *Themate*.

⁶¹ We also ignore here the later marginal additions above and to the right of the larger, first-written text.

This structure is then neatly laid out in the centre of the page:

- I
 - A. What is physics?
 - B. What is a transition?
from the metaphysical foundations of natural science to physics?
- II
 - a. How is physics (as doctrinal system) possible?
 - b. How is the transition from the metaphysical foundations of natural science to physics possible? (22:496, 143, t.m.)

A plan is thus confidently outlined, as a means of addressing the topic of the opening sentence, namely '[t]he doctrine of the transition from the metaphysical foundations of natural science to physics'. The opening of the draft thus provides a coherent depiction of the problematic and of structure through which it will be addressed.⁶²

A brief consideration of Kant's writing process is necessary to understand the format of the *Opus postumum* manuscript. In the Philippi Logic notes of 1772, Kant is reported to have described his method as follows:

At the beginning one mediates tumultuously [*tumultuarisch*]. One must write out that which comes to mind, [even] if occasional thoughts come to the senses that one has never had in one's life. First, one jots down all thoughts, as one had them, without order. After that one begins to coordinate and then to subordinate. One wants to produce something;⁶³ so one must certainly complete the skeleton of the system in general, and subsequently divide this into chapters. Thus every elaboration [*Außerarbeitung*] must proceed with three tasks [*Arbeiten*]:

1. One jots down all thoughts, without order.
2. One makes a general plan.
3. One fleshes out [*arbeitet ... aus*] all the parts. (24:484, m.t.)

In this three-fold methodology, the process of 'coordination and subordination' apparently facilitates the second stage's creation of the plan, from the stream-of-consciousness notes produced in the first stage. Borowski's account of Kant's method shows the second and third stages and describes further reworkings before the creation of a clean copy for the printer:

Kant first made general outlines in his head; then he worked these out in more detail; he wrote what was to be inserted here or there, or was to be explained more fully, on little scraps of paper which he then attached to that first, hastily jotted-down manuscript. After some time had elapsed,

⁶² This reconstruction of the opening of the text required close attention to the facsimile of the manuscript. In the Cambridge edition, the marginal continuation of the first sentence is included in the text without being designated as such. In Lehmann and Buchenau's *Akademie* edition, footnotes signal the marginal additions, but careful scrutiny of the notes is required to identify which parts of the sentence are additions.

⁶³ 'Will man was verfertigen'.

he worked the whole over again, and copied it out neatly and clearly, as he always wrote, for the printer.⁶⁴

There is good reason to think that Kant employed this method in the production of the critical philosophy.⁶⁵ The *Duisburg Nachlass* is a fruitful source for notes in the earlier stages of the production of the first *Critique*.⁶⁶ By the time of the *Opus postumum*, Kant has taken to delegating to an amanuensis the final stage described by Borowski, that of producing a clean copy intended for the printer.⁶⁷

The start of draft 'X' displays the second stage of the process described in the Philippi Logic: a 'general plan' is outlined. The folio proceeds with the third stage of the process: 'fleshing out' this plan. Kant provides an opening definition of physics, answering the first question of the plan ('What is physics?') (22:497, 143); after this, three numbered notes, running from the first to the second pages of the folio, further develop aspects of the definition of physics (22:497-9, 143-5). This fleshing out also includes the working-over of the text through marginal notes. At some point, marginal notes are added to the first page: the text is heavily corrected, and substantive notes are also added.⁶⁸ A second, different definition of physics is squeezed in, in tiny handwriting, above the first. On the bottom half of page two, further definitions of physics are proposed: Kant is thus rethinking the definition that attempted to answer the question in the first division of his plan. Notably, Kant's handwriting starts to change in the bottom half of the main

⁶⁴ Borowski, *Darstellung des Lebens und Charakters Immanuel Kants*, p. 191f., quoted in Cassirer, *Kant's Life and Thought*, p.137.

⁶⁵ The early-twentieth century debates over the 'patchwork theory', for all their ultimate interpretative and philosophical failings, have the value of highlighting that the first *Critique* was to some extent compiled from the kind of notes that constitute the first stage, through the fleshing-out of the general plan in the third stage. The patchwork theory contended that the *Critique* is a mosaic of texts written over Kant's 'silent decade' and hastily compiled in a matter of months, following comments Kant makes in letters to Garve and Mendelssohn in 1783 (10:338, 345). H. J. Paton described the patchwork theory, referring specifically to Vaihinger, as 'a monument of wasted ingenuity' (Paton, *Kant's Metaphysic of Experience*, p.40).

⁶⁶ See Paul Guyer's introduction to his edition of Kant, *Notes and Fragments* (Cambridge: Cambridge University Press, 2005), pp.69-70.

⁶⁷ Hence the amanuensis' copy of *Übergang 9, 10 and 11* in the *Opus postumum* drafts, which Kant however further heavily edits, crossing through much of it (22:543-55). Elsewhere, Kant notes down the amanuensis he would like to transcribe the text (21:44, 240; 21:72).

⁶⁸ Karl has outlined three steps in the composition of Kant's manuscript pages (Karl, 'Immanuel Kant', pp.130-1). The first is the writing of what we can call the main text (which Karl calls the *Grundtext* and Lehmann the *Hauptteil*), around which large margins are left (Karl, 'Immanuel Kant', p.130; Lehmann, 'Einleitung', 22:783). In the second step Kant inserts corrections and stylistic reworkings in the margins, linked to the main text by vertical marks. The third step is the addition of more substantive or contentful (*inhaltlich*) marginal notes. Importantly, Karl emphasises that the notes in this third step usually begin, chronologically, at the bottom of the page, and progress from there around the side to the top of the page (Karl, 'Immanuel Kant', p.130; see also Lehmann, 'Einleitung', 22:784). When they are connected, this can be traced through Kant's symbols, which link notes that run on from one another. Karl identifies several different kinds of marginal note in this third step: 'a progression or supplementation of the main text, a replacement, an alternative, a completed remark to the main text, or an independent reflection' (Karl, 'Immanuel Kant', p.132).

text of page two: it becomes less flowing and more compressed: difficult to distinguish, in fact, from the marginal notes. On the third and fourth pages, although Kant maintains the format of a ‘main’ and ‘marginal’ text, these are now both in a very small and compressed hand, almost indistinguishable from one another. Furthermore, the main text becomes more like the substantive marginal notes in content as well as appearance: it no longer reads like the opening of a publishable work, but like a series of notes in which thoughts are being developed and philosophical work is being done.

In the last two pages of the folio, the marginal notes and the main text represent something like stage one of Kant’s process as described in the *Philippi Logic*: capturing the mobile process of thinking by jotting down whatever comes to mind. It is not, however, completely ‘without order’: in fact, the order of Kant’s text is very important, as is signalled by the signs that connect passages to one another, and which continue sentences from the main text into the margins. The text is something between an orderless jotting of thoughts and the fleshing-out of a plan, whilst simultaneously coordinating and subordinating thoughts, in a way that can lead to a redeveloped plan. The neatly-divided three stages in the *Philippi Logic* – which even in 1772 may have been more an idealised version for Kant’s listeners than a true reflection of his process – thus swirl together in the procedure of the *Opus postumum*. These philological issues are inseparable from the philosophical understanding of the manuscript: we must be aware of Kant’s writing process in order to reconstruct the development of the thought process at work in this single ‘cell-like’ moment in Kant’s work on the transition problematic.

7. ‘Experience’ and the opening problematic of draft ‘X’

Kant begins to flesh out his opening plan for the transition project in draft ‘X’ by defining ‘physics’, the point at which the transition must arrive. Physics is first defined as ‘the doctrinal system of the laws of the moving forces of matter, insofar as they are given in experience’ (22:497, 143). *Experience* is thus central to this minimal definition of physics: this is made clear in the subsequent numbered notes. Note one distinguishes experience from perception: ‘One cannot *have experience* without *making* it. ... Conversely, one cannot *make* perception but only *receive* it as given’ (*ibid.*). Experience and perception are therefore opposed in a way that is not outlined explicitly in the first *Critique*.⁶⁹ This opposition is however more complex than it first appears.

⁶⁹ Experience is of course distinguished in a similar manner from ‘the raw material of sensible sensations’ or ‘sensible impressions’ in the openings of the A and B introductions to the *Critique*: the understanding actively ‘brings forth’ or ‘work[s] up’ passive sensation into experience (A1; B1). But unlike sensation, perception (*Wahrnehmung*) – ‘empirical consciousness, i.e. one in which there is at the same time sensation’ – is not distinguished (as passively received) from experience (as actively made) (A165/B207). ‘Perception’ indeed

The latter clause quoted distinguishes the ‘receiving’ (*empfangen*) from the ‘making’ (*machen*) of perception. Perceptions are *received* not made. Experience, according to the first clause, is *made*: does this then mean that it is *not* received? Apparently not: Kant inserts a parenthesis above the text after *haben*, so that the clause reads: ‘One cannot *have* (receive) *experience* without *making* it’.⁷⁰ Here, receiving and making are not exclusive: one receives experience *by* making it.

A second opening definition of physics is added to the first, scrawled in a small gap above the first definition.⁷¹ It reads:

[Physics is] the scientific *study of nature*, insofar as it is an object of experience. It is either investigation of nature or doctrine of nature,⁷² and its principles are either given rationally *a priori* or empirically. (22:497, 143)

The first sentence simply rewords the earlier definition, but the second sentence again sets out the crux of the problem immediately facing the transition project. The principles of physics are *either* given rationally and *a priori* or empirically. In fact, the implication is that they are both, in the two-fold conception of physics as investigation of nature and doctrine of nature. This sheds further light on the problem in the first note. Experience is *both* made *and* received; the principles of physics are given *both a priori and* empirically. This can be taken to be the opening problem of draft ‘X’. As in the distinction between the *Selbstsetzungslehre* and ether proofs that bookend fascicles X/XI, the problem has a subjective and an objective pole: on the one hand, experience is made and physics has *a priori* principles; on the other, experience is given and physics has *a posteriori* principles. The challenge of draft ‘X’, as with fascicles X/XI in general, is: how to reconcile these subjective and objective poles? The problem of forces – as key to Kant’s conception of physics, and implicated in his conception of psychology, as we have seen – will shortly become central to the attempts at this reconciliation.

In note two, Kant writes that ‘Something empirical (as material [*Stoff*] <or the material element [*Materiale*]> for sensible intuition) is necessarily contained in every experience’ (22:497, 144,

only first appears in the *Critique* in the Deduction, in terms of the ‘thoroughgoing and lawlike connection’ of perceptions in experience, so the term is associated with a certain degree of active synthesis and not mere receptivity (A110; cf. A97).

⁷⁰ ‘*Erfahrung* kan man nicht *haben* <(empfangen)> ohne sie zu *machen*’. The underlining in this sentence looks to have been added in Kant’s later edit, in which he added and deleted words, not when he first wrote the text: the underlining is in the slightly darker ink of the additions and deletions, compared to the more lightly-underlined ‘Anmerkung’ on the same line.

⁷¹ It is connected to the first with a sign, suggesting that it should replace it, but the first is not crossed out, so Kant, intentionally or not, lets both definitions stand.

⁷² ‘[E]ntweder Naturforschung oder doctrinale Naturlehre’: the latter words are problematic in English as they could be ‘doctrinal doctrine of nature’. Judging from the manuscript facsimile, Lehmann’s reading of ‘doctrinale’ looks questionable.

t.m.).⁷³ That there must be something empirical in experience is of course a (if not the) central tenet of the first *Critique*. Kant here, however, goes on to present this in terms of the transition problematic: the question of the *a priori* systematisation of the manifold moving forces of material nature.

[B]ut the *thoroughgoing determination* of this material [*dieses Stoffs*], in all the relations in which it affects the senses, is required, in order for an aggregate of perceptions to count as an object [*Object*] that is founded in experience. (22:497-9, 144, t.m.)⁷⁴

In order for the aggregate of perceptions to be unified into a single object, founded in experience – and so a single, unified experience – the matter or *Stoff* of experience must be thoroughly determined in all the relations in which it affects the senses. What would it mean to determine all the possible relations of matter to the subject? Kant states that, in fact, this complete determination is not possible:

Since the *thoroughgoing* determination of an object in perception (its complete apprehension and presentation)⁷⁵ is a mere *idea*, which is, indeed, suitable for approximation (*approximatio*), experience can never provide a certain proof of the existence of these or those moving forces of matter. It is the collected grounds of determination which, partially (*sparsim*) but never completely united (*omnimode coniunctim*), suffice as the certification [*Beurkundung*] of an experience. (22:498, 144, t.m.)

This thoroughgoing determination of matter is merely a regulative idea in the vein of a *Grundkraft* in the Appendix to the *Critique*.⁷⁶ A later addition provides a useful gloss: this mere idea is a ‘problematic concept’ (22:498, 144). The idea of thoroughgoing determination approximates the totality of relations of matter to the senses, and so whilst it cannot prove the existence of matter’s moving forces, it can certify or authorise (*beurkunden*) an experience as unified.

However, just as with the ambiguity around the hypothetical or real nature of the ether in the ether proofs, the merely regulative nature of this thoroughgoing determination of matter and its moving forces is in question. A note at the bottom of page two flatly contradicts this initial claim for the hypothetical nature of the thoroughgoing determination. Kant there writes,

⁷³ The marginal addition of *Materiale* is not noted as such in the Cambridge edition. It might represent a further iteration of the opening problematic, if *Stoff* is taken to indicate physical materiality and *Materiale* the subjective content of experience: in the first case the objective element of experience is emphasised, in the second case the subjective element.

⁷⁴ Here I have removed Kant’s later additions; with these added, the passage reads, ‘but <only> the *thoroughgoing determination* of <the concept of> this material [*dieses Stoffs*], in all the relations in which it affects the senses <as the formal element of the connection of the manifold of empirical intuition>, is <becomes> required, in order for an aggregate of perceptions <of an object> to <itself> count as an object that is founded in experience’. The additions shift the passage from the empiricist to the rationalist pole of Kant’s thinking of the issue: matter becomes ‘the concept of matter’; the way matter affects the senses is presented in terms of ‘formal element’ of ‘the manifold of empirical intuition’.

⁷⁵ I follow Förster in adding parentheses around ‘vollständig aufzufassen und darzustellen’.

⁷⁶ See chapter three, above.

the aggregate of the forces in a system (that is, with consciousness of their completeness – not *sparsim* but *stricte coniunctim*) cannot be given otherwise than *a priori*, through a principle, which carry with it the concept of necessity: which and how many forces form the aggregate of forces in a system. (22:502-3, 146)

Kant's use of *sparsim* and *coniunctim* ('dispersedly' and 'unitedly') highlight the fact that this is a direct contradiction of his earlier claim. In this note on page two, the aggregate is not to be partially or dispersedly but rather completely or strictly unified, through the systematic and necessary systematisation of the moving forces of matter, as the grounds of determination of a unified experience. This complete determination of matter's moving forces can avoid being a regulative idea if the 'aggregate of forces in a system' is given 'a priori, through a principle'. This represents a shift to the *a priori* or pole of Kant's thinking of the problem at the opening of draft 'X': if experience is taken to be *made*, and the principles of physics to be given *a priori*, then the thoroughgoing determination of physical forces can be constitutive, not regulative. In this development, this response to the transition problematic should be made possible through an *a priori* principle of the subject: this will return to us to the question of *subjective forces*.

8. The subject

Kant's draft now begins to reflect on this subject: the subject of perception and experience, and the subject who carries out physics, metaphysics and the science of transition. In a marginal note on page one, written next to the first definition of physics, Kant writes,

Experience has as its basis [zum Grunde] 1) *perception*, which always requires moving forces affecting the subject (be they outer or inner) 2. to elevate [*erheben*] the perceived to *experience*. For which an inner principle of the subject is required, to think the perceived object in its thoroughgoing determination. Whereof we make experience, a formal principle of thoroughgoing determination is there required. (22:499, 144, t.m.)⁷⁷

Perception, which in note one was defined in line with the critical position as 'empirical representations with consciousness', is now presented in terms of moving forces. These forces are subject-affecting (*das Subject afficirender bewegender Kräfte*): so note one's depiction of perception as passive is retained, although now stated in terms of forces. However, Kant's

⁷⁷ My translation of the last sentence differs substantively from Förster's; he renders it as 'For whatever we have experience of there is required a formal principle of thoroughgoing determination'. It seems important, given the discussion around *making* experience in note one, that Kant's use of *machen* is retained. The sentence in the *Akademie* edition is 'Wovon wir die Erfahrung machen dazu wird ein formales Princip der durchgängigen Bestimmung erfordert'. (The typographical inconsistency of '1)' and '2.' earlier in the quotation follows Kant's text). It is of course difficult to be sure, but we can speculate that this note was written at the same time as the main text on page one, and certainly earlier than many of the corrections and the other marginal notes on the page. It is in a lighter and narrower line than the other notes, and the ink appears closer to that of the main text than to that of the marginal notes immediately above and below it or to the amendments in the main text. The content of the note is also fairly systematic and directly connected to the passages in the main text.

parenthesis is significant: the forces may be ‘outer or inner’. This is another manifestation of the opening problematic of the draft. If the forces are ‘outer’, then they must be in some way empirically given; if ‘inner’, then they are somehow the moving forces intrinsic to subjectivity.⁷⁸ The problem that we saw in section 7, above, depicted in terms of the oppositions of *a priori* and *a posteriori* principles, and making and receiving experience, now receives a further iteration as the question of whether the moving forces are inner or outer.

The significance of this marginal note on the subject is clear in the new focus of note three, which opens the second page. Kant writes,

The influence of the moving forces of matter on the subject in respect of its inner sense in action and reaction at once, which in consequence has certain phenomena for outer sense as effects from those (sensations), constitutes a particular field of appearances, which belongs, as object of experience, to physics, which, since moving forces are directed toward ends, [has] directly or indirectly an immaterial cause at its basis [*breaks off*] (22:499, 144-5, t.m.)

The urgency of the opening of the main text of page two, still in Kant’s large, flowing hand, is evident in its breathless style (which ... which ... which) and abrupt cessation. In quick succession, a number of new ideas are explored. Having set out the distinction between inner and outer forces in the marginal note on page one, Kant now repeats the approach he took to the previous binaries (*a priori/a posteriori*, making/receiving): he explores how *both* sides of the binary might hold. So inner sense is affected by the moving forces of matter; the implication is that ‘action and reaction’ are in inner sense. Consequently, there are ‘certain phenomena’ (*Phänomene*) as effects in outer sense: these are sensations.⁷⁹

Furthermore, Kant has here introduced a teleological account of the moving forces, stating bluntly that they are directed towards ends. As such, physics has at its basis an ‘immaterial cause’. In keeping with the approach of the third *Critique*, the introduction of teleology leads to the concept of the organised, or, as Kant will say shortly in the paragraph, organic body:

A matter whose form is possible only by purposive determination, that is, an organised body, can only be thought as moved and as moving by a principle which⁸⁰ absolute unity of its combined

⁷⁸ Alternatively, ‘outer’ and ‘inner’ could refer to the distinction between outer and inner sense, in which case they would be internal to the subject. The latter is the direction in which Kant will move in the draft; however, in this case, the difficulties that we saw accompany Kant’s conception of matter and outer sense, and the ambiguity of matter appearing as something external to the subject, still apply.

⁷⁹ Kant’s terminology evokes a Leibnizian phenomenalism, although the complexity of his problematic persists: the influence of the moving forces ‘in respect of’ its inner sense (*in Ansehung seines inneren Sinnes*) leaves open the question of whether the moving forces *themselves* are outer or inner. If there is a hint of the Leibnizian position that phenomena are mere effects of ‘internal’, metaphysical forces, this is certainly not unambiguously asserted.

⁸⁰ Förster suggests, after ‘which’, ‘carries with it’: this is sensible, although Kant’s failure to specify the relation of the principle and the unity of moving forces is symptomatic of the difficulties in the problematic of the text.

forces, hence as constructed by a non-material being, in which the body is thought of as *animated* and matter as animating. (22:499, 145, t.m.)

Matter is reconceived here as the ‘animating’ (*belebend*) principle of a body. Kant’s German gives a clearer sense of the relation that *bewegt* and *bewegend* have to *belebt* and *belebend*. The organised body can only be thought (as ever, the mode of cognition is relevant) as moved and moving insofar as it is animated and animating. It is moved or animated as a *body*; it is moving or animating as *matter*. Kant’s first clause depicts the body as a *form* of matter, so the approach here is hylomorphic: as matter, the organised body is moved, or passive; as form, it is moving, or active.⁸¹ Alongside this is the now-familiar principle underpinning the unity of moving forces. This is not now just grounded on an ‘immaterial cause’ (*immaterielle Ursache*) as in the previous passage, which could be an *a priori*, rational principle, but on a more explicitly theological ‘non-material being’ (*nicht materiellen Wesen*).

Kant’s writing in the manuscript now becomes more note-like: the next three sentences are introduced with dashes. The plan of the draft (‘A. What is physics? B. What is a transition?’ etc.) has collapsed and Kant’s thought has spun off in an unforeseen direction. The next lines seek to return some order to proceedings: knowledge of the organised body is limited to only being known through experience, in an echo of the delimitation of force to the empirical, enacted in *Dreams* and the *Inaugural Dissertation*.⁸² Such order is again exceeded by the final sentence of the passage, however, which reflects on the ‘principle of vegetative or animal life’, different degrees of health, and the regeneration of the species through sexual intercourse (22:499, 145).

This represents the end of this free-form reflection on life and properties of organic bodies in the main text.⁸³ However, the marginalia to pages three and four of draft ‘X’ continue in a similar vein: most of the marginal notes that Förster does not translate are on teleology, organic bodies, health and life.⁸⁴ Here, in the main text of page two, Kant arrests his reflections on organisms to

⁸¹ In contrast to Kant’s usual discussion of physical forces in terms of attraction and repulsion, which are both active (see chapter three), this hylomorphism harks back to Leibniz’s dynamics in ‘Specimen Dynamicum’: ‘primitive [active] force (which is nothing but the first entelechy) corresponds to the soul or substantial form ... And indeed, the primitive [passive] force of being acted upon or of resisting constitutes that which is called primary matter in the schools, if correctly interpreted’ (G.W. Leibniz, *Philosophical Essays*, pp.119-20).

⁸² ‘The possibility of an organic body cannot be assumed, without knowledge of its actuality in experience’ (22:499, 145). Cf. chapter two, above.

⁸³ The question of organisation more generally continues to be significant to the ‘main text’ of page three and four, as we shall see.

⁸⁴ See (my translations): 22:505: ‘The organised body can be healthy or ill and the consumption of its forces is death, but with this [death], transition to the chemical operation of dissolution, to the matters [*Stoffe*] which proceed to new formations’; ‘One can think *a priori* the *possibility* of organic bodies even less than the matter of organising [*organisirender*] bodies (through procreation and propagation by means of two sexes). Experience belongs to that. But it can also be an organisation of a system of organised beings, namely for example the deer given for the wolf, the moose for the tree, the black earth [*Dammerde*: see the entry in

return to the question with which he started draft 'X': what is physics? In the middle of page two, Kant therefore returns to his initial plan. The main text up to this point has therefore been a complete cycle of Kant's working method: from the plan, to the expansion, to the reflections that transgress the plan and pull the thought in a different direction. From this point on, the main text and the marginal notes become harder to distinguish, and these different stages in the process are interwoven.

Before turning to what I consider to be the key moment in the development of Kant's thinking in draft 'X', we can briefly reflect on Kant's introduction of organised bodies. Gerhard Lehmann makes this central to his interpretation of the *Opus postumum*. For Lehmann, the appearance of organised bodies in the *Opus postumum* shows that the third *Critique*, particularly the *Critique of Teleological Judgement*, as much as the *Metaphysical Foundations*, should be considered the source of the circle of problems addressed in the final drafts. The *Metaphysical Foundations* and third *Critique* each bestow a part of what Lehmann argues is the two-sided problematic of the *Opus postumum*: the 'application problem' and the 'transition problem' respectively. The application problem is the *use* and *realisation* (4:478) of the structures of the critical philosophy in physical science.⁸⁵ The transition problem is a continuation of the issue underpinning the Schematism's requirement of a 'third thing', in this case bridging categories and intuitions (A138/B177).⁸⁶ The notion of transition itself is broader than the specific example of the Schematism: Lehmann denotes this the 'system-approach' that is most evident in the

Gehler's *Physicalisches Wörterbuch*] for the crop and even the humans for the different races according to the climate, and so the whole of the globe can be organised'. 22:506: 'Nature organises matter not merely into bodies but all these further into corps [*Corporationen*], which now also on their side have their interdependent end-connections (one is there for the sake of the other) the moose for the reindeer, this for the hunter, but this for the land-owner who protects them and maintains the less fortunate'; 'Nothing is here merely mechanical but has a *tertius interveniens*'; 'Everything is organised in the world-whole and to its purpose [*zum Behuf desselben*]'; 'Organic body is that from which the concept gives the same result, not merely from the parts to the whole but also interchangeably from the whole to the parts. From the thumb to the hand, to the arm etc. can be concluded. So organic body is only thinkable through reason'. 22:510: 'The generation of a body through another. Growth. Copulation. Organic body (not matter) is that in which every part is there for the sake of the others and whose possibility cannot be assumed *a priori*. To this, the matter [*Materie*] is not suitable as [that] which is always composite and which allows no atomism, so an immaterial principle that concerns *everything*'; 'Organised bodies are those that have life[,] Plants or animals[.] Otherwise those whose inner form contains ends that direct themselves can be defined as such'; 22:511: '(Tourtelle) Life (which insofar as is fully thought is synonymous with health) exists according to the author in the harmonious confluence of all relative activities into a system in the organs connected in the animalistic body, under the direction of a sensible principle, all collective to it. Brain, heart and *regio epigastrica* (by means of the diaphragm *Zwergfells Antagonism*) cramp tonic atonic. Centre, periphery[,] illness, miasmatic symptoms'. (This final note, as Adickes identifies, refers to a review of E. Tourtelle, *Elemens de medicine theorique et pratique* (1799) in the Jena *Allgemeine Literatur-Zeitung* of 30th January 1800. Adickes, *Kants Opus postumum*, p.148).

⁸⁵ Lehmann, *Kants Nachlaßwerk*, p.297.

⁸⁶ *Ibid.*

introductions to the third *Critique*.⁸⁷ The problem of transition runs throughout the third *Critique*, however: from the idea of the sublime, to the projection of the whole of nature as a system, to the notion of final causality.⁸⁸ The particular innovation in the third *Critique* that Lehmann considers central for the *Opus postumum* is the distinction between determining and reflecting judgement. Thus the question facing the *Opus postumum*'s account of special laws of nature is how these are *necessary* from the perspective of reflecting judgement, but *contingent* for determining judgement.⁸⁹ Lehmann writes,

So either the whole plan of the *Nachlaßwerk* is a step back to a dogmatic theoreticisation, or it stands from the start under the banner of an application of the *Critique of Judgement* to the physical region.⁹⁰

At the heart of this 'application' of the third *Critique* is its attention to the whole of nature, the problem of transition, and of subjective validity, and more generally the explanatory framework of determining and reflecting judgement.⁹¹

The development of the line of thought in draft 'X' presents an alternative account to Lehmann's interpretation of the connection of the late drafts to the third *Critique*. The appearance of the problem of organisation and teleology here affirms the insight that the *Opus postumum* cannot be considered in isolation from the major conceptual developments in the 1790 work. However, the draft did not *begin* with these considerations: in fact, as we have seen, they represent a departure from the plan initially outlined, and are then arrested by the return to the definitions of physics on page two of the draft; the reflections on organic life and teleological systems then predominantly continue in the margins of page three and four. We can therefore see that, *contra* Lehmann, the problematic of the third *Critique* does not represent a starting-point of the development in draft 'X'. Rather, the issue of organisation emerges in the context of the significance of the role of the *subject* in raising perceptions to experience, and of the question of relation that the moving forces have to subjectivity (whether they are 'inner' or 'outer').⁹² Kant thus explores the correlation between the subject as 'moved' and 'moving', and the organic and organised body as 'animated' and 'animating'. It is therefore the requirement, in the development of his line of thought, to think the *subject in terms of its forces* that pushes Kant to the question of

⁸⁷ *Ibid.*, p.299.

⁸⁸ *Ibid.*, pp.309-10.

⁸⁹ *Ibid.*, p.298.

⁹⁰ *Ibid.*, p.299.

⁹¹ On the wholeness, transition and subjective-validity problems, cf. *ibid.*, pp.303-11, and in relation to the *Opus postumum*, particularly pp.328ff.

⁹² Förster makes a similar point, although with a different starting-point, arguing that the introduction of organisms in the drafts 'can be explained entirely internally, as following naturally from Kant's discussion of the ponderability of matter, and of the mechanical powers' (*Kant's Final Synthesis*, p.22).

teleology, organisation and life, rather than the other way around. The interrelation of the problem of subjective experience and of organisation will become increasingly clear as our account progresses.

9. A key marginal note

After the new attempts at defining physics on page two, which represent a return to the content of the start of draft 'X', Kant leaves a gap at the bottom of the page; his next additions to this page are in the margin.⁹³ The marginal text is then continued into the space at the bottom of the page.⁹⁴ This bottom marginal note is then itself continued, connected with a symbol, onto the bottom of page three.⁹⁵ We can be fairly certain that this is the first thing written on page three, as the 'main text' above it refers to it.⁹⁶ I place 'main text' in inverted commas because, as noted above, the distinction between main and marginal text has all but disappeared on the third and fourth pages: the text is equally small, and continuous passages move between the margins and the main text and back, connected by Kant's symbols. This marginal note, extended onto page three, was therefore considered important enough by Kant to be continued onto the empty third page of the folio, transgressing his usual practice of squeezing marginal notes in ever-smaller writing onto the page on which they begin.

This important extended note reads,

In regard to matter and those of its forces which <externally> affect the subject (hence are *moving* forces), perceptions are self-moving forces combined with reaction (*reactio*), and the understanding *anticipates* perception according to the uniquely possible forms of motion – attraction, repulsion, enclosure (surrounding) and penetration. – Thus the possibility of establishing *a priori* a system of empirical representations (which otherwise appeared impossible) and of *anticipating* experience <*quoad materiale* [as material]> is illuminated (22:502, 146, t.m.).⁹⁷

⁹³ We can see that this is the case because the text that comes to fill the space under the definitions of physics ('...is there for the sake of the other ... only experience can prove it' (22:501.12-501.21, 146)) is a continuation of the left-hand marginal note, as designated by a symbol.

⁹⁴ The passage is: 'Empirical representations with consciousness ... forces in a system' (22:501.22-502.02).

⁹⁵ 'In regard to matter ... is illuminated' (22:502.03-10). In the Cambridge and current *Akademie* editions this is included in the text of page two (justifiably, as it is a continuation of the passage on that page), but it is actually located at the bottom of page three of the manuscript.

⁹⁶ This reference is not an interlinear addition but is in the main text itself: Kant writes, in the centre of page three, 'Diese unten angeführte Organisationen...' ('These organisations, referred to below...') (22:503, 147). I consider this to refer to the bottom marginal note.

⁹⁷ My substantive departure from Förster in translating this passage is to render 'sind die Wahrnehmungen selbst an sich bewegende Kräfte' as 'perceptions are self-moving forces' rather than 'perceptions are themselves moving forces': this gives a significantly different meaning. In the *Akademie* edition this important note (to which I have added Kant's amendments) is: 'In Ansehung der ~~das~~ Materie und ihrer ~~das~~ Subject <äußerlich> afficirenden mithin bewegenden Kräfte ~~auf~~ sind die Wahrnehmungen selbst an sich bewegende Kräfte mit der Rückwirkung (*reactio*) verbunden ~~worauf worinn die~~ und der Verstand anticipirt die Wahrnehmung ~~durch die~~ <nach den> einzig//möglichen einfachen Arten der Bewegung welche Formen der

Forces of matter are subject-affecting, and therefore moving. This gives an implicit answer to the problematic of the draft: the moving force of matter is moving due to the affections of the subject. This would suggest that they are ‘inner’ in the terminology of the marginal note on page one. However, Kant adds here, between the lines, ‘externally’. The location of the moving forces of matter is thus still a fraught issue. A number of new developments follow in this passage. Perceptions, again presented as forces, are now *self-moving*. These self-moving forces of perception are combined with *reaction*. Finally, the understanding *anticipates* perception according to four *uniquely possible forms of motion*. These three points, which we will address in turn, represent a major development in Kant’s line of thought in draft ‘X’.

Firstly, the notion of perceptions as *self-moving forces* represents a new approach to the transition problematic in draft ‘X’. In the folio’s first pages, perceptions were described as the subject’s reception of (or being affected by) moving forces. As we have seen, the question accompanying these moving forces pertains to their location: in inner sense, outer sense, or in a matter external to the subject? If perception is self-moving force, its forces can be both internal to the subject *and yet* affect it. No ‘externality’ of any kind is required: the activity of the forces is immanent to them, and so perception, despite being passive (‘received’ not ‘made’ in Kant’s terminology from note one) can be internal to the subject. What this might mean is shown in the sentence with which Kant opens the ‘main text’ of page three. As noted, this passage at the top of page three was written after (perhaps immediately after) the important marginal note at the bottom that is carried over from page two. It reads,

The material element [*Materiale*] of sensible reception lies in perception, that is, in the act through which the subject affects itself and becomes appearance of an object for itself. (22:502, 146, t.m.)

Perception is here defined in a way that is completely new for draft ‘X’. It is an act (*Act*) of the subject’s *self-affection*. The opening distinction between passive perception and active (and passive) experience has been overturned: there is also an active element to perception, in that the subject affects itself. This is an early example of the *Selbstsetzungslehre*.⁹⁸ The continuation of the passage, in which the subject ‘becomes appearance of an object for itself’, connects this even more strongly to what will become known as Kant’s later exploration of the doctrine of self-positing.

Bewegung — Anziehung, Abstoßung, Einschließung (Umgebung) und Durchdringung. — So erhellet die Möglichkeit ein System empirischer Vorstellungen a priori zu errichten was sonst unmöglich zu seyn schien und die Erfahrung <quoad materiale> zu anticipiren’.

⁹⁸ On the ‘virtual synonym[ity]’ of ‘self-positing’ and ‘self-affection’, see Beiser, *German Idealism*, p.200, and Adickes, *Kants Opus postumum*, pp.655-60.

The second development in the bottom marginal note is that perceptions are not however simply self-moving forces: they are *combined with reaction* (*Rückwirkung*). The economy of action and reaction stems from Newtonian mechanics: *Gegenwirkung*, which is likewise given the Latin equivalent '*reactio*', is found in Kant's 'third law of mechanics' in the *Metaphysical Foundations*.⁹⁹ At this point in the *Opus postumum*, the action of the forces of subjective perception have a counter-action. What is this? Again, we should look to the later 'main text' of page three for an indication. Kant suggests that the understanding 'stimulates *a priori* the moving forces of the object on which it acts to reciprocity [*wechselwirkung (sic)*]' (22:503; 147). This is reformulated as the understanding's 'actions [*Actionen*] with their reactions [*Reactionen*]' (*ibid.*, t.m.). Thus the [*W*]echselwirkung or *Reactionen* of the *object* of perception is the reaction that, in the bottom marginal note, must be combined with the active forces of perception. This, once more, is a manifestation of the guiding problematic: the active forces of perception cannot unfold *completely* immanently; rather, there is also the correlative *reaction* of the object. The status of the externality of this reciprocally reacting object is still at stake.

The third development is that the notion of *anticipation* is introduced. 'Anticipation' is of course a significant term in the first *Critique*: the principles governing the category of Quality are the Anticipations of Perception. Anticipation is also central to the 'important result' of the whole Transcendental Analytic, in the summation given in the chapter on phenomena and noumena:

the understanding can never accomplish anything more than to anticipate the form of a possible experience in general, and, since that which is not appearance cannot be an object of experience, it can never overstep the limits of sensibility, within which alone objects are given to us. (A246/B303)

As we have seen, at stake in draft 'X' is the anticipation not just of the bare *form* of a possible experience *in general*, but also the *matter* of *specific* experience. The problem that has accompanied this specific matter is how to conceive of it in terms of the critical distinction between the subject and object, between *a priori* principles and *a posteriori* knowledge. As we have repeatedly found, the draft runs up against the question of how such a 'matter' of experience might be conceived as either (or both) 'external' or 'internal' to the subject. And experience is now considered in its specific, not merely general, form, because what is at stake is the alignment

⁹⁹ 'In all communication of motion, action and reaction are always equal to one another' (Mech P4; 4:544). The discussion of the third law is the main *locus* for the appearance of 'reaction' in the *Metaphysical Foundations*. *Gegenwirkung* appears only twice in the *Dynamics* chapter, once in relation to physical contact (Dyn E6; 4:512) and once where Kant proposes to go beyond his self-imposed limitation on what can be said philosophically (rather than mathematically) of the specific construction of matter, in which 'matter filling its space to a determinate degree would be possible' through 'an action and reaction of the two fundamental forces [*Grundkräfte*]' (Dyn GR; 4:521). It is perhaps not coincidental that the term appears here, where Kant starts to enter into the problematic of the transition project and the *specific* determinations of matter (rather than just the concept of matter in general).

of the critical principles with the laws, and therefore the specific results, of the physical sciences. How is this to be achieved through a reworked notion of anticipation? And what is the relation of anticipation to force?

10. Anticipation of experience

At the bottom of page four of draft 'X', Kant writes:

That one cannot say 'matters' [*Materien*] but only 'matter' [*Materie*], and similarly not 'experiences' but 'experience', indicates that both concepts stem from a single principle,¹⁰⁰ and that the *a priori* principle lies in the knowing *subject*, not in the object of sensible representation, and the understanding anticipates the influence on the senses. (22:509, 150, t.m.)

Kant takes the fact that matter and experience are inherently singular, not plural, to indicate that they stem (*abstammen*) from a single principle (*von Einem Princip*). Here we have something like a return of the motif of a 'common root' that has been so significant in Kant commentary.¹⁰¹ This new common root in draft 'X' has instructive similarities to and differences from its counterpart in the *Critique*. The *Critique's* distinction between passive sensibility and active understanding (or, in the Doctrine of Method's formulation, between the empirical and the rational) is echoed in the distinction between passively received matter and actively created experience in draft 'X'. The similarities of this loose analogy are exceeded by the differences in the use of common root image. Here in the *Opus postumum*, the common root is not unknown and uncertain, but is located immediately in the 'knowing subject'. The question of the subjective and objective poles of Kant's approach to the transition is explicitly raised here, as the 'single principle' from which both matter and experience stem are 'not in the object of sensible representation' but in the subject.

Kant then writes that the understanding anticipates influence on the senses. This is either a *non-sequitur* – for how does the common singular nature of matter and experience indicate that the understanding anticipates sensory affection? – or, more strikingly, *designates* the single principle from which matter and experience likewise stem: as the understanding's anticipation of sensation. Indeed, something very much like this principle was already located in the transcendental subject in the first *Critique*, as the principle of the Anticipations of Perception that governs the use of the categories of Quality. Is Kant here elevating the Anticipations to the *a priori* principle in the subject that is the common root of matter and experience? This would make the

¹⁰⁰ A marginal note adds here 'or are analogous to each other'. I have added commas to break Kant's sentence up, but my editorial additions are lighter than Förster's.

¹⁰¹ Cf. Heidegger, *Kant and the Problem of Metaphysics*, pp.24-6, 112-120; Henrich, 'On the Unity of Subjectivity'; Avery Goldman, *Kant and the Subject of Critique: On the Regulative Role of the Psychological Idea* (Bloomington: Indiana University Press, 2012). See pp.214n43 and 233n89 for Goldman's relation to Henrich.

Anticipations, relatively little-studied by commentators on the first *Critique*, into a central part of the solution to the transition problem proposed in draft 'X'.

In an upper right-hand marginal note to page three, Kant writes:

It is strange; it even appears to be impossible to present perceptions *a priori* for the sake of experience.¹⁰² Axioms of intuition can and must be grounded *a priori*. But here it is anticipations of empirical concepts that are raised to principles [*Grundsätzen*] and also consequently to principles [*Prinzipien*] of *a priori* knowledge. (22:504-5, 148, t.m.)¹⁰³

We are now familiar with Kant's designation of something as 'strange': the identification of the mode of proof as *befremdlich* is a repeated refrain in the drafts of the ether proofs.¹⁰⁴ In draft 'X' the 'something strange' is the attempt to present perceptions *a priori* for the sake of experience. This should now be taken to be the most developed conception of the task of the draft, now presented in terms of Axioms and Anticipations, inherited from the *Critique* but rethought. Kant clarifies this task further down page three:

In the transition from the metaphysical foundations of natural science to physics, the understanding goes progresses [*schreitet*] from the axioms of pure *a priori* intuition of the object to perception, that is, empirical representation with consciousness in the subject, to the possibility of experience, which itself is nothing other than an aggregate of perceptions under a principle of their coordination [*Zusammenfassung*] (*complexus*) in one [*Einen*] concept. Not, however, *from* experience but for its sake, as a systematic combination [*Verbindung*] of the manifold of empirical representations. (22:503, 147, t.m.)¹⁰⁵

The task appears as the *a priori* presentation (not *from* experience, but *for its sake*) of the aggregate of perceptions, under a single coordinating principle. That is, to show how the variegated manifold of empirical perceptions (which, as we have seen, are self-moving forces) can be *anticipated* through an *a priori* principle.

The *befremdlichkeit* of such a task is already noted in the *Critique's* discussion of the Anticipations. '[I]t seems strange', Kant writes, 'to anticipate experience precisely in what concerns its matter [*Materie*], which one can draw out of it'. Nevertheless, 'this is actually what happens here' (A167/B209).¹⁰⁶ Such an anticipation is strange because perceptions contain the necessarily

¹⁰² Here Kant inserts an addition, which looks to have been written later, in a tiny hand above the marginal note. Förster's edition translates this and signals that it is an addition.

¹⁰³ My substantive divergence from Förster's translation is to insist on 'mithin auch' as 'and also consequently': Förster's rendering – he gives simply 'that is' – neutralises the sense in Kant's sentence of a progression from *Grundsätzen* to *Prinzipien*, by depicting them as simply synonymous.

¹⁰⁴ In the A edition of the *Critique*, as we saw in chapter five above, Kant refers to the centrality of *Einbildungskraft* for the possibility of experience as 'certainly strange' (A123).

¹⁰⁵ I do not follow Förster's suggestion that 'and' should be added before 'to the possibility of experience'. This has the effect of reducing Kant's threefold progression (axioms, to perception, to the possibility of experience) to a twofold one (axioms, to perception and the possibility of experience).

¹⁰⁶ 'Und so verhält es sich hier wirklich': Guyer and Wood give 'And this is actually how things stand'; Kemp Smith has 'Yet, none the less, such is actually the case'; Pluhar, 'Yet such is actually the case here'.

empirical element of sensation, which can only be given in experience; and yet perceptions are here to be anticipated *a priori*, by the understanding. Kant deals with this oddity in the *Critique's* Anticipations chapter by insisting that it is only the general quality of a *degree of reality* that is anticipated. No more specific quality of sensation can be anticipated *a priori* ('e.g. colours, taste etc.'): these are 'always merely empirical' (*ibid.*). What can be anticipated is that empirical sensation has a degree of reality, which can be represented in its distance from the absence of sensation ('through approximation to negation = 0') (A168/B210). There is thus a continuum of degrees of reality between different sensation ('between reality in appearance and negation there is a continuous nexus of many possible intermediate sensations, whose difference from one another is always smaller than the difference between a given one and zero' (*ibid.*)). This degree of reality is dubbed an *intensive magnitude*.

In the Axioms chapter, intuitions appear rather as *extensive* magnitudes, because the whole of an intuition is made up of discrete parts that are aggregated (or, as it were, added together) to form the intuition (A162-3/B203-4). The *intensive* magnitude of the Anticipations by contrast 'does not proceed from the parts to the whole' but is immanent to the perception as a whole (A168/B210). So as to adhere as far as possible to the critical strictures, the scope of the *Critique's* Anticipations is very limited: only the 'property of having a degree' and thus the quality of 'continuity' can be cognised *a priori* of sensations (A176/B218). At the end of the section, however, Kant returns to the strangeness that is retained by even this restricted 'anticipation': 'there must always be something striking [*Auffallendes*]' about this anticipation; for the researcher accustomed to Kant's transcendental approach, 'some reservation is aroused about the fact that the understanding can anticipate a synthetic proposition such as this' (A175/B217).

And hence there remains a question not unworthy of solution: how the understanding can assert something synthetic *a priori* about appearances, and how it can thus anticipate appearances in what is strictly and merely empirical, namely, what concerns sensation. (*Ibid*)

Kant is keenly aware that this *a priori* principle of anticipating perceptions, as having degrees of reality and being intrinsically differentiated, presses at the boundaries of the limitations set in the critical philosophy. How it is possible, Kant notes, is 'a question not unworthy of solution', but this is a question set aside in the Anticipations chapter.

The question returns in draft 'X'. No longer does 'anticipation' simply indicate that sensations have a non-negative degree of reality and thus are differentiated in a continuum (which, as Kant notes, is strange enough from the perspective of transcendental idealism); now, it is key to the unification of the 'aggregate of perceptions under a principle of their coordination'. At the end of the 'main text' of page four, Kant writes,

It is not through a scrabbling-together,¹⁰⁷ but according to a principle of connection [*Verknüpfung*] of the moving forces of matter in a system (that is, in relation to the possibility of the object for the sake of experience) that the moving forces of matter – empirical intuitions (perceptions) – can yield an *a priori* cognition of the object.¹⁰⁸ The *understanding* is thus, subjectively, the principle of the possibility of making sense-objects into one experience, as an aggregate of empirical representations. (22:509, 150, t.m.)

This is a return to the terminology of the earlier drafts of the transition project: the significance of the axioms and anticipations, for the understanding's role as the principle of unifying sense-objects into a single experience, is the task of *connecting the moving forces of matter in a system*. In what I above called the key marginal note at the bottom of page three of draft 'X', Kant writes that 'the understanding *anticipates* perception according to the uniquely possible forms of motion – attraction, repulsion, enclosure (surrounding) and penetration'.¹⁰⁹ Through this anticipation and its four forms of motion, 'the possibility of establishing *a priori* a system of empirical representations (which otherwise appeared impossible) and of anticipating experience *quoad materiale* is illuminated' (22:502, 146). This odd, new conception of anticipation as four specific forces is central to the answer to the transition problematic in draft 'X': that of forming an *a priori* system of empirical forces, or connecting matter's forces in a system.

11. Subjective faculties as stimulating forces

How is anticipation to do this? On the third page of the folio Kant writes,

The understanding has the faculty for making an empirical representation of a sense-object for itself, and thereby also the perception of an object, by means of the fact that it stimulates *a priori* the moving forces of the object on which it acts [*agirt*] to reciprocity [*wechselwirkung*]. – Now the understanding can enumerate *a priori* these actions with their reactions [*Actionen mit ihren*

¹⁰⁷ *Stoppelung*: Förster suggests 'compilation', which captures the sense of what Kant means, particularly as shown in comparable passages. Kant's image here is more suggestive, however: *stoppeln* in an agricultural sense means to 'glean', to gather leftover wheat after a harvest.

¹⁰⁸ I follow Förster's reconstruction of this sentence, which in Kant's draft is somewhat confused: 'Nicht durch Stoppelung sondern nach einem Princip der Verknüpfung der bewegenden Kräfte der Materie in einem System können die bewegende Kräfte der Materie d.i. in Beziehung auf die Möglichkeit des Gegenstandes zum Behuf der Erfahrung können die empirische Anschauungen (warnehmungen) ein Erkenntnis des Objects a priori abgeben'.

¹⁰⁹ The supplementation of attraction and repulsion with 'enclosure' and 'penetration' is unusual: Kant only uses 'Einschließung' in one other place in the *Opus postumum*, and with nothing like the significance it is given here: in an empirically-informed discussion of the cohesive fluidity of water and the effect on pressure of it being enclosed in a vessel, in the early *Oktaventwurf* of 1796 (21:390). 'Einschließung' does feature in a more significant context, in a draft of the categories of relation in a *loses Blatt* from the mid- to late-1770s, R4762: 'Einschließung, Folge und Begleitung' appear under the third relational category, here *Compositi (realium (non logicorum nec idealium))* (17:718). A different but similarly suggestive reference to *Einschließung* is in R3045 from the *Logic Nachlaß*: 'Alles Verhältnis (der Begriffe) ist entweder der Vergleichung, oder der Vergesellschaftung, oder der Einschließung oder Verknüpfung' (16:630). 'Durchdringung' appears more often, but also never with the suggestion that it is one of the only four possible forms of motion, nor in connection to the understanding's anticipation of perception. The term most often features in empirically-informed contexts in the earlier *Opus postumum* drafts. It only appears with comparable significance in the repeated depiction of the ether as '*alldurchdringenden*' in the ether proofs.

Reactionen], which only belong to perception, because they are mere relations of differing quality. (22:503, 147, t.m.)

The understanding has the faculty for having perceptions, as self-made empirical representations of sense-objects, by stimulating, *a priori*, objects to reciprocity or interaction. This can be considered a gloss on the earlier suggestion that ‘perceptions are self-moving forces combined with reaction’. The passage that follows states that a necessary task of physics to present these ‘organisations as anticipations’ (22:503, 147). That is, the understanding’s stimulation of the moving forces of matter are ‘organisations’ and ‘anticipations’. Kant thus presents the ‘self-moving forces of perception’ as stimulated [*erregen*] by the understanding, through an activity that we can call organisation or anticipation. The forms of motion through which the understanding anticipates perceptions are ways that it *organises* them: that is, in the terms of Kant’s teleology, to give them an end.

This idea, as speculative as it may sound, is further developed in a marginal note:

The issue [*Sache*] is as follows: perception is empirical representation with consciousness that it is such and not merely pure intuition of space. Now the effect [*Wirkung*] of the subject on the outer sense-object represents this object in appearance, and indeed with the moving forces directed toward the subject, which are the cause of perception. So one can determine *a priori* those forces which effect [*bewirken*] perception, as anticipations of sensible representation in empirical intuition, while one only presents (specifies) *a priori* the action and reaction [*Wirkung und Gegenwirkung*] of moving forces (under which, perhaps, understanding and desire belong) according to principles of motion in general, which the understanding specifies and classifies as dynamic powers [*dynamische Potenzen*] according to the categories. (22:505, 148, t.m.)¹¹⁰

The transition problematic might be resolved by specifying ‘*a priori* the action and reaction [*Wirkung und Gegenwirkung*] of moving forces ... according to principles of motion in general’. That is, to conceptualise action and reaction in the abstract, through an analysis of motion in general. This could be a counterpart to the *Metaphysical Foundations*’ analysis of matter in general.¹¹¹ The situation is however different in this passage from the *Opus postumum*. In a remarkable parenthesis here, Kant writes that ‘perhaps, understanding and desire’ should be numbered among the moving forces.

¹¹⁰ Förster adds at the end of this passage, ‘The representation of these forces is identical with the representation of perception’. It is not clear where this line comes from and its insertion in the Cambridge edition must be a mistake: it is not in the *Akademie* text and does not feature at this point in the manuscript.

¹¹¹ We might ask, has Kant not already undertaken such an analysis in the three laws pertaining to moving bodies in the Mechanics chapter of the *Metaphysical Foundations*? It is not in fact difficult to see why Kant would consider the Mechanics chapter insufficient for an *a priori* specification of action and reaction in general: the third law defends the equality of action and reaction, but – in line with the orientation of the *Metaphysical Foundations* in general – does not stretch to specifying forces beyond the bare fact of the equivalence of action and reaction. More importantly, the Mechanics chapter is insufficient because it merely pertains to parts of (lifeless) matter (that the matter of the Mechanics chapter must be lifeless is made explicit at 4:544).

Kant is proposing an analysis of motion that would also incorporate the movements, in an apparently literal and non-analogous sense, of the subject's understanding and desire. This, too, is explored further. In the lines in draft 'X' that we reconstructed above as a transition from the *Selbstsetzungslehre* to the ether proofs, Kant writes,

The 4 mechanical powers [*Potenzen*] are the moving forces of apprehension and reciprocal reaction [*wechselseitigen Reaction*].

There are 4 acts [*Actus*] through which the subject affects itself as object and thinks itself an object in appearance, through perceptions of action [*action*] and the reaction [*Reaction*] corresponding to it, to a system of empirical representations. (22:508, 149, t.m.)

An intriguing correspondence is here suggested between the four mechanical powers and four acts of the subject's self-affection. The 'mechanical powers', in various enumerations, were a commonplace in early mechanical thinking. Leibniz's widely-read first published critique of Cartesian physics, the 'Brief Demonstration' published in the *Acta* in 1686, refers to 'the five commonly recognized mechanical powers – the lever, windlass, pulley, wedge, and screw'.¹¹² In the *Physicalisches Wörterbuch*, of which Kant made much use when writing the *Opus postumum*, Gehler's entry on 'Mechanics' mentions the 'use of the simple tools [*Rüstzeuge*], the lever, the windlass and the wedge'.¹¹³ As Gehler notes and as was well-known, the history of mechanics stems from the pseudo-Aristotelian *Questions of Mechanics*, which was central in setting the problem-context for medieval mechanics; this text discusses the simple machines, particularly the lever, pulley and balance.¹¹⁴

The four 'mechanical powers' to which Kant refers *should* therefore relate to four of these simple machines from the mechanical tradition. Indeed, as Förster notes, in the earlier drafts of the *Opus postumum* Kant refers to such simple machines and their powers: '(a) the lever (b) rope and block (c) wedge. Pressure, tension, push' (22:259).¹¹⁵ However, here in draft 'X' the four mechanical powers are, somewhat eccentrically, 'the moving forces of apprehension and reciprocal reaction'. The objective, concrete machines of the tradition are replaced by subjective 'apprehension'. In a further counter-intuitive move, the 'acts of the subject' relate to objectivity, namely the subject thinking both itself and its object as objects. These subjective acts will lead to 'a system of

¹¹² 'A Brief Demonstration' in Leibniz, *Philosophical Papers*, p.298.

¹¹³ J. S. T. Gehler, *Physikalisches Wörterbuch oder Versuch einer Erklärung der vornehmsten Begriffe und Kunstwörter der Naturlehre mit kurzen Nachrichten von der Geschichte der Erfindungen und Beschreibungen der Werkzeuge begleiite in alphabetischer Ordnung* 5 vols. (Leipzig, 1787-95), vol. 3, p.168.

¹¹⁴ *Ibid.*; Aristotle, 'Mechanical Problems' trans. by W.S. Hett in *Minor Works* (Cambridge, MA: Harvard University Press, 1936), pp.329-411. Cf. 'Introduction' to Stillman Drake and I. E. Drabkin eds., *Mechanics in Sixteenth-Century Italy: Selections from Tartaglia, Benedetti, Guido Ubaldo, and Galileo* (Madison: University of Wisconsin Press, 1969), pp.5-6. The pseudo-Aristotelian *Questions of Mechanics* sought to reduce all simple machines to the lever, and the lever in turn to the 'remarkable' properties of the circle, as 'composed both of the moving and the stationary' (Aristotle, 'Mechanical Problems', p.333).

¹¹⁵ Quoted in Förster, *Kant's Final Synthesis*, p.16.

empirical representations', or *a posteriori* knowledge of objects. Therefore, the mechanical powers and subjective acts appear to have exchanged their referents: the mechanical powers relate to (subjective) apprehension, and the subjective acts to an (objective) system of empirical representations. There is at the least a blurring of the distinction between concrete mechanical powers and subjective acts: this is significant for the direction that Kant's thought takes in the draft. We should also note that it is difficult to see how there are *four* acts or powers: in each case, only two – action (or apprehension) and reaction – are named.

In the passage above, Kant contended that 'perhaps, understanding and desire' should be included among the moving forces whose action and reaction must be investigated (22:505, 148). An earlier passage, on page two, gives a definition of physics as

a complex [*Inbegriff*] of outer as well as inner sense-representations in a system, i.e. of outer as well as inner empirical intuitions, as well as inner perceptions of the subject, i.e. sensations (called feelings if they contain pleasure or displeasure). (22:500, 145, t.m.)¹¹⁶

Kant crosses through most of this passage ('i.e. of outer ... displeasure'), but the erased text is highly relevant to our concerns: subjective sensations, or even feelings when accompanied with pleasure or displeasure, are here incorporated into the subject-matter of physics. Taking both passages (22:505 and 22:500) together, the radically-expanded physics that Kant is contemplating would include the moving forces of understanding, desire, pleasure and displeasure.

In fact, this is explicitly stated in a marginal note on page four, not translated in the Cambridge edition:

Object of inner sense for sensation. To the moving forces also belongs human understanding. In the latter, pleasure, displeasure and desire. (22:510, m.t.)¹¹⁷

Kant thus unequivocally incorporates these four elements of human subjectivity – understanding, desire, pleasure and displeasure – into the moving forces and thus the remit of the transition project's reconceived physics. The significance of these four elements should be clear. In the systematic depiction of the terrain of the critical enterprise in both introductions to the *Critique of the Power of Judgement*, the three *Critiques* are identified as respectively attending to the faculties of understanding, desire, and pleasure and displeasure (5:198, 20:346). Now, draft 'X' proposes to reimagine these structuring 'higher faculties' (*oberen Vermögen*: the *Gesamte*

¹¹⁶ I diverge from Förster by not tidying up Kant's repetitive phrasing – 'so wohl ... als ... sowohl ... als auch ... als auch' – which shows the equivalences being pointed to here.

¹¹⁷ 'Object des inneren Sinnes für die Empfindung. Zu den bewegenden Kräften gehört auch der Verstand des Menschen. Imgleichen Lust, Unlust u. Begierde'.

Vermögen des Gemüths or *Erkenntnißvermögen* (5:197-8)) of the critical philosophy as *moving forces*.

12. Forces in the attempt at the transition in draft 'X'

This close reading of draft 'X' of fascicle 'XI' has sought to show its philosophical position *in between* the objective pole of the ether proofs and the subjective pole of the *Selbstsetzungslehre*, in relation to the overall problematic of the transition, that of *a priori* knowledge of the forces of *a posteriori* nature. The complexity of this intermediary position is evident in the draft's repeated attempts to conceive of experience and of physics – the two are blurred in Kant's broadened philosophical approach to physics – in a way that reconciles the objective (matter as physical substrate, the *a posteriori*, the 'external') with the subjective (matter as intuition, the *a priori*, the 'internal'). This reconciliation should not reduce to either pole but rather maintain both, contrary aspects of physics and experience.

This is not an issue that is foreign to Kantian philosophy: indeed, it is an inherent result of transcendental idealism's commitment to both the essential role of subjective conditions in experience or cognition of the object in general, and to the objectivity of this experience or cognition, guaranteed in the last instance by the idea of the noumenal thing-in-itself. The complexities of the positions that Kant must explore in the final drafts, we might say, are necessary consequences of the fundamental commitments of the *Critique of Pure Reason* when applied to the problem of the transition to an *a priori* system of physical forces, or to a physics grounded on the critical philosophy.

The attempts in the early drafts, the ether proofs and the *Selbstsetzungslehre* all employ the concept of force in various ways. Kant's use of force in attempting to solve the problems encountered by his final work reaches a fascinating apex in fascicles X/XI. In draft 'X', the *Critique's* notion of 'anticipation' is reconceived as the organising forces of the understanding, by means of which it stimulates objects to reciprocity. This is a way to grasp Kant's suggestion that perceptions are 'self-moving forces combined with reaction': our perception is the activity of the understanding in stimulating the object, and the reacting activity on the object on our senses. Moreover, alongside the moving forces of the understanding, Kant presents the understanding, desire, pleasure and displeasure *as themselves* moving forces.

*

This remarkable draft sees the final Kant rethinking fundamental elements of the critical philosophy in terms of forces. Subjective perceptions, the subject's principle of anticipation, and, ultimately, the faculties of understanding, desire, and pleasure and displeasure, are all moving forces, which stimulate the counter-acting forces of the object. This interplay of subjective and objective forces is generative of experience, where the latter is the expanded notion of physics that Kant comes to employ in the draft. The late science of transition is thus here a dynamic movement from the critical foundations to a critical physics, as a part of Kant's never-completed metaphysics of nature, in the shape of a dynamic relation between subjective and objective forces.

The previous chapters have shown that force is an inherently relational notion: as a predicable of the understanding, it is derived through the connection of the categories with one another, with sensibility, or with matter in general. In the third *Critique*, its unifying and systematising role is made possible by its intermediary status, between subject and object, the *a priori* and the *a posteriori*, and constitutive and regulative principles. Now, in the drafts of the *Opus postumum*, the sought transition to physics – or to specific experience – takes place through objective and subjective forces. Draft 'X' sees force continue to occupy a relational, unifying role, as the common ground of objective and subjective forces. The peculiar position of force in the Kantian philosophy is here in stark relief. Force is at once fundamental to the transition and to the rethinking of the critical structures entailed by the transition, whilst always resistant to being fixed by Kant's philosophy, always fluidly transgressing the philosophical structures that it underpins. Force is at once marginal and essential: hence its remarkable occlusion in the history of Kant interpretation, an occlusion that the late drafts can help us overcome.

Appendix 1

Force in post-Kantian philosophy

This appendix provides an (of course partial) account of the reasons for the neglect of ‘force’ in the mainstream of Kant scholarship, expanding on the discussion in section 5 of the Introduction. We can identify three broad strands of reasons for the marginal status of force in prevailing interpretations. Firstly, the more explicit focus on force in Kant’s contemporary readers and post-Kantian German Idealism; secondly, the legacy of nineteenth century neo-Kantianism, which retains a large influence on much contemporary Kant scholarship; and thirdly, the influence upon 1960s French philosophy of Nietzsche’s reading of Kant.

1. Kant’s contemporaries and German Idealism

The neglect of the significance of force in Kant interpretation can in part be traced to the more obvious importance of force in certain contemporaries and in German Idealism. Attempts to find philosophical conceptions and uses of ‘force’ in the late eighteenth and early nineteenth centuries would naturally turn to figures who make the concept more explicitly central to their major philosophical works. Herder, for example, wilfully uses an analogy between the natural forces of physics and biology, on the one hand, and the forces of the mind, on the other, to present these as manifestations of a single organic force, as discussed in chapter five. This is an instance of Herder’s fidelity to the pre-critical Kant: the Kantian version of a ‘dynamics’ that I reconstruct in chapter two becomes centrally thematised by Herder in a way that the critical Kant would reject.¹ Christophe Menke therefore turns to Herder’s work when presenting force as a ‘fundamental concept of aesthetic anthropology’.²

Herder’s foregrounding of forces as revealing the analogous relation of physical and mental forces, drawing centrally on the pre-critical Kant, Leibniz and Spinoza, has had less philosophical influence than the *post*-Kantian foregrounding of forces in German Idealism. Central to Fichte’s

¹ On Herder’s fidelity to Kant’s pre-critical views over his critical ones, see John Zammito, *Kant, Herder, and the Birth of Anthropology* (Chicago: The University of Chicago Press, 2002), p.137-77.

² Christophe Menke, *Force: A Fundamental Concept of Aesthetic Anthropology*, trans. by Gerrit Jackson (New York: Fordham University Press, 2013), chapters 2 and 3. Menke’s central distinction is between Baumgarten’s ‘faculty’ and Herder’s ‘force’. Kant’s use of *Kraft* is only discussed in relation to aesthetic pleasure, whereas Herder is depicted as the originator of a new, self-realising, non-teleological conception of force. Menke implies that Kant lacks a notion of force outside his aesthetics and has only a Baumgartian conception of ‘faculty’, as the end-directed practice of the subject.

1794-5 *Wissenschaftslehre* is the 'striving' of the I and the 'resistance' of the not-I.³ The not-I enacts an *Anstoß* or 'check' on the I, setting necessary external limits to the I's practical determination of objects. This 'alien element' is an 'opposing force' (*entgegengesetzte Kraft*), which is nevertheless for us derivable from the 'determining capacity [*Vermögen*] of the I'.⁴ The *Anstoß* of the not-I is no mere limitation but is itself what originally makes possible the I's practical striving and reflection on itself.⁵

Fichte's dynamic vocabulary, most often couched in terms of activity, drives, striving and longing, is then explicitly connected by Schelling to physical forces.⁶ Schelling's 1797 *Ideen zu einer Philosophie der Natur* reworks Fichte's conception of the mind's activities – the centrifugal outward activity, and the centripetal inward reflection resulting from the not-I's *Anstoß* – as repulsive and attractive forces.⁷ Schelling notes that these notions stem from Kant's *Metaphysical Foundations of Natural Science* (1786); however, he greatly generalises attractive and repulsive force, so that they are not only conditions of possibility of matter, but 'conditions for the possibility of *all* objective knowledge'.⁸ Specifically, these opposed forces are the conditions of intuition, which for Schelling is the highest level of knowledge.⁹ Schelling suggests that his '*entire enterprise* will be nothing but a progressive attempt' to determine the 'opposing activity' that counteracts the original activity that precedes thinking, and that his first attempt lands on the concept of force.¹⁰ His subsequent philosophy, from this perspective, represents a progressive expansion of this foregrounding of force. *Von der Weltseele* (1798) expresses an organic conception of nature, in which life and mind are aspects of living forces, and life is a 'play of forces'.¹¹ Later, Schelling will depict the distinction between the organic and inorganic as a difference of potencies (*Potenzen*).¹² The *Allgemeine Deduktion des dynamischen Prozesses* (1800)

³ J. G. Fichte, *Science of Knowledge* trans. by Peter Heath and John Lachs (Cambridge: Cambridge University Press, 1982), 1:270, t.m.

⁴ Fichte, *Science of Knowledge*, 1:272, 279-80.

⁵ On the *Anstoß* in its two-fold sense of 'check' and 'impetus', see Daniel Breazeale, 'Check or Checkmate? On the Finitude of the Fichtean Self' in Karl Ameriks and Dieter Sturma eds., *The Modern Subject: Conceptions of the Self in Classical German Philosophy* (Albany: SUNY Press, 1995), pp. 87-114.

⁶ Fichte's terms are *Tätigkeit, Triebe, Streben* and *Sehnen*.

⁷ F.W.J. Schelling, *Ideas for a Philosophy of Nature* trans. by Errol E. Harris and Peter Heath (Cambridge: Cambridge University Press, 1988), pp.150-2, 174-6. See Frederick Beiser, *German Idealism: The Struggle Against Subjectivism* (Cambridge, MA: Harvard University Press, 2002), p.515.

⁸ Schelling, *Ideas*, p.171, my emphasis. On Schelling's indebtedness to the *Metaphysical Foundations*, which he claims is lucid and complete, requiring only his 'casual observations', see *Ideas*, p.185.

⁹ *Ibid.*, p.175, 177.

¹⁰ *Ibid.*, p.175, my emphasis.

¹¹ Schelling, *Von der Weltseele* in *Schellings sämtliche Werke* vol. 2 (Stuttgart and Augsburg: J.G. Cotta'scher Verlag, 1856-61), p.566; see Beiser, *German Idealism*, pp.519, 541. On the plurality of vital forces, see Iain Hamilton Grant, 'Introduction to Schelling's *On the World Soul*' in Robert Mackay, ed. *Collapse 6* (2010), p.62.

¹² Beiser, *German Idealism*, p.548, referring to Schelling, *sämtliche Werke* vol. 3, pp.317-26, and *Fernere Darstellungen* in *sämtliche Werke* vol. 4, p.404.

presents a proto-dialectic of identity, division and identity-in-division to synthetically construct a dynamic concept of matter, via the forces of magnetism, electricity, gravity and light, with the ultimate end of reaching rationality, in a 'physical explanation of idealism'.¹³

While Schelling is the philosopher of the era who makes force most explicitly central to his work, it is Hegel who shaped these dynamic tendencies into the most enduringly influential system. Force is discussed at length in passages in Hegel's philosophy of nature.¹⁴ The notion is the direct topic of only a small part of the *Phenomenology of Spirit*, but a key one: 'Force and the Understanding' appears after the relatively straightforward dialectics of 'Sense-Certainty' and 'Perception', and before the famous so-called 'master-slave dialectic'. 'Force and the Understanding' is therefore a vital transition chapter, in which the dialectic of force – as soliciting and solicited, driven back into itself – develops into the notions of law and the supersensible.¹⁵ However, more important for the reception of Hegel and the occlusion of Kantian force is the *dynamising* of philosophy in the Hegelian dialectic. Kant's antinomic conception of reason is expanded into a general movement of contradiction, driving the movement of Hegel's Concept on the levels of both individual consciousness and human history. In general terms, the Hegelian dynamic conception of philosophy implies that Kantian thought – a stepping stone, if a key one, to Hegel's system in his depiction of the history of philosophy – is static, *lacking* forces. The Kantian philosophy is ultimately grounded in the supersensible as the inert, '*tranquil kingdom of laws*', as Hegel concludes in an apparent reference to Kant in 'Force and the Understanding'.¹⁶

2. Neo-Kantianism

For a sense of how the centrality of force in Kant was occluded by neo-Kantianism we need consider only the Marburg school variety, and more specifically that of Hermann Cohen. The range of positions within the nineteenth-century movement dubbed neo-Kantianism, with its general call for a 'return to Kant', is increasingly well-documented.¹⁷ Cohen's most influential

¹³ Schelling, *sämtliche Werke* vol. 4, p.76; see Beiser, *German Idealism*, pp.534-8.

¹⁴ See part two of the *Encyclopedia* (1817, 1827, 1830) *passim*, and for a critique of Kant's *Metaphysical Foundations*, §262 (*Hegel's Philosophy of Nature* trans. by A.V. Miller (Oxford: Clarendon Press, 1970), pp.45); an expanded critique is in the *Science of Logic* trans. by George di Giovanni (Cambridge: Cambridge University Press, 2010), 21:167-73.

¹⁵ Hegel, *Phenomenology of Spirit* trans. by A.V. Miller (Oxford: Oxford University Press, 1977), pp.79-103.

¹⁶ Hegel, *Phenomenology*, p.96, my emphasis.

¹⁷ That is, in English-language literature, which for a long time had an unsophisticated conception of neo-Kantianism. Recent work includes Rudolf A. Makkreel and Sebastian Luft, eds., *Neo-Kantianism in Contemporary Philosophy* and Beiser, *The Genesis of Neo-Kantianism, 1796-1880* (Oxford University Press, 2014). A classic older history is Klaus Christian Köhnke, *Entstehung und Aufstieg des Neukantianismus. Die deutsche Universitätsphilosophie zwischen Idealismus und Positivismus* (Frankfurt: Suhrkamp, 1986).

contribution is to reimagine the project of the first *Critique* as ‘*Erkenntniskritik*’.¹⁸ This is grounded on a new conception of experience, which Cohen attributes to Kant but which is almost entirely Cohen’s own: experience as nothing more or less than ‘the fact of mathematical natural science’.¹⁹ Kant’s transcendental method is thereby reconceived as the *a priori* securing of mathematical physics, manifest most notably in Newton’s system but which should for Cohen include the subsequent and future developments of natural science. In the second edition of *Kants Theorie der Erfahrung* the ‘fact’ from which Kant sets out (*ist ausgegangen*) is further specified as ‘Newtonian natural science’.²⁰ Ernst Cassirer defends the fact that Cohen’s account is open to post-Newtonian scientific developments: the ‘givenness’ that the philosopher recognises in the mathematical science of nature’ is no *specific* scientific doctrine but ‘ultimately means the givenness of the *problem*’.²¹ This nevertheless emphasises the fact that, on Cohen’s interpretation, the *problematic* of Kant’s philosophy is not a philosophical one but is bequeathed by natural science.

This focus of Cohen’s Kant-interpretation means that the ‘psychological’ aspects of the *Critique*, which had been central to predecessors like Fries, Herbart, Beneke and Lange, is dismissed.²² Cohen insists, in a way that would be determinative for Marburg neo-Kantianism, on an ‘objective’ reading of Kant. As Cassirer writes of Cohen: ‘*Erkenntniskritik* takes a strictly *objective* turn: it does not deal with representations and processes in the thinking individual, but with the validity relation between principles [*Principien*] and ‘propositions’ [*Sätze*]’.²³ Individual psychological processes and mental faculties are downplayed, in favour of the logical grounding that transcendental philosophy provides for scientific experience.

These two features of Cohen’s Kant – the transcendental method rethought as the grounding of empirical-mathematical science, and the dismissal of subjective elements of the *Critique* in favour of objective relations between principles and propositions – entails a restriction on the place of

¹⁸ *Erkenntniskritik*, a troublesome term for translators, can be ‘critique of knowledge’ or ‘critique of cognition’. Cohen uses this in favour of *Erkenntnistheorie* in *Das Prinzip der Infinitesimal-Methode und seine Geschichte* of 1883 and in the second edition of *Kants Theorie der Erfahrung*, which appeared two years later. For the history of the term prior to Cohen in Friedrich Eduard Beneke, Ernst Reinhold, Schleiermacher and others, see Köhnke, *Entstehung und Aufstieg*, chapter 2.

¹⁹ Cohen, *Das Prinzip der Infinitesimal-Methode und seine Geschichte; ein Kapitel zur Grundlegung der Erkenntniskritik* (Berlin: Dümmler, 1883), pp.119-20. Cohen gives as synonymous ‘[Kant’s] new concept of experience or mathematical natural science’ (*ibid.*, p.8).

²⁰ Cohen, *Kants Theorie der Erfahrung* 2nd edition (Berlin: Dümmler, 1885), p.55.

²¹ Cassirer, ‘Hermann Cohen and the Renewal of Kantian Philosophy’ [1912], trans. by Lydia Patton, *Angelaki* 10(1) (2005), p.100.

²² See Beiser, *The Genesis of Neo-Kantianism*, for a rereading of these figures as the psychologistic early founders of neo-Kantianism.

²³ Cassirer, ‘Hermann Cohen’, p.97.

‘force’. In Cohen’s Kant, forces are only located within the empirical-mathematical science that is grounded by the *Critique*. As Cohen writes on the first page of *Kants Theorie der Erfahrung*, transcendental philosophy concerns itself not with the ‘individual forces ... of nature’, but with the ‘type of research, the degree of certainty, the methodological characteristics of the practical value [*Geltungswertes*] in this science that constitutes the philosophical problem: nature as science’.²⁴ The specific forces of Kant’s philosophy are bracketed, so as to depict the critical philosophy in strictly methodological terms, as an epistemology underpinning natural science. In Cohen’s reading of Kant, the *a priori* grounds for natural science provided by philosophy must be stable and secure: psychological forces are dismissed, and force is merely the empirically-observed, mathematically-formulated regularity in physics.

Cohen’s neo-Kantianism was a key influence for thinkers at the dawn of ‘analytic’ philosophy. Bertrand Russell’s logicism extends Cohen’s focus on objective relations, and Russell has a strong antipathy to the concept of force.²⁵ In a more scientific context Ernst Mach was instrumental in stripping ‘force’ of its metaphysical trappings and reducing it to an empty mathematical relation.²⁶ Mach was a major influence on the Vienna Circle: an early name used by the group was the ‘Ernst Mach Society’. ‘Force’ was included in the Vienna Circle leader Otto Neurath’s lists of forbidden terms, to be avoided for a properly rigorous philosophical language.²⁷ The influence of neo-Kantianism on Anglo-American Kant studies, via figures like Hans Vaihinger, Erich Adickes, Norman Kemp Smith and Louis White Beck, has been very significant. For a brief discussion of the neo-Kantian inheritance in elements of current Kant scholarship, see the Introduction. In sum, Cohen’s fundamental occlusion of ‘force’ as a *philosophical* concept is not incidental to the marginal place of the notion in Kant-interpretations up to the present.

3. 1960s French philosophy

²⁴ Cohen, *Kants Theorie der Erfahrung*, p.1.

²⁵ See the chapter, ‘The Abolition of ‘Force’’ in Russell’s 1925 *ABC of Relativity* 4th edition (London: Unwin, 1985) pp.133-140. Russell’s 1903 *Principles of Mathematics* (New York: Norton, 1943) states that force is the ‘supposed cause of acceleration’ but the latter is ‘a mere mathematical fiction’ so the concept of force is meaningless (p.474).

²⁶ Max Jammer shows Mach’s central role in ‘eliminating the concept of force from mechanics’ and reducing it to ‘an empty scheme, a pure relational or mathematical function’ (Jammer, *Concepts of Force: A Study in the Foundations of Physics* (Cambridge, MA.: Harvard University Press, 1957), p.229).

²⁷ See ‘Universal Jargon and Terminology’, in Neurath, *Philosophical Papers 1913-1946*, ed. by R.S. Cohen and M. Neurath (Dordrecht: Reidel, 1983), pp.213–29. One of Neurath’s manuscripts with a list of terms to be avoided that included ‘force’ was shown in the exhibition *Der Wiener Kreis. Exaktes Denken am Rand des Untergangs*, University of Vienna, May-October 2015.

In contrast with analytic philosophy, the so-called continental tradition has commonly made 'force' central to its vocabulary. The much-heralded shift from structuralism to post-structuralism in France, regardless of whether this was more important for its Anglo-American reception than for the French context itself, is nevertheless marked by the increased significance of the concept of force.²⁸ Again, we can consider this broad movement through a single case in 1960s French philosophy, that of Gilles Deleuze.

Force is central to Deleuze's thought, but this is typically presented in opposition to Kant. Deleuze's *Nietzsche and Philosophy* (1962) attempts to make Nietzsche a systematic philosopher, and does so by interpreting key Nietzschean concepts – the revaluation of values, the will to power, the eternal return and genealogy – in terms of force.²⁹ For Deleuze, Nietzsche enacts a 'radical transformation of Kantianism, a re-invention of the critique which Kant betrayed at the same time as he conceived it, a resumption of the critical project on a new basis and with new concepts'.³⁰ Kantian 'critique', in the view of the early Deleuze and his Nietzsche, is at heart simply an act of reinforcing that which is critiqued. So the notions of God, freedom and the immortal soul, brought into question by the *Critique of Pure Reason*, are ultimately secured by the end of Kant's book: '[t]here has never been a more conciliatory or respectful total critique'.³¹ In contrast, Nietzschean critique is a dynamic encounter of active and reactive forces, in which existing values are fundamentally unsettled through the will to power and the determination of the genealogy of values, or the forces that have constituted them.³²

Deleuze's 1963 book on Kant, *Kant's Critical Philosophy*, can therefore be considered, as he later hyperbolically put it,

²⁸ Jacques-Alain Miller's 'Action of the structure' (1964) stands on the threshold of the move beyond structuralism. This essay attempts to retain a structuralist paradigm by reconceiving it as the *action* of structuring: structure is dynamised, particularly in forming the category of the subject (Miller, 'Action of the structure' in Peter Hallward and Knox Peden, eds. *Concept and Form, volume I: Key Texts from the Cahiers pour l'Analyse* (London: Verso, 2012), pp.69-84). Jacques Derrida's key 'post-structuralist' essay 'Force and signification' (1963), on structuralist literary criticism, suggests that '[i]n the future [structuralism] will be interpreted, perhaps, as a relaxation, if not a lapse, of the attention given to *force*, which is the tension of force itself. *Form* fascinates when one no longer has the force to understand force from within itself' (Derrida, *Writing and Difference* trans. by Alan Bass (London: Routledge, 2001), p.3).

²⁹ Deleuze, *Nietzsche and Philosophy* trans. by Hugh Tomlinson (New York: Columbia University Press, 2006), chapter 2.

³⁰ *Ibid.*, p.52.

³¹ *Ibid.*, p.89.

³² *Ibid.*, pp.93-4.

a book about an enemy that tries to show how his system works, its various cogs – the tribunal of Reason, the legitimate exercise of the faculties (our subjection to these made all the more hypocritical by our being characterised as legislators).³³

Kant is a thinker of architectonic fixity and lawlike judgements to which we submit; his 'image of thought', as *Difference and Repetition* (1968) puts it, is one of *stasis*, in contrast to the dynamic philosophies of Kierkegaard and Nietzsche.³⁴ *Kant's Critical Philosophy* therefore outlines the conservative, legislative structure of the faculties in the *Critiques*. Deleuze does nevertheless argue that the ground of the accord of Kant's faculties is shown in the third *Critique* to be a deeper free, indeterminate, spontaneous accord, founded in discord, and expressed in reflective judgement.³⁵ This is the affirmative result of Deleuze's critique of Kant: however, it is presented as counter to the prevailing static and legislative function of the critical philosophy. This positive result of Deleuze's reading is cast as Kant against himself: the Kantian philosophy immanently contains its other, in the guise of resources for a dynamising of the otherwise fixed and legislative critical structures.

Beyond the evident influence of Nietzsche on his interpretation of Kant, Deleuze's critique displays the more surprising influence of Cohen's neo-Kantianism. *Difference and Repetition* approvingly refers to Cohen's interpretation, and Deleuze's depiction of Kant draws to a great extent from Marburg neo-Kantianism.³⁶ The stable grounding that Cohen valorises in the critical philosophy is, however, the basis of Deleuze's *rejection* of Kant. The Kantian 'image of thought' in Deleuze's depiction of his 'enemy' in the 1960s is that of the neo-Kantian account of critical philosophy.

The need to read Kant *against himself* to salvage positive content from the *Critiques*, evident in Deleuze's treatment of the discordant ground of the accord of the faculties, recurs in French philosophy in the transformations of Kant, or foregrounding of marginal elements, pursued by Derrida, Michel Foucault, Jean-François Lyotard and, recently, Catherine Malabou.³⁷ Therefore

³³ Gilles Deleuze, 'A letter to a harsh critic' in *Negotiations* trans. by Martin Joughin (New York: Columbia University Press, 1995), p.6.

³⁴ Deleuze, *Difference and Repetition* trans. by Paul Patton (London: Continuum, 1994), p.9, 170.

³⁵ Deleuze, *Kant's Critical Philosophy* trans. by Hugh Tomlinson and Barbara Habberjam (London: Athlone, 1984), pp.60-1. For the stronger claim that the accord of the faculties of reason and imagination is born in discord, see Deleuze, 'The Idea of Genesis in Kant's Aesthetics', [1963] *Angelaki* 5.3 (2000), pp.59-70.

³⁶ Deleuze, *Difference and Repetition*, p.231. *Kant's Critical Philosophy* opens with an introduction on 'the transcendental method' constituted by the legislative structure of the faculties; the influence of Cassirer is evident when Deleuze writes, '[t]he supreme ends of Reason form the system of *Culture*' (p.1).

³⁷ Both Derrida's *The Truth in Painting* (1978) and Lyotard's *Lessons on the Analytic of the Sublime* (1991) follow Deleuze in foregrounding Kant's aesthetics, specifically in terms of the 'parergon', frame or boundary-concept, and Kant's sublime, respectively. Foucault's relation to Kant is deep but his renovation of critical philosophy is evident in the concept of the 'historical *a priori*' that structures *The Order of Things* (1966).

whereas ‘continental’ thought employs notions of force more willingly than its ‘analytic’ counterpart, this is typically presented *against* Kant’s critical philosophy, with the latter read deconstructively or through peripheral elements, in order to activate dynamic features that counter what is taken to be the prevailing direction of Kantian thought. Accordingly, continental thought has also neither attended to Kant’s extensive, explicit discussions of force, nor to the significant role of the concept throughout the Kantian oeuvre. Thus, for example, while Kevin McLaughlin’s *Poetic Force: Poetry after Kant* (2014) uncovers an account of ‘poetic force’ in Kant, McLaughlin primarily reads this through Heidegger’s notion of ‘force as unforce’ from his 1931 lectures on Aristotle’s *Metaphysics*, rather than utilising Kant’s own conceptualisation of force.³⁸

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These three very distinct trajectories in post-Kantian philosophy provide three possible grounds for the widespread neglect of force in the history of Kant scholarship. Other narratives are possible, including a lineage that emerges from Spinoza and deploys the resources for thinking force in his dynamic vocabulary of *potentia*, *potestas* and *conatus*: Kant’s acquaintance with Spinoza was almost certainly merely through second-hand sources, but Spinozism became important to the post-Kantian context via Jacobi, Herder and Maimon.³⁹ Another important trajectory in the philosophical history of force runs from the development of and deviation from Kant in German Romanticism, which I can here no more than indicate. Nevertheless, the key moment in the history of Kant interpretation that has led to the neglect of the significance of force is, I would contend, neo-Kantianism’s selective return to Kant, with its deep-seated effects on subsequent philosophy and history of philosophy.

Malabou’s *Avant Demain* (2014) follows this tradition by providing an epigenetic account of the Kantian transcendental.

³⁸ McLaughlin, *Poetic Force: Poetry after Kant* (Stanford: Stanford University Press, 2014). Heidegger’s own interpretations of Kant in the 1920s and 1930s show a marked lack of interest in the notion of *Kraft*, which is curious given the focus of his 1931 lectures, published as *Aristotle’s Metaphysics ̸ 1–3: On the Essence and Actuality of Force*, trans. by Walter Brogan and Peter Warnek (Bloomington: Indiana University Press, 1995).

³⁹ See Beth Lord, *Kant and Spinozism: Transcendental Idealism and Immanence from Jacobi to Deleuze* (Houndmills: Palgrave Macmillan, 2011).

Conclusion

The vicissitude of human affairs overturns whatever the daring race of Iapetus undertakes and spins it about in a restless whirlwind, allowing nothing human beings accomplish to stand on a firm basis. So it is that neither in empires nor in peoples, nor in customs and the arts, whether the liberal or useful arts, is there any fixed place or character. Rather, everything revolves in an eternal vortex and is driven around in a circle (so that it will not settle down into an inert heap).

– ‘On the philosophers’ medicine of the body’ (1786) (15:951)

What effect does a focus on force have on our broad view of Kantian philosophy? When Kant’s theoretical and natural-scientific oeuvre is read with the notion of force in the foreground, what is added to existing interpretations?

My chapters have proceeded broadly chronologically through the Kantian oeuvre. I firstly reconstructed the context of Leibnizian and Newtonian conceptions of force. An original argument was that Leibniz’s dynamics was an unfinished project, due to the ambition of its most developed projection: the new science of forces should provide wide-ranging philosophical insight, into, *inter alia*, bodies and minds. The monadological metaphysics, on my reading, is not the culmination of the dynamics but merely one option among many Leibniz was exploring at the end of his life. A further finding is that Wolff’s engagement with Leibniz’s dynamical themes is marked by an antipathy towards Leibniz’s metaphysical conception of substantial (or, in the late work, monadological) forces. Wolff therefore adds broadly Newtonian conceptions of motive forces to the framework of Leibniz’s dynamics.

This background made it possible to present a new interpretation of a range of Kant’s pre-critical natural-scientific and theoretical works. What may otherwise appear as an eccentric and heterogenous collection of occasional pieces are, from the perspective of the dynamics problematic, a series of attempts to philosophise on the basis of forces. Particularly, the fundamental elastic force of *Living Forces* is a common thread through these early texts, to which is added a ‘Newtonian’ attractive force; this, I argue, stems to a greater extent from speculative Newtonian chemistry than from the Newton of the *Principia*. What I take to be hints at the imminent publication of a treatise on dynamics is an indication that the Kant of the 1750s and early 1760s, like Leibniz, considered it possible to achieve broad insights on the basis of a philosophical investigation into forces. This ambition dissolved at the time of *Dreams*: in an original interpretation of this text, I argued that Kant’s tendency towards a unified philosophy of

physical and mental force skirted too close to Swedenborg's visions, prompting Kant's sceptical restriction of knowledge of fundamental forces in 1766 and 1770.

The central chapters on Kant's account of forces and force in, primarily, the *Critique* and the *Metaphysical Foundations*, show that this radical rejection of the use of forces in philosophy was short-lived, and that force is much more significant to the critical philosophy than has been recognised in commentary. Kant's mature notion of force is consistent with the critical limitations, because the Leibnizian differentiation of primitive and derivative forces is transformed into an epistemological distinction, where the multitude of empirical, derivative forces can be rationally reduced as far as possible to primitive ones, guided by the idea of a single fundamental force.

The central finding of my investigation into the critical account of force is that Kant identifies two separate, irreconcilable domains of force, the psychological and physical, with distinct fundamental forces at their bases. The forces in these domains have the common epistemological structure of derivative and primitive force, however; and they are grounded on a common ontological account of force. The critical notion of force as a predicable, or derivative concept of the understanding, necessitated an exploration of the means of derivation of the predicable 'force'. This showed, against a common view in the literature, that force cannot be conflated with the pure category of causality. I concluded that force can be derived from the connection of the categories of substance and accident and cause and effect, but it does not merely function as an inter-categorical relation. I sought to show that it can also be derived from the connection between the categories and the pure forms of intuition, and between the categories and matter in general of sensation. Force in these senses can be equated with the activity of the 'I think' and matter in general, or the activity of the general object of the inner and outer senses.

The broad dynamics project that I traced in Kant's pre-critical works therefore persists, albeit suitably modified, at a fundamental level of the *Critique's* architectonic. The critical philosophy continues to employ 'force' as a basic explanatory notion for both psychology and physics. The indeterminacy of the notion of force – which appears to be the relational concept *par excellence*, to the extent that it cannot even be unambiguously designated as a concept – explains why the role of force at the heart of the general objects of the inner and outer senses is not made more explicit by Kant, and why it is ignored in commentary. But at the same time, it is this very indeterminacy of force that allows it to occupy its fundamental position in the critical architecture. Its mediating functions stem from its liminal status.

The final part of the thesis extended this line of investigation, through the role of force in the third *Critique* and the *Opus postumum*. *Bildungskraft* is key to reflecting *Urteilkraft*'s judgements of purposiveness in natural organisms and nature as a whole. I argued that the pre-critical roots of *Einbildungskraft*, in a synthetic *bildende Kraft* between sensibility and the understanding, make evident the structural similarity of the first *Critique*'s *Einbildungskraft* and the third *Critique*'s *Bildungskraft*: both forces have unifying roles for experience. Again, it is the liminal position of force in general – between the *a priori* and the *a posteriori*, the regulative and constitutive, the subjective and the objective – that enables the intermediary functions of *Einbildungskraft* and *Bildungskraft*.

My interpretation of the *Opus postumum* sought to show that force is at the heart of the problematic of the final drafts. Kant's final work was to make possible an *a priori* system of empirical physical forces, through a transition from metaphysical foundations to physics. I presented an original account of the overall structure of the drafts, in which fascicles X/XI seek to mediate between the overly objective forces of the ether proofs and the overly subjective forces of the *Selbstsetzungslehre*. I reconstructed a microcosm of this mediation in a single folio, draft 'X'. The notion of physics is expanded so that it coincides with experience, and Kant's attentions are focused on the way that experience is both made and received. This happens, in the explorations in draft 'X', through the interplay of the *forces* of both subject and object. Ultimately, Kant suggests that the understanding, desire, and pleasure and displeasure be considered moving forces, which would stimulate the objective to reciprocity. This represents a recasting of the subject-matter of each of the three *Critiques* as a moving force.

My foregrounding of force across the span of Kant's philosophical development should show that this late recasting of the critical philosophy in terms of forces is no radical new departure, but merely makes explicit the ever-present dynamic substrata of Kant's thought. The fundamental faculties attended to by the *Critiques* are best understood as the psychological forces of the subject, which stand opposite the physical forces of the object; at the intersection of the two domains of force is human experience. My interpretation has presented Kant's theoretical and natural-scientific thought, from the first to the last works, as an investigation into this common ground of force, its differentiation into separate domains of the mental and the physical, and its dynamic unification as experience.

This returns us to two concurrent themes: the philosophical science of dynamics, in the broad sense that I reconstructed as Leibniz's unfinished project, and its implicit continuation in Kant; and my dismissal of the designation 'post-critical' for Kant's final drafts, which is significant for

the issue of the breaks and continuities within the Kantian philosophy. My interpretation shows that force is consistently present in Kant's philosophical explorations, but that its place within the critical structures remains indeterminate. This allows us to posit a unifying ground of Kantian philosophy: an engagement with the broad dynamics problematic of attaining knowledge across the spectrum of philosophy, from bodies to minds to ideas, through force. The break with dogmatic metaphysics and the grounding of transcendental philosophy in the *Critique of Pure Reason* is of course a decisive moment in the trajectory of Kant's thought. However, the critical dynamics, following the antecedent critique of reason's capacities, reveals an amended method but a consistent problematic. *Kraft*, whether in the guise of psychological faculties or physical forces, remains a fundamental notion for Kant's philosophising.

The question of the unity and grounding of Kantian critique was a key one for the immediate post-Kantians. As Karl Ameriks has argued, Reinhard was instrumental in the spread of the view that critical philosophy should be grounded on a single principle.¹ This was decisive for the particular, hugely influential developments of Kantian critique in Fichte, Schelling and Hegel. Without entering into this very complex philosophical conjuncture, we can note that force, on my interpretation, unifies Kant's philosophising in a radically different way to the one sought (as the 'spirit' beneath the 'letter' of Kant's text) by Reinhold and the German Idealists. Force is not a single principle or proposition; it cannot be primarily located in the I's practical activity, nor in the identity and self-revelation of nature and rational self-consciousness, nor in the logical self-movement of the concept through negation. It is inherently indeterminate and excessive of the philosophy that it underpins.

It is therefore significant that Kant deferred, to his forecast full system of metaphysics, the explanation the derivative concepts or predicables, the most of important of which, on my reading, is force. Kant's system of critical metaphysics or transcendental philosophy remained unfinished, at least in its metaphysics of nature. The sketch of the system that appears in the *Critique's* Doctrine of Method, discussed in the conclusion to my chapter four, shows that Kant's full system of metaphysics was to provide *a priori* cognition of the *a posteriori*. The *Opus postumum* drafts are clearly part of this project, in their attempt to progress from the critical foundations to the metaphysics of nature through an *a priori* system of empirical moving forces. Moreover, the *Opus postumum* is the text that illuminates the dynamic core of the Kantian philosophy, and shows how force is the necessary, indeterminate notion occupying this core. This is because Kant's attempt at a transition to an *a priori* system of the *a posteriori* makes particular

¹ Karl Ameriks, *Kant and the Fate of Autonomy: Problems in the Appropriation of the Critical Philosophy* (Cambridge: Cambridge University Press, 2000).

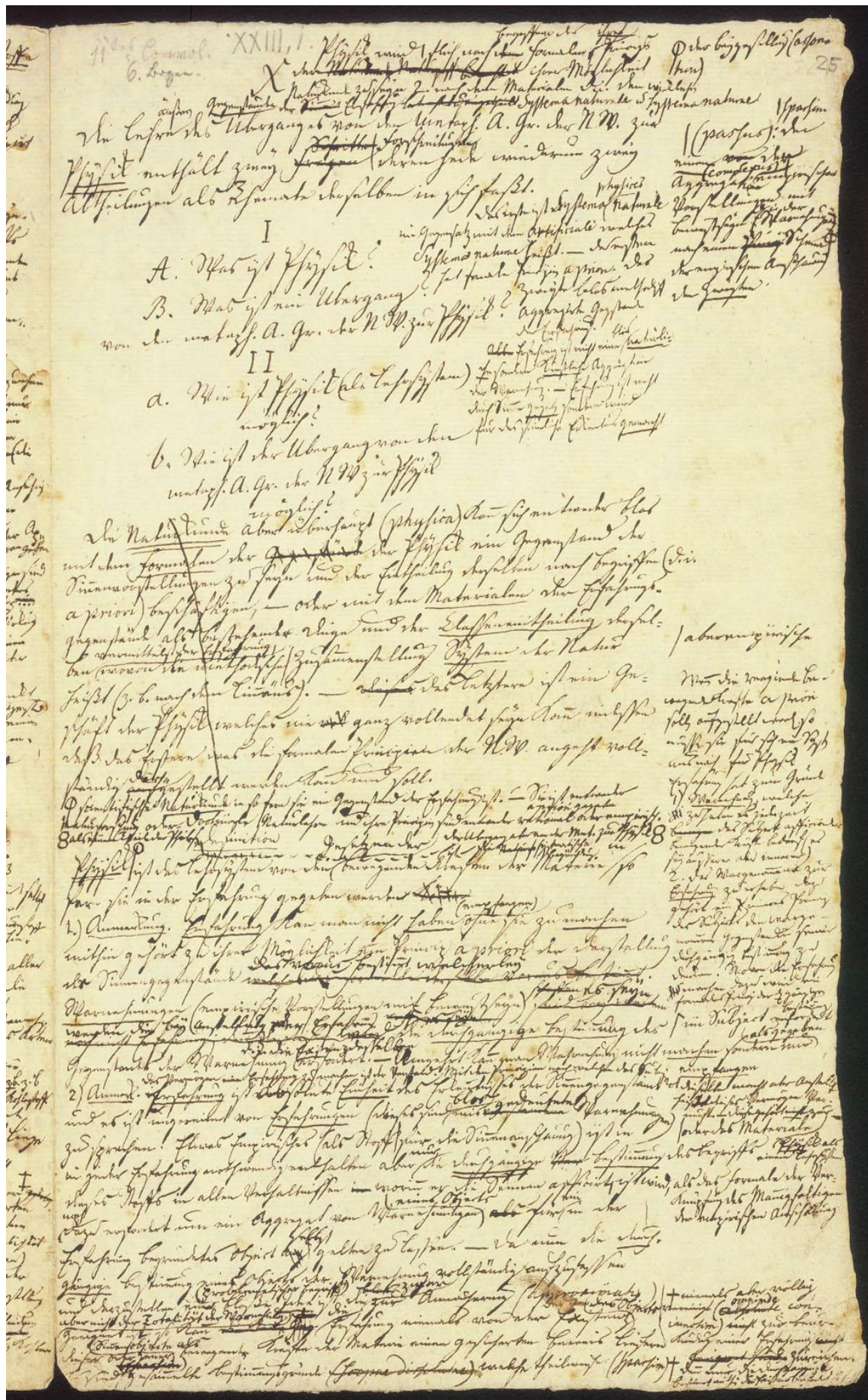
use of force, as the common ground of a dynamically-conceived subject and object. In its partial manifestation in the *Opus postumum*, the critical metaphysical system, rather than clarifying the notion of force, instead makes central use of it, with the indeterminate nature of the term continuing to enable its unificatory or transitional function.

The *Opus postumum*'s transition project represents Kant's response to the philosophical problem bequeathed by his own *Critique*: that of the movement from the critique of reason to a system of theoretical metaphysics grounded on that critique. The value of the late drafts, on my interpretation, is that they reveal the centrality of force to this endeavour. Force, as I have shown, emerges from its Leibnizian-Newtonian contexts to provide the topic of a range of Kant's early writings; it is submerged after the self-criticism of *Dreams* and *Inaugural Dissertation*, but continues to underpin the critical structures, and returns to explicit significance in the unificatory efforts of the late works. The return to theoretical metaphysics after its critical refounding thus takes place on the basis of force, as the constant touchstone in both the pre-critical and critical works, and the conceptual connection between the new, empirical-mathematical natural science and the old dogmatic metaphysics. We might even say that force drives Kant's theoretical investigations whilst refusing to be comfortably incorporated into them. This evokes the 'peculiar fate' of reason, with which the first edition of the *Critique* begins: reason is burdened, by its nature, with questions it can neither answer nor dismiss, and has an inherent drive to transgress its limitations. The Kantian oeuvre provides a sustained example of reason seeking to surpass its limits – even if just to determine them – through the concept of force. This means that, despite his calls for perpetual peace in philosophy, Kant's dynamic thought is pitched on the 'battlefield of endless controversies' that is metaphysics.

In sum, this study has contended that Kant's thought should be newly understood as a philosophy of force. 'Philosophy of force' can be taken in the objective or subjective senses of the genitive. As an objective genitive, this characterisation refers to the resources provided by the Kantian oeuvre for an understanding of the notion of force. At a key historical moment in the concept's development, prior to the separation of natural science and philosophy, yet after Newton's and Leibniz's very divergent ontological and epistemological accounts of force, Kant provides a sophisticated and singular attempt to synthesise these currents. The mature Kantian account of force I reconstruct, which has received insufficient attention in the philosophical and scientific history of the concept, adapts both the prior natural-scientific and metaphysical notions of force, integrating them with the ground-breaking new perspective of the critical philosophy. This singular synthesis of Leibnizian, Newtonian and Kantian elements in Kant's 'force' is achieved to

varying degrees of success, as we have seen, but, as Kant's own synthesis, it nevertheless deserves serious attention.

More important, however, is my contention that we should recognise Kant's 'philosophy of force' in the subjective sense of the genitive. Kant's philosophy is 'of force' in the sense that it is 'from force': it is, to a much greater extent than has been recognised, made possible, traversed and animated throughout by the concept of force. Force, as the inherently mysterious, physical-psychological stimulus of change and movement – which is located in an entirely different register to the concept of causality – is thus the dynamic, indeterminate ground of Kant's philosophy. Or better, the ground of Kant's *philosophising*: force is the covert impetus and impediment to Kant's ceaseless critique of the faculty of reason *and* of books and systems, including his own.



Immanuel Kant, "Opus postumum". Ms. germ. fol. 1702, Conv. XI, S. 25–28
Staatsbibliothek zu Berlin – Preußischer Kulturbesitz, Handschriftenabteilung
BBAW / Kant-Arbeitsstelle

Handwritten marginal notes on the left side of the page, including words like 'Sinn', 'Materie', 'Organ', 'Form', 'Wesen', 'Sein', 'Ist', 'Wird', 'Kann', 'Muss', 'Sollen', 'Darf', 'Wird', 'Kann', 'Muss', 'Sollen', 'Darf'.

Main body of handwritten text in German, discussing philosophical concepts such as 'Materie', 'Form', 'Organ', 'Wesen', 'Sein', 'Ist', 'Wird', 'Kann', 'Muss', 'Sollen', 'Darf'. The text is dense and covers most of the page.

Handwritten marginal notes on the right side of the page, continuing the philosophical discussion. It includes a boxed section with the text 'Materie ist das Substrat...'.

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I use the following conventions throughout the thesis: 't.m.': translation modified; 'm.t.': my translation. 'Kraft' is translated as 'force' throughout, without the alteration noted. Where untranslated French- and German-language primary and secondary literature is cited, the translation is my own and not noted as such.

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Kant's works are cited in the text according to the Academy edition pagination, except for references to the *Critique of Pure Reason*, which is cited, as is standard, according to the pagination of the 1781 first edition (A) and/or the 1787 second edition (B). I have generally followed the translations in the *Cambridge Edition of the Works of Immanuel Kant* (1992 –), modified where I considered necessary.

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