

Kantian Cosmology: The Very Idea

Gary Banham, *Kant Studies online*

The general conception of Kantian cosmology in *Universal Natural History* is one that folds into the “pre-Critical” period in the basic sense that the status of the types of principles invoked within the work is not subjected by Kant to critical assessment. This is far from meaning that the enquiry of *Universal Natural History* is simply abandoned by Kant. Rather, the stakes of the inquiry into cosmology become transformed and this transformation has much to do with the results of the *Critique of Pure Reason*, not least the arguments of the Transcendental Dialectic. In this piece I will first review some of the most salient lines of argument in *Universal Natural History* prior to undertaking to investigate a reason for re-thinking cosmology in Kantian terms both within the *Critique of Pure Reason* and in the wake of it. This latter enquiry will hinge both on an understanding of the nature of Kant’s use of the notion of the “regulative idea” and also upon an investigation of his uses of cosmic images within the Critical period.

Attraction and Repulsion:
The “Newtonian” Cosmology Revisited

The *Universal Natural History and Theory of the Heavens* has the aspiration to provide an account of the whole edifice of the world on the basis of what it claims are “Newtonian principles”. In the “Opening Discourse” of it Kant indicates that cosmology has both mathematical and physical dimensions, a distinction that leads him to formulate Newton’s own achievements as belonging to the mathematical half. The assimilation of Newton’s work to such a mathematical treatment suggests that Kant’s own work will focus instead on the “natural”

principles of bodies, using thereby some metaphysical grounds.¹ The “physical” part of cosmology does include sustained investigations of the planets, moons, comets and the sun but this is based upon a genetic inquiry that is generally termed a “cosmogony” and the basis of this genetic inquiry is formulated in terms of a story concerning forces. So, in the second part of the first section of *Universal Natural History*, Kant speaks of elementary matter and distinguishes between types of it that have specific density and attractive force and those which are lighter with the differences between the manifestation of such qualities being, however, conceived as infinite in variety.² Matter is thereby conceived as including a tendency or *conatus* to self-organize with the attraction of the heavier parts together in accumulated mass balanced by the repulsive elements of elasticity such that we can formulate what Kant terms a “static law” to the effect that there is an inverse relation between density and distance in the parts of the solar system with the planets formed of the heavier particles being closer to the solar centre, those with the lighter particles being further away.³

From the basic picture of the solar system Kant expands outwards to a general view of creation and this allows his conception of the Milky Way to approach systematic completeness by means of his overall view of the relationship between attractive and repulsive forces. A key element of this picture is the way it leads to a view of the universe as essentially governed by infinite forces as so that

¹ The *Physical Monadology*, on which Kant worked contemporaneously with the *Universal Natural History* is explicit in this division between what it terms “geometrical” (Newtonian) and “metaphysical” methodologies and in its aim at reconciling these from a standpoint that effectively derives a different model of physical bodies than is given in the earlier version of the latter. See particularly Ak 1: 476 where Kant speaks of the need to deduce both attractive and repulsive forces in order to explain “the inner nature of bodies”.

² In making this assumption of infinite variety Kant is clearly alluding to the Leibnizian principle of plenitude.

³ The neatness of this scheme does, however, soon break down when Kant has to deal with the differential densities of Mars in relation to the Earth and Saturn in relation to Jupiter!

“the field of the manifestation of divine attributes is just as infinite as these themselves are”.⁴ In claiming this view of the cosmos as infinite in range Kant deliberately opposes those who would claim that infinity is an impossible quantity by explicitly freeing the notion *from* quantification and expressing a dynamical equation when he raises the prospect of that which has been brought forth by God being related as a “differential magnitude” to that which the divine could have brought forth.⁵ The infinite variety of the density of matter postulated in the cosmogony is matched by the infinite space in which it is spread out within the bounds of an all-inclusive system. Alongside this new integrated conception of the cosmos comes a vision of endless rebirth as worlds are conceived of as aiming towards perfection of state after which they are destroyed and new ones arise from their ruins.⁶ This general theory of death and renewal presents the dense bodies at the centre of the whole universe as in decay just as the edges generate new life so that the developed world is caught in between decrepitude and gestation.

The ground of the picture of the cosmos that arises from the constant interaction of attractive and repulsive forces is not one that Kant can rest content to describe as imparted to the universe from a source external to it and in

⁴ Immanuel Kant (1755) *Universal Natural History and Theory of the Heavens* (1981 trans. by S.L. Jaki, Scottish Academic Press: Edinburgh), p. 151. See also the earlier statement that with regard to the universe there is “an abyss of a true immeasurability in which all ability of human concepts sinks even when it is elevated by the help of the science of numbers” (108).

⁵ This reference to “differentials” is all the more intriguing when we bear in mind the use to which the notion is subsequently put by Salomon Maimon who, likewise, utilizes it to go beyond the measurement of quantities and thereby reinvents in his own way a conception of *conatus*. See Salomon Maimon (1790) *Essay on Transcendental Philosophy* (2010 trans. by N. Midgley et al, Continuum: London and New York).

⁶ “What an uncountable number of flowers and insects perishes every cold day; but how little does one miss them, regardless [of the fact that] they are the splendid artefacts of nature and pieces of divine omnipotence; in another place this loss will be offset by overflow.” Kant (1755) p. 158. This image of an excessive economy of the whole cosmos is oddly reminiscent of the work of Georges Bataille: see Bataille (1946-9) *The Accursed Share* (1991 trans. by Robert Hurley, Zone Books: New York, 3 volumes).

rejecting this picture he stays faithful to the conception of *Living Forces* that there are forces immanent to the true motions of things. Thus “implanted forces and laws” which have God as their source are a foundation of the order which is necessarily grounded in the bodies of the universe and which enables it to be the case that we can speak of the true physical character of bodies by means of metaphysics. It is essential to this picture that the laws are directly implanted in the bodies and not an effect of some continual action of God⁷, not least because the “shortcomings” of nature are a consequence of the essence of nature itself thereby and cannot be attributed to a fault within the divine. Similarly, unlike Newton to whom it appears the *Universal Natural History* is supposedly indebted, Kant within this work appeals to “the force of attraction which is *essentially inherent* in matter”, an appeal that not only contravenes Newton’s rule against feigning hypotheses but does so in the starkest manner of giving a property to matter as essential that Newton always shrank from recognising in such a way.⁸ The reference to such essential qualities is not derived however from “mathematics” or quantitative analysis as Kant understands it but rather from a view of the “natural” bodies that arises from a physics that is grounded in metaphysics.

From the understanding of such attractive force as inherent in matter Kant derives the sense that there is a centre of attraction that is the “pivotal point of the entire nature” and which “holds in its sphere of attraction all worlds”. Whilst recognising that the notion of such a centre is paradoxical in an infinite whole Kant nonetheless defends

⁷ This appeal to the continual action of God was the source of Leibniz’s complaint against both the occasionalists and the Newtonians. For the central debate between Leibniz and the former see (1711) “Conversation of Philarète and Ariste” in Loemker *op.cit* pp. 618-28 and for the latter see H. G. Alexander (1956) *The Leibniz-Clarke Correspondence* (Manchester University Press: Manchester and New York).

⁸ For a careful description of some of the rationale for Newton’s insistence that we cannot describe gravity as essential to matter see Andrew Janiak (2008) *Newton As Philosopher* (Cambridge University Press: Cambridge and New York), pp. 102-12.

it in the sense that density can be given a point that is greatest and that at that point we can have the strongest power of attraction and that it is by means of such a notion that the sense that there is only one system in the infinite sphere of creation can be upheld. This idea of the central point is related carefully to a discussion of fire and light in the central point, not coincidentally the place also, of the “phoenix” like resurrection of matter after the chaotic collapse of the universe.

Regulative Ideas and Critical Procedure

If, after reminding ourselves of the early vision of cosmology that Kant presents in *Universal Natural History* we subsequently turn to the Critical Philosophy we are apt to do so to console ourselves with the sobriety of Kant’s treatment of the Antinomies, which we take to rule out reference to such infinite vistas as are given in the earlier work. The first two antinomies appear to merit such a view since; on the grounds of them it would appear that Kant rules out recourse to notions of infinity.⁹ However, there are a number of problems with deriving this lesson from the reading of the Transcendental Dialectic and Kant, in one of his lectures on metaphysics that dates from the Critical period suggests rather a more nuanced view when he is reported as saying: “The mistake in the representation that the world in itself is finite or infinite lies in this, that reason took a regulative principle for a constitutive one. The world is there not an infinite composite, but rather my composition of it is infinite.” (Ak. 29: 858).

⁹ The reading of the Antinomies is a matter of some interest, not least given that there appears often to be a conflation between the official positions of the thesis in the first two Antinomies with Newtonian views. For the *locus classicus* of this conflation see Sadik J. Al-Azm *The Origins of Kant’s Argument in the Antinomies* (Clarendon Press: Oxford), a work which consistently traces back the arguments of the thesis and antithesis to the arguments of the Leibniz-Clark correspondence and see, for an important corrective to this tendency Michelle Grier (2001) *Kant’s Doctrine of Transcendental Illusion* (Cambridge University Press: Cambridge and New York.)

What is involved in my composition of the world being infinite, in taking a “regulative” response to the question of its infinity and how would that be manifested in Kant’s Critical thinking? In the “Appendix” to the Transcendental Dialectic Kant indicates that taking transcendental ideas to be constitutive is to view them as supplying “concepts of certain objects” whereas a regulative employment of such ideas views them instead as “directing the understanding towards a certain goal upon which the routes marked out by all its rules converge, as upon their point of intersection” (A644/B672). So if the notion of the infinity of the world that was apparently endorsed in the *Universal Natural History* is not to be taken now as a description of a “certain object” then what effect will it have to see it instead as a “goal” that rules converge upon? When the notion of the regulative idea is first introduced Kant indicates that it is a *focus imaginarius* which indicates that a certain kind of image becomes available as a means to organise thinking but whose imagistic status has to be taken seriously as such. In order to illustrate this notion Kant refers us to a specific view as given in the reflection of mirrors, a view that involves a kind of “illusion” as when we imagine that the reflection given us is accurate despite the transposition that mirrors always involve. This example is instructive since the view of the mirror as essentially accurate is what enables us to utilise it in practice even though serious consideration of its properties can do no other than convict the mirror of semblance. Indeed, the properties of such mirror-images are not mentioned by Kant here for the first time since the recourse to them is essential in his varied references to the notion of incongruent counterparts, which involve the distinction between right and left hand, not least by mentioning how it is the mirror reflection that shows us the truth of the point that the hands are *incongruent* with each other despite the apparently identical extensive qualities which make them *counterparts*.¹⁰ Whilst the incongruent

¹⁰ The first use of the incongruent counterparts example is in the context of

counterparts device has been regarded by some as controversially proving different things at different points in Kant's career, two things are constant in his references to the example, firstly, that it shows the sense of "inner" or qualitative differences, and, secondly, that the point of this demonstration is to prove that spatiality is not something that can be comprehended in an essentially conceptual way.¹¹ Holding on to these two points is sufficient to see the connection of the demonstration of the incongruent counterparts argument to the utilisation of the mirror image when Kant explicates the sense of regulative ideas in the *Transcendental Dialectic*. The mirror image served to point us, in the discussion of incongruent counterparts, past conceptual understandings of space and towards a view of it that requires a different kind of unitary comprehension than can be given by concepts. Similarly, the reference to the mirror image in the account of regulative ideas is meant also to suggest a unitary view of the cosmos that is distinct from

the 1768 essay on *Directions in Space* where the specific reference to the mirror image is central as in this passage: "if the hand in question is a right hand, then its counterpart is a left hand. The reflection of an object in a mirror rests upon exactly the same principles. For the object always appears as far behind the mirror as it is in front of it. Hence, the image of a right of a right hand in a mirror is always a left hand. If the object itself consists of two incongruent counterparts, as the human body does it is divided by means of a vertical intersection running from front to back, then its image is congruent with that object." (Ak. 2: 382). The second reference is in the *Prolegomena* where again we have the mirror image: "What can be more similar in every respect and in every part alike to my hand and to my ear than their images in a mirror? And yet I cannot put such a hand as is seen in the mirror in the place of its original; for if this is a right hand, that in the mirror is a left one, and the image or reflection of the right ear is a left one, which never can serve as a substitute for the other." (Ak. 4: 286). Only in the *Metaphysical Foundations* does the reference to the notion dispense with the reference to the image of a mirror but it includes the view of unusual types of physiology in which "all organs were transposed leftward or rightward, contrary to the usual order" to make the same point. (Ak. 4: 484.)

¹¹ It has long been a standard reading of the recourse Kant makes to incongruent counterparts to suggest that the different uses of it are not commensurate with each other. For an example of this view see the entry on "incongruent counterparts" in Howard Caygill (1995) *A Kant Dictionary* (Blackwell: Oxford and New York) and compare the much more extensive and nuanced reading given by Jill Vance Buroker (1981) *Space and Incongruence: The Origins of Kant's Idealism* (Reidel: Dordrecht).

the standard constitutive views commonly adopted and, in the process, to suggest the *productive* role of illusions.

Now, if the mirror image is followed up, the point of it is that by means of it we see things that we would not otherwise see if it were not for its reflection even though the way in which they are thus seen is nonetheless distorted, it is still true that the distortion in question is not one that prevents use of the image in a way that enables discoveries to be made. This crucial point about regulative ideas connects specifically to a Critical procedure with cosmology as when Kant states that: “nature is properly the only given object in regard to which reason requires regulative principles” (A684/B712). Remembering this point leads to the true lesson Kant wishes us to derive from the Antinomies as he writes that when it comes to “nature in general”:

“The absolute totality of the series of these conditions, in the derivation of their members, is an idea which can never be completely realised in the empirical employment of reason, but which yet serves as a rule that prescribes how we ought to proceed in dealing with such series, namely, that in explaining appearances, whether in their regressive or in their ascending order, we ought to treat the series *as if* it were in itself infinite, that is, *as if* it proceeded *in indefinitum*.” (A685/B713)

What in the rest of this paper I propose to do is to apply this lesson of the Antinomies to the reading of some key passages in Kant’s Critical works in order to show how he means us to understand what a Critical view of cosmology is like. The first passage relates to the use of the mirror image by means of which Kant introduced the notion of regulative ideas in the “Appendix” to the Transcendental Dialectic and concerns what is often somewhat confusedly referred to as Kant’s supposed “Copernican revolution” in philosophy.¹²

¹² For a good treatment of some of the many problems with seeing Kant as announcing a “Copernican revolution” see I. Bernard Cohen (1985) *Revolution in Science* (Belknap Press: Cambridge, Mass and London), Chapter 15.

The use of the reference to Copernicus in the “Preface” to the second edition of the *Critique of Pure Reason* is, like the mirror-image introducing the notion of regulative ideas, meant to have a broadly methodological import, as is commonly recognised. However, careful attention to it should both dispel the idea that Kant refers here to a “Copernican revolution” on the one hand whilst also enabling the basic sense Kant intends to be derived from the reference to Copernicus to become clearer on the other.

The reference to revolution which is made in this passage concerns not Copernicus himself, as is often suggested, by rather the more general case of “mathematics and natural science” which have had, it is suggested by Kant, some kind of general change in their status by means of a revolution. Given that they have had such a change in status, Kant argues, we should try to find out what it was that enabled it to take place and it is suggested that this has something to do with an altered “point of view”. This alteration is connected to the first or primary thought Copernicus is said to have had when explaining the motions of celestial bodies. The comparison is made as follows:

“Failing of satisfactory progress in explaining the movements of the heavenly bodies on the supposition that they all revolved around the spectator, he tried whether he might not have better success if he made the spectator to revolve and the stars to remain at rest. A similar experiment can be tried in metaphysics as regards the *intuition* of objects. If intuition must conform to the constitution of the objects, I do not see how we could know anything of the latter *a priori*; but if the object (as object of our senses) must conform to the constitution of our faculty of intuition, I have no difficulty in conceiving such a possibility.” (Bxvi-Bxvii)

This comparison has often troubled people due to the point that the Copernican thought seems to require the decentring of the Earth whilst it is argued that the Kantian thought here is, rather, one that requires the object to be rendered secondary. However, this is not the key to grasping the comparison. It is rather that Copernicus shifts the point

of view on which the relationship between movement and rest is established and what Kant does is to shift the point of view on which the operation of the senses is seen to operate. The pre-Copernican view had taken rest to be a property of the observer and, similarly, the pre-Kantian view takes the senses to be purely receptive, thus, in both cases there is a fault in terms of what is regarded as stable. This is the key to the Copernicus reference: that which was stable is now placed in movement.

That the change in point of view that enables science and mathematics to have attained its changed status is not only due to Copernicus is, however, later stated in a footnote in which Kant refers to Copernicus' change as only having been an hypothetical one by contrast to the discovery of the central laws of motion of the heavenly bodies carried out by Newton who demonstrated by means of such laws what binds the universe together. So it is not that there was a once-and-for-all Copernican "revolution" that Kant wishes to follow but rather that the primary thought-experiment or hypothesis that Copernicus advocated of turning the perspective around is similarly taken in the "Preface" to the second edition of the *Critique of Pure Reason* to draw attention in this prefatory statement to the need for a transformation to first get adopted as a hypothesis though the *Critique* itself, Kant states, will show "apodictically", not hypothetically, the point of viewing space and time in a different way than has been done by philosophers hitherto. Hence the Copernicus reference, when seen in general context is meant to show that the Critical Philosophy carries out *not* a "Copernican revolution" but rather a "Newtonian" one in demonstrating the means by which cognition of the universe can be shown to be held together.

This is confirmed further by Kant's most extended passage on the cosmological revolutions that have been accomplished between Copernicus and Newton, which is given precisely in the context of discussing regulative ideas. This passage, despite its length, is worth quoting in full:

“Thus, for instance, if at first our imperfect experience leads us to regard the orbits of the planets as circular, and if we subsequently detect deviations therefrom, we trace the deviations to that which can change the circle, in accordance with a fixed law, through all the infinite intermediate degrees, into one of these divergent orbits. That is to say, we assume that the movements of the planets which are not circular will more or less approximate to the properties of a circle; and thus we come upon the idea of an ellipse. Since the comets do not, so far as observation reaches, return in any such courses, their paths exhibit still greater deviations. What we then do is to suppose that they proceed in a parabolic course, which is akin to the ellipse, and which in all our observations is indistinguishable from an ellipse that has its major axis indefinitely extended. Then, under the guidance of these principles, we discover a unity in the generic forms of the orbits, and thereby a unity in the cause of all the laws of planetary motion, namely, gravitation. And we then extend our conquests still further, endeavouring to explain by the same principle all variations and seeming departures from these rules; finally, we go on to make additions such as experience can never confirm, namely, to conceive, in accordance with the rules of affinity, hyperbolic paths of comets, in the course of which these bodies entirely leave our solar system, and passing from sun to sun, unite the most distant parts of the universe—a universe which, though for us unlimited, is throughout held together by one and the same moving force.” (A662-3/B690-1)¹³

Here note how the view of the universe as unlimited is held together with the view that there is a single force governing its totality by means of reference to the seminal principle of affinity, a principle Kant argues is not one that can be uncovered by scientific procedures as such

¹³ See also Ak. 18: 176 where Kant has a passage essentially preparing the way for this one and on which Michael Friedman comments in Friedman (1992) “Causal Laws and the Foundations of Natural Science” in P. Guyer (ed.) (1992) *The Cambridge Companion to Kant* (Cambridge University Press: Cambridge and New York), pp. 175-8.

procedures requires it to already be assumed. The principle of affinity is thus a regulative idea and, as such an idea, it involves moving beyond all data that could possibly be given to us and operates also by a series of approximations, each of which is only partially right.¹⁴

The Stars and the Moral Law

In addition to the methodological comments on cosmology in the *Critique of Pure Reason* which make clear a commitment both to a sense of it in Newtonian terms and to a view of it as requiring the importation of images framed by means of regulative ideas, Kant also reports practical and aesthetic responses to cosmology in the second and third *Critiques*. The uses made of cosmology in both these works are worth some attention before returning to the specific account given of the role of regulative ideas in cosmology in the *Metaphysical Foundations*.

At the conclusion of the *Critique of Practical Reason* Kant remarks on a relationship between cosmology and morality that has been widely cited if rarely subjected to sustained analysis.¹⁵ Kant opens the conclusion by comparing the “starry skies above me” with “the moral law within” and indicating they are two things that, as objects of reflection, lead to admiration and awe. Then the terms of the comparison between these two remarkable things are stated:

“The first thing starts from the place I occupy in the world of sense and expands the connection in which I stand into the immensely large, with worlds upon worlds and systems of systems, and also into boundless times of their periodic

¹⁴ Similarly, in the opening of the chapter on the Architectonic Kant speaks of the schema of an idea in science which is basically developmental and requires understanding that ideas are transformed in the course of being worked out. (A834/B862)

¹⁵ For a rare exception giving an analysis that, whilst distinct from that given here, is one from which I have decidedly learned, see Howard Caygill (2007) “Soul and Cosmos in Kant: A Commentary on ‘Two Things Fill the Mind...’” in D. Morgan and G. Banham (eds.) (2007) *Cosmopolitics and the Emergence of A Future* (Palgrave Macmillan: London and New York), pp. 213-34.

motion, the beginning and continuance thereof. The second thing starts from my invisible self, my personality, and exhibits me in a world that has true infinity but that is discernible only to the understanding, and with that world (but thereby simultaneously also with all those visible worlds) I cognize myself not, as in the first case, in a merely contingent connection, but in a universal and necessary one. The first sight, that of a countless multitude of worlds, annihilates, as it were, my importance as an *animal creature* that, after having for a short time been provided (one knows not how) with vital force, must give back again to the planet (a mere speck in the universe) the matter from which it came. The second sight, on the contrary, elevates infinitely my worth as that of an *intelligence* by my personality, in which the moral law reveals to me a life independent of animality and even of the entire world of sense, at least as far as can be gleaned from the purposive determination of my existence by this law, a determination that is not restricted to conditions and boundaries of this life but proceeds to infinity.” (Ak. 5: 162.)

The connection in this passage between the moral law and the starry skies occurs through a number of discrete means. The starry skies give us a sense of “the immensely large” but, by contrast, the moral law exhibits a world that has “true infinity”. This contrast suggests again the imaginative status that attaches to the former presentation and conveys again some form of regulative idea. By contrast the “true infinity” of the moral law indicates that in the latter case there is a basis for the infinite sense given that proceeds beyond the limited infinite of the cosmos. Further, the contrast serves the moral law also in terms of this law stating something universal and necessary in its connection to the one who gazes upon it whilst the one gazing on the starry skies remains conscious of a contingent relation in their connection to the vision they are given, a contingency itself furthered in the way in which the vastness of the skies seems to render the spectator nugatory. Interestingly, however, the form of the spectator that is so affected by the vision of the

starry skies is quite different from that which engages in the contemplation of the moral law. If the former is an animal being, the latter is a personality.¹⁶ The animality of the viewer of the stars is reminded by their vision of their finitude whereas the one who gazes upon the majesty of the moral law finds instead a sense of their independence of all animal conditions, including that of finitude which is why there is here a procession to infinity that is presented now as “true” in a way that the cosmos is not.

The images of the two are connected in two further ways, both of which are worth exploration after noting the ramified nature of the comparison that has been given in this passage. Firstly, the objects of both visions are indicated next by Kant to be “sublime” in nature, a point that points us forward to the *Critique of Judgment* and which I will shortly come back to. Secondly, the point is next made, perhaps in imitation of Aristotle,¹⁷ that whilst the attitude indicated in what at first appears rhapsodic praise, is sufficient to spur one on to investigation, they are far from being able to indicate a means by which such investigation is capable of being carried out. Indeed, not only is so but, left alone, such exalted feelings are likely to lead us astray and condemn us to such things as astrology in place of astronomy and superstition in place of morals. It is due to such dangers that the true maxim of inquiry comes not from the exaltation that Kant appears to have given vent to but rather from “the maxim to deliberate carefully beforehand on all steps that reason proposes to take and not to let it enter upon its course except on the track of a method carefully reflected upon beforehand” in order that the judging of the world can take a better direction and have a sounder outcome.

This maxim leads to a further set of comparisons between morals and enquiry into the immensities of the

¹⁶ As Caygill (2007) correctly points out this involves an implicit reference forward to the typology of *Religion within the Limits of Reason Alone* but leaves out the moment between animal and person indicated there, the moment, that is, of the human.

¹⁷ I am referring here to Aristotle’s suggestion that whilst we begin with wonder we cannot remain with it: see *Metaphysics* 983a15-20.

world of sense. The latter have been illuminated fundamentally not by the debased exaltation that emerges from the rapture that confronts the starry skies as rather by “the fall of a stone, the motion of a sling” which resolved into their elements and analysed into their forces produce true insight into the “world structure”. Similarly, an investigation of morals that strives to distinguish carefully that which is pure from that which is not is the method that will allow morals to avoid fanaticism so that the true lesson learned from the image, as was the case with the investigation of the reference to Copernicus in the *Critique of Pure Reason*, turns out to be different from the usual reception of it. In fact the two images have the same basic point, which is the need to learn the right lesson from natural science when undertaking philosophy by seeing the analogy that can be constructed between the two in the right frame. Undertaking inquiry into morals is akin to investigating the cosmos in the sense that both require critical investigation of method if any wisdom is to be achieved and this gives the example that should be set for teachers in the area in question, an example that gives “the path to wisdom that everyone ought to walk” (Ak. 5: 163).

The Sublime Cosmos

I don't, however, mean, by virtue of having derived the real sense of the analogical contrast between two forms of infinite at the conclusion of the *Critique of Practical Reason* to discourage tracking the reasons why Kant described the starry skies and the moral law as “sublime” or to indicate by means of the conclusion that there is nothing important involved in sublimity. Quite the contrary is the case as becomes clear if we look at the *Analytic of the Sublime*. But what immediately becomes clear when we move there after looking at the contrast that closed the *Critique of Practical Reason* is a further reason for viewing Kant's critical cosmology through the prism of regulative ideas. Kant states in the course of introducing the conception

of the sublime that “what is properly sublime cannot be contained in any sensible form, but concerns only ideas of reason, which, though no presentation to them is possible, are provoked and called to mind precisely by this inadequacy, which does allow of sensible presentation” (Ak. 5: 245).

It is precisely inadequacy that is the core of the relation to that which is sublime and inadequacy marked both the examples discussed in the conclusion of the *Critique of Practical Reason*. If our animal self appears sharply inadequate to the starry skies, our prudential conduct is certainly rarely worthy of the moral law, which is a reason why respect for it always involves a consciousness of inadequacy in relation to it.¹⁸ This inadequacy also marks anything sensible that is taken as characterising the sublime for us as nothing strictly sensible can attain the totality that is indicated in the sublime and it is this presentation of the sense of the totality as sublime that gives Kant a further grasp of what is involved in relating to ideas of reason.¹⁹ If the starry skies gave me, as Kant suggested in the conclusion to the *Critique of Practical Reason*, a sense of that which is “immensely large” they thereby connected me, as is evident in his later designation of this as a “sublime object”, to the sense of the sublime. To, most particularly, the sense of the mathematically sublime of which Kant writes that we thereby term sublime “that which is *absolutely great*” (Ak. 2: 48). Pointedly, however, connecting the starry skies example to the sense of the mathematically sublime, has one

¹⁸ So when discussing the case of respect for someone else who seems to us to follow the law Kant remarks: “For, since in human beings all good is defective, the law made intuitive by an example still strikes down my pride, the standard being furnished by the man I see before me whose impurity, such as it may be, is not so well known to me as is my own who therefore appears to me in a purer light”. (Ak. 5:77). Notice again the sense in which the person here who appears to incarnate the law for me is, in fact, a *focus imaginarius*.

¹⁹ I don’t mean here that ideas of reason are therefore simply to be seen as sublime as it is clear that investigation of nature often has to do with a quest for beauty and that this quest leads, as Kant puts it, to “profound investigations” (Ak 5: 246).

specific problem as that which is termed absolutely great is thereby great “beyond all comparison” and yet the whole point of the reference to the starry skies in the discussion at the conclusion of the *Critique of Practical Reason* was to bring the vision of these skies into comparison with a contemplation of another sort. Furthermore, the invention of instruments derived from the very methods commended at the conclusion of the *Critique of Practical Reason* themselves point to the impossibility of stability with regard to the estimation of greatness when it comes to objects of the senses:

“one readily sees that nothing can be given in nature, however great it may be judged to be by us, which could not, in comparison with even smaller standards, be amplified for our imagination up to the magnitude of a world. The telescope has given us rich material for making the former observation, the microscope rich material for the latter.” (Ak. 5: 250)

If the instability of all reference to the world of the senses is made manifest by the very means by which we have transcended our mere unaided sense then this points to a question as to how it is that anything natural can, nonetheless, serve for us, as it appears to do, as a sublime object at all? Kant’s response to this involves us in a sense of how the sublime can cancel the conditions of something’s being exhibited to us, how it can, that is, enable seeing to, in a striking way, reach beyond its own condition.²⁰

What is involved in such a movement of an exhibition that exceeds itself? A reference, above all, to the infinite: “Nature is thus sublime in those of its appearances the intuition of which brings with them the idea of infinity” (Ak. 5: 255). To have an experience of intuition of infinity is to be aesthetically led beyond measurement of magnitude.

²⁰ Kant’s own difficulty with this is, however, clear from one of the central points of the contrast with such sensible/supersensible oscillations as when he describes them as involving “delusions of being able to *see* something beyond all bounds of sensibility” (Ak. 5: 275) which clearly involves, however, the identification of the sublime experience with an objective illusion of constitutive sort as identified in the Transcendental Dialectic.

Imagination, the vehicle that is central to the exhibition of all ideas, is at work in presenting to us something that, as we proceed progressively in our intuition of it, involves loss of grasp of part of what was previously given in order for further parts to become available. This occurs above all with “the absolute whole” which, states Kant, is “infinity comprehended” (Ak. 5: 255). An example of this is given precisely with the Milky Way’s relation to other systems termed nebulae “which presumably constitute such a system among themselves in turn” and do not allow us to expect any limits to arrive.

“Now in the aesthetic judging of such an immeasurable whole, the sublime does not lie as much in the magnitude of the number as in the fact that as we progress we always arrive at ever greater units; the systematic division of the structure of the world contributes to this, representing to us all that is great in nature as in its turn small, but actually representing our imagination in all its boundlessness, and with it nature, as paling into insignificance beside the ideas of reason if it is supposed to provide a presentation adequate to them.” (Ak. 5: 256-7.)

The progressive diminution of the parts of nature as we move towards greater and greater vistas ends with the sense of nature itself as inadequate to the idea we are chasing by means of our investigations of it. The failure of nature to meet our standard of the infinite is precisely due to this standard being something that is intrinsically incapable of being stably and completely given through sense itself.

This relationship between the infinity of our idea and the presentation of nature involves us in an oscillatory relationship to the exhibition of the object we deem sublime as our relationship to it mirrors the double forces at work in the universe Kant pictured in *Universal Natural History* and which remained at the fore of his conception of the cosmos. The imagery of this through the sense of the sublime is given in §27 of the *Critique of Judgment*:

“This movement... may be compared to a vibration, i.e., to a rapidly alternating repulsion from and attraction to one

and the same object. What is excessive for the imagination (to which it is driven in the apprehension of the intuition) is as it were an abyss, in which it fears to lose itself, yet for reason's idea of the supersensible to produce such an effort of the imagination is not excessive but lawful, hence it is precisely as attractive as it was repulsive for mere sensibility." (Ak, 5: 258)

The response to the starry skies is here set into a much broader setting since the admiration and awe that was described in the *Critique of Practical Reason* is now connected to a double-movement of attraction and repulsion. This double-movement involves the observer being repelled from the immensity of the skies yet at the same time pulled towards it. The repulsion arises precisely from the animal-sensible part that was pictured most clearly in the *Critique of Practical Reason* as rendered thereby finite and transitory in its view of the skies. But that response to the skies was, after all, only part of the sublime movement involved as is now made clear given that the attraction to the image of these skies arose precisely as a consequence of the feeling not merely of our inadequacy when confronted with the cosmos but of its inadequacy when measured by the standard of our ideas. This oscillatory movement has, however, yet another element within it that relates more especially to our intuition and makes clear another way in which the conformity of objects to our intuition that Kant spoke of in the "Preface" to the second edition of the *Critique of Pure Reason* needs to be conceived:

"The measurement of a space (as apprehension) is at the same time the description of it, thus an objective movement in the imagination and a progression; by contrast, the comprehension of multiplicity in the unity not of thought but of intuition, hence the comprehension in one moment of that which is successively apprehended, is a regression, which in turn cancels the time-condition in the progression of the imagination and makes *simultaneity* intuitable. It is thus (since temporal succession is a condition of inner sense and of an intuition) a subjective movement of the imagination,

by which it does violence to the inner sense, which must be all the more marked the greater the quantum is which the imagination comprehends in one intuition.” (Ak. 5: 258-9.)

That which has to correspond to our intuition is not merely the object as something that is dependent thereby on the temporal and spatial forms that are stable for us in experience as we might be led to think from perusing the *Critique of Pure Reason*. It is also the case that we have the ability, in our vision of the absolute whole that is at work when we focus on the cosmos as a whole object, to render the whole before us at once and in so doing to supersede the condition of succession so that the whole is our object in its own way, a way that allows that whole to be a specific object for a special form of intuitive vision, albeit not one that provides the kind of cognitions that are at work in the successive synthesis that guides understanding.

“Now if a magnitude almost reaches the outermost limit of our faculty of comprehension in one intuition, and yet the imagination is by means of numerical concepts (our capacity for which we are aware is unlimited) summoned to aesthetic comprehension in a greater unity, then we feel ourselves in our mind as aesthetically confined within borders; but with respect to the necessary enlargement of the imagination to the point of adequacy to that which is unlimited in our faculty of reason, namely the idea of the absolute whole, the displeasure and thus the contrapurposiveness of the faculty of imagination is yet represented as purposive for the ideas of reason and their awakening.” (Ak. 5: 259-60.)

The vision of the phoenix, which Kant ascribed to the cosmos in *Universal Natural History*, now finds its home in the imagination itself, which constantly stretches out beyond itself, encounters a repulsive obstacle and yet is revived in the process. By means of excessive relation to the senses the ideas are awakened which supersede all that is sensible and thus in the process the return can be made to the relation to nature that sparked the original rapture. It is within the basic relation to nature itself and not by means of the speculations that marked the third part of *Universal Natural History* that

Kant now thinks the sublime can be grasped in the starry skies since he states that these skies should not be judged sublime on account of the view that worlds are inhabited by rational beings but only on the vision of them as “a broad, all-embracing vault” (Ak. 5: 270) so that, once again, the apparent rapture to which Kant’s images lead us, is nonetheless one that returns us in due course to an elevation of the mind capable of engaging with ideas but not to a vision of the world through the enthusiastic visions of adepts.²¹

Absolute Space in the *Metaphysical Foundations*

Whilst the investigation of Kant’s Critical works I have undertaken so far has focused primarily on the way that Kant’s reaction to cosmological imagery and notions has been expressed in the three *Critiques* I want to conclude with a more determinate response to a cosmological question in the *Metaphysical Foundations*. As I mentioned earlier, the use of the example of the incongruent counterparts by Kant has been somewhat controversial due to its being often presented that the conclusions of the discrete arguments in which it is invoked are quite different from each other. One of the reasons for this reaction is due to the invocation Kant makes, when first using incongruent counterparts in *Directions of Space*, of the conception of absolute space, something that appears to cut against the arguments of the *Critique of Pure Reason*. However, when we look at the *Metaphysical Foundations*, we discover that Kant’s reaction to the notion of absolute space is much more complex than is often supposed.

The topic of absolute space emerges in both the opening section on phronomy and in the concluding remark on

²¹ The visions of life on other planets that marked the work of Swedenborg have, on occasion, been taken to be a basis of the third part of *Universal Natural History* though it is notable that Stanley L. Jaki, in his notes on his translation of the work, notes generally critical, is sharp in clearing Kant of such an imputation (294).

phenomenology. Given that phoronomy is concerned only with the quantity of motion it revisits the Cartesian conception of viewing movement apart from force.²² It also, however, involves an important response to the Newtonian conception of absolute space viewed simply here simply as a way of quantifying motion. In phoronomy Kant abstracts from the inner determinations that were at work in the incongruent counterparts argument in order to focus only upon the external sense of quantity, which is why he focuses only upon speed (or velocity) and direction. The treatment of absolute space emerges as a result of Kant's analysis of what is involved in measuring motion at all:

“In all experience something must be sensed, and that is the real of sensible intuition, and therefore the space, in which we are to arrange our experience of motion, must also be sensible – that is, it must be designated through what can be sensed – and this, as the totality of all objects of experience, and itself an object of experience, is called *empirical space*. But this, as material, is itself movable. But a movable space, if its motion is to be capable of being perceived, presupposes in turn an enlarged material space, in which it is movable; this latter presupposes in precisely the same way another, and so on to infinity.” (Ak. 4: 481)

Here there is a curious result since the measurement of movement in any space is taken to include the measurement

²² Descartes argues for viewing movement in itself, separately from force in the *Principles of Philosophy* and this provides him with a way of understanding Galilean relativity in §§23-35 of Part II before arriving at his claim concerning the conservation of the quantity of motion in §36. R. Descartes (1644) *The Principles of Philosophy* (1991 trans. by V.R. Miller and R.P. Miller). The conception of the conservation of the quantity of motion also underpinned his subsequent “impact rules” in §§46-52 of Part II. The argument for the conservation of the quantity of motion was importantly criticized by Leibniz leading to the *vis viva* dispute that Kant contributed to in his first publication *Thoughts on the True Estimation of Living Forces*. Newton, by contrast, objected to Descartes' account of the relativity of motion in his unpublished *De Gravitatione* but, for a critical review of the account of absolute space from within the account of Newton's physical constructions see Robert DiSalle (2002) “Newton's Philosophical Analysis of Space and Time” in I. Bernard Cohen and G.E. Smith (eds.) (2002) *The Cambridge Companion to Newton* (Cambridge University Press: Cambridge and New York).

of the space in which the movement takes place. As a result the apparent summation of the totality of space in the notion of *empirical space* is insufficient since the complete space that can be envisaged is still one that requires a further element of measurement, which is why Kant does not treat empirical space as really being the totality that it first appears to be. Rather, empirical space is that which is intrinsically incomplete and requires, due to this incompleteness, a further scale of measurement, a requirement that never ends which is why the notion of infinity is invoked in the conclusion of the passage.²³

Given this understanding of the relativity of motion Kant articulates the need for a sense of absolute space as something that is not material and not given in experience. However, such absolute space is also declared by Kant to be “*in itself* nothing, and no object at all” as it only hereby signifies the indefinite extension of empirical space, the way of presenting therefore an image of something itself intrinsically non-intuitive. At the level of phronomy such absolute space is presented thus as a logical universal that is cannot be instantiated and Kant opposes this conception of absolute space to one that would treat it as a form of physical universality as the latter would “misunderstand reason in its idea” (Ak. 4: 482).

The topic of absolute space recurs when Kant reaches the conclusion of the *Metaphysical Foundations* in a “General Remark” to the discussion of phenomenology, where Kant’s view of the modality of propositions concerning matter in motion is given. Here Kant suggests that underneath the distinct concepts of motion in relative space, motion in absolute space and relative motion in general, lies the concept of absolute space itself. However, just as was maintained in the discussion of phronomy, so, again, here, Kant points out that absolute space is not an object of

²³ It is evident, however, that the sense of “infinity” here is not, as Kant put it in the Conclusion of the *Critique of Practical Reason*, “true infinity” but rather the “indefinite” that Descartes also substituted for the infinite in the *Principles of Philosophy*.

experience as it would involve “space without matter” and without matter involved in space there is no question of perception.²⁴ This enables a retrieval of the sense of absolute space simply as an idea of reason and, indeed, as a regulative idea as Kant makes manifest: “Absolute space is therefore necessary, not as a concept of an actual object, but rather as an idea, which is to serve as a rule for considering all motion therein merely as relative; and all motion and rest must be reduced to absolute space, if the appearance thereof is to be transformed into a determinate concept of experience (which unites all appearances).” (Ak. 4: 560)

Here the centrality of the regulative idea of space becomes clearer since Kant declares that the reduction of motion and rest to absolute space is a key component of arriving at the sense of “experience” itself.²⁵

One of the most intriguing parts of the discussion of absolute space in the final account given in the phenomenology concerns the discussion of circular motion which, as Kant indicates, appears to us as something absolute given that its appearance does not incorporate a possible reversal. However, if such circular motion is viewed as “true” motion rather than as merely “apparent” motion then it has to be remembered that such motion does not in fact appear to us as such but rather we experience such motion as equivalent to “rest”. This distinction between true and apparent motion should replace, says Kant, the reference to absolute and relative motion.

²⁴ This also helps to make clearer one of the apparent problems in the interpretation of the *Critique of Pure Reason* as, in the argument of the Aesthetic, Kant describes the conception of space without matter as conceivable whilst the argument of the Axioms appears to tell against this. Reconciliation can be given if we view the presentation of space without matter as a way of referring to an idea whilst the bar on perception of any such object would be thus maintained in relation to the categories of experience.

²⁵ This striking claim corresponds to Kant’s strongest treatment of the notion of regulative ideas at A651/B679. For the view that “the idea of systematic unity is a necessary condition for experience yet not constitutive of it” see Ido Geiger ((2003) “Is the Assumption of a Systematic Whole of Empirical Concepts a Necessary Condition of Knowledge?” *Kant-Studien* 94.

“Thus, circular motion, although it in fact exhibits no change in the appearance, that is, no phoronomic change in the relations of the moved body *to* (empirical) *space*, exhibits nonetheless a continuous dynamical change, demonstrable through experience, in the relations of matter *within its space*, for example, a continual diminution of attraction in virtue of a striving to escape, as an action or effect of the circular motion, and thereby assuredly indicates its difference from semblance.” (Ak. 4: 561)

This reference to dynamical change indicates that the action of the bodies is the real means of distinguishing between that which is a true as opposed to a merely apparent motion and this dynamical reference does not require the distinction between absolute and relative motion to be built into it. Further, the distinction between true and apparent motion seen in this dynamical fashion is itself something measurable, unlike the distinction between absolute and relative motion, given that the notion of absolute motion names an idea that no specific or particular case could possibly incarnate. The changes of relations to the starry skies are not in themselves sufficient further for true motions to be discerned since such changes can proceed from contrary grounds so that it is only by means of laws of motion that the sense of the heavens can be interpreted and true motions discerned. The distinction between true and apparent motion can invoke the idea of absolute space considered as a regulative idea without requiring, in the process, a sense of absolute motion to follow with it as the idea of true motion, considered as a consequence of dynamical distinction, is sufficient.

Having described this effect of the adoption of the idea of absolute space Kant concludes the *Metaphysical Foundations* with a critical rescue of the concept of “empty space” by distinguishing between its three possible senses. Considered phoronomically “empty space” is equivalent to the idea of abstracting from all particular matter simply to think of any empirical space as movable and this empty space is thus identical to the idea of absolute space. Empty

space considered dynamically would be a space that was not filled with matter and this is something that Kant does not find logically impossible but does rule out physically on the grounds of the ether as the basis of true rather than merely apparent attraction.²⁶ Empty space in the mechanical sense is a concept employed to account for the free motion of heavenly bodies but is again suggested to be unnecessary on the grounds of the effect of the ether hypothesis which would allow resistance of matter to be “as small as one likes” without ever entirely requiring it to disappear.²⁷

Conclusion

The cosmological system that emerges in *Critical Philosophy* is thus essentially based on Kant’s notion of a regulative idea, an idea that cannot be given in appearances and yet which provides a rule for governing them. This essential function of the regulative idea in Kant’s cosmology shows that the ideas discussed in the Antinomies, whilst productive of illusions, are not dispensable in Kant’s general picture of experience and certainly required in his account of the process both of science itself and of any serious philosophical account of the meaning of scientific inquiry.

²⁶ This conception becomes a central part of the *Opus Postumum*, not least in the celebrated “ether deductions” Kant attempts there.

²⁷ This is effectively the use of the law of continuity in relation to the notion of intensive magnitude.