

Kant on Causal Knowledge

Causality, Mechanism and Reflective Judgment

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Kant is well-known for his transcendental conception of causality. In the *Critique of Pure Reason*, he famously presents the causal law as an a priori principle of human understanding rather than an empirically discoverable fact about the world. According to this principle, as Kant argues in the ‘Second Analogy of Experience’, every change in nature has a natural cause.¹ We can thus know a priori that relations of cause and effect thoroughly determine all events that occur in the world. Discussions of Kant’s conception of causality usually focus on this transcendental principle.² In other parts of his writings, however, Kant’s discussion of the possibility of attaining causal knowledge of the world takes a rather different focus. In particular, in the second part of the *Critique of Judgment*, the *Critique of Teleological Judgment*, Kant is concerned not with causality as the transcendental conditions of experience in general but with the possibility of causally explaining concrete parts of nature and, more specifically, corporeal nature. Kant phrases this discussion in terms of the mechanical explicability of the natural world, where the mechanism of nature, as he tells us, is the determination of nature ‘according to the laws of causality’.³ Kant presents his account of the mechanism of nature in the context of his theory of living beings. Organisms, he suggests, raise a difficulty for any mechanistic account of the world: they do not seem to be amenable to mechanical explanation. Kant concludes in the *Critique of Teleological Judgment* that we cannot know, but can only assume, that nature is determined mechanically. The principle according to which material nature is thoroughly determined by merely mechanical laws,

¹ Cf. *Critique of Pure Reason* (CPR), A189ff./B232ff. References to Kant’s texts are made by citing the volume and page number of *Kants gesammelte Schriften*, Preussische Akademie der Wissenschaften (ed.) (Berlin: Walter de Gruyter, 1902ff.), with the exception of the CPR that is referred to by citing the page numbers of the original A and B editions. If not otherwise indicated, translations are from *Critique of Pure Reason*, trans. Norman Kemp Smith (London: Palgrave, 1929, first published 1781/1787); *Critique of Judgment*, trans. Paul Guyer and Eric Matthews (Cambridge: Cambridge University Press, 2000, first published 1790); and Immanuel Kant, *Metaphysical Foundations of Natural Science*, trans. Michael Friedman (Cambridge: Cambridge University Press, 2004, first published 1786).

² This is not surprising, for the precise argument of Kant’s proof for the causal law is far from obvious and interpretative issues abound. A question that has dominated discussions of the ‘Second Analogy’ is the debate between a weak and a strong interpretation. Cf. note 41 below.

³ *Critique of Judgment* (CJ), V 360.

Kant claims, is a purely regulative and subjective maxim that tells us something about how we must approach nature rather than about the objective character of nature itself.

The combination of these two claims, one developed in the *Critique of Pure Reason*, the other in the *Critique of Judgment*, may seem problematic. For how can we know a priori and with apodictic certainty that every change in nature has a natural cause, but have no way of knowing and can merely assume that material nature is thoroughly determined by the laws of causality? A first response to these questions may be that between writing the *Critique of Pure Reason* and the *Critique of Judgment* Kant changed his mind and gave up the causal principle as a necessary condition of possible experience.⁴ According to this reading, in the third *Critique* we can no longer assume that all of nature is determined causally but must allow that certain parts of nature, notably living beings, fall outside the causal framework. Despite the difficulty of combining Kant's various statements on natural causality, however, the *Critique of Judgment* does not seem to give any further evidence for this reading.⁵ Thus, even in the third *Critique*, Kant still seems to allow for the transcendental principle of causality introduced in the *Critique of Pure Reason* as necessary for conceiving of events in nature.⁶ How, then, can we make sense of Kant's apparently conflicting claims about causality and the mechanism of nature as forming part of a coherent conception of what it means to have causal knowledge of the world?

My aim in this paper is to propose an answer to this question that pays particular attention to Kant's account of the study of mechanical causes as a tentative, regulatively guided and reflective activity. I argue that rather than presenting a tension, there is an important continuity between Kant's principle of causality and his regulative principle of mechanism. Kant's discussion of living beings, in the *Critique of Teleological Judgment*, does not give Kant reason to alter, retrospectively, his conception of natural causality. Rather, the apparent anomaly of living nature only brings to the fore, perhaps more pointedly than that of inanimate nature, that our causal knowledge of the world depends not only on the determination of experience by the principle of causality but also on an essentially reflective process in our search for causal explanations.

I develop my argument in five steps. I begin, in Section 1, by giving a brief account of the principle of causality, introduced in the *Critique of Pure Reason*, and the maxim of mechanism, presented in the *Critique of Teleological Judgment*. In Section 2, I consider two competing tendencies in the literature in understanding the compatibility and relatedness of

⁴ Reinhard Löw argues for this interpretation in *Philosophie des Lebendigen: Der Begriff des Organischen bei Kant, sein Grund und seine Aktualität* (Frankfurt am Main: Suhrkamp, 1980), pp. 204ff.

⁵ Cf. Peter McLaughlin's discussion of Löw in his *Kant's Critique of Teleology in Biological Explanation* (Lewiston, NY: Edwin Mellen Press, 1990), pp. 143f.

⁶ Cf. the discussion in Section 3 below.

these two principles. According to the first, the concept of mechanism presents an interpretation of the concept of causality that has no objective ground in the nature of things but is subjectively necessary for beings with a kind of understanding as our own. This interpretation accounts for the fact that only the mechanical but not the causal principle is purely regulative. The reading faces the difficulty, however, that it leaves no room for the possibility of genuine mechanical explanation. It thus conflicts with Kant's conviction that science essentially relies on knowledge of mechanical causes. In order to rescue the possibility of scientific knowledge, the concept of mechanism would have to have objective validity. This, it is proposed according to a second reading, is established by Kant in the *Metaphysical Foundations of Natural Science*. The mechanistic interpretation of causality, he argues there, is necessitated by the objective character of material nature. And yet, while this second reading allows for the possibility of genuine mechanical explanations, it does not account for the regulative status of the maxim of mechanism.

The difficulty, then, lies in making sense of the mechanistic maxim as a purely regulative principle that nevertheless enables us to make determining statements about mechanical causes. As an answer to this difficulty, I develop an alternative reading of the maxim and its relation to the principle of causality. In Section 3, I argue that Kant introduces the maxim as a specific interpretation of the regulative principle of the systematic unity of nature. While the mechanistic concept of causality is objectively necessary for the realm of material nature, I suggest in Section 4, the maxim of mechanism is nevertheless purely regulative. It aims at a unified conception of nature as systematically ordered by particular mechanical laws, a conception which remains ultimately unattainable. As a regulative principle, the maxim of mechanism nevertheless provides us with a guide to our search for genuine mechanical explanations. By instructing us to think about nature as a whole as determined by mechanical laws, it leads us to apply the concept of mechanical causation to experience. On Kant's account, knowledge of particular causes in the material world, I conclude in Section 5, is thus essentially dependent not only on the transcendental principle of causality but also on the regulative maxim of mechanism. Focussing on Kant's regulative account of the mechanism of nature, I suggest in this paper, will help us get a better sense of Kant's multi-layered account of causal knowledge.

1. The Principle of Causality and the Maxim of Mechanism

In the 'Second Analogy of Experience', Kant argues that we can know a priori that '[a]ll alterations take place in conformity with the law of the connection of cause and effect'.⁷ In his proof of this principle, Kant claims that the concept of causality is necessary for distinguishing an objective sequence of states in the world from the merely subjective sequence of perceptions. Thus, Kant points out that in any experience, whether it be the experience of an event or that of a stationary object, we are confronted with a succession of perceptions. In the case of an event, as opposed to that of an object, however, we conceive of this succession as *necessarily ordered*. To employ Kant's well-known example, when we observe a house we can imagine that the successive perceptions of, for instance, the walls, the windows and the roof, could have been ordered differently. The order of perceptions depends on us, on the way we move around the house and turn our head, for example. When we experience a ship moving down the river, by contrast, our perceptions of the ship at various points on the river could not have had a different order. In observing the ship move with the current, we could not have seen the ship first downstream and then upstream. We thus take the event, but not the stationary object, to consist of a determinate succession of different states in the world, an objective succession to be distinguished from the merely subjective order of perceptions.

Insofar as the objective order of processes in the world 'remains undetermined through mere perception',⁸ Kant concludes that it is determined by

the understanding [...]; and in this case it is the concept of the *relation of cause and effect*, of which the former determines the latter in time, as the consequence, and not as something that could precede solely in the imagination.⁹

Only if we can conceive of the states of an event as necessarily ordered as causes and effects, Kant thus argues, can we regard these states as forming part of an objective process in time. The principle of the relation of cause and effect is an a priori law of the understanding that makes the experience of objective succession possible. It is a constitutive principle insofar as something can be the object of determinate temporal experience only if it falls under the law of causality. As a consequence, Kant denies that we could ever experience supernatural

⁷ CPR, B232.

⁸ CPR, B234.

⁹ CPR, B232.

causation or 'creation'.¹⁰ For something that was not itself caused by anything in nature could not be ordered in relation to other experiences in time and would fall outside the spatio-temporal framework of experience. The principle of causality is thus valid, Kant claims, without exception for all of nature:

it is a universal law of the very possibility of all experience that everything which happens has a cause. Hence the causality of the cause, which *itself happens* or comes to be, must itself in turn have a cause; and thus the entire field of experience, however far it may extend, is transformed into a sum-total of mere nature.¹¹

According to Kant, it is thus an a priori and constitutive law that every change in nature has a natural cause. The principle of causality is a universal law of *nature as such*, that is, of all that which can, in principle, be experienced.

So far, this is Kant's well-known story about the a priori principle of causality. In the *Critique of Teleological Judgment*, however, Kant seems to complicate matters by introducing a further principle of mechanical causation. There, Kant is concerned not with the general concept of nature of the *Critique of Pure Reason*, but with 'particular experiences' of material, or corporeal, nature and, more specifically, of living beings as opposed to non-living things.¹² Thus, Kant argues that we experience organisms, but not inanimate nature, as characterised by a specific organisation. Plants and animals are distinguished by a particular kind of arrangement of their parts within the whole and by a reciprocal interdependence between these parts. To take Kant's own example again, if we consider 'the structure of a bird, the hollowness of its bones, the placement of the wings for movement and of its tail for steering etc.' we seem to think of the parts of the bird as determined by their function within the organism as a whole.¹³ Our understanding of the eye as an organ of the bird, for example, is determined by its function for the working of the whole organism. We conceive of the eye as that organ which enables the bird to see. More generally, the existence and form of the individual parts of an organism seem to be purposive for the existence and survival of the organism as a whole. And insofar as each individual organ is, in turn, dependent on the

¹⁰ CPR, A206/B251. Already in the *Dreams of a Spirit Seer* Kant calls any attempt to explain nature by means of immaterial principles a 'resort of lazy reason' (II 331). It is therefore a mistake to claim that the transcendental principle of causality leaves open the possibility of a different kind of causality. Two authors who argue for this possibility are Bernhard Rang, 'Naturnotwendigkeit und Freiheit. Zu Kants Theorie der Kausalität als Antwort auf Hume', *Kant-Studien*, 81 (1990): 24-56; and Georg Sans, *Ist Kants Ontologie naturalistisch? Die „Analogien der Erfahrung“ in der „Kritik der reinen Vernunft“* (Stuttgart: Kohlhammer, 2000).

¹¹ CPR, A533/B561, translation amended.

¹² CJ, V 386.

¹³ CJ, V 360.

other organs for its own working, the living being as a whole seems to sustain and bring about itself. The organism thus seems to display not only a particular organisation of the parts within the whole, but also a capacity of the whole for self-organisation.

Crucial to this discussion of living beings is Kant's claim about their mechanistic inexplicability. By reference to purely mechanical laws, Kant suggests, we could not make any sense of the specific purposiveness that we seem to experience in living creatures. Instead, Kant goes on to argue, experiences of organisms 'bring reason into play in order to conduct the judging of corporeal nature and its laws in accordance with a special principle'.¹⁴ Thus, we can only make sense of the particular character of an organism, according to Kant, by means of an idea of reason, that is, the idea of purposiveness. We can think of the special character of organisms in terms of the end-directedness of our own rational activity. This does not mean, as Kant takes pains to point out, that we can actually have any knowledge of such purposive directedness in nature itself. Insofar as purposes are essentially connected with the intentionality of an agent who sets something as a purpose, we cannot discover that non-rational nature is in fact purposive. And yet, Kant argues, we nevertheless consider organisms *as if* they were purposively organised and end-directed. Instead of making determinate statements about the presence or absence of final causes in nature we can thus make assertions only about our reflections on the apparent teleological organisation and directedness of living creatures.

These considerations about organisms lead Kant, in the 'Dialectic of Teleological Judgment', to raise the question of the mechanical determination of nature.¹⁵ In particular, he argues that in reflecting about material nature we follow two competing principles. On the one hand, we assume that '[a]ll generation of material things and their forms must be judged as possible in accordance with merely mechanical laws'.¹⁶ On the other hand, by contrast, we follow the maxim that '[s]ome products of material nature cannot be judged as possible according to merely mechanical laws (judging them requires an entirely different law of causality, namely that of final causes).'¹⁷ It is the experience of living creatures, it thus seems, that presents an obstacle to considering all parts of corporeal nature as mechanically determined.

In the following, I shall not be concerned with an interpretation of the conflict that these two principles raise, let alone attempt a solution to it.¹⁸ Central for present purposes is rather

¹⁴ *CJ*, V 386.

¹⁵ Cf. *CJ*, V 385ff.

¹⁶ *CJ*, V 386.

¹⁷ *Ibid.*

¹⁸ I discuss this conflict in Angela Breitenbach, 'Two Views on Nature: A Solution to Kant's Antinomy of Mechanism and Teleology', *British Journal for the History of Philosophy*, 16 (2008): 351-369; and in *Die*

the particular status that Kant ascribes to these principles. The principle of the mechanical determination of nature is introduced as one of two regulative maxims that we employ, according to Kant, in our judgments about the material world. While these principles make no determining claim about nature itself, they present regulative maxims about the way we think about nature. The flipside of this is the denial of the possibility of knowing that all corporeal nature stands under mechanical laws. We cannot know but can only reflect about nature, Kant thus argues, as if it were completely mechanically determined.

2. Regulative and Constitutive Principles of the Mechanism of Nature

If the maxim of mechanism were supposed to be identical with the principle of causality, then the regulative status of the former would stand in conflict with the constitutive status of the latter. It is thus natural to conclude that there must be an important difference between the two principles. In particular, it has been argued that there is a difference between what Kant understands by 'causality' in the *Critique of Pure Reason* and what he refers to under the title of 'mechanism' in the *Critique of Judgment*. One of the most influential statements of such a differentiated account of mechanism in the third *Critique* is that proposed by Peter McLaughlin.¹⁹ According to McLaughlin, Kant's concept of mechanism differs from that of causality by its reference to the relation between material parts and their combination as a whole. To explain a natural object mechanically, McLaughlin argues, is to explain the way in which the parts determine the object as a whole. Thus, 'a mechanical explanation means the reduction of a whole to the properties (faculties and forces) which the parts have "on their own," that is, independently of the whole'.²⁰ This determination of the whole by means of its parts, as McLaughlin puts it, gives order to 'an *inclusion in space*'.²¹ It is therefore not analytically entailed by the concept of causality as such which orders 'a *sequence in time*'.²² The reason why we nevertheless interpret causality mechanistically, according to McLaughlin, is explicable by reference to the particular reductionist character of the human understanding. Due to the peculiar nature of our understanding we simply *cannot but* interpret causality in this way: 'We cannot regard a "real whole" as the cause of the

Analogie von Vernunft und Natur: Eine Umweltphilosophie nach Kant (Berlin/New York: Walter de Gruyter, 2009), Chs. 5 and 7. I shall come back to the status of the two principles in Section 4 below.

¹⁹ McLaughlin, *Kant's Critique of Teleology*, 141ff. McLaughlin refers to A. C. Ewing, *A Short Commentary on "Kant's Critique of Pure Reason"* (Chicago: University of Chicago Press, 1938, especially pp. 227f.) as an early pronunciation of this view.

²⁰ McLaughlin, *Kant's Critique of Teleology*, p. 153.

²¹ *Ibid.*, p. 152.

²² *Ibid.*

properties of the parts but only as the effect of these properties.’²³ The peculiar mechanistic character of the human understanding, moreover, is a purely subjective fact, incapable of further justification. It is a fact about us rather than about the world that accounts for the identification of relations in time with those in space.

On McLaughlin’s reading, the maxim of mechanism is a specific interpretation of the principle of causality that is only subjectively necessary for the human understanding. By spelling out the way in which creatures with a type of understanding as our own have to approach nature, the principle of mechanism has a purely regulative rather than constitutive status. McLaughlin’s interpretation has the advantage of explaining both why there seems to be an important connection between causality and mechanism and why, at the same time, only the causal, but not the mechanical, principle is objectively justified and hence constitutive of nature.

And yet, this reading also raises an important difficulty. For it does not seem to provide us with any possibility of ever attaining determinate mechanical explanations of nature.²⁴ If the very concept of a mechanical cause is not objectively valid, then there is no hope that mechanical explanations will ever yield objective knowledge. In thinking about nature by means of a concept that has merely subjective status, mechanical explanations would themselves turn out to make a claim about how we are to reflect about nature rather than about the objective character of nature itself. This result is crucially at odds, however, with Kant’s explicit statement that we can only explain the particular character of nature mechanically, that is, by reference to efficient causes, or the ‘nexus effectivus.’²⁵ Thus, Kant claims, it ‘is of infinite importance to reason not to let the mechanism of nature in its productions be dropped out of sight and be bypassed in its explanations; for without this no insight into the nature of things can be attained.’²⁶ If mechanical explanations are the only way of achieving scientific insight then they must not rest on purely subjective considerations, or else scientific knowledge itself will be impossible. McLaughlin’s

²³ Ibid., p. 166.

²⁴ In a later paper, McLaughlin acknowledges that the necessity of Kant’s mechanistic interpretation of causality remains obscure (‘Newtonian Biology and Kant’s Mechanistic Concept of Causality’, in P. Guyer (ed.) *Kant’s Critique of the Power of Judgment*, 209-218, pp. 215f.). He argues that Kant’s characterisation of the human understanding could be explained by the fact that it relied on the actual methodology of the mechanistic science of his time. It remains unclear, however, how the empirical methods of science could justify what is characterised by Kant as a subjective condition of the human mind.

²⁵ *CJ*, V 360.

²⁶ *CJ*, V 410.

interpretation of the status of mechanical causation thus seems to raise serious problems for the possibility of mechanical explanation in science.²⁷

How, then, can we avoid this difficulty? Although, in the third *Critique*, Kant does not spell out his justification for interpreting the causality of nature in mechanistic terms, I believe that we can find such a justification in other parts of his writings. In particular, we can find it in his argument that within the context of *material* nature causal relations have to be interpreted as *external* causal relations. Kant develops this account in the *Metaphysical Foundations of Natural Science*. There, he claims that given the transcendental principle of causality and the empirical concept of matter, we can know a priori that 'every change in matter has an external cause'.²⁸ Such external causes, he argues, must be understood in terms of the interactions between parts of matter by means of their forces of attraction and repulsion. For only by means of these 'original moving forces', Kant claims, can material objects have an extension in space and impart motion to other parts of matter.²⁹ In the context of corporeal nature, the principle of causality must therefore be interpreted as a principle of external, that is, mechanical influence.

If one thus attempts to explain change in a material object, one has to refer to the external influence of one material part on another. As Hannah Ginsborg puts it, to explain an object mechanically is to account for it 'in terms of the fundamental powers of matter as such.'³⁰ This, I believe, accounts for the reductionism of mechanical explanations that McLaughlin detects in the *Critique of Teleological Judgment*. For, to explain change in a material object, one must refer either to the influence of another material object acting on the first, or to the interactions between simpler material parts of the object standing in external causal relations to one another. Since, in his discussion of the contrast between the explicability of living and non-living nature in the third *Critique*, Kant is particularly interested in the explanation of the generation and inner functioning of organisms, he is specifically concerned with the second case of forces acting between the simpler material

²⁷ John H. Zammito, *The Genesis of Kant's Critique of Judgment* (Chicago: University of Chicago Press, 1992), pp. 223f., points out a similar difficulty as an objection to the interpretation of the concept of mechanism proposed by John D. McFarland, *Kant's Concept of Teleology* (Edinburgh: Edinburgh University Press, 1970). Similar to McLaughlin, McFarland argues that the concept of a mechanical explanation presents a merely subjective idea: the 'quantitative abstraction' that mechanical explanations rely on 'are not found in nature, but are introduced into nature for our own convenience in explaining it' (p. 31).

²⁸ *Metaphysical Foundations (MFNS)*, IV 543. Cf. the discussion of Kant's second of law of mechanics in Michael Friedman, 'Matter and Motion in the Metaphysical Foundations and the First Critique: The Empirical Concept of Matter and the Categories', in E. Watkins (ed.) *Kant and the Sciences* (Oxford: Oxford University Press, 2001), 53-69; and Konstantin Pollok, *Kants „Metaphysische Anfangsgründe der Naturwissenschaft“: Ein Kritischer Kommentar* (Hamburg: Felix Meiner, 2001), pp. 414ff.

²⁹ *MFNS*, IV 536.

³⁰ Hannah Ginsborg, 'Two Kinds of Mechanical Inexplicability in Kant and Aristotle', *Journal of the History of Philosophy*, 42 (2004): 33-65, p. 43.

components of a complex material whole. For in order to explain the generation and functioning of such beings, we must refer to the external influence that its material parts exert on one another. We thus identify the cause of such change in time with the external influence of parts of matter acting on one another in space. Consequently, the identification of the relationship between causes and their effects with the relationship between material parts and the wholes that they make up is not a merely subjective fact about the peculiar nature of the human understanding. Rather, it is required by Kant's conception of mechanical causation proposed in the *Metaphysical Foundations*. Thus, Kant argues,

[i]f we now consider a material whole, as far as its form is concerned, as a product of the parts and of their forces and capacities to combine by themselves (including in our consideration other materials which these parts add to one another), we represent a mechanical kind of generation of it [i.e. the material whole].³¹

The fact that Kant here characterises the mechanical explanation of a material object by reference to the relationship of parts and whole does not entail, contra McLaughlin, that the mechanism of nature is the purely subjectively motivated identification of relations in time with those in space. It shows rather, I suggest, that the causality of material nature must be understood as external causality, that is, as the causal interaction between parts of matter by means of their forces of attraction and repulsion. Empirical mechanical laws can thus be understood as a specific version of causal laws, that is, as laws of external causality. It is because of this that, as Kant argues, 'a real whole in nature is to be regarded only as the effect of the concurrent moving forces of the parts'.³²

According to the *Metaphysical Foundations*, we can thus know that material nature is ultimately determined by external, or mechanical, causation. And yet, if we can know a priori that all of material nature is subject to mechanical causes, do we really need to reflect about nature by reference to a further *regulative* maxim of mechanism? By turning to the

³¹ *CJ*, V 408.

³² *CJ*, V 407. I here agree with Ginsborg, 'Two Kinds of Mechanical Inexplicability', that the mechanism of nature should be read in terms of the general laws of mechanics that Kant sets out in the *MFNS*. I do not agree with Ginsborg's further claim, however, that the mechanism of nature has nothing to do with causality. Rather, as I argue here, it is the necessity of a mechanical interpretation of causality in the context of material nature that accounts for the necessity of mechanical explanations in science. I have argued for this interpretation in more detail in Angela Breitenbach, 'Mechanical Explanation of Nature and its Limits in Kant's Critique of Judgment', *Studies in History and Philosophy of Biological and Biomedical Sciences*, 37 (2006): 694-711.

Metaphysical Foundations in support of the mechanical maxim, would we not render that maxim itself constitutive?³³

The two contrasted interpretations of the maxim of mechanism thus present us with a dilemma. Either we read the mechanistic principle as a merely subjectively necessary interpretation of the principle of causality, thus conflicting with Kant's explicit claim of the necessity of mechanical explanation in science; or we understand the mechanistic interpretation of the causal principle as objectively necessitated by the character of material nature, thus presenting a challenge to the regulative status of the maxim of mechanism. The question, then, is whether we can make sense of the maxim of mechanism as a purely regulative principle, on the one hand, that nevertheless allows for the possibility of genuine mechanical explanations of nature, on the other.

3. Reflective Judgment and the Unity of Nature

In order to see how Kant can argue both for the objective necessity of mechanical explanation in science and for the impossibility of knowing that all material nature is determined by mechanical laws, it is instructive to pay attention to the way in which Kant introduces the maxim of mechanism in the 'Dialectic of Teleological Judgement'. Kant begins, in § 70, by telling the reader that our understanding of nature as 'the sum of the objects of the outer senses' is grounded in two types of law.³⁴ The first type is that of 'the universal laws of material nature in general', the second that of 'the particular laws that can only be made known to us by experience.'³⁵ By the universal laws of material nature in general, Kant seems to refer to those laws which, according to the *Metaphysical Foundations*, can be known a priori to hold for any part of material nature. On their own, however, these general laws are insufficient for a full account of particular experiences of corporeal nature. It is thus an empirical task to search for more specific laws under which we can subsume particular experiences. Kant argues that in so doing, however, we require a 'principle' or 'guideline' according to which we can investigate nature.³⁶ Moreover, it is the maxim of mechanism, as Kant subsequently introduces it, that presents such a guideline for our empirical research into the particular laws of nature.

At the beginning of § 70, Kant only gives us the outline of an argument for these statements. In particular, he here presupposes the claim, developed first in the *Critique of*

³³ Watkins suggests as much in 'The Antinomy of Teleological Judgment,' in D. Heideman (ed.), *Teleology. Kant Yearbook* 1 (2009): 197-221, p. 205.

³⁴ *CJ*, V 386.

³⁵ *Ibid.*

³⁶ *Ibid.*

Pure Reason and subsequently in the introduction to the *Critique of Judgment*, that we must assume a principle of unity as a regulative principle for the study of nature. In order to understand the status of the maxim of mechanism as a regulative guide to our empirical enquiries, we thus need to take into account Kant's previous arguments. This, as I argue in the next section, will elucidate why, after defending a constitutive principle of causality in the *Critique of Pure Reason* and a mechanical interpretation of this law in the *Metaphysical Foundations*, Kant introduces a purely regulative principle of mechanism in the *Critique of Judgment*.

Kant first discusses the principle of the unity of nature in the 'Appendix to the Transcendental Dialectic' of the *Critique of Pure Reason*.³⁷ Here, Kant raises the worry that although we may have a priori knowledge of the transcendental laws of nature, these transcendental principles leave our empirical knowledge of the specific laws of nature underdetermined. In the case of the a priori principle of causality this means two things. First, insofar as the principle provides no secure guarantee for our supposed knowledge of causal laws, future observations and experiments may always prove false what we believe to be the causal laws that determine a particular event. We may thus always be mistaken about particular causal explanations. Second, Kant raises an even more general difficulty about the very possibility of discovering causal regularities. Even though the a priori principle of causality guarantees that every event has some cause, Kant claims that it does not ensure that we will empirically discover any evidence of such a cause. For the natural processes that we experience could be so irregular that we would never have evidence for any causal regularities. Thus, Kant suggests that

[i]f among the appearances which present themselves to us there were so great a variety, I do not want to say according to the form (for in that respect they might resemble one another), but according to the content, that is, according to the manifoldness of the existing entities, that even the acutest human understanding could not by comparison of them detect the slightest similarity (*a case which is quite conceivable*), then the logical law of genera would have no sort of standing, and there would not even be a concept of genus, or indeed any other universal concept.³⁸

³⁷ CPR, A642ff./B670ff.

³⁸ CPR, A653f./B681f., italics mine.

Similarly, in the published introduction of the *Critique of Judgment*, Kant argues that

it may certainly be thought that [...] it would be impossible for our understanding to discover in [... nature] an order that we can grasp, to divide its products into genera and species in order to use the principles for the explanation and the understanding of one for the explanation and comprehension of the other as well.³⁹

According to Kant, it is thus conceivable that we fail to recognise any kind of similarity between different objects of experience. This would mean that we could not classify kinds of experience into genera and species and, hence, that we would have no evidence for any empirical laws.⁴⁰ No empirical evidence of causal regularities would thus be available. Even if we can know a priori that every event in nature has a cause, this knowledge would leave open whether we can find out about the particular causes of any given event.⁴¹

And yet, although it may thus be conceivable that we fail to know of any particular causal laws, it is nevertheless a practical impossibility to go about our business without assuming a great number of regularities to hold in nature. How else could we expect that having lunch will satisfy our hunger, that taking the train will get us to where we want to go, or that we will wake up well-rested after a good night's sleep? Kant thus argues that

³⁹ *CJ*, V 185. Kant spells out this worry further both in the first, unpublished, introduction (especially *FI*, XX 203ff.) and in the second, published, introduction to the *Critique of Judgment* (especially V 179ff.).

⁴⁰ Different commentators have pointed out that Kant mentions different aspects of nature that are left open by the transcendental principles of human understanding. Thus, Kant refers to the empirical conceptualisability of nature, the determination of nature by empirical laws, the systematicity of such empirical laws as well as their necessity. Cf. Henry E. Allison, *Kant's Theory of Taste: A Reading of the Critique of Aesthetic Judgment*, (Cambridge: Cambridge University Press, 2001), pp. 30f.; Paul Guyer, *Kant's System of Nature and Freedom: Selected Essays* (Oxford: Clarendon Press, 2005), pp. 48f.; and Rachel Zuckert, *Kant on Beauty and Biology: An Interpretation of the Critique of Judgment* (Cambridge: Cambridge University Press, 2007), pp. 27ff. I agree with Allison that we can find some coherence in Kant's various formulations if we keep in mind that it is 'the essential function of reflective judgment [...] to find universals for given particulars' and thereby to unify particular experiences into a systematic whole (*ibid.*).

⁴¹ I believe that this problem arises for both the weak and the strong interpretation of the 'Second Analogy'. According to the weak reading, Kant's argument establishes that all of nature has some cause but not that nature is determined by causal laws. Cf., e.g., Lewis White Beck, *Essays on Kant and Hume* (New Haven/London: Yale University Press, 1978), pp. 111-129; Gerd Buchdahl, *Metaphysics and the Philosophy of Science: The Classical Origins: Descartes to Kant* (Oxford: Basil Blackwell, 1969); and Henry E. Allison, *Idealism and Freedom: Essays on Kant's Theoretical and Practical Philosophy* (Cambridge: Cambridge University Press, 1996), pp. 80-91. According to the strong reading, by contrast, the 'Second Analogy' proves not only that every event has a cause but also that the same types of cause have the same types of effect. Cf., e.g., Arthur Melnick, 'The Second Analogy', in G. Bird (ed.) *A Companion to Kant*, (Oxford: Blackwell, 2006), 169-181; Paul Guyer, *Kant and the Claims of Knowledge* (Cambridge: Cambridge University Press, 1987); Michael Friedman, 'Causal Laws and the Foundations of Natural Science', in P. Guyer (ed.) *The Cambridge Companion to Kant* (Cambridge: Cambridge University Press, 1992), 161-199. The problem that remains open for both interpretations, I believe, is that of *discovering* the particular causal laws.

although we may not know a priori what regularities hold in nature, or whether we can find any such regularities at all, we nevertheless have to approach nature *as if* its causal processes were unified by particular laws. In the 'Appendix', Kant thus argues that the idea of the systematic unity of nature is a regulative idea of reason. The faculty of reason is that capacity by which we unify individual cognitions under higher principles and strive to combine all individual cognitions into a systematic whole. In order to make sense of our experiences as coherently connected, we have to assume that nature is unified. In particular, in our attempt to make sense of our experiences of nature as forming a coherent whole, we must presuppose the possibility that nature represents a unity systematically connected by necessary laws. In this sense, the unity of nature is only a '*projected* unity'.⁴² The idea of unity, Kant argues, is *read into* our experience of nature and thus presents an idea that does not constitute, but regulates, our experience of nature.

In the two introductions to the *Critique of Judgment*, Kant develops this idea of the unity of nature further. The principle of unity is now presented as a necessary principle of the reflective function of judgment.⁴³ What Kant here entitles 'reflective judgment' is the capacity to search for general concepts or principles that subsume given experiences. Reflective judgment is distinguished from determining judgment insofar as the former *reflects* about experiences in order to discover concepts and laws that may subsume such experiences, whereas the latter *determines* particular experiences by applying *given* principles to them.⁴⁴ The a priori principle of causality, for instance, is given by the understanding a priori and can therefore be applied to particular perceptions by means of the determining function of judgment. The empirical laws of nature, by contrast, are not given to judgment but must be discovered empirically. In order to have any reason for hope that this reflective activity will be successful, however, we need to assume that nature is ordered according to general laws:

⁴² CPR, A647/B675.

⁴³ The relationship between the role of reason in the CPR and that of reflective judgment in the CJ has been the object of much debate. Cf. for instance the discussion in Joachim Peter, *Das transzendente Prinzip der Urteilskraft: Eine Untersuchung zur Funktion und Struktur der reflektierenden Urteilskraft bei Kant* (Berlin/New York: Walter de Gruyter, 1992), part 2; and Suma Rajiva, 'Is Hypothetical Reason a Precursor to Reflective Judgment?', *Kant-Studien*, 97 (2006): 114-126. For the purpose of this paper, I shall assume that in the CJ we can still regard the idea of unity as an idea of reason, an idea, however, that is projected onto nature by our reflective activity of judgment. It is particularly controversial whether Kant regards the principle of the systematic unity of nature as a transcendental principle only in the CJ or also in the CPR. According to Rolf-Peter Horstmann, *Bausteine kritischer Philosophie: Arbeiten zu Kant* (Bodenheim bei Mainz: Philo, 1997), chs. 5-6, and Guyer, *Kant's System*, chs. 2-3, Kant's position changes between the first and third *Critiques*. By contrast, Allison, *Kant's Theory of Taste*, and Ido Geiger, 'Is the Assumption of a Systematic Whole of Empirical Concepts as Necessary Condition of Knowledge?', *Kant-Studien*, 94 (2003): 273-298, argue convincingly that the CJ develops what was already implied in the CPR.

⁴⁴ Cf. CJ, V 179.

judgment must thus assume it as an a priori principle for its own use that what is contingent for human insight in the particular (empirical) laws of nature nevertheless contains a lawful unity, not fathomable by us but still thinkable, in the combination of its manifold into one experience possible in itself.⁴⁵

On the one hand, Kant thus argues that, given what we can know about the world a priori, the validity of any set of empirical laws would seem contingent and altogether arbitrary. On the other hand, Kant also claims that in order to regard our empirical experiences as systematically connected, we have to assume that nature is unified according to necessary laws. The principle of judgment according to which we regard nature as a systematic and lawful unity is thus a merely 'subjectively necessary transcendental presupposition'.⁴⁶ Although it does not make any claim about nature itself, it is an assumption necessary for making empirical judgments about nature. It is a principle, Kant argues, required if the faculty of judgment 'is to have any hope of an interconnected experiential cognition in accordance with a thoroughgoing lawfulness of nature or of its unity in accordance with empirical laws'.⁴⁷

In order to make sense of our search for causal explanations, we must therefore reflect about nature as if it were systematically ordered by more specific natural laws. So far, this investigation does not say anything about the regulative maxim of mechanism. It can now be shown, however, that there is an important continuity between Kant's arguments for the regulative principle of the purposive unity of nature and his introduction of the maxim of mechanism. For, after arguing that we must assume a regulative principle of reflective judgment according to which nature is systematically ordered by empirical laws, Kant goes on to claim that we must postulate a *more specific* maxim of reflective judgment according to which nature is systematically ordered by *mechanical* laws. What, then, is Kant's argument for this further claim? In what sense is the mechanistic maxim a necessary assumption of reflective judgment?

4. The Maxim of Mechanism and Mechanical Explanations of Nature

In the 'Dialectic of Teleological Judgment', Kant argues that the mechanistic maxim 'is provided to [... judgment] by the mere understanding a priori'.⁴⁸ Given Kant's

⁴⁵ *CJ*, V 184f.

⁴⁶ *FI*, XX 209.

⁴⁷ *CJ*, V 386.

⁴⁸ *Ibid.*

characterisation of reflective judgment in the third *Critique*, this statement may seem puzzling. As we have seen, our attempt to discover the empirical laws of nature is characterised as a reflective procedure. We cannot simply apply given laws to particular experiences but must reflect about nature in order first to discover such laws. When Kant introduces the maxim of mechanism as a principle of judgment, yet asserts that this maxim is provided to judgment by the understanding, he cannot therefore mean that the maxim is given in the same sense in which the principle of causality is made available to judgment in its determining function. Rather, in light of what I have argued in Sections 2 and 3, the maxim of mechanism can be provided by the understanding only in an indirect sense.

Thus, Section 2 has shown that the identification of causality with mechanical causality is justified not because of a subjective fact about human understanding, but because of what we can know a priori about material nature. The principle that ‘every change in matter has an external cause’ is a constitutive principle making a determinate claim about corporeal nature.⁴⁹ Moreover, Section 3 has set out that the transcendental principle of causality leaves underdetermined the particular nature of specific causal laws. The crucial point to note is now that, just as the causal principle leaves open the nature of particular causal laws, so does the law of mechanical causation spelt out in the *Metaphysical Foundations*. While, according to this law of mechanical causation, we can know a priori that every change in material nature has an external cause, we can only find out about the particular causes of any specific change empirically. In order to explain particular experiences of material nature, we therefore have to investigate how the external interactions of parts of matter can causally affect a change in material objects. And, in order to make sense of this search, we must assume that nature is systematically ordered by particular mechanical laws that can, indeed, be discovered by us. In our search for such particular mechanical causes that affect changes within material objects, we thus have to presuppose the maxim of mechanism: ‘[a]ll generation of material things and their forms must be judged as possible in accordance with merely mechanical laws’.⁵⁰

The maxim of mechanism thus goes beyond the constitutive principle of external causality, spelt out in the *Metaphysical Foundations*. It presupposes that all of material nature stands under particular mechanical laws. It is the relatedness, yet also the crucial difference, of these two principles that can now explain Kant’s claim that the maxim of mechanism is, on the one hand, ‘provided’ to the faculty of reflective judgment ‘by the mere understanding a priori’ and yet, on the other hand, represents a principle of reflective judgment.⁵¹ For,

⁴⁹ *MFNS*, IV 543.

⁵⁰ *CJ*, V 387.

⁵¹ *CJ*, V 386.

insofar as it is a principle of the understanding that every event in material nature has a mechanical cause, the understanding provides, or makes available, to our reflective faculty of judgment a mechanistic interpretation of the principle of the unity of nature. In our search for mechanical explanations we interpret the regulative principle of the lawful unity of nature in mechanistic terms, thus yielding the maxim of mechanism.

The proposed reading can, I suggest, avoid the difficulties facing the two competing interpretations of the maxim of mechanism contrasted in Section 2. First, although the concept of the mechanism of nature has constitutive status, the maxim itself is purely regulative. Insofar as it is a specific interpretation of the regulative principle of the unity of nature it provides a guide for our reflections about the causal structure of nature. This is why the maxim makes a claim about how we are to approach nature rather than about the objective character of nature itself. The maxim is not regulative because it asks us to make use of a subjective concept of mechanism but rather because it is a specification of the more general regulative principle of the lawful unity of nature. The maxim of mechanism has regulative status, in other words, because it expresses a specific interpretation of the subjective principle that nature as a whole is systematically organised according to laws cognisable by the human understanding.

This reading implies that the regulative status of the maxim of mechanism cannot simply be explained by reference to the apparent teleological character of living beings that Kant discusses in the third *Critique*. It is not just the experience of organisms as such which makes it necessary, for Kant, to relegate the mechanical principle to a merely regulative status. Even if living nature could, in other words, be explained according to mechanical laws the maxim of mechanism would thus remain regulative.⁵² This suggests that, on Kant's account, the challenge raised by the apparently non-mechanistic character of living beings is a challenge that arises once the regulative status of the maxim of mechanism has already been accounted for. It is a challenge that persists even if we agree that the mechanistic maxim is a purely regulative guide for the study of nature.⁵³

Second, the proposed reading of the maxim of mechanism also offers an answer to the worry that we may not be able to ascribe a determinate or objective status to mechanical

⁵² According to Marcel Quarfood, 'the plurality of special laws harmonizing in sustaining the organism presents a complexity which at least with respect to the "peculiarity" of the human vantage point is infinitely too vast for the mechanical mode of explanation to be anything more than just a regulative principle' (*Transcendental Idealism and the Organism: Essays on Kant* (Stockholm: Almquist & Wiksell, 2004), p. 205). According to the reading I have proposed here, however, it is not the particular complexity of organisms that makes the 'mechanical mode of explanation' purely regulative. Rather, it is the claim that all of nature can be so explained that must be regarded as a purely regulative guide to our mechanical explanation of particular natural objects.

⁵³ This is why the conflict between a mechanistic and a teleological maxim remains, according to Kant, even if these maxims are understood as purely regulative principles.

explanations that are based, at least in part, on the employment of this regulative maxim. For although, as we have seen, the proposed account agrees with McLaughlin in arguing that the maxim of mechanism is a regulative principle of reflective judgment, it disagrees with his reading regarding the grounds of the maxim's non-constitutive status. In order to see how this difference between the proposed reading and McLaughlin's interpretation accounts for the fact that the former avoids the difficulties of the latter, we need to examine, in more detail, the role played by the mechanistic maxim in the formation of mechanical explanations. According to the reading proposed here, the maxim does not lead us to make use of a purely regulative idea in our reflections about nature. Instead, it guides us to employ a concept that is objectively valid within the realm of material nature. The maxim of mechanism thereby does not instruct us to make further reflective judgments. Rather, by asking us to think about nature as a whole as falling under mechanical laws, it leads us to determine our experiences of nature by means of the concept of mechanical causation. Despite the regulative status of the maxim, it thus enables us to formulate empirical explanations that have determining and not merely reflecting status.

In this respect, the mechanistic maxim contrasts with the second maxim introduced by Kant in the 'Dialectic of Teleological Judgment' as a guiding principle in our reflections on nature: 'Some products of material nature cannot be judged as possible according to merely mechanical laws (judging them requires an entirely different law of causality, namely that of final causes).'⁵⁴ This maxim presents a second, conflicting, interpretation of the regulative principle of the unity of nature. It asks us to reflect about nature as a whole as ordered not only according to mechanical but also according to teleological principles. As we have seen in Section 1, however, the idea of the purposiveness of nature is a purely regulative idea. Kant therefore holds that we cannot ascribe purposiveness to nature itself, but can merely regard nature *as if* it were purposive. Teleological considerations can thus offer regulative reflections about nature without, however, enabling us to make determinate statements about the purposiveness of nature itself. By contrast with objective claims about the mechanical causes of nature, teleological judgments will thus always remain analogical considerations without any claim to objective validity. As analogical judgments, these reflections may then work indirectly as heuristic means of finding out about further mechanical causes. They may lead us to discover mechanical relations between parts of matter that were originally regarded as purposively related. The teleological judgments themselves, however, will always remain reflective. This contrast highlights, I suggest, that although both maxims present regulative rather than constitutive principles for the

⁵⁴ *CJ*, V 387.

consideration of nature, only the mechanistic but not the teleological maxim directly instructs us to employ a concept that has objective validity. Application of the concept of mechanical causation, but not that of purposiveness, can thus lead to genuine explanations of nature.⁵⁵

5. Conclusion: Causal Knowledge as Applied Rational Cognition

In this paper, I have thus argued that there is a crucial continuity between Kant's principle of causality in the *Critique of Pure Reason* and his maxim of mechanism in the *Critique of Judgment*. Rather than standing in conflict with one another, the constitutive principle of causality and the regulative maxim of mechanism provide necessary conditions for knowledge of the causes that determine change in material nature. Focusing on Kant's regulative conception of mechanical causation in the third *Critique*, thus presents us with an account of causal knowledge that is essentially dependent on both constitutive and regulative principles.

In the *Metaphysical Foundations*, Kant characterises the resulting knowledge of mechanical causes as an 'applied rational cognition' and distinguishes it from the pure and apodictically certain part of knowledge, or 'science proper'.⁵⁶ This difference is grounded in the fact that empirical but not a priori statements comprise judgments about that which is independent of us and the particular character of which is therefore left underdetermined by the a priori concepts of the understanding. Since judgments about that which is left underdetermined by our a priori concepts must nevertheless be conceptual, empirical knowledge presupposes the availability of empirical concepts and principles that characterise the particular, contingent character of the given. And since, furthermore, these empirical concepts cannot be read off from given sense perceptions – since the given is not yet conceptual but must be conceptualised by us – we must provide empirical concepts and principles ourselves.

As we have seen, we can do so only by reflecting about nature, guided by the assumption that nature can indeed be ordered by empirical concepts and laws. By constructing conceptual schemes, by means of which we make sense of that which is given to us in experience, we thus read systematicity and lawfulness into nature. The idea of a fully

⁵⁵ This reading does not yet provide a solution to the conflict raised by these principles. It does, however, suggest that the resolution of the antinomy of judgment must take into account the different status of judgments made by employing the concept of mechanical causation, on the one hand, and that of purposiveness on the other. For a suggestion of how to read this resolution see Breitenbach, 'Two Views on Nature'.

⁵⁶ *MFNS*, IV 468.

systematic knowledge of natural causes, however, is only something we can strive for, yet can never fully achieve. Further experience may always lead us to revise our conceptual schemes. '[I]n natural science', as Kant therefore argues, 'there is endless conjecture, and certainty is not to be counted upon'.⁵⁷ Despite such lack of certainty, however, we have reason to formulate, and investigate the conjectures of science. Although, according to Kant, a regulative principle is necessary for the formation of causal explanations, we are therefore at least justified in *aiming* at causal knowledge of the world.⁵⁸

⁵⁷ *CPR*, B433.

⁵⁸ Acknowledgement: I would like to thank Onoral O'Neill, Nick Jardine, Marina Frasca-Spada, Sasha Mudd and the participants at the BSHP Conference 2008 for helpful comments on earlier versions of this paper.