

Mechanical Explanation in the “Critique of the Teleological Power of Judgment”

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In the “Antinomy” of judgment Kant speaks of merely mechanical laws as being sufficient to explain the production of an organism but also as being insufficient to explain such a product. Most recent interpretations take the maxim that all products of nature are to be judged as possible according to “merely mechanical laws” (CPJ V 387.4), to be merely regulative for our cognitive activities and not constitutive of experience or of the objects of experience (Watkins 2009, 200; see Quarfood 2004, 166 ff. for dissent). On the other hand, the regulative maxim of mechanism does not merely suggest a heuristic method that might be useful for biological research: it is supposed to be *necessary*. Thus the interpretation of what Kant means by ‘mechanical laws’, the ‘mechanism’ of nature, ‘mechanical’ explanation and other expressions of this sort is crucial to an understanding of Kant’s project in the “Critique of the Teleological Power of Judgment” and of his position on the explanation of the organism in particular. Whatever he means by these expressions, the fact that we are supposedly incorrigibly mechanistic in our scientific explanations of nature is said to be due to a *peculiarity* of our understanding, a peculiarity that is binding for us but not constitutive of the objects of our experience. This is where the problem lies: how to be necessary without being constitutive. The question is whether Kant provides the resources to produce a convincing explanation of how this is possible.

In the *CPR* Kant had already appealed to the peculiarity of our cognitive faculties, which depend on both (spontaneous) understanding and (receptive) intuition, to explain why the world of experience is constituted the way it is. This peculiarity of our understanding, that makes it depend on spatio-temporal sensibility and makes it apply precisely the twelve categories that it applies, is binding for us—but also for the objects of our experience. But when Kant reintroduces this figure of argument after §75 of the *CPJ*, he asserts that mechanism is merely regulative not constitutive, that is, that it is in some sense necessary, but not necessary in the same way as space, time and causality, which are of course constitutive of phenomena. Thus we have two interlocked problems: What is mechanism? And how does the

structure of our cognitive faculties (understanding and intuition) force us to be regulative mechanists without *thereby* forcing nature to be mechanical? A satisfactory interpretation of the “Critique of the Teleological Power of Judgment”—at least within the current consensus—must not only clarify what “merely mechanical laws” are, but also explain why the relation of intuition to understanding in our cognitive faculties makes these kinds of laws necessary for scientific explanation without their being constitutive of the objects of experience.

In the following three sections I shall first analyze a number of candidates for the meaning of ‘mechanical’ law in the *CPJ* and argue that the determination of a whole by the properties and interactions of the parts is the strongest candidate. In the second section I will take up a number of difficulties with this interpretation as it has been advanced in the past and dispense with some of them. In the third section I will explore some possibilities of reconstructing a Kantian argument for a part-whole determinism that is subjectively necessary for us, but not constitutive of the objects of experience.

1. What does Kant Mean by ‘Mechanical’ Laws or ‘Mechanical’ Explanation?

What Kant meant by ‘mechanistic’ or ‘mechanical’ explanation in his discussion of teleology and the organism is either what most people at the time meant or else it has a definite technical meaning defined by Kant somewhere in his writings (or in the ideal case both of these). In the first case we are dealing with a question of intellectual history to be answered by investigating the context in eighteenth-century science. In the second case we are dealing with an internal question of Kant-interpretation. A number of candidates for a technical meaning have been proposed, which are best characterized by the respective contrast concepts involved: spontaneous, non-physical, dynamic, holistic. It turns out that none is completely satisfying.

1) One possibility for a technical meaning, based on the *CprR* and the “Preface” to the second edition of the *CPR*, is the opposition of mechanism and freedom (spontaneity). The second manuscript of the so-called *Progress* gives some credence to this interpretation inasmuch as Kant’s discussion moves directly from natural purposes to freedom (*Progress* XX 294.10–14). Zumbach (1980, 99), for instance, sees a kind of “free cause” acting in the organism. But if freedom is the

counterpart to mechanism, then mechanism would simply be the same as the causal determinism of the phenomenal world—and the thesis of the antinomy of judgment would just assert that all production in nature should be judged as causal (which it of course is).

2) We could also interpret ‘mechanical laws’ as referring simply to empirical physical laws: from the *Theory of Heavens* (1755) onwards, Kant uses ‘mechanical’ to refer to empirical laws or regularities and even explicitly doubts whether these mechanical laws are sufficient to explain the production of organisms. However, although it is true that already in the *Theory of Heavens* Kant doubted the possibility of giving a mechanistic explanation of the production of even a worm or a weed, he nonetheless seems to have been convinced that these processes were completely *natural*, and he had no qualms about propagating something like the spontaneous generation of the first inhabitants of countless planets as soon as the physical conditions were right (*Theory of Heavens* I 230.14 ff., 351.5 ff.). He does not give exact dates for these events, as does Buffon (1775, 513) two decades later, but he does subscribe to some pretty wild naturalistic speculations in the appendix to the *Theory of Heavens* (“On the Inhabitants of the Celestial Bodies”). And we should not forget that, while Kant might also despair of ever giving a mechanistic explanation of the production of a table or a chair (in as much as these things are *purposes*, that is, they involve the causality of, or according to, a concept), nonetheless, the production of tables and chairs is certainly considered to be completely compatible with the causal closure of the natural world. The arguments of the “Third Antinomy” make it clear that Kant believes that even human moral action is compatible with the causal closure of the material world.¹ And Kant reaffirms in the *Metaphysics of Morals* that our reason, as long as it is embodied in a living creature, can have causal powers: a human being as a “*natural being* that has reason (*homo phaenomenon*)” can be a cause in the world of appearances—by means of his “reason as a theoretical faculty” (*MM* VI 418.14 ff., 418.8 f.). Thus, though Kant never spells it out in detail, there is a form of causality by embodied minds outside the realm of mechanical laws, but this technical human action is always compatible with physical conservation laws.²

¹ *CPR* B565. In *CprR* (V 96.28 ff.) Kant contrasts “psychological” to “mechanical” causality according to whether it is a representation or a bodily motion that produces an action.

² Kant wrote to Kiesewetter: “Neither by a miracle nor by a spiritual being can a motion be produced in the world without effecting just as much motion in the opposite direction, consequently according to

3) The third possibility is that Kant means in the *CPJ* what he meant in the *Metaphysical Foundations*, where he made a distinction between the areas of mechanics and dynamics: here, mechanics can be contrasted with another sub-discipline, dynamics, or distinguished from the more comprehensive discipline, physics. Mechanics has to do with the transfer of motion or force; dynamics has to do with the sources of force and the constitution of matter. This is the position Kant took in the mid 1780s as documented also in the Danzig physics lectures (XXIX 106.8 ff.) and various papers that Adickes published in the fourteenth volume of the Academy Edition:

The mechanical kind of explanation explains by the mere communication of motion not by its original natural production, that is, not completely based on the nature of bodies (*Refl.* XIV 470.2 ff.).

I think it is highly unlikely that Kant is using the term ‘mechanical’ in the “Critique of the Teleological Power of Judgment” to contrast one area of physics with another. The term ‘dynamics’ is not used at all in the discussion of teleology and the one contrast between the mechanical and the dynamical in the “Critique of Aesthetic Judgment” (*CPJ* V 234.19–23) has nothing to do with the distinction in physics.

However, we could also interpret Kant’s distinction in the *Metaphysical Foundations* as intending a contrast between *internal* and *external* causal relations: dynamics deals with the generation of forces in matter and the constitution of bodies; mechanics on the other hand deals with the force-governed interactions *between* bodies. In this sense we could say that mechanism involves how one piece of matter exerts influence on another piece of matter. And insofar as the interacting bodies in mechanics constitute a material system, mechanism essentially involves the causal interactions of *parts* of a system. Thus, interpreting mechanistic causation as external causation might be seen to introduce a sort of implicit mereology into the causality of nature. A mechanical cause could be seen as an external cause, and insofar as we are dealing with objects in space, they consist of parts external to one another. This makes

laws of the action and reaction of matter, for otherwise a motion of the universe in empty space would arise” (*Refl.* *Metaph.* XVIII 320.12–16).—Even a disembodied mind would have to conform to the conservation of momentum. If the momentum of the world system is not conserved, then the center of gravity of the system must shift.

aspects of the third possibility of understanding mechanism look very similar to the compositionality problem involved in the fourth option to be discussed below.³

In the *Metaphysical Foundations* (IV 543.16 f.) Kant distinguishes between the proposition that every change has a cause and the proposition that every change has an *external cause*⁴ and in the “Introduction V” to the *CPJ* (V 181.15–20) he repeats this distinction characterizing the first proposition as *transcendental* and the second as *metaphysical*. This suggests at least the possibility of a distinction such that causality itself is a (transcendental) condition of the possibility of an object and *external causality* is metaphysically necessary for the causal relations of bodies in space. Thus *mechanism* could be seen as “the category of causality under conditions of corporeality” (Teufel 2011, 254). This mechanistic principle is, however, constitutive of external experience. We would still have to explain why the maxim of mechanism is merely regulative, since in the study of organisms we are dealing only with bodies—for which mechanism, so understood, is constitutive. Furthermore, if ‘mechanism’ denotes the external causality of the corporeal, it would seem to have to include the actions of embodied reason on bodies, that is, the causality of concepts, which is usually taken to distinguish artifacts from mechanical productions. In any case we need some serious clarification of the causal status of art and technique, which Kant seems to exclude from the realm of the mechanical.

4) Kant could also mean by mechanical explanation the kind of reductionistic explanation of wholes by their parts that he mentions in passing in the *Metaphysical Foundations* (IV 532.34 ff.): “The mode of explaining the specific variety of matters by the constitution and composition of their smallest parts, as machines, is the *mechanical natural philosophy*”. This view is also articulated at length in §77 of the *CPJ*.

I take it that the default setting for the meaning of ‘mechanism’ in its various forms in the *CPJ* should agree with that particular definition that comes closest to what the terms meant in eighteenth-century science—what Kant could expect his readers to think.⁵ And there is, I think, some consensus in the history of science that

³ See Breitenbach 2006 (implicit) and Teufel 2011 (explicit).

⁴ See Teufel 2011, 254. In this context, the introduction of inertia as a basic property of matter, Kant also indulges himself with a polemic against hylozoism similar to those found in the *CPJ*.

⁵ For a detailed discussion of the options in eighteenth-century science, Wolffian philosophy and Kant, see van den Berg 2011, 87–153.

the term has two basic meanings, which overlap in significant ways. ‘Mechanics’ in the sense of the ‘study of machines’ explains things by showing how they can be produced out of their parts. You can take a machine (material system) apart and reassemble it so that it performs the same tasks as the original machine (system). This is one sense of what was called the *analytic-synthetic method*. The other meaning of ‘mechanics’ has to do with the fundamental science of very small particles, which have very general or even universal (‘mechanical’) properties (or ‘qualities’ as they were called at the time). The particular objects of nature can be subsumed under the universal properties of these particles and manufactured out of them. *Analysis* in the sense of going from the particular to the general and *analysis* in the sense of separating a system into its parts are done at the same time. In §77 Kant says a number of things that make it plausible that this is what he, too, meant by mechanical explanation. Most clearly:

When we consider a material whole, in terms of its form, as a product of its parts and of their forces and faculties to combine on their own (presupposing other matter that the parts supply to one another), then we represent a mechanical kind of production of the whole (*CPJ V* 408.24–27).⁶

Many of Kant’s remarks suggest that he means by mechanism a specific kind of causal relation, namely the determination of a whole by its parts. On this reading ‘mechanism’ or ‘mechanistic explanation’ is basically a synonym for reductionism. And on this view the “Antinomy” of judgment characterizes a fundamental contradiction that defines the science of biology: the biologist accepts only reductionist (mechanistic) explanations as satisfactory explanations of the origin and workings of the organism. But she also accepts only basically holistic descriptions of the organism as phenomenally satisfactory. The contradiction with which the biologist is supposed to live is that the characterization of the system to be explained must be holistic, whereas the explanation of the system must be reductionist. That is, only a description that precludes explanation is acceptable. There seems to be a basic tension between what Kant called *Naturbeschreibung* and *Naturgeschichte*⁷. Kant’s solution

⁶ This passage could technically be read not as a definition of mechanism, but as merely stating that part-whole determination is one of possibly many forms of mechanism, see Teufel 2011, 255.

⁷ Kant contrasts “natural history” (*Naturgeschichte*), a causal historical discipline, with “natural description” (*Naturbeschreibung*), a primarily classificatory discipline, in a number of writings (most

to the antinomy is a sort of *modus movendi* for the working biologist, which ensures that the phenomenon is always adequately described and that explanations, even if they are relativized by ‘as-if’ qualifications, always have the correct reductionistic form—and of course should we one day achieve a mechanistic explanation of the organism, all these elements of science would still be valid because they are mechanistic.

If we read Kant this way, many of the things he says begin to make some sense. But the interpretation also gives rise a number of problems that I want to take up now.

2. Problems with Part-Whole Determination

First of all, although many good historical arguments could be made to the effect that this position is widespread and more or less self-evident in seventeenth- and eighteenth-century science and although we would be hard pressed to find someone important who did not subscribe to this mechanistic presupposition, nonetheless this is simply a contingent historical fact of the matter and does not provide a systematic philosophical argument—and especially not a compelling argument immanent to Kant’s system. This is one formulation of a widespread misgiving about the interpretation suggested in McLaughlin (1990).⁸ Kant’s published writings give no hint of an *argument* as to why reductionistic explanation should be binding, or absolutely necessary for us and should thus force us to reject holism out of hand.

Secondly, although in §77 Kant characterizes the *discursive* nature of our understanding by the fact that it explains wholes by their parts, not parts by their wholes, he seems nowhere else in the book to adhere to this definition of discursivity—not even in those passages of §77 immediately preceding the part-whole commitment, where he characterizes our discursive understanding in the usual way: simply as being bound by concepts. We would have to come up with an argument as to why the fact that our understanding needs judgment to apply concepts to the

importantly *Races*, II 435.34) associating natural history with Buffon and natural description with Linnaeus.

⁸ From the original referee for Oxford University Press down to the work of most of the authors in this volume, no one has ever liked the interpretation that Kant is just making the method of modern science epistemically binding. Even McLaughlin (1990, 171–76), who takes this interpretation to be the best available, does not really like it.

manifold apprehended by intuition, forces us to explain wholes by their parts (without necessarily forcing phenomenal wholes to be determined by their parts).

Thirdly, it can be argued (see Teufel 2011, 253) that the conceptualization of compositionality, or the part-whole relation, as a kind of *causality* is metaphysically and logically objectionable. Mereology is not a causal discipline but a logical one. To the extent that Kant does in fact interpret the part-whole relation as causal, he has conflated a purely formal constitution relation with a kind of causation. In any case (according to this argument) compositionality is a constraint on causation insofar as it applies to bodies in space; it is not itself a causal relation. On this view we would, however, have to distinguish between mechanism as (metaphysically—not transcendently) constitutive of empirical bodies and mechanism as a merely regulative maxim for research.

These three objections accept that part-whole relations are involved in mechanism but question whether they involve a special *kind* of causality, whether they really define our understanding as ‘discursive’, or whether their ‘necessity’ has more than contingent historical import.

In a fourth objection, Ginsborg (2004, 44) has rejected the very proposition that part-whole relations are essential to the notion of mechanism, pointing out that it is not just organisms that “cannot be judged to be possible according to merely mechanical laws” (*CPJ V* 387.4 f.). Machines, too, are mechanistically unexplainable. She argues further that Kant’s most explicit characterization of mechanistic explanation as part-whole determinism (§77 cited above, *V* 408.24–27) does not actually apply to machines—the properties and interactions of a machine’s parts alone are insufficient to explain the production of the machine. Ginsborg (2004, 44) takes the “contingent unity” of the organism (and the machine) to characterize an aspect of the explanatory failure of mechanism that organisms have in common with machines. Thus, the fact that organisms are not explainable by merely mechanical laws does not even distinguish them from machines. Organisms do differ from machines, but this (second) kind of mechanical inexplicability is not (she believes) that involved in the antinomy: “this means that—*unless implausibly the need for teleology in the two cases stems from quite different sources*—it cannot be the non-machinelike character of organisms which makes them mechanically inexplicable” (Ginsborg 2004, 37; my italics). If I understand this right, I take the “implausible” position: the teleology involved in a machine postulates an idea or representation (formal cause) to explain

the system because the properties and interactions of the parts are not sufficient to produce the whole, but this idea or ideal cause is nonetheless a ‘real ground’ (*Realgrund*) of the machine; the teleology of the organism, on the other hand, involves the idea of the whole, not as a *cause* but as a “ground of cognition [*Erkenntnisgrund*] of the systematic unity of the form and the combination of all of the manifold” (V 373.23) because we would otherwise have to view the functioning of an organism to involve holistic causal relations.

Ginsborg has thus pointed out that there are two quite different ways in which mechanical laws can fail to determine a system completely: in artifacts and in organisms. Let me explicate in my own words:

Artifacts involve some kind of mental causation—that is, physical causation in some way guided by a concept. (There is a formal cause or blueprint. But this is all compatible with the arguments of the “Third Antinomy”.)

Organisms involve a form of causation that bears no analogy to any other form of causality that we know of (reciprocal production of the parts/holism).

Clearly Ginsborg is right that the significant difference between an organism and a machine lies neither in the mere fact of the contingent unity of the system nor in the need for a formal or final cause to explain its production, but rather in the peculiar kind of *efficient* causality (*CPJ* V 375.5 ff.) seen in the organism—which I have been referring to as holism—and which Kant wants to avoid having to acknowledge as a real causal dependency of the parts on the whole. The answer, I think, is: machines are mechanically inexplicable because they involve a form of concept-mediated causality; and this kind of causality is (purportedly) compatible with scientific naturalism as long as there is an embodied mind that has the concepts and acts on them. Organisms, on the other hand, seem to involve a causality *sui generis* that we cannot recognize as *real*; and our only alternative is therefore to treat them as if they were machines and as if at least one aspect their causality were ideal—knowing full well that the idea of the whole is not the cause or real ground of the organism, but merely a *ground of cognition* or “marker” (*Logic* IX 58.9–60.37) that indicates that we are dealing with a natural purpose.

Let me introduce some qualifications to Ginsborg’s objections, which will also address (and at least partly answer) the other objections. Then I will try to supply a

sort of Kantian argument for the necessity of part-whole determinism. Both are offered in the spirit of theses for discussion. I do not think the issue is easily settled.

Kant notes that the “inner natural perfection” of a natural purpose that leads us to call them organisms bears “no analogy to any physical, i.e., natural power known to us; indeed—since we ourselves belong to nature in the widest sense—not even a precisely appropriate analogy with human art” (*CPJ* V 375.13–16). Nonetheless, the fact that human agents act in the material world and instantiate causes that depend on or take account of a concept does not present a metaphysical problem for Kant (at least not in the *CPJ*): human actions are all part of the natural world. And in the *MM* (VI 418.14–18) with the distinction between *homo noumenon* and *homo phaenomenon* Kant reaffirms the notion that human reason can in some sense be a natural cause. Just how the idea of an artifact manages to be part of the efficient cause of that artifact’s production is left unexplained. But it is clear that Kant sees no violation of the principle of the “Second Analogy” or of the conservation of force in the world system in the fact that humans—or bees and beavers for that matter—make things that are otherwise underdetermined by the laws of nature. Thus, although machines are mechanically unexplainable, they present no special metaphysical or epistemological problem for Kant, since they are purposes (not products of nature), and the understanding that has these purposes can even tell us what they are. The mechanical inexplicability of artifacts (their contingent unity) cannot be the kind of inexplicability that leads to the antinomy. As mentioned earlier, in the *Theory of Heavens* Kant maintained that the origin of organisms on various planets seemed to be unexplainable by mechanical laws, but he seems to have assumed it somehow happened in the course of nature—that is, without mobilizing reason as part of the explanation. Thus the contingent unity of products of nature must be different from that of artifacts.

3. What is the Peculiarity of our Understanding that Makes us Mechanists?

The best argument for the assertion that Kant means part-whole determinism when he says ‘mechanism’ would be to show that the peculiar structure of our intellect, which uses intuitions and concepts, necessitates a certain part-whole determinism and makes it binding for us—we cannot do otherwise—but is not constitutive of the objects of

experience. That is, we should strive for something more than a merely historical argument to the effect that this was a widespread phenomenon at the end of the eighteenth century and could be taken as binding scientific method. There seem to be three options for a reconstruction: (1) We might in an interpretation of the appendix to the “Transcendental Dialectic” try to construct a parallel between the transcendental presupposition of unity or specification of empirical laws and some kind of presupposition involved in the experience of organisms. I see no promising avenues there and will not pursue this option. (2) On the other hand we could argue that the specifically *spatial* character of the part-whole relation in bodies makes mechanism not a transcendental condition of experience but a necessary principle that in some (to be specified) sense, while not constitutive of experience, is nonetheless binding—and still has some reasonable connection to reflective judgment. I shall explore this possibility in some detail, since it looks for a solution in the relation of understanding to intuition. (3) A third possibility is suggested by some scattered (unpublished) remarks by Kant about the essentially compositional nature of the understanding itself—with no appeal to spatial intuition.

Taking up the *second* possibility: in §§76 of the *CPJ* Kant explains that the peculiar structure of our cognitive faculties has serious consequences for the world of appearances. If we human agents were not so constituted that we separate understanding and intuition, we would not (in theoretical reason) have the distinction between the possible and the actual. Nor would we (in practical reason) have the distinction between what ought to be and what is. Finally, if our understanding were not such that it must go from the general to the particular, we would not have to make a distinction between the *mechanism* and the *technique* of nature when considering particular empirical laws and unifying them in a system of empirical laws of nature. Thus, Kant concludes at the opening of §77 that since the peculiar structure of our cognitive faculty in regard to theoretical understanding, practical reason, and determinate judgment has such far-reaching consequences, we should not be surprised if reflective judgment, too, were also subject to the consequences of these peculiarities.

Just like the distinction between possibility and necessity, just like the distinction between *ought* and *is* and just like the transcendental presupposition that nature is orderly, the concept of natural purpose, too, according to Kant is only possible due to a “peculiarity” of our understanding—apparently a peculiarity at least

similar to that above. However, in the case of a natural purpose the source of our difficulties is an actual object of experience: a real organism. This makes the problem quite different from those problems dealt with in §76:¹⁰ the peculiarity in this new case is not constitutive of experience (theoretical reason) nor of the possibility of realizing *ought* in *is* (practical reason) nor is it a transcendental presupposition of empirical research. It is occasioned by the experience of particular entities; that is determining judgment and the understanding have already constructed an object of experience out of the sensible manifold, but this object somehow bothers us.

Our understanding, says Kant, is characterized in its relation to judgment by a contingency of what diverse particular objects may be given in nature and then have to be subsumed under concepts. In constructing perceptions out of the sensible manifold, the understanding is dependent on what is contingently given to empirical intuition. And since our sensibility or intuition is passive or receptive, it must take what happens to come to it. We can however, says Kant, imagine a non-receptive—a spontaneous—kind of intuition. Now, because an intuition that is spontaneous would (by definition) be a kind of understanding, this comparison allows us (in a somewhat abstract way) to imagine a non-discursive, that is, non-conceptual spontaneity or understanding—at least by negation. Once we have an idea or a ‘non-idea’ of such an alternative understanding (a spontaneous intuition), we can ask how this ‘understanding’ (which apparently still has to go from the universal to the particular—and, I insist, is *finite*¹¹) would relate to judgment—a relation which for us is a constant

¹⁰ In §76 Kant gives three examples illustrating the peculiar relation of intuition and understanding in theoretical reason, practical reason and judgment. The problems associated with those peculiarities in the first two examples are resolved by the distinction between appearances and things in themselves. The third example is quite rudimentary and does not obviously appeal to this distinction or deal in any way with the subjective purposiveness of aesthetic judgment. It can be read as dealing with regulative principles on the unity of nature as a whole or as a misplaced preliminary to the discussion of the teleology of the organism in §77.

¹¹ The purpose of introducing a negatively characterized alternative understanding is to teach us something about the peculiarity of our understanding that makes us mechanists or reductionists. If the alternative “intuitive” understanding is not just holistic but also infinite, its lack of difficulty with the explanation of organisms can be due either to its non-discursive character or to its infinitude; this would tell us very little. The figure of argument itself only makes sense if just one property ascription is being negated.

source of contingency. For this other understanding, however, the particular is fully determined by the universal. But how is the universal, given in intuition to this new and intuitive understanding, actually given? Unfortunately this primarily negatively characterized understanding only illuminates our own understanding if we know exactly what aspect of our understanding is being negated. Thus we need first to look at the positive characterization of our understanding in the *CPR*.

The logical places to look are the “Deduction”, where the notion of a “peculiarity of our understanding” is first brought up (*CPR* B 145), and the “Second Antinomy”, in which the *conditions* of a body are self-evidently characterized as the *parts* of the body and the *regress* in the series of conditions is presented as the division of a whole into preexisting parts. Let’s see how far we can get in reconstructing a Kantian line of thought that explicates the part-whole relation:

We go out and perceive a sandy beach, a house, and a blade of grass. When we transform the empirical intuitions of these things into perceptions, we do this based on the *necessary unity* of space, and we, so to speak, sketch the shape of the object in accord with this synthetic unity in space. In Kant’s words (in the “Deduction”):

Thus if, e.g. I make the empirical intuition of a house into perception through apprehension of its manifold, my ground is the *necessary unity* of space and of outer sensible intuition in general, and I as it were draw its shape in agreement with the synthetic unity of the manifold in space (*CPR* B 162).

For perception the objects need only have (necessary) spatial unity; that’s enough unity to become an appearance. Determinate judgment can then provide for a physically necessary unity by adducing empirical laws for the sandy beach and

Kant admittedly (e.g., XXVIII 1017.5; 1111.26; 1214.33; 1219.11) often characterizes God’s understanding as “intuitive” (as opposed to discursive), but he does not seem to assert the converse: that an intuitive understanding has to be divine. In this section of the *CPJ* Kant distinguishes clearly between the quantitative and qualitative aspects of our understanding: the “limits” [*Schranken*] and the “constitution” or “character” [*Beschaffenheit* or *Eigentümlichkeit*] of our understanding (V 395.14f; 398.7f; 400.34). A few lines later (V 409.34 ff.) Kant is explicit that a different (but finite) understanding also cannot explain the organism so long as it is *qualitatively* similar to ours: “and absolutely no human reason (or even any finite reason that is similar to ours in quality, no matter how much it exceeds it in degree) can ever hope to understand the generation of even a little blade of grass from merely mechanical causes.” On the other hand, a qualitatively different understanding (even if it is finite) need not have problems with the organism.

purposes in the mind of an artisan (plus empirical laws) for the house. In the first case empirical laws that govern the behavior of the parts lead them to produce the whole beach (I give you a differential equation for the center of mass of each sand corn); in the second case (the house) these laws are insufficient and must be constrained by an idea or concept of the house as a whole in the mind of an artisan (an embodied mind). But in the case of the grass blade, judgment (in its determining form) fails at its task and begins to reflect on what it should do in this case, because the physical unity of the object remains contingent (only the spatial unity is necessary). As Kant noted in §61 of *CPJ* (V 360.15 ff.) discussing the anatomy of a bird, the *same* parts could easily have been arranged differently into a *different* whole. The production of the whole is not completely determined by the properties and interactions of the parts, and there is no natural understanding or embodied reason in sight to provide the missing determination.

In the resolution to the “Second Antinomy” Kant confirms the merely spatial unity of perceptions, telling us that while an object of experience is given as a whole to our understanding, it is given only as a *quantum continuum* (*CPR* B 554), all the parts of which are given in the *intuition* of the whole. But as discrete entities, the parts are given to the understanding only to the extent that the whole has been analyzed by the understanding into its parts. As a whole, an object of experience possesses at first only spatial unity: it can be divided into parts *in infinitum* because it is extended in space—without, however, being composed of infinitely many parts. The notion of the composition of a whole out of the parts is presupposed in many such passages but scarcely explicated or even discussed by Kant.¹²

For Kant’s newly invented intuitive (non-conceptual) understanding, on the other hand, a composite would presumably be given as a *quantum discretum*, all of whose parts are determined by the given whole. In this understanding the particular is completely determined by the general: there is no contingency in the relation of judgment to understanding. Thus it is possible that this other kind of understanding might experience no contingency in the relation of understanding to judgment when

¹² In the “Third Analogy”, where an explication of composition would have been appropriate, Kant is so busy with the question of interaction that he barely mentions composition and fails to say anything significant about it. In a letter to Beck (July 1, 1794) he remarks, that on reading over his own explanation of composition he does not understand himself: “I notice as I am writing this down, that I do not even entirely understand myself” (*Correspondence* XI 515.30f).

dealing with particular already-given objects. We have to explain given objects mechanistically or reductionistically (or to specify their physical unity by constructing them from their parts), but we cannot determine the particular by the universal and must allow for contingency there. But there is contingency only because (due to our peculiarity) we have to perceive the whole at first as a merely spatial unity or *quantum continuum*. The intuitive understanding, on the other hand, starts not with a merely spatial unity but with a physical unity and thus experiences neither contingency nor a need for teleological judgments.

Imagine that such an intuitive understanding confronts a complex system: just as a space is not determined by its subspaces, but is rather limited and determined by the space that encloses it (space is not a *compositum* but a *totum*, *CPR* B 554), so too, this intuitive understanding would go from a given whole to its parts. But since this understanding does not experience any contingency of the particular with respect to the general, the parts would be determined by the intuited whole. Whereas, for our understanding, the same parts could make up different wholes and the same whole as a *quantum continuum* could be divided up into different parts, for this intuitive understanding the same whole must determine the division into the same parts.

So what would Kant really get here, if this somewhat tentative reconstruction reflects what he might have meant? At least an analogy between the relation of mechanism to contingency and the relation of holism to necessity: as Kant noted in §61, discussing the anatomy of a bird, the *same* parts could easily have been arranged differently into a *different* whole (*CPJ* V 360.15 ff.). However the *same* whole can only be separated into *different* sets of parts as a *quantum continuum*; as *quanta discreta* only different wholes can be separated into different (discrete) parts. It is at least possible to interpret Kant's seemingly arbitrary commitment to part-whole determinism as coherent with the dependency of our understanding on spatial intuition and with the understanding's need for judgment in order to get from the general to the particular. The relation of our understanding to judgment has a peculiar characteristic: judgment's particular is not determined by or derivable from the understanding's general concept. Nonetheless, the particular is supposed to conform to and be subsumable under the general. It would seem to be contingent (good luck) that it works out so well. Kant then asserts that in order to conceive that this conformity of a natural object to our faculty of judgment is even possible, we have to imagine a different understanding, for whom the conformity of natural laws to its

power of judgment is necessary. For this understanding the parts are not given to intuition with the whole (as *quanta continua*), but rather (as *quanta discreta*) only given as a task in an indefinite progressus.

This briefly sketched approach to deriving the non-constitutive but nonetheless binding character of the part-whole relation from the relation of the understanding to spatial intuition is not overwhelmingly convincing. There is just too little material to work with, so that it is impossible to pin Kant down on any one position: something related to spatial intuition might by way of perception commit us to some form of mereology. But these texts only support the assertion that there is some evidence that Kant might have been thinking in this direction.

The *third* possible solution to our problem can be found in some of Kant's (unpublished) later work, in which he takes an entirely different direction on the part-whole relation. In the *Progress*, written a few years after the *CPJ*, for instance, Kant seems to be contradicting the main thrust of the famous §76 of the *CPJ*, which focuses on the relation of intuition and understanding, by insisting that composition does not belong to the receptivity of intuition at all, but rather only to the spontaneity of the understanding: *it is a concept a priori*. Not one of the categories, it is unique among the a priori concepts, in as much as it is “the only basic concept [*Grundbegriff*], that in the understanding originally underlies all concepts of sensible objects” (*Progress* XX 271.19 ff.; cf. XX 275.34–276.8). This includes not just spatial composition, but also temporal. If mereology is originally involved in all empirical concepts, this would seem to make the compositionality relation a conceptual issue not a causal one—contrary to Kant's tendency in the *CPJ*.¹³ In *Progress* Kant asks:

Whence do sensible objects acquire the connection [*Zusammenhang*] and regularity of their coexistence so that it is possible for the understanding to bring them under general laws and discover their unity according to principles (*Progress* XX 276.28 ff.)?

Such passages indicate that Kant later explored other interpretations of compositionality, that do not recur to the relation of understanding to intuition, but rather to the nature of the understanding itself. He seems to have been looking for a different way to give the part-whole relation a special status, so that reflective

¹³ This would seem to support at least the purely systematic part of the argument proposed by Teufel 2011, 253–4.

judgment could use the notion of composition to construct the unity of empirical objects:

All representations which constitute an experience can be assigned to sensibility, with one solitary exception, namely that of the composite, as such. [...] [Composition] belongs, not to the receptive nature of sensibility, but to the spontaneity of the understanding, as an a priori concept (*Progress* XX 275.36–276.2).

Furthermore, such a conceptualization of compositionality would allow us to explain retrospectively why Kant thinks that our specifically *discursive* understanding, precisely because it is bound by concepts, is also essentially committed to part-whole determinism. But this would also give us more than we want, since, if composition is an a priori concept that underlies all empirical concepts, then all bodies (organisms included) would be *constitutively* mechanistically (compositionally) determined; and the appearance of a Newton of the blade of grass (V 400.18f) would not be an absurdity, but rather almost inevitable. After all, under this assumption organisms (like all objects of experience) are in fact compositionally determined mechanisms.

4. Can Mechanism be Necessary and Still be Merely Regulative?

Our point of departure was the question of how the interpretation of ‘mechanism’ in the *CPJ* as referring primarily to the part-whole determinism of causal relations can be both a necessary and a regulative principle, how it can be binding for our cognitive activities but not constitutive of the objects of experience. If ‘mechanism’ simply refers to reductionistic explanation as practiced in science since the seventeenth century, it seems to be too historically contingent to deserve to be characterized as *necessary*. On the other hand, any attempt to make part-whole determination more than historically contingent as the method of modern science tends to make it constitutive of experience. The results of the considerations reviewed in the past three sections (see also Watkins 2009) seem to reinforce the dilemma: Kant does not provide the resources needed to argue that the purported peculiarity of our understanding is genuinely necessary *and* merely regulative.

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