KANT'S CRITIQUE OF TELEOLOGY IN BIOLOGICAL EXPLANATION

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Abbreviations

Ak	Kant: *Gesammelte Schriften* ("Akademie" edition)
AT	*Oeuvres de Descartes* (ed. by Adam and Tannery)
CJ	Kant: *Critique of Judgment* (transl. by Pluhar)
CPR	Kant: *Critique of Pure Reason* transl. by Kemp Smith)
GM	Leibniz: *Mathematische Schriften* (ed. by Gerhardt)
GP	Leibniz; *Philosophische Schriften* (ed. by Gerhardt)
PPL	Leibniz: *Philosophical Papers and Letters* (ed. by Loemker)
W	Kant: *Studienausgabe* (ed. by Weischedel)

Kant's texts are cited wherever possible according to the six volume *Studienausgabe* by Wilhelm Weischedel; otherwise according to the *Gesammelte Schriften* ("Akademieausgabe"). The *Critique of Pure Reason* is cited in Kemp Smith's translation with the page numbers of the original first and second edition (A and B); the *Critique of Judgment* is cited in Pluhar's translation with the page numbers of both the second original edition (B) and of the translation (CJ). The *Prolegomena* and the *Metaphysical Foundation of Natural Science* are cited in Ellington's translation On occasion I have amended these translations to make them more literal or to show better the logical structure of the German. Such passages are marked with an asterisk (*), e.g., B*97. Other translations of Kant are my own. Emphasis in Kant citations is Kant's unless otherwise indicated.

To My Parents
M.M.M. and P.O.M.

Introduction

The study presented here deals with an example of the interconnections between philosophy and the history of science. Kant's "Critique of Teleological Judgment" will be read as a reflection on philosophical, in particular, methodological problems that arose through the constitution of an independent science of life, biology. Kant's reflections are of course determined by the particular, historically contingent form taken by the newly established biology of his time, but it is not the purpose of this study to sketch these contingencies. On the contrary, the point is to isolate in this historically contingent form the systematic and today still valid insights of Kant into difficulties in principle of biological explanation. The consideration of the biology of the 18th century is not intended to relativize Kant's philosophy nor to excuse purported 'mistakes' by referring them to the state of scientific knowledge at the time. Rather, the point is first to reconstruct the actual explanatory problems of biology at its origin in order to investigate the extent to which Kant recognized and analyzed structural problems of biological science and the extent to which his results can still claim validity.

The question of whether the scientific explanation of the organism differs in principle from the kind of explanations given in physics and chemistry is not a question which philosophers have forced upon biology; rather it is a question that arose out of biology and confronts philosophy. The history of modern biology since Descartes can be told as a continual conflict between those who reduce life to physico-chemical processes (or biology to chemistry and physics) and those who for various reasons consider such a reduction impossible or improbable. Those of the first group are usually called mechanists or reductionists; the second group has had many names: animism, vitalism, neovitalism, holism, etc; almost every new generation of anti-mechanists has given itself a different name, and rightly so since the common denominator is in

fact the rejection of mechanism and reductionism not any particular positive doctrine. The question of the special status of the organism was already taken up in the great mechanistic systems of the 17th century and is still discussed under the heading of "reductionism" or "emergence" in general textbooks of the philosophy of science. Historically, it is mechanism that has always prevailed as a scientific approach; or in other words, it is anti-mechanism that has had to regroup and renew itself every generation: but it has always done so.

Mechanism has always won out in biology because it is able to generate a clear and definite research program. In fact mechanism is nothing else but the metaphysical hypostasis of an analytical method which is unquestionably part of the repertoire of every biologist – including the anti-mechanists. This method, reduction or analysis, prescribes that phenomena are to be traced back to the properties and interactions of the parts of the system. If subsequently the original phenomenon can be produced experimentally to a sufficient degree of approximation, then it has successfully been explained. The opponents of mechanism among natural scientists seldom doubt that a successful reduction is a sufficient explanation but rather only that such a reduction is possible in a particular case or kind of case. From mechanism a concrete research program emerges, namely precisely the program that mechanism projects onto the structure of being. However, from the negation of this projection there emerges no substantially different program of research; thus the neo-vitalists and holists of this century are scarcely to be distinguished from their opponents in their experimental technique. The differences lie in the goals pursued and inferences drawn, not in the means applied.

Philosophers of various schools have participated with or without invitation in this conflict and have taken one side or the other, supporting them with philosophical arguments. They have attacked the inability of mechanism to understand the organism or condemned the sterility of vitalism. Some few have analyzed the quarrel itself; among these Kant stands out.

In one of the standard textbooks on philosophy of science Ernst Nagel's *The Structure of Science*, which takes the side of reductionism, two problem complexes are taken up, which are thought to cause some difficulties for reductionism: the prima facie purposiveness of life processes and the apparent impossibility of

comprehending an organic whole as an additive system of independent parts (pp. 409f). In the "Critique of Teleological Judgment" Kant offers a solution that traces both problems back to the same structural peculiarity of mechanistic explanation. Kant is concerned not with the question of whether mechanism or vitalism (which arose in his lifetime) is right in biology but rather with the question of whether reductionism (which he considers to be the only scientific method) when applied to the organism displays a structural flaw that again and again necessitates teleological additions. He sees in the conflict between mechanism and anti-mechanism the same kind of antithetical opposition that he had analyzed in the 'Antinomies' chapter of the *Critique of Pure Reason*, in which each side looks strong only as long as it is attacking the other.

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Any new interpretation of Kant's philosophy inevitably takes up a position *vis à vis* the manifold approaches and traditions of interpretation. The discussion of these various approaches and the justification of my own approach do not belong in the introduction, but I would like at the start at least to indicate which traditions I have found helpful. As for my own approach, it can only be justified in practice: by providing an interpretation of the text that is historically and philologically sound and philosophically convincing. My claim at least is to have provided such an interpretation of the "Critique of Teleological Judgment" for the first time.

In view of the announced intention to read Kant's critique of teleology as philosophy of biology, it will come as no surprise that the tradition of Kant interpretation to which I am closest is one that sees Kant primarily as the philosopher of modern science. This kind of interpretation is most closely associated with the German Neo-Kantians, in particular, Erich Adickes and Ernst Cassirer; and this is the interpretation that I consider to be right enough to be worth criticizing in detail.

This book represents an attempt to learn something from Kant about the structure of biological explanation. The "Critique of Teleological Judgment," which is the second part of the *Critique of Judgment* and could perhaps best be seen as a fourth 'Critique', is

almost exclusively concerned with the use of teleological principles in biological explanation. Kant pursues systematically the question of the extent to which the mechanistic mode of explanation itself constantly forces the introduction of teleological principles into science. Teleology, in the form of the plan of the clock-maker deity, accompanied modern science from the beginning. The clock-work world presupposed a clock-maker God who anticipated the world system in thought. Those who doubted that the particles of matter in motion would have produced precisely this particular world of their own accord could take refuge in the teleology of the divine plan as a supplement to mechanism that was nonetheless completely in conformity with mechanism. Kant's 'Critique' is concerned with determining the boundaries of the necessity and legitimacy of this kind of teleology in biology.

Kant's 'Critique' will be reconstructed in three steps each of which will constitute a chapter of this book: The first chapter will present some basic problems of biological explanation in the historical form they took in Kant's time and as Kant took them up in his philosophy. Chapter Two analyzes Kants most important conceptual instrument for solving such fundamental problems: the argumentational figure of the antinomy, as developed in the *Critique of Pure Reason*. The third chapter traces Kant's application of this instrument to explicate the mechanistic concept of the organism. It will attempt to interpret Kant's critique of biological explanation as an intelligible and at least initially plausible theoretical structure that 1) takes up real problems of the science of the time, 2) can provide systematically interesting insights into certain aspects of the problems that are of more than just historical interest, and 3) is more compatible with the text and with other major writings of Kant's than are the available attempts at an interpretation.

In the first section of Chapter 1, I shall sketch some of the basic outlines of the theory of the organism in the 18th century. This is not intended merely as historical background to Kant's reflections; rather, the point is to present the concrete problems that arose for mechanistic biology in the attempt to explain certain aspects of the organism and to show that Kant recognized and reflected upon precisely these problems. In the second section I shall sketch Kant's development from the pre-critical direct speculation about the nature of the organism to the later reflexions on the nature of our *explanations* of the organism and shall introduce some of the

concepts that Kant used to treat the particular philosophical problems of biology. Finally I shall take up the central methodological problem that Kant saw in mechanistic biology and which he attempted to clarify in the Analytic of teleological judgment. The focus will be on the analysis of the notions of "objective purposiveness" and "natural purpose," with which Kant tried to conceptualize the problem.

The epistemological problem posed by biology having been presented in Chapter 1, I shall in Chapter 2 examine one of Kant's philosophical instruments for resolving such problems in general, the figure of argument called the "antinomy." The logical structure of antinomy arguments as presented in the *Critique of Pure Reason* will be analyzed. The emphasis will lie on the relation of the opposition of judgments (thesis and antithesis) to the table of forms of judgment at the beginning of the first *Critique* and on the use of indirect proof. Then in the third section, I shall attempt to clarify two central concepts used in the material argumentation of the cosmological antinomies, namely, the "unconditioned" and the "infinite series," so that the substance of the argument can be understood. The fourth and fifth sections will take up the Second and Third Antinomies respectively (division of matter and freedom *vs* determinism). The Second Antinomy is important for reasons of content (the Third for formal reasons) for an understanding of the "Critique of Teleological Judgment," because some problems in connection with the relation of part to whole that remain unclarified in the *Critique of Pure Reason* resurface in the later work. At the end of the chapter I shall deal briefly with Kant's system of antinomies in order to indicate some peculiarities of the status of an antinomy of *judgment*.

The third and last chapter is a sustained analysis of the antinomy of judgment that comprises the entire Dialectic of Teleological Judgment. The antinomy will be presented and its structure clarified. I shall then take up the most important approaches to interpreting the text and show that they share a common (false) presupposition. Based on the analysis of the material problem given in Chapter 1 and of the figure of argument given in Chapter 2, a new interpretation of the antinomy of judgment and its resolution will be developed. The resolution to the antinomy offers a solution to the insufficiency of mechanistic explanation that is still compatible with mechanism. It will be shown that Kant holds fast to mechanistic

reductionism as the only legitimate kind of explanation in science, but inasmuch as he acknowledges its weak points in the explanation of the organism, he establishes standards to be met by any possible future mechanistic explanation of the organism.

Chapter 1
Kant and Biology

1.1 Introduction

In the 1740's and 50's as Kant began seriously to reflect on the nature of the organism and the structure of biological explanation, the scientific discussion in physiology and natural history was strongly marked by the decline of the theory of preformation, the classical mechanistic theory of the organism. In this period, too, we find the development of a general concept of the self-reproduction of organic systems, which led in the course of the 18th century to the rise of vitalism. Kant analyzed and reflected methodologically upon this process. He attempted with the concept of "objective purposiveness" to connect this new concept of reproduction with the traditional question of teleology in nature, in order to make possible a concept of the organism adequate to the methods of mechanistic science.

In this chapter I shall present Kant's analysis of the concept of objective purposiveness in biological explanation as well as the historical prerequisites of this analysis in the development of the theory of the organism in eighteenth century biology and in Kant's own philosophical development. In Section 1.2 I shall briefly characterize the development of the mechanistic explanation of the organism. In Section 1.3 I shall take up Kant's study of contemporary theories of the organism, especially his use of the concept of purposiveness in biological explanation. Section 1.4 will consider Kant's analysis of *objective* purpose. In this analysis Kant completes the transition from the scientific investigation of the organism itself to the philosophical analysis of our explanations of the organism. It

will be seen that it is the concept of the organism as a self-reproducing system that makes it meaningful to speak of an objective purposiveness.

1.2 The Theory of the Organism in the Mid 18th Century

In this section I shall sketch some of the basic characteristics of the theory of the organism as it developed in the 18th century. I shall not attempt to provide a comprehensive analysis of biology in the Enlightenment but only to report some of the results of such an analysis. Primary sources will be cited only where they are directly quoted. A detailed analysis of the biological theories of this period can be found in Jacques Roger's *Les sciences de la vie dans la pensée française du xviiie siècle* (1959). A perceptive reflection on these developments is provided by François Jacob's *The Logic of Life. A History of Heredity* (1974). Arguments and sources for the particular interpretation of theory development given here can be found in my own work cited in the bibliography.[1]

Around 1750 the original intergrating mechanistic theory, the theory of preformation, could scarcely be upheld any more, although an adequate replacement theory had not yet been found. After the only moderately successful attempts (e.g. Buffon, Maupertuis, Lamettrie) to revive the atomistic pangenesis theories of the 17th century, there arose in the course of the latter 18th century a number of theories that introduced special organic forces and justified them by appealing to an analogy with Newtonian gravitation. These theories are today collected under the heading of vitalism. In spite of all differences in their explanations of the organism, preformation and vitalism shared a strictly reductionistic ideal of explanation. Both used reductionist methods, but both also postulated an autonomous explanatory level for the organism. Both reduced the phenomena of a system to the properties and interactions of the parts but denied that those properties and interactions postulated by the science of mechanics were sufficient for the explanation of the organism. Both conceived of the organism as underdetermined by the

1 Cf. also Cole, *Early Theories*; Mendelsohn, "Philosophical Biology"; Needham, *History*; Roe, *Matter*.

mechanical properties of particles: they differed in the way they compensated for the lack of determination. In the following I shall first characterize the theory of preformation, then adduce some reasons for its decline, and finally introduce the peculiar form of Newtonianism in biology known as vitalism.

Mechanism and Preformation

The classical theory of preformation, also known as the doctrine of pre-existing germs or of evolution (*développement*) or encasement (*emboîtment, Einschachtelung*), was the deistic theory of generation *par excellence*. In the mechanistic theories of the latter 17th century, the phenomena displayed by an organism were considered to be the necessary results of the properties and disposition of the parts, just as the movement of the hands or figures of a clock were the necessary results of the movements of its wheels, balances, and weights. This was the basic principle of the "mechanical philosophy." But how did it happen that the organism has just these parts and just this disposition of parts? Or, as it has been expressed since the end of the 17th century, how did it come to have this *organization*? The functioning of the organism could be explained by its structure, which could in turn be investigated by anatomical dissection; but the fundamental theoretical question that had to be posed dealt with the *origin* of this organization. One of the fundamental problems that the new mechanistic sciences had to solve was that of explaining how the basic forms of organization of the various living creatures could have arisen through the universal laws of matter in motion. As Descartes explained to his interviewer Burman:[2]

> Although he [had] only wanted to explain the functions of the animal, he saw that he could hardly do this without being compelled to explain the conformation of the animal from the very beginning [*ab ovo*].

The question to be posed was not *whether* a plant or an animal is a machine. Rather the question was: assuming organisms are machines, how did they acquire their structure or organization? Descartes was also only expressing the mechanistic consensus

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2 Descartes, "Conversation with Burman," pp. 68-9, AT V, 171.

when he further specified that the entire heterogeneity of the developed organic body must be completely and materially represented in the germ. The manner of representation postulated a direct correlation between part of the body and particle of the germ:[3]

> If one *knew* exactly in detail all the parts of the seed of a particular species of animal, for instance Man, one *could* deduce from that alone for reasons entirely mathematical and certain, the whole figure and conformation of each of its parts, just as the other way around *knowing* some particulars of this conformation one *can* deduce from this what the seed is.

Furthermore, it was generally implicitly presupposed that the arrangement of the particles in the germ also reflected the arrangement of the parts in the body, so that the germ contained a miniature copy of the entire body, somewhat like a reflection in a convex mirror. The fundamental question to be answered was thus: How are the germs organized? How do the particles of matter in motion come to produce such a complicated structure? How does the organism manage to reproduce its kind and always to produce another individual of the same species? The first mechanistic attempts at explanation tended to be eclectic mixtures of traditional, usually Galenic, theorems and corpuscular philosophical notions; but even Aristotelian elements could be remodelled mechanistically. For instance, Nathaniel Highmore (1651) explained generation not through an Aristotelian cooperation of form and matter but rather through the interaction of formal and material atoms.[4] A preliminary synthesis was reached towards the end of the 17th century in the theory of preformed or pre-existing germs.

The mechanistic theory of the organism was not an autonomous, isolated or isolatable theorem; it was an integral part of a comprehensive explanation of the material world. The organism occupied a particular position within a system of nature that explained not only the fundamental properties of the smallest (known) parts of matter but also the shape of the largest (known) systems of celestial bodies. From Descartes' *Principia Philosophiae* to Buffon's *Histoire naturelle* and even to Lamarck's final synthesis, the great deistic systems of modern science explained the organism within the framework of an aggregate theory of nature. But the organism nonetheless always received a special status within the system and

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3 Descartes, *La Description du corps humain*, AT XI, 277 (emphasis PM); cf. also Boyle "Forms and Qualities," *Works* III, 29ff.

4 Highmore, *History of Generation*, p. 27-8

was often mentioned in the same breath with the system of the world itself — especially by natural philosophers who doubted that the laws of nature and the properties of matter were sufficient to explain the origin of the world system. Consider what is being compared to what in the following example adduced by Samuel Clarke:[5]

> It being as impossible that the organized Body of a Chicken should by the power of any Mechanical Motions be formed out of the unorganized Matter of an Egg; as that the Sun Moon and Stars, should by mere Mechanism arise out of a Chaos.

In the early phase of the development of mechanistic thinking, the difference between organic and anorganic systems seems to have been conceived as merely quantitative. The organism was taken as merely much more complicated than the common material systems and was thus comparable on a small scale to the world system on a large scale; and this complexity led to special problems of explanation. The complexity of the mechanism of the world system or of an organism is so great, it was held, that we can hardly conceive that the mere motion of particles of matter would have brought about just this particular system of its own accord. The order of the world system seemed to be underdetermined by the mechanical properties of matter. From the notion of the underdetermination of the world system by the mechanical laws of motion it did not, however, follow that the system could not be explained by mechanics or that mechanical laws did not apply to it. On the contrary, it followed that nature or matter could have produced many different such systems, that many *different* material systems could have arisen out of the motions of the corpuscles. If the possibility actually realized was supposed to be something more than just a *chance* occurrence, then there must have been an original order imposed on matter, not reducible to the properties of matter or to the parts of the system. In the 17th century this state of affairs was of course expressed in theological terminology, and it was maintained that God not only created matter and gave it motion, but that he also ordered it and constrained it in particular trajectories. The same sort or argument applied to organisms. What the mere laws of material motion were unable to achieve had to be supplemented by the ideas and plans of a divine watchmaker. However, the central postulate of deism was

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5 Clarke, "Letter to Mr. Dodwell [for Anthony Collins]," *Works* III, 789.

that this activity of God was *unique* and occurred only at the creation of matter. After the creation only the laws of matter in motion hold. God was thus thought to play a part in cosmogony but not in physics. Robert Boyle in particular expressed this view again and again:[6]

> I think also further, that the wise Author of things did, by establishing the laws of motion among bodies, and by guiding the first motions of the small parts of matter, bring them to convene after the manner requisite to compose the world, and especially did contrive those curious and elaborate engines, the bodies of living creatures, endowing most of them with a power of propagating their species.

In such remarks the true sense of the term "preformation" becomes clear: the organizational forms of all species of organism are determined at the creation of the world. All species were preformed by the divine watchmaker. The task of a theory of generation and heredity was thus to explain the nature of this "power of propagating their species" as well as to reveal the material means of guaranteeing its continuity and constancy over time. The solution that was to prevail for almost a century arose in the 1670's more or less simultaneously in the work of a number of philosophers and physicians. This solution consisted in assuming that all the germs of all the individuals that were ever to live were created in a single act of creation. According to this kind of explanation the miniature copies of the future organisms have existed fully formed in the germs since creation. There were then three different theorems about how the germs had been stored since that time: panspermism and two kinds of encasement, ovism and animalculism.[7] *Pan-*

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6 Boyle, "Forms and Qualities," p. 15; cf. also p. 48: "I do not at all believe that either these Cartesian laws of motion, or the Epicurean casual concourse of atoms, could bring mere matter into so orderly and well contrived a fabrick as this world; and therefore I think, that the wise Author of nature did not only put matter into motion, but, when he resolved to make the world, did so regulate and guide the motions of the small parts of the universal matter, as to reduce the greater systems of them into the order they were to continue in; and did more particularly contrive some portions of that matter into seminal rudiments or principles, lodged in convenient receptacles (and as it were wombs) and others into the bodies of plants and animals ..."

7 Descartes' follower Pierre Silvain Regis described the possibilities in his *Cours de Philosophie* (first published in 1690, but completed perhaps as early as 1681) II,641: "Those who believe that the germs were produced at the beginning of the world are not all in agreement about the place in which they were formed: some believe that they were formed in the womb of the first Female of each species; others maintain that they were formed in the testicles of the first male; and there

spermism maintained that the germs floated freely through the air and were carried by the wind until they found an appropriate place to develop; normally this meant that they were taken up by an existing organism of the same species in food or air and eventually worked their way to the semen or ovum. Claude Perrault seems to have been the only major exponent of this particular view. Of more significance was the encasement theory. *Encasement* asserted that germs containing a miniature organism (called the *homunculus* in humans) were contained in the reproductive organs of each organism, and that the reproductive organs of these homunculi in turn also contained germs with homunculi that also held further homunculi in their reproductive organs etc. The first individual of a species held all its future conspecifics encased within it, one generation in the other. The only further question to be decided was whether they were stored in the male (*animalculism*) or in the female (*ovism*). The first explicit formulation of the theory was published in 1674 by Nicole Malebranche who opted for the ovist version.[8] Up until the 1740's the major debate in the theory of generation and heredity revolved around the question of whether the germ was located in the semen or in the ovum.

Besides its obvious theological advantages (e.g. that all creatures were directly created by God), the theory of encasement also had some philosophical and methodological strongpoints. It is a purely mechanistic theory and gives a material cause for the continuity and permanence of species. Furthermore, it transfers the apparently unavoidable teleology in the explanation of the organism back to the original creation, so that final causality does not enter into science itself. Except for the first origins of matter, which can-

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are others who pretend that they were scattered throughout the world, so that there are everywhere all kinds; but that after they have been taken up with nourishment they attach themselves precisely each to the ovary of the Females of its species."

8 Cf. Malebranche, *Verité*, pp. 82-3: "It would not seem unreasonable to think that there are infinitely many trees in a single germ; for it contains not only the tree whose seed it is but also a very great number of other seeds which can all contain within them new trees and new seeds of trees; and these hold perhaps in an incomprehensible smallness still other trees and other seeds just as fertile as the first; and so on to infinity. [...]

"We should think, furthermore, that all bodies of men and animals, that will be born up to the completion of the ages, were perhaps produced as early as the creation of the world; I believe that the females of the first animals were perhaps created with all those of the same species which they have engendered and which they will engender in the passage of time."

not in any case be studied by natural science, everything is explained by purely mechanical laws of matter. As Leibniz, who sided with animalculism, put it:[9]

> As for the motions of the celestial bodies and even the formation of plants and animals, there is nothing in them that looks like a miracle except their beginning. The organism of animals is a mechanism which supposes a divine preformation. What follows upon it is purely natural and entirely mechanical.

One peculiarity about the teleology used in the preformation theory as well as in deistic systems in general should be noted: It is the same kind of teleology, the same kind of reconciliation of mechanism and teleology, that take places in every process of manufacture or material production. A plan or an idea of the object to be produced guides the otherwise mechanical production, and a divine artisan is introduced who conceives the plan and executes it. However, the question of *why* the divine watchmaker chose to build the world machine — whether to play the music of the spheres or otherwise to provide for entertainment — is completely irrelevant to science; this is a purely theological question. Final causes in the strict sense are excluded from science and from its metaphysics. As Descartes put it:[10]

> And so finally concerning natural things, we shall not undertake any reasonings from the end which God or nature set himself in creating these things, [and we shall entirely reject from our philosophy the search for final causes] because we ought not to presume so much of ourselves as to think that we are the confidants of his intentions.

Nonetheless, teleology in a more general sense is not completely excluded. Of the four aspects of the causal nexus traditionally distinguished in philosophy — the efficient, the material, the formal, and the final — only the *causa finalis* has been banished from science and its metaphysical foundations. The causality of the form, *causa formalis*, or the plan that the artisan God stamps onto matter is admitted.[11] The teleology of the mechanistic systems consists entirely in the *causa formalis*, in the plan of the watch that the artisan designed before implementing it in the world.

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9 Leibniz, 5th letter to Clarke, §115.

10 Descartes, *Principia*, part I, §28; AT VIII,15-16. The clause in brackets was added in the French edition.

11 Hobbes, too, excludes final causes but counts the *causa formalis* as an efficient cause; cf. *De Corpore*, II, 10, §7, *Opera* I, 117.

On the basis of this deistic teleology the preformation theory was able to conceive of the actually given species forms as necessary and contingent at the same time. They were necessary in the sense that they functioned in a purely mechanical manner. They were contingent in the sense that their form was underdetermined by the mere laws of matter in motion. There are many other possible combinations of the particles which would nonetheless be compatible with the properties of those particles and might even be capable of living once produced. But these do not belong to the forms that were selected at the construction of the world system, and they are (presumably) too complicated to be likely to arise of their own accord. Every really given organism is causally fully determined on the assumption of an original preformation; and the encasement of the germs sees to it that the original organization is maintained without any extraordinary intervention by God.

Decline of the Preformation Theory

In the fifth decade of the 18th century a fundamental change in theories and explanations of the organism began, which led towards the end of the century to vitalism. It was no longer the quantitative complexity of the organism that occupied the foreground; rather the difference between organic and unorganic was seen to be of a qualitative kind, often expressed in the form of a *double* organization: the particles of matter were taken to be organized into *organic* parts or molecules and then these already organic parts were taken to be organized into organisms. The fall of the classical mechanistic explanation is clearly marked by the commotion surrounding Abraham Trembly's discovery of the fresh water hydra (polyp) around 1740, which served as occasion and point of departure for a number of new theories. The fact that the preformation theory, which had for sixty years been the paradigm of scientific explanation in organic nature, could be toppled so quickly and completely is due to the fact that the theoretical prerequisites had been slowly accumulating in the course of the 18th century and all that was needed was an empirical stimulus — and perhaps a generational change among scientists. However, even after 1740, a number of important scientists continued to be committed to the pre-

formation theory, which remained firmly entrenched in textbook science up to the end of the 18th century. Albrecht von Haller, for instance, who in many ways contributed significantly to the fall of preformationism, returned to the fold after a brief phase of epigenesis.

There are a number of factors that undermined the theory of preformation and made it possible for the phenomenon of regeneration in the polyp — an otherwise insignificant invertebrate, which would have remained simply an anomaly in the preformation theory — to be advanced as the central explanatory problem of biological theory and even to be seen by many as the quintessence of the organic. There were I think four factors that decisively contributed to this process: 1) developments in geological and cosmological theory, 2) the development of a specifically biological criterion of species membership, 3) the dominance of philosophical atomism in natural and social philosophy, and 4) the development of a general conception of self-reproduction of organic systems.

1) The theory of pre-existing germs in its original form presupposed that the germs were as old as the material universe. A later creation of animals and plants would have implied an extraordinary intervention of God into the already existing world. In the deistic view this would constitute a miracle, but natural science is only possible if natural events, except for the first beginning of the universe, have only natural causes. A later divine intervention into the affairs of the world could only occur for the purposes of revelation, to support faith and morals etc.; but if God has to repair his clockwork for other reasons, this means that he was not capable of shaping matter in such a way in the beginning that the clockwork would function without repair. As Leibniz said: "When God works miracles, he does not do it in order to supply the wants of nature, but those of grace. Whoever thinks otherwise, must needs have a very mean notion of the wisdom and power of God."[12] A philosophical insight lies behind the theological façade: namely, that the appeal to the supernatural to explain normal natural processes means the end of all science.

However, as soon as serious theories about the origin of the earth or the solar system could be presented, the encasement theory began to have troubles. On the one hand, if the (extremely complex)

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12 Leibniz, 1st letter to Clarke, §4.

system of the world as a whole arose in the course of time according to the laws of matter, why should not the organism in particular also arise by merely mechanical laws? On the other hand, if the earth itself arose in the course of time, then the first organisms with their encased germs could not have been there from the beginning of the universe. A theory of the earth such as for instance Buffon (1749) proposed asserted that the earth was thrown out of the sun and then cooled off for thousands of years before life was even possible. Under such circumstances the appeal to the immediate activity of a non-material cause to explain organization was unscientific and incompatible with deism.

2) A second reason for the decline of the preformation theory lay in changes in the conception of biological species during the early 18th century. Beginning with John Ray around 1700 and fully developed with Buffon around 1750, a conception of species emerged that no longer grounded the species membership of organisms in similarity of form (which could just as well apply to minerals) but rather in common descent and ability to propagate. The ultimately decisive criterion for determining whether two individuals belonged to a single species was whether they could mate with one another (or each with the same third individual) and produce *fertile* progeny. The sterility of the mule proved that horse and donkey were two different species. This concept of species is at first glance not at all incompatible with the theory of preformation: all those organisms are conspecifics that were encased together in the first individuals of a species. However, even though the sterility of species hybrids might be interpreted as a sign of the constancy of nature, their very existence and viability presented a serious challenge to the preformation theory: Such hybrids are obviously mixtures of two known organizational forms; but the germs are stored by only one of the parents. If one were to assume that perhaps two half-germs could be compounded, the preformation theory has already been abandoned; if we could explain how non-organized or half-organized parts of a germ could on their own form an organization, then we would not need the preformation theory in the first place. The encasement theory had to assume that each sterile hybrid had been encased from the beginning. As long as species-hybrids were merely a marginal phenomenon, the difficulties of the preformation theory in explaining them were not particularly significant. However, to the extent that species crosses to determine

common species membership became more and more important, this marginal phenomenon which revealed a weakness in the preformation theory was ever more made the focus of attention.

3) A third reason for growing dissatisfaction with the preformation theory lay in the fact that it was hardly to be reconciled with atomism without unscientific *ad-hoc* hypotheses. Atomism posited a limit in principle to the divisibility of matter: at some level we come upon ultimate indivisible particles. The preformation theory presupposed that matter could in principle be divided and structured *in infinitum*. The two views were compatible only if it was assumed that only a certain number of generations are encased — for instance, because the world was only 6000 years old and would only survive for another few thousand. And even in such a case the divisibility of matter necessary for encasement is out of all proportion to the divisibility necessary for an atomistic physics. As philosophical atomism became more and more prevalent in physics and social philosophy, the theory of preformation became ever more problematical.

4) The fourth and perhaps most important reason is directly connected to the discovery of the regenerative capabilities of the polyp. If this small animal is cut in two, the head grows a new tail and the tail a new head. The polyp can "reproduce" (as regeneration was called at the time) any part that it loses, as if the parts depended on the whole and not the whole on the parts. Mechanism assumed that the motions of a clock depended on the properties and disposition of the parts. If a gear is missing the machine stops working. It is not to be expected that the loss of a part enables the machine to perform acts (e.g. replacing the part) that an undamaged machine does not perform. This striking and much discussed phenomenon would however have remained an amusing and interesting anomaly at the margins of science, had not a general concept of the reproduction of an organic system been developed. If life is conceived as a continual process of re-producing the initial conditions of individual and species so that the life of an organic system consists in its self-reproduction through nourishment, exchange and replacement of its parts, then the regenerative capacity of the polyp is no longer merely an anomaly; it is a paradigmatic example of the basic phenomenon of life itself. It was only in connection with such a theory of reproduction that the rediscovery of the fresh water hydra (Leeuwenhoek had already

studied it around 1700) could achieve the significance that it actually acquired in the course of the 18th century.

The term "reproduction" was introduced in the early 18th century to denote the regeneration of lost or mutilated organs in the salamander and other amphibians and retained this meaning up to the beginning of the 19th century. It was apparently Buffon who first extended the meaning to include propagation as well. For Buffon "reproduction" was the most general common trait of animals and plants. In the second volume of his *Histoire naturelle* after a discussion of the commonalities of animal and vegetable kingdoms (Chapt. 1), he takes up "Reproduction en générale" (Chapt. 2) before he turns to the particular kinds of reproduction: "De la nutrition & de developpement" (Chapt. 3) and "De la génération" (Chapt. 4). His point of departure for the entire discussion is of course the regenerative capacities of the polyp.[13]

The development of the concept of the organism as a self reproducing system was initiated by John Locke in the second edition of his *Essay on Human Understanding* (1694). In Chapter 27 of the second book, in an introductory passage on the identity of the person, he attempts to determine the difference between the identity over time of a mechanical aggregate or "mass" and that of an organic body. The identity of an aggregate consists in that of its parts and thus ultimately in the identity of its component atoms. The identity of an organism consists, on the other hand, in that of the process of the continual reproduction of the parts of the system by the system. Such as system has two levels of organization: the *particles* of matter are organized into organic *parts*, and these are in turn organized into organisms which are able to produce ("frame") and reproduce ("continue") the parts:[14]

> We must therefore consider wherein an oak differs from a mass of matter, and that seems to be in this, that the one is only the cohesion of particles of matter any how united, the other such a *disposition* of them as constitutes the parts of an oak; and such an *organization* of those parts as is fit to receive and distribute nourishment, so as to *continue and frame* the wood, bark, and leaves, &c., of an oak, *in which consists the vegetable life*. That being then one plant which has such an organization of parts in one coherent body, partaking of one common life, it continues to be the same plant as long as it partakes of the same life, though that life be communi-

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13 Cf. Buffon *Oeuvres philosophiques*, pp. 233-56; on the concept of reproduction cf. Jacob, *Logic of Life*, chapt. 2

14 Locke, *Essay*, II, 27, §6 (emphasis PM).

cated to new particles of matter vitally united to the living plant, in a like continued organization conformable to that sort of plants.

Newtonian Biology

The preformation theory, which forsaw no production of organic systems after the first creation, could cope even less well with the continual reproduction of such systems. The encased germs did not reproduce; they simply expanded. The theories of identical and extended reproduction of organic systems proposed as alternatives to preformation were called at the time "epigenesis"; and this term has been adopted by contemporary historiography of science even though these theories have little or nothing to do with the Aristotelian theory of generation for which William Harvey, its last important proponent, introduced the name in the middle of the 17th century. The first alternative theories of the 1740's were in fact *pangenesis* theories, developed by Buffon and Maupertuis, which harked back to the atomistic theories of the 17th century (Gassendi, Highmore, Charleton) or perhaps directly to Lucretius and Hippocrates but were enriched by organic molecules and by attractive forces acting between the particles of matter. Pangenesis explained generation through the mixing of the seeds of both parents. The seed in turn consisted of particles, taken from and representing each of the parts of the body, which joined together either spontaneously or under the influence of the maternal organism to form a germ, which otherwise was quite similar to the *homunculus* of the preformation theory. Pangenesis had little difficulty with species hybrids or with atomism and was independent of theories of the history of the earth. Furthermore, at least in Buffon's version, it was founded on the concept of the reproduction of an organic system. For Buffon, nourishment, growth, and propagation were three kinds of general reproduction accomplished by distribution and assimilation of particles. When Buffon for instance says: "Everything, that can be, is," he means that all viable forms of organization that result from the combinatory possibilities of organic molecules under the given geological and climatic conditions actually exist; and *vice versa* only the actually given forms are really possible. This holds in principle whether the molecules happen to get together in the appropriate

womb or somewhere else (spontaneous generation), whether they meet here on earth today or whether they met on Jupiter twenty thousand years ago. All organisms are completely determined by the properties and interactions of the particles of which they consist; should a world catastrophe occur wiping out all living creatures, but leaving the basic geological and climatic conditions, then all species of organisms would return spontaneously. The organization forms of the species are not encased as germs, but rather stamped onto the structure of matter in the combinatorial possibilities of organic molecules and the underlying anorganic particles. Mosquitoes and elephants are just as determined as crystals.

The appeal to the combinatory possibilites of the particles and the limitation of the number of such possible forms may explain why there are precisely those species that there are. However the question, why the abilites that the organisms have based on their organization can be relatively independent of that organization could not be answered so easily. In regeneration, the paradigmatic example of life processes, parts of the organization are missing, that is, the form as a whole does not exist, but the functions are nonetheless performed. The logical solution to the problem was to introduce a new primary property of matter, a vital force, which was however limited in that it only came to expression under certain circumstances, for instance in a particular arrangement of particles. This solution is usually called vitalism; and in the 18th century it was almost always introduced with an analogy to the Newtonian force of gravity. With this analogy Buffon introduced his "moule interieure," Haller his "irritability," and Blumenbach his "Bildungstrieb"; similar arguments can be found in the work of Bordeu, Barthez, Hunter and Needham.[15]

The vitalism of the latter 18th century stipulated that life could not be reduced to the fundamental properties of matter postulated by mechanics. It was necessary therefore to introduce a new primary property of matter — the life force — which played no role in mechanics and which became active only under a certain constellation of factors; the life force was however not reducible to or caused

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15 Cf. John Hunter, "Lectures on the Principles of Surgery," in : *The Works*, London, 1835, vol I, p. 221ff; Théophile Bordeu, "Recherches sur les maladies chroniques," *Oeuvres complètes*; vol. II, Paris, 1818, pp. 924f; Johann Friedrich Blumenbach, *Über den Bildungstrieb*, Göttingen, 1789, pp. 25f. Cf. also Hall "Biological Analogues," for further sources.

by these factors but rather only released or triggered by them. The life force, under whatever name, was not the result of the organization of particles but the property of each an every particle. Only the expression of the property is a result of the organization. Furthermore, the level of organization at which the force is expressed is far below the level of the individual organism. Buffon introduced organic *molecules,* Haller the irritability of *fibers*, and Blumenbach had his Bildungstrieb become active in cell or mucous *tissue*. These theories could be strictly reductionistic in the sense that they reduced the phenomena of a system to the properties of its parts; on the other hand they allowed an autonomous biological level of explanation that could not be reduced to mechanics, for although the organism is strictly determined by the fundamental properties and laws of matter, one of these properties is non-mechanical. In answer to the reproach that such a life force is simply an unintelligible *qualitas occulta,* the vitalists pointed to the still unclear status of gravitation.

The analogy to Newtonian gravitation has a certain amount of justification. As an example of the appeal to Newton let me quote a passage from Blumenbach:[16]

> For most readers the reminder is hopefully quite superfluous that the *word Bildungstrieb* just like the *words* attraction, gravity, etc., serves no other purpose than to designate a force whose constant effect is known from experience, but whose cause just like the cause of the above mentioned so universally recognized natural forces is for us a *qualitas occulta.*

The legitimacy of the appeal to Newton by the vitalists and such 'proto-vitalists' as Buffon and Haller lies on the one hand in a similarity of method and on the other hand in a similarity of the reaction to the failings of that method. Newton's method consisted in tracing back the phenomenon to be explained to the essential properties of particles (in the last analysis indivisible atoms). *Essential* properties such as extension, impenetrability, or inertia are attributed not merely to every body of actual experience, but also to every imaginable body independently of the existence of other bodies: that is, to a body even if it were the only body in an otherwise empty absolute space. Gravity, although it belongs to every body of experience is not an essential property of matter, because as *mutual* gravitation it presupposes the existence of a system of bodies

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16 Blumenbach, *Bildungstrieb*, 25-26. In footnotes to this and subsequent passages Blumenbach cites Newton and Voltaire's exposition of Newton.

containing at least two elements. A property that is essential may not depend on external circumstances. Newton asserted explicitly that gravity was not an essential property even though it is a universal property of all bodies.[17] And against Leibniz's accusation that he had introduced a scholastic *qualitas occulta* into science, he protested, that Leibniz called "those things occult qualities whose causes are occult though the qualities themselves be manifest."[18] Newton did indeed reject immediate action at a distance as self-contradictory, since a thing cannot act where it is not, but he left it open whether the cause of gravitational acceleration is material and mechanical (e.g. a stream of particles) or whether it is perhaps immaterial (e.g. the immediate influence of God). Newton's spokesman Clarke expressed this with characteristic openness (and ambiguity) as follows:[19]

> And *Gravitation* itself, is not a Quality inhering in Matter, or that can possibly *result* from any Texture or Composition of it; but only an Effect of the continual and regular Operation of some other Being upon it; by which the parts are made to tend one towards another.

However, although gravity is not essential ("inherent") to matter and although its cause is occult, it nonetheless plays a fundamental role in Newton's physical explanation of the world.

The Newtonianism of the Enlightenment ignored Newton's and Clarke's fine distinctions between inherent qualities and universal phenomena and operated not only with gravitation but with the *force* of gravity. Only the cause of this force was considered occult, the force itself was manifest through its effects. This occult cause behind the gravitational phenomena could be conceived as an essential property of bodies that is however manifested only *in connection with* other bodies. If it was legitimate to ascribe to bodies essential properties whose expression depended on the existence of the system containing the body, it was but a small step to postulating essential properties, whose expression was dependent on the particular *kind* of system, when the explanation of phenomena demanded them. The door was open for magnetism, electricity and the *moule interieure*, the living principle, and the *Bildungstrieb*. These new forces were not the result of the "texture or composition"

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17 Newton, Letter to Bentley, Jan. 17, 1692, *Correspondence* III, 240.

18 Newton, Letter to Conti, Feb. 2, 1716, *Correspondence* VI, 285; cf. Freudenthal, chapt. 1 and 13.

19 Clarke, "Letter to Mr. Dodwell [for Anthony Collins]," *The Works* III, 760.

of the bodies; they were not caused by the constellation of factors but were rather occasioned, stimulated, triggered, or released by it. Blumenbach's "Bildungstrieb" for instance became aroused (*rege*) in a cell tissue of a particular structure, after which it became relatively autonomous.[20]

These theories provide the point of departure for Kant's reflections on the structure of biological explanation. In the precritical period Kant's orientation figure in the search for a "Newton des Grashalms" was Buffon; later, in the "Critique of Teleological Judgment," he refers explicitly to Blumenbach.

1.3 Kant's Study of Eighteenth Century Biology

Kant began rather early in his career to concern himself with problems of biological explanation and always expressed some skepticism as to the possibility of explaining the organism according to mechanical laws. From 1756 onward, physical geography, which included zoological and botanical systematics, belonged to his standard course offerings as a lecturer in Königsberg. Systematics — at least below the level of the species — was taken by Kant not as a merely descriptive enterprise but as a causally explanatory one. Erich Adickes in *Kant als Naturforscher* has examined Kant's sources for these lectures in great detail and was very often able to determine which authors Kant read and with which authors he was probably unfamiliar. We need not therefore go into individual cases here; it is clear on the basis of the work of Adickes that Kant was aware of and reflected on the most important contemporary developments in natural history and in theories of generation. We may thus assume that Kant's philosophical analyses rest on a knowledge of the empirical material without trying to trace back particular reflections to the problems encountered by any particular author. The point is not to show that Kant was "influenced" by some particular scientist or other; many different scientists had similar problems in the explanation of the organism.

The development of Kant's thinking about organic nature runs parallel to the development of his thought about the anorganic

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20 Cf. McLaughlin, "Blumenbach."

world. In physics Kant began with the discussion of purely physical questions (although often with a strong methodological emphasis), but in the course of time he turned more and more to the properly philosophical aspects of physical questions. In biology Kant dealt at first with biological questions of the peculiar structure of organisms and later turned more and more to questions of the peculiar structure of biological explanations.

First Positions

In his *Universal Natural History and Theory of the Heavens* (1755), in which he attempted to explain the origin and development of the solar system on the basis of the universal laws and properties of matter, Kant indicated that the explanation of an organism is much more difficult than the explanation of the solar system, without however elaborating on whether the difficulties were merely technical, based on the quantitative complexity of the systems, or whether they were supposed to be of a principle nature. He posed the rhetorical question:

> Are we in a position to say: Give me matter and I will show you how a worm can be produced? Don't we get stuck at the first step due to ignorance about the true inner make-up of the object and the complexity of the manifold contained within it? (W 1,237; Ak 1,230)

Kant's answer to the question is of course: We cannot explain even a worm; but the references to "inner make-up" and "complexity" seem to indicate merely technical difficulties. The same conclusion seems also to be suggested by his remark that the explanation of the solar system is easier than that of the organism, in as much as they are apparently taken to be of the same *kind*. Kant maintains,

> that the formation of all celestial bodies, the cause of their motions, in short, the origin of the entire present constitution of the world system will be comprehensible before the production of a single weed or worm will be clearly and completely understood. (W 1,237; Ak 1,230)

At one point Kant does in fact speak of the "absurdity" of the opinion of the Greek atomists that the origin of organisms could be explained by the "blind concourse" of atoms (W 1,234). However, this cannot be interpreted as a rejection in principle of the possibility of a mechanistic explanation or a mechanical production of organisms,

for in the context he is making a distinction precisely between mere accident and the necessity of mechanical laws: "In my conceptual scheme (*Lehrverfassung*) I find matter bound by certain necessary laws" (W 1,234; Ak 1,227).

In spite of all his skepticism about the chances of giving a mechanical explanation of a worm, Kant is forced by the structure of his theory of the heavens to assume a mechanical origin. On account of his cosmogonic theory, the deistic option is not open to him. Having explained that the planets etc. arose gradually and, consequently, that the necessary conditions for life could have arisen only in the course of time, he has only two alternatives: either matter has the ability to bring forth life of its own accord, or God intervenes in the already existing world so that life is a miracle and thus not the object of natural scientific explanation. This second option can be discarded for reasons of principle, since it invokes the ill-reputed *deus ex machina,* through which everything can be explained without effort. As Leibniz had pointed out, such explanations turn theology into the supplier of *ad hoc* hypotheses for bad science. Furthermore, in Kant's theory God would have to intervene again and again in the course of the world because there are very many planets, which are all to be furnished with life but which only achieve the conditions necessary to shelter life at different times.

Kant concludes his theory of the heavens with a speculative chapter "On the Inhabitants of the Stars," in which he assumes that life exists on many different celestial bodies. It may well not be impossible, he cautions, that some planets are uninhabited, but it would be "an absurdity" to deny that most of the planets are in fact inhabited, in so far as the right conditions prevail or have prevailed there. The necessary conditions arise in the course of time:

> Our Earth existed perhaps for a thousand or more years before it found itself in a position to support humans, animals, and plants. Now, the fact that a planet arrives at this perfection a few thousand years later does not gainsay the purpose of its existence. (W 1,378-79; Ak 1,352-53)

It should be clear that such a theory implies some kind of original spontaneous generation as soon as the appropriate physical conditions come about. There is no indication at all that Kant sees any kind of problem in principle. Although he does not in fact explicitly commit himself to a belief in the law-like occurrence of spontaneous generation – as, for instance, Buffon was to do only a few

years later in great detail – his position itself can hardly avoid this consequence.

Seven years later the situation had changed considerably for Kant. In his *Only Possible Proof of the Existence of God (*1762) the organism is no longer viewed as a detail problem in the cooling processes of large masses of matter in space, but rather as a problem in principle for scientific explanation. Now Kant believes that "it would be absurd to consider the first production of a plant or an animal as a merely mechanical incidental result of universal laws of nature" (W 1,680). He maintains that these laws of nature are "insufficient" to explain the "structure" of plants and animals; a choice must be made between two available alternatives.

> Whether, namely each and every individual of these kinds was constructed immediately by God and thus is of supernatural origin, and only propagation, i.e., the transition to development from time to time, is entrusted to a natural law; or whether some individuals of the plant and animal kingdoms were of immediately divine origin, but endowed with a, for us incomprehensible, power to produce, and not merely to unfold, their like according to a regular law of nature. (W 1,680; Ak 2,114)

The choice is thus between preformation and what, for lack of a better name, we call epigenesis. Kant clearly takes the side of epigenesis in this work but does so rather because the first alternative is untenable then because the second is convincing. He criticizes the preformation theory because it assumes *too much* supernatural action, and he maintains that it is immaterial whether one assumes that God created all germs directly at once and then stored them in the first organisms or that he intervenes in the world on the occasion of every act of generation: the difference lies only in the point in time. This objection is of course only valid on the condition that the germs arose *after* the origin of matter and not simultaneously with it; only then is the construction of the germs an extraordinary intervention into the course of nature.

Kant does not take up the question of whether God must directly create the first individuals of every species on every planet in which the right physical conditions have arisen. He does not deal with the geological and cosmogonical conditions for the origins of life at all. He takes up a rather defensive position in comparison to his earlier work and tries to *minimize the amount* of the supernatural in his explanations: "My present intention is merely to show that one ought to allow natural objects a greater possibility of bringing forth their issue according to universal laws than is com-

monly done" (W 1,681; Ak 2,115). Moreover, he passes over in silence the question of whether the supernatural can legitimately be appealed to at all in a natural scientific explanation.

Kant is in fundamental agreement with the epigenetic alternative to the preformation theory, but he criticizes the particular articulation that this alternative received in the works of Buffon and Maupertuis:

> The inner forms of Mr. de Buffon and the elements of organic matter, which in the opinion of Mr. de Maupertuis arrange themselves in consequence of their memories and according to the laws of desire and aversion, are either as incomprehensible as the thing itself or completely arbitrarily adduced. (W 1,680; Ak 2,115)

Particular such theories may be wrong, but the *kind* of theory is in principle correct since it attempts to explain at least *present* generation scientifically instead of tracing it back to an immediate divine action. In spite of all difficulties in actually providing an explanation, Kant modestly pleads for the attempt.

However, Kant does not develop any theory of the organism in this work, and many remarks simply repeat the positions of the theory of the heavens (e.g., W 1,708, 1,725; Ak 2,139, 2,152). Furthermore, it should not be forgotten that the perspective under which the organism is being considered in this book is the question of whether or not it contributes to a proof of the existence of God. Thus, we can expect no "theory" of the organism. Nonetheless, it is in any case obvious that Kant has begun to see difficulties *of principle* in a mechanistic explanation of the organism. He has apparently had serious second thoughts about mechanistic views, but he has not been able to come to an even provisional conclusion. He considers the laws of nature to be insufficient to explain the production of an organism, and he appears to ground his doubts not merely in the organism's quantitative complexity. However, the conceptual determination of what it is that distinguishes the organism from other things is not very convincing; Kant mentions *wonder*:[21] "And even if I could examine all the springs and tubes, all nerve fibers, levers and mechanical contraptions of such a thing, nonetheless, the wonder would remain" (W 1,725; Ak 2,152). This wonder at the adaptations of the parts to particular purposes indicates the problem, without however providing a conceptual handle for dealing with it.

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21 Kant returns to this concept in the CJ (§62); cf. B275-7; CJ, 242-3.

The Origin of Human Races

Kant's only extensive or systematic reflections about basic questions of biology in the time between the *Proof of the Existence of God* and the *Critique of Judgment* are to be found in a series of three papers on human races that Kant published in connection with his university lectures on physical geography.[22] Although these essays deal primarily with the question of the common origin of all humans and with empirical criteria for classifying races, some fundamental questions on the nature of organization are also touched on. In particular, the question of the purposiveness of organs and structures is taken up. Kant examines the ability of organisms to adapt themselves to conditions of their environment and to pass on these adaptations unchanged to their descendants — independently of the further existence of the environmental conditions.[23]

The concept of *race,* which Kant adopted from Buffon was new in natural history and referred to new problems. With the establishment of Buffon's criterion for species boundaries (the sterility of species hybrids) the problem arose that there were also *fertile* hybrids or half-breeds. That is, there existed clearly distinct varieties which passed on unchanged their characters and perhaps would have been considered separate species if the individuals had

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22 "The Different Races of Men," (1775) W 6,7-30; Ak 2,427-443; "Determination of the Concept of a Race of Men," (1785) W 6,63-82; Ak 8,89-106; and "On the Use of Teleological Principles in Philosophy," (1788) W 5,137-170; Ak 8,157-184.

23 The belief in the inheritance of acquired characters was quite common in the 18th century; and before Lamarck no distinction in principle was made between passively acquired mutilations and actively acquired adaptations. Kant was in fact one of the first serious critics of the possibility *in principle* of such inheritance. Blumenbach, for instance, though skeptical whether mutilations could be inherited, considered it to be a purely empirical question. In the second paper on race Kant wrote (in Lovejoy's translation): "Now it is clear that if some magical power of the imagination, or the artifice of men, were capable of modifying in the bodies of animals the reproductive faculty itself, of transforming Nature's original model or of making additions to it, which changes should then become permanent in subsequent generations, we should no longer know from what original Nature had begun, nor how far the alteration of that original may proceed, nor — since man's imagination knows no bounds — into what grotesqueries of form species might eventually be transmorgrified." (W 6,72; Ak 8,97; Lovejoy, p.184)

not been able to mate and produce fertile progeny with members of other varieties. Such varieties must, according to Buffon, have had a *common* origin, even though they possess *different* hereditary traits. The original species must have split up into lineages or races which transmit hereditarily their distinguishing characteristic traits. In such races *new* characters have arisen which apparently can be transmitted in generation. Furthermore, some of these hereditary traits seemed clearly to be purposive adaptations to the environment. Thus the question arose: How can new purposive properties be added to an organizational form in such a way as to be passed on in generation?

The empirical phenomenon that occasioned and was used to illustrate this general question of biological theory can be sketched rather briefly: Black Africans and white Europeans can mate and produce fertile progeny who bear traits from both sides and pass these traits on; both races thus belong to the same biological species. Although white Europeans (the Portuguese) who have been living in Africa for 200 years are burned brown by the sun, their children are at birth just as white as those born in Europe; the darker color of the skin is not inherited. The black Africans brought to Europe have not grown pale in the European climate; they transmit their dark skin unchanged. Since both races have a common descent (and since the common ancestor is supposed to have been somewhat similar to the present Europeans,[24] the Africans must at some time have become black. Kant also assumes that dark skin is a useful adaptation to the climate of the tropics. The question is thus: How could the Africans adapt themselves to the tropics? Why don't the Europeans today do the same? And why don't the Africans become white (again) in Europe? Or more generally: How can the environment occasion heritable adaptations, and why can't they be reversed?

Since he doubts that the laws of mechanics can explain the first origin of organic structures, Kant assumes a — somewhat indeterminate — *original organization*. If one assumes that the environment can change the hereditary organization by acting mechanically upon it, then there is no reason why it should not in

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24 Kant may well be the only European thinker of his time who seriously considered that the white European might not necessarily be the prototype of the species and that whites and blacks might be descended from a common ancestor that no longer exists. Nonetheless, he believed as an "empirical" hypothesis that the original stock was "white and brown haired." (W 6,28; Ak 2,441)

time also be able to change the organization to any arbitrary extent (e.g. beyond the species boundary); or, for that matter, why it could not have produced the organizational forms in the first place. However, it is impossible to see how environmental conditions (e.g. cold) should be able to effect heritable changes (e.g. a second layer of feathers in birds) as if the climate could know what should be changed in an organism. Kant thus concludes that all changes that are adaptive for the organism must have been included in some way in the original purposive organization. Adaptations to the environment must have lain dormant but capable of development as "germs" or "natural dispositions" in the original lineage.[25] They are then induced to unfold by the appropriate environmental conditions, but only already stored away characters can be called up by the environment. Only pre-adapted changes already available as dispositions can be transmitted. Only what itself has been inherited can be passed on in generation:[26]

> Accident or universal mechanical laws cannot produce such mutual fit. Therefore we must consider such occasional developments as preformed. However even where nothing purposive is displayed, the mere ability to propagate its particular acquired character is itself proof enough that a special germ or natural disposition for the character was to be found in the the organic creature. For external things can be occasional causes but not productive causes of what necessarily is propagated and breeds true. Just as little as accident or physical-mechanical causes can produce an organic body can they add something to its generative power, that is, effect something which propagates itself, if it is a particular shape or relation of the parts.

On the example of the development of the human races from an ancestral species which contained the dispositions to all the presently given races, Kant introduces the additional hypothesis that the unfolding of one particular disposition precludes the later unfolding of other developmental possibilities. After the original dispersion of humanity, humans have unfolded their innate capacities

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25 In the first paper on race Kant in fact introduces a technical, terminological distinction between "germs" [*Keime*] and "dispositions" [*Anlagen*]. The germs determine "particular parts," and the dispositions determine "only the size or the relation of the parts to one another" (Ak 2,434; W 6,17). However, he usually speaks of both at the same time, and even on those occasions later on where he mentions only one of them, there is no reason to believe that he is implying that the other is *not* meant.

26 "Different Races of Men..." (W 6,18; Ak 2,435).

to adapt to different climates, such as those of Europe, Africa, Asia, or America and have thus irreversibly fixed their skin colors.

The development of such germs and dispositions has as its consequence, that the present characteristics of the different human races can only be explained *historically*; and Kant distinguishes between a merely classificatory description of nature (*Naturbeschreibung*) and an explanatory natural history (*Naturgeschichte*). However, in the latter he is dealing with a history of development *below* the level of the biological species and only with the unfolding of the possibilities contained in the original lineage. In these essays Kant assumes an original organization without seriously asking where the organization comes from or how this assumption can be reconciled with his other views about the nature of scientific explanation. Even in the essay "On the Use of Teleological Principles," written shortly before the *Critique of Judgment*, he does not advance beyond this position. He also makes no attempt to specify the mechanism by which the "germs" act or are passed on:

> I for my part derive all organization from organic beings (through generation) and later forms (of this sort of natural object) according to laws of the gradual development of original dispositions (such as often are found in the transplantation of plants) which were to be found in the organization of their lineage. How this lineage itself arose, this task lies completely beyond the bounds of all humanly possible physics, within which I felt obliged to confine myself. (W 5,164; Ak 8,179)

Regulative Principles and Reflective Judgment

In the works discussed so far Kant has considered the organism from a biological point of view as an especially difficult object of scientific analysis. In the "Critique of Teleological Judgment" he deals not with the peculiarities of the organism as such but with the peculiarities of our explanations of the organism. Here the organism is not so much a particular kind of object with particular properties and structures, but rather it is an object that *causes us particular problems* when we try to explain it. He analyzes not the organism but biological explanation. Thus we have before us not a philosophy of the organism but a philosophy of science applied to biology. Kant analyzes not the causes of purposive structures and adapta-

tions but the concept of purposiveness itself as well as the assertion that the organism is something *for which* something else can be purposive or functional. Such questions were not seriously treated in Kant's "biological" writings; there Kant simply dealt with the functionality of traits (e.g. of skin color) for the organism. But since not everything can appropriately be taken as the subject of the purposiveness of other things, the question arises as to the conceptualization of those things for which other things can be functional. For instance, we might say that oil is purposive (functional, useful) for the efficient functioning or long term operation of a motor but not for the motor itself, which is not a subject for which other things are purposive. The organism, however, seems to be conceptualized as precisely such a subject, and this conceptualization is in need of analysis.

The theoretical questions that arise in the attempt to explain the reproducibility and the apparent purposiveness of organic systems is taken up by Kant in the *Critique of Judgment* (1790). In the Introduction and in the second part, the "Critique of Teleological Judgment," he undertakes a systematic analysis of the concept of purposiveness in biology. The postulate that Nature may be purposively arranged for our cognitive activities or that certain natural objects or their parts may be purposive for other natural objects or their parts is called a "regulative principle" for "reflective judgement." Before turning in the next section to Kant's analysis of purposiveness, I shall first attempt to clarify the nature of regulative principles in general and of reflective judgment in particular.

The concept of regulative principle was introduced and systematically expounded in an "Appendix to the Transcendental Dialectic" (B670-732), in which the concept of purposiveness also plays an important role. Regulative principles are contrasted to "constitutive" principles such as the twelve Categories, which are conditions of the possibility of the objects of experience. Regulative principles, on the other hand, are maxims or prescriptions that we give to ourselves (not to things) concerning how we should best deal with the already constituted objects of experience. In the *Critique of Pure Reason* Kant discusses only regulative principles for the *understanding* (not for judgment), the most important being the systematic unity of nature: we are encouraged "to compare and detect the hidden identity" and for instance to trace phenomena that are seemingly based on different forces back to one basic force (B*677).

Kant calls heuristic research maxims of this kind "logical principles," which however make a "transcendental presupposition." If we use, for instance, the concept of the systematic unity of nature regulatively, attempting to reduce different events to a common underlying regularity, we cannot prescribe to nature that it *must* have this unity. However, in as much as we proceed methodically, prescribing this rule to ourselves, we *presuppose* that nature does in fact possess this unity.

> It is, indeed, difficult to understand how there can be a logical principle by which reason prescribes the unity of rules, unless we also presuppose a transcendental principle whereby such a systematic unity is a priori assumed to be necessarily inherent in the objects. (B678-679)

Although such regulative principles "seem to be transcendental," they are not, and they cannot be given a transcendental deduction (B691). They are useful for empirical research, but we must remember that the *presuppositions* that we make when using them are not constitutive for nature and may turn out to be wrong. The particular examples of such general principles that Kant discusses in the section are all taken from the philosophical tradition.

The figure of argument of regulative principles of reason (for the understanding) is Kant's major instrument for reappropriating the ruins of the traditional metaphysics demolished by his critique. As far as the presentation in the *Critique of Pure Reason* is concerned, the need for the regulative employment of the metaphysical principles destroyed by the Dialectic does not arise from empirical research itself. At least primarily, the point is not empirical concept formation but rather a sort of metaphysical recycling: the sensible reuse of a traditional corpus of general principles. The basic postulates of rational psychology, cosmology, and speculative theology, which Kant has rejected as metaphysical assertions may be applied as heuristic maxims in empirical research. In the *Critique* itself Kant deals only with cases in which the general principle (rule, concept) is already available and attempts to show that the rule, which one already has, is "admitted as problematic only" (B674).

The most important of the regulatively recycled metaphysical principles is according to Kant the speculative or deistic concept of God. "Thus the transcendental, and only determinate, concept which the purely speculative reason gives us of God is in the strictest sense *deistic*" (B703). The deistic watchmaker God ("omnipotent Author") is introduced as a regulative principle in order to be

able to assert the systematic unity of nature, "*as if* all such connection had its source in one single all-embracing being, as the supreme and all-sufficient cause" (B714). We assume a unity of the world system that is purposive to our cognitive activities in order to have guidelines for the search for causal explanations. The deistic God becomes a "transcendental presupposition" of the "logical" use of the idea of the unity of nature. However, it should once again be emphasized, that in the *Critique of Pure Reason* itself these problems are dealt with in an *appendix*; the primary point of view is not the needs of empirical research but the possible employment of the deistic concept of God. God has for Kant no objective reality, and the concept has no empirical meaning; but it can at least still function as the transcendental presupposition of a sensible methodological principle for empirical science.

The regulative principles as presented in the *Critique of Pure Reason* are ideas of *reason* used heuristically by the *understanding*. The possible use of regulative principles by the faculty of *judgment*, on the other hand, remains unexplicated. Judgment, as it is introduced in the *Critique of Pure Reason*, is the ability to subsume the particular under the general:

> If understanding in general is to be viewed as the faculty of rules, judgment will be the faculty of subsuming under rules; that is, of distinguishing whether something does or does not stand *under a given rule* (*casus datae legis*). (B171; emphasis PM)

It is implicitly presupposed that the rule is given by the understanding and that judgment has only to subsume the given particulars or to seek the appropriate and subsumable particulars. In the *Critique of Judgment* the concept of judgment is further specified: judgment is still the "ability to think the particular as contained under the universal" (Bxxv; CJ, 18); but two kinds of judgment are now distiguished. 1) *Determinate judgment* corresponds to the faculty of judgment introduced in the *Critique of Pure Reason*, where the general rule was given, the only difference being that it is now conceived as merely one species of the genus judgment and not as the genus itself. 2) *Reflective judgment*, on the other hand, is the ability to subsume a given particular under a rule that has yet to be found. This species of judgment possesses a certain amount of autonomy in as much as it can give itself its own maxims for the best procedure in seeking the general rule. Such a maxim or rule for seeking the rule is called a regulative principle for reflective

judgment. Its main function lies in concept and theory formation in the empirical sciences.

In the Introduction to the *Critique of Judgment* Kant takes up regulative principles once again, this time not as principles for the understanding but for reflective judgment. Here, he considers mainly the problems of the classification and ordering of empirical events and regularities. The point is no longer the sensible use of a traditional corpus of general principles but rather the search for regularities in the manifold of empirically given objects and events. There are numerous parallels and similarities between Kant's remarks here and those in the Appendix to the Dialectic just discussed;[27] but there is also a decisive difference in that the regulative principles for reflective judgment deal not merely with nature as such but also with particular, empirically given things. We do not merely make the transcendental presupposition that nature as a whole is purposively constructed for our cognitive activities, that it is, for instance, divided into genera and species, but rather we also consider individual objects from the point of view of their purposiveness — (subjectively) for our feelings of pleasure and displeasure in aesthetics and (objectively) for one another in the study of nature.

We have just seen that Kant viewed nature as a whole as a deistic system and proposed this view as a regulative principle for empirical science. He returns to this principle as well in the Introduction to the *Critique of Judgment* in the question of systematizing empirical regularities. We ought, he says, to consider such empirical regularities as parts of a system of laws "as if they too had been given by an understanding (even though not ours) so as to assist our cognitive powers by making possible a system of experience in terms of particular natural laws" (Bxxvii; CJ, 19). We make it a regulative principle to judge nature to be so structured that it corresponds to our needs for order. When we classify and order empirical objects, we *presuppose* that nature has an order. The subjective purposiveness of nature, that is, the correspondence of nature to our need for order, is a principle of reflective judgment.

> This harmony of nature with our cognitive power is presupposed a priori by judgment, as an aid in its reflection on nature in terms of empirical laws ... since without presupposing this harmony we would have no order of nature in terms of empirical laws, and hence nothing to guide us in using

27 Cf. Liedtke, 1964.

> empirical laws so as to experience and investigate nature in its diversity. (Bxxxvi; CJ, 24-25)

Besides this subjective purposiveness of nature for our faculty of knowledge, Kant also considers a purposiveness of individual objects of experience for a certain aspect of our "mind" (*Gemut*). *Beautiful* objects are purposive for our aesthetic feelings. This kind of subjective purposiveness is the object of "aesthetic judgment" and the subject matter of the first part of the *Critique of Judgment*. However, Kant also takes up the question of whether individual objects can be purposive not merely subjectively, i.e., for our cognitive or aesthetic faculties, but objectively, that is, purposive for other *objects*. He asks what it means to say that one thing is purposive for another. The meaning of the concept of an objective purposiveness is the subject of the second part of the *Critique of Judgment*. This concept is introduced and clarified in the "Analytic of Teleological Judgment," to which we now turn.

1.4 The Analytic of Teleological Judgment

In the "Critique of Teleological Judgment" Kant undertakes a systematic analysis of the limits of mechanistic explanation and the legitimacy of teleological principles in natural science. His goal is to determine to what extent and under what conditions the purposive character of things, relationships, and processes can itself have some explanatory value, that is, may legitimately be used in scientific explanation. Furthermore, he seeks to determine when and whether one can or should introduce teleological assumptions as a heuristic device to reveal traces of the hidden pathways of mechanism. But the most important question he deals with concerns the seeming necessity of using a heuristic teleology in the explanation of organisms.

It is of course clear that the teleological assumptions are merely regulative. If the object studied is conceived as natural, it is precluded that its purposiveness is due to a purposefully acting subject or that real intentions are involved. However, we are also not dealing with the merely subjective purposiveness of nature or of individual natural objects for our faculty of knowledge or our

aesthetic sentiments, but rather with an "objective" purposiveness, that is, with a means-end relationship that is supposed to subsist *in the object of cognition not in the relation of the object to the subject*. The question is not whether something is conveniently arranged for our faculty of knowledge, but whether a thing (or a subsystem) can be purposive for another thing or subsystem (or both of them mutually purposive). Furthermore, it must be asked what it means for a thing if we can sensibly say that something else can be useful to it.

It is particularly important at the beginning of this study of Kant's critique of teleology to achieve some clarity about the kind of teleology and the kind of purposes under investigation. Kant is dealing with the *telos* of the artisan in the fabrication of a labor product not with the *telos* of a moral agent performing a good action. The subject is technique not morals, "technical-practical" purposes not "moral practical" purposes. Kant emphasizes this point in the introduction to the *Critique of Judgment*. The causality of purposes under discussion here is a kind of phenomenal causality, which can be ascertained in every product of art or labor. "The will, as the power of desire, is one of the many natural causes in the world, namely, the one that acts in accordance with concepts" (Bxii; CJ, 10). As long as we are dealing with concepts of nature (i.e. technique) and not with concepts of freedom (i.e. morals), then our subject consists in "corollaries" to theoretical philosophy and not in moral philosophy. The technical-practical prescriptions of reflective judgment belong to theoretical philosophy as corollaries; the "Critique of Teleological Judgment" is an addendum to the *Critique of Pure Reason* not an extension of the *Critique of Practical Reason*. Moral-practical purposiveness as such plays no role whatsoever in the "Critique of Teleological Judgment": it is only mentioned in the introduction in order to be excluded explicitly (Bxiii-xv; CJ, 10-12).

There is however an ambiguity in Kant's use of the concept "purpose" even in its purely technical sense. Since the cause must precede the effect in time, it is clear that the result of the production process is not in any sense a cause, but rather that the *idea, representation, or concept* of the result can be seen as a cause. Now, a concept can enter into the process of production in two different ways: As an anticipation of the finished product (*causa formalis*), a concept or representation guides production; and as an anticipation of the desired effects of the product (*causa finalis*), a concept or representation *initiates* the process of production. To take up a

Kantian (and ultimately Aristotelian) example, we can say that the idea of a house (in the form of a blueprint) guides the construction of the house; the idea of the rent that can be earned by renting out the house motivates construction. In both cases (formal and final) we are dealing with a natural cause that "acts according to concepts." In the first case the agent acts according to the concept of the object itself; in the second case, according to the concept of the useful effects of the object, i.e., according to a subjective motive. Although it is generally the latter, the intention or motive, that is meant when the "purpose" of an action (e.g. building a house) is discussed, nonetheless the former (the product) can also be called a "purpose" (at least in German) insofar as suitability for particular uses belongs to the concept of the product. A house is a structure suitable to live in, whatever the subjective motivations of the builder, and this suitability is part and parcel to what it means to be a house. In fact when Kant speaks of an idea or a concept as a "purpose" or a "final cause," he usually means the anticipation of the *product*, i.e. not the *causa finalis* in the proper sense but the *causa formalis*. When he says, for instance, that purpose "is the concept of the object insofar as it also contains the basis for the object's actuality," (Bxxviii; CJ, 20) he can only be referring to the anticipation of the product itself; there are, however, also ambiguous formulations where he could just as well mean the anticipation of the effects of the product. As will become clear in the analysis that follows, Kant does not seem to have distinguished sharply between the two conceptual possibilities. He says, for instance, that "the causality that a concept has with regard to its object is purposiveness (*forma finalis*)" (§10, B32; CJ, 65).

The Analysis of Purposiveness

The Analytic of teleological judgment is relatively straightforward compared to the Dialectic — at least its major thrust is rather clear. This straightforward character can however lead to oversimplifications, as is well illustrated on the example of

Schopenhauer, who can here be taken to represent the dominant tradition of interpretation:[28]

> In the 'Critique of Teleological Judgment' due to the simplicity of the material, one can perhaps better than anywhere else recognize Kant's peculiar talent for turning an idea this way and that, expressing it in various manners until it has become a book. The entire book wants to say only this: although organized bodies necessarily appear to us as if they were constructed according to an antecedent concept of purpose, this does not justify us in assuming that they are objectively so.

This judgment of Schopenhauer's cannot be denied a certain justification, at least if restricted to the Analytic; but even with respect to the Analytic, Schopenhauer oversimplifies considerably. While it is true that Kant continually repeats himself collecting ever more 'as if' formulations, nonetheless such psychologizing explanations distract from the obvious and substantial difficulties Kant is having with the philosophical material, which force him again and again to make a new attempt at defining the problem. In the Analytic Kant attempts to draw the methodological consequences of the introduction into biology of a general concept of the reproduction of an organic system by introducing the concept of objective purposiveness. The constant repetitions become more understandable, once one realizes that Kant is groping here at the edges of the explanatory capacities of his philosophical categories. He is more or less compelled to write a fourth 'Critique' and must attempt, so to speak at the special request of a particular phenomenon, to determine the boundaries of mechanistic explanation from the inside.

Although the impulse to a discussion of objective purposiveness, as Kant makes clear in the course of the "Critique of Teleological Judgment," comes from actual difficulties in concept formation in the sciences of his time, Kant structures the discussion as if he were dealing with a purely abstract question of the various possible determinations of a concept — in this case, the concept of purposiveness. This is done presumably to preclude the mistaken inference that the concept of natural purpose is an empirical concept derived from experience with a particular kind of phenomenon. The first section of the "Critique of Teleological Judgment" (§61) must explicate what is empirical and what is a priori in the concept of objective purposiveness. Kant begins with the distinction between objective and subjective purpose.

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28 Schopenhauer, *Will und Vorstellung*, p. 630

Although we have good reason, Kant tells us, to assume a subjective purposiveness of nature for our cognitive activities, there is no reason a priori, why an objective purposiveness should have to be attributed to nature in order to explain particular things. We would not prima facie expect that there should be natural things whose complete explanation demands that we make the same sort of reference to purposes that we make as a matter of course in explaining artifacts.

> But the universal idea of nature as the sum total of sense objects gives us no basis whatever [for assuming] that things of nature serve one another as means to purposes, and that even their possibility cannot adequately be understood except [as arising] through a causality in terms of purposes. (§61, B267; CJ, 237)

We have no reason to presume that there is in nature a special causality of purposes that are not *our* purposes (like the products of art) nor those of nature itself ("since we do not assume nature to be an intelligent being"). Not only could such purposes (without a real purposeful agent) not be foreseen, but "even experience cannot prove that there actually are such purposes." Thus we have neither reason a priori to believe that the concept of objective purposiveness has an empirical correlate, nor can we derive such a concept from experience. We can however project or "slip" it into nature by "some subtle reasonings."[29] That is, through an analysis of the concept of purposiveness we can acquire such a concept and arbitrarily apply this concept to nature. The question of course is, why we should want to do such a thing? At this point Kant simply states an empirical fact: the science of his time in fact used the concept of purpose where mechanism seemed insufficient; later on he argues that the use of teleology is unavoidable.

Objective purpose is not derived from experience, rather a particular contingent experience moves us to project this analytically derivable concept into nature in analogy with our own causality according to purposes. Far from being necessarily connected with the concept of a causally determined nature, the concept of objective purposiveness is only brought into play when a natural product appears quite accidental. Kant illustrates this contingent

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29 §61, B267; CJ 236. See also "Progress of Metaphysics" (Ak 20,293-4; W 3,631): "for one cannot perceive this [purpose], but can only introduce it by subtle reasoning [*nur durch vernünfteln hineintragen*], in order to recognize a purposiveness in such objects."

character on the example of an organism, pointing "for example, to the structure of birds regarding how their bones are hollow, how their wings are positioned to produce motion and their tails to permit steering and so on" (B268f; CJ, 236). There seems to be no reason why nature as a mere mechanism should have chosen precisely this composition of parts instead of thousands of other possible combinations of the parts; without recourse to the causality of purpose, this structure must appear "utterly contingent". Thus wherever particular phenomena seem to be underdetermined (accidental) by "mere mechanism," we introduce objective purposiveness as a regulative principle. We view the phenomenon as if a concept of the phenomenon had guided its production.

> For we adduce a teleological basis when we attribute to the concept of an object — just as if that concept were in nature (not in us) — a causality concerning an object, or, rather, when we conceive of the object's possibility by analogy with such a causality (which we find in ourselves) and so think nature as *technical* in what it itself can do. (§ 61, B269-70; CJ, 237)

Kant emphasizes that we may not consider such teleological grounds to be real causes (but only "Erkenntnisgründe" as he later elaborates); their postulation is a regulative principle.

First (§62), Kant divides objective purposiveness into a formal and a material version. His examples of formal purposiveness are all taken from mathematics: geometric figures such as conic sections are "fertile in principles for solving a multitude of possible problems" (B272; CJ, 240). Such "objects" of our formal intuition can be unexpectedly useful with regard to other objects of our formal intuition. But this kind of purposiveness plays no role in the subsequent analysis.

Much more important than the formal, however, is the material purposiveness, which has to do with real objects of material reality. Kant distinguishes (§63) a relative (extrinsic) and an intrinsic (absolute) purposiveness.[30] Experience prompts us to introduce the concept of material purposiveness only when we have to deal with particular objects whose explanation causes us particular problems. With certain particularly complicated systems we may assume a *relative* purposiveness of one part for another in order to facilitate the investigation of the interrelationships; with some objects, on the other hand, we *must* assume an *intrinsic* purposive-

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30 Intrinsic purposiveness is also called "absolute" only in the so-called "First Introduction," Ak 20,217; W 5,194; CJ, 405.

ness in order to explain them at all. Such objects of experience can only be comprehended as law governed and causally determined under certain conditions, namely, that the concept or representation of the object guided the efficient causes of the object in its production. Or as Kant puts it:

> Only in one case does experience lead our power of judgment to the concept of a purposiveness that is both objective and material, i.e., to the concept of a purpose of nature, namely, when we have to judge a relation of cause to effect which is such that we can see it as law-governed only if we regard the cause's action as based on the idea of the effect, with this idea as the underlying condition under which the cause itself can produce that effect. (B278; CJ, 244)

Although in such a case we can comprehend the lawful character of the process only if we assume that an idea of the result guides the process, we do not assume that there really exists an understanding that has the idea. This idea is a cognitive tool of ours, it is not an intention actually supposed to be realized by any understanding agent.

Relative purposiveness includes the usefulness of one thing for another. Kant speaks of the "utility" of a thing for humans and its "benefit" for other living creatures. Any thing that can serve as a means for some other thing may be said to be relatively purposive, whereby the "other thing" in Kant's examples is always an organism. Kant lists a number of such relatively purposive natural relationships, such as the benefit of sandy soil for spruce trees or of rivers for plants. He points out however that the relative purposiveness of a thing depends on the purpose-character of the creature for which it is beneficial. Only if we were to assume that the *existence* of certain things were a purpose of nature, would we have to consider "those natural things that are indispensable for this" as natural purposes (B282; CJ, 246). But we have no empirical or logical reasons to believe that any particular thing or kind of thing *ought* to exist; this applies to humans as well.

The relative purposiveness of one thing for another never justifies the inference that the purposive thing can only be thought to be possible in this connection. The relative purposiveness of one thing for another is never a necessary component of the explanation of the thing's origin. "For even if there were none of that natural utility, we would find that natural causes are fully adequate to make things come out this way" (B284; CJ, 247). The origin of the sandy soil so beneficial for the spruce trees can be completely explained without

any reference to the trees. We have no justification for the assumption that the *existence* of spruce trees was a purpose of nature, and that this purpose explains why the seas receded, leaving the sand behind. Judging a phenomenon as relatively purposive is thus never *necessary* in order to explain its origin, but the fact that is can sometimes be meaningful to ascribe this kind of purposiveness to a phenomenon gives an "indication" of a different kind of purposiveness which Kant denotes with the term "natural purpose." Not every thing is so constituted that other things can be purposive for it; e.g., the sandy soil is purposive for (beneficial to) the spruce trees; however the receding of the sea is not purposive for (beneficial to) the soil, but only by way of the soil for the trees. As Kant summarizes:

> We can easily see from this that extrinsic purposiveness (a thing's being beneficial to others) can be regarded as an extrinsic natural purpose only under the condition that the existence of what it benefits proximately or remotely is a purpose of nature in its own right. This, however, we can never tell by merely examining nature; and hence it follows that, although relative purposiveness points hypothetically to natural purposes, it does not justify any absolute teleological judgment. (B282-3; CJ, 246)

Natural Purpose

In cases of relative or extrinsic purposiveness, the thing considered purposive was in principle as a relative purpose explainable according to purely mechanical laws. With *intrinsic* purposiveness this is no longer the case. Here we are dealing with things whose form cannot be explained according to mechanical laws; the "contingency" of such things, i.e. their underdetermination by empirical laws of nature, compels us to assume an additional causality according to concepts. An object for whose origin we *must* assume "the ability to act according to purposes (i.e. a will)" can only be conceived to be possible as a purpose (B285; CJ, 248). For artifacts this occasions no difficulties: without the artisan and his idea or concept of what he wants to produce, an artifact would appear to be most accidental and clearly underdetermined by empirical laws. Kant uses the example of a regular hexagon found sketched in the sand: Although it is not completely impossible that such a figure could have been made on the deserted beach by the wind or the sea or by the footprints of animals without intent, we

can scarcely imagine it otherwise than as a *purpose*, i.e. a realized concept ("vestigium hominis video"). Here we assume an actual causality according to a concept and look for the agent (whom Kant consistently reduces to an understanding) who realized in sand the concept of hexagon. In this example we are clearly dealing with the idea of the product, not with the idea of the effects of the product that motivate its production. The motives and intentions of the artist — perhaps his anticipation of the surprise of the philosopher on discovering the hexagon — play no role in this analysis.

It will be worthwhile, especially with regard to the structure of biological explanation to examine closely the difference between the intellectual anticipation of the artifact itself (*causa formalis*) and the intellectual anticipation of the effects or consequences of that artifact (*causa finalis*). Both can be subsumed under the concept of "teleology", although only the *causa finalis* is commonly designated as "purpose." In Kant just the reverse seems to be the case. At any rate it is essential in the analysis of Kant's text to ask what kind of teleology and what kind of purposes he means. We have already seen that the *causa formalis* was an essential component of the deistic systems of the world, but that these systems denied the *causa finalis* any role in physical explanation. In these systems teleology consisted in a clockmaker God, assumed to be real, so that the entire world system was considered to be a divine artifact. If Kant is in fact restricting himself to the *causa formalis*, then he is not introducing any kind of teleology that was not *already* part of deistic science.

After introducing the example above to illustrate purpose, i.e., the causality of a concept, Kant poses the question whether there can also be things, which, like artifacts, can only be conceived as purposes but which are not artifacts but rather pure products of nature. Such things, which, like artifacts, are supposed to have an intrinsic purposiveness, Kant calls *natural purposes* ("Naturzwecke") and attempts to explicate this concept and to determine the difference to an artifact:

> On the other hand, in order to judge something, which we cognize as a natural product, to be a purpose, and hence a *natural purpose*, then — unless perhaps a contradiction lies in the very thought — we need more than this. (B*286; CJ, 249)

I shall go into some detail on Kant's analysis of this concept since it is the pivotal concept of his entire discussion of mechanistic explanation in biology and is the source of the "antinomy" resolved

in the Dialectic. Kant first presents a tentative characterization of the concept of natural purpose and explicates it with an example. It is important for an understanding of this section to note that this is merely an *illustration* and not yet a definition. The discussion begins with the words: "I would say, provisionally ..."; and after the tentative characterization he proceeds: "Before we analyze this idea of a natural purpose in full let me elucidate its meaning by an example" (B286; CJ, *249). The concept of natural purpose itself is supposed to be acquired purely through conceptual analysis (objective, material, intrinsic, natural purposiveness); however, it is illustrated from the start with what is supposed to be its empirical instantiation — the organism. Natural purpose is not a concept acquired from empirical experience of organism; this experience only prompts us to take up the analytically acquired concept. The tentative characterization of the concept to be illustrated reads:

> A thing exists as a natural purpose if it is both cause and effect of itself (although in two different senses). (B286; CJ, 249)

To explicate this characterization Kant adduces three properties of an organism: propagation, growth, and the mutual dependency of the parts on one another and on the whole. A thing, e.g. a tree, can be conceived as both cause and effect of itself, insofar as it 1) produces itself with regard to its species (by generating another individual of the same species), 2) produces itself as an individual by growth, and 3) produces itself by guaranteeing the nourishment and preservation of each part by the other parts. Thus Kant is referring to three kind of reproduction of a system: (3) the identical reproduction through nourishment and in special cases through regeneration, (2) the expanded reproduction of growth, and (1) the production of new systems.

For systematic reasons it is important, however, to emphasize that the concept of natural purpose is not introduced as a synonym for the organism. Organisms are objects of experience. Everything that Kant later says about natural purposes applies to the organism only insofar as it must be conceived as a natural purpose. The concept of the organism itself has "objective reality" because there are actually corresponding things in sense experience, i.e. animals and plants. The concept of natural purpose has objective reality only if there are objects of experience that are natural products and can only be conceived as if they had been produced intentionally by some understanding. If such things should exist (or if, as Kant tends to

believe, organisms are such things), then the concept of natural purpose, too, has objective reality, i.e. instantiation in experience; but we can never know this definitively, since our ability to conceive of particular objects of experience as non-intentional may change with time and the progress of science.

In the central section of the Analytic (§65) Kant attempts to explain what exactly a natural purpose is supposed to be. He begins with the remark that the concept of natural purpose as something that "relates to itself as cause and effect" "is still not quite appropriate and determinate and still needs to be derived from a determinate concept" (B289; CJ, 251). Kant's "derivation" of this notion is extremely problematical, and what he must have meant by it cannot be fully explicated at this point in the analysis. I shall however quote and analyze this derivation here in order at least to make it as intelligible as possible at this stage:

> 1) A causal connection, as our *mere understanding* thinks it, is one that always constitutes a descending series (of causes and effects): the things that are the effects, and that hence presuppose others as their causes, cannot *themselves* in turn be causes of these others. This kind of causal connection is called that of efficient causes (*nexus effectivus*).
>
> 2) But we can also conceive of a causal connection in terms of a *concept of reason* (the concept of purposes). Such a connection considered as a series, *would* carry with it dependence both downwards and upwards: here we could call a thing the effect of something and still be entitled to call it, as the series ascends, the cause of that something as well.
>
> 3) This sort of causal connection is easily found in the practical sphere (namely in art). For example, although a house is the cause of the money received for rent, yet, conversely, the *representation* of this possible income also caused the house to be constructed. This kind of causal connection is called that of final causes (*nexus finalis*).
>
> 4) Perhaps it would be more appropriate to call the former causal connection that of real causes, the latter that of ideal causes, since these terms would make it clear at the same time that there cannot be more than these two kinds of causality. (B*289-290; CJ, 251-52; emphasis and numbering PM)

Already in the first sentence there are unclarities: for instance, what does Kant mean by "as our mere understanding thinks"? *Every* kind of phenomenal causality, even "ideal" causation, is thought by the understanding. The causality of final causes is precisely the causality of an understanding, as Kant often stresses. The sense of the reference to our mere understanding in this restriction will only become clear in the resolution of the antinomy at the end of the Dialectic. But other than this, the thrust of

the first part is relatively straightforward: a normal causal connection, as it is usually conceived, involves a sequence of causes and effects that has a particular direction ("downwards"), so that the effect of a cause cannot itself in turn effect its cause.

In "art" the situation is different (3); here, there seem to be dependencies that go in both directions. A rented house is, for instance, the efficient cause of rental income; on the other hand, the income is the final cause or purpose of building the house. Kant calls this last relation the *nexus finalis*, although the rent itself may not properly be called a cause, but only the *representation* of the rent can be considered a cause of the construction of the house. The efficient causes may be called real causes and the final causes, taken as representations, may be called *ideal* causes to emphasize that there are only these two kinds of causality and that final causes presuppose an understanding that has ideas and can realize them.[31]

In (1) Kant stresses that the "things themselves" cannot have a causal influence on their own causes; in (3) he mentions that the *representation* of a thing can indeed have a causal influence upon the causes of the thing and calls this representation an ideal cause. However sentence (2) which is supposed to provide the derivation for the "still not quite appropriate and determinate" notion of natural purpose has nothing whatsoever to do with Kant's tenement house example. When it is asserted that a causal connection is conceivable that proceeds downwards and upwards, if one considers it not "as our mere understanding thinks it" but instead "in terms of a concept of reason," it is not the *representation* of the thing, i.e. an ideal cause, that is being considered. On the contrary, the thing itself, which is an effect, is supposed to be the cause of its own cause. As far as I can see, it is exclusively *real* causality that is being discussed here. If this passage is to make any sense at all, then it must be asserting the possibility in principle that a causal connection can proceed in two "directions" *at the same time*. The interpretation that might suggest itself of Kant's metaphor of the "series" of cause and

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31 The division of causes into ideal (mental) and real (physical) allows Kant to speak of both the *causa formalis* and the *causa finalis* without distinction as ideal causes. In the passage quoted Kant speaks of the *representation* of the rent (*causa finalis*), not of the representation of the house itself (*causa formalis*). In other examples the reverse is the case: the representation of a product of art or artisanship (not of its use or usefulness) is called the purpose (*Zweckursache*).

effect as forwards or backwards in time is untenable. In Kant's subsequent remarks it becomes clear that the kind of connection that could be viewed as a series downwards and upward is the relation of part and whole, which is also discussed in the same kind of terminology in the Second Antinomy of the *Critique of Pure Reason*.[32] A consideration of some kind of "backwards causality" is strictly excluded by the Kantian concept of causality.

A question also arises, as to why Kant speaks of a *nexus finalis* in "art" instead of e.g. a *causa formalis*. He does not say that the representation of the house enters causally into the origin of the house, rather he mentions only the representation of the rental income that motivates building the house without directly guiding construction. The purposiveness of the house for rental income is at best an extrinsic or relative purposiveness. Kant seems to want to conceive of the intrinsic purposiveness of an organism as the mutual extrinsic purposiveness of its parts. But this "derivation" of the concept of natural purpose raises more questions than it answers.

Kant's derivation has left the concept of natural purpose more or less just as indeterminate as before; we know only that a dependency is supposed to be involved that runs "both downwards and upwards." However, after the derivation Kant does take up three determinations of the concept of natural purpose that more or less parallel the three properties of the reproduction of the organism introduced in §64.

1) In order for something to be a *purpose*, it has to be guaranteed that its parts, as far as their presence and properties are concerned, are only possible through their relation to the whole. Insofar as this relation is mediated by the idea or concept of the thing, the thing is an artifact.

2) In order, furthermore, to be a *natural* purpose and not merely the purpose of "a rational being," it is necessary that the parts *themselves* mutually cause their respective forms rather than that the *concept* of the whole is responsible for the form and existence of the parts. The *idea* of the whole may not be the cause, "for it would then be an artifact," that is, it would be the product not only of a real cause but also of an ideal cause. The idea of the whole is merely what Kant calls a "cognitive ground" [*Erkenntnisgrund*],

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32 Cf. below 2.4, pp. 97f.

i.e. a *means* that *we* use to acquire knowledge about the thing.[33] The whole that the parts comprise must be such that we can conceive its concept as its cause; and we must be able to judge the efficient causes (the parts) as themselves effects of final causes.

3) Finally, every part must be able to be viewed not only as the purpose or final cause of the others but also as the efficient or real cause of the production of the others, "as an organ that produces the other parts", so that a natural purpose is an "organized and self-organizing being" (B292; CJ, 253). Kant compares the natural purpose with a clock, whereby the major difference between the two lies in the fact that the parts of the clock may be conceived as final causes of one another with reference to the understanding that made the clock *but not as efficient causes of one another*. They do not give rise to one another and need not be so judged. An organized creature is more than a mere machine, because it has the power to form its parts and to transfer this formative power to the "materials," so that the parts can mutually bring one another forth. Kant then points out that the analogy between artifact and organism is not worth much and even asserts that "strictly speaking, therefore, the organization of nature has nothing analogous to any causality known to us" (B294; CJ, 254).

It can thus be ascertained that the causality that distinguishes organization consists in an interaction between parts and whole. All determinations of the concept of natural purpose that Kant introduces have to do with the relation of part and whole. It becomes quite clear that the causal dependency downwards and upwards, mentioned earlier, referred to the relation of part and whole: "downwards" means that the properties of the whole are traced back to those of the parts; "upwards" designates the dependency of the parts on the whole or on the other parts. This will be presented in detail in the next chapter in the analysis of the Second Antinomy of the *Critique of Pure Reason*. I would, however, like to emphasize here the rather paradoxical circumstance, that the central problem of the organism and the fundamental difference between organism and machine is seen by Kant not to lie in a teleological relation at all, but rather to lie in the fact that a peculiar kind of *efficient causality* seems to be effective in the organism, and that

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33 On the concept of "Erkenntnisgrund" cf. Kant, *Logic*, §§7&8 (Ak 9,95-6; W 3,526; and "Progress of Metaphysics," (Ak 20,393; W 3,630).

this kind of efficient causality forces us to employ certain ideas or representations as cognitive means.[34]

Teleological Maxims

In the last three sections of the Analytic (§§66-68) Kant makes a virtue of necessity. Since in the case of inner purposiveness, we *have* to make use of teleological expressions, that is, since in science we cannot get by without them, we ought then to squeeze as much out of these principles as we can — but only as heuristic maxims. Thus, even in instances where we do not *need* to employ teleological principles, we should feel free to use them to help pick up the traces of mechanism. For instance, when examining a natural purpose that one can only conceive as embodying a means-and-end relation, one ought to consider *all* parts of it as possible *only* according to the concept of purpose, even such parts as could otherwise be explained in a purely mechanistic fashion such as bones, hair and skin etc. That is, even the parts that one could explain according to empirical laws should also be considered from a functional point of view (§66). Furthermore, nature *as a whole* should be judged as a system of relative purposes without of course establishing a hierarchy of such purposes and enthroning one of them as the ultimate purpose of nature. In modern terms, one should consider things in their ecological connections — whether they are "purposive" for other things and whether other things are "purposive" for them. It is thus possible and perhaps useful to consider nature not just as a system of causal laws but also as a system of purposive relations (§67). Finally, Kant emphasizes (§68) that in spite of its usefulness teleology is not an intrinsic principle of natural science but rather is "borrowed" from outside. Teleological principles are only regulative and themselves have no explanatory value, even though they may help us to find explanations. Explanations are mechanistic: in an experiment the phenomenon to be explained is produced according to known empirical laws: "for we have complete insight only into what we can ourselves make and accomplish according to concepts" (B309; CJ, 264).

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34 This point especially is emphasized by Jacob, *Logic of Life*, pp. 88-89.

Such teleological principles occasion no further difficulties since they are merely pragmatic maxims without any compulsory or binding character. Only the concept of natural purpose, only the *intrinsic* purposiveness is not purely voluntary and must necessarily be assumed. Only in this, so to speak, mandatory use of teleology does a problem of principle arise that must be examined more closely. This Kant undertakes in the Dialectic, where he once again takes up his original reservations against the concept of natural purpose ("unless perhaps a contradiction lies in the very thought"). There he attempts to solve the problem that comes to the surface in the difficult causal relation of part and whole by using the figure of argument of the "antinomy"; he attempts to bring the problem to a head by formulating it as a direct contradiction, so that it can be dealt with on a fundamental level. The next chapter will examine the "antinomy" as a figure of argument as it is presented systematically in the *Critique of Pure Reason*.

Chapter 2
The Antinomies of Pure Reason

2.1 Introduction

Concerning the "antinomy" of pure reason Kant wrote to Garve in 1798: "It was this that first awakened me from my dogmatic slumber and impelled me to the critique of reason itself, in order to remove the scandal of an apparent contradiction of reason with itself."[1] As a figure of argument the antinomy is the most important critical instrument used in the *Critique of Pure Reason* to dismantle modern metaphysics. Kant employs it in a critique of "rational cosmology," where it even serves "indirectly to prove" the correctness of his distinction between appearance and things in themselves (B534). In the antinomies chapter of the *Critique of Pure Reason* central theorems of empiricist and rationalist metaphysics are confronted with one another. The conflicting assertions are each proved in turn (apagogically, that is, each is proved by the refutation of its opposite) so that *both* apparently contradictory propositions must be acknowledged as simultaneously true (proven) and as simultaneously false (refuted) — or rather would have to be so recognized if we did not introduce the Kantian distinction between appearances and things in themselves.

In this chapter I shall analyze this figure of argument as it is presented in the section on "cosmological ideas" in the *Critique of Pure Reason* and in the *Prolegomena* and as later reflected upon in the so called "Essay on the Progress of Metaphysics." Furthermore, two of the four antinomies in the *Critique of Pure Reason* whose con-

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1 Letter to Garve, Sept. 21, 1798; Ak 12,257-8.

tent is particularly important for an understanding of the *Critique of Judgment* will be examined in some detail: the Second Antinomy, which deals with the relation of part and whole, and the Third Antinomy dealing with causality and freedom. The latter must be examined primarily because the traditional interpretation, dominant since Hegel, has considered the antinomy of judgment presented in the Dialectic of teleological judgment to be merely a repetition of the Third Antinomy.

Kant himself almost always explicates the structure of the antinomies on the example of the First Antinomy and compares or contrasts the others with this. Thus, in order to be able to cite Kant's own words, I shall have to concentrate on the First Antinomy — I shall also at least as a sort of digression deal with its content. This circumstance will on occasion inevitably lead to some somewhat baroque arguments, for which I would like to apologize in advance. Finally, a discussion of the highly controversial antinomies does not occur in a vacuum; there are external constraints that result from traditions of interpretation and from contemporary discussions of Kant; there are also distortions that result from the fact that no one can quite survey the entire literature. I can only take up those problems which either appear to be substantially interesting from my own necessarily subjective point of view or else can quantitatively simply not be overlooked and thus for pragmatic reasons cannot be ignored, whether or not they are particularly fruitful. For instance, in the next chapter I shall reject the widespread view that the antinomy of judgment has anything in common with the Third Antinomy other than its logical form, as has been asserted by the dominant interpretations. However, to make an argument against any special connection, I must of course analyze the Third Antinomy in some detail.

The "Antinomy of Pure Reason" constitutes the second of the three formally equal chapters of the second book of the Transcendental Dialectic. Dialectic is the "specious art" of using — or rather misusing — logic as an instrument for the acquisition of knowledge with empirical content. In this sense it is merely a "logic of illusion," "a sophistical art of giving to ignorance, and indeed to intentional sophistries, the appearance of truth" (B86). Within Kant's system dialectic means the "critique of dialectical illusion" (B86) and is considered to belong to logic. Kant uses the term "dialectic" in both senses: as illusion or sophistry and as critique of logical illusion.

Such an illusion whether intentionally (B86) or unintentionally (B353) introduced, is based merely on some sort of misleading similarity to a logical rule. It disappears as soon as it is exposed:

> Logical illusion, which consists in the mere imitation of the form of reason (the illusion of formal fallacies), arises entirely from lack of attention to the logical rule. As soon as attention is brought to bear on the case that is before us, the illusion completely disappears. (B353)

However, there is not only a logical illusion but also a transcendental illusion and accordingly also a transcendental dialectic, "a critique of understanding and reason in respect of their hyperphysical employment" (B88). But transcendental illusion does not disappear, even when it has been exposed. There exists, according to Kant, a necessary illusion, a "natural and inevitable illusion" that can ultimately be traced back to problems anchored in the basic conceptual equipment of our faculty of knowledge.

> There exists, then, a natural and unavoidable dialectic of pure reason — not one in which a bungler might entangle himself through lack of knowledge, or one which some sophist has artificially invented to confuse thinking people, but one inseparable from human reason, and which, even after its deceptiveness has been exposed, will not cease to play tricks with reason and continually entrap it into momentary aberrations ever and again calling for correction.(B354-5)

The antinomies are one aspect of this dialectic.

According to Kant, four antinomies or apparent contradictions arise in the attempt to answer some of the basic questions of cosmology. The conflicting answers which he examines correspond roughly to positions actually taken by empiricist and rationalist metaphysics. At one point Kant summarizes these questions:

> whether the world exists from eternity or has a beginning; whether cosmical space is filled with beings to infinitude, or is enclosed within certain limits; whether anything in the world is simple, or everything such as to be infinitely divisible; whether there is generation and production through freedom, or whether everything depends on the chain of events in the natural order; and finally whether there exists any being completely unconditioned and necessary in itself, or whether everything is conditioned in its existence and therefore dependent on external things and itself contingent. (B509)

Kant orders the answers to these questions according to the basic scaffolding of his system. Each of the four classes of categories (quantity, quality, relation, modality) receives it own proper antinomy; the antinomies are divided, in accordance with the system, into two pairs: mathematical antinomies (1 and 2) and dynamical

antinomies (3 and 4). In the presentation of the antinomies in the *Prolegomena* the answers are even ordered in the form of a table just like the categories and forms of judgment:

1.
Thesis
The world has, as to time and space, a beginning (limit).

Antithesis
The world is, as to time and space infinite.

2.
Thesis
Everything in the world is constituted out of the simple.

Antithesis
There is nothing simple, but everything is composite.

3.
Thesis
There are in the world causes through freedom.

Antithesis
There is no freedom, but all is nature.

4.
Thesis
In the series of world causes there is some necessary being.

Antithesis
There is nothing necessary in the world, but in this series all is contingent.

(I shall cite the somewhat longer and less clear versions of the *Critique of Pure Reason* later on when the antinomies are taken up in detail.):[2]

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The philosophical position underlying the theses is that of Newtonian empiricism. The antitheses reflect to a large extent the rationalist position of Leibniz. This aspect of the antinomies has been presented and discussed at length by Al Azm and Martin, and

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2 *Prolegomena*, §51; (Ak 4,339; W 3,211). I cite the *Prolegomena* versions both because they are shorter and clearer and because there are some difficulties with the formulation of the Fourth Antinomy in the CPR. The *Prolegomena* version in any case corresponds more closely to what is actually resolved in the resolution sections. The longer versions of the CPR will be cited when each of the antinomies is dealt with individually.

I shall restrict myself to examining just a few essential points.[3] The recognition that the position of the thesis is *cum grano salis* that of Newton and that the antithesis position is generally that of Leibniz is itself basically a historical triviality confirmed by any serious study of the history of science. I take it up here only because much recent philosophical discussion ignores this simple fact.

W.H. Walsh[4] points out that most English language commentators up to now have maintained just the opposite attributions (i.e., they associate Leibniz with the theses and Newton with the antitheses); and he further indicates that the reason for this lies in the fact that Kant himself characterizes the thesis position as "Platonism" and the antithesis position as "Empiricism." Al Azm cites T.D. Weldon as a chief exponent of this kind of interpretation; Weldon asserts:[5]

> It is immediately clear that Kant considers the theses to be the *a priori* contentions of rationalist cosmology, while the antitheses represent the empiricist attack on it, and also that the truth of the theses rather than that of the antitheses is desirable both on practical and speculative grounds. For the theses, in so far as they are true, involve the existence both of God and of a moral capacity in man, both of which are by implication denied by the antitheses ...

As Al Azm correctly remarks, this is far from "immediately clear." As a matter of fact, the only reason for the immediately obvious nature of this interpretation lies in the fact that Kant has called the Antithesis position "Empiricism" (B496). However, Kant's name-giving of course changes nothing in the rationalist content of the position as laid out in the discussions of the antitheses and only

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3 Cf. Al Azm, *Origins*, and Martin, *Kant*, pp. 48-58. This insight seems to be gaining acceptance: cf. Walsh, *Criticism*, p. 198; Wilkerson, *Critique*, p. 117; Allison, *Transcendental Idealism*, p. 38; even Bennett (*Dialectics*, pp. 7 and 119) who does not seem to understand the significance of the connection, does not deny the historical accuracy of the attributions. Unfortunately, when Al Azm rejects Strawson's philosophical objections to Kant's arguments as "historically irrelevant," he allows the impression to arise that he accepts the philosophical content of the objections as correct.

4 Walsh, *Criticism*, p. 198.

5 Al Azm, *Origins*, 3; Weldon, *Kant's Critique*, pp. 204-5. It is clear from the language used that Weldon at least is referring to the passage cited by Walsh (i.e. B494-500). Furthermore, Weldon's misinterpretation, that Kant considers the thesis to be preferable on speculative grounds, can only be traced to this passage, where Kant in fact asserts a speculative interest of reason in the thesis position; however two pages later, Kant informs us that the advantages of the antithesis in this regard "far exceed" those of the thesis (B496).

shows that Kant understands something different under the term "Empiricism" than the post-Kantian tradition. In a similar vein Fichte once classified Berkeley as a materialist — which tells us more about Fichte than it does about Berkeley. It should already occasion some perplexity that Kant attributes "popularity" to the thesis position — a property that no one has ever had to accuse rationalism of acquiring. As soon as we drop the fixation on the name that Kant gives and examine the content of the position and look at the philosophers who took up this position in the course of history, the situation becomes somewhat clearer. The positions taken in the theses can, as indicated, *cum grano salis* all be found in the writings of Newton: 1) a finite material world in empty absolute space, 2) indivisible atoms as the ultimate components of matter, 3) "active principles" such as the human will that introduce new *force* into the material world and cause voluntary movements, and 4) the habitual intervention of a deity into the everyday workings of the world; all these are integral parts of Newton's cosmology. All of these positions were explicitly attacked by Leibniz in a number of writings including the published correspondence with Samuel Clarke.[6]

As concerns Leibniz the grain of salt is somewhat larger and harder to swallow, but many aspects of his philosophy are clearly recognizable in the antitheses. Ever since Descartes, rationalist natural philosophers had tended to see the material universe as "indefinitely" large rather than as infinite, and Leibniz, too, concurred in this,[7] so that he was actually closer to Kant's own position

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6 The Newtonian position is most clearly presented by Samuel Clarke in his famous exchange of letters with Leibniz. The circumstances of the correspondence as well as a number of manuscripts of Newton's containing his drafts for parts of Clarke's letters leave no doubt that Newton agrees with Clarke on all essential points. Cf. Koyré and Cohen "Correspondence"; Alexander, "Introduction"; Freudenthal, *Atom*, pp. 24, 78.

7 Descartes makes the distinction between infinite and indefinite in a letter to Henry More (March 5, 1649; AT V, 267f.) and in the *Principia*, (part I §§ 26 and 27, AT VIII, 14-15). Cf. also Wilson, "Can I..." for more sources; cf. Spinoza, *Renati Des Cartes Principiorum Philosophiae Pars I & II*, II, Prop.6; Leibniz, *Nouveaux Essais*, II, 13, §21. The arguments of the rationalists are dressed up theologically and refer to the infinitude of God; but there is also a significant philosophical reason why the material universe cannot be regarded as infinite. For such rationalists as Descartes and Leibniz (and Kant as well) the *conservation* of "force" and matter in a material system constituted the foundation of all science (Descartes, *Principia* II §§30-36, AT VIII 56-61; Leibniz "Brevis Demonstratio" and "Dynamica" GM VI, 117ff and 440). However, the conservation of infinite

tion on the questions of the First Antinomy than to the position described by the antithesis. But it is also clear that he believed 1) that the world is as large as space and as old as time; 2) that matter is actually divided into infinity, 3) that the material world is causally closed and completely determined, and the aggregate amount of "force" in the universe is conserved; and 4) that the *deus supramundanus* never intervenes into the material world "for the purposes of nature" but only (e.g. in miracles) "for the purposes of grace." In general Leibniz took up the position with respect to science that although one knows for metaphysical reasons that materialism is false, in *science* one must act as if the "evil doctrine" of the materialists were true.[8] Even though the fit of the antitheses of the First and Fourth Antinomies to Leibniz's philosophy is not without its problems, in the Second and Third Antinomies, which are of greatest interest to us here, there is a very good match.

The form and the terminology in which the "Newtonian" theses and "Leibnizian" antitheses appear are of course Kantian; and they are not presented as historically contingent positions, but rather their content is supposed to be derived imminently from within the Kantian system. But Kant also says that it was the antinomies more than any other problem that compelled him to subject reason to a thorough-going critique in the first place.[9] We cannot separate history and systematics here. Kant takes up foundational problems of modern natural science and tries to explain the relative justification of each of the sides of the debate as well as the fundamental mistake common to both. He also *claims* to be able to derive the conflict and its resolution from his system of faculties of knowledge, categories, and forms of intuition. Kant's philosophy must be evaluated according to its ability to grasp conceptually the problems that really existed and to bring them closer to a solution. Had Kant simply derived some "nice" problems and their solutions from some

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quantities is empirically meaningless since it would be compatible with any empirical (and thus finite) loss or gain of the entity allegedly conserved.

8 Leibniz, 5th letter to Clarke; cf. Al Azm, *Origins*, pp. 116-121; Freudenthal, *Atom*, chap. 2 and 3. In his "Answer to Bayle," (GP IV,559; PPL, 557) Leibniz writes, "In a word, so far as the details of the phenomena are concerned, everything takes place as if the evil doctrine of those who believe, with Epicurus and Hobbes, that the soul is material were true, or as if man himself were only a body or an automaton."

9 *Prolegomena*, §50; Ak 4,338; W 3,209-10.

categories or other, problems which had no relation to the real problems posed by natural science, then he would rightly be gathering dust on the shelves of intellectual history.

It cannot of course seriously be maintained that Kant has really "derived" the conflict of Rationalism and Empiricism from within his system. Where he does more of less succeed is in ordering and interpreting some really given problems and assigning them places in his system, although there are some difficulties here. We shall, for instance, see that the second part of the First Antinomy (the size of the world in space) cannot be derived at all from Kant's systematics without contradicting another presupposition of his; this presupposition in turn is needed in order to formulate the Second Antinomy on the divisibility of matter. Furthermore, in the Second Antinomy Kant's systematics should just as well demand the question of the divisibility of an event in time as it does the divisibility of a body in space — but on this question, as far as I know, no major foundational conflict took place in 18th century science. Thus the attempt to make the systematic or "conceptual" origin of the antinomies in Kant's system solely responsible for the content of the theses and antitheses already fails in the derivation of the problems. It would seem to me also to be a rather peculiar way to save Kant's philosophical honor if we were to try to show that the philosophical problems which his system poses and, for better or worse, solves are only *accidentally* in accord with those which were highly controversial and for important reasons seriously debated in his time, or that the presentation of the former were adapted to the latter for purely external historical reasons.[10]

However, I should emphasize that I have no intention of trying to prove with philological means that Kant was "influenced" by the Leibniz-Clarke correspondence, or that he is thinking of Newton and Leibniz only (and no one else — for instance the young Kant himself). The point is that the debate between Newton and Leibniz represents not merely a quarrel between two philosophers but also presents a systematic discussion of the foundations and philosophical presuppositions of natural science in principle form. If it is true that both the conflict between Leibniz and Newton and the antinomies chapter of the *Critique of Pure Reason* deal with the same substantial problems, then a consideration of the Leibniz-

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10 Cf. Wike, *Kant's Antinomies*, chap. 2 for the other side.

Clarke correspondence can contribute to our understanding of the problems discussed by Kant in the antinomies chapter.

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It is well known that Kant proclaimed himself a follower of Newton not only in his earliest writings but also later in the *Metaphysical Foundations of Natural Science*. Thus it may come as a surprise that he is interpreted here as rejecting Newton's position along with that of Leibniz. But the paradox disappears as soon as we remember that the antinomies deal not with physics but with rational cosmology, i.e. with philosophy. The arguments presented in the antinomies chapter are philosophical not physical. It was quite possible for Kant to accept Newtonian physics without accepting all the postulates of Newton's metaphysics; in particular it was not necessary to subscribe to the methodology grafted on to his physics.[11] In fact Kant realized with a clarity that no one before him had achieved, that Newton's physics needed to be rescued from Newton's philosophy, i.e. that Newton's own metaphysics was incompatible with a mathematical-experimental science of nature. Kant undertook the task of providing philosophical foundations for Newtonian physics that were independent of Newton's metaphysics but at the same time did not appeal to Leibnizian metaphysics — at least not in all respects.

The result of this circumstance is a kind of asymmetry in the structure of the arguments in the antinomies chapter. The real intellectual opponent in the debate is Leibniz; it is the basically Leibnizian antithesis position that is in fact the object of Kant's attack. The Newtonian thesis position is not really even taken seriously; in any case the two positions are not at all treated as equals. For instance, Kant refers later to the thesis position of the Third Antinomy as "absolutely" (*schlechterdings*) false; the antithesis, too, is of course considered false but "not absolutely" so, rather it is

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11 Cf. Mittelstraß, "Galilean Revolution"; Freudenthal, *Atom*, chap. 3. Newton's metaphysics were unscientific in the sense that he adduces a direct intervention of God to explain the difference between theoretical prediction and empirical observation. God intervenes in the world to prevent the solar system from winding down.

"only conditionally false."[12] What Kant states explicitly for the Third Antinomy clearly holds implicitly for the others. I shall explain this briefly.

The apagogical form of proof used in the antinomies chapter has, along with important technical functions that will be discussed below, the function of giving the thesis position some initial plausibility without compelling Kant to provide any direct justification — which he would certainly have found very difficult. As long as the thesis can be presented as the only alternative to the antithesis, it can be made as strong as the antithesis is made weak. The refutation of the antitheses in the four antinomies demands an intricate and difficult argumentation that sometimes seems to presuppose at least some of the results of the critique of reason that the refutations themselves were supposed to support. The refutation of the theses, on the other hand, is comparatively easy. For example, Kant's refutation of the thesis of the First Antinomy (discussed in detail below), which postulated an empty time before the world, consists in declaring the notion to be unintelligible. The thesis of the Second Antinomy, physical atomism, is said to be self-contradictory; in other writings Kant even uses the proposition, "All bodies are divisible," as the paradigm of an analytic statement and the assertion that an extended body is indivisible as an example of a logical contradiction.[13] The thesis of the Third Antinomy, which as we shall see in Section 2.5 denies that the material world is causally closed, is incompatible with natural science as we know it, since it denies the principle of conservation in a material system, allowing non-material "active principles" to act in the world and thus implying that some physical events have non-physical causes. According to Kant, however, not even God himself could contravene the conservation laws, for this would be absurd.[14]

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12 *Critique of Practical Reason*, A206

13 Cf. *Prolegomena*, §2; "Über eine Entdeckung," (Ak 8,229; W 3,347). In the "Progress of Metaphysics" Kant asserts: "For instance, the statement: 'every body is divisible' does in fact have a ground, and a ground in itself, i.e. it can be understood as inferring the predicate out of the concept of the subject according to the law of non-contradiction and thus according to the principle of analytic judgments." (Ak 20,278; W 3,611)

14 If the vector sum of all 'forces' (mv) is not conserved and does not remain equal to zero, then the position of the center of mass of the material world changes; given the dynamic equivalence of a system and its center of mass, this implies a *motion of the universe* in absolute space. In one of the so-called "Kiesewetter

Thus according to Kant, the thesis position is inconceivable, self-contradictory or evidently false; it draws its only support from the fact that it is apparently the only alternative to the antithesis position. Jumping ahead slightly, let me point out that Kant resolves the antinomies or the apparent contradictions between theses and antitheses by arguing as follows: If one interprets them reasonably and takes the principles of his philosophy into account, then in the two mathematical antinomies (1 & 2) both theses and antitheses are false and in the dynamical antinomies (3 & 4) both are after some corrections *possibly* true. Looking back in the *Prolegomena*, Kant remarks:

> Consequently, whereas in the first case the opposed assertions *were both false*, in this case, on the other hand, where they are opposed to one another by mere misunderstanding, they *may both be true*. (§53; p. 83; emphasis PM)

According to the interpretation sketched above Kant attempts in the First and Second Antinomies to show that the antithesis position, *too*, is false. In the Third and Fourth antinomies he tries to show that the antithesis is not *exclusively* true; i.e. after showing that both positions, as presented, are false but can be corrected, he tries to prove that even if the corrected antithesis position is true, the corrected thesis is at least conceivable.

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The analysis of the antinomy as a figure of argument will be carried out in this chapter in five steps. First of all (Section 2.2), I shall examine the logic of Kant's argument in the antinomies chapter. The relation of the antinomies both to Kant's Table of Judgements and to his doctrine of logical opposition will be analyzed, and the key role for the entire argument played by the apagogical form of proof will be pointed out. Secondly (Section 2.3), the place in Kant's systematics and the basic structure of the argument will be

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Papers" ("Über Wunder" ca. 1788-90) Kant wrote: "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 laws of the action and reaction of matter, for otherwise a motion of the universe in empty space would arise." (Ak 18,320)

described; the key concepts of the "unconditioned" and the "infinite series" will be explicated on the example of the First Antinomy, and an important discrepancy between the two parts (space and time) of this antinomy will be pointed out. Section 2.4 will take up the relation of part and whole dealt with by the Second Antinomy and expose an unreflected presupposition of Kant's about the nature of this relation. In Section 2.5 I shall analyze on the example of the antinomy of freedom and determinism the somewhat different way in which the dynamical antinomies are resolved — the so called "subcontrary" type of resolution, which is supposed also to hold for the later antinomies in the *Critique of Practical Reason* and in the *Critique of Judgment*. Section 2.6 will examine Kant's system of antinomies as presented at the end of the "Critique of Aesthetic Judgment" in order to clarify the peculiar position of the antinomy of judgment. Finally (Section 2.7), the most important results of the analysis of the antinomies as a figure of argument will summed up.

2.2 Kant's Logic and the Antinomies

Contrary and Subcontrary Oppositions

In one of his drafts for an answer to the Academy prize question on the progress made in metaphysics since Leibniz and Wolff, in which he reflects on his own contribution to the progress of metaphysics, Kant compares the apparent contradictions of the First and Second Antinomies to contrary oppositions in logic. The Third and Fourth Antinomies he compares to subcontrary oppositions. The thesis of the First Antinomy maintains, for instance, that the world is *finite*; the antithesis maintains that it is *infinite*. On the opposition of these two propositions Kant writes:[15]

> The conflict of these propositions is not merely logical, not one of ana lytical opposition (*contradictorie oppositorum*), i.e., a mere contradiction;

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15 "Progress of Metaphysics," Ak 20,290; W 3,627; see also Ak 20,327-29; W 3,669-71.

> for then if one of the propositions is true, the other must be false and vice versa, e.g., *the world is infinite as to space*, compared with the counter-proposition, *it is not infinite as to space*; but [it is] rather a transcendental conflict, one of synthetic opposition (*contrarie oppositorum*), e.g. *the world is finite as to space*, a proposition which says more than is required for logical opposition ... which two propositions thus can both be false — as in logic two judgments opposed to one another as contraries [*Widerspiel*] (*contrarie opposita*).

The conflict between thesis and antithesis is thus supposed not to constitute a contradiction but rather a contrary opposition; and it is supposed to make a difference with regard to the statement, "The world is infinite," whether one asserts "The world is finite," or "The world is not infinite." In the first case, according to Kant, one says "more" than is necessary for contradiction and thus it could be that both conflicting propositions are false, i.e. the proposition, "The world is neither finite nor infinite," could be true. It will be helpful first to examine Kant's views on these kinds of propositions and oppositions.[16]

Kant calls the antinomies chapter as a whole a "conflict of reason with itself" or a "conflict of laws (antinomy)" (B434-5); the individual antinomies are called "conflicts." The German word "Widerstreit," usually translated as "conflict or "opposition," is Kant's most general term for opposition. It is a "concept of reflection" whose counterpart is "agreement" (*Einstimmung*) (B318, B320); it is the generic term for such more specific oppositions as real opposition (e.g. of forces), logical opposition, and transcenden tal opposition (between realities and negations).[17] Logical opposi tion, which interests us here, is subdivided into the contradictory, contrary and subcontrary oppositions familiar from the square of oppositions of traditional logic. Contradiction or "true" opposition is characterized as expressing neither *more* nor *less* than is necessary:

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16 A number of commentators have noted the similarity between the antinomies and these two traditional types of opposition. Cf. Heimsoeth, *Transzendentale Dialektik*, p. 305; Walsh, *Criticism*, p. 200 and "Structure," p. 83; Philonenko, "Jugement teleologique," pp. 23f; Butts, *Double Government*, p. 252. However, only M. Wolff, *Begriff des Widerspruchs*, has taken the analysis of these forms of opposition as the basis of an interpretation of the antinomies chapter. Section 2.2 of this chapter will be a running debate with Wolff's interpretation.

17 Cf. "The Amphiboly " B316-349; "Negative Größen," Ak 2,171f, W 1, 783f; Schmid, *Wörterbuch*, "Widerstreit." In Herder's notes of Kant's logic lectures we read: "Die Repugnanz ist aut logica aut realis." (Ak 28,1,12)

> For the true opposition that takes place here contains neither more nor less than belongs to opposition. According to the Principle of the Excluded Middle therefore both of the contradictory judgments cannot be true, but also both of them can just as little be false. Thus if the one is true the other is false and vice versa. (*Logic*, §48; W 3,547f)

Contraries on the one hand say "more" than is necessary for true opposition, and both can be false. Subcontraries say "less" than is necessary and can both be true. The only thing somewhat unusual about Kant's conception of these types of logical opposition is that he is not so much interested in the logical form of the propositions in the strict sense, that is, in their *identity or difference in quantity and quality*. Although in his lectures on logic (§48-50), he introduces them in the traditional manner, in practice he is interested only in the truth relations of the propositions: whether both can at once be true or both false, etc. Contraries thus need not be universal propositions, subcontraries need not be particular, and contradictories need not differ in quantity. They need only have the appropriate truth relations.

The distinction between these various kinds of opposition is significant when dealing with immediate inference and indirect proof, and it is in this context that Kant introduces them in his lectures on logic. The important point is that the so-called apagogical or indirect proof, in which the truth of a proposition is inferred from the falsity of its opposite, is legitimate only when the two propositions involved are true contradictories. If they are merely contraries, no conclusions about the truth or falsity of one can be drawn from the falsity of the other without introducing further assumptions. As for subcontraries, although one can indeed in traditional logic, infer the truth of one proposition from the falsity of the other, one cannot infer the falsity of a proposition from the truth of its subcontrary.

Returning to our original example, we can see that Kant is asserting that, of the three propositions,

1) The world is infinite,

2) The world is not infinite,

3) The world is finite,

(1) and (2) are contradictories but (1) and (3) are contraries, that is, that while either (1) or (2) *must* be true, both (1) and (3) *can* be false (and according to Kant they *are* false). What is the difference? In

what sense does the proposition, "The world is finite" say *more* than "The world is not infinite," *more* than is necessary for contradiction? The answer to this question is the resolution to the first antinomy, to which we shall presently turn. However, in order to avoid irrelevant complications, let me point out already here that Kant is not casting doubt on the rule of double negation since he elsewhere (B532) equates "non-infinite" with "finite." Moreover, the same argument also applies to the truth relations of the following three propositions where no double negation is involved:

3) The world is finite

4) The world is not finite

1) The world is infinite.

(3) and (4) are contradictories, but (3) and (1) are supposed to be contraries. As we shall see, Kant is distinguishing between the negation of a proposition (or, in singular categorical judgments, the negation of the copula) and the negation of the predicate.

Infinite Judgments

In the Table of Judgments in the Analytic of the *Critique of Pure Reason* (B95), Kant distinguishes three different "qualities" of judgment, each of which corresponds to one of the examples cited above. The three qualities are as follows:

Affirmative	S / *is* / P	"anima *est* mortalis"
Negative	S / *is not* / P	"anima *non est* mortalis"
Infinite	S / *is* / not-P	"anima *est* non-mortalis"

In an affirmative judgment the connection of a subject with a predicate is asserted (*setzen*, *ponere*); in a negative judgment the connection is denied (*aufheben*, *tollere*). In a so-called infinite judgment a subject is connected with a *negative* predicate. "In an affirmative judgment," says Kant in his lectures on logic as edited by Jäsche, "the subject is thought under the sphere of a predicate, in a negative judgment it is placed outside the sphere of the predicate and in the infinite it is placed in the sphere of a concept which lies

outside the sphere of an other."[18] Kant generally uses a Latin example to illustrate the distinction between negative and infinite judgments, since it is possible in Latin to distinguish between a negated copula and a negated predicate by the word order of the sentence (*non est*, *est non*).

Since the argument that Kant is trying to make with the figure of the antinomy seems to hinge on the distinction between a negative judgment (*The world is not finite*) and an infinite judgment (*The world is non-finite*), it will be worthwhile to study this difference more closely.[19] The distinction between the two is basically that in negative judgments, the statement itself is negated, or for singular judgments simply the copula, whereas in infinite judgements the negation applies merely to the predicate term. Kant apparently sees a difference between denying the ascription of a predicate and asserting the negation of a predicate.

Kant was certainly not the first to distinguish infinite and negative judgments, although the distinction was not part of the dominant tradition. According to a survey by Tonelli 16 of the 49 eighteenth century German logic books examined list the infinite judgment as a separate category.[20] But even those logicians who rejected or ignored infinite *judgments* (*iudicia infinita*) often had a place in their systems for negated or infinite *terms* (*termini infiniti*,

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18 Kant, *Logic*, §22 (Ak 9,103-4; W 3,534). This extensional characterization of the differences between the forms of judgment states that affirmative judgments place the things referred to by the subject term in the class of objects characterized by the predicate. The negative judgment denies their membership in this class. The infinite judgment asserts their membership in an incompatible class which is not necessarily coextensive with the complementary class.

19 The distinction was apparently not universally observed in Kant's time, and some logicians seem to have equated or conflated contrary and contradictory oppositions (cf. Lambert, fn 24 below). In one of his lectures Kant remarks: "It is puzzling that logicians have called contrariety a contradiction." (Ak 24,470).

20 There is no definitive analysis of the function of Kant's distinction of a third quality of judgment. In general, the infinite judgment is treated along the lines set by Schopenhauer as "a false window, of which there are many attached for the sake of symmetrical architectonics" (p. 541). Menne's otherwise very helpful study, "Das unendliche Urteil," also suffers from this 'Schopenhauer syndrome' of explaining a text by psychological speculation instead of philosophical analysis. Tonelli, "Voraussetzungen," examined close to 50 different eighteenth century logic texts and found that a third of them accorded some official status to infinite judgments. On the background of Klaus Reich's interpretation, L. Krüger in "Wollte Kant...?", makes a number of suggestions for interpreting this section of the CPR which will be taken up below.

normally rendered in English as "indefinite terms"). "Infinitum" is the Latin translation introduced by Boethius of the Aristotelian αοριστον, which was applied to parts of a judgment. However, after Boethius a judgment in which either subject or predicate contained a negation was often called "affirmatio infinita" or "negatio infinita". Kant seems however to have been the first to take the term "infinitum" literally. For most logicians the expression seems to have been simply a perhaps unfortunate but traditional term for *indefinite* predicates or for judgments containing such predicates.[21] Hegel remarked, looking back, "The name, infinite judgment, tends to be mentioned in the usual logic books, although it is not clear what its significance might be."[22]

Meier's *Logic*, which Kant used as a text in his lectures, considers infinite judgments in various forms: "If there is a negation in a judgment, either in the subject or predicate or in both at once, as long as the copula is not negated, the judgment is affirmative and is called *an infinite judgment* (*iudicium infinitum*)."[23] In practice Meier treats such judgments as if they were *negative*.

J.H. Lambert, often cited as influential for the development of Kantian logic, does not introduce infinite judgments but does consider indefinite terms (*termini infiniti*); he not only equates judgements containing such terms with negative judgments but even tries to reduce the latter to the former: "With regard to affirmation and negation we must note that both actually affect the predicate, and by negation the latter is transformed into a *terminum infinitum*."[24] This equation of negative and infinite judgments in their logical functions subscribed to by Meier and Lambert is rejected by Kant, who notes that his division of judgments "appears to depart from the technical distinctions ordinarily recognized by logicians" (B96).

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21 Cf. Prantl, *Logik*, pp. 692f; Maier, *Qualitätskategorie*, p. 44.

22 Hegel, *Logic* II,324 (pt. 2, sect. 1, chap. 2, A.c.).

23 Cf. Ak 16,636.

24 Lambert, *Organon*, §144, p. 93. It is interesting to note that Lambert after equating the two goes on to make a rather elementary logical mistake, in that he not only says that two contraries "contradict" one another but also that one must be true and the other false: "Since then consequently B and Not B cannot possibly be together in one and the same subject, then ... the statements: *Every A is B* and *Every A is not B* contradict one another absolutely, and one of them is necessarily false and the other is necessarily alone true."

In contrast to Lambert, Kant does not speak of infinite terms but rather of *negative* terms or predicates or simply "negations" (*Verneinungen*), which are the opposite of affirmative terms. This is significant in as much as Kant considers such predicates as being *logically* opposed to one another or even "contradictorily opposed" even when they are not joined together in a judgment.[25] According to its logical form, says Kant, an infinite judgment is affirmative since it uses the simple copula "est"; but in terms of content the judgment is negative, which affects its role, for instance, in a syllogism. In a later metaphysics lecture Kant remarks that the "*infinita* are affirmative judgments with regard to the copula, or negative with regard to the predicate. E.g. *anima est non-mortalis*."[26] In the *Critique of Pure Reason* Kant justifies the distinction with a reference to the differing intentions of "general" and "transcendental" logic.

> In like manner *infinite judgments* must, in transcendental logic, be distinguished from those that are *affirmative*, although in general logic they are rightly classed with them, and do not constitute a separate member of the division. General logic abstracts from all content of the predicate (even though it be negative); it enquires only whether the predicate be ascribed to the subject or opposed to it. But transcendental logic also considers what may be the value or content of this logical affirmation made by means of a merely negative predicate, and what is thereby gained with respect to our total knowledge. (B*97)

It seems at first glance that Kant admits openly that distinguishing infinite judgments as a special kind of judgment does not belong to logic proper and that the distinction is only imported into logic from transcendental philosophy. Accordingly, many commentators have interpreted him as not deriving the categories from the logical functions of the understanding but rather as determining the forms of judgment according to the already invented categories.[27] However, from later reflections and lecture notes it seems clear that Kant considered the distinction of infinite judgments from affirmative and negative to be part of logic. Lorenz Krüger has made the reasonable suggestion that we interpret the expression "transcendental logic"

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25 On "contradictorily opposed" predicates or determinations, cf. B48, B298, B486, B599ff. Kant considers two predicates (terms) such as B and non-B to be *logically* opposed.

26 Ak 29.1,985; the hyphen in "non-mortalis" was (justifiably) inserted by the editors of the "Academy" edition.

27 Cf. Krüger, "Wollte Kant...?" for a discussion of various commentators.

in this context as "transcendental reflection upon traditional logic"; this is an interpretation that can easily be reconciled with the text as it stands and fits in very well with Kant's later pronouncements.[28]

From this perspective, we can distinguish two logical levels besides the transcendental: a logic of judgments and a logic of terms or predicates. The logical form of the *judgment* is independent of the positive or negative form of the predicate; "general" logic — as far as quality is concerned — asks only whether the copula is "est" or "non est". But in a transcendental reflection upon logic we consider the "functions" or actions of the understanding in judging; there it could make a difference, if we posit a negation instead of removing an affirmation. The fact that an affirmative (infinite) judgment such as "anima est non-mortalis" can be *logically* opposed to another affirmative judgment such as "anima est mortalis" depends, according to Kant's analysis, on the *content* of the two *judgments*; but the opposition of the content of the two judgments itself depends merely on the *form* of the predicates, i.e. on the fact that one is the negation of the other. The two judgments differ only in the logical particle 'non' which in one judgment is attached to the predicate. Kant believes that the 'non' in "non-mortal" exercises a formal function and is not just part of the material term. If I say, "The soul is mortal; the soul is everlasting," the two judgments are inconsistent due to their content, due to the meanings of the predicates. But since the differences in meaning of the predicates is not based on a merely formal difference in the predicate terms (such as mortal/non-mortal), their opposition is not purely formal, i.e. properly logical.

The passage from the Transcendental Analytic quoted above thus proves to be somewhat ambiguous. Kant asserts that "general logic abstracts from all content of the predicate"; he does not claim that logic abstracts completely from the *form* of the predicate. Furthermore, the characterization of the predicate in infinite judgements as "merely negative" can only mean that it is supposed to be negative in a formal (and thus logical) sense. Kant cannot be interpreted as meaning "negative" in some transcendental sense, for in terms of transcendental content "non-mortal" or "immortal" (the

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28 Krüger, "Wollte Kant...?" p. 348. Cf. Refl. 3071 (Ak 16,640) and Kant's lectures in Ak 24,2,577 and 929.

predicate under consideration) is a transcendental *affirmation* or "reality."[29]

Summing up, we may characterize the infinite judgment as follows: A *judgment* which is affirmative in its logical form is to be called infinite, if its *predicate* is negative in form (independently of its transcendental content).

Although we may perhaps understand Kant's hesitancy simply to classify such judgments as affirmative, the question still arises as to why he did not simply treat them as negative judgments as did Meier and Lambert. In order to see why Kant could believe that the affirmation of a negative predicate was something else than the negation of an affirmative predicate, it will perhaps be useful to examine Lambert's argument for equating both kinds of judgment. Lambert introduces infinite terms (*termini infiniti*) in order to divide a genus neatly into two species: Genus A can be divided into an arbitrary species B and its *terminus infinitus* non-B. Then he maintains that "A is B" is an affirmative judgment and "A is non-B" is a negative judgment, and that the two stand in the relation of contradiction to one another. Lambert presupposes that the genus A belongs to the concept of the subject to which the species are ascribed as predicates, e.g., animate things (A) are either mortal (B) or non-mortal (non-B).[30] However, if one, instead, adopts Kant's procedure and begins with the two "contradictory" species B and non-B, ascribing them in different judgments at the same time to the same subject C: "C is B and C is non-B," the two judgments stand in the relation of contradiction to one another only if one can presuppose that "C is A" is analytically true; otherwise the two

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29 Unfortunately, Kant always illustrates the infinite judgment on the example of the immortality of the soul, and immortality is also an instance of what traditional philosophy called a "reality" or positive predicate, which can or must be attributed e.g. to the *ens realissimum* (God). Immortality, independent of its linguistic form as "non-mortal" or "eternally living," is in Kant's terminology a *transcendental affirmation*. The presence of the logical word "non" in the predicate (making it a "negative predicate") does not make it a transcendental negation. The (logical) form of the predicate is negative, its (transcendental) content is positive. Kant uses the same example in different contexts to illustrate both *logical* and *transcendental* negation. Cf. B602.

30 Lambert, *Organon*, §89, p. 55; cf. Strawson, *Introduction to Logical Theory*: "Suppose you draw a closed figure on a piece of paper and then someone indicates a point on the ceiling and says: 'Does this point lie inside or outside the boundaries of the figure?'... Things lying in a different plane were not excluded from it, but neither were they included in it." (p. 6)

judgments stand merely in the relation of contrariety.[31] For instance, an inanimate stone is neither mortal nor immortal (non-mortal). On the other hand, the soul (*anima*) must be either mortal or immortal, since it is analytically true — at least in our conceptual system — that the soul is animate.

The main function of infinite or indefinite terms is not in the logic of inference but in the logic of terms or categories, where it is used for definitional division. Any genus can be divided neatly into two species by distinguishing one species and negating it within the genus; for instance, all mammals are either marsupials or non-marsupials. In this case of course being a non-marsupial presupposes that one is a mammal. A predicate and its "infinite" negation are two mutually exclusive species which exhaust a genus, or in Strawson's terminology, they are two predicates which exhaust a given "range of incompatibility."[32] Thus if a subject falls under the range of incompatibility of being a mammal, it must either be marsupial or non-marsupial; if it falls under the genus of colored things, it must be blue or non-blue. The Law of the Excluded Middle holds only under such assumptions, when dealing with this kind of negation. Assuming the soul is animate (which is analytic), then it is either mortal or immortal; if the soul were the sort of thing that is not alive, then it would be neither mortal nor immortal just as stones, prime numbers, and truth tables are neither the one nor the

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31 Kant formulates the law of non-contradiction as follows: "No thing may be ascribed a predicate that contradicts it." (B*190, cf. also Ak 2,294; W 1,765). By this Kant means that no thing may be ascribed a predicate whose opposite is contained in the concept of the thing; for instance, "No unlearned person is learned." In such a formulation the restriction "at the same time" is unnecessary. In his discussion of the law of non-contradiction, Kant *separates* a predicate from the concept of the subject and then attributes both this predicate and its *opposite* to the subject at the same time. In this case the predicate does not contradict the subject (as the law of non-contradiction is said to demand) but rather only the other predicate: *The person is learned; the person is unlearned*. "The misunderstanding results from our first of all separating a predicate of a thing from the concept of that thing, and afterwards connecting this predicate with its opposite — a procedure which never occasions a contradiction with the subject but only with the predicate which has been synthetically connected with that subject, and even then only when both predicates are affirmed at one and the same time" (B192). The formulation presupposes that the person belongs to the genus of things that are either learned or unlearned. On the idiosyncracies of Kant's version of the law of non-contradiction in general, cf. Wolff, "Der Begriff des Widerspruchs in der 'Kritik der reinen Vernunft'."

32 Strawson, *Introduction to Logical Theory*, chap. 1.

other. We can thus say that while it is true that the soul is not blue, it is false to say that it is non-blue, just as it is false that it is blue. However, membership or lack of membership in the appropriate genus is obviously not always analytic in a given conceptual system. When membership in the genus is a synthetic predicate or contingent property, then the situation becomes somewhat more complicated: and just such a case occurs in the antinomies.

In various reflections and lectures (at least according to the notes his students took) Kant provided a number of mutually incompatible explanations of the nature of infinite judgments. Thus, it is probably impossible to give an interpretation that will make *all* his recorded remarks on the subject consistent. However, the *problem* that Kant is dealing with on all these occasions is the same: the *principium exclusi medii*, the Law of the Excluded Middle.[33] The common denominator of all Kant's inconsistent remarks on infinite judgments is that the Law of the Excluded Middle does not automatically apply to the conjunction of an affirmative and an infinite judgment as it does to the conjunction of an affirmative and a negative judgment.

Tertium datur

Nowhere in the *Critique of Pure Reason* does Kant say that infinite judgments play a significant role in dialectical illusion. However, the paradigmatic example used to illustrate the logical structure of the antinomies does in fact involve just such a

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33 Cf. e.g. the following two explanations taken from the lecture notes of Kant's students (which represent perhaps not so much what Kant said as what the students understood him to have meant):

"In infinite judgments I imagine that the subject is contained in a different sphere than that of the predicate. For example, *anima est non-mortalis*; here, I imagine that the soul does not belong to the mortals, but I think still more, namely, that it belongs to the immortals, I imagine it in a different sphere as contained in the concept." (Ak 24,578; hyphen added)

"But if I say: *anima est non-mortalis*: then I say not merely that the soul contains nothing mortal, but, moreover, that it is also contained in the sphere of everything that is not mortal ... I do not actually say *est immortalis*, but rather I say: that among all concepts in general which might be conceived outside the concept of mortality the soul can be found. And this actually constitutes the infinite judgment." (Ak 24,940; hyphen added). Cf. also Ak 16, 635-641.

judgment. Let us now turn to the question of how such judgments can lead to particular "dialectical" difficulties.

In a digression on Zeno (B530-35), Kant uses a purportedly simple example to display the logical relations of the propositions in an antinomy. He points out (B531) that there is a contradiction between the affirmative proposition :

5) Every body is good-smelling (every body smells good)

and the negative proposition:

6) Some bodies are not good-smelling (some bodies don't smell good).

But we could replace (6) with an infinite judgment such as:[34]

7) Some bodies are non-good-smelling (some bodies smell non-good)

Propositions (5) and (7) are incompatible, but they are not contradictories in the strict sense. The Law of the Excluded Middle, which applies to the conjunction of (5) and (6) on the basis of their logical form, does not apply to the conjunction of (5) and (7). Only on the presupposition that all bodies have some smell are (5) and (7) contradictories. Without this assumption both could be false, e.g. if all bodies are odorless or some bodies are odorless but none are bad smelling (having an odor is obviously a synthetic predicate). The apparent contradiction between (5) and (7) thus proves to be, in Kant's sense, a merely *contrary* opposition. Both propositions could be false, but both could not be true; the dialectical illusion of a contradiction disappears as soon as this is recognized. Here we are dealing only with a *logical* illusion. As Kant himself says:

> If someone were to say, that every body smells either good or it smells not good, a third case occurs, namely that it does not smell (diffuse) at all, and

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34 The reformulation of the opposition as good-smelling/bad-smelling proposed by Wolff (*Der Begriff*, pp. 48-56) and occasionally simply carried out in English and French translations (e.g. Meikeljohn, Barni and Archambault) disposes of the "logical word *non*" in the formulation and transforms the infinite judgment into a straightforward affirmative judgment which is incompatible with another affirmative judgment for reasons of content. However, Kant's problem is not that "contrary" predicates such as good-smelling and bad-smelling, or black and white could be confused with "contradictory" predicates; the problem is rather that *judgments* ascribing "contradictory" predicates (good-smelling, not-good-smelling; mortal, non-mortal) to the same subject at the same time may not themselves be contradictories but merely contraries.

> then both conflicting propositions can be false. If I say it [the/every body] is either good-smelling or it is not good-smelling (*vel suaveolens vel non suaveolens*), then both judgments are contradictorily opposed, and only the first [i.e., "every body is good-smelling"] is false, but its contradictory opposite, namely, some bodies are not good-smelling, includes also the bodies which do not smell at all: in the previous opposition (*per disparata*) the contingent condition of the concept of the bodies (the smell) remained with the conflicting judgment and was not cancelled out by it, therefore the latter was not the contradictory opposite of the former. (B*531)

Kant's presentation here may be somewhat clumsy, but the problem is relatively straightforward. In constructing this opposition we have implicitly assumed something about bodies which in fact must be explicitly legitimated.[35] As Kant would put it: the "logical illusion ... arises entirely from lack of attention to the logical rule" (B353). This kind of illusion could only lead to an antinomy if the presupposition is made not simply through lack of attention, but is in some sense "natural and unavoidable"; in this case the dialectical (logical) illusion would also be transcendental. This is supposed to be the case, according to Kant, with certain propositions, for instance, about the world. Kant then extends the same argument to these propositions about the world. For instance there is a contradiction between the affirmative and the negative propositions:

3) The world is finite

4) The world is not finite.

However, if we replace (4) with the infinite judgment:

1) The world is infinite,

we have a *contrary* opposition in which both propositions could be false. The same argument can be made for the two contradictories:

1) The world is infinite

and

2) The world is not infinite.

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35 Überweg writes, for instance: "These principles do not apply to those judgments, whose predicates stand to one another in the relation of contrary or positive opposition. Rather, in this relation under certain presuppositions ... both judgments can be false .... Both can be false ... if the subject cannot be ascribed the concept that is superordinated to the two contrary predicates as the concept of their common genus (a relation which is called by Kant *dialectical opposition*)." (*System der Logik*, §81, p. 213).

If , however, we replace (2) with the infinite judgment:

3a) The world is non-infinite (i.e. finite),

we obtain a contrary opposition because (3a) says "more" than is necessary for contradiction with (1). The Law of the Excluded Middle applies to the conjunction of (3) and (1) — and (1) and (3a) — only if the world belongs to the genus of things that have a determinate size, either finite or infinite. Kant maintains that in order to have some determinate or definite magnitude, the world as a whole would have to be able to be given as a totality — which, he maintains, could occur only if it were a thing in itself. Thus only on the assumption that the world is a thing in itself does the thesis of the First Antinomy contradict the antithesis in the strict sense. If I deny this assumption, then the two propositions turn out to be mere contraries.[36]

> If, therefore, we say, "the world is either infinite in extension or it is not infinite (*non est infinitus*)," and if the former proposition is false, its contradictory opposite, "the world is not infinite," must be true. And I should thus remove [*aufheben*] an infinite world, without positing [*setzen*] another, namely, a finite world. But if we had said, "the world is either infinite or finite (non-infinite)," both statements might be false. For in that case we should be regarding the world in itself as determined in its magnitude, and in the counterproposition we do not merely remove the infinitude, and with it perhaps the entire separate existence of the world, but attach a determination to the world as a thing real in itself. This assertion may, however, likewise be false, if, namely, the world is not given as a thing in itself at all and thus not given as either infinite or finite with regard to size. I beg permission to entitle this kind of opposition *dialectical opposition*, and that of contradiction *analytical opposition*. Thus of two dialectically opposed judgments both may be false due to the fact that the one does not merely contradict the other, but says something more than is required for contradiction. (B*531-2)

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36 Wolff interprets this passage as follows. "Kant thus maintains that the relation of the predicates 'infinite' and 'finite' is always contrary, while the relation of the predicates 'infinite' and 'not infinite' is always contradictory. Kant seems once again to attempt to base the contrariety between 'finite' and 'infinite' independent of context on purely linguistic critieria." (*Der Begriff*, 54) While it is true that Kant does indeed try to base the opposition of these predicates on purely linguistic criteria, 1) *both* pairs of oppositions are considered to be 'contradictory'; 2) Wolff ignores Kant's explicit distinction between "not infinite [*nicht unendlich*] (*non est infinitus*)" and "non-infinite [*nichtunendlich*]"; in the first expression the negation is part of the copula, in the second part of the predicate; 3) *here*, Kant is dealing not with problems involving the oppposition of predicates but of judgments: affirmative and infinites judgments are contraries; affirmative and negative judgments are contradictories.

Both conflicting propositions presuppose that the world as a whole is given and therefore must have a definite magnitude. However, the world as the totality of objects of a possible experience can never be given as a whole to any human understanding. The world could only then be given as a whole (although not to our understanding) if it were a thing in itself. Thus, in so far as we debate whether the world is finite or infinite, we presuppose that it is something given and thus that it can have a determinate magnitude. If the world as a whole is not given it need also not have a determinate magnitude, either finite or infinite. The apparently analytical opposition proves to be merely dialectical; the contradiction turns out to be a contrary opposition, as soon as the presupposition that the world is a thing in itself is dropped — a presupposition that grounded the *tertium non datur* in the conjunction of an affirmative and an infinite judgment.

> If, however, I take away this assumption, or this transcendental illusion, and deny that the world is a thing in itself, the contradictory opposition of the two assertions is converted into a merely dialectical opposition. Since the world does not exist in itself (independently of the regressive series of my representations), it exists neither as *an in itself infinite* nor as *an in itself finite* whole. It is only to be met with in the empirical regress of the series of appearances, and not as something in itself at all. Hence, if this series is always conditioned, then it is never completely given, and the world is not an unconditioned whole, and thus also does not exist as such a whole, either of infinite or of finite magnitude. (B*532-3)

The solution to this (the first) antinomy shows that it is "merely dialectical, and that it is a conflict due to an illusion" (B534).

It is here that we can see the true purpose of Kant's systematic use of the apagogical form of proof in the antinomies chapter. The resolution of the antinomy shows that both seemingly contradictory propositions are false, i.e. that the opposition is not contradictory but rather contrary. But both have supposedly been *proved* to be true. The solution is to be found in the form of proof: The proofs are not proofs at all, they are refutations of the respective counterpropositions. Only under the assumption, *tertium non datur*, can one interpret the refutation of the counterproposition as a proof of the proposition; and precisely this presupposition is shown by the contrariety to be false. With the falsehood of the presupposition all proofs become invalid while the refutations remain unaffected; and since the refutations are still valid, all theses and antitheses are thus false. If the proofs had been direct, they would continue to be

valid, and the antinomy would be insoluble. Thus, it seems to me, that any interpretation that attempts to reconstruct the proofs by making them direct, misses the point from the start.

In the "Doctrine of Method" at the end of the *Critique of Pure Reason* Kant draws consequences from the key role played by indirect proofs in the antinomies chapter: he bans this form of proof from philosophy. In the section on "The Discipline of Pure Reason in Regard to its Proofs," he remarks that reason's "proofs must never be apagogical, but always ostensive" (B817). The reason for this is that it often happens,

> that the two propositions contradict each other only under a subjective condition which is falsely treated as being objective; and since the condition is false, both can be false, without its being possible to infer from the falsity of the one to the truth of the other. (B*819)

Let us briefly recapitulate the structure of the antinomy: a logical illusion can arise when two contrary (or subcontrary)[37] propositions appear to stand in contradiction or analytical opposition, so that it seems that one of the pair of conflicting propositions must be true and the other false, and that apagogical proof procedures would be legitimate. The resolution of the antinomy consists in showing that the opposition is not one of contradiction but rather a merely dialectical (synthetic, contrary) opposition.

The illusion, insofar as it was ever really unavoidable (this must be taken up below), will presumably remain unavoidable even if one acknowledges the solution. At the beginning of the "Dialectics" Kant asserted

> Transcendental illusion, on the other hand, does not cease even after it has been detected and its invalidity clearly revealed by transcendental criticism (e.g. the illusion in the proposition: the world must have a beginning in time). (B353)

Thus the difference between logical dialectic and transcendental dialectic lies not in the form of the opposition but rather in the inevitability of the illusion or of the presupposition that causes the illusion. What is transcendental in the antinomies lies not in the form of the apparent contradiction but in the presuppositions of the cosmological ideas.

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37 The peculiarities of the "subcontrary" form of resolution will be dealt with in Section 2.5 below.

Thus, two aspects of the antinomies should be kept distinct: 1) the question, whether the semblance is really transcendental, i.e. whether the dialectics and illusion are really necessary, and 2) the question, whether the critical technique of presenting basic positions of metaphysics as contrary (or subcontrary) oppositions, which appear to be contradictions, and the subsequent resolution of these pseudo-contradictions is an appropriate instrument for explicating and solving philosophical problems. For the purposes of this study, it is the figure of argument used in the antinomies chapter that is of importance, and not so much the question whether Kant in fact succeeds in "logically" deriving the positions confronted from "the first germs and dispositions in the human understanding" (B*91). In the next section, I shall take up only very briefly Kant's reasons for asserting the inevitability of the illusion.

2.3 The Unconditioned and the Infinite Series

The Systematic Locus

The questions and answers of rational cosmology are not presented in the *Critique of Pure Reason* as contingent and historically given but rather as systematically necessary. According to Kant such problems develop inevitably from the germs and dispositions of the human faculty of knowledge. I shall take this claim of Kant's into account only insofar as to *describe* the systematic locus and the thrust of the argumentation in order to introduce the concepts and assertions necessary for an analysis of the resolution of the antinomies. In this section I shall merely be *describing* Kant's itenary and *reporting* his views; I shall not make any attempt to defend or justify them except in terms of logical coherence with his system and intersubjective intelligibility. For the purposes of this study it is unimportant whether the illusion is really objective and whether these particular antinomies are really unavoidable — I shall deal with this sort of question in the next chapter on the antinomy of judgment. The point here is merely to make transparent the struc-

ture and function of this kind of argumentational figure for later reference. That the positions of the thesis and the antithesis reflect real foundational problems of modern natural science, has already been made clear in the discussion of the Leibniz-Clarke debate. I shall here simply assume for better or worse that they can also be 'derived' in some manner from Kantian systematics.

The three major areas of interest of the Dialectic are traced back to the three different forms of logical inference: categorical, hypothetical, and disjunctive (B360-1 and B379-80). From these three forms of inference Kant derives three "ideas of reason" (analogous to the forms of judgment and concepts of the understanding) and reasons from the logical to the transcendental (in analogy to the analysis of the understanding). The transcendental concepts of reason (ideas) can also be used transcendently, i.e. illegitimately, if the understanding attempts to follow them beyond the bounds of possible experience. The Dialectic or the critique of the *illusions* which occur thereupon is divided into two books, "the first on the transcendent concepts of pure reason, the second on its transcendent and dialectical inferences" (B366).

In accordance with the three relations of inferences to their conditions, there are three transcendental ideas which denote the subject matter of three areas of metaphysics: the subject matter of psychology (the ego as a simple substance, the soul, immortality); the subject matter of cosmology (the world, freedom); and the subject of theology (God). The ascription of objective reality to these ideas is a "dialectical inference" (B397-8). The antinomies chapter deals with the second area, the world (and freedom). "The *second* kind of pseudo-rational inference is directed to the transcendental concept of absolute totality of the series of conditions for any given appearance ... The position of reason in these dialectical inferences I shall entitle the *antinomy* of pure reason." (B398)

Like the other inferences of reason the antinomies are due to reason's demand for the unconditioned, for absolute totality of the conditions. In the antinomies in particular the problem is the absolute completion of the *series* of conditions belonging to a given conditioned phenomenon.

> Reason makes this demand in accordance with the principle that *if the conditioned is given, the entire sum of conditions, and consequently the absolutely unconditioned* (through which alone the conditioned has been possible) *is also given.* (B436 emphasis, Kant)

The understanding is essentially a capacity to make connections; it advances one step after the next connecting them up in a series. It is only through the understanding that empirical knowledge is possible. Reason on the other hand strives for the whole. Whereas the understanding *seeks* the condition for every conditioned in order to connect the one with the other, reason views the condition as being already given with the conditioned — just as the validity of an inference presupposes "totality in the series of the premisses" (B388). "If, therefore, knowledge be viewed as conditioned, reason is constrained to regard the series of conditions in the ascending line as completed and as given in their totality" (B388). The totality of the series of conditions is "a requirement of reason" (B389) which the understanding cannot always fulfill, because it can only connect one element after the other. In general the understanding is constantly challenged by reason to advance ever further; but in certain cases, determined by the categories, the understanding is *in principle overtaxed*, that is, reason demands a performance that the understanding cannot deliver.

Reason, however, cannot create its own concepts; it can only take over concepts of the understanding and then liberate them from their restriction to possible experience (B435). The ideas of reason are thus liberated concepts of the understanding. The cosmological antinomies arise when, with respect to the world as totality of appearances, one of these concepts of the understanding liberated by reason is taken up again and used by the understanding. They arise when it is assumed that the entire series of conditions is *given* in the sense of being able to be experienced by the understanding, that is when the world as aggregate appearance is taken to constitute such a given totality. As Kant puts it:

> The whole antinomy of pure reason rests upon the dialectical argument: If the conditioned is given, the entire series of all its conditions is likewise given; objects of the senses are given as conditioned; therefore, etc. (B525)

Under these presuppositions the series of conditions is either finite, in which case the last member of the series (the first condition) itself has no conditions and thus is unconditioned, or the series of conditions is infinite, in which case the series itself as a whole is something unconditioned. In accord with the four classes of categories (quantity, quality, relation, modality) there are four cosmological ideas of the completion of a series, each of which leads to an antinomy. These ideas pertain to the "absolute completeness" of the

series 1) of *Composition* (of the world in space and time), 2) of *Division* (of a body), 3) of *Origination* (of an action), and 4) of *Dependence of Existence* (of things in the world). The first two ideas are called "mathematical," the third and fourth are called "dynamical."

The *thesis* of each antinomy maintains that the series of conditions is finite, i.e. that the series ends with an unconditioned. The *antithesis* always asserts that the series is infinite, that is, that it itself is an unconditioned. It should be noted that we are always dealing with a series that goes *from* the conditioned *to* its condition; this kind of series is called by Kant a regress (B437-8, B538). The reverse series (from the condition to what it conditions) is called a *progress*; but this kind of series causes no particular philosophical difficulties. The difference between regress and progress can be seen if we take up once again Kant's comparison with logic: we must presuppose all *premises* of an inference as given in order to draw a conclusion, but we need not presuppose all further *consequences* that can possibly be derived from these premises.

> But if the same knowledge is viewed as a condition of yet other knowl edge, and this knowledge as constituting a series of consequences in a descending line, reason can be quite indifferent as to how far this advance extends *a parte posteriori*, and whether a totality of the series is possible at all. For it does not need such a series in order to be able to draw its conclusions ... (B388-9)

The Course of the Argument

In the first section of the "Antinomy of Pure Reason" the cosmological ideas are introduced. In the second section the theses and antitheses are presented, each is given an apagogical proof, and some explication of each is provided. In the third section, "The Interest of Reason in these Conflicts" Kant reports that the thesis position, although it is speculatively second rate, nonetheless has the advantage of fitting better with morals and religion; furthermore, "the thesis also has the advantage of *popularity*; and this certainly forms no small part of its claim to favor" (B495). After pointing out that the antithesis (that is, Leibnizian rationalism under the title of "empiricism") is speculatively far superior but rather immodest, not popular and not very conducive to faith and morals, Kant returns to the thesis position adducing in its support "the

architectonic interest of reason" in quantities of manageable size (B503), which of course recommends the finitism of the thesis position. It should be remarked here that the characterization of Newtonian empiricism (called "Platonism") as moral and popular but speculatively second rate is a sort of obituary for the thesis position, since the antinomy deals with a conflict in speculative metaphysics not with a moral conflict or a popularity contest.

Kant then points out that the infinite series of the antithesis of each antinomy are *too large* for our understanding, but he also admits that the finite series of the theses are *too small* (B514-16).[38] After offering transcendental idealism with its distinction between appearance and thing in itself as the "key to the solution of the cosmological dialectic," he turns to the "critical solution of the cosmological conflict of reason with itself" (B525). This section contains, besides the analysis of the logical structure of the antinomies discussed above (the digression on Zeno), the most explicit presentation of the premises of the arguments of the antinomies. Kant explains:

> *Further*, if the conditioned as well as its condition are things in themselves, then upon the former being given, the regress to the latter is not only *set as a task*, but the condition therewith already really *given*. And since this holds of all the members of the series, the complete series of the conditions, and therefore the unconditioned, is given therewith, or rather is presupposed in view of the fact that the conditioned, which is only possible through the complete series, is given. (B*526)

If we were dealing with a thing in itself, then it could be that with the conditioned all the conditions of its possibility could also be given. If the world were a thing in itself, then the series of its conditions would be given with it and would have a definite magnitude (either finite or infinite); it would not merely be indeterminately given as a task of synthesis of a series.

Before Kant turns to the resolution of the cosmological antinomies in particular, he undertakes in the eighth section an analysis of the concept of infinite series. This analysis must be examined

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38 In the case of the Fourth Antinomy Kant substitues thesis for antithesis; I think this is due merely to carelessness. It should, however, be noted that there are a number of other peculiarities in connection with the Fourth Antinomy, which, for instance, is twice called an "apparent antinomy" (B588, B592), an antinomy itself being only an *apparent* contradiction. Here, too, I would suggest careless formulation and not intent to distinguish the Fourth Antinomy as a sort of pseudo-antinomy. An interpretation which allowed us to take Kant literally would of course be preferable, if it could be provided. Wike (*Kant's Antinomies* pp. 53f and 91f) makes an attempt.

in some detail if the arguments for the resolution of the antinomies are to become intelligible. I shall therefore now take up Kant's analysis of the concept of infinity as presented in the resolution of the First Antinomy (beginning/boundary of the world).

After showing the formal route to a resolution of the antinomies in the digression on Zeno by indicating that a third possibility exists, i.e. by showing that thesis and antithesis are logically incompatible but not contradictory opposites, Kant takes up the question of whether the cosmological ideas can be salvaged if presented in a new form. If the idea of reason concerning the totality of the series of phenomena is not misunderstood as a concept of the understanding, but merely taken as a rule — to pursue the series ever farther, without presupposing that the regress in the series has already been completed —, then the idea can be used as a "regulative principle of reason." In this manner the completion of the series of conditions is not "given" but "set as a task" (B536). However, the point is not that thesis and antithesis are transformed into regulative principles, but that the idea of reason behind them both should be used only regulatively:

> The principle of reason is thus properly only a *rule*, prescribing a regress in the series of the conditions of given appearances, and forbidding it to bring the regress to a close by treating anything at which it may arrive as absolutely unconditioned. (B536-7)

Here it is clear that at least the thesis position with its finite empirical unconditioned (world, atoms, etc.) must prove to be false, "for the absolutely unconditioned is not to be met with in experience" (B538). It must however still be shown that there is an alternative to the infinite series of the antithesis.

At the beginning of his presentation of the antinomies Kant distinguished between *progressive* and *regressive* synthesis, and in the course of the argument he develops a highly stylized terminology to keep these two kinds of series distinct. A *progress* proceeds from a given phenomenon (as condition) to what it conditions, e.g. the series of descendants of a given pair of parents (B539). A *regress* proceeds from a given conditioned phenomenon to its condition, e.g. from a person now living back through the series of his or her ancestors. Although it is only the regress that leads to dialectical problems, the progress must nonetheless be taken into consideration in order to make sense of the special problems of the "mathe-

matical" antinomies. First let me present some examples of the stylized technical vocabulary:

regress	progress
from the conditioned to the condition	from the condition to the conditioned
retreat	advance
ascends	descends
regressive synthesis	progressive synthesis
on the side of the conditions	on the side of the conditioned
in antecedentia	*in consequentia*
ascending line	descending line
(B438, B539-540)	(B438, 539-40)

While Kant is not entirely consistent in his use of this vocabulary (for instance, he occasionally "advances" through a regress), it will only then be possible to recognize the problems which force him to deviate from the paradigm if we first presuppose the rule. Only then can we distinguish between simple mistakes or infelicities of presentation and serious difficulties with the material. In particular, the Second Antinomy, which is essential for the discussion of the antinomy of judgment in the next chapter, cannot be understood without clear terminological distinctions. The subsequent analysis will be carried out in three steps: 1) Kant's distinction between an infinite and indefinitely continued series will be presented; 2) the regress *in indefinitum* will be examined on the example of the question of the beginning of the world, 3) some structural inconsistencies involving the second part of the First Antinomy (size of the world) will be exposed.

The Concept of Infinity

1) In infinitum and in indefinitum

A synthetic series is either finite or infinite in the sense that the regress or progress in the series is either finite or can be continued to infinity. The "infinite" of both regress and progress is a *potential* infinity. The assertion that such a progress or regress can be completed, i.e. that the set of elements in the series can actually

be given, involves a contradiction according to Kant.[39] Even in passages where Kant describes the actual infinite postulated by the antithesis position (and rejected by Kant), he consistently distinguishes between an actually infinite series (set) and the merely potentially infinite regress in it.

> This unconditioned may be conceived in either of two ways. It may be viewed as consisting of the entire series in which all the members without exception are conditioned and only the totality of them is absolutely unconditioned. This regress is to be entitled infinite ... the series *a parte priori* is without limits or beginning, i.e. is infinite, and at the same time is given in its entirety. But the regress in it is never completed, and can only be called potentially infinite. (B445)

After rejecting the finite series of the thesis position, Kant introduces a third possibility: a progress or regress is possible not only *in infinitum* but also *in indefinitum*. An advance or retreat can be carried on not only to infinity but also "to an indefinite extent" (B*540-1). This distinction is at first introduced as a difference in the terminology used by philosophers and mathematicians. "Mathematicians speak solely of a *progressus in infinitum*. Philosophers, whose task is to examine concepts, refuse to accept this expression as legitimate, substituting for it the phrase *progressus in indefinitum*." (B538-9)

With regard to a *progress* this difference in the language of philosophers and mathematicians is unimportant. For instance in the continuation of a straight line, "the distinction between an infinite and an indeterminately great advance (*progressus in indefinitum*) would be a mere subtlety" (B539). This applies to every unlimited progress, that is, for every such advance from a condition to what it conditions "this possible advance proceeds to infinity in the series of appearances," for "we are referring only to what we *can* do" (B*539). Here we can imagine that the series really goes on forever since it is not presupposed as "given (*datum*)" but only added on as "giveable (*dabile*)." In this case reason does not demand a given totality in the series, and, accordingly, no conflict of reason with itself can arise.

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39 "The true (transcendental) concept of infinitude is this, that the successive synthesis of units required for enumeration [*Durchmessung*] of a quantum can never be completed." (B460) An "actual infinity" is rejected (B549). An actual infinity would be "a given quantity that can never be wholly given, which is self-contradictory" ("Progress of Metaphysics," Ak 20, 289; W 3,625).

The explanation of the mere subtlety of the distinction between infinite and indefinite in the case of a progress also specifies the conditions under which the distinction is not merely a subtlety: wherever reason does in fact demand absolute totality, e.g. in a regress, this distinction must be made. In this case the philosopher must insist on his distinctions. Kant thereupon proceeds to make the subtle distinction between the possibility of infinitely regressing in a series and the infinite possibility of such a regress.

> When the whole is empirically given, it is *possible* to proceed back in the series of its inner conditions *in infinitum*. When the whole is not given, but has first to be given through empirical regress, we can only say that it is *forever possible* to proceed to still higher conditions of the series. (B*542)

Kant thus reproduces in the case of the regress precisely the distinction that he rejected as "subtle" in the case of a progress. In the case of a regress, where a distinction is made between being able to ascend indefinitely far and being able to ascend infinitely, the decisive factor seems to be the question whether or not the series of conditions is given in *empirical* intuition:

> We answer: when the whole is given in empirical intuition, the regress in the series of its inner conditions proceeds *in infinitum*; but when a member only of the series is given, starting from which the regress has to proceed to absolute totality, the regress is only of indefinite extent (*in indefinitum*). (B*540-1)

However, Kant emphasizes: "In neither case, whether the regress be *in infinitum* or *in indefinitum*, may the series of conditions be regarded as being *given* as infinite in the object." (B542) However unclear Kant's presentation may be, it is obvious that he cannot have meant that the series of conditions (said to be given in empirical intuition) is given as a whole to the *understanding*. We shall return to particular formulations in the next section.

What Kant is trying to say with these formulations is, I think, something like the following: We can sensibly distinguish between denumerating a potentially infinite series of discrete units (e.g. the natural numbers) and the potentially infinite division of a continuum (e.g. a line). The natural numbers can be constructed by successive synthesis or "through repeated addition of the unit to unit" (B456), but only as many numbers are given in our intuition as have already been synthetically constructed. However, for a *given* geometrical line a similar series can be constructed by successive synthesis, if the line is divided, if, for instance, first one half is taken,

then 1/3, 1/4, 1/5, etc. Each line arrived at by this procedure was already given in intuition but not given to the understanding as a discrete quantity.[40] In both cases we are dealing with a progress so that it would be a mere "subtlety" to insist that the series of (say) natural numbers can only be continued *in indefinitum*. In cosmology on the other hand, when dealing with the other kind of series, the regress, there are supposed to be reasons for distinguishing between the *indefinite* regress in a series of discrete units and the *infinite* regress in a continuum. Kant seems also to be making some loose correlation between this distinction and that between the category classes quantity (extensive magnitudes) and quality (intensive magnitudes). The main purpose of the distinction seems to be to absolve Kant of the need to call the regress backwards in time through discrete units *potentially infinite* if he wants to avoid postulating a beginning of the world. I shall attempt to apply this distinction to explain the resolution of the first antinomy.

2) The Antinomy of Time

Earlier in this chapter we saw how T.D. Weldon, fixated on the name "Empiricism," simply overlooked the rationalist content of the antithesis position. Most commentators on the antinomies seem fixated in a similar manner on Kant's denominations, for instance, on the fact that each thesis and each antithesis is assigned a short piece of text entitled "Proof." The striking feature of all these proofs is that they do not at all prove the propositions to which they attached; rather they refute the corresponding counterproposition. Every proof provides *an argument* to refute the counterproposition and then simply *asserts* the proposition to be proved. As shown in the last section, the antinomy consists not so much in the fact that two apparently contradictory propositions have been proved, but rather in the fact that they have both been *refuted*. This is why Kant can later resolve the antinomy by showing that the opposition is one of contrariety not contradiction, since both are false. In my discussion of the first antinomy I shall therefore not examine the proofs as

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40 The distinction between counting discrete units and dividing a continuum is derived from Aristotle. Cf. *Physics*, bk. 3, chap. 7, 207a33f; cf. Wundt, *Kleine Schriften*, 67ff.

such but rather the arguments in these proofs adduced to refute thesis and antithesis.

As presented in the *Critique of Pure Reason*, the First Antinomy reads:

> Thesis
> The world has a beginning in time, and is also limited as regards space.
>
> Antithesis
> The world has no beginning, and no limits in space; it is infinite as regards both time and space. (B454-55)

The refutation of the thesis presented at the end of the antinomies chapter in the "Solution of the Cosmological Idea" is the same as that presented in the "proof" of the antithesis: The thesis is said to imply an empty time before the world (or an empty space outside it). In an empty time nothing can happen, including an origin of the world; such an origin cannot be the object of a possible experience. At the end of the Analytic in the "Amphibolies" chapter Kant called the notion of an empty time (an empty space) a "nothing," an "empty intuition without object *ens imaginarium*" (B348). The attempt nonetheless to conceive this "nothing" results in an — as a rule theologically articulated — equivocation with the word "world," whereby we imagine a (non-material) "world" before the world, in which material systems can arise. Kemp Smith, for instance, writes:[41]

> If Kant means by it [the term "world"] merely the material world, the assumption of its non-existence does not leave only empty time and space. Other kinds of existence may be possible, and in these a sufficient cause of its first beginnings may be found. The nature of creative activity will remain mysterious and incomprehensible, but that is no sufficient reason for denying its possibility.

Kant of course does not deny the possibility of creative activity; on the contrary, he asserts, "I have therefore found it necessary to deny *knowledge*, in order to make room for *faith*" (Bxxx). He denies only that such creative activity could be the object of possible empirical experience; and the antinomies are supposed to arise not out of propositions of faith but out of purported knowledge.

The refutation of the antithesis, on the other hand, which posited the infinity of the past, is supplemented in the "solution" section by a number of remarks on the question of whether the regress backwards in time can proceed *in infinitum* or only *in indefinitum*.

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41 Kemp Smith, *Commentary*, p. 487.

In order better to assess Kant's arguments for the refutation of the antithesis I shall also introduce the most influential critical interpretation of Kant's argument, which attempts to refute Kant's refutations.

To refute the antithesis, Kant adduces (in the "proof" of the thesis) the following argument:

> If we assume that the world has no beginning in time, then up to every given moment an eternity has elapsed, and there has passed away in the world an infinite series of successive states of things. Now the infinity of a series consists in the fact that it can never be completed through successive synthesis. It thus follows that it is impossible for an infinite world-series to have passed away ... (B454)

The standard objection now made by contemporary commentators was first introduced by Schopenhauer, given its most lucid articulation by Russell, and popularized by Strawson and Bennett. Strawson presents Kant's arguments as follows:[42]

> [Suppose] that for as long as the world has existed a clock has been ticking at regular intervals. Then the argument goes as follows. If we assume that the world has no beginning, but has existed for an infinite time, then it follows that up to present moment, or up to any previous historical moment, an infinite number of ticks has occurred, an infinite series of ticks has been completed. But this, by the very nature of an infinite series, is impossible.

Strawson objects, that an infinite temporal series of discrete events out of the past is only impossible if we not only assume an end in the present but also implicitly insinuate a beginning sometime in the past. In this case we would be asserting infinitely many discrete units between two given points, which is in fact impossible; but the argument was supposed to prove that there was no beginning of the world. An infinite series must be open ended, but it can be open on either end. It seems clear that Kant has confused the end of the real progress of world history with that of the mental regress back in time.

Kant's own further arguments, however, deal with the difference between an *infinite* and an *indefinite* regress into the past. He writes:

> For the solution, therefore, of the first cosmological problem we have only to decide whether in the regress to the unconditioned magnitude of the universe, in time and space, this never limited ascent can be called a *regress to infinity*, or only an *indeterminately continued regress* (*in indefinitum*). (B546; emphasis PM)

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42 Strawson, *Bounds*, pp. 176f; cf. also Bennett, *Dialectic*, p. 119.

Kant's question is thus whether the regress back in time is potentially infinite or merely indefinitely large. It is undisputed that we can continue the regress at will, just as we can continue to count the natural numbers at will. We can also represent the progress of real historical events after any particular point in time reached by the mental regress if we count backwards from the number reached. This is precisely what we do when we assign dates in ancient history, e.g. 390 B.C. etc. If the regress is potentially *infinite* (like the progress of the natural numbers), we could represent it as the mirror image of the denumeration of the natural numbers (e.g. -1, -2, -3, -4, -5 ... or 1 B.C., 2 B.C., ...). If that is true, then the real historical course of the world out of the past must have accomplished something like counting the natural numbers *backwards*. An infinite *progress* does not imply that someone has *already* covered the same ground in the other direction, but a regress *in infinitum* back in *time* implies that the world has already covered the same path going forwards (progress). Kant rejects the notion that the temporal series of events can have the same kind of open structure on its "past" side as it has on its future side, he rejects the regress *in infinitum* and replaces it with an indefinite regress, since the potential infinity of the regress back in time would imply that an infinite (beginningless) progress out of the past had already been completed, and thus that an actual infinite set, a "real infinity" of past states, had been accumulated. To modify Strawson's description of the argument slightly, let us replace his etherial ticks of the clock with somewhat more substantial drops of water: Kant is asserting that, if your tap had been dripping forever, so that you could now count the drops of water in the tub *in infinitum*, your tub would contain an actually infinite amount of water, which is absurd; therefore your tap has not been dripping forever.

In such a case the philosopher must according to Kant take care whether he says *in infinitum* or *in indefinitum*. The world series must be indefinitely large.

> This cosmic series can, therefore, be neither greater nor smaller than the possible empirical regress upon which alone its concept rests. And since this regress can yield neither a determinate infinite nor a determinate finite (that is, anything absolutely limited), it is evident that the magnitude of the world can be taken neither as finite nor as infinite. The regress, through which it is represented, allows of neither alternative. (B546n)

It is worth pointing out that Bertrand Russell saw the problems involved in this antinomy rather clearly and articulated the

difference between "mental regress" and "real progress," but in doing so he maintains that Kant confuses the two. Russell notes quite correctly:[43]

> When Kant says that an infinite series can 'never' be completed by successive synthesis, all that he has even conceivably a right to say is that it cannot be completed *in a finite time*. Thus what he really proves is, at most, that if the world had no beginning, it must have already existed for an infinite time.

Russell simply assumes that Kant was unaware of this and ventures some speculations as to the reasons why he did not see this.

> Owing to the inveterate subjectivism of his mental habits, he failed to notice that he had reversed the sense of the series by substituting backward synthesis for forward happening, and thus he supposed that it was necessary to identify the mental series, which had no end with the physical series, which had an end but no beginning. It was this mistake, I think, which, operating unconsciously, led him to attribute validity to a singularly flimsy piece of fallacious reasoning.

Instead of examining Kant's objection, that the world could not "have already existed for an infinite time," Russell assumes that Kant has ascribed the end of the progress to the regress and has thus simply made a trivial mistake. Consequently he does not discuss any philosophical grounds that might have moved Kant to take up this particular position offering instead psychological speculations about mental habits and unconscious operations.

Kant rejected the notion of an infinite past. The reason for this lies however not in a confusion of progress and regress. The reason lies in Kant's belief that if the world had already existed for an infinite time, then an infinite amount or set of discrete successive events would already have occurred. If the regress (mental series) back in time can be carried on to infinity, that is, if it represents an infinite task, then the real history of the world (physical series) has *already* completed an equally great task forwards. An infinite task can be carried out forever, but it cannot be sensibly said to be completed. While there is no difficulty in imagining a task which has a beginning but no end, it quite questionable whether we can conceive of completing a task which has no beginning, especially if we assume (as Kant obviously does) that what is completed is also given. In a paper on the "logic" of this problem Fred Dretske[44]

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43 Russell, *Knowledge*, p. 161.

44 Dretske, "Counting to Infinity," p. 100.

maintains that it is *logically* false to assert that someone has, for instance, already counted the natural numbers, for an endless task cannot be completed. But he allows that a beginningless task can be completed. For instance, the assertion that someone has just finished counting the natural numbers *backwards* is supposedly not only logically impeccable but also possibly even empirically true. Thus the impossible becomes possible if it is done in a manner that is inconceivable.

Kant, in any case believes that it is absurd to maintain that world history has done something similar to counting the natural numbers backwards. *This* is the position that Russell and the others ought to have attacked with philosophical arguments, instead of aiming psychological speculations at mental habits. The philosophical presupposition that underlies this sort of misinterpretation was articulated by Russell when he maintained that:[45]

> The notion of infinity ... is primarily a property of *classes*, and only derivatively applicable to series; classes which are infinite are given all at once by the defining property of their members, so that there is no question of 'completion' or of 'successive synthesis'.

Thus the reason that Kant and Russell cannot agree on whether the world is infinitely or only indefinitely old lies neither in Kant's mental habits nor in Russell's, but rather in philosophical differences about the concept of the infinite: whether infinity can be given actually as a class or set, or whether it can only be set as a task, as potential progress in a series. Whether or not Kant's arguments against the impossibility of an infinite past are convincing, thus depends on whether or not one is prepared to accept the existence of actually infinite classes, not merely in mathematics but also in the realm of physics.[46]

3) The Regress in Space

In the second part of the First Antinomy — the extent of the world in space — the refutation of the thesis on the finite extent of the world and of the antithesis on its infinite extent have the same structure as those in the first part concerning time. Before we turn

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45 Russell, *Knowledge*, p. 160.

46 Paul Lorenzen, *Methodisches Denken* pp. 94ff, argues against the actual infinite in mathematics as well.

to the Second Antinomy, I would, however, like to point out a certain asymmetry in the structure of the two parts of the First Antinomy. There is a significant difference with respect to the series of conditions between the relation of time to the content of time (event) and that of space to the content of space (body); and this difference leads to some inconsistencies.

Every period of time is conditioned by the period of time that precedes it, and every event in time is conditioned by the events that precede it. For both, going back in time is a regress and going forward is a progress. The situation is somewhat different for space. Every space is limited and thus conditioned by the space that *surrounds* it. "Inasmuch as one part of space is not given through the others but only limited by them, we must consider each space, in so far as it is limited, as being also conditioned, in that it presupposes another space as the condition of its limits and so on" (B440). The content of space, on the other hand, the material body (or the aggregation of such bodies to systems) is not conditioned by the bodies that surround it or by the system of which it is a part; on the contrary, it is conditioned by its own parts. The body is "a conditioned, whose own parts are its inner conditions, and the parts of the parts are its remote conditions" (B*440). The movement "outwards" from part to whole is a *regress* for space but a *progress* for matter. While surveying a space is a regress, compounding a material system is a progress.

When Kant introduced the pair of concepts, condition and conditioned, and the stylized vocabulary associated with them, he also used the concepts ground (*Grund*) and result (*Folge*). In fact, it is quite difficult to give the concept-pair condition/conditioned anything other than a causal sense, if it is to be applied to material objects. With regard to the formal intuitions, space and time, one can at least imagine such conditions in terms of representability in formal intuition. But if the condition is to be considered the material ground of a material object, then we are dealing with causality; and in a causal nexus — there is no doubt for Kant — the parts condition the whole.

It seems therefore that the series of compounding the material world out of bodies must be a progress from condition to conditioned and not a regress, and thus it ought to be able to proceed *in infinitum* and not just *in indefinitum*. Furthermore, since it does not proceed from the conditioned to its condition but rather from

condition to the conditioned, there can be no temptation to jump immediately to the unconditioned; and thus no antinomy should result. The question, whether the world has a limit in space, leads to a *progressus in indefinitum* which presumably is not said to go on *in infinitum* only because the space in which the world is located is supposed to recede merely *in indefinitum*.

The problem could be somewhat alleviated, by asking instead whether the space in which the world is located is finite or infinite. One could then say that there is a regress in the space of the world not in the composition of matter itself. In this case we would only have to reproach Kant with expressing himself rather unclearly. But the question would still remain: in what sense is the system of the world something unconditioned, if it is finite or infinite in space. A first event, for instance, would have had no material cause that preceded it and thus would not be conditioned by any other phenomenon; to this extent it could be said to be unconditioned. But an outermost shell or most comprehensive system of the universe would *not be unconditioned*; rather it would be conditioned by its own parts. At best one might maintain that the space in which it is located is unconditioned because it is not limited and conditioned by any space surrounding it.

This problem, too, could be disposed of, if we were to drop the presupposition that a material system is conditioned by its parts and to maintain that the transition from world-part to world-whole is a *regress* from a conditioned to its condition, i.e. that the whole conditions the part.[47] The interpretation of the size of the world as presenting an antinomy seems to demand in this case that the causal chain go from "outside" inwards, i.e. that in a good Thomistic manner every subsystem is conditioned by the system encompassing it and by its "place" in this system. Only in such a case can the question of the size of the world lead to a *regress*. However, if the composition of matter, the path from part to whole, were a regress, then the division of matter would be a progress just as the division of space is a progress. The allegedly smallest particle of matter would

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47 Kant himself gives expression to this difficulty in the course of the solution to the Fourth Antinomy, where he points out that "the mathematical regress [i.e., of the 'mathematical' antinomies] is concerned only with the combining of parts to form a whole or the division of a whole into parts ..."; there, we are dealing only "with the possibility of an unconditioned whole of given parts, or with an unconditioned part for a given whole..." (B588). However, he adduces no reason, why a "whole of given parts" should in any sense be *unconditioned*.

then not be something unconditioned but rather merely something that could not itself condition anything else. Thus the antinomy of division, the Second Antinomy, would just disappear; for it is impossible for both the division *and* the composition of matter to be a regress.

For the argument made in this study it is important to note that Kant runs into difficulties with his own sytematics here by presupposing that the parts condition the whole. He ventures no argument in the *Critique of Pure Reason* as to why this must be the case. The problem is covered up by calling the spatial composition of the world a regress — in violation of the definition of the concept.

2.4 The Antinomy of Division

The Second Antinomy like the First is resolved as a contrary opposition. It is easily recognized as a presentation of the opposition between the Newtonian and the Leibnizian theory of matter and is the only antinomy in which Kant rather clearly wins a round against Leibniz. The question at issue is whether there are simple, indivisible, ultimate particles of matter (atoms) or whether matter is actually divided up into infinity. Kant's resolution will be the suggestion that matter be considered as infinitely *divisible* but not infinitely divided. Three points have to be clarified with regard to this antinomy before we can proceed: 1) Why the division of a whole must be called a regress in the first place; 2) Why the division of a body can be called a regress *in infinitum* (not merely *in indefinitum)*; and 3) what Kant rejects in Leibniz' conception of the organism. However, since there has been a great deal of misunderstanding of this antinomy in connection with the concept of 'monad', I shall also take up the question of the antinomy's relation to Leibniz's 'monadology', as soon as I have briefly reported Kant's formulation of the antinomy.

As presented in the *Critique of Pure Reason*, the antinomy of division reads:

> Thesis
> Every composite substance in the world is made up of simple parts, and nothing anywhere exists save the simple or what is composed of the simple. (B462)

> Antithesis
> No composite thing in the world is made up of simple parts, and there nowhere exists in the world anything simple. (B463)

The proofs that Kant thereupon provides need not concern us as proofs; in purely formal terms they wear their invalidity on their sleeves. Both thesis and antithesis (if we ignore the slight difference in subject) have the logical form, "All S is P; no S is P". Thus, they present a textbook case of contrary opposition. Consequently, the truth of one proposition cannot be inferred from the falsity of the other. However, the proofs, as the proofs of all the antinomies, are conducted apagogically and are therefore invalid from the start — independent of the later critical resolution. We can however reformulate the antinomy in such a way that it takes on the form of an apparent contradiction: Some bodies are simple; all bodies are non-simple (compounded). To display the similarity to the First Antinomy, I shall formulate it as follows:

Thesis (affirmative judgment)

(1) The number of parts of a body is finite.

Antithesis (infinite judgment)

(2) The number of parts of a body is infinite.

If we do not want to presuppose that a material body is something that has a determinate given amount of parts, we could say:

Resolution (negative judgment)

(3) The number of parts of a body is not finite (or infinite).

Kant expresses the state of affairs as follows:

> We must therefore say that the number [*Menge*] of parts in a given appearance is in itself neither finite nor infinite. For an appearance is not something existing in itself, and its parts are first given in and through the regress of the decomposing synthesis, a regress which is never given in absolute completeness, either as finite or as infinite. (B533)

Kant's resolution of the second antinomy consists in calling the set of parts indeterminately large: he says, "only the divisibility, i.e. an in itself absolutely indeterminate number [*Menge*] of parts is given — the parts themselves being given and determined only through the subdivision" (B*554). The division can be continued *in infinitum*, although the body need not be said to consist of infinitely many parts, nor must infinitely many parts already be given. But Kant nonetheless adheres steadfastly to the proposition that the divisible

is divisible because it has parts; it is not asserted (or even considered) that the parts are only differentiated from one another by the division. As we shall see below, division is for Kant merely the revealing or discovering of the parts of a compound; the parts do not arise through the division; rather they are merely made objects of experience by it.

Kant's refutation of the antithesis (proof of the thesis) argues as follows. Since composition is a merely "accidental relation of substances," there must be substances out of which the bodies can be composed. If these substances are themselves always divisible (always have parts), then there is nowhere anything independent of composition (no subject of this accident). This argument is quite similar to the one that Kant had proposed in the *Monadologia physica* (prop. ii, theorema) as well as to arguments by Leibniz on simple substances in metaphysics and by Clarke on simple particles of matter in physics. The argument is also valid, if one accepts the implicit premises. The first such premise is mentioned by Kant in the *Monadologia physica*: "Bodies consist of parts, which separated from one another have a persistent existence"; that is, the parts are independent of their composition to a whole body.[48] The second premise is that we are dealing with things in themselves, i.e. that the parts and parts of the parts are *given* with the whole.

The refutation of the thesis (proof of the antithesis) shares the same presuppositions; but it points out that the extended is *per definitionem* divisible and therefore must be composed of parts. Something that is not divisible cannot be extended, and no extended body can be compounded out of the non-extended. The application of mathematics in science excludes the possibility of indivisible ultimate particles.

Each refutation expresses the self-understanding of one of the two fundamentally different interpretations of the analytic-synthetic method of modern science. Newton interpreted it as a method of drawing inferences from the phenomena to the properties of the ultimate particles of matter; these properties of the ultimate particles could not be further analyzed. Leibniz on the other hand could not comprehend why there should be material entities to which the method of scientific analysis no longer applied, and this method presupposes that phenomena should be explained by their parts; the

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48 Kant, Ak 1,477; W 1,522; Leibniz, "Monadology" §2, GP VI, 670; PPL, 643; Clarke 4th letter, N.B.

justification of science lies in the fact that it nowhere arbitrarily interrupts the process at allegedly ultimate elements.[49]

Physical and Metaphysical Monads

Kant's remarks in the proofs and observations to the second antinomy might possibly occasion some confusion. For instance, the arguments for the antithesis repeatedly call the proponents of the thesis (whom I have put in the camp of Newtonian atomism) "monadists"; and the thesis, too, calls itself a "monadology." But there are in fact important differences between the monadology of Leibnizian metaphysics, the dynamical theory of matter proposed by Leibniz in his physics, and the *physical* monadology once adhered to, for instance, by the young Newtonian, Immanuel Kant. The elder Kant wrote:[50]

> The reason for this confusion lies in a badly understood *monadology*, which does not at all belong to the explanation of natural phenomena, but is rather an, in itself, correct Platonic conception of the world worked out by Leibniz, in so far as (considered not as the object of the senses but as a thing in itself) it is merely an object of the understanding, which nonetheless still underlies the phenomena of the senses.

Strictly speaking the Leibnizian monadology has nothing at all to do with the Second Antinomy, which deals with cosmology and the concept of matter. In the observation to the thesis, in the *only* passage where Leibniz is explicitly mentioned, Kant stresses precisely the difference between the simple *parts* of matter asserted by the thesis and the simple *substances* of Leibnizian metaphysics:

> The word *monas,* in the strict sense in which it is employed by Leibniz, should refer only to the simple which is *immediately* given as simple substance (e.g. in self-consciousness), and not to an element of the composite. This latter is better entitled *atomus*. (B468-70)

Here reference is made to the specifically Leibnizian use of the term "monas," and this use is distinguished from a different usage that could just as well be called "transcendental atomistic" (B469). Kant himself had once, in the 1750's and 1760's, supported this second kind of theory, which he called "physical monadology."

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49 Cf. Freudenthal, *Atom*, chap. 3.

50 *Metaphysical Foundations*, Ak 4,507; W 5,61-2.

I do not intend here to present the Leibnizian metaphysics of monads. I only want to make one point clear: whatever the difficulties of Leibnizian philosophy and whatever the monads are really supposed to be, it is unequivocally clear that they are *not* supposed to be the material *parts* of bodies. The bodies are not composed of monads and cannot be dissected into monads.[51] The monads (simple substances) "ground" or "constitute" the bodies; the phenomena "result" from monads, they "belong to" a monad. But monads are not bodies. "Strictly speaking, however, matter is not composed of these constitutive unities but results from them ... Substantial unities are not parts but foundations of phenomena."[52] There are of course some ambiguous expressions in the "Monadology" and the "Principles of Nature and Grace," two popular works written by Leibniz shortly before his death, but the fundamental position is quite clear — at least Kant saw it that way. In a reply to a critique by Eberhard he wrote:[53]

> Is it really credible that such a great mathematician as Leibniz, wanted to have bodies compounded out of monads (and thus space out of simple parts)? He did not mean the corporeal world, but its substrate, the intelligible world, unknowable to us, which lies only in the idea of reason ...

Thus, whatever the monads are, they have relatively little to do with the question whether material bodies are divisible, or with the question of the size of the set of a body's parts.

However, out of Leibnizian dynamics with its "active" and "passive" forces a physical theory arose that took the name "physical monadology" and represents a further development of Leibniz's physical theory in a direction quite incompatible with the intentions of Leibniz's metaphysics: "Every body consists of unconditioned, simple, original parts, i.e. monads," wrote the young Kant and explicitly equated the terms *monas*, *elementum materiae*, and *pars corporis primitiva*.[54]

Physical monads are simple, indivisible, but also unextended centers of force, which through their forces occupy and fill a space.[55] They are in principle impenetrable but nonetheless elastic

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51 Cf. Cassirer, *Leibniz*, pp. 343-351; Mittelstraß, *Neuzeit*, pp. 499-501; Vogel, *Vielheit*, pp. 42-70 and the passages cited there.

52 Letter to de Volder, June 30, 1704 (GP II,268, PPL, 536).

53 *Über eine Entdeckung*, Ak 8,248; W 3,370.

54 "Monadologia physica," Ak 1,477; W 1,522-3.

55 Cf. Adickes, *Kant als Naturforscher*, vol. 1, 177-8.

and thus present a physical alternative to the absolutely dense and inelastic atoms of Newtonian physics. But on a philosophical level this theory is every bit as atomistic as Newton's atomism, since it maintains that matter consists of simple ultimate particles whose properties explain all phenomena. The difference lies in the choice of properties; and this is a physical question. In any case, it is to this sort of monadism that Kant refers in the Second Antinomy and which he rightly considers to be a variety of philosophical atomism. Sixty years after the death of Leibniz there was no reason to connect the word "monad" directly or exclusively with Leibniz. In the meantime there had been important debates in physics about monads, and as Kant put it in his lectures on metaphysics at the beginning of the 1760's: "Since on their account a great quarrel arose, so that the word Monad is now heard in beer parlors and street songs, one gradually begins to abstain from the word."[56]

The basic principle of Kant's physical monadology: "Bodies consist of parts which separated from one another have a persistent existence," could have no place in the physics of Leibniz, which was a physics of systems not a physics of isolated particles. Leibniz proposed laws for material systems, which only applied to single particles in so far as these, too, could be conceived as systems. He did not (like Newton) trace laws back to the properties of simple particles which "have a persistent existence" even independent of the system. Even the active and passive forces of matter, on which all properties of bodies are based, are attributed only to material systems; Leibniz does not appeal to centers of force or to simple units endowed with forces or to any sort of dynamical atoms.

As far as the division of matter is concerned, Leibniz believed that[57]

> each part of matter not only is infinitely divisible, as the ancients recognized, but also is actually subdivided without end, each part into parts, each of which has its own distinct movement. Otherwise it would be impossible that each part of matter could express the whole universe.

Since matter is infinitely divided, it can also be organized and structured *in infinitum*. At every level of division or composition a body can be either an organized system of parts (machine) or a mere aggregate of parts.

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56 Ak 28,1,28 (Herder's lecture notes).

57 "Monadology" §65; GP VI,618; PPL, 649.

Some or all parts of an organized system can themselves be mere aggregates. Some or all parts of an aggregate can themselves be organized systems. Leibniz's most common example of an organized system is a watch or an automaton; and of an aggregate it is a basket of fish or a pond full of fish. However, if the parts of an organized system are organized and their parts in turn are also organized, then the system is an organism.[58]

> So each organic body belonging to a living being is a kind of divine machine or natural automaton infinitely surpassing all artificial automata. For a machine made by human art is not a machine in each of its parts; for example, the tooth of a brass wheel has parts or fragments which are not artificial so far as we are concerned, and which no longer bear any traces of the machine, for the use of which the wheel was intended. But the machines of nature, living bodies, are still machines in their smallest parts, into infinity. It is this that makes the difference between nature and art, that is, between the divine art and ours.

Kant criticizes this theory of the organism in the resolution of the Second Antinomy.

Part and Whole

In the first section of the antinomies chapter Kant introduced the cosmological idea of the completeness of division and designated the pursuit of the series of conditions as a *regressive* synthesis:

> reality in space, i.e. *matter*, is a conditioned. Its internal conditions are its parts, and the parts of these parts its remote conditions. There thus occurs a regressive synthesis, the absolute totality of which is demanded by reason ... (B440)

Although Kant holds that an empirical space is conditioned by the space surrounding it, i.e. that the parts of space are conditioned by the whole (the surrounding subspace), he nowhere adduces an argument as to why just the opposite should be the case with respect to matter. Kant apparently thinks it self-evident that a material whole is conditioned by its parts and not by the larger whole of which it is a part. In his metaphysics lecture of 1763 Kant had said that "all composition is a contingent nexus, a mere *accidens,*"[59] but

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58 "Monadology," §64; GP VI,618; PPL, 649.

59 Ak 28,1,29 (Herder's notes).

why it is an accident not of the body as a whole but of its parts is not explained. The commentators agree with Kant on this in as much as they find this relationship unproblematical. Bennett, for instance, who seldom does not object to what Kant says, is in this case in full agreement: "It is obviously true that a substance exists independently of any facts about how it relates to anything else to compose a larger whole ... "[60]

In the *Monadologia physica* Kant had equated "divisible" with "compounded" with regard to matter, as if only that which already consists of parts is divisible.[61] This position (though with critical restrictions) is still taken in the *Critique of Pure Reason* and the *Metaphysical Foundations of Natural Science*. For space, on the other hand, the parts are not conditions of the whole; a space is not composed of its parts. "Space should properly be called not *compositum* but *totum* since its parts are possible only in the whole, not the whole through the parts" (B466).[62] Kant makes no attempt in the *Critique of Pure Reason* to justify the assertion that dividing up a whole does not thereby create the parts in the first place, but rather traces and displays the already existing dividedness (makes it an object of experience).

I do not wish to problematize the relation of part and whole any further at this point; it will be dealt with in great detail in the next chapter. I want only to point out that Kant assumes his conception of this relation without argument. And in case it really is supposed to be self-evident, then it must at some point in time have become evident. Aquinas, for instance, did not believe that the parts were the condition for the whole.[63] Descartes considered extended matter to be a continuum that was only divided up into bodies by

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60 Bennett, *Dialectic*, p. 164.

61 *Monadologia physica*, propositions 2 and 4 W 1,522, 528; Ak 1,477, 1,479 Cf. Adickes, *Kant als Naturforscher*, vol. 1, p. 149; Kemp Smith *Commentary*, p. 489; *Prolegomena* §52b.

62 Although Kant does say (B211, B463) that a space consists of other spaces (and not of points or simple parts), nonetheless, the subspaces are not conditions or grounds of the space.

63 Aquinas sees the conditioning of the whole by the parts as a proof that the whole in question is not a natural object. A number of houses may make up a city or the composition of parts may make up a house; these however are not natural objects but products of humans; cf.*Summa contra gentiles*, IV,35,3, §3731. A natural object is constituted by form and matter, and the form depends on the position or place of the object in nature. Cf. Werner, *Thomas*, vol. II, 201ff.

motion; he even asserted that two contiguous bodies are only then different bodies, if they are in motion relative to one another; two contiguous bodies at rest relative to one another have no boundary; there is only the extended and motion (division).[64] And Bishop Stillingfleet, with whom Locke still had to debate, saw a serious problem with regard to the simple parts which were supposed to have a persistent existence even when separated from one another: namely, that no one has ever observed them separated from one another:[65]

> If then none of these things which *bodies* are *resolved* into, and are supposed to be *compounded* of, either have been or can be proved to exist *separate* from or *antecedent* to those bodies which they compound, what then becomes of all our company of atoms which are supposed by their *concourse* in an *infinite Space* to be the *origin* of the *world*? I know not where to find them, unless *dancing* with the *School-men's* Chimeras in a vacuum, or in a space as empty as they *infinite* are, viz. some *Epicurean's brains*.

Even as late as the time of Locke, the supposedly self-evident assertion that a whole *consists* of what it can be divided into had to be justified, because it was actually denied by some thinkers.

Regressus in infinitum

Although Kant's arguments in the refutation of the thesis and antithesis of the Second Antinomy have been comparatively well received by the commentators, his remarks in the section in which the antinomy is resolved have driven the commentators to outrage and sarcasm. As opposed to the resolution of the antinomy of time where the regressus was only allowed to go *in indefinitum*, Kant here maintains that while a body is not actually divided up *in infinitum*, at least the regress from whole to parts can be carried on *in infinitum*. A number of seeming contradictions crop up, since Kant appears to be saying both: the parts are given with the whole and the parts are *not* given with the whole. It cannot be denied that Kant in the last two sections of the antinomies chapter (cf. B540-42;

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64 Descartes, *Principia*, II, §§23 and 25; III, §§45-48. (AT VIII,52-54 and 99-104).

65 Stillingfleet, *Origenes Sacrae or a Rational Account of the Grounds of Christian Faith*, (1680) p. 425, quoted by McGuire, "Atoms," p. 44.

B552-53) gives adequate occasion for confusion. Some examples may be given here (emphasis PM):

> A1) For this matter is *given* as a whole, and therefore with all its possible parts, in empirical intuition ... the further members of any continued division are themselves empirically *given prior to the continuation of the division*.. (B541)
>
> A2) there are always more members, *empirically given*, than I reach through the regress of decomposition; (B*542)
>
> A3) For the conditions (the parts) are themselves *contained* in the conditioned, and since this is given complete in an intuition that is enclosed between limits, the parts are one and all *given together* with the conditioned. (B551-2)
>
> B1) In neither case, whether the regress be *in infinitum* of *in indefinitum*, may the series of conditions be regarded as being *given* as infinite in the object. (B542)
>
> B2) [A body] is therefore infinitely divisible, without *consisting*, however, of infinitely many parts. (B553)
>
> B3) only the divisibility, i.e. an in itself absolutely indeterminate number [*Menge*] of parts is given — the parts themselves being *given and determined only through the subdivision*; in short, the whole is not in itself already divided. (B*554)
>
> B4) For these [the phenomena] are mere representations; and the parts exist merely in their representation, consequently in the division (i.e., in a possible experience where they are given) and the division reaches only as far as such experience reaches. (Prolegomena, §52c, 83; A149)
>
> B5) For the parts insofar as they belong to the existence of an appearance exist only in thought, namely in the division itself. (*Metaphysical Foundations*, 54; A50)

Although it is correct that the B-opinion is expressed more often than the A-opinion, nonetheless we are dealing here not with an opinion poll but with expressions of one and the same person to a large extent within the course of ten pages. There are even more such remarks, which are simply too long to be quoted conveniently. However it is possible to interpret Kant in such a way that he is not engaged in wild fluctuations between contradictory positions and also without simply certifying a qualified majority of votes for the B-opinion.

It is quite clear on the basis of the resolution section of the antinomies chapter as well as from Kant's later writings, that he holds that not all the parts or the conditions are necessarily given as discrete entities before the regressive synthesis of division. It is also clear that the division itself cannot be the condition of the parts, i.e., that division is not a real ground (*Realgrund*) but only a cognitive

ground (*Erkenntnisgrund*). In the antinomy itself the question is, whether the regress of division can be carried on into infinity or just indeterminately far. As we saw in the last section, a series in which the regressus goes *in infinitum* is supposed to be given as a whole, and we have seen that this is only possible with a continuum. The crucial point lies in the way in which the whole is said to be *given*: a whole can, according to Kant, be given in *intuition* without its parts' being given to the understanding as discrete magnitudes. The infinite divisibility of space grounds the infinite divisibility of "reality in space"; and the space of a body is completely given in intuition without any synthesis of parts. The philosopher can be certain of the objective reality of the parts, since they are already in intuition before has dissected the body so far that he can place the intuition under a concept. Kant also makes it clear that the point at issue is what should be inferred "when the whole is given in empirical intuition" (B540). The contradictions in the passages cited above disappear when we see that the term "given" in (A) is taken in a different sense than in (B): according to (A) given to *intuition*, according to (B) given to the understanding. "For although all parts are contained in the intuition of the whole, the whole division is not so contained, but consists only in the continuous decomposition, that is, in the regress itself, whereby the series first becomes actual" (B552). Interpreted this way, the propositions in (A) supplement those in (B) and justify the assertion that the regress proceeds not merely *in indefinitum* but *in infinitum*; for a body that is to be divided is given as a whole to sensible intuition, which is not the case for the history of the world system.

As opposed to the regress in time, which cannot be carried on *in infinitum* (i.e., is not potentially infinite, since this would make the series itself, which has already be completed, actually infinite), the regress of division is potentially infinite because the series itself only goes as far as the regress in it has advanced; the *set* of parts is never actually infinite.

The Organism

The difference between organic and inorganic matter for Leibniz lay not in the *extent* of division but in the kind of division. A

"machine" can be decompounded into its parts, but it constitutes a functional nexus: the parts have a purposive relation to the whole for which they were determined. Aggregates do not contain such relations. According to Leibniz anorganic bodies are not machines that are composed of machines, but rather aggregates that are composed of machines and aggregates.[66]

> Each part of matter can be thought of as a garden full of plants or as a pond full of fish. [...] And although the earth and the air interspersed between the plants of the garden and the water interspersed between the fish in the pond are not themselves plants or fish, they also contain them ...

With the rejection of Leibniz's theorem of the actually infinite dividedness of matter Kant also rejects the corresponding concept of the organism or of the organic body. However, Kant's rejection goes farther than the distinction between phenomenon and noumenon demands. On the one hand according to Kant, though we have no justification for assuming an infinite number of parts, we can nonetheless *exclude* the possibility that in a finite process of dissection (in a possible experience) we will ever encounter a part that itself has no parts. On the other hand, however, Kant also asserts that in the case of organic bodies we can *reliably expect* that a *finite* process of dissection will arrive at parts that, while still divisible, are no longer organic, i.e. no longer internally structured.

Kant considers the Leibnizian concept of organism as self-contradictory due to the actual infinity involved:

> On the other hand, in the case of an organic body structured [*gegliedert*] to infinity, the whole is already represented by this concept as partitioned and yields to us, prior to all regress of division, an in itself determinate, yet infinite number [*Menge*] of parts. This, however, is self-contradictory. This infinite involution is regarded as a never to be completed (infinite) series and nonetheless in the same consideration as completed. (B*554-5)

This objection naturally applies to Leibniz's theory of inorganic matter as well, but it cannot be circumvented by transforming the actually infinite dividedness into a potentially infinite regress of division. In organisms, according to Kant, the regress from organic whole to organic parts cannot be carried out to infinity (*in infinitum*).

> To assume that in every structured (organized) whole every part is in turn structured [*gegliedert*], and that in such a manner in the dissection of the parts to infinity, new articulated parts [*Kunstteile*] are always to be met with, in a word, that the whole is organized to infinity: this is quite incon-

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66 Monadology §§67-68; PPL, 649.

> ceivable. It is, however, quite conceivable that the parts of matter could be[come] structured [*gegliedert*] in their decomposition to infinity. (B*554)

There seems thus to be an important difference between the division of an "organic" body and the division of a merely "composite" body. This difference, Kant explains, lies in the fact that an organic body is a "quantum discretum" and a merely composite body is a "quantum continuum". The division to infinity is, according to Kant, based exclusively on the fact that substance is extended in space and like space constitutes a continuum. Only insofar as a body is taken as a *quantum continuum* is it infinitely divisible. As merely homogeneous extension, substance is arbitrarily divisible, without the properties' that belong to the concept of substance being affected. As soon as the object is conceptualized not as continuous but as articulated, the justification for infinite divisibility no longer holds. If something is conceived as structured (as a *quantum discretum*), it has *per definitionem* a determinate (finite) number of parts. An "organic" body must have a determinate amount of parts; the parts themselves, in so far as they, too, are *quanta discreta*, must also have determinate numbers of parts. This process cannot however be continued to infinity, for a determinate amount is according to Kant by definition finite. If the process of division itself is nevertheless to go on *in infinitum*, then at some point in the division, the parts of the *quanta discreta* must themselves be *quanta continua*. The organic body is given as a whole in intuition only as mere extended substance not as a structured system. At some stage of division the organic body must consist of anorganic matter.[67] While it is in fact an empirical question *how far* one must go in the dissection of an organic body before one encounters parts that are anorganic, it must nonetheless in principle be possible to dissect the body that far; that is, the lowest level of the organic must be the object of a possible, finite experience. Even if we should happen to fail to arrive at this level by means of some dissection procedure, we must nonetheless assume it to be possible in principle to arrive at an anorganic part:[68]

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67 Kant himself avoids the expression "organic matter" which could be misunderstood as meaning that matter as such could be organic and not merely organized into organic bodies. There is only one kind of matter, and it is inert.

68 Cf. also Heimsoeth, *Transzendentale Dialektik*, 328f. Löw, for instance, misses the point of the passage, which he takes to be affirming the inevitability of our failure to reach the anorganic by dissection. He thereupon interpolates a

> How far the organization may go in a structured [*gegliedert*] body, only experience can show; and even if this experience were not to arrive with certainty at any inorganic part, still such parts must at least lie in the realm of possible experience. (B*555)

The Kantian concept of the organic is not articulated further in the *Critique of Pure Reason*, but it should be clear from what has been said so far that the particular character of the organism cannot lie in the *kind* of matter of which it is composed. At some level of division everything is anorganic; and since this level is within the range of possible experience, the problems that might arise in the transition from anorganic to organic matter belong to empirical science, not to metaphysics or transcendental philosophy.

2.5 The Antinomy of Freedom

For our discussion of the antinomy of judgment in the next chapter it is necessary to analyze the Third Antinomy of the *Critique of Pure Reason* for three reasons: 1) considered formally, the Third Antinomy introduces the type of resolution used in all later antinomies constructed by Kant; 2) in terms of content this particular antinomy displays some parallels to the antinomy of judgment in as much as it deals with the relation of causal determinism or natural causality to moral-practical purposes (although not to technical-practical purposes); 3) historically speaking, most commentators on the "Critique of Teleological Judgment" have viewed the antinomy of judgment as a repetition or extension of this antinomy, so that, even though (or precisely because) I shall dispute this opinion in the next chapter, a presentation of the Third Antinomy is a prerequisite for the discussion. I shall treat the Third Antinomy only insofar as it is necessary to reveal the formal structure of the "subcontrary" antinomies and to clarify what a "cosmological idea" of freedom is supposed to be.

In the *Critique of Pure Reason* Kant formulates the Third Antinomy as follows:

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terminological distinction between "organic" (infinitely structured) and "organized" (finitely structured) which has no textual basis.

Thesis
Causality in accordance with laws of nature is not the only causality from which the appearances of the world can one and all be derived. To explain these appearances it is necessary to assume that there is also another causality, that of freedom. (B472)

Antithesis
There is no freedom; everything in the world takes place solely in accordance with laws of nature. (B473)

Due to the confusion caused by Kant's "proof" of the thesis, in which he seems to be talking about an original first cause of all causal chains, this is one instance where a look at the Leibniz-Clarke debate can indeed help to clarify the issue. The thesis maintains that physical causality is not enough to explain empirical phenomena; this position can be well illustrated by a passage from Newton's *Opticks* where he explains why in spite of the apparent lack of conservation of motion in inelastic impact the world system does not run down:[69]

> There is a necessity of conserving and recruiting it [motion] by active principles such as are the cause of gravity ... and the cause of fermentation ... For we meet with very little motion in the world, besides what is owing to these active principles *or to the dictates of a will.*

We may add to this Samuel Clarke's defense of freedom:[70]

> Action, is the beginning of a motion where there was none before, from a principle of life or activity: and if God or man, or any living or active power, ever influences any thing in the material world; and everything be not mere absolute mechanism; there must be a continual increase and decrease of the whole quantity of motion in the universe. Which this learned gentleman [Leibniz] frequently denies.

Kant had always maintained that this kind of position was absurd. Like Descartes and Leibniz he took conservation laws for matter and "force" to be absolutely fundamental for science. His first published work, for instance, dealt with the question of the *measure* of the force that is conserved in the world system (there was never any question as to *whether* what is to be called force was conserved). Furthermore, he even claimed in the *Metaphysical Foundations of Natural Science* that he had proved "apodictically" the conservation

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69 Latin edition cited by Alexander, "Introduction," xviii (emphasis PM). Cf. also Locke, *Essay*, IV, chap. X, §19: "free action of the mind causes motion."

70 Clarke, 5th Letter §§93-95.

of momentum in the system of the world.[71] The position thus under discussion is the purported ability of the will to introduce new force (energy) into the material world and the need to appeal to this "fact" in the explanation of nature. In any case, a great deal more sense can be made of the Third Antinomy if we take it to be dealing with the apparent contradiction between the conservation of motion (causal closure of the material world) and the causal efficacy of the will.

Subcontrary Oppositions

To clarify the formal structure of the antinomy, I shall follow Michael Wolff and present the apparent contradiction in the following form:[72]

Thesis: Some things act spontaneously (are free).

Antithesis: No things act spontaneously (are free).

("Spontaneous" is taken to mean: able on its own to initiate a causal chain.)

Kant's proofs for the thesis and antithesis need not detain us here; they are as usual apagogical. The schema of finite and infinite series is continued in the proofs and refutations; however, in the resolution section at the end of the antinomies chapter (B560-587) this semblance of uniformity is abandoned, and the infinite series disappear without a trace. We know that Kant considers the thesis to be false because it sins against the category of causality. Why the antithesis is taken to be false becomes clear only after a number of arguments in the resolution section, which will be presented below. For the moment we can say that the problem with both propositions is that they do not distinguish between things in themselves and appearances and extend their assertions to both realms: For instance, "some phenomenal things act spontaneously," is simply false, for things that are not completely causally determined do not

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71 *Metaphysical Foundations*, A154; Ak 4,562-3; W 5,132-3. Although Kant in the preface characterized "genuine" science as being apodictically true, this is his only explicit claim in the entire book to have shown something to be apodictically true.

72 Cf. Wolff, *Der Begriff*, p.57.

appear. And "No thing in itself acts spontaneously," is, while not evidently false, at least without any justification whatsoever. However, in contrast to the First and Second Antinomies, it is possible here that both propositions, thesis and antithesis, can be salvaged if each is restricted to one area. For instance:

Thesis. Some things in themselves act spontaneously

Antithesis. No phenomenal thing acts spontaneously.

The Third and Fourth Antinomies, called by Kant "dynamical" differ from the first two "mathematical" antinomies in that they need not presuppose that the condition and the conditioned are homogeneous. For instance, although the parts (conditions) of a phenomenal body must themselves be phenomenal, it is not necessary — according to Kant — that all causes (conditions) of such a thing be phenomenal. Kant admits that up to the last section of the antinomies chapter "we have been overlooking an essential distinction." When this new possibility is taken into consideration, it "opens up to us an entirely new perspective in regard to the dispute in which reason is involved" (B*557). Since we were compelled to distinguish between appearances and things in themselves in order to resolve the contradiction in the first two antinomies, we can now use this distinction to solve the dynamical antinomies in a different fashion. We can declare the thesis and antithesis in their undifferentiated form to be false (so that the dynamical antinomies still conform to the model presented in the digression on Zeno). On the other hand, after the differentiation both of them can be true, namely, if the thesis refers only to the noumenal world and the antithesis only to the phenomenal.[73] In this case, "we are able to obtain satisfaction for understanding on the one hand and for reason on the other"; and "when thus given this corrected interpretation, *both may alike be true*; which can never happen with the cosmological ideas that concern only the mathematically unconditioned unity" (B*559-60). The formulation "*may* be true" is to be taken literally: in the First and Second Antinomies thesis and antithesis *are* false; in

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73 In Reflection No. 5829 (Ak 18,365) Kant writes: "*opposita* under two different conditions are not contradictorily opposed; the opposition is inadmissable and both statements can be true. For instance, the will as appearance stands under natural necessity and as intellectual it is free. Both conditions are to be conceived in all beings, but only on the example of the will do we notice the latter."

the Third and Fourth both *can be true*.[74] The resolution section on the Third Antinomy is thus essentially an argument as to why the reformulated thesis *could* be true and why the Antithesis without reformulation is or ought to be false .

In his "Essay on the Progress of Metaphysics" Kant says about the dynamical antinomies:

> Thirdly, proposition and counterproposition can also contain less than needed for logical opposition and thus both be true — as in logic two judgments opposed to one another merely by the difference of the subjects (*iudicia subcontraria*) —, as this in fact is the case with the antinomy of the dynamical principles, if namely the subject of the opposing judgments is taken in a different sense in each. (W 3,628;; Ak 20,291)

Accordingly, the subject, "thing," in the thesis and the antithesis is to be taken in a "different sense"; therefore there is no contradiction but only a subcontrary opposition. Kant's analysis of the various kinds of opposition was described earlier in this chapter. According to the square of oppositions, subcontrary oppositions normally have the form, "quidam S est P; quidam S non est P." Kant generalizes the form so that it includes not only statements in which the same predicate is asserted and denied of different subjects, but also those in which the same subject is taken in different senses, or even all pairs of judgments of which both can be true but not both false.

Kant presents no deliberations on the subcontrary antinomies comparable to the Zeno-digression on the contrary antinomies. However, as Wolff[75] has pointed out, Kant does present an example in the "Observation" on the Fourth Antinomy that can serve to illustrate the resolution of the subcontrary opposition of cosmological propositions. There, Kant mentions the "controversy between two famous astronomers, which arose from a similar difficulty in regard to the choice of a standpoint":

> The one had argued that the *moon revolves on its own axis*, because it always turns the same side towards the earth. The other drew the opposite conclusion that the *moon does not revolve on its own axis*, because it always turns the same side towards the earth. Both inferences were correct, according to the point of view which each chose in observing the moon's motion. (B489)

The two statements emphasized by Kant seem to contradict one another; but the seeming contradiction turns out to be a subcon-

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74 Cf. also *Prolegomena*, §53.

75 Wolff, *Der Begriff*, pp. 56-7.

trary opposition, if one takes into consideration the fact that the subject, the moon, is taken in different senses. The moon's motion must first be put in relation to a reference system. In relation to a particular reference system the moon revolves around its axis, in relation to another system it does not revolve. In a corrected version specifying reference systems both statements can be true. Furthermore, the example also makes another subtle point. The reference systems which Kant introduces are not equivalent in status because he is not dealing with uniform rectilinear motion but rather with rotational motion. The rotation of a body around its own axis is an *absolute* motion in both Newtonian and Leibnizian physics: in rotation centrifugal forces arise.[76] Kant, too, in the *Metaphysical Foundations of Natural Science*, singles out the "circular motion of a body" as a "real" motion, not merely relative to a particular system of reference.[77] Although there are many different kinematic descriptions of the state of motion of the moon according to the systems of reference chosen, nonetheless there is only one dynamical description in classical mechanics: if centrifugal forces arise, then it "really" rotates; if not, then it does not rotate. The example shows, if one takes it seriously, that even if there *is* a "real" rotation of the moon (measurable by the centrifugal forces), there *can* still be a standpoint (e.g. the earth) in relation to which the moon is at rest. Thus we have an example of two statements one of which *is* really true (or false) and the other of which *can* be true (or false). It should also be pointed out that the essay discussing the quarrel of the two astronomers, to which Kant is referring here, deals precisely with the problem of the relative or absolute rotational motion of the moon.[78]

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76 Cf. Freudenthal, *Atom*, pp. 29f, 68f.

77 Kant, *Metaphysical Foundations*, Ak 4,557; W 5,125-6.

78 Kant mentions explicitly Jean Jacques d'Ortous de Mairan (B489) and is almost certainly referring to his essay, "Recherches sur l'equilibre de la lune dans son orbite," (1747). The two astronomers discussed there are Newton (represented by Cassini) and Kepler. Newton's position is reported as follows: "Tout corps tout spheroide & pour ne point nous ecarter de notre sujet, tout globe, tel que celui de la Lune, sera dit tourner réelement sur son centre ou sur son axe, si par son mouvement, les parties qui le composent acquérent une veritable force centrifuge sur son centre, ou sur l'axe de revolution qui passe par son centre..."

Wolff (*Der Begriff* p. 61) argues that Kant's example of the rotation of the moon does not fit the Third Antinomy: "In terms of content this solution *would* only support the comparison, if for example the subcontrary judgements *were* to read as follows: 'The moon revolves on its axis (independent of any reference to a system

If Kant meant this example seriously, then we should expect to find in the resolution of the subcontrary antinomies an asymmetry between the seemingly contradictory propositions, such that one is simply true and the other merely possibly true. Let us return to the thesis and antithesis of the Third Antinomy in a "corrected" version:

Thesis: Some things (intelligible entities) act spontaneously.
Or: Some things (intelligible entities) have themselves no causes.

Antithesis. No thing (object of experience) acts spontaneously.
Or: All things (objects of experience) have a cause.

Kant can interpret such propositions as subcontrary opposites because both can be true but both cannot be false. The reason for this lies, however, not in the logical form of the propositions but in their transcendental content. The antithesis is a synthetic judgment a priori; it is a priori true. The propositions cannot both be false because one of them is always true. On the other hand both can be true, since the thesis is a descriptive statement about the supersensible and thus can at least not be refuted.

To resolve the antinomy of freedom, Kant must show that human freedom is a thing in itself and that it can in some intelligible sense 'act' in the phenomenal world.

The Freedom of the Turnspit

To understand Kant's proof of freedom, it will be useful first to examine his remarks at the end of the resolution of the Third Antinomy. There he explains what he originally wanted to demonstrate and what he *claims* to have shown. He emphasizes that, "our intention has not been to establish the *reality* of freedom as one of the faculties which contain the cause of the appearances of our sensible world" (B585-6). The objective reality of freedom cannot be proved

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of coordinates)' and 'The moon does not revolve on its axis for us (considered in reference to the surface of the earth)'. Between these judgments, too, the originally given contradiction would be resolved as far as the logical form is concerned." (emphasis P.M.) But this is precisely what Kant in fact means. It is certainly no accident that he chose a ("true") rotational motion as his illustration.

since the concept cannot be given the appropriate sensible intuition. This is true of everything supersensible. But Kant limits his claims even more: "It has not even been our intention to prove the *possibility* of freedom. For in this also we should not have succeeded ... " (B586). The transcendental possibility of freedom can also not be proved, for a spontaneously acting thing (a thing not fully determined causally) cannot be subsumed under the category of causality and is therefore not the object of a possible experience according to the principle: "the conditions of the possibility of experience in general are likewise conditions of the possibility of the objects of experience" (B197). The only thing that Kant might be able to prove in this connection is the *logical* possibility of freedom, i.e. that the *concept* or the "transcendental idea" of freedom can be conceived without internal contradiction or contradiction to the a priori conditions of experience. Kant maintains that the complete causal determinism of the phenomenal world does not contradict the causality of freedom. "What we have been able to show, and what we have alone been concerned to show, is that this antinomy rests on a sheer illusion, and that causality through freedom is at least *not incompatible with* nature" (B586).

Kant's conception of freedom must now be explicated, and it must be shown how freedom can sensibly be ascribed causality in the phenomenal world. The freedom under discussion is the "power of beginning a state spontaneously [*von selbst*]" (B561; cf. B476, B570-72). However, there are three different concepts of freedom involved here, which must be distinguished; I shall call them psychological, moral, and cosmological or transcendental freedom. *Psychological* freedom or the spontaneity of phenomena is the freedom asserted in the *uncorrected* thesis and denied in the *corrected* antithesis. *Moral* freedom or "freedom in the practical sense" is "the will's independence of coercion through sensuous impulses" (B562). This is the freedom that is discussed in the *Foundations of the Metaphysics of Morals* and in the *Critique of Practical Reason* as moral legislation and is the object of practical reason. Moral freedom is not problematized at all in the *Critique of Pure Reason* and is not at all affected by the antinomy; the moral validity of the laws of freedom depends on practical reason and is not affected one way or the other by the antinomies of theoretical reason. The freedom that is dealt with in the resolution of the antinomy is *cosmological* freedom, which asserts that moral legislation can also be the *cause* of

phenomena in the material world. Thus the "transcendental idea" of freedom is the notion that the moral laws of freedom can exercise causality in the world of appearances. "It is particularly noteworthy that the practical concept of freedom is based on this transcendental idea, and that it is the latter in the former that constitutes the real source of the difficulty which has always surrounded the question of the possibility of freedom" (B*561). We are thus dealing with an intelligible (noumenal) spontaneity, not, as in the uncorrected thesis, with a psychological (phenomenal) spontaneity. The freedom that initiates a chain of phenomena cannot be psychological for the latter is itself a phenomenon.

The traditional psychological problem of freedom focused on the paradigm of indifference. In the classical form of the paradigm — in the parable of Buridan's ass — a donkey stands between two equal bushels of oats at equal distances from it and in all respects equally attractive. The donkey can be compared with a piece of iron between two equally strong magnets or with a balance in equilibrium; in such a case the donkey would have to starve to death in the midst of all this plenty because it has no reason to prefer one bushel of oats (or in other versions: pile of hay) to the other. This was, for instance, Spinoza's conclusion.[79] However, most philosophers have argued either that an entirely symmetric situation is impossible or that the donkey could choose without grounds for preference. Leibniz and Clarke debated the question of freedom on the example of a balance in equilibrium as well as in theological costume on the question, whether God could create two identical particles of matter and place them in two *different* places in otherwise empty space (an indifferent situation).[80] Neither of them was willing to let Buridan's ass starve. Clarke takes up the thesis position: an "active agent" has active principles and can act even in an indifferent situation:[81]

> But intelligent beings are agents; not passive, in being moved by the motives, as a balance is by weights; but they have active powers and do move themselves, sometimes upon the view of strong motives, sometimes upon weak ones, and sometimes where things are absolutely indifferent.

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79 Cf. Spinoza, *Ethica*, II, Prop. 49. The presentation of Buridan's ass, including magnets and weights, is based on Bayle's *Dictionnaire*, "Buridan". Cf also Leibniz, *Theodicée*, I, §49, GP VI,129

80 Clarke, 3rd letter §§5-8; 4th letter §§1-2; Leibniz, 5th letter, §§3, 15, 16. Cf. Freudenthal, *Atom*, chap. 13.

81 Clarke, 4th letter, §§1-2.

Leibniz denies, that such an indifferent situation can ever occur. There cannot be two equivalent things that are equivalent in *every* respect and in *every* relation to the subject; there must be some difference that in fact makes a difference and provides grounds for a decision:[82]

> To assert also, that the mind may have good reasons to act, when it has no motives, and when things are absolutely indifferent, as the author [Clarke] explains himself here; this, I say, is a manifest contradiction. For if the mind has good reasons for taking the part it takes, then the things are not indifferent to the mind.

Even a free action is determined by sufficient reason:[83]

> It is true, that reasons in the mind of a wise being, and motives in any mind whatsoever, do that which answers to the effect produced by weights in a balance.

Kant was not satisfied with either of these positions. Clarke's solution grounded freedom in the ability to act *without* a motive and without a rational ground. Furthermore, this freedom of humans (and the spontaneity of animals) seems to consist in the ability to abrogate the conservation of force, to act against the laws of nature. Such a clear violation of the principle of the second analogy was of course out of the question for Kant.

Leibniz's arguments, on the other hand, are acknowledged to be in principle correct: "For if appearances are things in themselves, freedom cannot be upheld" (B564). This is argued at length in the *Critique of Practical Reason*. Kant denies, however, that the determination by motives deserves the name of freedom and, accordingly the antithesis reads simply: "There is no freedom ..." Even if one were to say that an action is not determined by an external mechanism but by internal representations, one is only distinguishing between an *automaton materiale* and a Leibnizian *automaton spirituale*. Leibnizian freedom, says Kant, "would at bottom be nothing better than the freedom of the turnspit, which, when once wound up, accomplishes its motions of itself."[84]

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82 Leibniz, 5th Letter §16.

83 Leibniz 5th Letter §3.

84 *Critique of Practical Reason*, A174; Ak 5,97; W 4,222.

In the *Critique of Pure Reason* Kant conceives the psychological aspects of the problem of freedom as part of natural necessity. Everything that has to do with *wanting* belongs to the causally determined world of appearance. Freedom has to do with "*ought*."

> No matter how many natural grounds or how many sensuous impulses may impel me to *will*, they can never give rise to the "ought", but only to a willing which, while very far from being necessary, is always conditioned; and the "ought" pronounced by reason confronts such willing with a limit and an end — nay more, forbids or authorises it. (B576)

The consequence is that only those actions that have a moral dimension, that result from an *ought*, can be called free. The fact, that I can raise my hand when I want to, proves only that I have the freedom of the turnspit.

The Transcendental Idea of Freedom

Thus far Kant has not advanced beyond the position of Leibniz, who also placed moral freedom and physical causality or necessity in different spheres. Leibniz, however, introduced the principle of pre-established harmony, so that he could always guarantee a "harmony between the physical kingdom of nature and the moral kingdom of grace" as well as a harmony in the realm of nature itself between the sub-area of efficient causes and that of purposes.[85] Since Kant does not base his philosophy on this principle, he needs some mechanism to guarantee a coordination between the two realms. Kant's problem is to explain transcendental or cosmological freedom, that is, to explain how the moral freedom of humans agents as things in themselves can be causally effective in the world of appearances. In the *Prolegomena* Kant poses the problem as follows:[86]

> But if natural necessity is referred merely to appearances and freedom merely to things in themselves, no contradiction arises if we at the same time assume or admit both kinds of causality, however difficult or impossible it may be to make the latter kind conceivable.

The first step in Kant's proof of the (logical) possibility of a causality of freedom consists in an extention of the concept of

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85 "Monadology,"§87; GP VI,622; PPL, 652.

86 *Prologomena*, §53, p. 84; W 3,216; Ak 4,343

causality. Since nature is not a thing in itself but a phenomenon, it must have an intelligible substrate that appears. Every event has a cause in the phenomenal world that precedes it in time; but every event is also the appearance of something that lies in the intelligible world. Kant now interprets the relation of a thing in itself to its appearance as a kind of cause and effect relation and speaks of the "intelligible cause of appearances" (B566). "Such an intelligible cause is not determined with respect to its causality by appearances, although its effects appear and thus can be determined by other appearances" (B*565). *Every event*, every link in the causal chain of phenomena, *thus has two causes*: a phenomenal cause preceding it in time and a noumenal cause that appears in it. The inhabitants of the intelligible world, that "underlie" the successive links of the phenomenal causal chain, are completely independent of one another, since they are neither spatio-temporal nor need they fall under the categories. If human agents should possess a faculty that is only supersensible, such as freedom, then this faculty could also "appear," that is, be the cause of an effect in the phenomenal world. "Thus the effect can be free in respect of its intelligible cause, and at the same time in respect to appearances be regarded as their result according to the necessity of nature" (B*565). The notion, Kant concludes, that there could be "natural causes" (like humans), that "have a faculty which is intelligible only" (like freedom) is compatible with the "law of causality" as long as the phenomena of these intelligible causes agree with the causal laws (B573). What Kant seems to mean is that the moral *ought* of freedom[87] could appear as an empirical *willing* to carry out this or that action in the phenomenal world. At least this can be conceived without contradiction.

With this 'proof' Kant has of course proved much too much.In this sense every event can be called free. About things in themselves we cannot affirm or deny anything determinate except how they

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87 The precise mechanism of the causality of intelligible freedom in the material world is not described by Kant. From some remarks in connection with the Fourth Antinomy is becomes clear that a phenomenal action itself is not to be considered the appearance of freedom as a thing in itself. Kant distinguishes between the ground of the *existence* (Fourth Antinomy) and the ground of the *causality* (Third Antinomy) of a phenomenon (B446, B589). The construction seems to be as follows: the free arbitrary will (noumenon) follows a moral rule; this decision appears as empirical arbitrary will (*arbitrium brutum*) to perform a certain action, thus bringing it about. Thus freedom is the ground of the causality of the empirical willing of an action. Cf. also CJ, Blv; W 5,271)

must appear if they should want to appear; and there is no contradiction in the assertion that the fact that it rained yesterday was also the appearance (effect) of a thing in itself (say, the freedom of Julius Caesar). Many abstruse assertions are in this sense possible, i.e. unfalsifiable, so long as they merely assert something descriptive about the supersensible.[88] Thus, there must also be some positive grounds for singling out human freedom from among the manifold inhabitants of the intelligible world. Kant adduces two such grounds.

1) While we cannot have any empirical or theoretical knowledge about things in themselves but only about phenomena, there is, however, one thing in itself to which we nonetheless have *direct access*, namely, to ourselves as moral agents, to our moral freedom as rational beings. This kind of access, which Kant articulates in later writings, is called here in a somewhat undifferentiated manner simply "mere apperception":

> Man, however, who knows all the rest of nature solely through the senses, knows himself also through mere apperception; and this, indeed, in acts and inner determinations which he cannot regard as impressions of the senses. He is thus to himself, on the one hand phenomenon, and on the other hand, in respect of certain faculties the action of which cannot be ascribed to the receptivity of sensibility, a merely intelligible object. We entitle the faculties understanding and reason. (B*574-5)

Reason "determines" the understanding according to an idea, and the understanding makes "empirical use" of the concepts.

Apperception should not be confused with the introspective knowledge of one's own subjectivity that Kant discusses as inner sense. Apperception is thus not experience in the proper sense, because it is not mediated by the senses; it is knowledge only in the sense that practical reason, too, is called a "faculty of knowledge". Kant gives an indication of how the causality of freedom is supposed to act: practical reason "determines" according to an idea and the understanding carries it out. In the terminology of the *Critique of Judgment* we might say: moral-practical purpose determines (appears as) technical-practical purpose. It is also important for the later discussion of the antinomy of judgment to point out that Kant explicitly restricts this type of causality to humans, since only we have this apperception: "*In lifeless, or merely animal, nature we*

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88 Cf. the reflection quoted in fn 73. Cf. also Beck, *Commentary*, p. 187; Butts, *Double Government*, pp. 247ff; Broad, *Kant*, pp. 275f.

find no ground for thinking that any faculty is conditioned otherwise than in a merely sensible manner" (B574). Whatever may later be the case, at least in the *Critique of Pure Reason* Kant sees no special connection between freedom and the organism.

2) Thus far it has only been said that humans have empirical-theoretical knowledge of themselves as causally determined inhabitants of the Leibnizian realm of nature and apperceptive access to themselves as inhabitants of the Leibnizian realm of grace, and that the supersensible can without contradiction be conceived as the cause of appearances. The second ground that Kant adduces for singling out freedom, reads: "'Ought' [*Sollen*] express a kind of necessity and of connection with grounds which is found nowhere else in the whole of nature" (B575). The real sense of Kant's appeal to "imperatives" in this context becomes clearer through the explanations that he gives in the introduction to the *Critique of Judgment*. There he again distinguishes between nature and freedom, and twice stresses that nature cannot influence freedom (the reverse is *not* asserted). However, even if the physical *cannot* act upon the moral, nonetheless the moral *ought* to act on the physical and consequently this action *must* be conceivable:

> Hence an immense gulf is fixed between the domain of the concept of nature, the sensible, and the domain of the concept of freedom, the supersensible, so that no transition from the sensible to the supersensible (and hence by means of the theoretical use of reason) is possible, just as if they were two different worlds, the first of which cannot have any influence on the second; and yet the second *ought* to have an influence on the first, i.e., the concept of freedom ought to actualize in the world of sense the purpose enjoined by its laws. Hence it must be possible to think of nature as being such that the lawfulness in its form will harmonize with at least the possibility of the purposes that we are to achieve in nature according to the laws of freedom. (Bxixf; CJ, *14-15)

It is the moral *ought* that is meant here. Kant's reasons for attributing causality in the material world to moral freedom, that is, for assuming a cosmological or transcendental freedom, are moral. He attempts to show that this transcendental idea of freedom is logically possible, apperceptively accessible, and furthermore morally "necessary."[89]

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89 Compare this position with that of the key sentence of the so-called "oldest system program" of German Idealism: "How must a world be constituted for a moral being?" Kant wanted only to prove the conceptual possibility of what morality demands; his successors, however, drew conclusions about the nature of the material world from the fact that moral agents can act in this world.

I do not want to pursue the Kantian concept of freedom any further. The point here was only to make the structure of the subcontrary antinomy transparent and to present enough of the content of the argument, so that the differences and similarities of this antinomy to the antinomy of judgment can sensibly be discussed.

2.6 The Systematics of Antinomy

A *Critique* needs an Analytic and a Dialectic, and a Dialectic must have an antinomy. Kant's philosophy recognizes seven antinomies, of which however only six receive the title "of pure reason." Among the six antinomies of reason there are three kinds. In a section at the end of the "Critique of Aesthetic Judgment" (§57) entitled "Comment II" Kant presents a classification of the various antinomies:

> Here the following important point arises spontaneously: that there are *three kinds of antinomy* of pure reason, all of which are still alike in that they force reason to abandon the otherwise very natural presupposition that objects of sense are things in themselves and force reason to regard them instead as mere appearances that are based on an intelligible substrate (something supersensible, the concept of which is only an idea and precludes cognition proper). (B243; CJ, *218)

Without such a conflict with itself, reason would never have been willing to accept the critical restrictions on its speculation. Each of the three faculties of knowledge in the Kantian system has its own antinomy of reason: theoretical reason or understanding has a fourfold cosmological antinomy, practical reason and aesthetic judgement each have a single antinomy. Each of these antinomies makes reference to a particular faculty of the mind:

> And so three antinomies arise: (1) *for the faculty of knowledge*, an antinomy of reason concerning the theoretical use of the understanding when this use is extended up to the unconditioned; (2) *for the feeling of pleasure and displeasure*, an antinomy of reason concerning the aesthetic use of judgment; (3) *for the faculty of desire*, an antinomy [of reason] concerning the practical use of our intrinsically legislative reason. (B244; CJ, 218)

The "Critique of Teleological Judgment" also has an Analytic and a Dialectic; and its Dialectic also contains an antinomy, which, however, has no place in the system just presented here. This anti

nomy is thus apparently not one "of pure reason" and in fact is also not so named. This — the seventh — antinomy is called the "antinomy of judgment" and has no faculty of the mind to which it directly relates. The difference is important in that we should not expect to find in this antinomy a conflict of *reason* with itself, as in the antinomies of reason, but rather a conflict of *judgment* with itself. The inevitability of the dialectical illusion cannot, for instance, be traced back to the demand of reason for the unconditioned, as is maintained for the antinomies of practical reason and aesthetic judgment. It is also questionable whether the distinction between phenomena and things in themselves will bring a solution to this antinomy. Although the application of this figure of argument to another area in the antinomy of judgment should display some similarities to what we have seen in this chapter, there will certainly be some differences due to the different kind of object to which it is applied.

2.7 Summary

Three significant results of the analyses undertaken in this chapter, which provide the basis for the subsequent investigation of the antinomy of judgment, should be recalled to mind: 1) the "logic" of the antinomies, 2) the presupposition of the conditioning of the whole through the parts, and 3) the completeness of the systematics of the antinomies of reason without any mention of an antinomy of judgment.

1. A Kantian antinomy is an apparent contradiction between two propositions that in equal measure make an unspoken and ungrounded presupposition. This presupposition implies that the Law of the Excluded Middle applies to them. In the *Critique of Pure Reason* two conflicting predicates, which exhaust a range of incompatibility, are attributed to a subject, whereby it is assumed that the genus of which the two predicates are species may be attributed to the subject. Under this presupposition both of the two conflicting predications are then argued *ad absurdum* thus refuting the presupposition (that the world is a thing in itself). If one disputes this presupposition, then the *tertium non datur* no longer holds; the op-

position proves to be not an analytical opposition (contradiction) but rather a merely dialectical or synthetic opposition (contrary opposition). Both propositions could be false. Since all proofs for the various propositions were apagogical, they are thus all invalid; nonetheless the refutations of the respective counter-propositions, contained in the proofs, are still valid.

2. In the *Critique of Pure Reason* Kant reiterates an assumption that he had introduced as early as the *Monadologia physica*, namely that the parts condition the whole, but the whole does not condition the parts. This assumption leads, if one takes Kant's concepts and arguments seriously, to an incompatibility between the justifications of the First and Second Antinomies: either the dissection of a material system (Second Antinomy) is a regress from a conditioned to its condition or the composition of a material system in space (First Antinomy) is such a regress. Only one of them can be a regress, and without a regress there is no antinomy. The equation of the relation of part and whole with that of cause and effect is not problematized at all by Kant. The identity of the two relations seems to be self-evident.

3. The system of antinomies of reason that Kant presents at the end of the "Critique of Aesthetic Judgment" is complete and closed in its structure. There is no place for additional antinomies of reason. The antinomy of judgment, which is not foreseen there, must have a different position in the critical system than the antinomies of reason.

Chapter 3
The Antinomy of Judgment

3.1 Introduction

In the Analytic of teleological judgment Kant attempted by means of dichotomies and definitional division to derive analytically from the concept of purposiveness a concept of natural purpose, which he could then "project" (*hineinspielen*) onto nature in order to explain certain particularly problematical phenomena, namely, organisms. The subsequent justification or "derivation" of this concept left many questions unanswered, including the question of whether the concept itself was not self-contradictory. In any case, at the end of the Analytic a number of reservations about the legitimacy of such a concept had still not been removed. In the second part of the "Critique of Teleological Judgment" Kant attempts somewhat more successfully with dialectical means what he was not quite able to do with analytical means. His instrument is the figure of argument of the antinomy which we analyzed in the last chapter. Formally, the Dialectic of teleological judgment consists entirely of a single antinomy: it is presented, explicated, and resolved. In terms of content, the Dialectic is a thorough critique, but also a fundamental justification, of mechanistic, reductionistic explanation in biology. A number of difficulties in principle regarding this type of explanation are analyzed; but in the final analysis Kant insists in spite of all reservations on the exclusive legitimacy of this type of explanation in science; that is, he continues to subscribe to the identity of scientific and reductionist explanation.

An antinomy in Kant's system is a conflict of laws, and only a faculty that gives itself laws, i.e. that is autonomous, can be involved in an antinomy. Within certain limits, the faculty of judgment as reflective judgment is autonomous. When the particular is given in experience but the universal under which it is to be subsumed is not, judgment prescribes itself a rule about how it is to seek the universal (concept, law). But only in this limited area of concept formation and hypothesis development in empirical research does judgment have a legislative function, and even here it legislates only for itself. Only in this area can an antinomy specific to judgment arise. Wherever the universal is given by the understanding and the faculty of judgment is only determinate and thus not autonomous there can be no antinomy — at least no antinomy of judgment.

The antinomy of judgment is in principle a supplement to the *Critique of Pure Reason*; it presupposes the results of the Critical Philosophy. Organisms (particulars) are objects of experience and are subject to the categories and the forms of intuition as are all other phenomena. A problem arises only with the introduction of the concept of natural purpose as the universal under which all organisms are to be subsumed. Judgment gives itself the rule of using this concept, and it seems that the concept might contain a contradiction. In this case the autonomous faculty of reflective judgment would have involved itself in a contradiction, which, if it should turn out to be unavoidable, must be called an antinomy. However, it should be remembered that Kant himself introduced the concept of natural purpose on the basis of a philosophical position achieved through the *Critique of Pure Reason*, and so he must bear the consequences of any inconsistencies. If an antinomy or an apparent contradiction nonetheless results, then it cannot be an antinomy of pre-critical, dogmatic reason, but rather an antinomy of a critically informed and circumspect faculty of judgment. The concept of natural purpose, as we saw in Chapter 1, was barricaded behind critical restrictions and reservations and almost buried in subjunctives and 'as if' formulations. If a real antinomy is to arise, that is, if the dialectical illusion is to be more than pure sophistry, then it must arise on the basis of the Critical Philosophy, and the mere reference to the distinction between appearance and things in themselves or to other such truisms is of no avail. The unjustified presupposition which leads to the antinomy cannot be the same as the one exposed in the *Critique of Pure Reason*. The appearance of

contradiction in the concept of natural purpose must be based on a (false) presupposition not excluded by the *Critique of Pure Reason*.

In the four-part antinomy of the *Critique of Pure Reason*, the contradiction between thesis and antithesis exposed the unjustified presupposition that the world is a thing in itself and provided an indirect proof that it is merely an appearance. In the Dialectic of teleological judgment Kant construes a contradiction between two assertions of reflective judgment in order to expose as false an unjustified presupposition of empirical science. This presupposition is the basis of the reservations about the concept of natural purpose and only becomes clearly visible when the problem is brought to a head and formulated as an explicit contradiction. We shall see that this presupposition is precisely the one we came across in the analysis of the antinomy of division: the assumption that the parts are the condition of the whole, but that the whole is not the condition of the parts. In the Dialectic this equation of causal explanation as such with the reduction of a whole to the properties of the parts, that is, the equation of scientific *analysis* of a phenomenon with its *dissection* into component parts will be called "mechanism" by Kant. It is the hypostasis of this mechanistically conceived causality as the only kind of efficient ("real") causality that occasions the appearance of a contradiction in the concept of natural purpose. The resolution of the antinomy leads to a relativization not of causality itself, but of mechanism or reductionism – without however seriously calling into question its status as the only legitimate form of scientific explanation in general.

The text of the Dialectic consists of ten two-to-five page numbered sections (§§69-78). A fairly dependable survey of the course of Kant's argument can be given by listing the section-headings. At least it will prove to be one of the peculiarities of the interpretation developed here, that it interprets Kant to be arguing in each section more or less just what he announces in its title. The headings read:

§69	What an antinomy of judgment is.
§70	Presentation of that antinomy.
§71	Preliminary to the solution of the above antinomy.
§72	On the various systems concerning the purposiveness of nature
§73	None of the above systems accomplishes what it alleges to accomplish.

Let it also be noted that, disregarding the "Comment" (§76), the antinomy of judgment has exactly the same number of sections as the antinomies chapter in the *Critique of Pure Reason* and a similar structure as well, although the parallels of content are rather loose.

On the basis of the analysis of the antinomy as a figure of argument carried out in the last chapter, we should expect the theories of the organism actually propounded in the 18th century to be taken into consideration in some manner by the thesis and antithesis of the antinomy of judgment. We cannot of course expect to find a repeat of the Leibniz-Clarke debate, since the two did not in fact quarrel about the concept of the organism; but even the more general expectation, that both sides of the contradiction represent positions actually taken by significant scientists, cannot be satisfied without reservations. We can be fairly certain that Kant's predecessors did not consider their theories of organic phenomena to be merely regulative principles in the sense of the *Critique of Pure Reason* and that they were closer to what Kant called "constitutive principles." The concept of *natural purpose* was introduced by Kant himself, and he must take full responsibility for any internal contradictions that should arise. If Kant intends to draw his predecessors into the antinomy (which he obviously attempts to do in §§72-74), he cannot introduce these positions directly as thesis and antithesis. He must find some kind of mediating step to translate these positions into the conceptual scheme of the Critical Philosophy.

The form in which this antinomy is resolved (as are those of the *Critique of Practical Reason* and the "Critique of Aesthetic Judgment") is the subcontrary form. It is shown that, the false presupposition having been exposed and rejected, both thesis and antithesis in their new forms *can* be true. The asymmetry in status that could be seen between thesis and antithesis of the antinomy of freedom will also recur in this antinomy.

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The remark above about the peculiarity of my interpretation of Kant actually refers just as much to a peculiarity of traditional Kant scholarship with regard to the antinomy of judgment, a peculiarity that will be reflected in the structure of this chapter. With respect to this literature my assertion that, for instance, the section §71 with the title "Preliminary to the Solution of the Above Antinomy" was intended as a *preliminary* to a solution and not as a mere *addendum* to an already completed solution, constitutes a radical departure from almost all previous interpretations. Even my view that Section §76 "Comment" contains what is basically a footnote to the subject matter of §75 finds little support. And I have yet to find a commentator who looks with favor on the suggestive thesis that the final resolution of the antinomy is probably to be found in the final sections of the antinomy discussion. Furthermore, no commentator seems to have found it worth mentioning that the antinomy of judgment, unlike all other antinomies in Kant's system, is neither called, nor can (for systematic reasons) be called, an antinomy of *reason*. The various interpretations of the antinomy of judgment will be dealt with extensively in Section 3.3 below, but a few general remarks are called for at this point in as much as the shortcomings of these interpretations have materially influenced the structure of my presentation.

At present no even halfway satisfactory analysis of the Dialectic of teleological judgment is available, nor has a plausible explanation been given even of what Kant may have *intended* to say. Even such first rate commentators as Cassirer and Adickes have been unable to provide a serious interpretation of the text; and Adickes, as we shall see below, literally argues himself *ad absurdum*. Kant's "Critique of Teleological Judgment" especially the Dialectic has driven otherwise reasonable commentators to devices which would under other circumstances have been rejected out of hand as abstruse. The dominant approach has been that of Schopenhauer, who considers the text to be an architectonic misconstruction, a baroque structure, in which *all* windows are false: A *Critique* must have an Analytic and a Dialectic, and a Dialectic

must have an antinomy; therefore Kant has for architectonic reasons conjured up something that he can call an antinomy. The Dialectic is supposed basically to have no philosophical content; the so-called antinomy is supposed already to be resolved as soon as it is clearly formulated. The question arises then, of course, why Kant wrote so much about it. The alternative seems to be posed: either not to take this particular text seriously or not to take Kant's system seriously. For instance, some recent commentators have postulated two different drafts which Kant simply collated and sent to press.[1] On the other hand, one can take the text seriously and change the system; it has been suggested that the category of causality be transformed into a merely regulative principle, or that a thirteenth category be introduced for teleology, or even that a third form of intuition for purposiveness be admitted.[2] My interpretation will attempt to avoid such acts of desperation without however denying the objective grounds that have led to them. The goal is to show that Kant in the Dialectic of teleological judgment means something that a) significantly resembles what he actually *says*, and b) is compatible with the basic positions of the *Critique of Pure Reason*. From the analysis of Kant's presentation of the antinomy (Section 3.2) and of the interpretative difficulties of previous commentators (Section 3.3) some more specific considerations will be worked out and articulated.

The reason for the unsatisfactory character of the available interpretations lies mainly with Kant himself. His presentation and his elucidations of the antinomy create many problems and any interpretation of the Dialectic can be confronted with particular passages which it can scarcely explain. As a first step, an interpretation of the text as a whole must be established in order to show what Kant is actually getting at. Due to these particular circumstances my procedure will on occasion seem rather philological. It will sometimes be necessary to go through the text line by line in order to show what Kant must have *meant*; on the other hand, it will occa-

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1 Cf. Delekat, pp. 463f; Löw, pp. 206f. This kind of interpretation can take on a life of its own: Delekat *infers* from the content of the text that it must consist of two different draft versions. Löw, who cites Delekat, assumes as fact that two drafts have been spliced together and bases his interpretation of the text's content on this assumption. No external evidence whatever for the two draft thesis has been offered.

2 Cf. Driesch, "Kant und das Ganze"; Ernst, *Zweckbegriff*, p. 64; Van de Pitte, "The Role," pp. 114f.

sionally be necessary on points of fundamental importance to insist literally on Kant's exact wording — against the entire tradition of interpretation. In Section 3.3 the most important varieties of interpretation of the antinomy itself will be examined systematically. Differences in the interpretation of other passages will occasionally also be taken up, but there will be no explicit discussion of the spectrum of interpretations on these points, since such differences are in principle merely consequences of the fundamental differences in the interpretation of the antinomy itself. The interpretation of this point is what is decisive.

In Section 3.4 I shall examine Kant's focusing of the opposition and his discussion of his predecessors (§§72-76) Section 3.5 will present the resolution of the antinomy (§77) and the subsequent reconciliation of mechanism and teleology (§78). Section 3.6 will recapitulate the argument.

3.2 Presentation of the antinomy (§§69-71)

Determinate judgment, according to Kant, cannot run into contradiction with itself since it does not give itself any laws; it subsumes particulars under concepts given it by the understanding, and if some conflict should arise between concepts, it is the understanding itself that is responsible. Reflective judgment on the other hand must subsume a given object under empirical laws which it must itself first find. It is its own legislator to the extent that it gives itself rules about how to find these laws. It is thus at least conceivable that it could find itself compelled to give itself different maxims for action that actually come into conflict with one another. Whereas determinate judgment might possibly be obliged to accept contradictory principles (which might constitute an antinomy but only an antinomy of the faculty mandating the principles), reflective judgement can run into difficulties with its own proprietary principles. That is, an antinomy specific to judgment, should one arise, can arise only with respect to reflective judgment. At least, it is possible in principle for an apparent contradiction between two maxims of reflective judgment to arise.

> Now between these necessary maxims of reflective judgment a conflict may arise, and hence an antinomy; and this antinomy forms the basis for a

> dialectic. If two conflicting maxims both have their basis in the nature of our cognitive powers, then this dialectic may be called a natural one, an unavoidable illusion that we must expose and resolve in the critique so that it will not deceive us. (B312; CJ, 266)

Here Kant announces his intention to present an antinomy between "necessary maxims of reflective judgment." In the presentation of the antinomy itself we may thus expect 1) to find a conflict between two *maxims*, 2) that these maxims belong to *reflective* judgment, and 3) that both of them may in some reasonable sense be said to be *necessary*, or at least to have "their basis" in the nature of our cognitive powers. It should also be clear on general logical principles that whatever it is that Kant is going to call a "maxim" has to be expressible in the form of a proposition if it is to stand in contradiction to another maxim.

The antinomy of judgment as formally presented in §70 reads:

> [R1] *The first maxim* of judgment is the *thesis*: All production of material things and their forms must be judged to be possible in terms of merely mechanical laws.
>
> [R2] *The second maxim* is the *antithesis*: Some products of material nature cannot be judged to be possible in terms of merely mechanical laws. (Judging them requires a quite different causal law — viz., that of final causes.) (B314; CJ, 267)

These two propositions, called "maxims," are definitely incompatible: it is asserted that *all* material things *must* "be judged to be possible in terms of merely mechanical laws," and that *some* such things *cannot* be so judged. This is the apparently analytical opposition that must be shown by the critique to be merely dialectical. This is the contradiction that seems to be contained in the concept of natural purpose.[3]

We are dealing here with an antinomy within that kind of empirical natural science that is grounded in the critical philosophy. However, this conflict is nonetheless similar to one rampant in pre-Kantian science, which did not distinguish between regulative and constitutive principles in Kant's sense. One can in fact reconstruct some pre-Kantian conflicts if one transforms these maxims into dogmatic postulates about reality — although the anti-

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3 It should be noted here that the subject of the two propositions is actually not the same: all *production* — some *products*. The difference is not made use of in the resolution of the antinomy. It is also clear that the opposition is rather one of contrariety than of contradiction in the strict sense.

nomy is not just the "critical" reflection of a really given historical conflict. Kant proceeds (note the subjunctive):

> These maxims are regulative principles for our investigation [of nature]. If we converted them into constitutive principles concerning the possibility of the objects themselves, they would read:
>
> [C1] *Thesis*: All production of material things is possible in terms of merely mechanical laws.
>
> [C2] *Antithesis*: Some production of material things is not possible in terms of merely mechanical laws. (B314-5; CJ, 267)

Kant points out that this second pair of opposites, should one propose it, would present a conflict and could result in an antinomy — not an antinomy of *judgment*, but rather a "conflict within the legislation of reason." (B315; CJ, 267) These principles would not be such as judgment gives itself but rather principles forced upon it from without. This second pair of opposites (C1 and C2), which does in fact reflect two basic positions of 18th century thought on the nature of the organism, does not constitute an antinomy — neither an antinomy of judgment nor one of the understanding or reason — since neither of them is in any sense necessary. As Kant says: "Reason, however, cannot prove either of these two principles." (B315; CJ, 267) Moreover, even if we were to assume that the propositions could be proven, they would still not constitute an antinomy of *judgment* and Kant proceeds to admonish us not to confuse the two pairs of conflicting propositions.

It should also be pointed out that the second maxim of the antinomy (R2) consists of two complete propositions, of which only the first contradicts the first maxim (R1). However, only the second part of (R2) (which Kant put in parentheses) deals with teleology or final causes. Thus, the apparent contradiction or the antinomy itself subsists not between a mechanistic and a teleological principle but between two different propositions about *mechanism*, between the *general necessity* and the *occasional impossibility* of purely mechanistic judgment: everything must be judged mechanistically, some things cannot be so judged. It is thus, strictly speaking, incorrect to speak of an antinomy between mechanism and teleology or between mechanistic and teleological principles, since no logical incompatibility between them is asserted by these propositions. Only after the occasional impossibility of merely mechanistic explanation has been established does the second part of the second maxim (on final causes) apply at all. Only when it is clear that there exist things that

we cannot explain mechanistically need we take refuge in teleology. The maxim of teleology proper ("Judging them requires a quite different causal law — viz., that of final causes") is introduced only if the first part of (R2) is true; and furthermore, it can only then potentially lead to difficulties if (R1) is also true. Thus a conflict between mechanism and teleology can only then arise when both apparently contradictory propositions about mechanism are true, that is, *after* the antinomy proper has already been resolved in a "subcontrary" manner. The resolution of the apparent contradiction must show that both maxims of mechanism can in some intelligible sense be said to be true. After the resolution of the antinomy proper, the occasional use of teleology must then be reconciled with what is left of mechanism. The first task is completed by Kant in the second to the last section, §77; the second task in the last section, §78. It is essential for an understanding of the Kantian text to remember that we are dealing with *three* propositions (two on mechanical laws and one on final causes) and with two different oppositions. The two propositions about mechanism contradict one another; their relation to the proposition about final causes has still to be clarified.

Kant's presentation of the antinomy in §70 takes these three elements and their particular relations into account. Before he cites the maxims themselves, he examines their origins. He stipulates:

> that judgment presupposes two maxims as it reflects: one of these the *mere understanding* gives it a priori; the other is prompted by *special experiences*, experiences that bring *reason* into play so that we may judge ... in terms of a special principle. (B314; CJ, *267; emphasis PM)

Mere understanding says "everything must"; special experience says "some things cannot"; and then reason comes into play and in turn introduces final causes. Three elements are mentioned: 1) understanding *a priori*, 2) empirical understanding or experience, and 3) reason. At this point in the analysis it is difficult to explain what exactly these distinctions are supposed to mean. However, it can at least be pointed out that we have already encountered a similar distinction between understanding and reason in the "derivation" of the concept of natural purpose in §65. There, the "mere understanding" prescribed a particular kind of causal connection; a special experience compelled the understanding to introduce final

causes "in terms of a concept of reason (the concept of purposes)" (B289; CJ, 251).[4]

3.3 Interpretations of the Antinomy

Kant's presentation of the antinomy of judgment and especially some of his occasional remarks *about* the antinomy have given rise to a number of insecurities in interpretation in as much as Kant seems here to be groping forward at the outer limits of his conceptual scheme. He seems to be trying to determine the bounds of the mechanistic view of the world *from the inside*. In order to help clarify the issues and problems involved in this antinomy, I shall here introduce some of the most important approaches to interpreting the text: all of them either interpret the antinomy as merely an artificial sophistry or else attribute opinions to Kant that are incompatible with central positions of the *Critique of Pure Reason*. However, the point of surveying this literature is not to show that there are passages in Kant's works which seem to contradict (in the context I provide) the cited interpretations. On the contrary, the point is to determine whether the basic approach on which these interpretations are grounded is acceptable in terms of method and plausible in terms of content.

Three Approaches

(1) Most commentators have interpreted the opposition between the two constitutive principles (C1 and C2) as the apparent contradiction in which the antinomy is said to consist. Instead of locating the antinomy between the two regulative principles, they see in these two principles the resolution of the antinomy. Such influential Kant scholars as Adickes, Stadler, Körner, Ewing, and Ernst Cassirer assert that the differentiation between regulative and constitutive principles provides the solution to the antinomy of

4 Cf. above 1.4, pp. 47f.

judgment. A passage from Ernst Cassirer may serve to illustrate this view:[5]

> The antinomy between the concept of purpose and the concept of cause thus disappears as soon as we think of both as two different modes of ordering, by which we attempt to bring unity into the manifold of phenomena. Then, the harmony of two mutually supplementing 'maxims' and orders of reason takes the place of the conflict between two metaphysical basic factors of events.

There are a number objections to this kind of interpretation. In the first place, this characterization of the opposition and its resolution does not at all match up with Kant's announcement of the antinomy discussed in detail in the last section. It was supposed to consist in a conflict between *maxims*, which belonged to *reflective* judgment, and which in some sense could be said to be *necessary*. But Kant neither calls the constitutive principles (C1 and C2) "maxims" nor does he treat them as such. He says explicitly that they belong not to reflective judgment but rather to determinate judgment. And he nowhere even hints that the constitutive principles might in any sense be necessary; they are even introduced in the subjunctive mood, and Kant afterwards maintains that they *cannot* be proved. We would thus have to assume that Kant presents in §70 an antinomy completely different from the one he announced in the last sentence of §69.

Secondly, in the *Critique of Pure Reason* Kant had already envisioned the possibility of a confusion between regulative and constitutive principles without trying to pass off such a confusion as an antinomy. There he wrote:

> When merely regulative principles are treated as constitutive, they can be in conflict as objective principles. But when they are treated merely as *maxims*, there is no real conflict, but merely those differing interests of reason that give rise to the separation of modes of thought. In actual fact, reason has only one single interest, and the conflict of its maxims is only a difference in, and a mutual limitation of, the methods of satisfying this interest. (B*694)

The possibility that the confusion of regulative and constitutive principles can lead to a seeming conflict and the fact that differing max-

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5 E. Cassirer, p. 369. Cf. also Adickes, *Naturforscher*, vol. 2, 473-4; Adickes, *Systematik*, p. 171; Baumanns, p. 109; H.W. Cassirer, p. 344; Eisler, p. 634; Eisler, p. 634; E.-M. Engels, p. 93; J.E. Erdmann, p. 213; Ewing, *Causality*, p. 228; Karja, p. 87; Körner, p. 208; Löw, p. 212; O'Farrell, p. 659; Schrader, p. 225; Stadler, p. 128.

ims need not contradict one another is dealt with here in two relatively clear sentences. Kant did not need to write half a book simply to repeat this. In any case it seems to me not to be a very sensible strategy of interpretation to read the Dialectic of teleological judgement as a somewhat unclear and self-contradictory repetition of a triviality. The concept of antinomy itself, as we have seen in the previous chapter, excludes the possibility of puffing up such simple mistakes into antinomies. In such cases we would be dealing with a "mere artificial illusion."

However, the third and most important objection to this interpretation lies in the fact that the two maxims (R1 and R2), into which the antinomy is supposed to have been resolved, are not at all in "harmony" with one another. They are formulated as a direct contradiction. Even if it be admitted that some of Kant's later utterances *about* the antinomy allow or even call for Cassirer's interpretation, there still remains one fundamental problem: the contradiction involved in the formal statement of the antinomy by no means disappears simply because Kant can be interpreted as reporting that it is gone. The alleged assertion by Kant of the absence of a contradiction is hardly a solution to the antinomy. He may not simply assure us that the difficulties involved with the concept of natural purpose have disappeared. If this interpretation correctly expresses Kant's views, then Kant himself is wrong and the antinomy that he has actually presented is not at all resolved.

Hegel — not the first, but certainly one of the most important proponents of this sort of interpretation — saw the problem I have sketched above quite clearly and drew precisely the same conclusion, namely, that it would be wrong to think that Kant had resolved the antinomy. He assumed, however, that Kant had not noticed that the maxims were every bit as contradictory as the constitutive principles. In the *Science of Logic* Hegel writes about thesis and antithesis of the antinomy:[6]

> The Kantian solution to this antinomy is ... that therefore both must be regarded not as objective propositions but as subjective maxims; that I should on the one hand always reflect upon all natural events according to the principle of mere mechanism, but that this does not prevent me, on given occasions, from investigating some natural forms according to another principle, namely according to the principle of final causes, — as if these two maxims, which by the way are supposed to be necessary for

6 Hegel, *Logik*, II,442-3 (pt. 2, sect. 2, chap. 3). The earliest such interpretation seems to be that of Lazarus Bendavid (1796, pp. 147-152).

> human reason only, were not in the same opposition in which the above mentioned propositions found themselves.

It is, however, hardly credible that Kant could have overlooked the opposition between the two maxims, and even less than credible that he would have repeated such formula-like phrases if he had not wanted to formulate an explicit contradiction. In conclusion, we can see that this interpretation asserts that Kant resolves a different antinomy than he announces, that the resolution offered is philosophically trivial, but that nonetheless, as carried out by Kant, it is inadequate.

(2) An alternative to this interpretation, which could to a certain extent forestall Hegel's objection, can point out the peculiarity of Kant's assertion that the maxim of judging everything mechanistically is merely a regulative principle of reflective judgement and not a constitutive principle of determinate judgment. A number of commentators have correctly pointed out that the complete causal determination of all objects of experience (including organisms) is not a merely regulative principle, but is rather constitutive of experience. For instance, H.W. Cassirer writes:[7]

> How can Kant treat the mechanical and teleological principles as reflective principles? Such an assertion is obviously contrary to the fundamental principles of his philosophy. According to him the mechanical principles are derived from the universal law of causality. This law is a product of the understanding. It is an objective principle. By means of it we know prior to all actual experience that every event in nature must be determined by mechanical causes. This has been made quite clear by Kant in the *Critique of Pure Reason*, and it will be sufficient to refer to his discussion of the second Analogy.

If the first maxim (R1) maintains: everything must be judged to be causally completely determined; then it does in fact simply assert what is self-evident after the *Critique of Pure Reason*: all phenomena are causally determined. Such a maxim would simply make it a rule to interpret things as they in fact are. Mechanism, so interpreted, is thus constitutive and teleology merely regulative. The antinomy could then arise either 1) when we falsely take *mechanism* to be merely regulative (conflict of the two regulative principles) or 2) when we falsely take *teleology* to be constitutive (conflict of the two constitutive principles). Kuno Fischer, for instance, saw that the two maxims are really inconsistent if both apply to reflective

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7 H.W. Cassirer, p. 345.

judgment: "If we posit that both these maxims apply to the same kind of judgment, then their antinomy is insoluble." From this he concluded: "The thesis holds for determinate judgment, the antithesis for reflective judgment."[8] This interpretation has the advantage that it can at least take the first pair of propositions (the "maxims") to be the antinomy, so that it at least to this extent conforms to Kant's characterization. The resolution of the antinomy is also rather simple: it is pointed out that the two apparently contradictory propositions are taken in different regards — one as constitutive and one as regulative —, and thus there is no true contradiction. This interpretation does however have the disadvantage that the dialectical illusion involved in the antinomy is entirely artificial. According to this interpretation we have no reason to take the first maxim (R1) as a merely regulative principle for reflective judgment, because it is in reality constitutive; or rather, the only reason we have to do this is that Kant has explicitly instructed us to do just this in §§ 69 and 70, that is, to take *both* maxims as regulative. Our mistake and thus the entire antinomy would thus be nothing more than a confusion deliberately instigated by Kant; the dialectic would thus be "one which some sophist has artificially invented to confuse thinking people" (B354).

This interpretation also raises a second problem. It assumes as evident that concepts like "mechanism" and "merely mechanical laws" have the same meaning as "causality." Such an equivalence is *not* formulated by Kant. On the contrary, some of his remarks exclude the possibility of such an identification. In his discussion of the two constitutive principles (C1 and C2) Kant asserts that *neither* of them can be *proved* by reason. That is, even the proposition (C1): "All production of material things is possible according to merely mechanical laws," can, according to Kant, not be proved. However, the complete causal determination of all material things was supposedly *proved* in the *Critique of Pure Reason*: what is not causally completely determined does not appear. The mere existence of something as a phenomenon is already sufficient proof that it possible according to merely *causal* laws. A.C. Ewing draws the appropriate conclusion: "This passage by itself seems to constitute quite a sufficient proof that Kant does not at this stage mean to identify mecha-

8 Kuno Fischer, p. 492; cf. Bauch, pp. 442 and 445.

nism with phenomenal causality."[9] In any case, if mechanism is the same as causality, then its validity must already have been proven by the *Critique of Pure Reason*.

There seem thus to be two important reasons to distinguish the two concepts, mechanism and causality. Finally, if one equates them, then the entire construction of the antinomy is simply deceptive packaging. Kant simply calls constitutive principles regulative and regulative principle constitutive; he contradicts himself. Furthermore, we would also have to assume that he immediately contradicts himself again, since he asserts that the supposedly constitutive principle of mechanism is unprovable (in which case it would not be constitutive). Both contradictions follow from the equation of mechanism with causality which is interpreted into the text, thus refuting the equation.

(3) This conclusion must be relativized in light of a third variety of interpretation: Either "mechanism" means something different from "causality" or else "causality" has changed its meaning since the *Critique of Pure Reason*. Some commentators have attempted a solution by demoting the category of causality to a merely regulative principle. They see in this the beginning, or even the completion of a transition in Kant's thought to a kind of vitalism or openly advocated teleology. This approach to an interpretation was relatively popular in German neovitalism early in this century

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9 Ewing, *Causality*, p. 228. Although a number of commentators have noted that Kant *must* have seen a difference between mechanism and causality, only Ewing seems to have fathomed Kant's reasons. Macmillan (pp. 271-2), for example, considers causality to be constitutive for all *real* experience and mechanism to be regulative for all *possible* experience. Often, the mechanistic interpretation of causality is conflated with the use of causality in the branch of physics known as mechanics: Kant's "analysis of experience was by no means restricted to the domain of theoretical physics" (Schrader, p. 223); Kant "realizes that all thinking is not the thinking of the physicist and that to make sense of some aspects of our experience we must use concepts different from the mechanical, even if these cannot be objectively justified" (McFarland, p. 135). Ewing on the other hand sees that mechanism is supposed to consist in the reduction of a whole to its parts; but he does not distinguish between the alternatives, namely between the possibility that the *representation* of the whole has a causal influence on the parts (intentional purposiveness) and the possibility that the whole itself has such an influence (natural purpose). This problem will be dealt with at length in the next section.

but also recurs today in a neo-Thomistic variant. A good example from the days of neovitalism is given by Wilhelm Ernst:[10]

> The tendency of the concept of causality to sink down from its originally constitutive, categorial dignity to a regulative principle is then brought to its conclusion in the doctrine of the antinomy of the *Critique of Judgment*. [...]
>
> It is not so much the concept of purpose that approaches the categories, but rather the categories that approach in dignity the concept of purpose.

Since the publication of Kant's so-called *opus posthumum*, it has become possible to follow further the supposed transformation of the category of causality. Some recent interpretations see the *Critique of Judgment* not as the end of a development but as a way station along the path to an unreserved teleology thought to be demonstrable in the *opus posthumum*. Whereas the neovitalists had looked for preliminary stages of the rejection of mechanistic thought within the *Critique of Pure Reason*, their Thomist or neo-Aristotelian successors have tended rather to emphasize precisely the *break* with the position of the *Critique of Pure Reason*. Reinhard Löw, for instance, tries to show "that not only a development transpired in Kant's thinking on the problem of teleology but even a conversion"; he claims to have found an "Aristotelian turn" in the *Critique of Judgment* which Kant is supposed to have pursued further in the *opus posthumum*.[11] Although taking the *opus posthumum* into consideration increases the size of the pool of quotations, it does not fundamentally increase the plausibility of this interpretation. This manuscript material is in fact only relevant to the question if the purported transitional phase can already be demonstrated in the "Critique of Teleological Judgment";[12] and this demonstration has not been provided. It is merely shown that some

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10 Ernst, pp. 64-68; Ungerer, p. 100, agrees with Ernst and cites Driesch and Frost.

11 Löw, pp. 12 and 138. The fundamental flaw in Löw's analysis is that he fails to provide the argument that supposedly convinced Kant to abandon mechanism and that thus might be able to convince contemporary mechanists to do the same.

12 Kant's *opus posthumum* is not an coherent work that can be interpreted independent of positions taken and argued for in other writings. These manuscript fragments can only be made accessible on the basis of an already well founded interpretation of Kant's philosophy. If an "Aristotelian turn" cannot be demonstrated in Kant's published writings, then there can be no justification for interpreting these incomplete pieces so that they are inconsistent with the *Critique of Pure Reason*.

utterances of Kant's in the *Critique of Judgment* can be *interpreted* in such a way that Kant *seems* to be abandoning his critical reservations about teleology. Löw explains the purported conversion by appealing to arguments found satisfying by the proponents of teleology in science but not accepted by mechanists – arguments that were certainly already familiar to Kant long before he began the *Critique of Judgment*. However, no argument is advanced that might plausibly be conceived to have convinced the "mechanistic" author of the *Critique of Pure Reason* to abandon his objections, and Kant himself of course gives no such argument. The interpretation of an "Aristotelian turn" in Kant is thus grounded on arguments whose power to convince presupposes such a turn. We would have to believe that Kant without much ado simply abandons one of the fundamental pillars of his system (the category of causality); that, while he was not willing to abandon causal determinism to save human freedom — as the Third Antinomy shows —, he does just this without any hesitation in order to explain organisms.

It seems to me to be methodologically much more sensible to assume, with Ewing, that Kant distinguishes between mechanism in particular and causality in general. Furthermore, this third variety of interpretation has the same difficulties as the first. The maxims are still just as contradictory as before — however one interprets the phrase "according to mechanical laws," for it appears in *both* maxims. Almost all proponents of the third variety follow Ernst Cassirer in seeing the distinction between regulative and constitutive principles as itself the solution to the antinomy.[13]

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13 A number of commentators have attempted to avoid the problems criticized here. In particular Marc-Wogau (214-245) sees that the confusion of regulative and constitutive principles cannot constitute the antinomy, but he clings to the identification of mechanism and causality. McFarland, too, agrees that the confusion-thesis is unsatisfactory, but he looks for a solution in the supersensible, as if we were dealing with an antinomy of *reason* rather than of judgment, and he seems to conflate mechanism with the science of mechanics. Finally, Philonenko's interpretation has much in common with mine — especially in the emphasis on the *form* of the antinomy. However, he fails to commit himself to a particular interpretation of the antinomy, i.e., whether R1 and R2 are incompatible or not. Furthermore, in spite of his emphasis on the formal aspects, he translates the phrase "nach bloß mechanischen Gesetzen möglich," which is repeated verbatim in all four propositions (R1, R2, C1, C2), differently each time so that the linguistic form of the contradiction is not conveyed.

All of these interpretations have great difficulty in explaining what, if anything, Kant is doing in the remaining paragraphs of the Dialectic. If the antinomy has been resolved after three sections or even after two, what is the purpose of the remaining seven rather difficult sections? With the exception of Hegel, almost all commentators seem to agree that the antinomy is resolved as soon it is enunciated clearly. Either we have two non-binding suggestions, about how we ought to judge, or we have two propositions on different levels: one constitutive for the objects of experience and one regulative for our dealings with these objects. The question of course arises: What is the point of all this? Why does Kant write so much about so little? The answer generally given to this question — though rarely put quite this succinctly — is simply, that he is *crazy*.

Kant as an Architectonic Psychopath

I cited earlier some remarks of Schopenhauer's about Kant's "strange talent" for repeating himself as well as about his peculiar disposition to mount "false windows" onto his system for reasons of symmetry.[14] While such expressions of exasperation in the work of Schopenhauer were still the spontaneous or perhaps affectedly conceited reactions of the long-suffering Kant scholar, the basic thought underlying them became a hermeneutic principle in the work of Erich Adickes. In the form of the thesis of "Kant's systematics as a system-building factor," this idea is systematically applied to the interpretation of Kant's works. On the antinomy of judgment in particular Adickes writes:[15]

> For the antinomy consists in the contradiction that arises between those two ways of considering as soon as one makes teleological explanation a constitutive principle, and the solution consists thus in restricting this explanation to a merely regulative principle. However, Kant has already warned throughout the entire Analytic against making it a constitutive principle, and the Dialectic was therefore in itself completely unnecessary; but symmetry and systematics demanded it imperiously, and Kant was so permeated by the impossibility of defying this demand that he goes so far as to call the Dialectic an "unavoidable illusion that we must expose and resolve in the critique so that it will not deceive us."

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14 Cf. Schopenhauer, pp. 630, 509, 541.

15 Adickes, *Systematik*, p. 171.

Today, a hundred years later and out of context, these remarks of the young Adickes sound rather peculiar, but the basic idea put forward here in somewhat extreme form is nonetheless still quite widespread. The key role played by Adickes in the reception of Kant in this century depends not only on his work on ordering and publishing Kant's manuscripts and tracing his scientific sources but also lies in his attempt to separate the chaff from the wheat in Kant's system. Since Adickes' basic idea in one form or the other is still taken as self-evident by many commentators, it will be worthwhile to examine this approach to interpretation in some detail. Although Kant may in fact be the only modern philosopher who can seriously compete with Plato and Aristotle as the subject matter of academic treatises, he is nonetheless in a class of his own when it comes to the question of how many of his own admirers take him to be tendentially mentally ill. Kant is often seen as the prototypical architectonic psychopath.

Adickes' thesis that certain parts of Kant's works were written for "systematical" reasons cannot simply be dismissed out of hand, and *within the framework* of the theory of the intellectual make-up of the scientific personality developed by Adickes and others it may even have some plausibility. At first, the thesis of Kant's systematics as a system-building factor merely asserts the indubitable fact that Kant used the conceptual instruments developed in the *Critique of Pure Reason* to deal with any new problems that happened to arise for him. It would also not be surprising to learn that Kant chose his objects of investigation with an eye to whether or not they were readily analyzable with these conceptual means. Perhaps, too, in later writings the means are not so much determined by the object studied, but rather the object overwhelmed by the means. These means determine what kinds of problems become visible in the first place, and their application might even create problems which would otherwise not have been there — which does not, however, mean that they are simply imaginary. The thesis is employed by Adickes as a hermeneutical instrument to distinguish what is 'important' from what is 'unimportant'. The procedure distinguishes reasons of philosophical content for a proposition from private, psychological motivations. The notion that Kant wrote the "Dialectic of Teleological Judgment" only because a *Critique* must have a Dialectic and a Dialectic must contain an antinomy assumes that Kant conjured up the Dialectic and that no

serious philosophical problem is dealt with there. While such parts of Kant's writings may have been written by the person, Kant, they do not really belong to his philosophy, and thus need not be taken into consideration. The thesis on systematics gives a *psychological* explanation of why Kant could have written something without any philosophical content. However, at least for Adickes, it presupposes that a demonstration of the philosophical emptiness of the passages in question has in fact been given. On the dialectic of teleological judgment Adickes poses the rhetorical question:[16]

> If one then, as is natural and fair, excludes whatever owes its existence only to systematics, since the history of its origin contains at the same time its judgment of condemnation, what still remains?

It is in fact "natural and fair" to exclude whatever was introduced *only* because of systematics, because the criterion for its being exclusively due to systematics is that no plausible philosophical reason for the passage can be found, and thus it must be excluded anyway. This thesis must however have devastating effects if it is taken as a presupposition of an interpretation of Kant. In such a case the attempt to find a philosophical problem may not even be made, or may quickly be abandoned, since the notion is rather widespread that Kant often wrote things without actually wanting to say anything. An explanation is always available for passages that are difficult to explain: the architectonic. With some commentators the perfunctory employment of Kant's purported psychological quirks leads to abandoning all requirements of consistency for the interpretations, the justification being that Kant was really as self-inconsistent as are the interpretations.

Nonetheless, on the background of the interpretations of the antinomy of judgment analyzed in the preceding section, the conclusions drawn by Adickes are not really so unreasonable; in fact if there is no alternative to these interpretations, it is hard to see how one can avoid such conclusions. For, if it is true that there is nothing of philosophical interest in the book, then the reference to Kant's architectonic idiosyncracies at least gives a plausible explanation as to why the book exists at all and why we can safely ignore it. However, of its very nature, the thesis of the system-building systematics can only be applied, if we are unable otherwise to make sense of the text.

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16 Adickes, *Systematik*, p. 171.

According to Adickes, not only was the Dialectic written for architectonic reasons, but "the Doctrine of Method, too, was only elaborated on account of systematics."[17] With this assertion Adickes has in effect traced back *three-fourths* of the "Critique of Teleological Judgment" to systematics. And here the thesis becomes absurd. Both the *Critique of Practical Reason* and the "Critique of Aesthetic Judgment" have an Analytic and a Dialectic with an antinomy, and one might very well get the impression that the antinomy was just thrown in for "systematic" reasons.[18] But in both cases the Dialectic is only about *one-tenth* as long as the Analytic; it is almost an afterthought. In the *Critique of Practical Reason* there is not even a formal confrontation of a thesis and an antithesis in the presentation of the antinomy. No matter how one interprets these latter texts, they do make one thing clear: Systematics does not in any way demand that the Dialectic be *longer* than the Analytic — as is the case in the "Critique of teleological Judgment." At this point the thesis of Adickes is not even psychologically plausible.

Adickes draws and articulates the consequences of the failure to locate the philosophical problem Kant intended to deal with in the Dialectic. But the conclusions that he justifiably draws from this failure are so absurd, that a more sensible interpretation of the text must be found. Adickes has pushed his own interpretation *ad absurdum*.

The Appearance of a Solution

In the secondary literature two passages from the Dialectic are often cited in support of the assertion that the antinomy of judgement rests on a confusion of regulative and constitutive principles. The first of these is located in §70 shortly after the formal presentation of the antinomy. There Kant writes:

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17 Adickes, *Systematik*, p. 171.

18 Let me emphasize the subjunctive *might*. These latter two *Critiques* are not our subject matter here, and I do not want to insinuate that they are really supplied with a Dialectic for purely systematic reasons alone. The point here is merely the hypothetical question: How *long* need an antinomy be for reasons of systematics? Both works demonstrate that a Dialectic need not be very long.

> On the other hand, as far as the first presented maxim of a reflective judgment is concerned, it does not in fact contain any contradiction at all. (B315; CJ, *267)

Although it is grammatically unambiguous that only *one* maxim is being dealt with, about which it is asserted that it does not contradict itself, the sentence is normally interpreted — and accordingly also translated — as if Kant were maintaining that the *two* maxims do not contradict *one another*.[19] Although it may be difficult to imagine why Kant should want to assert that the first maxim is not self-contradictory (for who would disagree?), nevertheless, he says it and it is also *true.* On the other hand the assertion that the two maxims (R1 and R2) are not incompatible is plainly and straightforwardly *false*. For purely methodological reasons it is illegitimate to attribute to Kant an obviously false assertion which is contrary to his explicit words and their literal meaning. (I shall return to some of the misgivings which certainly remain about this argument after dealing with the second passage often cited in this context.)

The only passage whose *literal* interpretation seems to indicate that Kant himself at least believed that the antinomy was already resolved by the distinction between regulative and constitutive principles is the last paragraph of §71:

> Hence *all semblance of an antinomy* between the maxims of strictly physical (mechanical) and teleological (technical) explanation *rests on our confusing* a principle of reflective judgment with one of determinative judgment, and on our confusing the autonomy of reflective judgment (which holds merely subjectively for our use of reason regarding the particular empirical laws) with the heteronomy of determinative judgment, which must conform to the laws (universal or particular) that are given by understanding. (B318-9; CJ, 270; emphasis PM)

The assertion seems rather clear (compare Hegel's paraphrase quoted above): The antinomy is based on the confusion of regulative and constitutive principles, of reflective and determinate judgment. Indeed, if one considers this paragraph in isolation, there is no other interpretation that is in any way nearly as plausible. It might be supposed that the standard interpretation of the antinomy is more or less mandatory in view of such a passage. Nonetheless, if

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19 All three available English translations (including Pluhar's otherwise excellent new translation) mistranslate this sentence. The German reads: "Was dagegen die zuerst vorgetragene Maxime einer reflektierenden Urteilskraft betrifft, so enthält sie in der Tat gar keinen Widerspruch." Cf. also Sievert, 454; H.W. Cassirer, 345; Zumbach, *Transcendent Science*, 131.

Kant actually believes that the antinomy that he has constructed is resolved by such remarks, then he is certainly mistaken, as I have shown in the discussion of Ernst Cassirer. The seeming contradiction that Kant correctly sees in his concept of natural purpose, will not disappear simply because he says that it is gone. Furthermore the seemingly natural interpretation, which has traditionally been dominant, does not in fact take Kant *literally*. Kant does not, for instance, say that the *antinomy* is based on a confusion but rather that the *appearance* or semblance (*Anschein*) of an antinomy is so based. Let it be remembered that, although an antinomy in Kant's system contains only a *seeming* contradiction, nonetheless at least the semblance is supposed to be genuine and not just arbitrary or optional. It may be asked whether the *semblance* of a seeming contradiction is an antinomy or just a confusion.[20] Secondly, this appearance of an antinomy is supposed to subsist between a mechanical and a teleological way of explaining. However, in the formal presentation of the antinomy — as we have seen — mechanism is not opposed to teleology, but rather two propositions about mechanism stand in opposition. And if we take the two constitutive principles (C1 and C2) to be the antinomy, we have to admit that teleology is not mentioned there *at all* (not even in parentheses). Finally, the passage cited provides no solution to the difficulties involved in the concept of natural purpose but only reports that a solution has been given.

The result of the analysis of this second passage is just as dissatisfying as that of the first: What Kant seems to mean is quite certainly false. What he *literally* says is, while not false, also not exactly enlightening; and we might with a certain amount of justification think that he did not necessarily mean it that way. Thus, either Kant wanted to say something false (the contradiction is gone) and expressed himself somewhat imprecisely; or he wanted to say something else and expressed himself somewhat unintelligibly. The point for an interpretation of the work as a whole is the following: If we interpret these passages as Kant scholars have traditionally interpreted them, then the entire construction of the antinomy is indeed really a false window. In this case there would in fact be no

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20 This is precisely what Kant means by "scheinbare Antinomie" in *Metaphysik der Sitten*, Ak 6,418; W 4,549-550. It must however be admitted that the same phrase occurs in some ambiguous passages in connection with the Fourth Antinomy; cf. B588, B768.

philosophical reason for this part of the text, and thus the psychological explanation offered by Adickes and others would at least be plausible. However, this one sentence of Kant's is a rather flimsy basis for drawing such far-going conclusions, especially since one cannot even take Kant literally when drawing them. The passage does not contain a solution but at best merely the assertion that there is nothing to solve, that is, it (perhaps) expresses the mere opinion of Kant's that the contradiction is gone. And if Kant really meant to say this, why did he call the section "*Preliminary* to the solution to the above antinomy"? Thus, if we want to take the text seriously in philosophical terms and to continue to pursue the problems of Kant's analysis of biological explanation, we have no choice but to reject the previous approaches to its interpretation.

3.4 Heuristic but Necessary Principles

The task now is to develop an alternative to the interpretations of the antinomy of judgment previously available that a least keeps open the option of pursuing some of the philosophical questions posed by the Analytic and of bringing them closer to a solution. In the Analytic the organism was essentially determined not as something that has certain properties but as something whose explanation causes us certain difficulties. If the Dialectic is to accomplish anything, it must explain why we have such difficulties. In this section I shall take up three questions that must be clarified before the resolution of the antinomy can be presented: 1) What does Kant mean by mechanism or mechanistic explanation? 2) What does the purported necessity of the two maxims (R1 and R2) consist in? and 3) If, as I maintain, the two constitutive principles (C1 and C2) do not make up an antinomy of judgment, why were they introduced in the first place? I shall try to answer one of these three questions in each of the following three subsections.

Mechanism

Let us return to Ewing's insight into the necessity of distinguishing between mechanism and causality. If we want to retain causal determinism as a category, then we shall have to find a relevant difference between mechanism and causality. There must be a specific difference that makes it possible for mechanism to be regulative for reflective judgment while causality remains constitutive of experience as such. It must be shown that mechanism is only a particular species of the genus of natural causality. In his presentation of the antinomy Kant does not specify any difference; in fact he does not speak of causality as such at all. He simply uses the terms "mechanism" or "mechanical laws" instead of "causality" or "causal laws"; but he uses them in a way that would be inconsistent with the *Critique of Pure Reason*, if his intention was to equate the two concepts.

Only in §77 in which the actual antinomy is resolved, does Kant explain the *differentia specifica* of mechanism. There he characterizes the mechanistic manner of explanation as follows:

> When we consider a material whole as being, in terms of its form, a product of its parts and of their forces and powers for combining on their own (to which we must add other matter that the parts supply to one another), then our presentation is of a whole produced mechanically (§77, B351; CJ, 293)

When we explain something, we explain a "whole" "as the joint effect of the motive forces of the parts" (§77, B349; CJ, 292). Mechanism has a determination that natural causality as such does not have. This *differentia specifica* is to be found in the special relation of part to whole: in mechanism the parts determine the whole; the whole cannot determine the parts.[21] The concept of causality as developed in the *Critique of Pure Reason* involves a *sequence* in *time* but not an *inclusion* in *space*. Causality gives time a direction, a

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21 In Kant's draft to the introduction of the CJ (the "First Introduction") he writes: "But it is quite contrary to the nature of physical-mechanical causes that the whole should be the cause that makes possible the causality of the parts; rather, here the parts must be given first in order for us to grasp from them the possibility of the whole." (Ak, 20,236; W 5,214; CJ, 425)

before and *after*; but it does not give space a direction, an inside and an outside. In any case it does not follow analytically from the concept of causality that the parts condition the whole; nor is a contradiction involved in the assertion that a whole conditions its parts. There is no reason a priori why the parts into which a system can be divided must be conceived as temporally and thus causally prior to the system. Both organic and social systems may be, and have been, conceived to be older than at least some of their constituent elements.

Thus for Kant, 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. I want to emphasize here that the point is *not* whether a whole is 'more' than the 'sum' of its parts nor whether it displays properties or laws not possessed by the parts. The point is rather whether the *parts* can have properties *in* the whole and *due to* their presence in the whole which they would not (did not) have independently of their existence in the whole.

The category of causality does not demand that the parts of a material system have all their relevant properties independent of their organization into a whole, or that organization is a property of the parts and not a property of the whole. Practical mechanics as used in manufacturing, however, presupposes that the parts produced will have precisely those properties in the machine that they had before they were put together to make the machine and that the parts of a machine, do not lose any properties when the machine is taken apart. Rigid gears and levers do not become elastic in the machine and springs and transmission belts do not become rigid. Let it be remembered that Kant closed the Analytic of teleological judgment with a commitment to the traditional mechanistic view that we can only really understand what we can *in principle* produce. Any kind of explanation other than that "according to mechanical laws" is excluded:

> This is done so that, when we study nature in terms of its mechanism, we keep to what we can observe or experiment on in such a way that we could produce it as nature does, at least in terms of similar laws; for we have complete insight only into what we can ourselves make and accomplish according to concepts. But organization, as an intrinsic purpose of nature, infinitely surpasses all our ability to exhibit anything similar through art. (§68, B309; CJ, 264)

Thus we can see that the antinomy of judgment is conditioned by the purported necessity of this manner of explanation: the necessity to reduce a whole to the independent properties of its parts. However, before we turn to the nature of this necessity, a few differences between this position and that of the *Critique of Pure Reason* should be discussed briefly.

The conceptual development in the decade between the *Critique of Pure Reason* (1781) and the *Critique of Judgment* (1790) is quite marked. We saw in the analysis of the Second Antinomy in the *Critique of Pure Reason* that Kant considered this reductionistic conception of the relation between parts and whole to be self-evident. The parts are obviously the conditions of the whole and have a "persistent existence" independently of the whole. Now, Kant distinguishes this reductionistic conception of causality, which he had once apparently taken to be causality as such, from causality in general as a particular species. He has sharpened his somewhat undifferentiated concept of causality in such a way that this particular relation of parts and whole is no longer supposed to be taken as causality as such, but only as a particular kind, which he calls "mechanism" (though it is nonetheless taken to be necessary).[22]

There is one obvious objection to this interpretation. It seems *prima facie* implausible to assume that Kant introduces such an important distinction between mechanism and causality in the *Critique of Judgment*, especially in light of the fact that he explicitly equates the two concepts in the *Critique of Practical Reason* written just two years earlier. In the various recapitulations of the Third Antinomy (freedom and determinism) in this work Kant refers to the opposition between freedom and mechanism and throughout consistently uses "mechanism" as a synonym for causal determinism.[23] The objection can be taken even further: The term "mechanism" plays no relevant role in the first edition of the *Critique of*

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22 Ewing, *Short Commentary*, pp. 227-9 writes: "Nor does he ever in dealing with freedom distinguish between different kinds of causation in the phenomenal world. In the Critique of Judgment he maintains the view that besides mechanical causation there is another kind of causation even in phenomena, namely, that which accounts for the peculiar properties and behavior of organisms, but he does not use such a distinction to help him deal with the problem of freedom. At the time when he wrote the works which discuss freedom he apparently had not yet come to this conclusion, and so does not draw any distinction within the phenomenal world between mechanical and non-mechanical causation."

23 Cf. *Critique of Practical Reason*, A155, A173-180.

Pure Reason (1781); it occurs occasionally but only in the sense of "machine" or "system."[24] In the presentation of the antinomy of freedom, for instance, it is not used at all. The terms "mechanism" and "causality" are neither equated nor distinguished. Kant introduced the equation in later writings and used it systematically. In the new preface to the second edition of the *Critique of Pure Reason* (1787) Kant recapitulates the Third Antinomy as an opposition between freedom and the "mechanism of nature" (Bxxvii-xxx). And in the *Critique of Practical Reason* (1788) he almost always says "mechanism" when he means natural causality. Thus, it could be objected, if we want to see a development in Kant's thought during the 1780's, then this development is towards a systematic identification of mechanism and causality and not towards their differentiation.

Such an objection presupposes a particular conception of conceptual development that is not unassailable. It is assumed that conceptual development is continuous and cumulative. One can just as well maintain that only the equation (and thus comparison) of the two concepts mechanism and causality makes it *possible* to differentiate between them; it is only the synonymous usage of the terms in a particular context, where they turn out to be incompatible, that makes their differentiation *necessary*. My interpretation of the conceptual development is thus that it was only the attempt to extend causal explanation in its reductionistic form to the explanation of the organism, that forced Kant to acknowledge that he had ascribed as self-evident a determination to causality that cannot be derived analytically from the concept of cause. It is significant that in those cases in which Kant in the *Critique of Pure Reason* (B version) and in the *Critique of Practical Reason* equates causality and mechanism — in the antinomy of freedom — the relation of part and whole plays no relevant role. But for the concept of natural purpose and consequently for the antinomy of judgment, this relation is decisive.

In conclusion, it can be seen that the interpretation of the *Critique of Judgment*, demanded by considerations of content, can indeed be reconciled with Kant's other writings. The distinction between mechanism and causality is necessary to make sense of the Dialectic of teleological judgment, and it can conceived as a rational development of Kantian positions. Finally, it now becomes clear,

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24 Cf. *Critique of Pure Reason*, A66, A696, A697, A691.

how the antinomy of judgment can be conceived as an apparent contradiction *within* Kant's critical philosophy. This distinction forces Kant to reconsider the seemingly self-evident character of the presuppositions underlying the Second Antinomy in the *Critique of Pure Reason*.

Necessary Maxims

In the *Critique of Pure Reason* Kant had shown how differing interests of reason could lead to conflicting demands on the understanding; but so long as they are only regulative principles, there is no genuine opposition. The regulative ideas of reason introduced in the *Critique of Pure Reason* applied to phenomena in general: one ought, for instance, to collect species into genera and divide genera into species. These were general heuristic principles to be applied at different times for different purposes. In the *Critique of Judgment*, on the other hand, we are dealing with regulative principles for the faculty of judgment not for the understanding, and these principles are to be applied to a *particular object* — possibly at the same time. With regard to the concept of natural purpose, we are not dealing with two merely heuristic maxims expressing two different cognitive interests, such as for instance: dissect the anatomical structure, consider the ecological context. With regard to a natural purpose, both conflicting maxims are, according to Kant, *necessary* to acquire knowledge about the object at all. Thus it must be explained in what sense the two (heuristic) maxims are said to be necessary.

If the first maxim (R1) were only supposed to assert that everything should be considered as causally determined, there would be no difficulty in showing its necessity. Only that which is causally determined can be an object of experience at all. It would be a necessary maxim but not one of reflective judgment; it would be a constitutive principle of determinate judgment. As a regulative principle its purported necessity must receive a special explanation. If mechanism is not identical to causality, then the supposed necessity of the maxim of mechanism needs special justification.

The same explanation of the necessity of mechanism is given a number of times in the course of the Dialectic. In §70 after the formal presentation of the antinomy, Kant writes:

> I ought always to reflect on these events and forms in terms of the principle of the mere mechanism of nature, and hence ought to investigate this principle as far as I can, because unless we presuppose it in our investigation [of nature] we can have no cognition of nature at all in the proper sense of the term. (B315; CJ, 268)

Our knowledge of nature is mechanistic according to Kant; explanation for us is *per se* mechanistic explanation. As we saw earlier, Kant took the position at the end of the Analytic that we only have "insight" into that which we can in principle produce, at least in thought. And even in the announcement of the antinomy itself, he indicated the nature of the necessity of the antinomy when he said: "These maxims are necessary ... reflective judgment needs such concepts whenever it seeks so much as to get to know nature in terms of its empirical laws" (§69, B312; CJ, 266). In the last section of the Dialectics Kant wrote:

> Reason is tremendously concerned not to abandon the mechanism nature [employs] in its products, and not to pass over it in explaining them, since without mechanism we cannot gain insight into the nature of things (§78, B354; CJ, 295)

Finally, we read in the Doctrine of Method, that without "the principle of natural mechanism ... there can be no natural science at all" (§80, B368; CJ, 304).

The negative form of all these assertions is significant: Kant maintains that we *must* judge all material things to be possible according to the mere mechanism of nature, because we *cannot* explain them *otherwise*. As incorrigible reductionists we cannot accept an explanation that is not mechanistic. Thus the necessity for the mechanistic judgment of natural things consists in the fact that we have no alternative to mechanistic explanation. It should not be forgotten that the maxim of mechanism (R1) is merely regulative. It makes no prescriptions for nature, only for us: we must consider natural things as if they could be explained mechanistically.

In order to justify the necessity of (both parts of) the second maxim (R2) we can, on the other hand, refer back to the Analytic or to §75 where the argument is recapitulated. The necessity of this maxim is *hypothetical* and becomes real on the occasion of a "particular experience": *If* there is something that we *have* to consider as a natural purpose, then we *cannot* judge it merely mechanistically and *must* also consider it teleologically. A natural purpose is

defined as something that we cannot explain merely mechanistically; since we can conceive *real* causes only as mechanistic, we must take refuge in *ideal* causes whenever the mechanistically conceived causes are insufficient. The necessity of the second maxim (R2) is thus a conceptual or analytical necessity in the hypothetical case that there should in fact be things that we have to consider as natural purposes. If organisms should turn out to be explainable in mechanistic terms, i.e. if they should turn out not to be natural purposes (and assuming there are no other suitable candidates for the position), then the second maxim would not be necessary, it would not be "prompted by special experiences" (§70, B314; CJ, 267), and there would be no antinomy. There would be, so to speak, only the speculative possibility of an antinomy, if somewhere, sometime a genuine natural purpose should turn up. But it should not be forgotten that while it is *theoretically* possible that what we take to be a natural purpose might in fact be explained in a purely mechanistic manner, it is *practically* speaking as good as impossible. To accomplish this, we would have to know all the properties of all the parts (and their parts) as well as all the empirical regularities and laws that apply to them. The task is not logically impossible but practically hopeless:

> For it is quite certain that in terms of merely mechanical principles of nature we cannot even adequately become familiar with, much less explain, organized beings and how they are internally possible. So certain is this that we may boldly state that it is absurd for human beings even to attempt it, or to hope that perhaps some day another Newton might arise who would explain to us, in terms of natural laws unordered by any intention, how even a mere blade of grass is produced. Rather, we must absolutely deny that human beings have such insight. (§75, B337-8; CJ, 282)

Regulative and Constitutive Principles

After the formal presentation of the antinomy of judgment Kant warns against "transforming" the regulative maxims into constitutive principles, since the latter would produce a quite different opposition than the conflict that is important for the Dialectic. Nonetheless, he then proceeds formally to present this second, spurious opposition in exact parallel to the opposition of the maxims. In the course of the reception of the work this parallelism has given

occasion to the various misunderstandings dealt with in the last section. The question however arises: If this second pair of opposites cannot in fact be part of the antinomy, why then did Kant connect it so closely to the formal presentation of the antinomy? The answer lies, I believe, in Kant's attempt to integrate the various philosophical positions about the organism expounded by his predecessors in science and philosophy into the construction of the antinomy. In fact in §§72-74 Kant reports and criticizes four different "systems about the purposiveness of nature," which (compressed of course into two conflicting basic positions) are supposed to cover the entire spectrum of previous theories. These systems, which all propund mechanistic theories, assert or deny on this background the purposiveness of the organism and of nature as a whole. Each of these positions presupposes in a pre-critical form one of the constitutive principles (C1, C2). Since the opposition of the two maxims (R1, R2) does not present an antinomy of pre-critical positions but rather one that arises within the critical system itself, the pre-Kantian positions can only be introduced as the transformation of critical maxims into constitutive principles. In this manner the parallels of content between pre- and post-critical positions can be made clear, although the maxims (R1, R2) of the antinomy are not merely the regulative reflections of these constitutive principles. The relation between the two pairs is more complicated than it appears on first sight.

Kant compresses four philosophical systems into two conflicting basic positions: The so-called *idealism* of purposiveness (Epicurean accident and Spinozist fatality) conceptualizes the purposiveness of nature as *unintentional*; the so-called *realism* of purposiveness (hylozoism and theism) comprehends the purposiveness of nature as *intentional*. Using these two basic positions, Kant plays through a kind of pseudo-antinomy: idealism is the assertion that *all* purposiveness of nature is *unintentional*; realism asserts that *some* purposiveness of nature is intentional. He then argues that both sides cannot prove their assertions. As dogmatic or constitutive assertions they cannot even guarantee the objective reality of the purposiveness itself, which they maintain is intentional or unintentional.

> This explains why all the systems that might be devised to treat dogmatically the concept of natural purposes and the concept of nature as a whole having coherence in terms of final causes cannot decide anything whatsoever by way of either objective affirmation or objective negation. For if we

> subsume things under a concept that is merely problematic, then we do not know whether we are judging about something or nothing, and hence the synthetic predicates of the concept (here, e.g., whether it is an intentional or an unintentional purpose of nature that, in thought, we add to the production of the things) can yield only problematic judgments, whether affirmative or negative, about the object. (§74, B331-2; CJ, 279)

With the distinction between regulative and constitutive principles in the *Critique of Pure Reason* such systems have already been superseded. Their dogmatic assertions can be interpreted as heuristic maxims: "On the latter alternative [as maxims] the principles, though disparate, might well still be reconcilable; on the former, the principles are opposed as contradictories, so that they are incompatible and annul one another" (§72, B321-2; CJ, 272). As long as such heuristic maxims are not necessary, they represent merely different cognitive interests of reason.

It is interesting to note that Kant in his analysis of the theories of his predecessors makes no distinction in principle between the purposiveness expressed in the *organism* and that seen in *nature as a whole*, that is, between natural purpose and the purposive arrangement of nature as a whole. Both are dealt with at the same time and on the same level, until Kant turns in §75 to an analysis of the possible conflict between the regulative maxims of reflective judgment. Here once again he takes care to distinguish between the status of those regulative maxims that apply to the judgment of organisms from a teleological perspective and those that deal with nature as a whole from this perspective. The organism is given empirically; nature as a whole is not given empirically. "But while the maxim of judgment is useful when applied to the *whole* of nature, it is not *indispensible* there"; on the other hand, for the *organism*, insofar as it is taken as a natural purpose, "that maxim of reflective judgment is *essentially necessary*" (§75, B334; CJ, 280-1; emphasis PM). A genuine antinomy can only arise if the maxims are necessary.

Even if we might like to admit that the regulative maxims (R1, R2) of the antinomy could in some reasonable sense be "transformed" into the constitutive principles (C1, C2) of pre-critical science, the reverse is *not* the case: the regulative maxims which constitute the antinomy are not just the regulative translations of these constitutive principles. The relation of the maxims (R1, R2) to these constitutive principles (C1, C2) is not the same as the relation in the *Critique of Pure Reason* of the maxims of the logical use of the ideas

of reason to their transcendental presuppositions. Consider the two constitutive principles:

[C1] *Thesis*: All production of material things is possible in terms of merely mechanical laws.

[C2] *Antithesis*: Some production of material things is not possible in terms of merely mechanical laws. (B314-5; CJ, 267)

The content of these statements can be understood either constitutively as dogmatic assertions or merely regulatively as subjective maxims guiding research. We can use them regulatively (logically) without taking as a constitutive principle the "transcendental presupposition" that we thereby make. Just as in the Transcendental Dialectic of the *Critique of Pure Reason*, the Critical Philosophy can save the dogmatic postulates of pre-Kantian philosophy as heuristic maxims of research. If we interpret the constitutive principles (C1, C2) as merely regulative in the sense of the Transcendental Dialectic, then they do in fact express merely different cognitive interests and do not come into conflict.

However, there is no regulative interpretation of the conflicting constitutive principles (C1, C2) that can produce the two maxims R1 and R2 in which the antinomy consists. A regulative interpretation of the constitutive principles does not make them necessary, but the antinomy subsists between the general *necessity* and the occasional *impossibility* of merely mechanistic judgment. Between regulative principles an antinomy can occur only if the conflicting maxims are in some sense "indispensible." Recall Kant's original announcement of the antinomy: "Now between these *necessary* maxims of reflective judgment a conflict may arise, and hence an antinomy" (§69, B312; CJ, 266). The antinomy arises not merely because Kant takes up the dogmatic postulates of his predecessors as regulative principles, but rather because in the case of natural purposes (*and only there*) these regulative principles *must* be employed.

3.5 The Resolution of the Antinomy

The resolution of the antinomy of judgment consists in the appeal to a "peculiarity of our understanding" (as it is expressed in

the title of §77) or to a "peculiar constitution of our understanding." Both the necessity of explaining everything mechanistically as well as the impossibility of doing just this in the explanation of the organism are not objective but rather subjective in nature. Our understanding has, according to Kant, the peculiarity that it can only explain mechanistically, that it can genuinely understand only that which it can itself produce out of its parts. Due to this peculiarity, we *must* judge all natural things to be possible according to merely mechanical laws, because it is only such natural objects that we can explain at all. However, apparently due to the same peculiarity, we *cannot* explain some objects in this manner and have to introduce final (actually formal) causes. *We* must explain everything mechanistically, but nature need not always let itself be explained in this way. The incompatibility between the two maxims (R1, R2) is based on the presupposition that the necessity and impossibility are objective. Our subjective inability to explain things otherwise than in a mechanistic manner and our incapacity to explain certain things mechanistically contradict one another only under the presupposition that we *must* be able to explain everything. If there is a difference between causality and reductionist mechanism, such that causality is constitutive of the objects of experience and mechanism is merely regulative since it is based on a subjective peculiarity of our understanding, then it is at least possible that there may be objects of experience that are not explainable for us. If the presupposition that everything (all objects of experience) must be explainable for our mechanistic-reductionistic understanding is dispensed with, then the antinomy dissolves and both maxims can be true. Kant's solution to the antinomy consists essentially in ascertaining a reductionistic peculiarity of our human understanding, that is *not constitutive* for the objects of experience: these need not let themselves be reduced.

Kant's deliberations in §§77 and 78 on the resolution of the antinomy are often very difficult to understand and have given occasion to many misinterpretations and much merely associative reasoning. In this section I shall a) comment extensively and in detail upon Kant's central presentation and justification of the peculiar constitution of our understanding, b) analyze his comparison of our understanding to an imagined "intuitive understanding" taking up the relation to similar figures of argument used in the *Critique of*

Pure Reason, and c) present the reconciliation of mechanism and teleology developed by Kant in §78.

Mechanistic Explanation

As early as the announcement of the antinomy of judgment in the first section of the Dialectic Kant pointed out that the necessity of the two regulative maxims (i.e. that which makes their possible conflict a "natural dialectic") has its basis in the nature of our cognitive powers (B312; CJ, 266). At the end of §73 Kant gives the first indication of his solution to the antinomy; there he mentions "the character and limits of our cognitive powers" (B328; CJ, 277). In contrast to the discussion of the regulative use of the ideas of reason in the *Critique of Pure Reason*, where he argues that the limited or finite character of our understanding forces us to use regulative principles in empirical research, the discussion here centers not only on the quantitative limits but also on the *quality* (constitution) of our faculty of knowledge. "Faculty of knowledge" is used here in the broadest sense, and in the "Comment" (§76) Kant deals with the peculiar relations within the mind among reason, understanding, and sensibility. Section 77, however, deals with the peculiarity of a particular faculty, namely, the understanding, indeed of specifically human understanding. The problem dealt with is thus not the potentially universal difficulties based on the fact that reason must rely on understanding and understanding on sensibility; it is the understanding alone that makes us mechanists.

In his presentation Kant seems at first to be alluding to the difference between understanding and judgment in a manner similar to that of the arguments in the *Critique of Pure Reason* which made use of the distinction between understanding and sensible intuition. Understanding must rely on judgment since the objects of experience (the particular) are underdetermined by the concepts of the understanding (the general), at least as far as finite understandings are concerned. With regard to a certain universal, particular objects always have something accidental about them which can provide the occasion for teleological judgments, in as much as purposiveness is taken to be the necessity of the contingent: If an object of experience is underdetermined by (contingent in light of) the

known empirical laws, then we look for further laws and need only presuppose a subjective purposiveness of nature for our activity of knowledge acquisition. An infinite understanding could, through a knowledge of all empirical laws, completely determine the concept of every particular, so that nothing accidental remained. The fact that *we* cannot do this but must rather rely on regulative principles of judgment is due to the finite character (limits) of our understanding not to its peculiar quality (constitution). The problem, however, also does not lie in the fact that our understanding must proceed from the universal to the particular, as some of Kant's remarks seem to suggest. For, all of the various kinds of understanding investigated by Kant in fact proceed from the universal to the particular. I shall show that the real problem of our mechanistic understanding lies not in the relation of universal to particular, but rather in the *equating* of this relationship with that of part to whole.[25] It is our peculiar ("mechanistic") manner of explanation that equates the subsumption of the particular under the general with the reduction of a whole to its parts. Kant explains this in a long paragraph in the middle of §77, which will be analyzed in detail below.

To explain the mechanistic peculiarity of our understanding Kant takes up a tried and true method and introduces a contrast understanding: he imagines a different kind of understanding that differs from ours in precisely the property that is to be explicated (and of course *only* in this one respect). From the differences in the way such an understanding would explain the given objects of experience, Kant can better determine what the peculiarity of our understanding consists in and at the same time show that this peculiarity need not be constitutive for nature. Imagine, for instance, an understanding, that does not need to judge mechanistically, i.e. an understanding that does not reduce a whole to the properties of its parts, but is in all other respects similar to ours. This different kind of understanding, if it wanted to find the conditions (causes, grounds) of a given object, would not search for the parts of the thing and then compound them in thought; it would not dissect the whole at all, but rather it would seek the (larger) whole of which the thing investi-

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25 Driesch ("Kant und das Ganze," p. 369) asserts that Kant has fallen into an "obvious confusion of the relations universal-particular and whole-part." On the contrary, it is essential to note that Kant does *not* put the *whole,* but rather the *part,* in the place of the universal.

gated is itself a part. For such a specifically different understanding, the subsumption of a particular under a universal would be equated with tracing back a part to its whole. The *explanans* would be the whole the *explanandum* the part — just the reverse of our way of thinking. Even though our understanding explains a system by examining its parts and ideally rebuilding the whole in thought, we can imagine a different understanding that explains a part of a system by examining the whole and then ideally detaching and isolating the part in thought. Kant does not maintain that we can really imagine such a process (in fact he denies it), he merely asserts that we can imagine an understanding that could envision such a process and that such an understanding does not involve any contradiction.

Kant calls our understanding "discursive," and its point of departure (the *explanans*, namely the parts) for the causal explanation of a phenomenon he calls the "analytical universal" since the general grounds or causes of the phenomenon are found by dissection (analysis). The general explanatory principle is the part. For the other, imaginary kind of understanding, the point of departure (*explanans*) for the explanation of a phenomenon is the whole, which would be a "synthetic universal." Alluding to our intuition of space, where a space as a whole is intuited and a subspace is conditioned by the space surrounding it, Kant calls this contrast understanding "intuitive." This other understanding would sense no underdetermination (contingency) of the structure in relation to its component parts, e.g. in the form of an organic body, as our understanding does (cf. §61, B368ff; CJ, 236) It would not think that "nature could have built differently in a thousand ways," but would rather only ascertain that the various parts were the necessary consequences of the only natural division of such a whole.

Kant begins his analysis of our mechanistic (analytical, discursive) peculiarity as follows:

> The point is this: Our understanding has the peculiarity that when it cognizes, e.g., the cause of a product, it must proceed from the *analytically universal* to the particular (i.e., from concepts to the empirical intuition that is given); consequently, in this process our understanding determines nothing regarding the diversity of the particular. Instead (under the sup position that the object is a natural product) our understanding must wait until the subsumption of the empirical intuition under the concept provides this determination for the power of judgment. But we can also conceive of an understanding that, unlike ours, is not discursive but intuitive, and hence proceeds from the *synthetically universal* (the intuition of a whole as

> a whole) to the particular, i.e., from the whole to the parts. Hence such an understanding as well as its presentation of the whole has no *contingency* in the combination of the parts in order to make a determinate form of the whole possible. Our understanding, on the other hand, requires this contingency, because it must start from the parts taken as bases — which are thought of as universal — for different possible forms that are to be subsumed under these bases as consequences. (B348-9; CJ, 291-2)

Such an "intuitive" understanding would not need teleological principles (at least not for organisms) because it would not reduce a whole to the properties of the parts. Since it does not explain mechanistically, the deficiency of mechanistic explanation for the organism would not compel it to assume teleological principles. Our understanding takes the parts and their properties (the analytical universal) as its point of departure; from the properties of these parts (the general grounds) various possible combinations and compositions to a whole result. Of the "thousands" of combinations only one is realized, so that the whole is underdetermined by the properties of the parts and thus seems to be accidental, just as the particular is underdetermined by the universal. (Whether the whole is really underdetermined by the properties of the parts, could only be known if all the infinitely many empirical laws were known; in that case it could be shown whether only one whole or many different wholes could arise out of precisely these parts.)

Immediately following this, Kant gives his clearest characterization of the peculiar constitution of our understanding:

> Given the character of our understanding, [we] can regard a real whole of nature only as the joint effect of the motive forces of the parts. (B349; CJ, 292)

We cannot regard a "real whole" as the cause of the properties of the parts but only as the effect of these properties. In other words, we cannot regard a whole as a *real* cause; but there are also *ideal* causes. Due to our reductionistic understanding we cannot conceive the causal conditioning of the parts by the whole; or rather we can only conceive this if the whole is an *idea*, i.e. when the representation of the whole guides the production or acquisition of the parts. In this way the idea of the whole can, as an ideal cause, be the condition of the parts. This, however, is a case of real (technical) purpose and presupposes a purposeful understanding (the artisan) that has the idea of the whole and applies it to the technical product. If we are confronted with a phenomenon in which the unthinkable (conditioning of the parts by the whole) seems to be real, we must try

to conceive it *as if* the idea of the whole were the condition of the parts, and we must make it a rule to be on the lookout for the understanding that once had the idea although we may not dogmatically assert that it exists. This, however, is our problem, and from it follows nothing that might be constitutive of nature itself.

> Let us suppose, then, that we try to present, not the possibility of the whole as dependent on the parts (which would conform to our discursive understanding), but the possibility of the parts, in their character and combination, as dependent on the whole, so that we would be following the standard set by intuitive (archetypal) understanding. If we try to do this, then, in view of that same peculiarity of our understanding, we cannot do it by having the whole contain the basis that makes the connection of the parts possible (since in the discursive kind of cognition this would be a contradiction). The only way that we can present the possibility of the parts as dependent on the whole is by having the *presentation* [*Vorstellung*] of [the] whole contain the basis that makes possible the form of that whole as well as the connection of the parts required to [make] this [form possible]. Hence such a whole would be an effect, a *product*, the *presentation* of which is regarded as the *cause* that makes that product possible. But the product of a cause that determines its effect merely on the basis of the presentation of that effect is called a purpose. It follows from this that the fact that we present [certain] products of nature as possible only in terms of a kind of causality that differs from the causality of the natural laws pertaining to matter, namely, the causality of purposes and final causes, is merely a consequence of the special character of our understanding. Therefore, this principle [of the causality in terms of final causes] does not pertain to [how] such things themselves are possible through this kind of production (not even if we consider them as phenomena), but pertains only to the way our understanding is able to judge them. (B349-50; CJ, 292)

In this passage Kant makes it clear that both our problem with the concept of natural purpose and our recourse to teleological regulative principles are derived from the particular constitution of our understanding. These problems and their solutions have no effects whatsoever on nature itself, even as a mere phenomenon. We may have to judge mechanistically, but nature does not have to be mechanically constructed. We have no the right to assert that there actually exists an understanding which has the idea of the organism and guides the production of the organism out of the parts according to this idea, nor can we say that the production of organisms by merely mechanical laws is definitely *not possible*, nor that mechanism is the only kind of natural causality, nor that there is in fact some other kind of natural causality. The solution, stating that we must *judge* the organisms to be such and such without being

able to guarantee that they must *be* such and such, is obviously not very satisfying:

> This clarifies at the same time why we are far from satisfied in natural science if we can explain the products of nature through a causality in terms of purposes: the reason for this is that all we demand in such an explanation is that natural production be judged in a way commensurate with our ability for judging such production, i.e., in a way commensurate with reflective judgment, rather than with the things themselves and for the sake of determinative judgement. And [to make these points] we do not have to prove that such an *intellectus archetypus* is possible .... (B350; CJ, 292)

The resolution of the conflict between the general necessity and the occasional impossibility of mechanical explanation is thus the following: We must judge all natural things mechanistically because for us only mechanical objects can be explained. If we are unable to conceive of a particular object of experience as naturally mechanical, we must judge it as an artificial mechanism that was intended by some understanding. This is not because such an understanding exists, nor because the thing is not really mechanical (if we knew all empirical laws we might be able to conceive it as mechanical), but because we cannot otherwise conceive the apparent causal dependency of the parts on the whole. Our mechanistic understanding is unable to explain the organism (insofar as it is a natural purpose) by pure "real" causes, by the "natural laws of matter" — and the same would apply to any finite mechanistic (non-intuitive) understanding:

> Indeed, absolutely no human reason (nor any *finite* reason similar to ours *in quality*, no matter how much it may surpass ours in degree) can hope to understand, in terms of nothing but mechanical causes, how so much as a mere blade of grass is produced. (B353; CJ, 294; emphasis, PM)

Both the necessity and the impossibility of mechanistic judgement can be traced back to the peculiar constitution of our understanding. Both the necessity and the impossibility are subjective in nature; they apply to us — or to any qualitatively equivalent finite understanding — but not to every imaginable understanding. The two original maxims can thus be reformulated in the following manner: For our finite, "discursive" or mechanistic understanding only those natural things that can be conceived as merely mechanical can also be explained. Some such natural things cannot be explained, because they cannot be conceived as merely mechanical. There is no contradiction between these two propositions, for it need not necessarily be the case that all natural things can be explained

by us. Both sides of the conflict could be right. In any case since the concept of natural purpose at least does not contain a contradiction, it is a possible concept. Thus the title of §77 reads: "On the peculiarity of the human understanding that makes the concept of natural purpose possible for us." The antinomy is resolved through the introduction of a non-constitutive peculiarity of our understanding which we cannot, however, overcome. Our natural science is reductionistic, it decompounds a whole into its parts and assumes that one could reconstruct the whole again out of the parts. It cannot allow that the *parts* lose by this separation any essential properties (dependent on the whole), which would then not be available for the production of the whole: "for we have complete insight only into what we can ourselves make and accomplish according to concepts. But organization, as an intrinsic purpose of nature, infinitely surpasses all our ability to exhibit anything similar through art" (§68, B309; CJ, 264). But this inability of ours cannot guarantee that in nature (even as a phenomenon) such a dependence of the parts on the whole is not possible. And the organism seems to demonstrate that this kind of causality is even real.

Intuitive and Discursive Understanding

Both figures of argument that Kant introduces in §77, the *peculiarity* of our understanding and the *intuitive* understanding, (which is supposed to clarify our peculiarity) are quite problematical. Both figures were already used in the *Critique of Pure Reason* but in a somewhat different sense. The problems that arise respectively from the reuse of these two terms are of quite different seriousness. The reintroduction of the "intuitive understanding" leads to merely terminological problems as to what Kant presumably means by the term; these can be clarified philologically without much difficulty. The mechanistic peculiarity of our understanding, on the other hand, raises problems of substance for the Critical Philosophy which are not so easy to dispose of. I shall deal first with the merely terminological problems and then turn to the more serious philosophical questions.

Kantian philosophy is inhabited by a rich multiplicity of various species of the genus understanding. However, all of these vari-

ous kinds of understanding are essentially *contrast* understandings; they are understandings that are in some particular respect *different* from ours. If our understanding is finite, we can imagine an infinite understanding as contrast. If our understanding is bound to the sensible forms of intuition space and time, we can imagine an understanding that itself intuits directly and thus does not need sensibility. Or we can imagine an understanding that, while bound to sensibility, possesses a different, non-spatio-temporal sensibility. We can imagine "higher" kinds of understanding that are nonetheless still finite and are still similar in "quality." We can even imagine an understanding (as done in the Dialectic of teleological judgment) that is qualitatively different, "higher," in terms of it constitution. Such an imaginable understanding is however only negatively determined, that is, it is characterized only by the negation of the property that interests us at the moment. It serves only as contrast. Whereas our understanding is discursive (i.e. mechanistic), "we can conceive of an *intuitive* understanding as well (negatively, merely as one that is not discursive)" (B347; CJ, 290). Kant's contrast understandings — when they gets a name at all — are always called "intuitive" (*anschauend*, *intuitiv*) understandings. The common characteristic of all these various intuitive kinds of understanding is not a particular property that they share but rather their common function as contrasts. In the Dialectic of teleological judgment the epithet "intuitive" for the understanding receives a certain justification in terms of content through the comparison with our spatial intuitions. The thoughts of such an understanding have a certain similarity to our intuitions of space "inasmuch as no part in space can be determined except in relation to the whole (so that [in its case too] the possibility of the parts is based on the presentation of the whole)" (B352; CJ, 293). Let us recall again the discussion of the antinomy of division in the previous chapter (2.4), which showed that the explanatory regress from the conditioned to its condition in space takes the opposite direction as that in matter.

Thus, when Kant introduces a so-called "intuitive" understanding in his resolution of the antinomy of judgment, this con trast understanding should differ from ours only with respect to its handling of the relation of parts to wholes. If the contrast understanding also differs from ours in other dimensions (e.g. if it is not bound to the forms of intuition space and time, or if it is infinitely

powerful), then the comparison cannot give us any information about the particular peculiarity of our understanding under discussion. Thus, although the intuitive understanding in the *Critique of Pure Reason* and in the *Critique of Judgment* bear the same name — and fulfill much the same kind of function — there is no justification for attributing the properties of the intuitive understanding of the *Critique of Pure Reason* to that of the *Critique of Judgment*. The fact that Kant in §77 also calls or seems to call this intuitive understanding an "intellectus archetypus" has led many commentators even to equate this understanding with the "law giving reason" of the *Critique of Pure Reason* (B723), which was also accorded the same Latin binomial nomenclature in parentheses.[26] Nevertheless the only thing this "intuitive," non-reductionistic contrast understanding of the *Critique of Judgment* has in common with God as a regulative idea of the systematic unity of nature as characterized in the *Critique of Pure Reason* is the Latin binomial. If one considers the contrast understanding in the *Critique of Judgment* to be infinite, then it is in principle unclear whether it is the quantitative limitation of our understanding or its qualitative constitution that is being made responsible for the necessity of teleological principles.[27]

Let us now turn to the substantial point: the mechanistic constitution of the understanding. In his argument justifying the mechanistic peculiarity of our understanding Kant compares this peculiarity to a peculiarity of our *intuition* which he dealt with in the *Critique of Pure Reason* and claims that he can argue in a similar manner in the *Critique of Judgment* with respect to the understanding (§77, B345-6; CJ, 289). However, a new problem arises because he has in fact *already* used such an analogous argument in the *Critique of Pure Reason* to justify a *constitutive* principle. In §21 of the Transcendental Deduction (B145-6) Kant introduced a "peculiarity of our understanding" to explain why there are twelve, and only twelve, and precisely his twelve categories. In fact it was precisely Kant's "Copernican turn" in philosophy to derive constraints on the objects of experience from the faculty of knowledge of the cognitive subject. The subjective peculiarities of the understanding became constitutive for the objects of experience. Now Kant is

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26 Cf. Löw, pp. 210f; Delekat, pp. 463f; Macmillan, pp. 276 and 280.

27 Düsing (p. 90n) ignores this distinction asserting that the "justification of the concept of purpose is derived from the finitude of our understanding."

introducing a *second* peculiarity of our understanding that is not constitutive for experience but is nonetheless supposed to be binding for knowledge. This second peculiarity of our understanding compels us to explain only mechanistically without being able to guarantee that all objects of experience can be so explained. Such a merely subjective necessity that is non-binding for nature raises a number of difficulties. For instance, in the Transcendental Deduction Kant objected to psychological or subjectivistic interpretations of the Categories since this would lead to skepticism, being "exactly what the skeptic most desires":

> The concept of cause, for instance, which expresses the necessity of an event under a presupposed condition, would be false if it rested on an arbitrary subjective necessity, implanted in us, of connecting certain empirical representations according to the rule of causal relation. I would not then be able to say that the effect is connected with the cause in the object, that is to say, necessarily, but only that I am so constituted that I cannot think this representation otherwise than as thus connected ... Certainly a man cannot dispute with anyone regarding that which depends merely on the mode in which he is himself organized. (B168)

The concept of mechanism seems to be just what the concept of cause was not under any circumstances to be: a concept resting merely on a "subjective necessity implanted in us." Even the fact, that this peculiarity of our understanding is supposed to be one not only of a particular individual but of the entire human race, does not change the problem in any fundamental way; and Kant does not explain further how or why the understanding is so constituted — whether there are supposed to be psychological, sociological, or epistemological grounds. We are said to be so constituted that we cannot conceive a real causation other than in a mechanistic-reductionist fashion. This retroactive introduction of a *second* peculiarity of our understanding or of a second level of peculiarity must lead to some changes in the treatment of the understanding.

Just as in the case of the concept of mechanism, where Kant was forced to sharpen his conception of causality and to introduce distinctions into the relatively undifferentiated concept of the *Critique of Pure Reason*, so too, he must sharpen his conception of the understanding here. Let us pose, for example, the question: For what *kind* of understanding do the Categories hold? In the *Critique of Pure Reason* it was left rather unclear whether the Categories hold only for our human understanding or for every imaginable understanding. Systematically speaking, the latter must be the case.

Since Kant claims to have derived the Categories from the Table of Judgments, that is, from the basic forms of logic that hold for all reason, they must also be considered binding for every understanding. And in fact when Kant introduces a contrast understanding in the *Critique of Pure Reason*, it is always (implicitly) an understanding with the same Categories but with a different connection to sensibility. On the other hand, Kant often speaks of "our human understanding" even in connection with the categories, and his language often suggests not only a sort of species specific idiosyncracy but also its psychological anchoring in the mind. However, except for such subjectivistic figures of speech there is no reason to believe that Kant took this (categorial, causal) peculiarity of our understanding to be a kind of psychologically anchored *idolon tribus*. Just as the difference between mechanism and causality only became relevant and recognizable once it actually made a difference — as was the case in the discussion of the organism but not in the discussion of freedom — so, too, a distinction between our (specifically human) mechanistic peculiarity and our (universal logical) causal peculiarity only becomes recognizable on the example of the organism. The equation of our mechanistic understanding with *the* understanding as such, which occurs often in the *Critique of Pure Reason*, may be somewhat untidy, but, so long as we have no real need or occasion to make the distinction, it remains harmless, much like the conflation of genus and species in genera with only one (known) species. Only in the *Critique of Judgment* does an occasion arise that necessitates the distinction.

The Categories (e.g. causality) are constitutive of all experience and accordingly of all objects of experience. If I can trip over something in the dark, that thing must be spatio-temporal and completely determined causally — otherwise I could not even come into contact with it. But perhaps there is a difference between experiencing something and explaining it scientifically. If my understanding should be subject to some constraints (e.g. reductionism) which are not derived from the logical forms of judgment and thus need not apply to every understanding, then there might be objects of experience that remain in principle incomprehensible for me, and thus I might not be able to understand and explain everything I stumble upon. We need the concept of natural purpose as an "Erkenntnisgrund" not in order to *experience* the organism but in order to *explain* it according to our standards of scientific explana-

tion, in order to "gain insight" into it or to "conceive" it as a product of *nature*. We need this conceptual tool because, while the causal influence of a whole upon its parts is "conceivable" in the sense of being free of internal contradiction, we nonetheless cannot (according to Kant) actually conceive it — at least we are unwilling to accept as scientific any explanation that adduces this kind of causal action. Analogously to his differentiation of mechanism as a particular kind of causality, Kant now distinguishes (scientific) knowledge as a particular *kind* of experience, which is subject to additional determinations. Apparently, not all experience is knowledge. To be an object of experience, a thing must be causally determined; to be explainable by us, it must, due to our peculiarity, also be completely determined causally by its parts.

Our second peculiarity (mechanism) thus seems to be a good candidate for a merely psychologically anchored *idolon tribus*. Kant's utterances on this score are just as psychologizing as was the case with the original categorial peculiarity, but here there is no connection to universally valid logical forms of judgment. Such a psychological interpretation is however not compelling. Kant merely postulates the mechanical peculiarity of our understanding and makes no attempt to explain what it consist in and why it is justified. It is only assumed to have the appropriate effects on our way of explaining things in science. While a psychological interpretation certainly could be defended if one wanted to, nonetheless, it is possible to attribute an *epistemological* sense to this peculiarity in terms of the historical development of science, and it is at least plausible that this was Kant's intention, as can be seen in his allusion to the "analytical universal."

The scientific method of the modern natural (and social) sciences — the subject of treatises from Bacon to Kant — was generally called the "analytic-synthetic method" (sometimes the "resolutive-compositive" method, and in the later 18th century, simply the "Newtonian" method).[28] It was developed in the course of the 17th century primarily in physics and physiology and based itself on two traditions: the logic of the Italian Renaissance and the mechanical procedures of craftsmen. The course of research, the investigation of the object or the pursuit of a phenomenon to its ground was called

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28 On the analytic-synthetic method, cf. Freudenthal, *Atom*, chapt. 3 and 13; also Molland, "Atomisation of Motion"; Gilbert, *Renaissance Concepts*; and Enfers, *Philosophie der Analysis*, pp. 89ff.

analysis. The explanation, the derivation of the phenomenon from the grounds discovered, was called *synthesis*. Both concepts had a double meaning in accordance with their double origin. Analysis meant rational argumentation starting from the less general and moving to the more general, i.e. reasoning towards general principles, but also the physical dissection of an object into its component parts. Synthesis was movement in the opposite direction, from more general principles to the particular as well as the physical composition of the object out of its parts. In the "corpuscular or mechanical philosophy" as it was called by Robert Boyle, both these meanings of the method could be united. There, the more general principles were always the properties of smaller parts or particles. The dissection into ever smaller parts led to the discovery of ever more general principles of matter. In the atomistic version of this method it was even assumed that one could find the ultimate (most general) principles of nature in the properties of the ultimate (smallest) particles of matter. The method itself equated the search for more general grounds with the dissection into smaller parts. The proof for the truth of the analytical universal thus reached consisted in deriving again with necessity the initial phenomenon (synthesis) — either in thought or in experiment. The method itself assumed that a phenomenon is completely determined by the properties and interactions of its parts. If the whole still seems underdetermined by the properties of the parts discovered so far, then the analysis must be carried farther until enough properties of small enough parts are known, so that the synthesis can be carried out successfully. The method determines its object, inasmuch as it excludes the possibility that a whole that is *in reality* underdetermined could ever be recognized as such by the method. Something may well not yet have been successfully reduced, but nothing may be irreducible in principle. The only exception is of course a work of art (craftsmanship), which is in fact underdetermined by material ("real") causes; it can only be explained completely by including "ideal" causes such as the ideas and intentions of the artist. If the grounds discovered by the analysis did not suffice to reconstruct the initial phenomenon in the synthesis, it was always possible to compensate for the missing determination of the objects by appealing to the ideas and purposes of a divine artisan. Otherwise, the non-reducible was incomprehensible within the

method. A good illustration of this way of thinking is provided by Robert Boyle:[29]

> And thus in this great automaton, the world (as in a watch or clock) the materials it consists of being left to themselves, could never at first convene into so curious an engine: and yet when the skilful artist has once made and set it going, the phenomena it exhibits are to be accounted for by the number, bigness, proportion, shape, motion (or endeavour) rest, coaptation, and other mechanical affections of the spring, wheels, pillars, and other parts it is made up of: and *those effects of such a watch that cannot this way be explicated must, for aught I know, be confessed not to be sufficiently understood.*

It is the reductionism of this method that Kant wants to make binding as a peculiarity of our understanding for all knowledge.

The method of science and its presuppositions are not considered to be constitutive of nature but to be necessary regulative principles for an understanding like ours. Kant does not say that science as it in fact arose historically can only explain things in a mechanistic manner and that we therefore ought to judge thing to be possible according to mechanical laws; rather he maintains that our understanding cannot do otherwise. It is not that our conceptual instruments force us to reduce a whole to its parts (because we *in fact* have no other such instruments), rather, he says, our understanding is so constituted that we have no other way of explaining things *in principle*. The method of classical modern physics is equated with scientific explanation in general and the latter is equated with knowledge as such. This is anchored in the "constitution" of our understanding, so that this way of thinking seems not to be one that arose in the course of history but to be one that is systematically simply given. On the textual basis available I cannot of course *prove* that Kant is indeed referring in §77 to the specific use of the analytic-synthetic method in modern science, although there is much to indicate this. It is however not necessary to prove this since the point was merely to show that, even in the case of this second peculiarity of our understanding, Kant's occasionally psychologizing manner of expression can be given a consistent epistemological sense. Thus, a psychological interpretation with all its problems is by no means necessitated by the text.

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29 Boyle, "Forms and Qualities," p. 48-49 (emphasis PM).

Mechanism and Teleology

After the apparent contradiction between the general necessity and the occasional impossibility of an exclusively mechanistic explanation of all natural phenomena has been resolved, teleological explanation proper must still be reconciled with mechanism. In general there is no opposition between mechanism and teleology, just as little as there is an opposition between the tools of an artisan and the plan according to which he employs them. Ideal and real causes play a part in every process of production. A problem can only then arise if the object to be explained is supposed to be a product of *nature*. Even though the necessity of the regulative maxims is merely subjective, nonetheless, the assumption that a thing is mechanistically explainable, i.e. is a product of nature, could come into conflict with the assumption that a purpose is also the cause of the product. To resolve this possible conflict, Kant introduces the supersensible, so that a certain analogy to the resolution of the Third Antinomy of the *Critique of Pure Reason* arises, which has led a number of commentators to read the antinomy of judgment as a mere repeat of the antinomy of freedom and determinism. However as was shown above (3.2), the conflict between mechanism and teleology can arise only *after* the antinomy itself has already been resolved.

In order to prove that an object of experience can simultaneously be a product of nature and of a purpose, Kant reminds us that the objects of experience are the appearances of a supersensible substrate and maintains that in the supersensible both the mechanical and the teleological grounds of the possibility of such a product are reconcilable. For instance, if an object, e.g. a maggot, could be explained as the product of the mechanism of nature, we could nonetheless assume without self contradiction that the mechanism only executes the purposes of a supersensible being. On the other hand, if we assume that something is the appearance of a supersensible purpose, we can still maintain without contradiction that the realization of the purpose was carried out by mechanical laws.

> For where we think purposes as bases that make certain things possible, we must also assume means whose causal law does not itself require

> anything that presupposes a purpose, so that this law can be mechanical and yet also a subordinate cause of intentional effects" (B361; CJ, 299).

If the maggot can be explained purely mechanistically without teleology, then the assumption of a supersensible purposive agent is superfluous, but even where superfluous there is no contradiction in the assumption that the mechanism is subordinated to a supersensible purpose. And wherever the assumption of a supersensible purposive agent is not superfluous because mechanism is not sufficient there is of course no contradiction either. The analogy to the antinomy of freedom consists only in the fact that the supersensible purposive agent like noumenal freedom can be conceived without contradiction as the noumenal ground or cause of phenomena. But the analogy goes only so far. In the antinomy of freedom it was argued that we not only have *direct access* to our noumenal freedom but also moral reasons for ascribing to it causal efficacy in the phenomenal world. In the antinomy of judgment we have no such access to any supersensible principle of teleology ("supreme architect") and moral necessity plays no role at all.

According to Kant, mechanistic explanations are always correct when they are possible. Teleological explanations are always compatible with mechanistic ones and supplement the deficiencies of such explanations as long as no objective reality is ascribed to the understanding that entertains the purposes and carries them out. The mechanistically not-yet-reduced is considered as if an understanding had so arranged it as it is. Should it turn out that a phenomenon judged teleologically can be explained mechanistically, e.g. on the basis of newly discovered empirical laws, no contradiction can arise between the new mechanistic explanation and the superseded teleological explanation; what was teleological in the old explanation becomes superfluous and what was mechanistic in the old explanation remains valid. Since the teleological manner of explanation is introduced only when the merely mechanistic seems to be deficient, it can be dispensed with as soon as its presuppositions are removed. It never impedes the possibility of a later mechanistic explanation and at the same time points out where such an explanation must fit in. Whether or not, in a thing that we have to conceive as a natural purpose, an unimaginable, non-mechanical, real causality is active, we can never know with certainty. However, since we can judge the causes of such a phenomenon as mechanically real and teleologically ideal, we can admit that a purely

mechanistic explanation of the organism may perhaps never be successful without abandoning mechanism as the ideal of explanation.

3.6 Summary

The point of departure of the Dialectic of teleological judgement was an apparent contradiction in the central concept of Kant's analysis of biological explanation, the natural purpose. This concept had been introduced to deal with the peculiar causal relations in an organism. But, as has been stressed, the actual problem for Kant, and for philosophy, is not the organism or life as such, but rather the *discrepancy* between the mechanistic ideal of explanation and the actual explanations given in biology. The organism is not a problem for philosophy but for biology. The way that biologists explain the organism to their own satisfaction may however pose a problem for philosophy if it does not conform to the ideal which philosophers consider universally valid. The *first* problem that Kant saw in the explanation of the organism was the underdetermination of the structure of the organism by the properties of its parts: The necessity of precisely this and only this structure given these particular parts could only be grasped if an additional causality according to purposes was assumed. The *second* problem lay in the fact that these structures or organizational forms have certain abilities which occasion further explanatory difficulties, in particular the ability of the whole to confer new properties on its parts.

Kant brings the discrepancy mentioned to a head and formulates it as a direct contradiction using the argumentational figure of the antinomy, in order to pose and resolve the problem in principle. The solution lies in the introduction of a conceptual distinction between mechanism and causality such that mechanism is determined as a species of the genus causality whose *differentia specifica* consists in the stipulation of the determination of the whole by the parts. Causality itself remains as one of the categories constitutive of the objects of experience, but mechanism has only subjective validity in as much as it rests on a peculiarity of our understanding that is not constitutive of nature. Due to this peculiarity of our understanding we cannot understand, conceive, or even "become

acquainted with" a causal relation in which a whole acts upon the properties of its parts, as seems to be the case in the organism. We can only conceive such a causality of the parts by the whole if the whole is ideal, such as the idea or representation of the object to be produced in the mind of an artisan. We are compelled to consider the organism as if there were an understanding that had the representation of the whole and directed the mechanical laws according to this representation in order to produce the organism.

We have seen that this particular relation of part and whole is incorporated into the modern ideal of scientific explanation conceived as the ideal production of the state of affairs to be explained. This presupposition of the analytic-synthetic method of science is characterized by Kant in somewhat psychologizing terminology as a peculiar constitution of our understanding. However, insofar as he resists the temptation to make this peculiarity binding for nature, he succeeds in grasping the teleology that was in fact used in the explanation of the organism as the result of the limitations of a particular method. Kant affirms in the end the exclusive legitimacy of mechanistic-reductionistic explanations, but he demands that any explanation of the organism recognize and deal with two phenomena: the underdetermination of the whole by the independent properties of the parts and the causal influence of the whole on its parts. Furthermore, it has turned out that in Kant's critique of teleology final causes in the proper sense, *causae finales,* have played more or less no role at all.

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