

The Construction of Empirical Concepts and the Establishment of
the Real Possibility of Empirical Lawlikeness in
Kant's Philosophy of Science

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Abstract

In Chapter I, I discuss Buchdahl's view that the possibility of empirical lawlikeness could not have been established in the Principles of the *Critique* given the differences between transcendental, metaphysical and empirical lawlikeness, and the connection between the faculty of Reason and empirical lawlikeness. I then discuss the general conditions for empirical hypotheses according to Kant, which include the justification of the method by which an empirical hypothesis is obtained and the establishment of the general and specific constructability of the empirical concept.

In Chapter II, I discuss the nature of the general construction of concepts which is treated in the Schematism of the *Critique*, surveying the views of Pippin, Allison, Bennett and Butts in an effort both to make sense of a difficult part of the Critique and to demonstrate that the Schematism is indeed where Kant demonstrates how the construction of empirical concepts in general is possible.

In Chapter III, I discuss Brittan's and Butts' views on the nature of the specific construction of empirical concepts, defending Butts' interpretation as compatible with Buchdahl's view that gaps exist between kinds of lawlikeness for Kant and, because of its connection with an interpretation of how metaphysical lawlikeness figures in the *Metaphysical Foundations of Natural Science*, insofar as it helps us to establish the possibility of empirical lawlikeness and natural science.

Introductory Remarks

This thesis concerns the constructability of empirical concepts insofar as it is a condition for the possibility of empirical concepts and lawlikeness, and natural science in general, in Kant's philosophy of science. The observed regularities in the natural world that we tend to think of as evidence of the conformity of objects to laws, or, more specifically, as evidence of empirical lawlikeness, was not established in the *Critique of Pure Reason*, although the demonstration of the possibility of empirical lawlikeness is begun there with the establishment of another kind of lawlikeness; transcendental lawlikeness. In Chapter I of this thesis we discuss Buchdahl's argument to this effect, after which we explore his claim that an independent foundation was required in order to bridge the gap between transcendental and empirical lawlikeness. In Chapter I, we also discuss the role of the faculty of Reason in determining the possibility of empirical lawlikeness. As a faculty which seeks to unify experience, Reason is shown not only to urge us to embody particular laws within a coherent network expressive of a scientific theory of reality, but in the third Chapter it is also shown to be the element which encourages us to create idealized mathematical constructions of empirical concepts.

In Chapter II, we begin the investigation into the nature of the construction of empirical concepts. Chapter II concerns the establishment of the possibility of the construction of concepts in general. Here we will see that there are three types of concepts that are possible to construct; transcendental, sensuous and empirical concepts. Given the possibility of constructing empirical concepts generally—that is, given that they can be shown to be subject to the general conditions of space and time, we then move on to Chapter 3, where we continue to investigate the constructibility of empirical concepts, although at a much more detailed level.

In Chapter III we compare two views on the construction of empirical concepts. We consider Brittan's view that Kant was concerned to show that matter could be thought of as possessing certain ontological features, but that Kant's usage of two different methodological approaches to demonstrate the ontological features of matter led to certain difficulties in the demonstration of the possibility of the concept of matter. For, in order to demonstrate the real possibility of matter, Kant had to rely on a dynamical methodology, but this methodology was unable to provide the essential requirements of concept construction. Paradoxically, the mechanical approach, which can provide the latter, cannot provide us with the empirical

determinations of the concept of matter which enable us to determine that the concept is a 'really possible' one.

Butts' view, which is the other view that is considered in this Chapter, resolves this tension in that Butts argues that Kant's concerns are those of establishing the epistemological conditions for the possibility of the concept of matter. On Butts' view, we do not regard Kant as being particularly troubled by the two different methodological approaches, but merely as demonstrating the conditions that we are subject to in attempting to establish the possibility of empirical knowledge. Thus we can resolve Brittan's paradox if we view Kant as simply concerned with the demonstration of the epistemological conditions of empirical knowledge and as perhaps ultimately holding to a kind of transcendental idealism wherein the reality of empirical science must be viewed in terms of the internal conditions for knowledge.

Finally, in Chapter III, we also return to Buchdahl's notion that an independent foundation is required to establish the possibility of empirical lawlikeness and compare this to Butts' view of the nature of the construction of the concept of matter. I argue that the independent foundation that Kant provides is actually that of metaphysical lawlikeness, which can be thought of as that kind of lawlikeness which legitimates the transition from our empirical determinations of the concept of matter to the idealized mathematical construction of the concept of matter required if natural science is to be possible. If this argument is acceptable, then the establishment of metaphysical lawlikeness is related to the construction of the concept of matter in MFNS, just as the establishment of transcendental lawlikeness is related to the general construction of the concept of matter in the *Critique of Pure Reason*. In this paper then, the possibility of both the general and specific level of constructing empirical concepts, and the establishment of transcendental and metaphysical lawlikeness have all been linked to the possibility of empirical lawlikeness and natural science, the latter of which Kant tries to establish in MFNS.

Chapter I

(i) Introduction

In 'The Conception of Lawlikeness in Kant's Philosophy of Science', Gerd Buchdahl offers a perspective on what Kant intended to accomplish in parts of *The Critique of Pure Reason (Critique)* and in *The Metaphysical Foundations of Natural Science (MFNS)* via an account of how the conception of lawlikeness figures in the *Critique* and *MFNS*.¹ 'Lawlikeness' simply refers to a conformity to law, a law being what is predicated of an invariant, observed regularity. According to Buchdahl, Kant actually referred to three separate conceptions of lawlikeness: transcendental lawlikeness, metaphysical lawlikeness and empirical lawlikeness.

Empirical lawlikeness, which is of primary concern in this paper, is that kind of lawlikeness which appears to be directly in nature itself. Thus, when I see that the moon traverses the hemisphere daily, and see that the moons of other planets revolve around their own planets, I may hypothesize that our moon revolves around earth in the same way that distant moons revolve around their own planets. There is then, a lawlike connection between planets and moons since all moons revolve around planets. The observation of such lawlike regularities is the basis for science and knowledge in general, and Kant's investigation into the conditions which determine our knowledge of the natural world involves an investigation into the possibility of establishing empirical lawlikeness. As we shall see, the establishment of this latter possibility is closely connected to the establishment of transcendental and metaphysical lawlikeness.

Transcendental lawlikeness refers to a kind of lawlikeness wherein the necessary perception of certain features of the physical world as objectively connected is explained by the fact that our experience is conditioned by a rule. This rule or 'category', is a 'transcendental' condition of experience; that is, although we cannot have empirical knowledge of the rule itself, we do know that the rule is a necessary condition for our experience to be as it is, and thus have transcendental knowledge that the rule applies.

Metaphysical lawlikeness is only briefly explored in the present article by Buchdahl, who suggests that it is tied to the 'metaphysical construction' of empirical concepts. The importance of this notion rests in its role in establishing the real possibility of empirical science. For this construction of empirical concepts is the source of the necessitarian character of

metaphysical laws and of their scientific character. Buchdahl thinks that we should not expect to find that metaphysical lawlikeness of *MFNS* flows directly from the results of the Principles; for despite the fact that there is a conformity to the Principles in *MFNS*, this accordance is 'sought out' in undertaking the 'special metaphysics' of natural science as a guide and is not itself the justification of metaphysical lawlikeness.

We will begin our discussion of the possibility of empirical lawlikeness for Kant by distinguishing it from transcendental lawlikeness. Some commentators on Kant have argued that Kant tried to establish empirical lawlikeness in the Second Analogy of the *Critique*. Buchdahl shows why this is not the case, and I will explain his view, which is, I think, a view that makes a great deal of sense of how the Second Analogy fits into Kant's metaphysics and philosophy of science.

(ii) Transcendental Lawlikeness

Buchdahl [1972] writes that in the Analytic of the *Critique* Kant attempts to show that because we experience nature as having certain 'objective' features we must invoke the categories as an explanation of this:

... the Analytic purports to establish no more than the experimental notion of an objective 'nature' in general, regarded as a series of singular contingent happenings and things, a notion of which according to Kant essentially involves certain categorial concepts, some of which — especially the categories of relation, including those of causality and interaction (mutual causation) — have a lawlike character [Buchdahl, 1972, p. 149].

The 'objectivity' in our experience of nature in general requires of us that we think of certain categories as lawlike. It is this sense of lawlikeness in which the category of causality is viewed as a transcendental condition of experience that Buchdahl refers to as transcendental lawlikeness.

Buchdahl argues that certain philosophers, notably Strawson, have misconstrued Kant's arguments regarding causal lawlikeness in the *Critique* because they confuse empirical lawlikeness with transcendental lawlikeness. Buchdahl writes:

Peter Strawson has accused Kant of engaging in an impermissible slide from causality as a transcendental condition ('transcendental

lawlikeness') to causality as a principle justifying causal inferences ('empirical lawlikeness') [Buchdahl, 1972, p. 152].

This accusation by Strawson is prompted by Kant's proof in the Second Analogy of the *Critique* where Kant argues that we are forced to experience our representations of the succession of events in Time as causally ordered. Here Kant is notoriously ambiguous:

If we try to discover what sort of new property the **relation to an object** gives to our subjective representations, and what new importance they thereby receive, we shall find that this relation has no other effect than that of rendering necessary the connection of our representations in a certain manner, and of subjecting them to a rule; and that conversely, it is only because a certain order is necessary in the relations of time of our representations, that objective significance is ascribed to them [Critique, M, A 197/B 242].

If we condense one of Kant's claims here we end up with this: when in experience we attribute a relation to an object, we never do so without a rule (category) requiring it of us. However, Kant also appears to argue in parts of the Second Analogy that we must think in certain successions of events as casually ordered, and that in such a case this relation is a necessary one. (See Critique of Judgement, A 192/B 237.) The ambiguity is that of whether the necessity of the relation is due to the objects themselves or due to the subject. In *The Bounds of Sense* Strawson seems to think that it is due to the former in this case:

It is conceptually necessary, given that what is observed is in fact a change from A to B, and that there is no such difference in the causal conditions of the perception of these two states as to introduce a differential time-lag into the perception of A, that the observer's perceptions should have the order: perception of A, perception of B — and not the reverse order. But the necessity invoked in the conclusion of the argument is not a conceptual necessity at all; it is the causal necessity of the change occurring, given some antecedent state of affairs. It is a very curious contortion indeed whereby a conceptual necessity based on the fact of change is equated with the causal necessity of that very change [Strawson, 1966, p. 138].

It is thus that Strawson reasons that Kant invalidly establishes the claim that there are certain objectively necessary causal connections between objects in the physical world. Buchdahl disagrees with Strawson, arguing

that Kant only intended to prove the possibility of a necessary order which is due to the subject [Buchdahl, 1972, pp. 153–154]. This latter interpretation seems to be in keeping with what Kant says at A 196/B 241, where Kant also distinguishes his endeavour from Hume's (see Kant's reference to 'the notions which people have hitherto entertained') regarding causality.²

No doubt it appears as if this were in thorough contradiction to all the notions which people have hitherto entertained in regard to the procedure of the human understanding. According to these opinions, it is by means of the perception and comparison of similar consequences following upon certain antecedent phenomena, and it is only by this process that we attain to the conception of cause. Upon such a basis, it is clear that this conception must be merely empirical, and the rule which it furnishes us with — 'Everything that happens must have a cause' — would be just as contingent as experience itself. The universality and necessity of the rule of law would be perfectly spurious attributes of it. Indeed, it could not possess universal validity, inasmuch as it would not in this case be *a priori*, but founded on induction. **But the same is the case with this law as with other pure *a priori* representations (e.g. space and time), which we can draw in perfect clearness and completeness from experience, only because we had already placed them therein, and by that means, and by that alone, had rendered experience possible.** [my emphasis] Indeed, the logical clearness of this representation of a rule, determining the series of events, is possible only when we have made use thereof in experience. Nevertheless, the recognition of this rule, as a condition of the synthetical unity of phenomena in time, was the ground of experience itself, and consequently preceded it *a priori* [Critique, M, A 196/B 241].

If we take this summary of Kant's to be a statement of the type of lawlikeness and necessity that he is truly attempting to establish, then Buchdahl's reading of Kant as merely trying to establish transcendental lawlikeness in the Second Analogy seems to be accurate. For on Buchdahl's view, the order of events which embodies a certain objectivity forces us to invoke the categories, which must be thereby thought of as lawlike. So for Buchdahl, empirical lawlikeness is not at issue in the Second Analogy. He argues further that Kant would never have thought it to be at issue there, for Kant required that an 'independent foundation' link transcendental and empirical lawlikeness, and this foundation was not provided in the Second Analogy. Buchdahl writes:

I have already alluded to Kant's oft-repeated reminder that the categories do not yield empirical laws without recourse to experience. What I am maintaining is that according to his less frequently noted view, they do not even yield lawlikeness, which requires an independent foundation to be shunted between the transcendental principle and the actual empirical law [Buchdahl, 1970, p. 157].

Having made the claim that Kant required an additional foundation in order to establish empirical lawlikeness, and that the latter must therefore be quite distinct from transcendental lawlikeness, Buchdahl proceeds to give four 'indications' which support this reading of Kant. These indicators are important because they reveal that the faculties of Reason and of the Understanding are involved in our knowledge in quite different ways. The faculty of the Understanding is shown to be a faculty which establishes possibility with regard to our experience of objects, while the faculty of Reason originates, legislates and regulates (systematizes) thought about our experience of objects. The four indicators are:

1. The distinction between causality as a regulative principle of the understanding, and as a regulative principle of Reason, with Reason invoked as a spontaneous source commanding the search for causes.
2. The second indicator has to do with a distinction similar to the first, with the added suggestion of some kind of 'analogy' existing between the two.
3. The third indicator concerns systemicity of scientific theory as a source of the lawlikeness of empirical laws. Here, Kant is quite explicit that we require the regulative and systematic activity of reason for an independent foundation of empirical lawlikeness in general.
4. The last indicator concerns the contention sometimes expressed quite explicitly that the concept of causality, whilst 'founded' or legitimized in the transcendental argument, is, at the level of empirical lawlikeness, only **applied**. In other words, at this level causality provides us with conceptual form, not transcendental foundation [Buchdahl, 1972, p. 154].

All the above indicators develop the argument that an independent foundation is required to establish empirical lawlikeness by drawing a distinction between the respective roles of the faculty of the Understanding

and the faculty of Reason as they relate to transcendental and empirical lawlikeness. I will try to emphasize this in my explanation of what these four indicators are.

(iii) Reason and Empirical Lawlikeness

In discussing his first indicator Buchdahl writes that Kant distinguishes between causality as a regulative principle of Reason and as a principle of the Understanding. As a principle of the Understanding, causality is a 'transcendental condition' of experience; that is, our experience of nature in general as having certain objective features is thought of as possible only in virtue of certain lawlike categories. By contrast, causality as a regulative principle of Reason does not ascribe causality as a condition of experience but rather prescribes causality; that is, it forces us to seek out causality. Kant writes:

In relation to the present problem (regarding the totality of the dependence of phenomenal existences), therefore, the **regulative principle** of reason is that everything in the sensuous world possesses an empirically conditioned existence — that no property of the sensuous world possesses unconditioned necessity — that we are bound to expect, and, insofar as is possible, seek for the empirical condition of every member in the series of conditions — and that there is no sufficient reason to justify us in deducing any existence from a condition which lies out of and beyond the empirical series, or in regarding any existence as independent and self-subsistent [Critique, M, A 561/ B 589].

Kant's two general points from this quote are that 1. Reason seeks to find causality everywhere and 2. Reason's hypotheses regarding causality must be limited by the possibility of the object. Regarding the latter, I will only say here that it will later become an important ingredient of this chapter. The former point, that Reason seeks to find causality everywhere, is further subject to a law of Reason which requires that we seek to find an underlying unity to the causality that we are driven to find everywhere. Kant writes:

For the law of reason which requires us to seek for this unity is a necessary law, inasmuch as without it we should not possess a faculty of reason, nor without reason a consistent and self-accordant mode of employing the understanding, nor, in the absence of this, any proper and sufficient criterion of empirical truth. In relation to this criterion, therefore, we must suppose the idea of the systematic unity of nature to

possess objective validity and necessity [Critique, M, A 651/ B679].

Because of this unificatory procedure, Reason is also regarded as providing us with a basis for determining empirical truth. The criterion is systematicity itself, and it provides a reason for choosing one theory from amongst all candidate theories.

Reason and the Understanding then have quite distinct roles with regard to causality. For while Reason merely requires that we seek out causality, the Understanding must assume that causality pervades nature, for only if such a unity is assumed to exist can experience of nature be possible. Yet, as Buchdahl goes on to argue, the two levels of Reason and the Understanding are also linked with respect to causality. For the Understanding in a sense mimics Reason in that it tries to see causality everywhere as a feature of nature. But this similarity is motivated differently in the two faculties. For Reason seeks to find causality everywhere because of its natural drive, whereas the Understanding only seeks it as a transcendental condition of experience in general. And so Reason, as the faculty which seeks out causality in its natural drive, seeks to unify causal connections, and gives a criterion for empirical truth, must be the justification for our seeking out empirical lawlikeness in nature. The Understanding, on the other hand merely fulfills other quite different needs regarding the possibility of experience. This is Buchdahl's first indicator that empirical lawlikeness, and it is based on an investigation into the very special role of Reason in justifying empirical lawlikeness as a faculty for drawing inferences. Buchdahl summarizes his position in his 1982 article entitled 'Reduction-Realization: a Key to the Structure of Kant's Thought':

Take causality; As a category of the understanding, this 'determines' the sequence of perceptions, to yield an objective sequence in time; as a concept employed by (theoretical) reason, it yields an inference from **ground** to consequence, i.e., from instances of objective sequence to the existence of a causal uniformity or law. Hence Kant defines the understanding also as a capacity that involves concepts and principles, and reason as a capacity for drawing inferences [Buchdahl, 1982, p. 89].

Buchdahl's second indicator that there is no smooth connection between transcendental and empirical lawlikeness involves a description of the analogy between the levels of the Understanding and Reason. For the Understanding and Reason are both faculties which unify, but — and a big 'but' — the Understanding unifies **appearances** via rules, while Reason unifies **rules of Understanding** via principles which are creative of

synthetic knowledge. Kant writes:

The understanding may be a faculty for the production of unity of phenomena by virtue of rules; the reason is a faculty for the production of the unity of rules (of the understanding) under principles [Critique, M, A 302/ B 359].

The analogy between the Understanding and Reason then, as unifiers, is perhaps not as significant as the disanalogy between the two regarding their **functions** as unifiers. While the Understanding unifies appearance, Reason's object of unification is actually the Understanding itself; for Reason '...gives a unity **a priori** [to the manifold of cognition] by means of conceptions — a unity which may be called a rational unity, and which is of a nature very different from that of the unity produced by the understanding' [Critique, M, A 302 / B 359].

Thus with his second indicator Buchdahl continues to demonstrate that there is a gap between Reason and the Understanding, a gap which lends credibility to the claim that there is also a gap between empirical and transcendental lawlikeness — which would require that an independent foundation be 'shunted in' to link the two. Buchdahl then, has so far accumulated a good deal of credibility for his argument. He tries to augment this credibility even further with his third indicator; that Reason is responsible for generating the notion of empirical lawlikeness due to its projecting a 'synthetic unity objectively'.

With his third indicator Buchdahl wants to demonstrate that Reason, in its hypothetical use, is the source of empirical lawlikeness. Here Buchdahl argues:

The reason Kant gives [for thinking empirical laws as necessary] is that 'otherwise they would not constitute an order of nature'. Evidently this ties their necessitarian status to scientific systematization.... In so far as empirical generalizations are to be '**called** laws they must be regarded as necessary'. [my emphasis] And why? 'In virtue of principles of the unity of the manifold' — which is here a reference **not** to the unity of the understanding but to reason or reflective judgement [Buchdahl, 1972, p. 157].

Accordingly, empirical laws must be thought as necessary because they are part of a systematic and unified theory of nature — that is, because they are part of the 'order of nature'. Kant further describes the nature of the

relationship between particular empirical laws and the 'order of nature' at A 648/ B676:

All that we can be certain of from the above considerations is, that this systematic unity is a logical principle, whose aim is to assist the understanding, where it cannot of itself attain to rules, by means of ideas, to bring all these various rules under one principle, and thus to ensure the most complete consistency and connection that can be attained. But the assertion that objects and the understanding by which they are cognized are so constituted as to be determined to systematic unity, that this may be postulated a priori, without any reference to the interest of reason, and that we are justified in declaring all possible cognitions — empirical and others — to possess systematic unity, and to be subject to general principles from which, notwithstanding their various character, they are all derivable — such an assertion can be founded only upon a **transcendental** principle of reason, which would render this systematic unity not subjectively and logically — in its character of a method, but objectively necessary [Critique, M, A 648/B 676].

According to Kant then, Reason demands that we regard our experience of nature as part of an empirical system such that particular laws are subsumed under more general ones. Thus, Kant views empirical lawlikeness as somehow being the result of an embedding in a system or theory which is characterized by having only a few general principles. This view is itself not foreign to one influential account of lawlikeness, due to Carl Hempel.

Hempel says that there are two features which help us to distinguish empirically lawlike statements from accidental generalizations. These are 1) that lawlike statements are essentially generalizations, that is, the statement 'If X is released, X will fall' must pertain to any object X and not simply to **some** object X and 2) that the sentence must express a counterfactual relation. Good- man has illustrated Hempel's second point; the generalization 'Everything in my pocket on V-E day was Silver' does not sanction the counterfactual 'If p had been in my pocket on V-E day, p would have been Silver'. The generalization does not sanction this counterfactual because it does not express a real lawlike relationship between the antecedent and the consequent of the statement.³ That causality itself was perhaps explainable in terms of counterfactuals was a later suggestion due to Lewis.⁴ The most general feature of lawlikeness in scientific contexts, is expressed by Hempel in *Aspects of Scientific*

Explanation as follows:

Thus, the explanation of a general regularity consists in subsuming it under a more general law. Similarly, the validity of Galileo's law for the free fall of bodies near the earth's surface can be explained by deducing it from a more comprehensive set of laws, namely Newton's laws of motion and his law of gravitation, together with some statements about particular facts, namely, about the mass and the radius of the earth [Hempel, 1965, p. 247].

Hempel also states that:

The main function of general laws in the natural sciences is to connect events in patterns which are usually referred to as explanation and prediction [Hempel, 1965, p. 232].

According to Hempel then, empirical laws are valid insofar as they are subsumable under a general theory — a theory being a unified, small set of general laws. Moreover, empirical laws serve to reinforce the unity in natural science by 'connecting events in patterns'. So like Kant, Hempel associates lawlikeness with subsumability under a unified, small set of general laws. This similarity between Hempel and Kant lends credibility to Kant's own views and provides a certain amount of clarification of what Kant meant.

Buchdahl concludes his argument at this point with a reassertion of the connection between empirical lawlikeness and the subsumability of such laws under a unified system as made possible by Reason, a connection which reinforces his argument:

Once more then, the necessitarianism of empirical laws, their lawlikeness, is a function of the unifying procedure of Reason or judgment and this procedure is one which Reason is driven to procure [Buchdahl, 1972, pp. 157, 158].

Finally, Buchdahl further distinguishes transcendental and empirical lawlikeness in Kant's thought by demonstrating that causality as a transcendental law differs from causality as it figures in an inductive context. For in contrast to the kind of certainty that we attach to causality as a transcendental condition of experience, causal connections, when they refer to inductively established regularities, cannot carry such certainty and carry only probability. Hence at A 770/B 798 Kant claims that the

probability of an empirical hypothesis itself depends upon certainty regarding the possibility of the object:

Imagination may be allowed, under the strict surveillance of reason, to invent suppositions; but, these must be based on something that is perfectly certain — and that is the **possibility** of the object. If we are well assured upon this point, it is allowable to have recourse to supposition in regard to the reality of the object; but this supposition must, unless it is utterly groundless, be connected, as its ground of explanation, with that which is really given and absolutely certain. Such a supposition is termed a **hypothesis** [Critique, M, A 770/B 798].

Thus we may infer that the probability of an empirical statement's being descriptive of nature is dependent upon the establishment of the real possibility of the 'object'. This leads us to associate the real possibility of empirical lawlikeness with two things; (1) with showing that the concepts can be brought into connection with what is given in intuition (i.e., through the procedure of construction), and (2) with the general conditions of experience, that is, with the possibility of experiencing nature as an ordered unity. That these are indeed the two essential aspects of real possibility is affirmed by Brittan who writes that Kant claims that

...real possibility can on occasion be demonstrated a priori, and this in two different ways. First, one can exhibit a priori an intuition corresponding to the concept. this is the way of mathematical construction. Second, one can argue on the basis of so called transcendental considerations that application of the concept is required by the possibility of experience. This is the way of Kant's metaphysical method [Brittan, 1986, p. 62].

In short then, there is a general condition for the possibility of empirical lawlikeness which is based on the possibility of experiencing an order of nature, and there is a more specific condition which relates to the constructability of concepts.

In [Buchdahl, 1982], Buchdahl provides a generalized discussion of the nature of real possibility in connection with a method of validation which appears in Kant's thought and which Buchdahl calls the 'reduction-realization process' (RRP). Buchdahl characterizes Kant's main concern as that of establishing 'real possibility' — a term which he depicts as being equivalent to Kant's sense of ontology [Buchdahl, 1982, p. 43]. Real

possibility, he thinks, exists at three levels in Kant's thought: Real possibility regarding nature in general (general ontology), which can be associated with the transcendental lawlikeness of the *Critique*; real possibility regarding physical nature which relates to the special ontology and metaphysical lawlikeness of MFNS; and real possibility regarding nature as an ordered system of objects and empirical laws, which he refers to as Kant's 'systems ontology'. On page 43 of the above mentioned article Buchdahl describes the nature of these ontologies:

Correspondingly, we may thus distinguish among a 'general', a 'special', and a 'systems' ontology. The last named is concerned with the problem of the validation of the methodological maxims and ideas of natural science, supposedly yielding a "projected" system of empirical laws, constituting a description of the "unity" or 'order of nature'.... 'Special ontology' (Kant calls it "special metaphysics") investigates the possibility, and thus the intelligibility of the basic concepts and laws of Newtonian science. For instance, it seeks to show that gravitational action-at-a-distance is a real possibility and a legitimate hypothesis, the problem here arising from an explication of the concept of matter which belonged to a previous scheme of physics, and which thus seemed to make such action **impossible**...general ontology...deals with the problem of the real possibility of objective cognition, or experience in general [Buchdahl, 1982, p. 43].

While Buchdahl is primarily interested in emphasizing the importance and nature of general ontology in his article, our concern here is primarily with the 'systems ontology'. The 'special ontology' will figure in a later chapter.

Buchdahl claims that in order to understand the notion of 'systems ontology', which involves the problem of theory construction in science, we must first clarify what criteria are required by Kant for acceptance of empirical hypotheses. We have already established that Kant thought that the inductive probability of a hypothesis depends on the possibility of the object itself being certain. The hypothesis, Buchdahl notes, must also be explanatory of the consequences and its probability is directed related to its explanatory power. In addition, the hypothesis must be a 'unity', that is, it must not require that ad hoc hypotheses be relied upon in providing an explanation. Finally, empirical laws must be able to be systematized into more general scientific theories.

According to Buchdahl, what a systems ontology does is give additional

criteria which are to be met in the accepting of empirical hypotheses. For instance, if a hypothesis is to be regarded as part of a systematic theory about nature it must not conflict with known facts about history and psychology. Most importantly, a hypothesis may be regarded as really possible only if there is a justification for the method by which it was derived. Only then does an empirical hypothesis possess a kind of objective validity — and therefore, real possibility.

Therefore, Buchdahl wants to argue that part of the acceptance of an empirical hypothesis, part of its real possibility, is dependent upon the validity of the method by which it is obtained. This method, as we know, involves the claim that the methodological maxims of Reason create a unity of nature or project a system of empirical laws. Buchdahl argues that the demonstration of this is a transcendental one (although not a deduction), which he expresses in terms of his reduction-realization terminology. Kant himself writes regarding this that:

The most remarkable circumstance connected with these principles is, that they seem to be transcendental, and, although only containing ideas for the guidance of the empirical exercise of reason, and although this empirical employment stands to these ideas in an asymptotic relation along (to use a mathematical term), that is, continually approximate, without ever being able to attain to them, they possess, notwithstanding, as **a priori** synthetical propositions, objective though undetermined validity, and are available as rules for possible experience. In the elaboration of our experience, they may also be employed with great advantage, as heuristic principles. A transcendental deduction of them cannot be made; such a deduction being always impossible in the case of ideas, as has been already shown [Critique, M, A 663/B 691].

The reduction-realization method is depicted by Buchdahl as being a general methodological feature in Kant. The process is as follows. First, nature is **reduced** or deprived of its systematicity and conceived of as being only a succession of objects. Then the maxims of reason are ‘injected’ into our conception of nature, thereby ‘realizing’ the concept of an ordered nature. This injection of the concept of an ordered nature is justified by our actual experience of nature as systematic (which is assumed). Buchdahl compares this realization with the schematization of the categories:

Now Kant employs the same move in the present context: just as intuition supplies a schema for the category and thus “realizes” the latter,

so we may imagine the notion of a **maximum** of systematization as the “analogon” of such a schema [Buchdahl, 1982, p. 90].

The reduction-realization process is then, a kind of transcendental proof of the possibility of the maxims which explain how it is that our experience of nature is an ordered, systematic unity. However, that there is an order of nature is not **known** a priori by us through maxims of Reason themselves, rather, this order of nature is known inductively, because of our (empirical) experience of nature. Therefore, the transcendental proof explaining how the methodological maxims necessarily relate a priori to objects gives **real** possibility to the maxims and to the concept of an ordered nature. So the systems ontology — or the purported connection between the maxims of Reason and an order of nature — has been shown to be justifiable using the reduction-realization process which Buchdahl thinks is typical in Kantian thought. Moreover, all of this shows how one of the criteria for acceptance of empirical hypotheses can be met. However Buchdahl warns that because we have ‘realized’ only the **rule** which projects systematic unity and not the a priori necessity of cognition of an **object**, that ‘objective validity’ is its **usual** sense has not been obtained.

Having shown how the systems ontology can be validated, and how in one sense an empirical hypothesis can be really possible, Buchdahl goes on to detail the nature of the regulative principles of Reason and how they project a unity of nature. He writes:

...regulative principles are such as (1) lack **constitutive** force, (2) have a **methodological** function, and, finally (3) possess a **transcendental** status. All three characteristics, and not just one or the other, as wrongly implied in many accounts of Kant, define the notion of regulativeness [Buchdahl, 1982, p. 88].

Thus, because of our greater understanding of **how** a systems ontology is valid, we know that the maxims themselves do not yield knowledge of an order of nature and are therefore not constitutive. We also know that they have a transcendental status, which simply means that they have no corresponding object in experience but can be shown to be a necessary condition of experience. The unity of nature then, is represented to us not as an object itself, but as the result of the maxims of Reason, and as grounded transcendently.

We can summarize our discussion as follows: First of all, empirical lawlikeness could not have been established in the Principles of the

Understanding of the *Critique* since the Understanding yields only the possibility of lawlikeness in nature in general and not the claim that empirical laws exist. Secondly, the faculty of Reason must be regarded as the faculty which justifies empirical lawlikeness because it is a faculty which seeks to unify into a system or 'order of nature' the abundance of causal connections it is driven to hypothesize. Since empirical lawlikeness itself also depends in part on the fitting of such laws into a unified order of nature given by Reason, that is, since lawlikeness requires a systematicity, empirical lawlikeness should be regarded as very closely tied to the activity of Reason. Third, we have also learnt that the empirical hypotheses of natural science must be directed toward 'really possible' objects.

We noted that real possibility can be established for a theory in two ways; (1) by showing that the theory satisfies the general conditions of experience, this both at the level of the Understanding and at the level of Reason, and (2) by **constructing** the concepts of the theory in intuition. Construction in intuition itself operates at the level of the categories [as part of the general ontology] and at the level of the laws of Newtonian Physics [as part of special ontology]. We will take these themes up in order, beginning in Chapter II with the general ontology of constructability in the Schematism and concluding in Chapter III with the special ontology of construction in MFNS.

Chapter II

(i) Introduction

The establishment of the real possibility of empirical concepts of objects is often thought to begin in the Schematism with the establishment of the real possibility of the categories. Kant provides evidence for this view at A 235/B 288:

That the possibility of a thing cannot be determined from the category alone, and that in order to exhibit the objective reality of the pure concept of understanding we must always have an intuition, is a very noteworthy fact. Take, for instance, the categories of relation. We cannot determine from mere concepts how (1) something can exist as subject only, and not as mere determination of other things, that is, how a thing can be substance, or (2) how, because something is, something else must be, and how, therefore, a thing can be a cause, or (3) when several things exist, how because one of them is there, something follows in regard to the other categories; for example, how a thing can be equal to a number of things taken together, that is, can be a quantity. So long as intuition is lacking, we do not know whether through the categories we are thinking an object, and whether indeed there can anywhere be an object suited to them. In all these ways, then, we obtain confirmation that the categories are not in themselves knowledge, but are merely **forms of thought** for the making of knowledge from given intuitions [Critique, NKS, A 235/B 288].

There is however, some controversy over exactly what role the Schematism plays in the *Critique*. In this chapter, I will give an analysis of some of the different interpretations of the Schematism in order to elucidate its part in the establishment of the real possibility of pure concepts of objects, the latter being a general condition for the real possibility of empirical experience. Our analysis of the Schematism chapter will focus on the views of Pippin in *Kant's Theory of Form* [1982], Bennett in *Kant's Analytic* [1961], Allison in *Kant's Transcendental Idealism* [1983], and Butts in *Kant and the Double Government Methodology* [1984], and will attempt to establish the link between the Schematism and the establishment of knowledge in general.

Before we look at the views of these philosophers, it will be helpful to clarify somewhat the link between the construction of concepts in intuition, the schematism of concepts and the real possibility of concepts of objects. The Schematism is located after the first book of the Transcendental Analytic, which deals with the canon of the Understanding. It is the first chapter of the second book of the Analytic which deals with the canon for the faculty of judgement, and the latter is that which tells how the analytic of principles involves the application of the concepts of the Understanding to appearance. According to Kant, the transcendental doctrine of judgement pertains to: (1) the schematism of pure Understanding which involves an explanation of the conditions by which judgment can subsume appearances under the rules or concepts of the Understanding, and (2) the principles of pure Understanding which describe how the judgments made in connection with the categories are the foundation of all other knowledge. Kant writes:

Our transcendental doctrine of the faculty of judgement will contain two chapters. The first will treat of the sensuous condition under which alone pure conceptions of the understanding can be employed — that is, of the **schematism** of the pure understanding. The second will treat of those synthetical judgements which are derived **a priori** from pure conceptions of the understanding under those conditions, and which lie a priori at the foundation of all other cognitions, that is to say, it will treat of the principles of the pure understanding [Critique, M, A 136/B 175].

The Schema itself is described by Kant as a ‘mediating representation’ which ensures the homogeneity between categories and appearances. At (A 137/B 176), in the opening paragraph of the Schematism he says:

In all subsumptions of an object under a concept of representation of the object must be **homogeneous** with the concept; in other words, the concept must contain something which is represented in the object that is to be subsumed under it [Critique, NKS, A 137/B 176].

In terms of **pure concepts** of the Understanding, the schema is a condition of sensibility due to a transcendental determination in time of the category, and through which the use of the category is restricted. As such, the schema is a kind of methodological condition which regulates the use of the category and is a ‘transcendental product of the imagination’. In relation to **empirical concepts** the schema provides a means for the ‘productive imagination’ to construct an image according to the rule of the empirical concepts of objects. Finally, there is also a schematism of pure sensuous objects such as

geometrical figures in space, and this involves the construction of the figure in the pure imagination a priori. Kant says that this latter form of construction is the transcendental condition for the construction of images. He writes of these three kinds of schema:

The **image** is a product of the empirical faculty of the productive imagination — the **schema** of sensuous conceptions (of figures in space for example) is a product, and, as it were, a monogram of the pure imagination **a priori**, whereby and according to which images first become possible, which, however, can be connected with the conception only mediately by means of the schema which they indicate, and are in themselves never fully adequate to it. On the other hand, the schema of a pure conception of the understanding is something that cannot be reduced into any image — it is nothing else than the pure synthesis expressed by the category, conformably to a rule of unity expressed by conceptions. It is a transcendental product of the imagination, a product which concerns the determination of the internal sense, according to conditions of its form (time) in respect to all representations, in so far as these representations must be conjoined **a priori** in one conception, conformably to the unity of apperception [Critique, NKS, A 142/B 181].

There are then, three kinds of schema according to Kant. There is a transcendental schema of pure concepts, a schema of concepts of the pure imagination a priori and a schema of empirical concepts of objects. The Schematism chapter itself deals primarily with the schema of the concepts of the pure understanding, but this schema is important to establish because it the general condition for the possibility of knowledge, and as such is preliminary to the other two kinds of schematization in a sense. The schematization of a priori figures in space is not treated by Kant in depth, although Philip Kitcher [1975] has given an interpretation of what this kind of schematization entails. The schema of empirical concepts of objects is, of course, of great interest here as well, and we shall consider its nature, in the interests of demonstrating how the real possibility of constructing empirical concepts of objects is dependent upon the production of images via the schematization of the empirical concept. But preliminary to any discussion of the specific types of schema and of their respective roles regarding the possibility of empirical concepts, it is necessary to discuss the general nature of schematization and the character of the Schematism chapter itself, all of which will provide a suitable foundation for determining the exact nature of the link between schemata, construction of concepts in intuition, and the real possibility of

concepts of objects.

(ii) The Schematism of Pure Concepts of the Understanding

In his chapter on the Schematism [Pippin, 1982, pp. 124-150], Pippin interprets the role of the Schematism as that of providing an account of how the pure and empirical concepts developed in the *Analytics* can be applied. This 'application' involves an account of how rules (pure concepts) are applied in forming judgements. Pippin summarizes what he takes Kant to have accomplished in earlier parts of the *Analytics* and describes Kant's results as leading up to the application of concepts which takes place in the Schematism:

In other words, once we know **how** to prove the objective validity of pure concepts (by means of an appeal to the possibility of experience), know that such a proof shows that necessity for some pure concepts, and then **introduce** the specific characteristics of our experience (that is, its spatio-temporal character), we can proceed to use that proof, in terms of that (human) experience, **and attempt a proof** for a specific judgment about all objects of experience. Without the 'introduction' of these characteristics into the argument, concepts could not be "applied", could not yield judgements [Pippin, 1982, p. 126].

In the above quote, Pippin indicates that we need certain building blocks before an application of the concepts is possible. However, determining the exact nature of the application of the categories of the objects of experience is problematic because Kant does not give us enough clues for us to settle unambiguously the problem of what he had in mind by 'application'. Since there can be identifiable instances of a concept only when a rule is **applied** to intuition, and since knowledge is a result of this application, it is important to discern what Kant meant by the term application.

One word that Kant often uses to characterize application is the word 'subsumption'. This word, unfortunately, has an ambiguous meaning. Subsumption under a rule can imply that many particular cases fall under a more generally described rule. Some have construed cases, but, Pippin warns, it is actually a (methodological) rule which prescribes how conceptual synthesis is to be carried out.

The view that concepts should be regarded as rules for the

subsumption of the manifold of intuition has been criticised by commentators such as G.J. Warnock. Warnock argues that if concepts are themselves viewed as rules for the subsumption of the manifold of intuition, then Kant's account appears to imply that a set of application rules must be made available for determining the application of the first set of rules. Warnock writes:

In learning to use a word of this sort (to 'apply a pure concept'), a special, extra step is necessary; I must learn a rule for constructing in imagination some sort of model, which illustrates, or is an imagined case of, what the concept applies to. An image **alone** will not do, since no **single** thing can ever completely show the use of a pure concept (or of, e.g. the word 'cause'); I must learn a rule for **constructing** my illustrative model. "This representation of a universal procedure of imagination in providing an image for a concept, I entitle the schema of this concept [Warnock, 1948-1949, Analysis, p. 81].

Warnock goes on to argue that even construed as such Kant's characterization of concepts as providing a rule for constructing a model is problematic:

And it is now clear that, if I can understand my rule, and so understand what my illustrative model is **for**, I have **already** applied the concept - namely to the model [i.e., so somehow another rule for application is needed]. But I must in this case have applied it **without** the rule and the model; if so, they are unnecessary; I may find a model helpful, i.g., as a simple specimen, or a reminder, but it cannot be used to **explain** how it is that I can apply the concept. I cannot understand how a model illustrates causality, unless I already know how 'cause' is used [Warnock, 1948-1949, Analysis, p. 82].

Pippin offers an alternative suggestion to this line of argument by claiming that the rules themselves must be regarded as having semantical import, he writes:

Kant explains that these rules consist of several **Merkmale**, semantic "markers" or "characteristics", which, as an aggregate, or list, function as **Erkenntnisgrund** in the recognition of some other conception, or some intuition [Pippin, 1982, p. 108].

and he goes on to quote Kant from the *Logic* (1800) as saying:

A marker [**Merkmal**] is **that thing which makes up part of the knowledge of it** or — which is the same — a partial representation insofar as it is considered as cognitive ground of the whole representation. **All our concepts are therefore markers**, and all thinking is nothing but a representing through markers [my emphasis] [Pippin, 1982, p. 108].

Application, we noted earlier, is important because it is part of the transcendental account of how rules are applied in forming judgements. Pippin, who offered a suggestion that the fact that the rules of the Schematism may have semantical import provides us with 'directives' for application which could be a solution to worries raised by Warnock. We shall have occasion to look further into the semantical rules interpretation in our discussion of Butts in section (iv) of this chapter.

Naturally, in understanding how rules are applied in forming judgements, it is important to know what is meant by rules, and for this reason we have considered a couple of interpretations of the nature of the rules of the Schematism. Another important feature of the Schematism is that it establishes the general possibility of our forming judgements concerning when a concept of rule is applicable in the determination of an **object**, that is, it is part of the doctrine of 'transcendental judgment'.

The demonstration that it is indeed possible to make judgements and the explanation of what are the conditions for such judgments, is considered by Pippin to be a central part of the Schematism. Pippin argues that the schematization of the pure concepts of the Understanding operates only to expound the meaning of the categories, which in turn helps us to determine what the conditions of their application to objects in judgement are. As such, it is the schema of pure concepts which establishes transcendental judgment, or the conditions for the possibility of judgment, thus setting the limits within which empirical judgments can be made. Therefore, the establishment of transcendental judgment plays an important role in the demonstration of the application of the categories to the objects of experience in judgment. Pippin writes:

For pure concepts of the understanding, the Schematism could just be said to specify further the meaning of the concept itself ("for us"), and in that sense to help explain the conditions of its application. That is, the question of a schematism for pure concepts only asks about "the possibility of application", not for rules specifying actual application ... judgment is still always required in empirical investigation, but we must now explain how that judgement could be possible, in what way the

categories set the limits within which an empirical judgment can be made. And specifying the categories in that way is transcendental judgment [Pippin, 1982, p. 135].

The establishment of the possibility of judgment in the transcendental schematism of pure concepts is regarded by both Pippin [1982] and Allison [1983] (albeit slightly differently) as really being the **translation** of categories into their temporal modes. As Pippin writes:

The categories are thus said to determine appearances by virtue of the understanding's "affecting" inner sense, and since the form of inner sense is time, categories are to be understood as modes of time consciousness [Pippin, 1982, p. 136].

This view seems to be in agreement with what Kant writes at A 139/B 178:

The conception of the understanding contains pure synthetical unity of the manifold in general. Time, as the formal condition of the manifold of the internal sense, consequently of the conjunction of all representations, contains **a priori** a manifold in the pure intuition. Now a transcendental determination of time is so far homogeneous with the **category**, which constitutes the unity thereof, that it is universal, and rests upon a rule **a priori**. On the other hand, it is so far homogeneous with the **phenomenon** inasmuch as time is contained in every empirical representation of the manifold. Thus an application of the category to phenomena becomes possible, by means of the transcendental determination of time, which, as the schema of the conceptions of the understanding, mediates the subsumption of the latter under the former [Critique, NKS, A 139/B 178].

Because the schematization of pure concepts is essentially the rule for the determination of the concept in the temporal order, the schema for pure concepts should not be regarded as an image, Pippin thinks, but rather as a method of representation:

A schema is thus said to be a **Methode**, not, as any image must be, a particular representation. So far, such a claim is straight-forward enough. As Walsh points out, part of the understanding and meaning of a concept must involve more than understanding the strict semantical significance of its definition, more than being able to shuffle around synonyms in that definition. And it must involve more than being able to produce one or two examples of the concept. To be sure, if once could

do all that, one would have thereby some understanding of the meaning of the concept, one would have to be able to produce a whole series of various examples, and it is this added ability which Kant seems to be trying to get at with the notion of a schema as a “method” [Pippin, 1982, p. 136].

Pippin is also critical of the suggestion by Gram that schemata can be understood in terms of pure intuitions. Pippin writes:

He argues that concepts and intuitions are both considered representations in intuition by Kant (that intuitions, in short **can** function as semantic entities in Kant’s theory); that we cannot represent intuitions by means of concepts, that all judgements of experience are judgements based on empirical intuitions, and therefore that any judgment of experience must contain an element which does not stand for a concept. So the problem of genuinely synthetic judgments a priori is not, Can we combine two concepts independent of experience? but, Can we discover independent of experience, and assert (in the judgment), that objects fall under concepts? Now this theory leads to the consequence that in a priori judgments, we are directly making a claim that all intuitions (function as a subject term in such judgments) fall under a concept. We thus need a pure intuition to do that, and providing that pure intuition is what we **do** in schematizing concepts [Pippin, 1982, pp. 139, 140].

Pippin argues that this view wanders too far from Kant’s own views regarding intuitions, and that simply because the intuitions may be grounds for an assertion, this does not entail that what is asserted is about intuitions themselves. Pippin also complains that Gram’s account of what pure intuitions are is too sketchy, which obviously leaves his view problematic given that there is ambiguity regarding the exact role of pure intuition in schematization. As we will see later, Allison is also critical of Gram’s account and provides another way of making sense of the idea that schematization involves pure intuition.

Thus, Pippin thinks, we must distinguish carefully between the notions of concept, schema and image in order to understand the Schematism properly:

In sum, we now have three terms related to one another: (1) concept — a rule for synthetic unity; (2) schema — a method projected by the transcendental imagination specifying the conditions

under which it can be used; and (3) image — some individual example of a concept, resulting from the use of the rule, as specified by the schema [Pippin, 1982, p. 137].

Pure concepts then, are not themselves images, nor do they produce images. As Warnock has pointed out it would be impossible to create a representation of the concept of causality in the form of an image, since no single image could ever show the full sense of causality which would be requisite of the image as a model of causality. What pure concepts do have is transcendental schemata. Furthermore, pure concepts are not transcendently schematized in virtue of a transcendental judgment for the transcendental judgment is that which allows us to connect the pure concept with objects of experience in judgment.

(ii)b The Temporal Dimension of Schematization

Bennett, who agrees with Pippin regarding certain aspect of the schematization of pure concepts, thinks that the schematization involves the adding on of a temporal parameter. Bennett writes that:

A schema is a kind of counterpart to a concept, and it involves imagination. Since imagination produces intuitions, which for humans are necessary temporal, schemas — even schemas of atemporal concepts — are all somehow temporal. The schema of the concept of substance, say, is a rule not for producing images of substances but for doing something — Kant does not make clear what — which involves imagination and therefore involves time. Each category, then, has an associated schema which carries temporality with it ... The schema of any category, then, is just the category itself with the condition of temporality added [Bennett, 1966, pp. 150, 151].

Allison follows after Paton in thinking that the schema **is a product of the determination of our inner sense of time by the categories**. He construes the relationship between temporal determination and the categories differently than does Bennett [Allison, 1983, p. 188]. For Allison, unlike Bennett, thinks that the categories **act** to produce an inner sense of time and so become schematized. And as such an added temporal parameter is not featured, but a pure temporal intuition is created. So it is by this method that the schematism of pure concepts tells us when a judgment is possible according to Allison, who describes real possibility as possibility in **time**. Allison writes:

'Real possibility' is defined in terms of the agreement of the thought of an object (the "synthesis") with the "conditions of the time in general". Simply put, to be really possible means to be possible in or over a period of time [Allison, 1983, p. 189].

and regarding the active component in this determination Allison writes:

...to "determine an intuition" ... clearly means to synthesize, conceptualize, or subsume the given intuition under a concept in such a way that the intuition is related to, or represents, an object [Allison, 1983, p. 182].

Allison's view however, does not stem from an unambiguous foundation. For Allison himself cites eight different characterizations of the transcendental schema by Kant, not all of which appear, on the surface, to be compatible with his view. The third and sixth formulations that he cites, for instance, may appear to hint at a different view of the transcendental schematism wherein the schemata are viewed as pure intuitions. Kant writes that the transcendental schemata can be regarded:

3. As the "formal and pure condition of sensibility to which the concept of the understanding is restricted".

and

6. As "the true and sole conditions under which these concepts obtain relation to objects and so possess **significance**" [Allison, 1983, pp. 179, 180].

Given these formulations of the schemata and Kant's claim in the *Critique of Judgment* (which Allison cites) that:

Intuitions are always required to verify [darzuthun] the reality of our concepts. If the concepts are empirical the intuitions are called examples, if they are pure concepts of the understanding the intuitions go by the name of schemata [Allison, 1983, pp. 180, 181].

Allison writes (following Gram's idea) that we must acknowledge that Kant did intend us to think of the schema as an intuition [Allison, 1983, p. 181]. What Allison further maintains is that this view of the schema is entirely compatible with the view of the schema as providing temporal

determinations of pure concepts. Gram, who has argued that the schemata must be regarded as pure intuitions does not recognize this compatibility and argues that Kant's view is incoherent:

In particular, he denies its compatibility [the compatibility of Kant's account of transcendental schema as pure intuitions] with the "third-thing" account [of transcendental schema as representations for concepts which are a priori determinations in time]. The heart of the problem, according to Gram, lies in what he takes to be the in-coherence of the notion of a "third-thing," which is both universal and particular, intellectual and sensible. Since these constitute two sets of contradictory properties, nothing can possess both members of either set. Moreover, even if something could, it would not be pure intuition, which is by definition entirely sensible and particular [Allison, 1983, p. 181].

So Gram does not see the two views, of the schemata as providing determinations in time and as pure intuitions, as compatible. Hence he argues that there is an incoherence to Kant's description because he views the former as being constitutive of sensible properties and the latter as being constitutive of **a priori** intellectual properties — which if true does render the description of what a transcendental schema is to be an incoherent one within Kant's philosophy. Allison is critical of Gram's treatment of this problem and he argues that it is flawed because Gram fails to distinguish between two senses of "pure intuition" in Kant. The two senses are these: for Kant there is a **form** of intuition of space and time which Allison takes to be equivalent to spatiality and temporality in general — and the sense to which Gram refers —, but there is also a **formal** intuition whereby space and time as objects with certain determinate properties are synthesized in accordance with the categories such that they can be brought into the unity of consciousness and lead to cognition. Allison thinks that concepts plus space and time as formal intuitions are necessary conditions for the possibility of knowledge namely, experience. Here space and time are considered as 'epistemic conditions'. Allison characterizes an 'epistemic condition' as follows:

For our present purposes it must suffice to characterize an epistemic condition simply as one that is necessary for the representation of an object or an objective state of affairs. As such it could also be called an "objectivating condition"; for it is in virtue of such conditions that our representations relate to objects or, as Kant likes to put it, possess "objective reality" [Allison, 1983, p. 10].

The schemata then, because they pertain to formal intuitions of space and time serve as methodological or epistemic conditions for our representations of objects. This is the process, Allison thinks, which is required for our forming of representations, and it is the concept of determinate pure intuitions which is central to the transcendental synthesis of the imagination in the Schematism. It is these determinate intuitions to which we must appeal in order to **construct** concepts mathematically. Allison argues:

Nor can this second (determinate) sense of pure intuition be taken as an afterthought to which Kant merely alludes in an obscure footnote in the Second Edition. On the contrary, it is a central thesis of the Transcendental Deduction, even in the First Edition, that it is only insofar as the “pure manifold” of the intuition (indeterminate pure intuition) is synthesized in accordance with the categories that it can be brought into the unity of consciousness and thus yield an actual content for cognition. As Kant clearly states, apart from such synthesis,” not even the purest and most elementary representations of space and time, could arise. **“Surely such representations count as pure intuitions in the Kantian sense, and so we are led inevitably to conclude that the conception of a determinate pure intuition is as central to Kant’s thought as the doctrine of the transcendental synthesis of the imagination, from which it is in fact inseparable** [my emphasis] [Allison, 1983, p. 181].

Allison goes on to provide additional textual support for his interpretation of the schemata as transcendently determining the categories as pure temporal intuitions. In doing so he cites two passages in Kant: the first which is at A 26/B 42, is where Kant seems to sanction the idea that pure intuitions can be considered to be **conditions** of sensible intuition. Kant writes:

...the form of all phenomena [space] can be given in the mind previous to all actual perceptions, therefore **a priori**, and how it, as a pure intuition, in which all objects must be determined [space is what Kant is referring to here although this applies to time as well, on Allison’s view], can contain principles of the relations of these objects prior to all experience...If we depart from the subjective condition, under which alone we can obtain external intuition, or, in other words, by means of which we are affected by objects, the representation of space has no meaning whatsoever [Critique, M, A 26/B 42].

Regarding Kant's passage here Allison argues that it is generally plausible to draw the connection between pure intuitions and forms of intuition:

...Kant asserts that space is "nothing but the form of all appearances of outer sense," precisely because he claims to have shown already that it is the "subjective condition of sensibility under which alone outer intuition is possible for us." Kant here assumes a correlation between 'condition of intuition', or sensibility, 'form of intuition', and 'pure intuition'. Given this correlation, it would seem plausible to maintain that transcendental schemata are pure intuitions if they can be shown to function as "forms" or "conditions" of sensible intuition [Allison, 1983, p. 185].

Allison reads Kant's claim at A 140/B 179 that 'pure **a priori** concepts, in addition to the function of understanding expressed in the category, must contain **a priori** certain formal conditions of sensibility, namely, those of inner sense to be evidence that the schemata must also be regarded as determining the categories in time according to Kant. Allison writes:

Kant certainly seems to affirm such a function for transcendental schemata when he characterizes them as 'formal conditions of sensibility'. Indeed, this is strikingly reminiscent of the above mentioned characterization of space as a 'subjective condition of sensibility'. Even apart from this, however, it should by now be clear that this is precisely the function that is assigned to transcendental determinations of time. As conditions of empirical time determination, they are certainly conditions in a different sense than are space and time themselves. The latter are general forms or conditions of sensibility, that is, conditions under and with reference to which the data of empirical intuition are given to the mind, while transcendental determinations of time are specific temporal conditions of empirical intuition and, therefore, pure intuitions in the Kantian sense [Allison, 1983, p. 185].

Allison then, views the schemata as both pure intuitions and as transcendental determinations of the categories in time, that is, as determinate pure intuitions, and it is to these determinate intuitions that we must appeal he writes, if we are to construct concepts mathematically. For, in order for the construction of concepts of objects to be possible, the transcendental schema must allow for the possibility of formulating "schematic judgments", and the latter can only yield knowledge about objects of experience if the formal

conditions of inner sense are in accord with objects of experience. On Allison's view, this accordance is possible in virtue of the schematization's provision of the necessary epistemic conditions for knowledge, which it does in virtue of the temporal conditions which determine the categories. As temporally conditioned, then, the schematized categories have built into them an epistemic conditioning of possible experience of objects. Thus, the schema is also regarded as having a methodological function by Allison, which is in agreement with Pippin who said that the schematization involved a subsumption according to a methodological rule.

We have then, considered several aspects of the schematization of pure concepts. We saw that the schema should not be regarded as an image but that they might be regarded as methodological rules which govern the subsumption of categories. This subsumption may involve a transcendental determination of the categories in time, as construed by Allison, in which case the schema may also be regarded as determinate pure intuitions.

An important distinction in the Schematism that has yet to be discussed in detail is the distinction between the schematism of pure concepts of the understanding and the other two kinds of schematisms; that of sensuous concepts and that of empirical concepts.

(iii) The Schematism of Pure Sensuous Concepts of the Imagination and Empirical Schematism

In the following (rather long, but revealing) quote Kant distinguishes between the synthesis of the categories of the Understanding and the figurative synthesis of sensuous concepts:

This synthesis of the manifold of sensible intuition, which is possible and necessary a priori, may be entitled **figurative synthesis (synthesis speciosa)**, to distinguish it from the synthesis which is thought in the mere category in respect of the manifold of an intuition in general, and which is entitled combination through the understanding (**synthesis intellectualis**). Both are **transcendental**, not merely as taking place a priori, but also as conditioning the possibility of other a priori knowledge.

But the figurative synthesis, if it be directed merely at the original synthetic unity of apperception, that is, to the transcendental unity which is thought in the categories, must, in order to be distinguished from the merely intellectual combination, be called the **transcendental**

synthesis of imagination. **Imagination** is the faculty of representing in intuition an object that is **not itself present**. Now since all of our intuition is sensible, the imagination, owing to the subjective condition to which alone it can give to the concepts of understanding a corresponding intuition, belongs to **sensibility**. But which is determinative and not, like sense, determinable merely, and which is therefore able to determine sense **a priori** in respect of its form in accordance with the unity of apperception, imagination is to that extent a faculty of intuitions, conforming as it does to the **categories**, must be the transcendental synthesis of **imagination**. This synthesis is an action of the understanding on the sensibility; and is its first application — and thereby the ground of all its other applications — to the objects of our possible intuition [Critique, NKS, B 151, 152].

The schematism of a priori sensuous concepts is discussed by Philip Kitcher [1975]. He focuses his discussion of the schematism of figures in space in pure imagination, arguing that their schematization does indeed involve the drawing of a picture in the mind which corresponds to the empirical intuition. Kitcher writes:

Kant calls the set of rules which we follow to produce the object of a concept the **schema** of that concept, noting, apropos of a discussion of Berkeley's attack on Locke that "it is schemata, not images of objects, which underlie our pure sensible concepts. No image could ever be adequate to the concept of a triangle in general". Kant's solution to the problem is thus to claim that we can draw general conclusions using only those features of the image on which the rule has pronounced. In the above example, my production of a **scalene** triangle was brought about by a free decision of mine over and above my application of the rule. It is therefore illegitimate to use the scalene peculiarity to draw the conclusion that all triangles are scalene.... Now we can know that all triangles have the R-properties [properties drawn in accordance with rule] which they do have merely by analyzing our concepts. Again, since none of the A-properties [properties which are accidental to the figure and are a product of free choice] of the particular triangle we construct is shared by all triangles have an A-property just because we notice that our particular triangle has that property. Where pure intuition is supposed to help us is in leading us to the S-properties [properties derived from the application of the rule on the structure of the surface and which are thereby determined by both the schema and the structure of space] which are shared by all triangles. By this means we arrive at propositions which are synthetic a priori and are basic to

geometry [Kitcher, 1975, pp. 43, 44].

Thus on Kitcher's view schematization of a priori concepts is image making with a concept which leads us to conclude that it is possible to have synthetic a priori knowledge about space.

As we have already indicated, there is also a key distinction to be made between the schema of pure concepts and the schema of empirical concepts. At A 141/B 180 Kant describes the relation between the schema and empirical concepts:

Indeed it is schemata, not images of objects, which underlie our pure sensible concepts...an object of experience or its image is [not] ever adequate to the empirical concept; for this latter always stands in immediate relation to the schema of imagination, as a rule for the determination of our intuition, in accordance with some specific universal concept. The concept 'dog' signifies a rule according to which my imagination can delineate the figure of a four footed animal in a general manner, without limitation to any single determinate figure such as experience, or any possible image that I can represent **in concreto**, actually presents [Critique, M, A 141/B 180].

The claim that the schema provides rules which guide us in our empirical judgments about objects has been criticized by Bennett [1966] in a way not unlike Warnock's. Bennett argues that Kant's account may be circular because his claim that the application of the concept to an object is made by means of an image really involves two application rules: a rule which relates images to objects and a rule which enables us to apply the image to the dog. Bennett says:

To insert an intermediate image between a concept and a putative instance of it is only to replace one concept application by two. For the single question 'Is that object a dog?' it substitutes the pair of questions 'Does this image correspond to that object?' and 'Is this image an image of a dog?' [Bennett, 1966, p. 144]

However, splitting up the application problem as Kant has done does not provide a better explanation of how concepts can be applied to objects. So, according to Bennett, Kant's schematism does **not** solve the problem of application of concepts to objects.

Whether or not Kant's account works, Kant apparently does think that

the schemata provide rules whereby empirical judgments can be made, and that without such rules, we could not construct a concept of a dog or of any object in general. The schemata then, are depicted by Kant as being integral to the formation of empirical judgments. In the following section we will explore the nature of this connection as it is discussed by Butts. Butts gives an account of rules which may better explain how to make sense of the application Kant claims is made.

(iv) Butts' Interpretation: The Schematism as a Semantical Rule

According to Butts, the problem of constructing empirical concepts of objects according to a rule is the central problem of the Schematism. Butts characterizes Kant's whole project in the *Analytic* as that of showing how it is that we can move from the fact of our having immediate intuited knowledge of conceptual knowledge:

The programme of Kant's "*Analytic*", as I read it, is to show just how we can move from immediate intuited knowledge in the form 'this **X** seems red', to conceptual (objective) knowledge in the form 'this **X** is red' [Butts, 1984, p. 154].

Thus, the problem of application of the categories to experience is not the twofold problem of showing that categories can apply generally to experience and then showing that sensible concepts can apply to experience, but it is just the problem of how it is possible to have conceptual systems that will be fitted to making truth claims about experience. For this, Butts claims, we need two things; (1) the formalism of laws (established in the *Principles*) and (2) rules for determining the formal content of observation — the latter of which will enable the mathematization of experience [Butts, 1984]. The categorical subsumption of the Schematism then, is viewed by Butts as involving the systematic demand for providing observations with a partial interpretation.

The theory of the Schematization of concepts then is viewed by Butts as providing the semantical rules that partially specify the meaning of observations. The part of the meaning specified is the mathematically tractable part. The schema, in specifying the logical form of observation statements which are relevant in deciding the applicability of a category, give meaning to the category as well as orient our thinking regarding the construction of empirical concepts. Butts goes on to describe the nature of the construction of both empirical and nonempirical concepts. He

writes that to construct a concept in a priori intuition means to produce individual examples according to rules that are given in our conceptual system. We construct concepts gradually, learning by example [I have here omitted the material in parentheses]:

I learn the concept from constructed examples. By attending to “the act” of construction, I am able to generate the rule for generating triangles. Since the Kant concepts are rules, learning the concept is the same as listing the rules of construction. To find out how to construct a concept is to learn by examples [Butts, 1984, p. 183].

Thus, concepts of triangles and concepts of dogs are made explicit by analysis according to Butts. Mathematics then is not applied directly to sensuous apparitions but is applied to the idealized constructed concept. According to Butts then, at the root of the construction of concepts, and therefore at the root of the establishment of the possibility of natural science is the Schematism, for it is in the Schematism that the possibility of meaningful construction of concepts is first established. However, the Schematism, according to Butts, can only establish the general possibility of doing science. For each science, Butts, writes, requires an additional set of semantical rules:

If we ask how the general semantical rules of the formalism (the schemata) apply, the answer is that they apply only to the world conceived of as in general a world of measurable physical objects and events in which these objects are ingredient. To become more specific, the formalism must be supplemented by semantical rules of another kind introduced by each special science. The subject matter of a particular science invites us to try various forms of explanation; the choice of things to be investigated, the choice of the domain of individuals over which the observational variables will range, is made freely and pragmatically. What guides the choice is a quest for individuals whose interposition will result in ‘data’ in accordance with the theoretical demands of the given science [Butts, 1984, pp. 198, 199].

So far then, we have briefly looked at some interpretations of the Schematism chapter in the *Analytic*. As we have noted, there is some ambiguity as to what Kant has meant by the applicability of the categories and as to the exact nature of the exposition of this application. Pippin made some useful comments about the nature of the application and pure schematization as well as about the differences between concepts, schemata

and images. Allison agreed with Pippin that the schema itself should not be regarded as an image but as a method for determining the conditions under which a concept can be used. Allison's most important contribution however was in demonstrating that the schematization of pure concept can be regarded both as being a determination of the concept within time and as given in pure intuition; this helps us to make sense of Kant's endeavour in the Schematism. Finally, Butts stresses the role of the Schematism insofar as the Schematism is an important foundation for the possibility of empirical science. Butts' analysis of the link between construction of concepts and the semantical rules given in schematization is helpful and important within the context of this paper. For if the possibility of constructing empirical concepts of objects is indeed beginning to be established in the Schematism then several things become clarified regarding the intentions of Kant in writing MFNS.

What Kant is doing in MFNS now appears to be a natural extension of an enterprise which begins in the *Critique*. For having shown that it is indeed possible for us to have empirical concepts of objects via the establishment in general of the possibility of constructing such concepts in the Schematism, he can now proceed to detail the specific possibility of a certain conception of matter, thus embarking on what Buchdahl would call his 'special ontology'. In the third chapter of this thesis I will turn to a discussion of nature of this construction, which I will discuss in connection with Brittan [Brittan, 1978 & 1986]. I will then examine some of the themes that were brought up in Chapter One regarding the possibility of natural science and empirical lawlikeness and the independent foundation which is required to establish the latter.

Chapter III

(i) Introduction

In Chapter I we discussed the nature of and conditions for empirical lawlikeness according to Kant. Empirical lawlikeness, we saw, was not established in the Principles and is itself something that Reason, in giving unity to nature, both seeks out and makes possible. Moreover, in order for empirical lawlikeness to have real possibility, the concepts of objects in empirical hypotheses must be able to be shown to be both generally and specifically constructible. In Chapter II we discussed the general establishment of real possibility by the method of constructing categories, which Kant treats of in the Schematism. This demonstration involved the exhibition of the existence of pure schemata or rules. In this chapter, we will discuss Kant's view of the construction of physical concepts, the most important of which is matter. This he does in MFNS. In our discussion of this aspect of Kantian thought we will look at Brittan [Brittan 1978 and 1986] who has a clear and detailed account of the nature of the construction of the concept of matter in MFNS, as well as at Butts, who has a different view from Brittan.

The second task of this chapter will be to defend the following claim: that in establishing the possibility of empirical lawlikeness and natural science, Kant thought that he would first have to establish an 'independent foundation'. Although Buchdahl's claim regarding the need for an independent foundation was discussed in the first chapter, the nature of this independent foundation was not discussed. I will argue that the independent foundation which bridges transcendental and empirical lawlikeness is metaphysical lawlikeness, and that establishing the possibility of the latter was an integral part of establishing the possibility of empirical lawlikeness. All of this will require an investigation into the nature of metaphysical lawlikeness, and a demonstration of how it figures in Kant's thought. But first we must discuss the possibility of constructing the concept of matter, which is itself, I will argue, linked to the establishment of metaphysical lawlikeness.

(ii) General Aspects of Constructing the Concept of Matter

According to Brittan [Brittan, 1978], Kant, in MFNS, tried to establish if it is

to be possible. Specifically, Kant tried to show that matter must be understood as being composed of attractive and repulsive forces, and that these forces can be determined 'a priori' [MFNS, 523, 524].⁵ Brittan thinks that Kant encountered certain difficulties in his demonstration, and that Kant himself may have been aware of his own only moderate success in MFNS. For instance, Kant says in the introduction to MFNS that he was accomplished 'no very great work' in MFNS, although he seems to attribute his lack of success, in part, to the nature of the metaphysical doctrine of body. At 473 he writes:

... in metaphysics the object is considered merely as it must be represented in accordance with the universal laws of thought, while in other sciences, as it must be represented in accordance with data of intuition (pure as well as empirical). Hence the former, inasmuch as the object must always be compared with all the necessary laws of thought, must furnish a definite number of cognitions, which can be fully exhausted; but the latter, inasmuch as such sciences offer an infinite manifold of intuitions (pure or empirical), and therefore of objects of thought, can never attain absolute completeness but can be extended to infinity, as in pure mathematics and the empirical doctrine of nature. Moreover, I believe that I have completely exhausted this metaphysical doctrine of body, as far as such a doctrine ever extends; but I believe that I have accomplished thereby no very great work [MFNS, 473].

In his 1978 paper, Brittan writes of Kant's attempt in MFNS that at least two difficulties arise for his account. The first difficulty arises in relation to whether Kant has construed matter as a priori, a posteriori, or both, and the second arises in connection with the constructability of the forces which are constitutive of matter. Regarding the first difficulty, Brittan writes:

If not always clear in detail, the main outlines of the program are comprehensible. But Kant's attempt to carry it out reveals two sorts of difficulties buried in the program. One of these difficulties originates in his claim that the concept of matter is an empirical concept because an element in the concept, motion, cannot be "cognized" **a priori**. Nevertheless, the concept of matter seems to play a rather curious role, somewhere between purely **a priori** and purely empirical concepts (Kant says, in fact, that it has a certain **a priori** elements **in it**). On the one hand, the concept is empirical insofar as the "possibility of experience, and ultimately the unity of consciousness, seem to require something like the concept of matter, first for the construction, i.e., empirical

representation and determination, of space and time, on which not only the construction just mentioned, but also the “refutation of idealism” would seem to depend. Kant’s narrow dichotomy — a priori or a posteriori — does not allow him to deal adequately with the concept of matter. At the same time, the fact that the concept of matter is called on to play different roles on different occasions accounts for the shifts in Kant’s attitude toward the **a priori/a posteriori** status of Newton’s theory [Brittan, 1978, pp. 136, 137].

The a priori element of the construction of the forces constitutive of matter resides in the extent to which the forces operate in space, and it is this which gives them a priori status. Kant writes:

The only intuition that is given **a priori** is that of the mere form of appearances, space and time. A concept of space and time, as quanta, can be exhibited **a priori** in intuition, that is, constructed, either in respect (figure) of the quanta, or through number in their quantity only, (the mere synthesis of the homogeneous manifold). But the matter of appearances, by which **things** are given us in space and time, can only be represented in perception, and therefore **a posteriori**. The only concept which represents **a priori** this empirical content is the concept of a **thing** in general, and the **a priori** synthetic knowledge of this thing in general can give us nothing more than the mere rule of the synthesis of that which perception may give **a posteriori** ... it can never yield an **a priori** intuition of the real object, since this must necessarily be empirical [Critique, NKS, A 720/B 748].

Thus Brittan writes in connection with Kant’s development of the a priori aspect of the construction of the law of universal gravitation, (the LUG) which is the law governing the attractive force:

The point is that the proportionality of the force to the inverse square of the radius is a property of conic sections, and hence follows as a theorem from the postulates that lay down the conditions for the construction of conic sections ... (and whether or not its orbit is a conic section is a matter of empirical fact; it is in no way necessary), the objects must obey the inverse square law ... physics is possible only when experience, space and time in particular, has a determinate structure. In this same sense, the law of universal gravitation “stands under” the Principles [Brittan, 1978, p. 142].

According to Brittan then, the LUG is only partially constructible a

priori — insofar as it is subject to the conditions of spatio-temporal experience — but since we experience forces a posteriori, evidence of the existence of forces is never certain and necessary and forces cannot be regarded as fully constructible a priori. Brittan outlines the second difficulty in Kant's endeavour in MFNS, which concerns the non-constructability of forces, and is described as follows:

The other sort of difficulty in Kant's attempt to carry out his program concerns the construction of forces. Since the concept of matter, on Kant's analysis of it, essentially contains attractive and repulsive forces, the construction of the concept eventually involves the construction of these forces. But since according to Kant our knowledge of these forces is inevitably **a posteriori**, they cannot be constructed. Thus, the task Kant sets himself in the MFNS, to construct the concept of matter, ends in half-admitted failure. I say "half-admitted" because there is a certain amount of hedging on his part. On the one hand, for reasons I have already indicated, attractive and repulsive forces "make possible the **general** concept of matter." On the other hand, owing to their **a posteriori** aspects, it is not possible to "construct this concept (in detail and thus) represent it as possible in intuition." Even more confusing is Kant's suggestion that although **he** has failed to construct (completely) the fundamental forces, and hence the concept of matter, there is still left open the possibility that they might be constructed by others [Brittan, 1978, p. 138].

At 517 Kant indicates the **possibility** that the constructive enterprise might fail:

Because the original attractive force, namely, to act immediately at a distance, belongs to the essence of matter, it also belongs to every part of matter ... this original attractive force ... in combination with its counteracting one, namely, repulsive force ... must admit of being derived. And thus would the dynamic concept of matter as the movable filling its space (in determinate degree) be constructed. But for this construction one needs a law of the relation both of original attraction and of original repulsion at various distances of the matter and of its parts from one another. **Since this relation rests solely on the difference of direction of both these forces ... and on the size of the space into which each of these forces diffuses itself at various distances**, this law is a pure mathematical problem, with which metaphysics is no longer concerned ... For metaphysics answers merely for the correctness of the elements of the construction that are granted our rational cognition; it

does not answer for the insufficiency and limits of our reason in the execution of the construction [MFNS, 517].

So far we have not yet discussed the constructibility of the concept of matter in detail, but have only set the background for such a discussion. As we have already seen, Brittan thinks that there are quite a few difficulties in Kant's account even at the most general structural level. Brittan notes that Kant does not quite have a clear position regarding whether matter is a priori or a posteriori and that the basic constituent of matter, force, and the LUG, which is necessary for the characterization of matter as composed of attractive and repulsive forces, cannot themselves be constructed a priori. Therefore, the establishment of their real possibility, and naturally, of the real possibility of matter, may not be regardable as successful if this is true, or at least, so Brittan thinks. I think that Brittan's construal is misleading, as is his presentation of aspects of Kantian thought as problematic. In the section (vi) of this chapter, I will try to show how the tensions that Brittan highlights can be resolved given that Kant is engaged in bridging transcendental and empirical lawlikeness with metaphysical lawlikeness. However, before this we must focus on the exact nature of the specific attempt to construct matter, in order to demonstrate how the second criterion of real possibility is fleshed out by Kant.

(iii) The General Framework of MFNS

Before turning to Brittan's discussion of the construction of the concept of matter in MFNS, it might be useful first to stop and outline the general framework of MFNS and what Kant tries to accomplish in each chapter.⁶

In the first chapter of MFNS, entitled the **Phoronomy**, matter is treated only insofar as it is thought of as 'the movable in space'. Here matter is treated as a movable point and considered in terms of the measurable quantity of its velocity and direction. At 480 Kant writes:

Nothing but motion is to be discussed in the phoronomy; therefore no other property than movability is here attributed to the subject of motion, namely, matter. Matter thus endowed can itself be taken, then, as a point. In phoronomy one abstracts from every internal characteristic, hence also from the quantity, of the movable and concerns himself only with motion and what can be regarded as quantity therein (velocity and direction) [MFNS, 480].

In chapter two, which is entitled the **Dynamics** matter is regarded as 'the movable insofar as it fills space'. Matter can be regarded as filling space insofar as it is subject to attractive and repulsive forces. These forces are regarded as filling space in varying degrees. Kant writes:

... the dynamical explication of the concept of matter ... presupposes the phoronomic one but adds to it a property that is related as cause to effect, namely, the capacity of resisting a motion within a certain space. This property could not come into consideration in the foregoing science, even when we dealt with the motions of one and the same point in opposite directions. This filling of space keeps a certain space free from the intrusion of any other movable thing when its motion is directed to any place within this space [MFNS, 496].

The **Mechanics**, which is the third chapter, deals with the mechanical laws which govern the motion of matter insofar as matter is thought to possess repulsive and attractive forces which allows us to think of matter as acting on other matter. Kant writes:

... in the mechanics the force of a matter set in motion is regarded as present in order to impart this motion to another matter. But it is clear that the movable would have no moving force through its motion if it did not possess original moving forces, whereby it is active in every place where it exists before all proper motion. And it is clear that no uniform motion would be impressed on another matter by matter whose motion lay in the path of the straight line in front of this other matter unless both possessed original laws of repulsion; and that matter could not by its motion compel another matter to follow it in the straight line (could not drag another after it), unless both possessed attractive forces. Hence all mechanical laws presuppose dynamical ones; and a matter as moved can have no moving force except by means of its repulsion or attraction, upon which and with which it acts directly in its motion and thereby imparts its own motion to another matter [MFNS, 536, 537].

Finally, the fourth chapter, the **Phenomenology**, deals with the subject's experience of the motion of matter as objectified insofar as it is considerable in terms of a publicly experienceable motion of matter. Of the distinction between an appearance and a representation of an object Kant writes:

But when the movable as such, namely, according to its motion, is to be thought as determined, i.e., for the sake of a possible experience, then it is necessary to indicate the conditions under which the object (matter)

must be determined in one way or another by the predicate of motion. Here the question is not of the transformation of illusion into truth, but of appearance into experience. For as regards illusion, the understanding is always involved with its judgements determining an object, although it is always in danger of taking the subjective for the objective (think of the moon illusion in the *Critique* at A 297/B 354); but in appearance, no judgement at all of the understanding is to be found [MFNS, 555].

The four chapters then, discuss the doctrine of body and determine the concept of matter in relation to the transcendental predicates already familiar to us as the categories. Of this connection between metaphysics and natural science Kant writes:

Natural science properly so called presupposes metaphysics of nature; for laws, i.e., principles of the necessity of what belongs to the existence of a thing, are occupied with a concept which does not admit of construction, because existence cannot be presented in any a priori intuition ... the latter must indeed always contain nothing but principles which are not empirical (for that reason it bears the name metaphysics) ... either it can treat of the laws which make possible the concept of nature in general even without reference to any determinate object of experience ... (see the transcendental argument below) or it occupies itself with the special nature of this or that kind of things, of which an empirical concept is given in such a way that besides what lies in this concept, no other empirical principle is construction below [MFNS, 469, 470].

(iv) Brittan on the Construction of the Concept of Matter in MFNS

In 'Kant's Two Grand Hypotheses' [Brittan, 1986], Brittan writes that the argument in MFNS regarding the constructibility of the concept matter is partially accomplished, at a general level, in the *Critique*, and concluded at a more specific level in MFNS, this being related to the two ways of establishing the real possibility of certain concepts. Recall that the first way is to construct the concept in intuition; the second way is to establish its necessity for knowledge by means of a transcendental argument.⁷ Brittan describes the **transcendental argument** regarding the possibility of a concept of matter as follows:

There are two levels of transcendental argument at stake here. The more general level of transcendental argument goes somewhat as fol-

lows. Kant's Refutation of Idealism in **KRV** turns on the claim that the unity of consciousness requires the existence of objects in some sense external to us. It cannot merely be the case that such objects have spatial location, for otherwise they are not to be distinguished from volumes of empty space. Spatial location does not by itself provide us with a suitable empirical criterion for the existence of objects external to us. In addition to spatial location, and more generally extension, we must also attribute something like impenetrability to such objects, the power to resist and exclude other objects among which are, most importantly, ourselves. Thus the necessity of the concept of matter has to do in the first place with a distinction between matter and space and with the empirical determination of the latter. In this respect, the argument completes Kant's enterprise in **KRV** [Brittan, 1986, pp. 62, 63].

Brittan characterizes the **mathematical construction** as follows:

As for the construction of the concept of matter, Kant tries in the first two chapters of *MAN* to show under what conditions the concept of matter is mathematizable. In the first chapter, the *Metaphysical Foundations of Phoronomy*, where matter is understood as the movable in space, this involves establishing an appropriate additivity rule (given in the law of composition of velocities). In the second chapter, where matter is understood as impenetrable extension or that which "fills" a space, it involves showing determinate degree [Brittan, 1986, p. 64].

However, despite the fact that Kant begins his demonstration of the constructability of the concept of matter in the *Critique*, Brittan warns that the propositions that Kant tries to prove about matter in *MFNS* do not have the same synthetic a priori status as do the propositions of the *Critique*. Brittan explains why:

The reason for this is that the concept of matter is an empirical concept. One of its components, motion, can only be given a posteriori, in experience. It follows, I think, that in **our** world the spatially extended permanent objects required by the unity of consciousness are **in fact** identical with matter. Matter happens to function as the perceptible representation of spatial and temporal relations, but we can conceive, perhaps barely, of other sorts of changes besides motion in terms of which these relations could be defined [Brittan, 1986, p. 63].

The more specific level of argument in MFNS concerns the demonstration that certain conditions must be met if matter is to be thought of as an impenetrable substance that is also movable. In chapters one and two of MFNS, where Kant deals with intuited quantity and quality with respect to matter, Kant demonstrates that matter, in order to be constructible, must be mathematizable. Regarding the constructibility of matter in intuition Kant writes in the preface to MFNS:

Therefore, in order to cognize the possibility of determinate natural things, and hence to cognize them a priori, there is further required that the intuition corresponding to the concept be given a priori, i.e., that the concept be constructed. Now, rational cognition through the construction of concepts is mathematical ... a pure doctrine of nature concerning determinate natural things (doctrine of body and doctrine of soul) is possible only by means of mathematics. And since in every doctrine of nature only so much science proper is to be found as there is a priori cognition in it, a doctrine of nature will contain only so much science proper as there is applied mathematics in it [MFNS, 470].

That an intuition corresponding to the concept of matter be given in order for matter to be constructible entails that we experience matter both as an extensive magnitude (as having quantity) and as an intensive magnitude (as having quality) according to Kant. According to Brittan, extensive magnitudes are arithmetically addable, that is, parts of objects can be added to form new wholes. That matter has extensive magnitude and thereby has addable parts is what enables the mathematical construction of matter to take place. According to Brittan, this mathematical construction is defined as an **additive** function:

My suggestion is that the constructible is the addable. The reason why non-Euclidean figures, to continue the same example, cannot be constructed is not because we cannot visualize or imagine them, but because there is not an appropriate metric for them as there is, notably, in the case of Euclidean geometry whose distance function is embedded in the Pythagorean Theorem. And there is not an appropriate metric for them, Kant thought, because it is only on the presupposition that a Euclidean metric is supplied by us, a priori, that we can understand how it is that Euclidean geometry applies with perfect precision to the objects of our experience [Brittan, 1986, p. 65].

Brittan then, thinks that the constructible is equatable with the addable, and he demonstrates how this interpretation can be applied to MFNS.

He argues that only quantities (and not qualities, i.e., intensive magnitudes) can be fully constructed according to Kant, and that Kant's mathematical construction of matter is therefore located in the Phoronomy.⁸ In MFNS Kant writes of the mathematical construction:

Since in phoronomy I cognize matter by no other property than its movability and hence may consider matter itself only as a point, the motion can be considered only as the description of a space ... The determinate concept of a quantity is the concept of the production of the representation of an object through the composition of the homogeneous. Now since nothing is homogeneous with motion except motion, so phoronomy is a doctrine of the composition of the motions of the same point according to their direction and velocity... [MFNS, 489]

Thus, we might interpret Kant here to be saying that what we can know regarding a thing is its motion, and that knowledge of the motion of a thing is related to the measurable units given insofar as an object is subject to the general conditions of space and time. This measurability is, according to Brittan, related to the notion of objectivity for Kant. Brittan writes:

On the other reinforcing line of thought, Kant connects measurability with objectivity. Realizing that measurement is not of objects **per se** but of properties, we ask ourselves, under what conditions can numbers be assigned to them? A traditional answer, most of the elements of which can be found in Kant's text, goes as follows. To begin with, objects can be measured when they can be arranged in some order that is isomorphic to the structure of some numerical system. In particular, if objects can be ordered by a transitive and asymmetric relation, then numbers can be assigned to them. Once objects can be ordered in this way, with respect to some property, they can be compared numerically. They can be measured ... A second set of "metrical" conditions must be satisfied before the question "how much?" can be answered. In particular, objects must be physically additive as well as orderable with respect to a given property before physical relations precisely correspond to numerical relations. Thus the precise application of mathematics to intuitions depends on their being extensive magnitudes [Brittan, 1986, pp. 68–69].

Knowledge of objects then, is connected to measurability in that measurability gives determination and determination is a precondition of knowledge. It is connected generally insofar as objects of experience must be subject to the conditions of possible experience, which means that they must be located in space and time. However, determinate spaces and times can be

experienced only in terms of a metric defined on spatio-temporal **objects**, and this metric ensures measurability. Secondly, objects of experience must be extensive magnitudes in order that we apprehend them as the unity of consciousness requires — as successions of parts — this allowing us to detail precisely “how much” an object moved.

The fact that we can supply the metric by which we can construct matter is equivalent to thinking of ourselves as supplying the ‘form’ of knowledge according to Brittan. The ‘content’ of experience, however, is that which corresponds to the ‘real’ for Kant. The ‘real’ has two sides; a subjective side which is embodied as sensation, and an objective side which is embodied as matter:

It follows, according to Kant, that we can have a priori knowledge of the forms. Now the forms of our experience are space and time and the content, what fills these forms, is, subjectively considered, sensation, or, objectively considered, matter (that which causes sensations). If we can have a priori knowledge of these forms, then it would seem that our knowledge of the content is a posteriori [Brittan, 1986, p. 67].

According to Brittan then, Kant distinguishes between the concept of matter insofar as it is an extensive magnitude and an intensive magnitude. We shall see that Kant argues that intensive magnitudes such as fundamental forces are non-constructible.

Despite this, Brittan thinks that there is an important sense in which the qualitative aspect of matter is objective, and that this is an important part of what Kant wants to establish. For in order that experience be ‘about’ objects, we must infer merely from our sensory experience of matter as an intensive magnitude with qualitative character that there is matter to which the concept of an intensive magnitude corresponds. The experience of matter as an intensive magnitude then, is an important part of the establishment of the objective validity of the concept of matter and this objective validity cannot be established from the purely quantitative (formal) characteristics of matter.

This can be seen as follows: There must be a qualitative content in our perception of objects in order that it be possible for us **epistemically** to distinguish objects from the space in which they exist, and, in order for us **metaphysically** to distinguish between objects and empty space, there must be attributed to objects an objective qualitative content corresponding to the qualitative content of sensation. This is **matter**.

Thus, there must be a qualitative (intensive) content in our perception of objects. For what makes something material is essentially its quality of impenetrability. Since qualities are not mathematically additive, and thus in Brittan's sense, are not constructible, while quantities are, there appears to be a certain tension between the two ways of knowing objects.

Nevertheless, Brittan claims, Kant wants to establish both the necessity of matter being quantitatively and qualitatively knowable. Historically, there are 'two grand hypotheses' available to Kant about the way in which the material world could be fundamentally understood. The first hypothesis is essentially the Cartesian view of matter as the extended impenetrable, atomistic stuff which can be explained in terms of its mathematical properties; the second hypothesis is the Leibnizian one that matter must further be explained as essentially composed of the attractive and repulsive forces through which it can be thought of as 'filling' space. Brittan argues that the incompatibility between the two characteristics is actually resolved in some way by Kant — a way that is important insofar as it reveals a further aim of Kant's metaphysics of natural science.

(iv)a The 'Two Grand Hypothesis'

One crucial difference between these two hypotheses centers on the way they treat the notion of impenetrability. On the mathematical-mechanical approach in natural science impenetrability is assumed to be an absolute and irreducible property. However, on the metaphysical-dynamical approach impenetrability is understood in terms of a repulsive **force** admitting of degrees. Hence, impenetrability is, in this latter case, relative impenetrability. According to Brittan, a key advantage that the metaphysical-dynamical approach has over the mechanical approach for Kant, is that the former finds an **explanation** for the conception of matter as impenetrable in terms of the repulsive forces' infinite compressibility.

The difference between what we know of matter in terms of its quantitative and qualitative aspects is resolvable, although perhaps only with a paradoxical result, Brittan thinks, if we grasp the connection between the mathematical and metaphysical components to physical theories. Kant writes at 478 that the metaphysical approach is present in MFNS to a small, but important degree:

I have in this treatise followed the mathematical method, if not with all strictness (for which more time would be required than I had to devote

to it), at least imitatively. I have done this not in order to get a better reception of it through a display of profundity, but because I believe that such a system is quite capable of mathematical treatment, and that perfection may in time be attained through a cleverer hand when, stimulated by this sketch, mathematical investigators of nature may find it not unimportant to treat the metaphysical portion — which cannot be gotten rid of anyway — as a special fundamental part of general physics, and to bring it into unison with the mathematical doctrine of motion [MFNS, 478].

On the metaphysical-dynamical hypothesis matter is viewed as composed of attractive and repulsive forces. In order for us to understand matter in terms of our own experience of it then, the metaphysical-dynamical hypothesis requires that matter be ultimately explained in terms of the forces that constitute it, and this is why Kant rejects the mechanical-mathematical hypothesis that matter be understood as an absolutely impenetrable extensive magnitude. Brittan writes:

... on the dynamical hypothesis impenetrability is relational, not absolute. An object is impenetrable just to the degree that its repulsive force has been compressed; the more compressed, the more impenetrable is the object. No object is absolutely impenetrable and the degree to which an object is impenetrable can always be determined empirically. Thus the concept of impenetrability on the dynamical hypothesis is not “empty”; there are empirical conditions for its application [Brittan, 1986, p. 82].

There are other discrepancies between the two kinds of hypotheses insofar as they help us to form our concept of matter. Empty space, for instance, may be a hypothesis of the mechanical-mathematical approach, while according to the metaphysical-dynamical approach, it is not empty, but only relatively empty. On the dynamical hypothesis, space is relatively empty because its ‘emptiness’ is determined in experience in terms of the degree to which objects resist penetration. Since objects only have a relative degree of impenetrability, the determination of this being made empirically in accordance with the degree of compressibility of the repulsive force, space is only relatively empty on this hypothesis. By contrast, given that the mathematical-mechanical hypothesis follows the Cartesian view of matter as an extended, impenetrable substance, this latter hypothesis presumes as fundamental to it both absolute impenetrability and empty space.

Furthermore, the metaphysical-dynamical approach hypothesizes that

matter be infinitely divisible in order that forces be regarded as continuous, like space and matter, although this is not consistent with the mechanical-mathematical approach. Brittan's argument regarding this can be pieced together as follows:

... on the dynamical hypothesis matter is divisible to infinity since there is in principle no least part into which forces can be divided nor some point past which no object can be compressed. Forces, like space and matter are continuous (p. 83) ... Insofar as geometry is descriptive, in turn, of that which fills space, matter, then matter too must be infinitely divisible ... natural science depends on the infinite divisibility of matter. But the mechanical hypothesis denies the infinite divisibility of matter (p. 81) ... [because] ... no matter how often an object is divided, its parts will always have these properties [quantitative and qualitative] in a determinate magnitude (p. 78) [Brittan, 1986, pp. 83, 81, 78].

So the two types of explanatory approaches to understanding matter seem to force us to embrace conflicting notions about the nature of matter, but, if we understand their origins and role with respect to the establishment of objective validity, Brittan thinks, it is comprehensible why Kant thinks that we should depict matter in these two very different lights. For the dynamical hypothesis is based on what is empirically determinable about matter, while the mechanical-mathematical hypothesis is based on the required freedom of the imagination in making philosophical speculations. We shall see that the postulation of the existence of the fundamental forces cannot be demonstrated by construction, unlike the postulation that matter is an extensive magnitude. On the other hand, no content can be given to the concept of matter except insofar as it is based on experience, and this makes the metaphysical-dynamical approach necessary too. Brittan thinks that this difference between the two sorts of hypotheses explains the need for both explanatory approaches in natural science.

(iv)b The Non-Constructibility of Fundamental Forces

Following Hartz, Brittan argues that the reason that forces are not constructible is because they do not admit of any measurement as do extensive magnitudes, because they are non-relational. Brittan writes:

We can think of all of the properties ascribed to matter by the mechanical hypothesis as relational properties. But, one might argue, relational properties alone do not give us an adequate concept of a physical object. An adequate concept requires the ascription of at least

on non-relational property. But the fundamental forces are just such non-relational properties. Therefore, the concept of matter to which the fundamental forces belong is adequate. The difficulty is that for the very reason that they are non-relational they are not mathematizable; that is, not constructible. This larger picture is correct in outline: It supplies a plausible philosophical motive for Kant's embracing the dynamical hypothesis and it accurately locates the crux of Kant's problems [Brittan, 1986, pp. 87–88].

Brittan's view here presupposes that Kant subscribed to the belief that space is relative rather than absolute. The notion that space is absolute was made famous by Newton, and it is, roughly, the notion that there is some absolute frame of reference which allows for a unique determination of which object of a pair of objects in motion relative to one another is in **absolute** motion, and which (if either) is in absolute rest. The notion that space is relative stands in contrast to this, denying that there is any absolute standard for the determination of absolute motion, and claiming that the motion of an object can only be determined in terms of its relation to other objects in space. Brittan characterizes Kant's position regarding relativity as follows:

What interests us here is not so much Kant's proof that the composition of motions can be represented only in a particular way as the remarks he makes concerning absolute space. Kant begins the *Phoronomy* with a defense of what he calls "relative space" and hence also of "relative motion" (since the motion of an object is defined as the change of its external relations to a given space). Insofar as space, or a space, is to be a possible object of experience, i.e., perceptible, it must be capable of being located with respect to some other space in which its movement may be perceived. All perceptible space is thus relative to some other space in which we assume it to be located. The ideal limit to the procedure of "embedding space". But the concept of absolute space refers only to this ideal limit. It is regulative idea, the principle of construction of ever larger spaces, and not an object of experience [Brittan, 1978, p. 104].

So, since all measurement of objects is made with reference to a relative space, properties must be relational in order to be measurable. The fact that the non-constructability of forces is problematic for Kant is explained by Brittan in terms of the difficulty in assigning a determinate direction to a force given that in each frame of reference the force receives a different value. Brittan writes:

These forces [dynamical] are determined for any individual body as a function of its relation to other bodies. But we still face the problem of dividing up the accelerations; if we refer the motion to one frame of reference, we assign a particular value to the postulated forces; if we refer it to another frame, then the forces receive another value. In either case, the notion of a postulated dynamical force is fundamentally indeterminate. It is in this sense that the dynamical forces are not “constructible” [Brittan, 1986, p. 90].

Brittan sums up his appraisal of Kant’s endeavour as follows, pointing out that the two hypotheses are a source of tension that Kant has difficulty trying to resolve:

In one way, Kant comes to a rather paradoxical conclusion. The mechanical hypothesis is “constructible”, but there are no empirical conditions for the application of several of its key concepts. It is not “really possible”. The corresponding concepts of the dynamical hypothesis are in the same sense “really possible”, but they are not “constructible”. The paradox is already indicated in the titles: the mechanical hypothesis is mathematically, but not metaphysically, adequate; the dynamical hypothesis is metaphysically, but not mathematically, adequate. Yet it is one of Kant’s central objectives to show that mathematical and metaphysical adequacy coincide, or at the very least are compatible [Brittan, 1986, pp. 90–91].

Brittan then, thinks that Kant was not entirely successful in establishing the objective validity of the concept of matter because he must rely on a non-constructible concept of matter as force to establish the real possibility of matter as a determinate concept, but could successfully construct the concept mathematically only given a different conception of matter as the absolutely impenetrable.

The conclusion that Brittan [1986] tried to draw from his view that certain tensions exist between the dynamical and mechanical hypothesis matter is constructible, but not really possible, while on the dynamical hypothesis, matter is really possible although not constructible. The tension is that alone neither hypothesis is adequate, and that as a consequence both hypotheses are necessary but construe matter in conflicting ways. Brittan explains the existence of such a tension in terms of a general concern of Kant’s to distinguish between form and content in his Critical philosophy:

The paradox results, I think, from a deeper tension at the heart of Kant’s

philosophical enterprise. On the one hand, he wants to distinguish sharply between form and content, to maintain that knowledge a priori is alone possible of the former, and to conclude that the limits of our experience and of the world. On the other hand, he wants to maintain that content has its own form, to maintain that we can have some a priori knowledge of it, and to conclude that our experience is in some sense directly and immediately of the real. One view emphasizes the measurable aspects of our experience, the other its purely qualitative aspects. Kant undoubtedly thought that he could combine both into a comprehensive view. I think he failed [Brittan, 1986, p. 91].

Brittan does concede however that it is possible to view Kant's enterprise in such a way that it does not have to face such a paradoxical tension. On this view, Kant is thought of as establishing only the internal (transcendental) reality of natural science, which, if true, dissolves the tension between the 'two grand hypotheses' somewhat. Brittan, while not committing himself to this view (he writes here with reference also to the views of himself and Butts) writes:

This third view is that the reality of natural science is an internal reality. The distinction between what is real and what is not is a scientific distinction, elaborated in a number of different ways as a contrast between motions, real forces, real causes and real objects are those which are merely hypothesized or are otherwise apparent. The reality of natural science does not depend either on identifying, as it did with Descartes, the real with the measurable, or on identifying, as did Leibniz, the real with the non-measurable. It is itself part of natural science, although to point this out, of course, is to give up the attempt to say what is, all cards on the table, really real. To opt for empirical realism as I think Kant, rightly construed, understood it, is at the same time to opt for a kind of transcendental idealism [Brittan, 1986, p. 91].

(v) Butts on the Construction of the Concept of Matter in MFNS

We now turn to an alternative picture which is that of Butts [1984]. Butts stresses the epistemological importance of the dynamical and mechanical hypotheses in contrast to Brittan's ontological interpretation. What this means is that according to Butts, the hypotheses have certain functions in grounding the concept of matter insofar as we can have knowledge of it. His general thesis is that Kant was less concerned to show what the **ontological** conclusions are that can be reached regarding the concept of matter (as an extensive magnitude of force) and was more concerned with

the **methodological** conclusions. For example, in connection with Kant's doctrine about absolute space, Butts writes:

... Kant's construction of point motion addition as well as his other constructions invoke a heuristic principle in the form of a demoted idea of reason. The concept of absolute space is not appealed to as an ascertainable ontological feature of the physical world, but only as the methodological rule that one can add additional frames of spatial reference whenever they are required to solve a problem not otherwise tractable. Thus the heir to the metaphysical idea of absolute space with which Kant struggled in his early works is a methodological principle and nothing more [Butts, 1984, p. 194].

Butts also applies this methodological perspective on Kant's account of construction:

If I am right in stressing that Kant's categorical structure is a structure of rules (the most interesting ones of which are semantical rules, rules of constructing, projecting, doing, making), and if I am right thinking that Kant construed mathematical objects as idealizations, then the correctness of the application of the rules in the idealization is not predetermined, it is a way of seeing, looking for, understanding and expecting. In short, a Kantian idealization of sensation is a structure of searching for and hopefully finding ... Kant's entire categorial structure (his epistemic grammar and its required semantical rules) is one complex and exotic set of expectations that reality will be the sorts of things we can understand and comprehend under scientific laws [Butts, 1984, p. 197].

Butts then, can be summarized here as follows: mathematical constructions are **idealizations** and which are partly explainable in terms of our general set of expectations that nature will be scientific. The role of sensation is merely of epistemic import here: it serves as an empirical check on theory construction, but the construction itself has a will of its own insofar as it seeks to idealize experience:

... the nature of sensing, as I have been urging all along, provides a model of decisive observability. In sensation a state is introduced that was not previously present; in this sense only sensation is decisive. It remains subjective, and science seeks objective knowledge depending on public methods of acquisition. Thus observations in science only need to imitate the model of decisiveness without becoming restricted to

particular states of consciousness. Sensations yield undetermined appearances and are in this respect theory free. Observations made by an instrument remark idealized “presences” fully determined by theory: The instrument is designed to capture just those idealized features of data which the presence of sensation leaves mysterious [Butts, 1984, pp. 199-200].

The role of sensation then, is to guide the scientific aspect of the activity of making scientific theories, according to Butts, rather than that of helping to provide objective validity as Brittan argues. The general picture of scientific activity then, that Butts wants to depict as being Kant’s is the following:

... that we cannot know beyond the bounds of possible experience does not commit us to accept that all knowledge is sensational, direct and sharp like pains in the hand. And that we cannot sense external objects except that they be represented in euclidean space does not prevent us from trying out sub-grammars that permit new construction, new definitions. What science, as Double Government Science, does it give us some assurance that in the absence of direct empiricism and **an sich** realism we can still get on with the job; the human resources for making and selecting worlds are, for humans, enough [Butts, 1984, p. 200].

Thus while Brittan emphasized the role of sensation in providing the subjective side of what is real in the concept of matter [Brittan, 1986], for Butts the role of sensation is that of a mere guide in the very initial stages of construction. For Butts then, the idealizations of construction make the establishment of a concept of matter appear to be quite speculative. This depiction of the nature of construction is in keeping with our original view of the importance of the faculty of Reason in establishing the possibility of empirical hypotheses. For Reason is the faculty which urges us to seek out lawlikeness and unity in experience, and tries to idealize experience. Furthermore, because Butts stresses the epistemological function of the two hypotheses, the tension that Brittan tried to establish loses import.

In commenting on a later version of Butts’ account [Butts, 1986], Brittan argues that Butts makes three good points [Brittan, 1986, p. 89]. The first is that the dynamical hypothesis is important methodologically because it explains how forces are related to scientific theories. The second is that the dynamical and mechanical hypotheses are not rival views of reality. The third is that Kant’s position is made problematic by his inconsistent

application of empirical and transcendental realism.

Brittan however, is critical of Butts because Butts' account does not itself explain why Kant was particularly concerned to show that matter has intensive magnitude and obeys the LUG. Brittan argues that a better explanation of the need for two approaches is that it is part of Kant's hope to show that fundamental forces provide the concept of matter with objective validity, despite their non-constructability. Brittan thinks that this endeavour of Kant's was not entirely successful, but that this should simply be regarded as a fundamental difficulty of Kant's task.

By way of summing up we note that Brittan's own view is vulnerable to criticism. First of all, as Brittan himself demonstrates, if we view Kant as merely trying to establish transcendental idealism, then the apparent tension that Brittan sets regarding the two ways in which matter is depicted by the two different hypotheses dissolves. Secondly, if we want to count MFNS as part of Kant's critical philosophy (and I certainly do) it must be read as a work that is primarily concerned with establishing the epistemological conditions of natural science rather than as an attempt to regard matter as determined according to certain ontological features. Agreeing with Butts then, I argue that Kant is not primarily concerned to establish exactly **what there is**, but **what the conditions for saying what there is** are. Given the view that MFNS is part of Kant's critical philosophy and that this entails the establishment of the conditions for knowledge, then I must side with Butts in arguing that the dynamical and mechanical hypotheses are significant only insofar as they are methodological limitations of what natural science can say about the concept of matter, and that Kant is simply interested in exposing the epistemological features by which natural science must be constrained.

(vi) The Establishment of Metaphysical Lawlikeness in MFNS

Butt's methodological account can be compared to Buchdahl's notion that there is a certain 'looseness of fit' between the empirical, metaphysical and transcendental levels in Kantian thought. For Buchdahl [1972] claimed that there is a gap between the transcendental and empirical levels and that the establishment of transcendental lawlikeness could not lead directly to the establishment of empirical lawlikeness without an independent foundation being shunted between the two levels, as we say in Chapter I. This independent foundation is I think, what Buchdahl refers to as metaphysical

lawlikeness, and I will try to show how Butts' characterization of the nature of the construction of the concept of matter can be viewed as Kant's attempt to establish metaphysical lawlikeness in MFNS.

Although only vaguely characterized by Buchdahl, we can still determine enough about metaphysical lawlikeness from his article [Buchdahl, 1972] to determine that it is essentially linked to the construction of empirical concepts and the real possibility of empirical lawlikeness and natural science. Buchdahl says of metaphysical lawlikeness that:

1. It is tied to the metaphysical construction of empirical concepts.
2. The importance of metaphysical lawlikeness rests in its role in establishing the real possibility of empirical science.
3. The construction of empirical concepts is the source of the necessitarian and scientific character of metaphysical laws.
4. Metaphysical lawlikeness is responsible for 'seeking out' an accordance between the transcendental lawlikeness of the Principles and the possibility of empirical lawlikeness established in MFNS, or, is that kind of lawlikeness which is established in MFNS.

Characterized as such, metaphysical lawlikeness still remains a fairly mysterious concept. As Buchdahl characterizes it, it is linked to the establishment of the possibility of empirical lawlikeness in MFNS and is in fact the kind of lawlikeness established in MFNS. This in itself seems plausible enough: for as we have seen possibility must be established both at a general level, which is the level at which transcendental lawlikeness is established, and at a specific level, which we might regard as the level at which metaphysical lawlikeness is established. Moreover, Buchdahl links metaphysical lawlikeness to the construction of concepts. We have already seen that the possibility of empirical lawlikeness depends upon the general and specific constructability of concepts. Given this and a demonstration of how that metaphysical lawlikeness plays a role in the construction of concepts (in that it carries half of the responsibility for their constructibility) and is established in MFNS we may be in a position to attempt to clarify further what the exact nature and role of metaphysical lawlikeness is in the establishment of the possibility of natural science.

My suggestion is that we regard metaphysical lawlikeness as that lawlikeness which allows us to bridge the gap between our experience of matter, which leads us to conceptualize matter as composed of forces, and

our idealized constructions of the specific concept of matter. This view presupposes the accuracy of Butts' interpretation of the nature of the specific construction of the concept of matter as well as Buchdahl's argument that certain gaps exist between the empirical, transcendental and metaphysical levels in Kant. Given this picture, metaphysical lawlikeness is that kind of lawlikeness which ensures the legitimacy of idealized constructions of empirical concepts. As such, metaphysical lawlikeness serves a function comparable to, but more specific than transcendental lawlikeness regarding empirical lawlikeness. For transcendental lawlikeness ensure that the general conditions of our experience of objects in space and time allows us to experience nature as lawlike, but this argument is at a very general level. Metaphysical lawlikeness is established in constructing empirical concepts and ensures that particular experiences of objects at the sensory level are consistent with the idealized mathematical construction required if empirical lawlikeness is to be possible. Thus, both the establishment of transcendental and metaphysical lawlikeness, and in doing a critical analysis of what the conditions for a natural science are, Kant had to establish the possibilities of both of the former kinds of lawlikeness.

It is important at this point to clarify the distinction between Kant's references to the Principles of metaphysics, or metaphysical principles, and metaphysical lawlikeness. If my interpretation of what metaphysical lawlikeness is correct then it is clear why both of these features of Kantian thought should be entitled 'metaphysical'. For, traditionally, the metaphysical always concerns that which we can say about the **ontology** of the world. Kant, in his critical philosophy, is critical of metaphysics in this old sense and thinks that before we undertake any sort of metaphysics that we must determine what the conditions limiting that which we can say about our **experience** of the natural world are. The metaphysical principles then, provide general directions for understanding our experience of nature, while metaphysical lawlikeness would have to be that which ensures the connection between specific experiences of objects in nature and mathematical constructions of concepts. As such then, both may be termed metaphysical in that they relate to our experience of nature, but the two must be regarded as distinct.

We may summarize our terminology and clarify the relations between concepts that we have used as follows then: Empirical lawlikeness is that kind of lawlike regularity which we notice in our experience of the nature world. When we always experience heavy objects as tending to fall towards the earth with a certain velocity, we postulate that there is an attractive force which explains the lawlikeness that we observe in our experience of

objects in nature. Transcendental lawlikeness explains the general conditions of our experience that make such experiences possible, and it justifies the formulation of certain metaphysical principles which are general laws describing the relations between objects which we will experience. Thus, transcendental lawlikeness leads us to think of the relationship between heavy objects and their falling toward the earth, only that the concepts through which we must think these objects as related have imparted a certain lawlikeness into our experience of them as related. Metaphysical lawlikeness legitimates the more specific construction of empirical concepts of objects insofar as they are ideal, which is a required step between transcendental and empirical lawlikeness. For metaphysical lawlikeness allows us to proceed from the basis of our experience of matter as relatively impenetrable (insofar as it is subject to attractive force) to the idealization, made for this purpose of understanding observed empirical regularities, that matter can be regarded as possessing certain ideal properties, for instance, absolute impenetrability. Thus the lawlikeness here is simply the guarantee that this jump from experience to the ideal can or must be made if empirical lawlikeness is to be possible.

If I have correctly depicted metaphysical lawlikeness as linking our particular experiences of objects with the idealized mathematical construction of concepts, then Buchdahl's claim that lawlikeness in general is the result of the legislative function of Reason is also supported. For it could only be Reason, as the faculty which seeks to unify and to idealize which could be responsible for the seeking out of a conformity between particular experiences of objects and idealized constructions, in order that it enable a system of empirical laws to be developed by humans in their attempt to depict nature as a coherent whole.

That the faculty of Reason as a unifier of experience is relevant to this case is important. For in order that the 'special metaphysics' in MFNS be successfully established not only must metaphysical lawlikeness, the legitimator of the construction of empirical concepts be established, but so must the methodology involved in establishing the possibility of empirical lawlikeness be reflective of Reason's need to unify experience. We discussed the methodological justification of empirical lawlikeness and its connection to the faculty of Reason in Chapter I, and that metaphysical lawlikeness is reflective of Reason's unificatory procedures fits together nicely with Buchdahl's view that Reason has an important role in establishing the possibility of natural science and empirical lawlikeness. That metaphysical lawlikeness is the result of Reason's unificatory procedures also explains how metaphysical lawlikeness is possible and is established in practice.

Another important conclusion that should be drawn here is that given this picture of metaphysical lawlikeness and Kant's claim at A 720/B 748 that the a priori construction of appearances is only possible with respect to the general conditions of space and time, it follows that the more specific construction of the concept of matter does not involve establishing its a prioricity, but only involves establishing the link between particular experiences of objects and our ability to make idealized mathematical constructions which correspond to these experiences of objects. This then, tells us something more about the nature of the construction of empirical concepts insofar as it can be linked to a prioricity: we can know only generally that the concept of an empirical object is subject to the conditions of experience and is in this way linked to the a priori, while regarding the specific construction of empirical concepts in MFNS we can know only that it involves the possibility of metaphysical lawlikeness and depends upon the unificatory procedures of Reason in its establishment of the possibility of an empirical science.

Finally, a word of criticism directed at Brittan's depiction of the tensions in Kant's thought regarding the construction of empirical concepts: The tensions that Brittan set up were the result of a focus on the ontological status of the concept of matter given the mechanical and dynamical hypotheses. I have tried to show that if we remember that Kant's concerns regarding metaphysics and a foundation for natural science were primarily epistemological rather than onto- logical, and, that if we grasp the nature of lawlikeness for Kant and its functions at different parts of Kant's critical thought, then we can see that Kant's endeavour was not so problematic and tension-filled as Brittan depicts it to be. The reason that Brittan finds this tension in Kantian thought is, I think, not only because of his emphasis on the ontological, but also because of his failure to grasp fully the need for and function of a third kind of lawlikeness in establishing the possibility of empirical lawlikeness. This lawlikeness is, I claim metaphysical lawlikeness.

For several reasons, then, it may be useful and illuminating to regard metaphysical lawlikeness as that kind of lawlikeness which links our particular experiences of nature and our mathematical constructions of concepts, and as the lawlikeness necessary for the establishment of the possibility of empirical lawlikeness and natural science in general.

Footnotes

1. I will be citing articles and books in the text of this paper by referring to the author, year of publication and page number after an initial introduction by title. The Critique of Pure Reason will be cited as the Critique and the Metaphysical Foundations of Natural Science will be cited as MFNS. When quoting from the Critique I will cite the shortened version of the title, and either M or NKS — which stand for the Meiklejohn and Norman Kemp Smith translations respectively.

2. Many commentators on Kant's Second Analogy have interpreted his discussion of causality to be an attempt to refute Hume's skepticism regarding causality. Buchdahl, however, would find such an association misleading because it leads to a Strawsonian type of objection that that Kant did not successfully demonstrate that knowledge of the existence of an objective causal order in nature could be determined *a priori*. Hume's problem can be described as follows: The conjunction of causes and effects by humans must be the result of human experience and could never be determined as necessary *a priori*. Because we determine certain events to be causes and other effects of these causes based on **past** experiences of a constant conjunction of these events, the causality that we infer to exist is not due to a necessity of reason, but only custom. In *An Inquiry Concerning Human Understanding* cited from *Reason at Work*, p. 317, Hume concludes that; 'All belief of matter of fact or real existence is derived merely from some object present to the memory or senses and a customary conjunction between some other object ... if flame or snow be presented anew to the sense, the mind is carried by custom to expect heat or cold, and to **believe** that such a quality does exist and will discover itself upon a nearer approach. This belief is the necessary result of placing the mind in such circumstances. It is an operation of the soul, when we are so situated, as unavoidable as to feel the passion of love, when we receive benefits; or hatred, when we meet with injuries. All these operations are a species of natural instincts, which no reasoning or process of the thought and understanding is able either to produce or to prevent.'

3. Nelson Goodman, *Fact, Fiction, and Forecast*. New York: The Bobbs-Merrill Company, Inc., 1955, pp. 18-20.

4. David Lewis. 'Causation'. in *Causation and Conditionals*, edited by Ernest Sosa, London: Oxford University Press, 1975, pp.181-182

5. See Brittan [1978, p. 136] for a discussion of this.

6. This outline is following Ellington's sketch of MFNS in the introduction to his translation of MFNS, pp. xvi–xviii.

7. See my quote from Brittan in section (iii) of chapter one.

8. See Brittan [1986, pp. 84–85] for a discussion of this.

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