

## **Necessary Principles of Perception: A Comparison of Kant and Reichenbach**

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**Abstract:** In *The Theory of Relativity and A priori Knowledge*, Reichenbach characterizes the nature and epistemological status of what he calls “coordinating principles” – principles which connect, or coordinate, objects in the world with our perceptions of them. Further, Reichenbach claims that the coordinating principles are “equivalent to Kant’s synthetic *a priori* judgments”. This article evaluates Reichenbach’s claim of equivalence. It examines and contrasts the epistemological statuses that Kant and Reichenbach ascribe to the judgments or principles, respectively. The statuses, the article concludes, are not, as Reichenbach asserts, equivalent. Kant and Reichenbach disagree about the fundamental nature of knowledge.

“The fact that our sense organs mediate between concepts and reality is inherent in human nature and cannot be refuted by any metaphysical doctrine” (Reichenbach 37). Perception is the only human means of access to physical objects because physical objects are more than just the product of equations and definitions. They must be experienced before they are known. As accurate and detailed as my description of an apple is, you will not actually know what it tastes like until you taste it. There is something unique about the knowledge of physical objects given to us by perception that can never be given through description and equations alone. However, individual perceptions themselves cannot determine individual physical objects. There are infinitely many, different, possible perceptions of a given physical object. Even if only the sense of sight is considered, any object can be perceived from many different angles, in many different locations, and together with various other objects. Yet, we say that each possible perception would be a perception of that particular physical object. A difference in perception does not entail a difference in object. Therefore, there

must be something other than perception itself which links each perception with a particular object.

Reichenbach calls this something a coordinating principle. In *The Theory of Relativity and A priori Knowledge*, Reichenbach characterizes the epistemological status of such principles. He also provides a truth criterion for the principles and attempts to determine which principles meet his criterion. Examples of coordinating principles include the persistence of objects over time and the three-dimensionality of space (Reichenbach 31). Reichenbach also says of the coordinating principles, "They are equivalent to Kant's synthetic *a priori* judgments" (47). However, Reichenbach does not ascribe to the coordinating principles the same epistemological status that Kant ascribes to synthetic *a priori* judgments. Instead, he maintains that Kant's position is refuted by the theory of relativity. In this paper, I will explain and contrast the epistemological statuses which Reichenbach and Kant ascribe to the principles or judgments, respectively. I further hope to suggest an answer to the question of whether or not Reichenbach is correct in his interpretation and refutation of Kant's position.

I claim that Reichenbach is wrong in his interpretation of what Kant means by *a priori*. He confuses what Kant calls a "secure indication" of a judgment's being *a priori* with the definition of *a priori* (Kant B4). Reichenbach claims that one of Kant's definitions of *a priori* is "necessary" (Reichenbach 48). Yet for Kant, to be *a priori* is not to be necessary. It is to arise and be justified independent of sense experience. However, I believe Reichenbach is correct in claiming that Kant believes that if a judgment is synthetic *a priori*, it is necessary. Therefore, Reichenbach's claim that Kant's position is contradicted by the theory of relativity is correct. I here hope only to clarify and explain in more detail Kant's position not to defend it in its entirety.

Kant arrives at the need for synthetic *a priori* judgments by a somewhat different chain of reasoning than that which leads Reichenbach to the coordinating principles. Kant looks at the relationship between individual sensations and whole perceptions rather than at the relationship between individual objects and perceptions. We are constantly bombarded with thousands of individual pieces of sense data. Right now, each of my fingers feels the plastic surface of my keyboard, my ears hear the crackle of oil sizzling on the stove, and my eyes see the white of this page. Yet it is not possible that the content of any one of my sensations includes that much information. The sensory data I receive from my fingers includes texture and possibly even intensity and duration, but no one piece of sense data includes the object 'keyboard'. Many

individual sensations constitute my perception of my keyboard. Thus, there must be prior principles which organize sensations and relate them to physical objects. Perceptions of objects – what Kant calls appearances – must be constructed from sensations. From this line of reasoning Kant concludes, “Since that within which the sensations can alone be ordered and placed in a certain form cannot itself be in turn sensation... its form must all lie ready for it in the mind *a priori* ...” (Kant B34).

Although they arrive by different means, both Kant and Reichenbach arrive at the conclusion that some sort of principles or forms are necessary for our thinking about and unified perception of physical objects. Reichenbach goes so far as to claim that the principles he and Kant have in mind are equivalent, even though they each ascribe a different epistemological status to the principles. My project here is an exploration of this difference between Kant and Reichenbach’s characterizations of the principles. However, my work on this project has led me to a comparison not only of the epistemological statuses which Kant and Reichenbach ascribe to the principles but also of their views about necessary truth. I believe that the fundamental disagreement between Kant and Reichenbach is over the nature of necessary truth and its relation to the human mind and human experience.

The first section of this paper discusses Kant’s conception of the synthetic *a priori*. I seek specifically to answer the question of why Kant considers synthetic *a priori* judgments to be necessary truths. The second section examines Reichenbach’s view of the epistemological status of the coordinating principles. Here I aim to answer the question of whether or not Reichenbach believes there are any necessary truths. The third section compares Kant’s view with Reichenbach’s interpretation of it. Specifically, I focus on the contrast between what Kant means when he calls synthetic *a priori* judgments necessary and what Reichenbach takes him to mean.

### I. Kant on the Synthetic *A Priori*

Kant defines as *a priori* those cognitions which arise independent of all sense experience. By cognition Kant refers to any objective, conscious representation produced by the human mind (Burge 1/18). The justification for believing such a cognition – one which arises independent of all experience – must also be independent of all sense experience. It must lie in the nature of the cognitive faculties. For Kant, a justification is required for having knowledge (1/25). The cognition must be true and the grounds of its justification known in order for the cognition to qualify as knowledge.

This definition invites the question of how it is possible for a cognition to arise independent of sense experience. Not only that, but how can a justification be discovered independent of sense experience? After all, human thought and awareness begin with the beginning of experience. Kant agrees that this is the case (B1). No cognition can precede experience in temporal order. However, to arise independent of sense experience is not a temporal relation. It is not even to be a thought that is separate from any sense experience whatsoever. To arise independent of experience is to have an internal source. It is to arise from the mind itself. The source of *a priori* cognition must be the human cognitive faculties, although Kant does admit that sensory input plays a role in triggering the production of such cognition (B2).

Kant divides *a priori* cognitions into pure and impure cognitions. *A priori* cognitions which include concepts arising from experience are impure. It is possible for a cognition with a *posteriori* content to have an internal source. In such cases, the relation between the *posteriori* parts is that which is cognized *a priori*. For example, Kant believes that 'alteration' is an *a posteriori* concept. Thus, the cognition 'every alteration has a cause' contains *a posteriori* content. Yet Kant still believes this cognition is *a priori* (B3). The relationship of 'having' between 'every alteration' and 'cause' is the part of the cognition which arises independent of sense experience. However, only those cognitions both whose parts and the relations between whose parts arise independent of all experience are considered pure. For example, Kant believes that 'bodies are extended' is a pure *a priori* cognition (Burge 1/18). He believes that the concept 'body' cannot be abstracted from experience. It has its source in the mind and is therefore *a priori*. Also the concept 'extended', Kant thinks, is contained in the concept 'body'. Thus, the cognition 'bodies are extended' contains nothing *a posteriori*. It is pure *a priori*.

From here, Kant again divides *a priori* cognition into two categories: the synthetic and the analytic. These categories are distinct from the pure and the impure. There is no special correspondence between synthetic or analytic and either pure or impure. A special subgroup of cognitions, namely judgments, can be categorized as either synthetic or analytic. If by cognition Kant refers to any objective conscious representation, by judgment he refers to those objective conscious representations which are propositional. He sees such propositional cognitions as having subject-predicate form. Those cognitions in which the predicate is contained in the subject are analytic. Those in which the predicate is not contained in the subject are synthetic (Kant B10). To use the above examples, Kant believes that the concept 'extended' is contained within the concept

'body'. Thus, the judgment 'bodies are extended' is an analytic judgment. However, the concept 'cause' is not included in the concept 'alteration'. Therefore, the judgment 'every alteration has a cause' is synthetic. Synthetic judgments are also neither derivable from the axioms of logic nor vacuous (Burge 1/11). Analytic judgments can be either.

Kant gives several proofs of the existence of synthetic *a priori* cognitions. He identifies necessity and universality as "secure indications" of an *a priori* cognition (B34). Something is necessary if and only if it could not be otherwise. Something is universal if and only if there is no exception to it. Neither a necessary nor a universal cognition can arise or be justified *a posteriori*. Experience can only give us instances of things. It can only suggest necessity or universality by induction and extrapolation from the fact that no exceptions to a rule have yet been found. Yet, Kant thinks that more than an inductive conclusion is asserted by *a priori* cognitions. He believes we have a greater degree of certainty about such cognitions. They actually are necessary and/or universal. Therefore, necessity and universality serve as signals of an *a priori* cognition. Kant takes mathematical propositions to be both necessary and universal in nature. Further, he argues that certain propositions of geometry are not only necessary and universal but also synthetic (B14-17). Thus, the existence of necessary and universal synthetic judgments in geometry is a proof for Kant of the existence of synthetic *a priori* cognitions.

Experience itself is also a proof for Kant of the existence of synthetic *a priori* cognitions. The rules governing perception, what Reichenbach calls the coordinating principles, cannot, according to Kant, arise from experience. The rules give order to perception and are therefore presupposed by it. Kant believes experience cannot prove or disprove rules which it presupposes (B5). Thus, the rules must arise and be justified independent of sense experience. Therefore, experience itself presupposes the existence of synthetic *a priori* judgments.

A discussion is now warranted of Kant's view of the specific role of such rules in perception. Do they indeed function in the same way as Reichenbach's coordinating principles? Kant believes there are three human, cognitive faculties – sensibility, understanding, and reason. The sensibility is the capacity by which we perceive. Kant divides perceptions, which when referring to a perception of a particular object he calls an appearance of that object, into two parts – sensations and intuitions (B33). Sensations are the immediate sense data we receive from physical objects through our sense organs. Intuitions are the conscious representations, cognitions, which

represent those objects in our minds. Each individual intuition is unique to a particular object or set of objects and to a particular time and place. It is a singular representation (Burge 1/18). The sensibility receives sensations and creates immediate representations of them.

The understanding is the capacity by which we think about intuitions and categorize them under concepts. Concepts are also cognitions, but they are general unlike intuitions. They apply to many objects in different places and at different times. The understanding receives the singular representations created by the sensibility and puts them into categories of general representations. Finally, reason is the capacity by which we generate concepts and *a priori* rules of cognition. The understanding receives the concepts under which it categorizes intuitions from reason. Thus, for Kant, the understanding is the link between sensation and reason (Burge 1/30). It is the link between physical objects and *a priori* principles.

All three cognitive faculties together create the appearance of an object, which Kant divides into matter and form. The matter of the appearance is what is given through sensations. The form is what is represented in intuitions. The form is the constant structure which is common to all appearances. For example, all appearances have three dimensions. The form is the relations that exist amongst all of the sense data which comprise an appearance. These relations are constant among all appearances because they are determined by the same synthetic *a priori* judgments. Kant claims that there is a single form of outer intuition – intuition of objects outside ourselves – and a single form of inner intuition – intuition of a person's subjective, inner experience. The form of outer intuition is space. The form of inner intuition is time.

Kant's form space is a composite of many of Reichenbach's coordinating principles. Likewise Kant's form time is also a composite of many coordinating principles. The synthetic *a priori* judgments which determine the relations amongst the sense data are the type of principles which Reichenbach thinks could function as coordinating principles. For example, Kant's form space organizes sensations into appearances which have three dimensions and whose geometry is Euclidean. This function of organizing sensory data and connecting it with appearances of objects is roughly equivalent to the function Reichenbach assigns to the coordinating principles. Kant's forms space and time do function like Reichenbach's coordinating principles. Therefore, why Kant labels them synthetic *a priori* is relevant here.

Kant offers four primary reasons for why he claims that space is *a priori* (B38-B40): One, space cannot be abstracted from appearances of objects (Hartnack 18). In order to conceive of objects as being

outside oneself, space must already be presupposed. Two, space is a necessary representation. The human mind cannot represent the nonexistence of space. It can only represent an empty space devoid of all objects. Three, there cannot be more than one space. Only one space can be imagined. If we try to imagine more than one space, the spaces can only be imagined as parts of one still larger space. Four, space is not a concept. For each concept there are a given number of representations which are instances of that concept. However, none of the representations are that concept. While space can likewise be divided into parts, each of these parts is space. There is only one instance of space. There is no distinction between concept and instance when we think of space (Hartnack 20). I think Reichenbach would argue that some of these reasons do not indicate that space is *a priori* but rather lead to conclusions about limitations on human thinking or imagination. However, my aim here is only to explicate Kant's position not to evaluate it.

Kant offers parallel reasons for claiming that time is *a priori*. Time cannot be abstracted from perceptions. It is presupposed by them. Time is a necessary representation. The human mind cannot conceive of a world without time. There is only one time. We cannot imagine more than one time. Neither is time a concept. There are no instances of time that are not time (B46-B48).

Thus, for Kant, space and time are the *a priori* forms of intuition. They are presupposed by any human perception of a physical object. They are prior to and necessary for experience. Therefore, they cannot be disproved by experience. A set of principles, which Reichenbach would say is equivalent to a possible set of coordinating principles, constitutes Kant's forms space and time. Thus, by parallel reasoning, Kant would say that this set of coordinating principles is prior to and necessary for experience. It, likewise, cannot be disproved by experience. Therefore, for Kant, this set of coordinating principles determines the way human experience is and must be.

To summarize, Kant defines as *a priori* those judgments which arise and are justified independent of all sense experience, although such judgments might involve *a posteriori* concepts. He further defines as synthetic those *a priori* judgments in which the predicate is not contained in the subject. He considers necessity to be a secure indication of *a priori*-ty. Synthetic *a priori* judgments determine the form of appearances. They function in a similar way to Reichenbach's coordinating principles and are necessary judgments about the way human experience must be. Therefore, Kant would hold that a certain set of coordinating principles contains necessary

and synthetic *a priori* judgments which are presupposed by perception.

Now that Kant's position has been elucidated, I turn to a more detailed examination of Reichenbach's explanation of the function and epistemological status of the coordinating principles.

## II. Reichenbach on the Coordinating Principles

Reichenbach characterizes all cognition of physical objects as coordination between actual physical objects and human sense data. Reichenbach assumes a definition of cognition similar to Kant's. Cognitions are conscious, mental representations. Even though physical objects are often represented in terms of equations, Reichenbach points out that it is crucial to differentiate between physical and mathematical objects. Mathematical objects can be uniquely determined by equations and definitions alone.<sup>1</sup> Physical objects cannot. They belong to the real world rather than the logical world and must be experienced before they are known (Reichenbach 34-36). Therefore, the equations of physics must differ from the equations of mathematics because they must claim to be true of the real world. Mathematical equations need make no such claim.

Because they must claim to be true of the real world, the equations of physics need something which connects them to physical objects. According to Reichenbach, the coordinating principles function as this link between physics and objects. For example, in a one-dimensional world the coordinating principle 'space is flat' would differentiate a successive series of perceptions, as perceived by a person walking a straight line through space, of identical buildings from a series of perceptions, again by a person walking a straight line, of the same building in a round space. Nothing could be found in the perceptions themselves which would differentiate between a flat space and a round space. Only the use of one particular coordinating principle determines how many buildings are cognized. The principle coordinates each perception with an object, in this case a building, in the real world. Coordinating principles, then, are required for perception of the structure of the physical world.

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1 Reichenbach himself states this (pg. 34). However, it is not clear in what sense he believes it. He appears to agree with Hilbert that any set of objects which fits the mathematical axioms is permissible, and it is possible for there to be more than one permissible set of objects. Perhaps what Reichenbach has in mind when he says this is something closer to the opposite of what I mean when I say that physical objects must be experienced before they are "known". Perhaps he simply means that all the properties of a mathematical object are determined and can be known through equations.

Given this conclusion, Reichenbach attempts to answer two questions: What is the epistemological status of a principle such as 'space is flat', and what criterion can be given for saying that such a principle is true? Reichenbach develops his picture of the status of coordinating principles in light of Kant's conception of the *a priori*. He interprets Kant's notion of *a priori* as having two meanings: one, "necessarily true" and two, "constituting the concept of object" (48). According to Reichenbach, his own idea of cognition as coordination supports the latter of these definitions. The coordinations do determine the elements of reality (49). Elements of reality are Reichenbach's equivalent to objects.

Reichenbach compares the coordinations made in cognition to examples of coordinations made in mathematics: A given set of points on a line are each coordinated to a specific fraction. Or each point of a given set of points is coordinated to a corresponding point in another given set of points. However, the coordinations made in cognition differ from these mathematical examples in that one set of things being coordinated is not already defined. In the examples, both sets of points or the set points and the set of fractions are given. In the flat versus round world example on the other hand, the set of buildings is not given. The number of buildings in the set is not previously determined. A given number of perceptions  $X$  can be coordinated to either one building or to  $X$  buildings without any change in the perceptions.

Thus, there is something unique about the coordinating principles. Which principle must be used is not determined by the sense data. Several coordinations which contradict each other can be made using the same data. The data itself says nothing about which is the correct coordination. Thus, some set of principles is required for perception. Yet no one particular principle itself appears to be necessary.

Returning again to the building example, suppose I use the coordinating principle 'space is round'. I continue my circles of this round world and in my sequence of perceptions of the building, the wood of one of the window frames becomes progressively more rotted each time I see it. After a long series of such perceptions, I see the building again, but this time the wood is dry and not rotted. Until this time, I have assumed a further coordinating principle: Natural causal processes do not spontaneously reverse themselves. The rotting of the wood cannot be undone without an outside cause affecting this change.

Assuming that no outside cause is acting on the building, my new perception causes a contradiction between my coordinating principles. It forces me to give up one of them. However, it does not

determine which I must give up. I can give up either 'space is round' or 'natural causal processes are not undone spontaneously'. Renouncing either one will eliminate the contradiction between my perceptions and my principles. Reichenbach captures this when he says, "It seems probable, although by no means certain, that an individual principle can always be carried through" (59).

Which principles we choose to keep and which we choose to give up is at least partially a matter of convenience. For example, it would be possible to develop a logically consistent physics in which a spring was a rigid body and a ruler fluctuated in length. However, the equations would be far more complex than when we take the ruler to be rigid. This idea that which principles we keep and which we give up is a matter of convenience leads to the conclusion that there is something arbitrary in our choice of coordinating principles. There is a sense in which principles can never be validated or invalidated by perception.

While Reichenbach believes this is probably true of individual principles, he denies that this is true of complete systems of coordinating principles. This is the basis on which he denies the necessity of any system of principles. A system of coordinating principles can be invalidated empirically. Thus, Reichenbach rejects Kant's claim that a set of synthetic *a priori* judgments, which is equivalent to a possible set of coordinating principles, is necessary. Reichenbach instead assigns a certain priority over experience to the coordinating principles but makes them in another sense subject to experience.

The coordinating principles are prior to experience in that some set of principles is necessary for any unified experience at all. This is Reichenbach's primary point of agreement with Kant: Sensation is a bombardment of unordered sense data. Perception alone has nothing in it that uniquely determines objects. A cohesive experience is dependent on the existence of ordering principles. However, Reichenbach gives 'uniqueness' as the only criterion for the validity of any set of coordinating principles, and 'uniqueness' is determined by perceptions (43). 'Uniqueness' of a cognitive coordination is defined as different sets of empirical data resulting in the same value for a given physical variable (Reichenbach 45). No inerrant reasoning or experiment will result in a conflicting value.

Thus, Reichenbach disagrees with Kant that the necessity of the coordinating principles can be a result of their being presupposed. That which presupposes can disprove that which is presupposed. All knowledge, according to Reichenbach, is arrived at through the method of "logical analysis" (75). This method involves an analysis of actual empirical data. Thus, it is similar to induction rather than

deduction. When a 'unique' coordination is found, the principles which led to it can be considered knowledge. Kant's deductive method cannot suffice because all knowledge is derived from empirical data. Coordinating principles are required for any perception of the physical world, "[b]ut it is impossible to deduce these principles from an immanent schema. We can detect them only gradually by means of logical analysis and must abandon the question of how long their specific forms will remain valid" (Reichenbach 77-78). As the history of science shows, new discoveries can always lead to the rejection of principles once believed to always lead to 'unique' coordinations.

This discussion lends itself to the conclusion that Reichenbach discounts the importance of human reason whereas Kant places a high value on it. However, I want to note here that while Reichenbach does hold that all knowledge is arrived at empirically, he believes reason makes a crucial contribution to knowledge. The existence of arbitrary elements in our system of coordinating principles is the evidence of this contribution (Reichenbach 89). For Reichenbach, reason still plays a critical role in knowledge.

From this discussion of Reichenbach's conception of knowledge, I now suggest an answer to the question of whether or not Reichenbach believes there are necessary truths. I believe that the question of whether there are any necessary truths in Kant's sense – truths which could not be otherwise – has no proper answer for Reichenbach. What is necessary in Reichenbach's sense is what is required by experience. It is possible that someday we may discover coordinating principles which will never be contradicted. However, we have no guarantee that what is required by experience will be the same forever. All of our knowledge is always potentially subject to refutation by experience. As Reichenbach says, "One must become accustomed to the fact that epistemological statements are significant even if they are not eternally true predictions" (87).

In summary, Reichenbach considers the coordinating principles to be prior to experience. They are required for any unified perception at all. However, this does not mean that they are not subject to refutation by experience. All knowledge is arrived at by logical analysis of empirical data. The currently accepted system of coordinating principles represents the principles which lead to 'unique' coordinations at this time. The arbitrary elements in the system are the product of reason. Therefore, for Reichenbach, both reason and empirical experience are necessary for knowledge, at least for now.

I now turn to a brief examination of Reichenbach's characterization of Kant. I hope to call into question some of the

vulnerabilities Reichenbach claims exist in Kant's theory. It is possible that they are not as central to Kant's view as Reichenbach supposes.

### III. Reichenbach on Kant

I have already mentioned some of Reichenbach's interpretation of Kant's conception of the synthetic *a priori*. I will here sketch it in a more connected fashion. Reichenbach claims that Kant has two meanings for his notion *a priori*: one, "necessarily true" and two, "constituting the concept of object" (48). Reichenbach further claims that these two meanings together entail the following: "...there are no implicitly contradictory systems of coordinating principles for the knowledge of reality" (60). This means that any arbitrarily chosen system of coordinating principles, as long as it is explicitly consistent, can yield a coordination which satisfies Reichenbach's criterion of 'uniqueness'. In other words, any system of principles which do not conflict with each other meets the truth criterion.

As noted earlier, the first mistake I believe Reichenbach makes is the obvious one. By *a priori*, Kant means neither "necessarily true" nor "constituting the concept of object". He means arising and having a justification independent of all sense experience. However, this point is only a minor problem for Reichenbach's argument because of what is true. Kant does believe that judgments are *a priori* if and only if they are necessary, and Kant claims that a function of *a priori* truths is to constitute the concept of objects. Reichenbach's two characterizations do apply to Kant's conception of synthetic *a priori* judgments. Therefore, I proceed with a further analysis of Reichenbach's characterization of Kant.

Reichenbach's analysis of Kant's position hinges on what he believes is Kant's definition of necessary. Reichenbach thinks that, for Kant, to be necessary is to be "true for all times" (60). Again, I think Reichenbach has misinterpreted Kant's concept. Reichenbach's definition oversimplifies Kant's views about necessity. Kant makes a distinction between what he calls logical necessity and the type of necessity he associates with synthetic *a priori* judgments (B286 Note). Synthetic *a priori* judgments are not logically necessary. They have a weaker epistemological status than that of logically necessary truths. Their necessity derives not from any objective logical proofs but from the nature of human reason. For purposes of clarity, Buroker refers to the necessity associated with *a priori* judgments as "epistemic necessity" (63). I find this term fitting and will adopt it for purposes of this paper.

According to Kant, only truths which are axioms of logic or are directly derivable from the axioms of logic have logical necessity. Thus, logical necessity can apply only to analytic judgments never to synthetic ones. I believe that both Kant and Reichenbach would agree that such truths exist. Neither would deny, for example, that 'it is not the case that P and not P'. However, neither synthetic *a priori* judgments nor the coordinating principles are truths of this type. Thus, this is not what Kant has in mind when he says that synthetic *a priori* judgments, such as truths of geometry, are necessary.

"Epistemic necessity" on the other hand is a weaker type of necessity. It is a necessity only with regards to human knowledge. I believe Kant takes a judgment's having "epistemic necessity" to mean something along the lines of 'we cannot know it to be otherwise' or 'it is a fact about the way human knowledge or experience must be' (Buroker 63). He allows the possibility that such judgments may in fact be false about the world itself. However, Kant believes that it is impossible that we can know the judgments to be false. They are judgments about the way our experience must be. Therefore, for Kant, we are justified in holding such judgments to be true and deducing other truths from them.

This is why Kant, through transcendental idealism, makes truth relative to a point of view (Burge 2/1). He realized that we cannot cognize or perceive, at least in any unified way, anything in itself. We ourselves must impose some sort of structure on the sensations we receive. It is this insight that Reichenbach too holds to be true. However, Kant also held that because perceptions presuppose the structure, the structure cannot be disproved by perceptions (B5). Hence, the judgments are judgments of how experience *must* be. It cannot be otherwise. Kant saw no way of rejecting the structure without a change in the nature of human reason. Therefore, he assigned to the judgments which structure perceptions and arise from reason alone – the representations space and time – the status of both *a priori*-ty and "epistemic necessity" (B55-B58).

Kant further believed that our justification for holding such judgments also comes from the nature of reason alone. Thus, such judgments are not necessarily true for creatures whose reason is different than ours nor are they necessarily true of the world itself. Kant left open the possibility that the world itself is other than our perceptions of it (B56-B57 & Burge 2/1). From the point of view of transcendental idealism, synthetic *a priori* judgments are necessary truths. Kant does not answer the question of whether or not they are true from the point of view of empiricism.

Thus, for Kant, to claim that synthetic *a priori* judgments are necessary is not to claim that they are true for all times or for every

possible perceiver. The claim is much weaker. In fact, the claim is not even so much about the content of the judgments themselves but about human knowledge and experience. Synthetic *a priori* judgments are judgments about the way human experience must be. Kant believes that we, by means of our human cognitive faculties of reason and perception, cannot know or prove such judgments to be otherwise.

Again, this misinterpretation on the part of Reichenbach does not seriously call into question his argument. I still believe Reichenbach is correct in claiming that the theory of relativity is not compatible with Kant's view. The theory clearly proves that some of the truths Kant took to have "epistemic necessity" can be disproved empirically. However, I think Reichenbach's interpretation of Kant makes it unclear what specific points of Kant's view he rejects. What Reichenbach specifically rejects is Kant's idea that because a judgment or principle is presupposed by human perception it can therefore not be disproved empirically. This is not quite the same as Reichenbach saying that he rejects the claim that the coordinating principles are necessary, if he takes necessary to mean "true for all times". Kant never claims that synthetic *a priori* principles are true for all times in any absolute sense.

I believe Reichenbach himself would not consider any knowledge to be necessary in the sense of having "epistemic necessity". Reichenbach believes that the body of knowledge at any given time has the status of the "best possible approximation" that can be known at that time (87). He believes that there is a possibility of any knowledge being disproved empirically at some point in the future. No principles can be shown to describe the way human experience *must* be. No principles are "epistemically necessary".

However, like Kant, Reichenbach assigns a special status to the coordinating principles which are the default principles generated by human reason. Reichenbach refers to such principles – i.e. 'space has three dimensions' – as "self-evident". These are the same principles which Kant calls "epistemically necessary".<sup>2</sup> Yet unlike Kant's necessity, Reichenbach does not consider "self-evidence" a sufficient condition for believing a judgment to be true. The special statuses Kant and Reichenbach assign to the default principles are not the same. A comparison of "epistemic necessity" and "self-evidence" will shed light on why Reichenbach rejects the epistemic status Kant ascribes to synthetic *a priori* judgments.

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2 I am here using Buroker's term. Kant himself never uses this term. He refers generically to synthetic *a priori* principles as "necessary".

Therefore, Reichenbach's term "self-evident" requires some attention here. It is not clear exactly what he means by this. It may be something as obvious as things which are "self-evident" are those which we assume without any conscious thought. For example, when I open my eyes I see three dimensions. I do not ask myself how many dimensions space has or have any thought of the form 'space has three dimensions'. What I see is simply organized into three dimensions without any conscious activity on my part. If this is true, one possible reason for Reichenbach's rejection of "self-evidence" as a sufficient condition for truth is illusory perceptions. Humans are certainly subject to hallucinations and the like.

Another possibility for what Reichenbach means by "self-evident" is that which cannot be imagined to be different. What I assert by 'cannot be imagined to be different' is the same as what Kant asserts about space when he says that space is a "necessary representation" (B38). It is true that I cannot bring to mind a mental picture of what the nonexistence of space would look like. However, this also is a problematic notion. For example, it is just as impossible for me to represent to myself what a world would be like in which time moved slower. Yet, physics has proven that time slows down as one nears a super-massive object. Reichenbach sees no basis on which Kant can claim that principles generated by reason alone can constitute judgments which humans cannot know to be otherwise. Therefore, Reichenbach would claim that there are no "epistemically necessary" principles.

In summary, Reichenbach's interpretation of Kant is somewhat oversimplified. He does not accurately characterize several of Kant's key notions, namely '*a priori*' and 'necessary'. Yet, this does not undermine Reichenbach's argument that Kant's view is contradicted by the theory of relativity. It is undeniable that many of the judgments Kant holds to be true and necessary are refuted by the theory. What Reichenbach's oversimplification does, however, is cut Kant's view short. I want to suggest that it is possible that Kant's account of the relationship between human reason and necessary truth is not as straightforwardly open to objection as Reichenbach claims. Perhaps there is a set – albeit much smaller than that which Kant claimed – of principles which actually are "epistemically necessary". However, this still leaves open the question of how Kant himself would modify his theory to account for the theory of relativity. As it stands, Kant's view is not a suitable alternative to Reichenbach's.

#### IV. Conclusions

The fundamental point of agreement between Reichenbach and Kant is the belief that reason contributes to the human perceptual experience in some basic way. Unified perception would not be possible without some set of ordering principles which must have reason or some faculty of the human mind as their source. It is when they attempt to assert the epistemological status of such principles that Reichenbach and Kant disagree.

Kant believes the principles to be synthetic *a priori*. They are necessary truths from the transcendental point of view and cannot be contradicted or disproved by anything empirical. Reichenbach believes the principles to be the current, best approximations of knowledge. They are prior to experience in that they are required for the possibility of unified experience. However, they are not necessary in the sense that they could not be otherwise or that they describe the way experience must be. All knowledge is a best approximation derived from empirical data. Reichenbach reduces necessity, as it applies to the coordinating principles, to a sort of functional requirement of empirical experience.

Thus, the essential difference between Kant and Reichenbach is their views of the nature of knowledge. They have different answers to the questions of whether or not there is knowledge to be acquired independent of empirical experience and of whether or not there is any necessary truth. The theory of relativity certainly shows that Kant held too many *a priori* judgments to be necessary truths, but the question of how many of these are central to his view that reason can generate knowledge independent of empirical experience remains unanswered. While Reichenbach's view that there is no knowledge independent of empirical experience has not been refuted, I question Reichenbach's claim that scientific discoveries like relativity preclude the existence of any knowledge independent of experience. It might be possible to accept both the theory of relativity and the existence of some *a priori* knowledge.

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