

# **A History of Philosophy**

## **52 Kant's Epistemology**

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Ready to get back to Immanuel Kant. Last time was purely introductory, trying to get a handle on his project and then on some terminology. And what we were doing then really covered about the first ten pages of the selection we have in Kaufman from the Critique of Pure Reason.

I hope that in your reading, you've discovered the similarity. Not much point in my trying to say that unless it helps introduce you to that material. Today, we want to look at his epistemology, his theory of knowledge, which will cover the two sections of the critique that he labels the transcendental aesthetic and then the transcendental analytic.

The aesthetic has to do with sense perception, and the analytic has to do with understanding. It's because of concepts that we have in our understanding that we're able to make judgments. It's because of the a priori structures of perception that we're able to have clear perceptual ideas, sense perceptions, and clear and distinct ideas of that sort.

So keep that distinction clear. You notice that in the transcendental analytic dealing with understanding, we're dealing with the faculty of thinking. As distinct from the faculty of sensing.

And that, I would think, is sufficient in itself to distinguish the two. His point is that we don't start thinking in generalized or abstract terms about the natural world or the self, or even start thinking about God, without having at least some input from the faculty of sensing, which precedes understanding. So that you find that Kant says that concepts without percepts are empty and percepts without concepts are blind.

You see, if a concept is an abstract general idea, and we've heard about abstract general ideas from Locke, Berkeley, and Hill, concepts like cause and effect, like substance. But those concepts, those abstract general concepts, are empty, have no content, apart from percepts. That is to say, particular sense perceptions.

But on the other hand, percepts without concepts are blind. You see, they have no meaning. They don't know where they're going.

They don't contribute to anything. So we have to not only distinguish the faculty of sensing from the faculty of thinking, not only distinguish sense representations from abstract ideas, but we have to recognize that the sense representations are a prerequisite for developing abstract ideas. They're connected.

Now, having said that, you can perhaps get a handle on this terminology that I've put over here, which he spells out in a particularly dense section. You'll see it if you haven't discovered it already. Where the term Anshan, I suppose, literally means insight, it is the term that's usually translated as intuition, where intuition is awareness.

Whatever it is we're directly aware of is known by intuition. And of course, in the tradition since Locke, what we're directly aware of is our own ideas. So our intuitions are of ideas or sense perceptions.

You see. Anshan, intuition. You'll find that term used throughout the critique.

Keep its awareness in mind. It refers to the mental act of being aware, conscious of. The mental act.

As distinct from the mental content, which is what John Locke called an idea. A representation of something external. And the act and the content are to be distinguished from the faculty, the capacity that we have to sense.

Similar kite. The faculty. Sensibility is the way it's translated, which isn't a very good English term considering how we use the word sensible.

It's not a very sensible term in that sense of sensible. But I think if you recognize that these three terms have to do with the aesthetic, the transcendental aesthetic perception. Remember that the term aesthetic in German, in fact in most European use, refers simply to sense experience, not just to the aesthetic in our narrow sense of it, the artistic or the beautiful.

But in the literal sense of the Greek verb, which the Greeks present realize means to perceive. The barbarians picked that up along the way. So the transcendental aesthetic, then.

Nothing to do with the arts at this stage. Okay, so that is distinct from the transcendental analytic. Verstand is the term for understanding.

Reference to the faculty. Thinking. And begriff, the concept, the abstract idea.

Okay, so keep that terminology in mind. Now, perhaps that will come clearer as you look at the next piece on the board. We're familiar with this rubric.

Ever since Descartes. The mind is immediately aware of its own ideas, which are simply subjective representations of external realities, or purport to be such. And this framework is the one, of course, which Descartes, Locke, and Berkeley all begin with.

And Hume, in a sense. But Kant as well. You see, Kant is assuming this rubric, which was part of that rationalist tradition in which he was raised.

You remember the Wolf Baumgartner people, who were post-Leibniz rationalists in Germany. He was raised in that tradition. But also part of the tradition of Hume, who awakened him from those dogmatic slumbers.

So the very project he has is a project that arises within that tradition. The problem he's trying to handle is a problem that's posed by that rubric, if you like. That is to say, how do we get the idea of cause and effect? Hume, the empiricist, says it is an a priori.

We don't get any idea of causal connection, causal necessity from experience. What we get is the idea of constant conjunction. Then psychologically, we come to think of it as necessary.

So he's starting with this. All right, now translate that into what Kant is doing. And if what we're talking about is ideas in the sense of sense perceptions, then our perceptions of things, according to Kant, are the confluence of two things.

The raw input, raw, unprocessed sensory stimuli, on the one hand, and the form that the mind gives, that the faculty gives to this. That is to say, John Locke's claim that in sense perception the mind is a blank tablet, *tabula rasa*, is false. It's not that we have innate ideas, like Plato said, or self-evident concepts like Descartes thought.

But it's rather that the mind is sort of pre-formed to handle things sensorily. If you want an analogy other than a *tabula rasa* or a blank cake of wax on which things leave impressions, think of a violin case that's really made to fit the violin. Or think of an ice cube tray, better still, into which the raw, unprocessed sensory input flows and comes out shaped, formed, so that you can get a mental handle on it.

So the perceptual experience we actually have, what we actually experience, is formed, structured sense experience that somehow or other has come together in a unified fashion. Now, notice how far-reaching that is. Our sense perceptions are itty-bitty things.

According to Hume. That is to say, we receive simple impressions. Beep.

Beep. Beep. No connections between them, no relationships given.

They're completely atomistic. How, then, do we perceive those three beeps as one when they're sped up? Beep. Now, how do we get from A to Z? We do.

And, of course, the physiology of perception seems to be in terms of stimuli, atomistic stimuli to the sense organs. So in terms of the atomistic nature of sense impressions, there is no coherence, unity, structure, or order. And then, of course, we have five different senses.

With no given relationship in the Hume tradition. No given relationship between the eyes and the ears, the nose and the taste. And yet somehow or other, warm, delicious food, all five senses are involved at once.

The color. The smell. The texture that you feel as you taste it.

The sound of it sizzling as it comes to you. You see, it's all one. Are you ready for it? What we have is unified sense experience.

You see, that's why Aristotle talked of an additional sense, the *sensus communis*, the sense that is in common to all five senses. Well, somehow or other, Kant is trying to explain the same sort of thing. The cohesion, the unification, the interrelatedness of all the atomic bits in one more holistic sense experience, sense perception.

So then, if the empirical input comes to us atomistic, bombardment, one booming, buzzing confusion bombarding every sense, somehow or other, this gets sorted and ordered. So our faculties must provide some sort of structure, a filter lens, whatever metaphor you want. Well, and the same is true when you come to understanding, because the perceptions that we have provide perceptual experience.

But how do we get from individual perceptual experiences to general abstract ideas? To the sorts of concepts that the understanding works with. Well, he maintains that once again the mind is so equipped, so functions, remember that Hume had talked of the mind's proclivities. The Scottish realists, the mind's proclivities.

Kant is thinking that way, too. He talks of faculties. But the mind has the capacity to provide structural principles that enable us to conceptualize what is going on in the world of perceptual experience.

And what the understanding does then is to formulate judgments about perceptual experience. Different kinds of judgments, different categories of judgments. So you formulate causal judgments.

Yeah. You make quantitative judgments. That is to say, is everything like this or just some things? But you make different kinds of judgments because you've learned to conceptualize, to categorize.

And the categories are not empirically derived; they're what the mind provides. There's nothing in experience to provide you with categories. And again, if the notion of categories seems new, it ain't.

Remember, Aristotle had his categories. Substance, quality, etc. Ten categories of thought.

Ten categories of being. Corresponding to each other. Categories are simply ways in which we think.

So that the mind is not just a random thinker, but it's a channeled thinker. We think along certain given channels. This is the way we're made.

It's not only the Newtonian world of physics that is ordered. It's the mental world that is ordered. In fact, the order is transferred by Kant to the mental world because it turns out that these categories are really Newton's categories.

Newton's concepts. So the structure of the Newtonian universe is a structure we have given to it. Whether that's the way it is there in itself, we don't know.

We've structured the world that way. We talk of it in terms of space, time, cause and effect, matter, and substance. There are categories.

So he's working with this Cartesian framework, but instead of the mind being passive in the whole business as it was for Locke, the mind is the active contributor. It's the mind that structures experience and thought. It's the mind that creates its own meaningful world.

Whether the world as it is in itself is meaningful, we don't know. But by the time we experience it and think about it, it's at least meaningful to us. That's why science is possible.

What science is talking about is the world as we experience it. The phenomenal world. Not necessarily the world as it is in itself, the noumenal world.

OK, now that's intended to tie in this new step today to what we were talking about last Friday. Does that do it? OK. Questions? Comments? Before we look at anything more particular.

Ryan? The categories that we have in our minds that have given us this Newtonian outlook through which we've processed the sense data and categorized it in this way, we can't say that these are universal or that we're born with them? Yeah. There's a way to get involved, whether they are biological or cultural. Well, you see, it is these

forms and categories that he says are a priori. And a priori, for him, means that they're universal.

They're not just cultural. They're universal, and they are necessary. That is to say, we cannot think otherwise.

There's a logical necessity to it. So that simply explains why it is that everybody sees things alive. Yeah.

Differences of individual experience don't change the fact that we all have spatial experience. We all think in causal categories. That's always there.

You can't avoid it. Why couldn't Hume avoid it? Here you are. You can't avoid it.

OK. David? Aristotle said that it was because of the nature of that order of being that we get categories, because they're actually in nature. Yeah, that's a good point to make.

That, whereas the categories for Kant are simply categories of thought, for Aristotle, they are categories of reality as well as categories of thought. So for Aristotle, you've got a corner on reality, which is why Aristotelian philosophy, through the Middle Ages, didn't really have any epistemological problems. You see, if you've got categories of thought that coincide with the structures of reality, then what is rational is real.

What is real is rational. You've got a corner on it. Kant doesn't deny that our categories are the categories of reality.

He says we've no way of knowing. How do you know if the tree that falls in the forest when there's nobody around here... It's the same sort of thing as with Berkeley. How would you know? Esther? Right.

So that means that... It's the same. Okay, then... Yeah. Yeah.

So how would Kant respond? Well, I think he'd be surprised that there were non-Euclidean geometries. I think that would be his first response because non-Euclidean geometry is a product of what? Late 19th century? I think I'm right in that. Lobachevskian, Riemannian geometry, which differs from Euclidean in that the fifth postulate is different.

Euclid's fifth postulate, you remember the parallel straight lines never meet? Well, in non-Euclidean geometries, they either converge or diverge. And as a result, you get all sorts of queer by Euclidean standards results that are far more useful than Euclidean geometry when it comes to vast reaches of outer space. So non-Euclidean

geometry does have its use when you're dealing with what's called the curvature of space.

Yeah. Well, obviously, Descartes' philosophical method was the method of Euclidean geometry. Newtonian physics made use of Euclidean geometry.

The science of optics, which was the moving force in the development of physics on the continent of Europe. Remember, Descartes did work in optics. Spun ground lenses to earn a living while he applied the methods of geometry to philosophy.

Well, what can one can't say apart from being surprised? I think he would probably respond in one of two ways. One, he would say, oh, those differences are minor.

Might require some fine-tuning of my categories, but that's about all. Non-Euclidean geometry doesn't deny such things as substance, cause, and effect. So.

Secondly, Kant might say, all right, then. Apparently, I have to revise my claim that the two forms of sense perception are space and time. You see, geometry deals with space.

It's the science of space. And if you've got a different conception of space in non-Euclidean geometry than you do in Euclidean, then his claim that there is a universal category, universal concept, rather, of space has got to be changed. So I think most people who follow the Kantian line tend to think less about a priori forms of sensibility, space, and time, and to emphasize simply a priori categories of understanding.

Get it? You see, so that the forms of space and time are perhaps learned. Subsequent neo-Kantian thought, because there was a neo-Kantian movement through the 19th century, revived in the late 19th century, influential into the early 20th century, existentialism grew out of it. Later neo-Kantians see these categories as learned, culturally acquired, transmitted, learned in the course of experience, and changing with the course of experience.

Max Weber, for instance, on the cultural side. Well, in that case, what you get is a relativizing of the structures of thought. You see? And that obviously makes it a lot harder to maintain that there is any objective truth in science.

Because if the categories are culturally influenced, you have an even greater problem about identifying any objective points of reference coinciding with them. Yeah. And so in that way it's the neo-Kantian movement relativizing a priori grids that led to cultural relativism, to the relativizing of the notion of truth, not just of knowledge.

You see? And to various kinds of subjectivism in the 20th century, of which existentialism was one. So, keep that in mind. Which reminds me, I said last time I was going to start today by commenting on the influence of Kant, and I guess I forgot about that.

All right, let me just briefly indicate, and we'll pick up on the threads later on. Kant's emphasis on human subjectivity and its creative resources that we bring to experience gives a new meaning to the term imagination. Watch Kant's use of it.

We'll get into it, if not today, next time. Imagination. It provided the point of departure for Coleridge, the early Romanticists, speaking of imaginative expression, self-expression in the arts.

Romanticism is a result of Kantian influence, with its emphasis on the creativity of our inner self, the creative resources of the inner self. And if in some kinds of psychology applied to the arts you hear the notion of certain universal symbols, universal symbolism, certain kinds of depth psychology, that's the influence of Kant. You'll see.

Depth psychology generally, Freudian, Jungian. Indirectly, the influence of Kant. Certain subjective influences shape our behaviors and our thoughts.

You'll see. German nationalism. Evil.

Now, get over the individualism of the 18th century into a more corporate sense of identity in the 19th century, and the inner spirit of that corporate identity has all of the Kantian creative power bursting out all over. In the 19th century, nationalism was indirectly influenced by Kant. Expression of romanticism at the national level.

A romanticized view of nature. Manifest destiny and things of that sort. 19th-century romanticism.

German idealism. Hegel and the like. Ultimately, the real nature of the mind is creative thoughts.

Really get that idea? Kant. Existentialism. Yes, we live in a world of bare, meaningless fact and we have to create our own meanings and our own value, our own selves, in fact, according to Sartre.

You know, you can't read Sartre without hearing faint echoes of Kant that would make him turn over in his grave. So forth. Or go on to the postmodern movement in our day.

You see, the emphasis on subjectivity is coming up all over the place, so that you have no objective knowledge at all. The hermeneutical movement. The political correctness movement.

You see, all of that is saying subjective influences, subjective influences. That began with Kant. Poor Kant, he never meant half of that.

But the evil that men do lives after them. The good is often torn with their bones. And I think that applies to Kant as well.

Shakespeare spoke early but truly about Kant. David? Well, it depends on what you mean by objective. The word objective, like the word subjective, has at least two different meanings.

It may mean, as it does in Berkeley, that the subjective is what is in your mind. That's the way it is in Kant. It's in your mind.

An objective is what is independent of any mind, of any knower, of any consciousness. Now, for Kant, these are subjective; they're not objective characteristics. But I call that metaphysical subjectivity, metaphysical objectivity.

But the other sense of subjectivity and objectivity is more attitudinal. What sort of approach do you take? What is your stance as you look at something? An objective stance is one that is detached. Spectator.

Observer. I'm being quite objective when I grade your examinations. At least I'm trying to be.

Say all the nasty things you like about Kant and about me, and I try to stand back and be objective. On the other hand, a subjective stance is one that's involved. Passionate.

I care. Now, that is the Kierkegaardian sense of subjectivity. When Kierkegaard talks of a subjective path, he's talking of passion, being concerned.

You come to Christianity, you come to Christ by a subjective path, says Kierkegaard. He doesn't mean it's all subjective and relative. No, he means you can't come without the passion of faith, of love, of hope.

Are you not coming otherwise? So, distinguish those two senses, the attitudinal and the metaphysical. Esther? Yes. Well, that's precisely what Kant is saying.

They're not in the external world. We have no way of knowing. Yes.

Well, they are subjective in the sense that they are structures built into our perceiving and thinking. They're already there in that sense. You don't have to develop a concept.

They're already functional. They're not innate in the sense of having an innate idea that you already know and think about independently of experience. No.

You don't have clear and distinct innate ideas recollected under the force of Plato's dialectic. No. You don't have clear and distinct ideas that become self-evident upon reflection.

No. You only become aware of these in operation. Yes, sir? So, you don't get to them simply introspectively with the help of dialectic.

You get to them by what? The transcendental method. The transcendental method. Remember last time? What is the transcendental method? Well, it's the method of getting at the transcendental ego.

The transcendental self. What does he mean by transcendental? He does not mean transcendent, remember. He does not mean transcendent.

Though once in a while he gets the two words mixed up, at least the translations do. He means transcendental. That is to say, the creative, subjective contribution to experience.

So how do we get at that? Well, the transcendental method, you see, is an attempt to bracket all of the empirical particulars and to ask what's left. Did you get that? I'm not sure from your faces. Let me get the passage, and you can underscore it because it's tremendously important to see that method becomes very influential.

What you want is page 372, first of all. The top of the first column. Even with our experiences, different kinds of knowledge are mixed up, which must have their origin a priori.

For even if we remove from experience everything that belongs to the senses, that's the particulars, there remain nevertheless certain original concepts and certain judgments derived from them, which must have had their origin entirely a priori, independent of all experience. Now hold that in your mind, and maybe with your finger, and look at 375. I call a second column in the new paragraph, 375, I call all knowledge transcendental, which is occupied not so much with objects as with our a priori concepts of objects.

Okay? So it's not going to be a method that talks about the external world, but about this a priori grid that lends these subjective structures. A system of such concepts could be called transcendental philosophy. That would be a huge undertaking.

And then on 376, you notice that Division 2 is entitled Transcendental Philosophy. And he says it's an idea for a critique of pure reason that would trace, according to fixed principles, a plan that guarantees the completeness and certainty of all parts of which the building consists. Trying to get at that a priori structure, as it were, the plan for the building of knowledge, the blueprint that's subjective.

You see? And accordingly, when you get to elements of transcendentalism, transcendental aesthetic is an attempt to apply it. Now, after the initial definitions that I was talking about there on 377, 377, at the very bottom of the first column, you find this. In a phenomenon, something that appears to you, something you experience, I call that which corresponds to its sensation, the sense stimuli, its matter.

But that which causes the manifold matter of the phenomenon to be perceived as arranged in a certain order, I call form. So form and matter. Where did he get those terms? Well, you might say he may have got it from aesthetics in the other sense, where you sometimes talk about a painting in terms of its matter and its form.

But no, I think it's really Aristotelian. You see? Where Aristotle talked of particulars as having form and matter, physical particulars. Kant is talking not of physical particulars as having form and matter, but particular phenomena, particular experiences as having form and matter.

So the empirical input, that's the matter of it, the subject matter of it, and here's the form. You see? The form and the matter. So now what he wants to do is to lay aside, to bracket, to put out of consideration, the matter, the content of the experience.

Never mind if it's apple pie, plum pie, raisin pie, or just plain dry bread. Leave that alone. What is it that is the structure of the experience of such things? You see? Never mind particular colors, particular shapes, particular smells, etc.

What's the structure? The structure of the experience. And whatever the kind of perceptual experience is, he's after that structure. Now look at the bottom of 377, that second column, or rather halfway down the column, second column.

If we deduct from the representation, from the Forstellung, and you deduct from the representation, the Forstellung, what belongs to the thinking of the understanding, substances, forces, divisibility, there still remains something of an empirical intuition, an empirical intuition, the ancient, namely extension. Form. These belong to pure intuition, a priori, regardless of what particular form there is.

How large? How small? What shape? What they all have is spatial extension. Two-dimensional, three-dimensional, spatial extension. And so there is a pure, not a mixed, but a pure intuition, a priori, without a real object of sense or sensation.

A pure intuition that exists in the mind as a form of sensibility. Now the science of all such principles he calls transcendental aesthetic. And so, at the top of 378 in the transcendental aesthetic, we must first isolate sensibility by separating it from the understanding, and then we must separate all that belongs to sensation so that nothing remains but the pure intuition, the pure form of the phenomena.

The only thing which sensibility a priori can supply. And it appears that there are two pure forms of sensuous intuition, space and time. Now, remember, space and time for Newton were objective realities.

For Kant, they are subjective forms of sensibility. Forms of sense awareness. Huge change right away.

He is subjectivizing the space-time structure of things. Now, let me add a footnote that looks ahead. This is going to be very useful to him later on.

When he is dealing with freedom and determinism. In a Newtonian world of space-time causal mechanisms, how can there be such a thing as freedom? Freedom of choice, freedom of will. Easy.

If the space-time structure is something that is subjective, you can have objectively real freedom. So his distinction between phenomena and noumena, appearance and reality, makes it possible for him to have real freedom of the will, real objective moral obligation, a real God, which would be problematic were it not for the subjectivity of those forms. See where he is going? Yeah, he was raised a German Pietist.

While he didn't remain very pious, he at least seems to have retained a concern for things like moral law, freedom, moral responsibility, and a divine moral lawgiver. And he wants to make room for that in a Newtonian universe. A Newtonian universe that is locking everything into causal mechanisms of a material sort in a space-time world.

So if he can argue that the world of physical causes, the space-time nature, is simply a subjective structure we impose on experience, all the rest is possible. So the conclusion of the critique of pure reason is going to be, well, there's a lot of room to believe other things. And in his other two critiques, the Critique of Practical Reason and the Critique of Judgment, he goes on to argue for the other things.

Well, the transcendental method. Does that clarify, Esther? You look sort of dazed, but let's take it as it is. Now, what he's arguing, let's make sure we have it, is that space and time are not objective realities.

Now, I suspect that this is the sort of thing that shouldn't take you by surprise. Because if by space and time you mean Newtonian conceptions of space and time, and if you're up to date on your physics, then you don't believe that space and time are what we think of as space and time in terms of modern physics as simply relational possibilities. There's no such thing as an infinite expanse of empty space.

That's nothing. The only way we can talk meaningfully about space is when there are physical events occurring, and there are some sort of relationships that we call spatial relationships between them. Space is simply an abstraction referring to all possible such relationships.

You see? Time isn't a thing. It's not made of elastic. You see? Time isn't a thing.

It's an abstraction that refers to relationships between events. You see? Yeah, and you know perfectly well how the relationship is very funny. Time can drag, or it can wraith, as it does in philosophy courses, or it can stand still.

You see? Yeah. There's no such thing as a fixed realm of time. Well, hadn't Berkeley said that from an empirical standpoint? You see? All right, now Kant is picking up, as it were, on that and saying, well, what are space and time? They're just subjective structures that we organize experiences with.

Subjective structures. Our faculty of sensibility is so made that we experience things sequentially. Beep.

Beep. You know, and you expect it in the next one. Beep.

Because we've learned to think sequentially. You experience my former three beeps sequentially. You see? And you also know that after those three beeps, I gave you a beep.

So there it is. You see? But it's our subjective structuring of things in those relationships that he's talking about. And any Newtonian conception of time has no objective counterpart.

Space and time both. And you'll find in reading the aesthetic that it's pretty obvious what he's saying. Look on 378.

Second column. Space is not an empirical concept derived from external experience. 378.

And then number two at the bottom of the second column. Space is a necessary representation a priori, forming the very foundation of external intuitions. And a couple of sentences later, it's a condition of the possibility of phenomena.

Not a determination produced by phenomena. Space isn't something produced by the sensory input. It is rather what makes sensory input possible.

It's the precondition. The transcendental method tries to identify the preconditions that make experience possible. What are the subjective preconditions that make it possible? Let's see.

Yeah, and then on the next column, number four. Space is not a discursive or general concept of relations of things in general. It's not a generalization, an empirical generalization.

It's a pure intuition. It has no empirical content. You see? And then the conclusions that he draws.

Second column. Space does not represent any quality of objects by itself. Space is nothing but the form of all phenomena of the external senses.

It's from the human standpoint only that we can speak of space. If we drop the subjective condition, space means nothing. So on 380, he puts it this way, at the bottom of the first column.

Discussions teach the reality, the objective validity of space with regard to everything that can come to us externally as an object, but the ideality of space with regard to things considered in themselves by our reason, independent of the senses. Now what's he saying? Well, he says it again in another way. And this is clearer.

We maintain the empirical reality of space as far as every possible external experience is concerned. Yet you rarely experience things spatially. That's the empirical.

In experience, it's real to you. In the world as it is for you, experience is spatial. In the world as it is in itself, it's not.

The empirical reality. But then he goes on at the same time. It's transcendental ideality.

That is to say, space is nothing. If we leave out of consideration possible experiences and accept it as something on which things by themselves are in any way dependent. No, it's nothing.

It's simply an ideal that the transcendental mind has in order to have its experience. Now the same is true almost verbatim with regard to time. And after the discussion of time, he gets to a more general explanation.

And on 384, makes his conclusion halfway down the first column. Time and space are two sources of knowledge from which various a priori synthetic cognitions can be derived. Of this, pure mathematics gives us a splendid example.

How come? Space? Yeah, that's what geometry is about. The science of the idea space. You see, geometry is not about round balls.

It's about geometrical objects such as circles and spheres. It's not about any line or triangle I draw on the board. It's about the ideal straight line or triangle.

A straight line in mathematical definition has length but no breadth. In other words, it doesn't exist empirically. You couldn't see it.

A point has a location but no dimensions. In geometry, a point is not an empirical object. Points, lines, triangles, circles, and spheres are ideal entities, thought entities that don't exist empirically in the physical world.

So there can be a science of this transcendental form. What about time? Mathematics of time? Yeah, how about number series? Sequences, number series. Arithmetic is the science of the sequence of time.

You see. So what then are we going to say about the status of mathematics? Oh, you see, philosophy of mathematics is very much involved here. Plato had a philosophy of mathematics in which mathematical objects were real, objective entities.

The ideal of equality. Equal length. The idea of a triangle, whatever.

No objective reality to mathematical objects for Kant. They're concepts. Kant is a conceptualist.

Plato was a realist about such things. The nominalist will see them simply as dealing with relations between arbitrary ideas defined arbitrarily. The conceptualist will see mathematics as dealing with abstract ideas.

Either universal ones or created ones. Abstract ideas. The nominalists see it as dealing simply with the meanings of words.

And to this day, you have those three major traditions in the foundations of mathematics. Kant was very influential. Just last week, I received a copy of a book

from one of our graduates, Nick Detlefson, who teaches philosophy of mathematics at Notre Dame.

This is his second book. It's in the philosophy of mathematics. And he's dealing with precisely this kind of question.

That's it. Well, the transcendental aesthetic. A couple of minutes.

Questions? Then let's call it a day and come back next time to the analytics.