

CLASS at Wisdom's Goldenrod, Hector, NY
with Anthony Damiani (AD)
December 19, 1981
PHYSICS; EPISTEMOLOGY

TOPIC: Physics

SUBJECT: Epistemology

SUBSUBJECTS: Philosophy of Science, Symbolic Functioning, Gnostic and Fabricative, Reason-Principles, Providence and Necessity

CONTENTS:

Introduction and book recommendations

Philosophy of science background: discussion of key philosophers: Alfred North Whitehead, Bertrand Russell, Ernst Cassirer, Pierre Duhem; quantum physicists' philosophical writings

Richard Platek's (RP) personal journey in physics: early experience with pendulum demonstration in high school; discovery of mathematical patterns and order; disillusionment at MIT upon learning about approximations; shift from physics to mathematics

RP's position on physics

- 1) Physics deals with irrational necessity**
- 2) Techniques develop first to adapt to this necessity, then theories arise as a mythology to accompany the techniques**
- 3) Scientific theories are pragmatic tools, not true or false; they are adequate for certain scales of perception and manipulation**
- 4) No need to reduce one level of theory to a more fundamental one; each level of description is valid in its own domain**
- 5) When theories talk about unobservable things like the origin of the cosmos, they are like myths, e.g. the "corn god" of the Aztecs**

Discussion and debate about RP's view

RP maintains physics never gets beyond a "likely story"

AD asks if the gnostic and fabricative are convertible

VM argues physical theories seem to go beyond just techniques; theories unify diverse phenomena under common principles in a way that transcends particular applications

AD suggests RP's position is that of Cassirer, a symbolific activity that we cannot get beyond; but symbolific activity is itself a product of reason-principles which can be traced back

More discussion on the nature of necessity; if rational, then that reason is beyond even the Demiurge

RP, Cassirer, Langer, etc., start from the premise that knowledge is something which operates *reflectively*, and hence can only be spoken of in terms of adequacy and not truth; thinking and object are distinct

RP maintains that concepts are pragmatic tools that reveal a partial perspective, not the full intelligible essence

Theory is approximation which never gets to the object's essence as long as you operate within the symbolific activity of thinking

AD suggests that the greatest revolution yet to come is the realization that gnostic and fabricative are convertible, like matter and energy; by studying an object deeply enough, one can trace the immaterial reason-principles producing it

Not even the Sage can distinguish between Providence and Necessity in the world

VM tells the story of Heisenberg's insight into quantum mechanics, a mystical experience unifying gnostic and fabricative

Quote from Susanne Langer's *Philosophy in a New Key*; her materialism an inevitable outcome of Whitehead and Cassirer's epistemological premises

The developments in physics from Planck onwards a re-accounting of Hindu-Buddhist battle regarding the universal being in thing or in mind

It could be that necessity is *super-rational*, *super-providential*

RP says experiences such as Heisenberg's are subjective, only incidentally connected to valid scientific content

Discussion of bridge example; multiple valid descriptions at different scales; hierarchy vs. heterarchy

Schedule changes

Future course content: plan to cover physics history from Newton to Planck, focus on quantum mechanics development

BOOKS READ FROM OR REFERENCED:

- Gary Zukav, *The Dancing Wu Li Masters*
- Fritjof Capra, *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism*
- A.S. Eddington, *The Nature of the Physical World*
- Albert Einstein, Leopold Infeld, *The Evolution of Physics: The Growth of Ideas from Early Concepts to Relativity and Quanta*
- Lyall Watson, *Lifetide: The Biology of the Unconscious*
- Lewis Thomas, *The Lives of a Cell: Notes of a Biology Watcher*
- Lewis Thomas, *The Medusa and the Snail: More Notes of a Biology Watcher*
- Alfred North Whitehead, *Science and the Modern World*
- Alfred North Whitehead, *A Treatise on Universal Algebra: With Applications*
- George Boole, *An Investigation of the Laws of Thought, on Which are Founded the Mathematical Theories of Logic and Probabilities*
- Charles Howard Hinton, *The Fourth Dimension*
- Alfred North Whitehead, Bertrand Russell, *Principia Mathematica*, 3 volumes
- Alfred North Whitehead, *Process and Reality*

- Ernst Cassirer, *The Problem of Knowledge: Philosophy, Science, and History Since Hegel*
- Ernst Cassirer, *The Myth of the State*
- Ernst Cassirer, *Symbol, Myth, and Culture: Essays and Lectures of Ernst Cassirer, 1935-1945*
- Ernst Cassirer, *Determinism and Indeterminism in Modern Physics: Historical and Systematic Studies of the Principle of Causality*
- Ernst Cassirer, *The Philosophy of Symbolic Forms*, 3 volumes
- Pierre Duhem, *The Aim and Structure of Physical Theory*
- Werner Heisenberg, *The Physicist's Conception of Nature*
- Werner Heisenberg, *Physics and Beyond: Encounters and Conversations*
- Erwin Schrödinger, *Science and Humanism: Physics in Our Time*
- Erwin Schrödinger, *What is Life?: The Physical Aspects of the Living Cell*
- Victor Zuckerkandl, *Sound and Symbol*, 2 volumes
- Plato, *Timaeus*
- Susanne K. Langer, *Philosophy in a New Key: A Study in the Symbolism of Reason, Rite, and Art*

DIAGRAMS referred to (not with this transcript version) [Transcriber note: [diagram] means the speaker is referencing a diagram as he or she is speaking. If someone is drawing or writing, with audible sounds of chalk on a blackboard, I indicate this by [drawing] or [writing].]

NOTES:

- This event is among those in later 1981/early 1982 when Anthony was exploring Astrology/the Zodiacs, Cosmology, Physics, Astronomy, Soul, Nature, and The Grid: Gnostic and Fabricative.
- Richard Platek (RP) was a member of Wisdom's Goldenrod and taught there from 1970-1980, was a professor of mathematics and computer science at Cornell, president of Odyssey Research Associates Inc., Ithaca, NY, and consultant for Institute for Defense Analyses (IDA), Alexandria, Virginia.
- Victor Mansfield (VM) was a member of Wisdom's Goldenrod, professor of physics and astronomy, Colgate University. See <https://www.paulbrunton.org/victormansfield.php>.

TRANSCRIBED Verbatim by IT 2022. **Archival verbatim transcript – V11a.**

AUDIO FILES: 1981 1219a, 1981 1219b. [Note 1: "Tape" and "Side" refer to original audio cassette tapes that were later digitized into .MP3 Audio Files. Note 2: Sound quality for most of Audio File 1981 1219b is not great: every few seconds the file speeds up and one or more words are lost.]

1981 12/19 at Wisdom's Goldenrod Physics; Epistemology

[Audio File 1981 1219a Begins]

S: (It's--)

VM: Uh-- we went-- we probably won't take the whole time with that. You never know. Richard decided that what would be useful or-- we've decided together anyway, what would be useful would be sort of a brief historical review of, let's say, mathematician's attitude towards the foundations of mathematics. See because mathematics when you discuss wh-- truth value of mathematics and contrast it with physics or compare it with physics, it might illuminate both. So, I think that's the way we're going to try and go and, as far as the future goes, we're not real settled on that, we're trying to coordinate our efforts with Anthony's wishes and remain open to possibilities so it's a little vague, I'm sorry. People have asked me a lot about-- well not a lot, some people have asked about what books. And I've been real vague because I don't care for any of them too much. But Richard seems to like this *Dancing Wu Li Masters*. [Note: Gary Zukav, *The Dancing Wu Li Masters*.] Can't-- Anthony's got a copy of it in the back. I don't remember who wrote it, is it Zukav [RP writing] or something like that?

S: Yeah.

RP (faint): Yeah.

VM: It's-- I only read a hundred pages or so and I couldn't read anymore but-- (laughter)

AD (faint): But you could keep on, you could keep on reading. I've gone to almost 300. Very informative.

VM: Yeah well, see I--

RP: The book is good because--

VM (simultaneously): Might be--

RP: See but--

S (simultaneously): See that's written for a non-scientist.

VM: Yeah that's why I couldn't handle it after a while.

RP (simultaneously): It's written by a non-scientist.

S: I did the same thing, I read-- I started reading it but I couldn't-- it's--

VM (simultaneously): It got boring for me.

S: --get through it.

RP: It's about Tai Chi and physics. (bit of laughter)

VM: But there's some decent physics in there and it's written as-- as Richard reminds me, it's written at a nice level. It doesn't assume a lot of background and it doesn't pull you in too many directions at once.

The Tao of Physics, [Note: Fritjof Capra, *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism*.] I don't know if it's as good, it's got more mysticism but you'll find that less enjoyable because it's done rather superficially.

RP: Spelling is Z-a something? [writing]

VM: Z-u-h [S simultaneously: Z-u--] isn't it? Zukav?

S (simultaneously): Z-u-k-o-f-f? Or something like that.

VM: I don't know, how do you spell it Anthony, can you just read the title?

AD: *The Dancing Wu Li Masters*, Gary Zukav. [RP writing] Z-u-k-a-v.

VM: Ok. That's in paper.

RP: It's a paperback, it's three dollars.

AD (faint): Paperback, yeah.

VM: Actually, you know, the old classics by Jeans and Eddington are really super. And they're beautifully written. They're a bit out of date a lot of them because, well they wrote forty years ago. But still if you can get like-- I can't remember whether it's Jeans or Eddington, it's on *The Nature of the Physical World*, that's very nice. [Note: A.S. Eddington, *The Nature of the Physical World*.] That book, Einstein and Infeld, *The Evolution of Physics* is good, unfortunately it's out of print. [Note: Albert Einstein, Leopold Infeld, *The Evolution of Physics: The Growth of Ideas from Early Concepts to Relativity and Quanta*.]

RP (faint): I'll write it down.

VM: Do you have any other suggestions, Richard, about what (to read/you're reading)?

RP (simultaneously): Yeah. Let's see. Yeah, all-- there's-- there's a lot of ideas in biology, contemporary biology, which are extremely-- They're much different than physics but they're-- Well, let me give a-- There's-- there's a book called *Lifetide* [writing] by Lyall Watson. [Note: Lyall Watson, *Lifetide: The Biology of the Unconscious*.]

VM: That's the Watson and Crick Watson.

RP: No.

S: No.

S (simultaneously, faint): No.

VM(?) (simultaneously, faint): No?

RP: No, but he's also a biologist.

VM: James Watson, is that right (Severin)?

S: Yeah it is.

RP (simultaneously): And, he ha-- that's his most recent one, he has a whole series of books. But this is the most recent one and it's a very-- it's one that you'll see in most paperback bookstores right now. And that's covered there. Other books in biology are the-- are the-- are the ones by the physician Lewis Thomas.

VM: Yeah.

S (very faint): Yeah. He might be [one word inaudible]

VM: It's *Life of a Cell*, *Head of Medusa*. [Note: Lewis Thomas, *The Lives of a Cell: Notes of a Biology Watcher*, and *The Medusa and the Snail: More Notes of a Biology Watcher*.]

RP: [writing] I'll just write *Life of a Cell*.

VM: Those are little quickies you read before you go to bed. They're quite nice. They're about five, six, ten pages long at most.

RP: And these are editorials in *New England Journal of Medicine*. They're short, and therefore you can read them one at a time. And, he has a very fresh point of view of the biology. That's-- that's-- I was about to sail.

S (faint): You mean there's [couple words inaudible]

RP: Well let's see. Well we'll accumulate longer lists as we go on. Um-- yeah. We-- we did want to speak on, you might say, the philosophical ramifications of some of the things in science. If you want to read-- let me give you a list of some people there. In other words, if you want to read people who are actually so-called philosophers of science. It's a very-- well-- right now, philosophy of science is extremely dreary and insipid field.

VM(?) (faint): Certainly (you're right). (bit of laughter)

RP: There are like two types of people who work in it-- who do-- who write in it. One are people who just can't make it as scientists. They're like second rate, and instead they pontificate. They lay down the law to other people. They get one level above them, "Well those people are only physicists, I'm a philosopher of physicist-- physics." And, they're as bad as philosophers as they were physicists. And it's a whole dreary area, it's people-- academics holding down jobs in philosophy departments, writing only for themselves. And, there's no spark in their-- in their writing. Then you find the-- the elder state-- the elder statesmen of physics like Schrödinger and Heisenberg and Bohr. And I find them very stupid people, I don't understand-- When they step outside of their field of expertise, the level of philosophy is just [VM: It's primitive.] very childlike. That plus a sort of streak of sentimentalism that runs through there. So I'm not-- I'm not too enamored with them. But, you do find some of the older people in the philosophy of science. See, the moderns I can't point to anybody who I really--

VM: Did you ever read Feyerabend? [Note: Paul Feyerabend, Austrian philosopher of science.]

RP: I mean, yeah.

VM (simultaneously): Feyerabend.

RP: Yeah he's one of these--

S (faint): [couple words inaudible]

VM (simultaneously): He's a little sparkier though than the others.

RP: These are perfect. Let me just bring up some of the (olders/old ones) who I *am* familiar with. [drawing] One is Whitehead. [writing] Alfred North Whitehead. And, one book of his that would be directly of interest is his *Science and the Modern World*. [10½ second pause while writing] Um-- Let me say a few words about Whitehead because it comes-- it's together with the thing you talked about philosophy of mathematics. Whitehead was originally a mathematician in the nineteenth century England, *applied* mathematician. And, his first book of-- what you might call more *general* science was a book that he wrote in 1890 called *Universal Algebra*. [Note: Alfred North Whitehead, *A Treatise on Universal Algebra: With Applications*.] And, he-- he recognized in the book that mathematics was not a science of quantity, or the traditional ways one speaks of it as being science of magnitude, but that it was a science of pure form. And that what it deals with are the possible forms with which the mind can comprehend its object. And that's what he saw as the meaning of algebra. Now, unfortunately most people who know anything about algebra think of it in a high school sense as some kind of calculation.

But in the nineteenth century particularly in England, the word 'algebra' extended its meaning. For example, George Boole who did work in what we do-- what we ou-- the algebra of logic, how propositions combine to form new propositions. And he abstracted out from his combinations of sentences to form new ones what we now call Boolean algebra. And, it's an immensely practical thing, it's what's the basis of all, say, circuit design in digital and computer network, computer circuitry. And, that was one kind of-- new kind of algebra because what the variable there ranges over is not numbers but truth values, true and false. And it's the mere form that true and false can com-- forms that true and false can combine in. I didn't read Boole himself until fairly recently. He has a book called *Laws of Thought*. [Note: George Boole, *An Investigation of the Laws of Thought, on Which are Founded the Mathematical Theories of Logic and Probabilities*.] And I only knew about him from when you learned Boolean algebra but he was quite a-- a deep thinker actually. I mean it (didn't) come out of nowhere that he-- that he-- that he made this *Laws of Thought*. And it turns out he dabbled in the occult, and his wife, after he died, she became associated with various circles in England, occult circles, and she was a very close friend of a man named Hinton, Charles Hinton, who was very popular among the Theosophists, he wrote a book on the fourth dimension and so on. [Note: Charles Howard Hinton, *The Fourth Dimension*.]

But anyway, Whitehead includes in *Universal Algebra* rules where-- he-- it's not a question of that he could lay out exactly what this algebra that he had in mind is. Instead in this work which is supposed to be like a first work, it's the first time that *title* was used, *Universal Algebra*, he merely lays down examples, he gives-- he gives exam-- I'm not recommending you read the book, it's very difficult. It's really a math textbook but I'm just using it to show how his interest changed from being applied mathematician to one up level to sort of like mathematics as a *general* science, a universal science. And in the book he gives examples of what he has in mind of what algebra could do. And one of them is his Boolean algebra. The examples that he chose were very well chosen, 'cause they turn out to be the fundamental structures that are used in twentieth century mathematics. Now that wasn't apparent in the 1890's exactly what would be important and what wouldn't be important. For those of you-- I'll mention

what they are. For those of you who know there's a thing called linear algebra, which is *central* to modern-- to modern mathematics and yet it was just a mi-- very minor topic in the late nineteenth century.

His second work in that sort of vein was his collaboration with Bertrand Russell in the book called the *Principia Mathematica*. [Note: Alfred North Whitehead, Bertrand Russell, *Principia Mathematica*.] And this was a work in the philosophy of mathematics as to why mathematics is true and what's its talks about, what's its object. It's a three volume work. Took a long time to write. And, then there was a second edition that took a long time to write. And it was *very* influential in its time. Russell also wrote a lot on philosophy of science but no-- from *my* point of view nowhere near as acute as Whitehead. And, what Russell's main-- at that period, Russell's main thing was to refute Kant. And Kant's view of mathematics as a syn-- what Kant calls a synthetic a priori judgment. I don't want to get into what those terms mean but Russell really doesn't understand it either, so you don't feel badly. He completely misunderstands Kant's conception of transcendental judgment, transcendental categories. Don't worry. And, uh-- Anyway, instead of showing it to be synthetic a priori, he tries to prove that mathematics is in Kant's terms analytic. And the whole *Principia Mathematica* is an *extended* study to show that mathematics is analytic.

Well I ought to say what these words mean because-- Um-- To say that some statement is analytic would mean that the conclusion is contained in the premise--yeah, right--in a tautological-- tautological way. It is no more than a *development* of the premise. Like if I tell you all married men are bachelors. No, no. If I tell you all bachelors are unmarried men, it's true but you could find that it's true by consulting a dictionary to find out what bachelors are. There's no-- there's no bringing together of *disparate* elements and then saying, look here, we have some new-- we found out a new relationship between two things which are not equal, which are really to begin with disparate, different. What would be their-- I don't know. All Irishmen are drunkards. (RP laughs) You see, you wouldn't find-- suppose it were true, I don't know, I gotta give it to them. You wouldn't find in the dictionary under Irishmen-- (RP laughing) It would be two disparate things because Polish people are also drunkards. (bit of laughter) Now the question was-- let me bring it down to earth, the question was, is $1+1=2$? Well what nature is that? A very simple arithmetic statement. Is it already contained in $1+1$, 2 , or do you have two different things? 2 on the one hand and $1+1$ and then you've *discovered* in some way that they're equal.

And the second kind of thing is called a synthetic judgment. And Kant felt that mathematics is synthetic, that is, the statements have real content where two previously not identified or not related objects are seen to be related, you discover a new fact. And, it's a priori in the sense that it has nothing to do with experience. One can find out the truth by reflection. Within it may be elicited from having experience. You may need to see a couple apples. But after you've seen a couple apples you could turn away and do arithmetic, and you know that arithmetic has nothing to do with apples. It's not a branch of homology. (bit of laughter) Neither is it a branch of physics. Uh-- Now-- Ok, um, Kant felt that the synthetic a priori judgments are transcendental in that you're nowhere aware-- you're no way aware of making these things, you don't-- you don't do this constructive mathematics at a level of consciousness in the-- even in the wider sense. Certainly it's not a form of psychology. But it doesn't appear within your ken of awareness at all. On the other hand, you have to trap it down by realizing that it's a presupposition of your experience. That's what the transcendental method essentially means. But when you do and the mathematician gets to work, he does discover these a priori elements which are necessary, implied in all experience.

Now, what Russell tried to show was, he didn't doubt the a priori of it. That's ok. It was the synthetic nature of it. That is, how can a judgment of two disparate things being equal be made a priori. Is there any such thing as an a priori synthetic judgment before experience. And what he tried to show, and Whitehead with him in (his/this) elaborate work, was how all mathematics in a-- is in a sense tautologic-- tautological? Tautological. That how it would be possible to take any mathematical statement, and when you analyze it by the logical method of the meaning of the terms, you find out it's really comes down to the law of self-identity, $A=A$. And that, it's just a question of *unabbreviating* the terms. It's in the-- it's in the tradition of Leibniz-- of the great classical rationalist tradition of Leibniz, that the human mind is capable of deserting all truth. Leibniz is another story, I mean. It's all truth without any experience whatsoever. That is, Leibniz, the classical rationalist, just constructed the whole world without even opening their eyes. And they had a certain amount of success, a certain amount of failure.

Anyway-- I'll go more into this because it's one of the-- why didn't Russell do in *Principia* is one of the-- one of the major schools of philosophy of mathematics. He went on from there to a full career, he dropped mathematics almost entirely and went on for a full career in philosophy. He changed schools, he went from Cambridge, England to Cambridge, Mass. He didn't want to change the stationary. (laughter) He went to-- he went to Harvard and became professor-- professor of philosophy and was extremely influential, in fact, people-- you should realize that the-- the influence that Whitehead had on America in that, for a long period of time, all the people who served in government were recruited from Harvard. And Franklin Roosevelt's reign--

VM: Is that the same time Santayana was there then?

RP: No, Santayana was the early part of the century.

VM: Ok.

RP: But from Franklin Roosevelt's time onward, every Supreme Court justice for example. Justice Frankfurter being perhaps the most famous Harvard man. [Note: Felix Frankfurter, nominated by Franklin D. Roosevelt.] And they all were educated, they all took classes with Whitehead. So it's really was at the sort of *formation* of American development. Now, you know, we're-- it's just-- it's only-- since 1932 till now, I mean [one word inaudible] they all just ended in 1980, you know, the idea of that being the dominant way of running government, is these ideas to run government. So, as I say, Whitehead's-- Whitehead's influence is-- There's some essays by Justice Frankfurter about Whitehead and his influence on-- There was a time when they would meet in the Cabinet and Franklin Roosevelt and every man there was a former student of Alfred Whitehead. Every man and woman was [one/two words inaudible] Anyway, one of his works is this one called *Science and the Modern World* where he tries-- where it's a lot of stuff on science, on its meaning and so on and-- and its influence on-- among-- His most famous philosophical work is called *Process and Reality*. And, it's heavily influenced by theories of relativity and quantum mechanics. In other words, he-- he feels-- he was a-- Whitehead's perhaps one of the last philosophers in the grand tradition of setting out a system. [MW assents] But, his system was heavily influenced by the science of the time. Because as he points out in *Science and the Modern World* science is the dominant metaphor, driving force. Ok. So, if you have a-- Well I recommend *Science and the Modern World* as a good philosophical writing that pertains to-- to science.

Another person--I'm just sort of like pointing out philosophers of science--is Cassirer. [12¼ second pause while writing] *Problem of Knowledge*. [Note: Ernst Cassirer, *The Problem of Knowledge*:

Philosophy, Science, and History Since Hegel.] Cassirer gives you a real feeling for the historical struggle that-- that you have in various periods of science. See when you learn science and you learn it like a complete thing, over you might say. The consensus. And what's left out-- 'cause even scientists don't learn it, they don't have time-- what's left out is the-- is the *immense* conflict that science went through to reach this consensus. Um-- And Cassirer is very historically orientated, a little too much so. You could read a whole book of Cassirer and it's only the last chapter that he brings you up to the problem, to the problem. I mean is he-- he has this book called *The Myth of the State* which is his last published book and it was supposed to be about Nazism and fascism and so on. Well, he starts you off in Babylonia. (laughter) You know, what did the Greeks think of the state, what did-- what did-- what did, you know, Thomas Aquinas think of the nature of the state, Machiavelli and Rousseau, goes on and on. Of course this is all true, that all these elements go into it. But you-- but it's supposed to be an essay on fascism. And, it's only in the last chapter that he brings you up to the moderns, and-- Well, as I say, it was a little too historical. And the editor said, "I had to cut a lot of the history out" (laughter) in a posthumous book.

AD: There's a recent one, just put out a last one.

RP: The essays of--

AD: (No but) *Myth, Culture, and Symbol*. [Note: Ernst Cassirer, *Symbol, Myth, and Culture: Essays and Lectures of Ernst Cassirer, 1935-1945*.]

RP: Yeah, it's a question [couple inaudible AD words simultaneous with RP] of his essays, collection of his essays through the years. I'll write that down, *Myth, Culture, and Symbol*?

AD: *And Symbol*.

RP: [writing] But anyway, as far as the science is concerned, he *really* knew his history of science. He *really* knew it. And he makes these debates become *really* alive. You relive them, if you can-- if you have this, you know-- He's very sympathetic to every side of an issue, and that he himself just likes the thinking part. It's like, you know, well yeah, sure, he's not going to decide between Chinese food and Italian food. He just loves them all. So he's very sympathetic from every point of view, and, he writes it all out and (he/you) (really) [one word inaudible] yes that's right, and then you get to the next one, that right-- that's right too, you know. (bit of laughter) But-- and then he really brings home what the clash was.

Um-- well-- The one on the philosoph-- *Problem of Knowledge* is a bit difficult, in that-- all his books are a bit difficult in that he presupposes that you know the primary literature. They're all reflections on things. He presupposes you've been educated, you know. He doesn't like-- you know, he thinks, he assumes-- well [one/two words inaudible] it's in Latin for example. And, if you-- it's nice that it's in Latin. But if you don't know it's in Latin you could read it and understand it, it's only when you stop for a second and say "Oh that's in Latin, I don't understand it," that you don't understand it. (RP laughs, bit of laughter) I just don't read in Latin very well if I'm reading fast. (some laughter) Amazing. (bit of laughter) I don't know Latin at all. Anyway, he just presupposes that you know, you know, it's like it's supposed to be like a post-graduate work. You've already *read* everybody. Like you grew up in a library. And, then it's all comments on it so, you have to backtrack when you read Cassirer a lot. He'll bring up something and then you'll realize, well it's no use my reading this controversy, I don't even know what the issues are, and you gotta go somewhere else. But then he's good for that-- he's good for that in that he

lays down where you should go if you wanted to really fill your education in. The one book on physics on the-- I don't have, I didn't read it, is the one on *Determinism and Indeterminism in Modern Physics*. [Note: Ernst Cassirer, *Determinism and Indeterminism in Modern Physics: Historical and Systematic Studies of the Principle of Causality*.] I can't seem to get a copy (of it), it's missing. (I mean--)

VM (simultaneously): It has been translated though, Richard?

RP: Yeah, it came out in 1956. If anybody ever sees it--

S (faint): (You can get it.)

RP: Um-- [short pause] Cassirer has his own philosophy and-- and all of his stu-- his-- the co-- which is laid out in his, you know, *Philosophy of Symbolic Forms*, those three volumes, in all of his historical works, like *The Problem of Knowledge* is a history. It's only one volume, it's the only one you get in English, it's really the last volume of a long volume work in German. And the other ones deal with the problem of knowledge in European history starting I don't know God knows when, but (it's/its) last volume that goes from the nineteenth century--that's the one that's been translated--nineteenth to the early twentieth century. And he deals with physics, mathematics, biology, and history, you know. Well as they say, all of his historical works are written from the point of view of his own philosophy and they (all sort of) like, you know-- So the guy has a philosophical system, he shows how everything in history converges to it. (Well/But) that's ok. He's still very interesting.

A man who was a physicist, and perhaps the best writer on-- in the physics world, or philosophy and history of science, is a Frenchman Pierre Duhem. [short pause while writing] But unfortunately most of his stuff's not translated. But the one on *The Nature and Structure of Physical Theory* is. [Note: Pierre Duhem, *The Aim and Structure of Physical Theory*.] [15½ second pause while writing] It's late nineteenth century French. He was completely an outlaw within the French (cannon), that speaks well-- within the French academic world. He lived during a period of secularization, liberalism, and he himself was a monarchist, a staunch Catholic, what they call, what's that word (when you're--) Oh I forget. This is a certain political movement of Catholics in France to restore the legitimacy of the king and pope, because it was a big movement in nineteenth century. Anti-Semitic, you name it, he was in. Fi-- he was a really fine fella. And of course he just didn't fit in anywhere, and he made terrible enemies among the-- he hated the centralization of education. He hated all the Napoleonic innovations--the centralization of education in France, which would mean if you were not official, you were really nowhere, there's no place to go because they controlled all appointments and schools and-- He had a-- he just found very *minor* things, although his-- his own scientific work is of top notch, he worked in thermodynamics, (studied) heat, and particularly its applications to chemistry. Um-- but-- he was on the outs in lots of things, even in scientific theory, he was on the losing side of every battle. (RP laughs a bit) But, he's really good. He was really good. He for example *never* would have-- *never* would accept the Maxwell approach to light and elec-- electromagnetism. Totally against it, and-- Of course, you know, if you know that that's the winning one, then you say well he was wrong. But, his reasons were much better than the other people's reasons. (RP laughing) That's the point. He's-- he *gave* reasons, the other people didn't give reasons. Gave really good philosophic reason(s). Anyway, he's very interesting. I should bring-- Cassirer likes him too.

Ok. Well that's just some of the-- some of the like big shots in the philosophy of science, no one of which is-- they all died in the '40, you know, this guy died turn of the century but the other two died in the '40s. So in some it's a-- it's not modern at all and it doesn't deal with things like quantum mechanics

or anything. But, a lot of these issues were really-- a lot of these issues in what you consider quantum mechanics let's say, these philosophical issues, they were all thoroughly discussed before quantum mechanics amazingly. The whole thing of allowing a statistical approach into science was the most hotly debated issue in the nineteenth century. They just would-- it just wasn't accepted by a lot of people. Ok. Well--

VM: Richard, just before we end this up let's-- [RP simultaneously: (Gonna talk about--)] I didn't realize we were going to spend time discussing various books. I thoroughly agree with Richard that when the sort of the great scientists of the twentieth century or physicists of the twentieth century write about the philosophical repercussions or ramifications of physics they tend to be very primitive in their philosophic understanding. Despite their enormous potency as physicists their philosophic understanding is usually very weak. But there's still a few that I could recommend.

RP: Want me to write them down for you?

VM (simultaneously): Yeah, go ahead, one is *The Physicist's Conception of Nature* by Heisenberg. Very pleasant book. You won't [RP writing] learn a whole lot of physics but it-- but it gives you a certain historical background, it's nicely written, and, he gives you a sense of the continuity of physics from essentially Galileo on, and he really-- it's very historic. Not a great deal of physics in it but he does try and give you a little bit of the flavor of the controversy of quantum mechanics coming in. And, his biography is kind of nice too, *Encounters and Conversations in Physics*, [Note: Werner Heisenberg, *Physics and Beyond: Encounters and Conversations*.] which actually that's very pleasant. And again there's a lot of discussions on the foundations of physics that he remembers through his own personal filter of people with-- you know, discussions with Einstein and Bohr and so on. And then-- There's a couple by Schrödinger and none-- none of these I can strongly recommend but there's one little one where he doesn't-- [RP writing] he doesn't support a lot of his arguments. [student assents, faint] It's the one I gave Richard, it's-- what is it called, may--

RP: *Science and Humanism*. [Note: Erwin Schrödinger, *Science and Humanism: Physics in Our Time*.]

VM: *Science and Humanism*, right. [RP writing] And *What is Life?* is another one which, I don't know-- [Note: Erwin Schrödinger, *What is Life?: The Physical Aspects of the Living Cell*.] None of them are great. I guess that's it. If I come across something that I think is--

AD (simultaneously): You ever look into Philipp Frank?

VM: I never did, never did.

AD (faint): He's got three or four books out on philosophy of science.

RP/S(?): No.

VM: I'll have to look into it. Philipp Frank.

RP: Yeah. [writing]

S (very faint): (Who'd you) say?

RP: Big white hair. I met him at a park.

MW: Richard, did you ever come across an author named-- I-- I can't pronounce it, it was something like U-e-k-h-i-l-l, [RP writing] something like that? [Note: Jakob Johann von Uexküll.] German, around the turn of the c--

AD: (Uexküll?) U-x.

MW: Yeah, something like that.

AD (simultaneously): (A/The) theoretical biologist?

RP: Oh, [MW simultaneously: Yeah.] oh, oh, oh, yeah vitalism.

MW: Is that-- is that good? I saw a reference to it in--

AD (faint): (I have it), I gave up. [few words inaudible] conscious I gave up.

RP (simultaneously): Yeah it's vi-- it's the vitalism controversy.

MW (faint): Yeah there was a reference to it in that *Sound and Symbol* book [Note: Victor Zuckerkandl, *Sound and Symbol*.] and it sounded like he was an interesting fellow but I don't know.

LR: (Well thinking) about him. (RP laughs, bit of laughter)

AD (faint): These peo-- these people write a cosmic treatise at the drop of a (pen/pin). (bit of laughter)

RP: Well actually Schrödinger at least is-- is brief.

VM: Yeah he is.

S (faint): Don't say.

RP: Where-- Ok, these are like just background. [student assents, very faint] What were we going to do? Oh, yeah. I was going to say something about truth.

VM (simultaneously): (We/You) (want) to discuss the truth value of physics. Yes.

RP (simultaneously): Yeah, alright.

VM (faint): That's right.

RP (simultaneously): Let me give-- I have to give-- I-- [one/two inaudible student words simultaneous with RP] I am not a physicist by no means. I could hardly find the right key to my door. Um-- And-- (bit of laughter, student words) and um, I haven't thought about these things-- I *was* interested at one time in my life in the philosophy of science. But I haven't thought about it for a long long time. And, that's why I'm taking this opportunity to speak, just tru-- just thoughts. (laughter) Because I hope to be refuted. I hope to be refuted or at least somebody bringing up all sorts of contradictions and so on, so that I can be-- start becoming my-- just I'm sluggish at it, start becoming more involved in thinking about it. And-- so, my opinions are formed by just assimilating little snatches here and there over the years that just appeal(ed) to me for one reason or another. It's almost like if you look through the things you might have accumulated in some drawer somewhere, an old yo-yo or something. (bit of laughter) So they're really not consistent in any means, you know. But that's why I say, Vic's a physicist and-- So as I-- [one/two

inaudible VM words simultaneous with RP] as I talk to him about these things and he-- he sits there with an open mouth and he doesn't believe (laughter) that I'm saying that. (VM, RP laugh)

VM: That's true. Ok. Now give us your old yo-yo comment.

RP (simultaneously): Ok, well wait a minute I gotta-- See now, I have to explain that my-- my-- how I got into it. (laughter)

S (amidst laughter): You're going to tell us (about) [one/two words inaudible]

VM (simultaneously, amidst laughter): Come on, Richard. (laughter)

SD (amidst laughter): You know, in Babylonia. (more laughter)

VM: [one/two words inaudible] you and Cassirer.

RP (simultaneously): It's happening because, you know, it's where you come from.

BS: What were you doing in Babylonia?

VM: He's going to start in Brooklyn, (laughter) Brooklyn, not in Babylonia.

RP (simultaneously): That's exactly right, high school.

S (faint): Brooklyn [few words inaudible]

VM (simultaneously): See? Brooklyn. What high school? PS what?

RP: P-- no, it's New Utrecht High School.

VM: Alright. Now [one word inaudible]

RP (simultaneously): Now when I was in high school, (laughter) I was not that much interested in anything, (RP laughs, laughter) over anything else. It was all very the same, see. And, there was a period of time when all of a sudden everybody came over to me and said, you're good at stuff. And there was too many times where I wasn't. But I mean at one point, I changed from being an ordinary student to have a consistently 99 average in school. And everybody says, "Well what happened!? You used to be a dummy." And-- (or wasn't I), you know. And now I have a 99 average. And I didn't know what happened at all. It was only years later when I was speaking with PB, he said-- he said, "Well, have you always been telepathic?" And I said, "Oh! (laughter) That's it!" That's how I knew the answers on the exam. The teacher was sitting up there and knew the answer themselves and that's why I can't solve the problem that other people don't know the answer about. (some laughter) So I became instantaneously good in everything. (laughter) I mean I had a 99 average, I never opened-- I never studied or anything. I knew the answer.

AS (simultaneously): Wait a minute, Richard, which question did-- didn't the teacher know?

RP: Oh he said they always know these-- the an-- you know, it's always the-- they always give you [BS simultaneously: Right.] questions that they know the answer.

S (very faint): Yeah but (they only know new ones).

RP: Oh the *new* ones that come up I can never solve. Ok. But then one day, and I have ver-- it's a-- it's a terrible school, it's a poor public school [one word inaudible]

VM: Buddy Hackett went there though, didn't he?

RP: Buddy Hackett went there, it's true. (laughter) Abe Burrows, Arnold Stang, and myself.

VM (simultaneously): Good to get it-- get it all out in the beginning (laughter) before--

RP: It's-- it's very inductive for stand-up comics that school. (laughter)

S (faint): If I can recognize (you).

VM: Buddy Hackett. (bit of laughter)

RP: So one day this teacher and God--

S: It's your God.

RP: It's a teacher by only extended use of the term. (bit of laughter) It was a physics class. They didn't really know much physics but they read, you know-- taught us the lessons out of the books. And-- Oh I have to tell it because it was so striking in my life. We did the law of the pendulum.

VM: Oh I know what you're going to say, you didn't like the sign θ equals θ .

RP (simultaneously): Law of the pendulum. (Really) I'm not up to that yet.

VM (faint): Is that what you're going to tell them?

RP: Now, when you have a pendulum on a bob, you know, and (it's/this is) the way all clocks work, (well) it used to work. Pendulum. I'll just write it this way. [writing] The period-- period means if you leave it go how long it takes to come back. The period-- I won't put down the numbers but the period is proportional to the constant times the square root of the length. We'll leave the constant up there. Times the square length. Now what that means is-- and this guy had actual pendulums up there-- what that means is the time doesn't depend upon [drawing] the distance that you pull the pendulum away from the center. In other words, if I take the pendulum away here and I leave it go at the time, it never came-- and I got a real big angle and leave it go, well guess what? It takes *exactly* the same amount of time to get back, *exactly* the same. And the guy had a couple of pendulums there so you could work (it). Of course the one that you put out further goes faster. But they manage to sort of like synchronize themselves and they both get back to the same spot. It also doesn't depend upon the weight on the bottom. You could put a very heavy weight, and it may-- the angle (will) leave it go or a light weight. Well that's assuming within certain limits. And it go-- and it-- it doesn't depend. So that's one thing, that the thing (all/only) depends upon the length. And the other one is that it depends upon the length by the square root meaning that if I take one-- and this is what the guy did. [drawing] If I take one that's four times longer, four-- take one that's four times longer than the original, then the one that's four times longer will go-- well the one that's one-- one fourth longer, that'll go four times faster. Four times faster?

S: Twice.

RP: No.

SD (faint): Twice as fast.

RP (simultaneously): Faster, but I mean the period [SD simultaneously: Twice] is twice-- [SD, faint: Twice.] twice, twice. Meaning that when you pull these things out, when you pull these things out, this one will make two ticks while this one makes one tick. Ok? And you could have them laying there and you do (it/them). And you go [RP makes noise]. This one goes back and forth and that one just goes [RP makes noise or couple words inaudible] And you really measure them out, the square root, you know, you take it three times and so on, nine-- nine times.

BS (simultaneously): It's four times-- four times longer.

RP: Well four times-- square root, you see that's called like four and you got a two. Two square root is four and three-- nine times longer you get a three. So the period is one third because it's three times longer, the period, 'cause one third is faster. That knocked the socks off as they say. I couldn't believe it, you know, I couldn't-- I went up there because-- Usually your life is fairly chaotic. Nothing much happens, they can't predict anything, particularly while, you know-- It just-- there's nothing there that-- And all of a sudden this guy's showing you how there's order, like a peek through, that-- and then underneath, you know, the apparent chaos of things there was this tremendous order such that you'd have such a simple thing like this holding. And that just overwhelmed me. And, as I say, I-- I decided I wanted to become a physicist, not because there's any-- any like inclination other than that, just all of a sudden, oh, it was a sense of duty. Certainly had no interest in pendulums. But it was like a sense of duty, that that's where the path of, you know, reason and understanding lay. I was at the level you might say of a Leibniz, that's why I bring up Leibniz, because Leibniz was-- in Leibniz's philosophy, nothing happens without sufficient reason, that's the whole principle, that the-- everything in the world no matter what you look at has its sufficient reason. [writing] Oh, rationalism. [9 second pause while writing] Nothing happens without sufficient reason.

Now, by rationalism here you mean the kind of rationalism that's known as Continental Rationalism, seventeenth century Rationalism. And that *everything*, every occurrence in the world, you can find out its sufficient reason. And the human mind is suitable, is apt, you got the powers to do it. Incredible, that's like a whole world opens up if you get struck by that idea. It's the really, you might say, faith, the underlying faith of the physical enterprise, enterprise of science, that there's nothing that occurs that doesn't occur by a sufficient reason, and that sufficient reason is capable of being understood by the human intellect without revelation, without any authority telling you or so on. Just by penetrating into it on its own powers. And *everything* will be left, everything will be unveiled, all secrets of the show. That's *heavy* stuff for a teenage person. And uh-- um-- I'm always happy as a-- as a teacher when I meet people of that-- I meet young people who come to school and are suffering under that illusion. (bit of laughter) It's just-- it's just very heartwarming as opposed to those other guys, you know. It's just-- you know, you-- it's-- makes you feel good, you know, that there's still these idealists left. And it really-- the word 'idealist' is the right word and it's exactly what this is. It's a form of idealism, that the whole world is-- can be presented in ideas, and by ideas you mean human ideas, human mind. In other words, what they are doing is-- what-- what Leibniz and such, their school, means by necessity is logical necessity. [10¼ second pause while writing] That's what you mean by sufficient reason. Things necessary-- to-- to say that things necessarily occur, the necessity that's meant there is a *logical* necessity. They must occur for

logical reasons, the Rationalists [one/two words inaudible] And-- well, let me write down the word 'idealism'.

(Side 1 of original cassette tape digitized as 1981 1219a Ends; Side 2 Begins)

RP: --or do things on weekends. I am amazed, absolutely amazed. When I went to school--

VM: Ah, the good old days.

RP: Well, it was the school. When I went to MIT, nobody did *anything* but study, there was absolutely-- it was being in the priesthood. It was-- they took-- it was just like we see, oh isn't that cute, they take a six year old kid and make him a Tibetan monk and so on like that and he studies all day long. When I went to school, every single person, and there was no two ways about it, and there was no not wanting to do it, did nothing but-- well I wasted my youth-- (RP laughs a bit) did nothing *but* study from when they opened their eyes in the morning till they went to sleep at night, there was no other activity. And everybody did it with this faith and dedication until middle of their career and they get disillusioned. It happens usually about middle of sophomore year, they just get-- something happens. Well it *did* happen, you see. Then Vic was-- he wants me to get to this part. I went to this lecture in physics. And, the guy was going to do a great thing. He was going to *derive* the law of the pendulum from-- from even more *fundamental* truths of physics. You see, it's wonderful when you find out that pendulums work that way. And you say, every single pendulum in every circumstances? Then you think about it. Well when God planned the world he was that much worried about pendulums that he had to set down a law of the pendulum? Is there also a law of a screwdriver and so on, is that right? No, there are more fundamental laws of physics which are closer let's say to the divine plan of the cosmos, and then you *derive* the law of the pendulum from it using mathematics. You can't do that until you reach a certain stage of mathematics, that's why-- that's why they didn't tell me about that earlier. So that's wonderful. I went to the lecture, I was all excited. And the guy-- I won't go through the detail. But what he does is in the course of the lecture-- it's deriving this from the law of gravity.

VM (faint): It might be 'cause of me.

RP: What you do in the middle of it is you make an approximation. You take a function and you erase it and you write (another) [one word inaudible] thing in its place, for those of you who know trigonometry. You replace $\cos \theta$ by $1 - \frac{\theta^2}{2}$. Very simple. You just do it, there's a $\cos \theta$, alright, we'll erase it over there, one mi-- I said wait a sec here, what are you doing there? He says well, you know, that approximately equals that. And I couldn't for the life of me understand what he meant by approximately equals. It's like saying a dead man's approximately alive. (laughter)

VM: No, it's like saying a sick man is approximately alive.

RP: Or a sick man is approximately-- well-- is it-- but they're not equal! He says, well they are fairly equal. (laughter) But they're not equal at all! They're *never* equal! In fact they're equal only when θ is zero. It's only one time [couple words inaudible] But other than θ -- see for small θ they're approximately alike. But I couldn't-- I couldn't for the life of me understand what approximate equality meant. Because at no time are they equal. And, what is he talking about? He said-- because you see I was coming from a completely idealistic point of view and this man was more empirical. What he meant by

equal meant that you can't-- if you squint, you can't discern between them. (bit of laughter) If you don't look too closely, if you-- if your measurements are sufficiently crude, then within the-- the error of measurement you can't discern. Well, my law of the pendulum, my precious law of the pendulum. I said to the guy, "You mean it's only approximate. It's really not true that the thing, if you put two of them here, one with a big angle [drawing/writing] and one with a little angle and you let them go they have the same period." The guy said, "No. They really don't have the same period. But you won't see the difference between them unless you look real closely." See I didn't know what he meant, look real closely, I never looked at all. (laughter) It wasn't a question of looking. Well, so then I said-- so the guy was very honest with me. And I asked him about well the stuff that he's doing to derive it, the Newtonian physics too, does that have the same status, is that too only approximate? And the guy says "Of course that's only approximate too." And I said and the stuff behind that, is that only approximate? He says "Of course, it keeps going that way. That's what physics *is*."

Well, I mean, some people lose it in the movies. (laughter) I lost my innocence at MIT. (more laughter) It was a real shock, a real shock, it's like as if-- as many people who became Communists like in the 1930's and then find out about the crimes of Stalin and it just *destroys* them, you know, like they-- they can't live the rest of their lives, (they're all) upset. This was my sort of like equivalent. I didn't know what to do, I was stunned, I wanted to drop out of school. I wanted to actually abandon it. And I took things fairly seriously. I wanted to actually abandon (these/this) type of studies, I didn't see any reason to do it, it was-- it was interesting perhaps to some people, approximations and all that, but it wasn't what drew me there and certainly it's not worth studying from morning till night and things like that. I mean how much are you going to give up for approximations? (laughter) I really did, I was going to drop out of school, it was only my grandfather who talked me back into it. He told me how-- my grandfather was a laborer, and he told me how if I didn't go to school I have to be a laborer all my life. (bit of laughter) And he told me about how--

VM (simultaneously): He knew how to scare you, didn't he? (some laughter)

RP: He tol-- well he told me the nature of the bosses, my-- my-- you know, they came from Europe and-- and they came to America and they worked as wage earners. They told me the nature of the-- of the-- of the owning class, the capitalist class, and how they're predators and so on and so forth, scared the wits out of me. (RP laughs a bit) And how if you try and-- he always-- this is what he told me, how the FBI came around his place and made him fire all the people who had been members of the Communist-- the Communist(s) in the 30's, and the bosses fired them. In other words, if you stay in that class, you'll-- you'll have no hope for any-- they'll get you no matter at which turn (you) [one word inaudible] so this is a way out. Well I don't know. He was right of course.

S (very faint): Approximately.

RP: Approximately right, yeah. But anyway, I stayed. (bit of laughter) And what I found out was, I went and I talked to all these people, you know, faculty members and they said, "Oh, you know what you are? You're a mathematician, you're not a physicist, that's just what's wrong." It's like saying, oh you're, you know-- you *thought* you were a Leo but you're a Libra. You're a mathematician, you're not a physicist. You'll be much happier in mathematics. And so, that was Lenny Silver who told me that. Because he too had been a physicist and then switched to mathematics. So I did, I switched to mathematics and for a year or more I was happier. And then I-- well I don't want to go into (knowledge) because it's going to (get rid

of it). And of course, then I found out a similar sort of thing happens in mathematics, that at its foundations there are problematic issues also, and that's why I went into supposedly the foundations of mathematics or mathematical logic as a-- as a-- as an interest.

But anyway, yeah, I found the idea of approximation-- and, I thought about it, that's when I started getting into the philosophy of science, I thought about it quite a lot and I revised my ideas. And, that's what I really want to speak about and that's what Vic's going to criticize. It's the notion of this necessity. [short pause while writing] I said that in Leibniz's view, necessity meant *logical* necessity. But, that's just when you're really naïve. Necessity, the necessity that we're faced with, is not a-- a rational necessity. It's an irrational necessity. It's just-- it's *exactly* what you mean by the opposite of reason. It's-- or if you read the *Timaeus*, he talks about how the Demiurgus has to *mold* necessity in some way. And that necessity-- that not only are *we* subjected to necessity but even the Demiurgus *inherits* this necessity. And that it's an irrational element. It's just necessity. What could be more irrational? And that when you really *need* something, what could be more irrational? I mean not only if you try and explain *why* you need it, the felt need is [writing] irrational. See, a human being, a physical human being in this world is incomplete. He has to eat. He doesn't have-- he can't-- even the flowers have to be in the sun. Biological life is incomplete. It needs a source of energy outside of itself to thrive. You need clothing. You need shelter and so on. And you must accommodate yourself to a necessity. And there's no two-- you know, you can't argue your way out of it. You can't replace it by something else. There is this brute bare necessity that we're all subjected to, ok. And that-- and that's the basis. And if it wasn't for that necessity, there'd be no physics. There'd be no nece-- if it wasn't for *that* necessity, there'd be no nece-- necessity to think about these things. You'd be much happier asleep. You wake up because you're hungry. That's the only reason you wake up.

VM (simultaneously): [one word inaudible] Nor would there be any necessity for philosophy either.

RP: Maybe. I don't know. Anyway-- Now, from the very beginning of recorded history, you find ways of adapting to this necessity. And they're-- they are first as far as any kind of way of-- or like physics is concerned. They are technique. [short pause while writing] *How to* accumulate food, hunt if you have to or plant, *how to* weave, how to make buildings and so on. These are-- these are technique, technique of coming into direct contact with the physical reality. And, you could put any kind of, you know-- you can be super sophisticated about oh, it's not physical reality, it's a mental vritti and so on like that. But, when you get down to this level of felt necessity, you really feel you're coming in contact-- you have to lift the thing and move it and push it and eat and so on, you really feel that you're coming into contact with a certain level of reality that you-- that that's what you mean by physical. It's physically present and you must adapt yourself to it.

Now, it's the history of technique is much longer than the history of what we call physics. Physics or the scientific revolution and so on two hundred, three hundred years old, but people have been using technique and knowing how to manipulate and move things for much longer periods of time. You can go like down to the Corning Glass Museum. Guess where that is? Corning. And, they have the whole history of glass. It's just fascinating. It's fascinating because it's got no theoretical part to it, it's almost all technique of how you would change the glass, manipulate the glass and do things like that. And glass is really something. I mean just think of it. You're inside, you need shelter. Well you can't have holes in your wall because the wind and the rain and the cold comes in. But on the other hand, you can't have your wall solid because it's going to be too dark, like Ithaca. Nobody wants to live in a dark place all the time.

Just contradictory things. You need to be-- you need to be sheltered and you need light--glass! (some laughter) It's just far out. Glass, this is-- that's-- to me, that's much more than (the actual) [one/two words inaudible] (activity) and so on, that man's discovery of something like that, of a wall that you can see through, a wall you can see through. (some laughter)

S (amidst laughter): Cool.

RP: 'Cause we take it all for granted. Well you get your glass, put your glass in and things like that. That's why I'm so slow doing these things. If I have to put a window in I just stand there for hours looking at (this/his) window (RP laughing) saying "Glass!" while my wife's screaming, "It's cold, put the window in!" (laughter) "Far out, gla--" And then it-- and the next thing would be that glass could open and close. You don't have to have it in a fixed position. You want to open and close it to let-- when you do want to let-- well, alright. (bit of laughter) Now, at no level-- at no-- whenever-- now-- people do, when they work with glass or another one would be the use of metals, the long tradition of metallurgy, when they-- when they do work with it, they develop about what they're working with a cert-- besides these rights or rituals of working with it, they develop the mythology that goes along with it. And this is a way of comprehending the material. They develop a theory of the material that they're using. Now, that's what you mean by theory in a scientific theory, theory of the material. Now, the question is, is this theory of the material, and it's never been a time-- (when) [one/two words inaudible] one man shows another man how to smelt metal and get the ore out and pour it and so on he's got to explain in stages. And, he speaks about it in a certain way, which is-- which is particular to that craft. It still remains. If you go to any craftsman and he-- and he's working with his object, he'll speak about it in the lore and language which is traditional to that craft. Fine? Electricians talk about turning the *juice* on, so on. They think of it as a fluid running through a wire.

Now, the question is, are these theories which-- which are sort of like the-- the myth that accompanies this ritual, are these theories true. Well, I don't think anybody ever-- they haven't ever put it in those terms--are these theories true? It's much more like are they adequate. Not true, are they adequate for the task at hand. In other words, when you're working with something at a-- at a given level, you know it only in certain ways, the ways for that-- for that level. You're not concerned with *other* ways of knowing it. And what you have is a theory that speaks exactly to that level of knowing it that you're working with that-- right now. If you're working with glass, that glass got to be melted and poured, and I'm sure-- I'm not a glass blower or anything like that, that they have their ways of speaking about it, 'cause they want to communicate to you when's the right time that you turn it and so on. Well, you wait till you see the [one word inaudible] on the bottom and you turn it, they *mean* something by that, something that they look for. The-- what I'm saying (it's/is) only meaningful to you if you know a particular craft, and you know that there's a language that's associated with it that deals with an aspect of the object that's only apparent during these manipulations and only has meaning within these-- within these manipulations.

Now, there are an *enormous* number of ways of describing objects, as many ways as there are approaches to them through the various techniques and crafts of manipulating them. They're not true-- I don't think the word 'true' or 'false' pertains to them at all. It's just a question of are they adequate for communicating the skills of working with them. Right? If somebody wants to describe to you something, like how to walk through a city street, and he'll use a various language that you-- that you would-- that you would understand, and the meanings of those terms within that language have to do entirely with

walking through the street and it'll con-- it'll contain such theoretical constructs as "dark alleys", as in don't walk near dark alleys, and so on, stay on-- stay on populated streets. See-- I mean what's that for, what's a "dark alley", it's purely a theoretical construct, (you know). I guess you can say dark alley is there. Ok.

Now, from my point of view, *all* of physics is just an extension of this paradigm. First the techniques of manipulating, then a theory to cover it. The most important thing in this development is to *refute* the theory. Because you're not really refuting it. The most important thing is to find where the theory doesn't hold. Because by *so* doing, you find the exact boundaries of where the theory *does* hold. The level of observation or cognition, the level of-- the degree of-- the scale of perception, that's the best part, the scale of perception about what you're talking about. Therefore (when/and) people have classical mechanics and they-- and they go to the quantum world and they find it doesn't work, that did not in any way mean that it's false 'cause it never was true. It meant that you now have-- and that's, as I say, the most important part of the physics, you now have the *boundaries* in which the theory is true. That means the theory is true when size is within this range and time is within that range and so on, then you could speak about it this way. True, I don't mean true, applicable. Applicable.

Now, what I don't-- what I don't think is useful is any kind of reductionism of one of these levels of description to another level, in saying the lower level is more true, that things are truly molecular. You see, when-- when you go speak to a man who works with glass, there's no reason to speak to him about glass being molecular. He sees glass as a frozen fluid. And what you do is that when you melt it and pour it and then you freeze it again, and get it in different shapes. And he works with it at the level of a frozen fluid. And to speak about molecules, if it doesn't come up in the midst of his talking, in the midst of his actual thing, it would lead him astray. He wouldn't *know* what to do if you talked to it about molecules. You *have* to know it only as fluid flowing and the type of tension and cohesiveness that you have of fluids. And-- Now are the molecules truer? No, there are times when you do the type of techniques when speaking in the molecular language is appropriate for the type of manipulations that you're doing. Are they really molecules there? If-- if you're going to say there are really molecules there I can't say where you could say there's not really fluids there. Fluids as macroscopically observable fluids and not as molecules bounded and the-- not reducing it and, you know, taking a fluid away and putting-- putting the molecules there with the hydrogen bonding that-- that's-- that's supposed to be responsible for the fluid qualities. Am I clear? Fluids are fluids. Yeah. Ok.

Now, the *amazing* thing about the growth of science is that at every level you have the science and it develops a technique, it extends the technique of that level, and that very extension of the technique is what's used to, so-called, refute the very theory that's responsible for its construction, or to find the boundaries. All the stuff about atoms wouldn't have been possible to be made without vacuum pumps. And the vacuum pumps are all constructed on Newtonian lines. Newtonian lines, that's the word, Newtonian. Using Newtonian theory you can now make things *better* than you did when-- before you had theory, I mean, don't put me wrong, I'm not-- I see theory as the-- as a *superb* tool, as an *extension* of the hand, as part of craft. It's the thing-- it's the form of a tool that's *distinctively* human. Apes put sticks together to get bananas. But it's man who uses *theory* as-- as a tool to get better bananas or something like that, (SD laughs) synthetic bananas. Anyway, I see it as-- it's a tool which extends the capabilities of man and technique and by so doing can get new tools which then disclose the boundary of the very theory that you're working with. This is always a problem, you say, wait a minute. For example like determinism, indeterminism. The quantum mechanics is supposed to be indeterminate and yet all of its empirical

evidence that it rests on is based upon the belief that determinism reigns in the level of equipment that you're looking at, that the needle really does move in response to electrical charge and so on according to deterministic theory. Well I see nothing wrong with that, as I'm trying to say. The-- each level increases the technology that's possible at that level in such a way to do the best thing that science can do for itself, show you its own boundaries of where it's inappropriate, you see. It *speeds* that up, that development up. And, the very-- the final end, in some sense, is when science discovers its *complete* boundaries of where it's inappropriate as far as the life of man is concerned. And then it would fulfill its task. And it's capable of doing it. Um--

But for now we're summing up. I would say-- if I-- if I had to label it as anything it's-- it's a-- it's a kind of pragmatism. But I don't see-- I'm not a pragmatic in other-- in other areas-- in other areas, but when it comes to physics, or I mean physical reality, there's irrational necessity. Goddamn, it's irrational. (RP laughing) I can't see any other stance except a pragmatic stance. Because you got to deal with it best you can to quiet it down for a few moments of time when you needn't be concerned with pragmatics. But that's only-- then it comes up again. You get hungry. [short pause] But I don't-- another way to put it, I don't in *any* way think that the-- that the-- that the abstract or theoretical constructs of physics are any way *there*. They're not there. You must always come back to the level of sensible qualities. 'Cause after all, that's all that counts in a pragmatic approach.

Oh yeah, one more point and then I'll-- then I'll-- I'll open myself to criticism. Then there's the thing of when the theory talks about things which are *not* directly observable, such as the origins of man and evolution theory, or the origins of the cosmos, Big Bang and all that. If you're saying that the only real reason for science is as a-- or lore, l-o-r-e, lore, that kind of lore, l-o-r-e, the lore that accompanies technique-- no it's not-- certainly not natural law-- the lore that accompanies technique, what's the purpose of all of the stuff with cosmology and so on and so forth. Well-- It's a corn god. This is the point that Vic hates. It's a corn god. You know--

AD (very faint): A what?

RP: A corn god, c-o-r-n (RP laughs a bit) god, g-o-d.

S (very faint): Is what? (bit of laughter)

RP: You know, if you went to the Aztecs and you ask them-- and the Aztecs were an e-- a people whose economy is completely dependent upon corn, corn was everything, and you asked them how the world began, they would tell you in the beginning the corn goddess sprouted off life and so on and so forth. And if they asked you for-- and you'd say the origin of life is corn. And if they asked you for proof they'd say "Here. Take a man-- we'll do this experiment-- take a man and deprive him of food, he'll be very close to death. Now give him some corn and he'll wake up and be alive. Therefore life is corn." In a similar way-- (laughter) in a similar way--

VM: You learned a lot in that high school, Richard. (laughter)

RP: --sci-- (more laughter) when science speaks about the Big Bang and so on, it's-- Well, I'll tell you. In a hundred years when you listen to these guys talk about the origin of the cosmos as the Big Bang, you'll laugh at them like you laugh at the corn goddess, that they took a small aspect of life, corn, and they extrapolated it out to be the origins of the cosmos, it came out of corn, life comes out of corn, people come out of corn, in the beginning a man was like a piece of corn. You know, this is the type of

mythology that you would find among Aztecs. And of course we laugh. But nobody seems to laugh when they talk about in the beginning man was an amoeba. They go “Very sensible. Of course.” (laughter)

BS (faint): (How about) [couple words inaudible]

S: Uh-hm.

RP: Not to say they should teach creationism in high school. (laughter, RP laughs) I have-- the solution to that problem is to abandon public education but that’s another-- (laughter) Ok. I hope that people are going to take the opposite side.

VM: You know, before-- before [MW, faint: I’m convinced. (some laughter)] I try and-- try and defend the opposite end of the stick, I want to be sure that these folks understand your heresy, Richard, so it might be-- (RP laughs, laughter) [RP simultaneously: Thank you.] it might be best if [RP simultaneously: Three (dollars).] before we start trying to take an *opposite* point of view, (would be) certainly understand Richard’s tension that he’s making here. All you ask--

LR (simultaneously): Let’s just take a vote.

RP: Oh no!! (laughter)

S: Maybe he does it--

S (faint): That’s another [couple words inaudible]

RP (simultaneously): Everybody’s got to repeat it in his own words.

VM: Yeah no seriously, maybe it’s-- now maybe it’s initially transparent but I’m not sure. That’s why I somehow think that’s a more [RP simultaneously: Yes you’re right.] pedagogically sound approach. Rather than jumping into the other side, let’s make sure we understand position A before we come and try and counter it with position B.

MW: Well, [VM simultaneously: (Simple.)] for one thing it seems to be saying that-- that each one of these physical theories could not be--

AD: Louder!

MW: Each one of these physical theories cannot actually be described as knowledge.

RP: Oh yes. No--

MW (simultaneously): Because when you say you have knowledge you’re-- you-- I would say that you usually mean that you are knowing something that is true of the object but that is-- the object *is* the way you are describing it.

RP: Well do you call technique knowledge? Do you know *how* to ride a bicycle? Most intellectuals don’t, that’s what George Wallace said. No, do you *know* how to ride a bicycle? Do you use that term?

MW: Yeah, you would use that term.

RP: Isn’t that a very primo-- primordial kind of knowledge, these knowledge of techniques?

MW: But, it's a question of don't-- the distinction you seem to be making was between knowing how to deal with the situation and objects, which you-- you would not go as far to say that you could then say the statement was true or false.

RP: No but-- but when you--

MW (simultaneously): True or false is when you [couple words inaudible]

RP (simultaneously): When I say you know how to ride a bicycle, I don't only mean that you could move your feet around in the right way. You have a theory of the bicycle because you know how to get it to go some places. And that theory isn't involved with angular momentum unless you took a course. [MW assents] It's involved with the way bicycles go. That's a theory. And I-- and I'd say, that's your knowledge of the bicycle. Now, the bicycle as it stands outside of you? No. The bicycle as it interfe-- interfaces with you. It's your knowledge about that interface or that interaction.

MW: Right, so it's--

RP: And that's the only thing that-- that's the only-- that's the only meaning the bicycle has for you. Now somebody who *sells* bicycles, he has a different theory about bicycles. There it's how much his markup is. Somebody who *designs* bicycles and so on and so forth.

MW: So they [one word inaudible]

RP (simultaneously): Now are those knowledge?

MW: So your position is also a way of making the object so multivalent you might say that it's capable of having all these different aspects according to different [LR simultaneously, faint: Scales of perception.] people's relationship to it.

RP: Scale-- yeah, scale of perception, right. Yeah.

LR: Michael you're defining knowledge in a different way than Richard just did (earlier). When you said knowledge just now you defined it as true perception or true understanding of the object, as if to say there was a true understanding of the object and a false. And Richard's defining knowledge as that which fits in any scale [RP assents] of perception.

MW (faint): Right. Now is it--

RP (simultaneously): What Plato calls a likely story.

MW: Yes, right, you were saying-- I mean I'm going back to-- I mean your whole story with the pendulum I thought was to bring out [RP: The (obvious/opposite).] the difference between that ideal conception of what knowledge is--

LR (simultaneously): Richard, a good way to ask that would be, in what you've just presented, is there a true kno-- is there at all an absolute (knowledge).

RP: Oh I was going to get into knowledge (in/of) mathematics which is different. But let's leave it [S simultaneously: Is it?] just with this. Yes. My point of view it is.

AB: Richard?

RP: It is. There is true knowledge.

AB: Aren't you proposing a kind of modified idealism where--

AD: Louder!

AB: --it's-- You're proposing a kind of modified idealism where our interaction with the physical or real world is only through the medium of the human understanding which are these successive approximations of relationship to the object through a kind of functionalism, you know, of use. You know, you have a certain use for the bicycle and so you develop a certain understanding of how to interact with that bicycle so it serves your purpose.

RP: But the-- there is a--

S: Why do you call it a--

RP: But there is a criterion of success.

AB: Because it's a--

VM/S(?) (faint): [three words inaudible]

RP: Which is not-- which is not quite idealistic as I-- [AB simultaneously: But what I mean by--] The criterion is that the felt need has been discharged.

AB: But what I mean by idealism is you're not saying that your system of understanding actually describes the thing the way it is. Because now there's this deeper system of understanding which goes through-- you know, a new technique goes in one step deeper and one-- then one step deeper and so you can extend human knowledge indefinitely, and you're never completely exhausting the object. It's only this system of abstract rel-- the system of relationships that you have to perceive the object or use the object that was what you're calling knowledge.

AD: Look I'm going to shut the heat off if you people don't want to talk loud.

VM: Well I-- it's too hot anyway, I agree.

BS: What do you mean by exhausting the object?

S (simultaneously, faint): Is the heat turned on?

AB: In other words, Richard's saying every time you have a new system of understanding, that leads to new techniques which can lead to a whole new other system of understanding which extends your knowledge of the object deeper so you go from one level of physics to another to another and there's always another thing underneath. You're not really ever exhausting the object.

RP: But pers-- [BS simultaneously: That never touches the object.] wait, hold on. Personally I-- I don't--

AB (simultaneously): But I find it in idealism.

RP: I don't particularly like this vertical thing of one thing underneath being deeper. I see it more as horizontal.

AB: Ok but you--

MW (simultaneously): Just different.

RP: Comple-- just different.

AB: You're still describing it as a series of successive approximations within the human mind.

RP: Fa-- I don't like the word 'approximation' either.

MW (faint): No.

S: No.

SD: 'Cause that's assuming there's something really there which you're [S simultaneously: You're putting a hierarchy.] getting better and better understandings of. I don't think that's what he's saying.

S: Yeah.

AB: Then what *are* you saying?

RP: When you have a need for anything and the thing is-- and-- and the need is discharged in whatever way it is, you don't need any further explanation of things.

S: Right.

RP: And that itself is the criteria of success.

AB: What's your definition of the thing?

RP: Well, no, it's not-- I don't need-- First of all, I come back to the need, not the thing. And I don't *need* to define need. (RP laughs) That's the point, it defi-- it's completely self-evident.

AB: So isn't that an idealism, you're not really [RP simultaneously: I don't know.] dealing with the object?

RP: Object?

BS: Sounds pragmatic more than anything.

RP (simultaneously): The-- yeah, the object is the need.

SD (simultaneously, faint): That's part of the criticisms.

MW: Idealism has got (someone--)

RP: Yeah, alright, I'll say yes.

MW (simultaneously): It's flipped its meaning too many times to use.

S (simultaneously): Right.

RC: When you-- when you do talk about knowledge, would you say that in these situations there's any knowledge at all?

RP: Yeah, well, I left it out but the-- there's a great deal of mathematics in all of these theories, [RC: And--] which is-- which I consider the true part.

RC: And would you say that that knowledge is a knowledge *of* something?

RP: I'm telling you what it's a knowledge of, it's a knowledge of mathematical structure.

RC: And would you say that mathematical structure, would you call it an idea, like a knowledge of-- you have knowledge of an idea.

RP: Yeah, that's all you can.

RC (simultaneously): Could you say that what physics is doing, perhaps, and what the sciences are doing, is taking that knowledge of an idea and extending it just a little bit further to say that also the knowledge involved in the situation is the knowledge of which idea applies to this situation. Like not only did I have an idea but that I know also--

RP: But Nature does the selection.

RC: --whether it's applicable or not applicable.

RP: Nature does the selection. You don't know beforehand. You may think it's appropriate, you do it and it doesn't turn out to be appropriate.

RC: Right.

RP: So it's not-- *it* does the selection and it's-- and you know the-- the response is whether you want-- get what you want.

RC: Like if this nece--

RP: The glass doesn't seem to hold, it cracks. You're making bad glass.

RC: If this necessity that's imposed upon you-- Let's say-- like you say it's an irrational necessity. Could I see this necessity as being the need to explore ideas per se, that--

RP: You're being very generous about it! (RP laughing) No, I don't know, I mean that's-- you're making the better part of your life, I mean, you know-- You're giving a-- you're giving yourself a theory to live by, that this necessity has a higher aim.

RC: That for example when you say the scales of perception change. Could I see that scale-- that change in a scale of perception as almost like stepping into the realm of instantiation of a different idea. That at (the--)

RP: All I could say is, you're making the best of a bad situation. What I mean is, you know, there you are subjected to this necessity and you say, "Oh it really just can't be that bad. It *must* be for some higher purpose." And then you're finding this higher purpose. Well, if it really is that bad.

VM: It is what it is.

LH (simultaneously): I just want to ask it this way. Richard, you've got this one knowledge, a necessary knowledge of the object. And then on the other hand you're speaking about an ideal knowledge, knowledge of idea. And the question that's coming up in my mind is-- is why-- how do you know that's not just another change in scale of perception.

RP: I didn't follow.

SD: In other words, is the mathematics simply another scale of perception.

LH (simultaneously): Idea is just as much an object. The mathematical idea is just as much an object.

RP (simultaneously): Actually, I'm sorry I brought in the mathematics, I would have been happy to speak just on a qualitative science. In other words when a guy [one word inaudible] does working with glass or working with any kind [LH simultaneously: Yeah but right away--] of material. Forget the mathematics.

LH: But right away that-- the question is going to come up in this group, is there true there, I mean, is there any possibility of true-- true knowledge, or ideal knowledge.

RP: Yeah, I think I gave my answer.

LH: Right. And then my question is, what-- how is that-- how is that ideal knowledge different except in scale from like this necessary knowledge, it's just another kind of knowledge of a more fundamental kind of object, an idea.

RP: Oh. Well then no, maybe I didn't give my answer.

S (faint): (You are.)

RP: I'm saying-- that's good that you brought it up. I'm saying that the guy-- First of all he never thinks of it in terms of knowledge. It's part of his craft, it's part of his vir-- you know, that's the Greek word, *arête*, the virtue. It's part of his power. It's a very modern thing to call those things knowledge. Ok but it's part of his power. And, it only has meaning within the context of manipulating the object, and has no high-- no other meaning outside of that.

S: But how [AD simultaneously, faint: Let's get--] is mathematics different?

VM: Let-- I was going to try--

AD (simultaneously, faint): Let's get to the problem, [VM simultaneously: Yeah.] alright, [VM: Alright.] in this way. Maybe this might be the problem. Is there in our understanding included the root of the being of the object. In other words, included in the cognitive understanding of an object is there included the fabricative processes that make that object to be what it is. And I think what Richard is saying [VM simultaneously: He's saying no.] is no.

VM: No.

RP/S(?): No.

VM: Yes well, I-- I would take quite an opposite point of view, not just because I enjoy being opposite but I tend to think this way.

AD: Let's-- let's avoid thinking in terms of agreement, disagreement.

VM: Yeah, ok. Just the--

AD (simultaneously, faint): (We're) absolutely uneducated.

VM: Right, [S simultaneously: Right.] this is just for-- for the question of bringing out both points, you know, take an opposite point of view. Let me back up to play with the example of the bicycle again because it's something concrete to hang on for a while. You get a hold of a bicycle and according to Richard's point of view you develop a certain technique of riding the bicycle. And this is really all that science is at any level, it's just a-- an unfolding of technique for manipulating that particular level, that particular realm of perception. But somehow to me that doesn't seem to do justice to the-- to the level of (the/a) theory. For example if you stay with the bicycle just a little bit, in riding a bicycle it's something you learn through habit structure and through a number of skinned knees and so on but if you could, let's say, take the bicycle and use that as your-- as your entry into Newtonian mechanics. You perform a lot of experiments with a bicycle, you watch how it falls over, you watch how riding it in different ways and so on gives rise to different effects, and then you bring reason to bear on it, reason to bear on these experiments, and you quantify it and let's say make it more precise with calculus. And let's say if you could do this, you Newtonian bicycle rider, you could then develop the theory of Newtonian mechanics. There would be implicit in this bicycle the law of gravity as well as all the dynamics, $F=ma$, force equals mass times actions. And from this you could spin out all the laws of planetary motion. In fact you can even do a nice job discussing the structure of galaxies themselves because to a very good approximation, and I'll speak about approximation and its limits and so on in a minute but-- And you could, let's say, work out all of the-- the laws that you need to generate an ephemeris. In addition you can also work at the microscopic level, you could work out, and Newtonian physics has done this, let's say the structure of ideal gases which are ideal and they're not the kind of gas that you would run up against in certain kinds of situations but if you wanted to discuss many many problems in physics, ideal gas laws are really Newtonian at base and it's just an innumerable number of-- of applications of Newtonian physics.

Now it seems to me there's a real qualitative difference between the *instinctual* technique of riding a bicycle and the enormous superstructure of Newtonian mechanics. And somehow it's like the riding of a bicycle is a particular and the Newtonian mechanics when it's unfolded is more like the general or the-- the reason-principles which go to converge on this particular phenomena, riding a bicycle, and give it structure. But the structural laws that we call Newtonian dynamics, granted they have limitations, I don't want to address everything at once. We'll worry about the limitations later. But granted they have limitations, but their-- their range of applicability is so much broader, so much more fundamental, that it seems to really be very, let's say, imprecise to just lump them together with the technique of riding a bicycle.

AD: No I-- Vic, I think you strayed away, I follow what you're saying but you strayed away, I wanted to stick-- again, I want to return to the point (we're/you're) making.

VM (simultaneously): Alright. Is the intelligible in the object.

S: Well--

AD (simultaneously): Let me put this way, is the com-- is-- is the fabricative convertible to the gnostic and is the gnostic convertible to the fabricative. [VM: Alright but--] Instead of saying $E=MC^2$.

RP: And, [VM simultaneously: It is--] all I-- I'm saying, the level-- it might be at another level. But the level that the human being ordinarily operates with, no. And wha-- and what takes the place of, let's say, the kind of development where it would be, what takes the place are these theories which attempt to bridge the gap.

VM: Ok. Let me just stay out of science altogether 'cause I can see that's where Anthony wants to push if I understand.

AD: No I want to [VM simultaneously: I--] get to the crucial issue [few words inaudible] see [couple/three words inaudible]

VM (simultaneously): Yeah, alright, that's what I'm saying, I'll stay out of all the-- all the discussion of Newtonian mechanics and so on, throw it all aside. Let me see if I can answer your que--

AD (simultaneously): Remember these problems have been argued before physicists.

VM (simultaneously): Yes, yes, they're much more fundamental than physics. I would say that the reason-- to use, let's say, Greek terms. In the-- in the sense world, both the fabricative and gnostic reason-principles are inherent in the objects in front of me, that-- it may not be obvious right away. It may take a good deal of digging. Let me use an example from astrology. Initially, you know some days are good days, some days are bad days, you can't accomplish much. And then you start studying astrology. And, from that you get deeper and deeper insights into the fabrication of a universe, both the inner universe and the outer universe. And, right *in* the very experience of your daily world, you penetrate deeper and deeper and you see both the way the world is constructed and the meanings inherent in it, from right here. And if you're wrong, you'll be corrected. And a theory *does* develop. Some people call it philosophy, occult science, whatever you want to call it. And so I-- it's hard for me to take this almost agnostic point of view that Richard seems to be taking. I'm not sure-- am I addressing myself to the question?

AD (simultaneously): Now-- now we're getting closer, yeah.

AH (faint): Vic, could I respond to what you just said?

VM: Yeah please Andrew, go ahead.

AD: Because-- excuse me now. Because Richard's position is the same one of a Cassirer.

VM: Yes I know, symbolism.

AD (simultaneously): A formalism and a symboli-- symbolific activity which we cannot get beyond.

RP: No I'm--

VM: Granted, sym--

AD (simultaneously): What I'm-- what I'm bringing in is the whole notion that the symbolific activity *itself* is *caused* by reason-principles, alright, which we can trace back, [student assents] so if I'm-- if I'm contemplating a piece of (force), and if my penetration into that object is deep enough, the conversion should take place that I should be able to understand how knowing, alright, is doing, or how doing can become knowing.

VM: Right.

AD: In other words, it's the conversion of one into the other. Is-- is that an ideal, is that a figment?

RP (simultaneously): No, no. No that--

AD (simultaneously): Or is-- is that the limits of human knowledge?

RP: It-- there are no limits to human knowledge. But, we have to stick with man-- a present level of scale of perception you might say or scale of understanding. And, it may very well be that by intense thought, one can project oneself into the object and penetrate it. But--

[Audio File 1981 1219a Ends]

[Audio File 1981 1219b Begins]

AD: --workability. [student assents] Fabricative.

VM: Yes.

S (faint): Right.

VM: In fact you'd say like the whole of-- since we've been talking about a lot of physics I'll use my example there. The whole atomic world is in some ways a projection of the understanding of the scientist, that whole mathematical [AD simultaneously: Into--] structure--

AD: Into--

VM: Into a physical reality.

AD: Fine. If we don't want to say physical reality, [VM simultaneously: Don't say physical.] you say symbolic formal [VM simultaneously: Symbolic--] understanding.

VM: A *formalism* known as quantum mechanics, very elaborate, very precise with many many rich ramifications and so on in some ways is a conversion of the intelligible into the fabricative. Or, I would just turn it the other way around just as well, there's a parity here, it's a conversion of the fabricative into intelligible in the sense that you have studied the external world, what is fabricated and given to you, and you have made it intelligible.

AD: We did that-- we tried to get a glimpse of that [S: That's right.] when we read from Deck's conclusion.

VM: Right, exactly.

AD (simultaneously): The Intelligible is the sensible, [VM simultaneously: There's one world.] the sensible *is* the Intelligible [VM simultaneously: One world.] and there's no interval between them.

VM: I agree. I mean, you see, when I-- when I hear Richard's discussion, I-- I mean there's a certain sympathy I have with the point of view, on the other hand, if I take that to the extreme it seems like I have a material world and an Intelligible world, and they're always kept apart, they're always kept separate, there's this irrationality, and the techniques that flow from it to deal with it and so on, but somehow an island of rationality, an island of life which never is allowed to-- to make any kind of deep penetration into that. And somehow that separation is very Neo-Vedantic. Yeah.

MW (very faint): Yeah.

S (faint): Sure is.

RP: Well, as far as I-- well-- I'm only talking about-- I'm talking about the observan-- observance of the so-called external world.

VM: And it's what physics [few words inaudible]

RP (simultaneously): And in the theory-- well that's what-- it's a-- it's-- it never get-- I could-- I'm saying, it could never get beyond a likely story, a problem--

S: (Story/It's alright).

VM: Richard, that's-- that's any problem of symbolism is a [RP simultaneously: That's right.] likely story, and in fact, let's-- let me just take astrology. I never thought I'd see astrology being used to defend physics but the issues come-- (laughter) the iss-- it seems strange, the issues are not physics or astrology, it's more fundamental than that. But let's say when you do astrology, you look up in the ephemeris and you say, "Wow, I have Saturn on the Moon. I have Uranus on Mars," whatever. And you bring up all the symbolism of Uranus, all the mythology of Mars and so on and so forth and you try and get an insight into precisely what's going on in your life. Now, there's always a disparity or always at least a difference, a real difference between the actual experiences you go through in the outer world and the kind of symbolism you use to interpret. That there's just got to be, I mean it's the nature of symbolism. And so, I can't see how you can use that to dismiss the potential truth value of any science that's forced to use symbolism, and I'm using science in a very broad sense.

RP: I'm not dismissing the truth value. I'm saying it makes-- it makes possible certain kinds of experiences, satisfaction. And that's what your symbol-- and there's your symbolic activity doing it there too. [student assents] The fact that you could consult an ephemeris and have mythological tales about the planets, or even *not* mythological but just some sort of theory about them, and that makes possible certain kinds of experiences. Now but you said yourself, those experiences are other, those experiences are *felt* experiences and they're other than what's reflected in the symboli-- symbolific activity. [VM simultaneously: See I--] But there's my agreement.

VM: Yeah, I would say that the symbolism is an attempt at grasping something which is *non*-symbolic [RP simultaneously: Yeah.] and attempting to apply it to the world of experience. There's [RP simultaneously: That's true.] really three levels here. There's a-- let's say three levels. There's like the

raw experience you have in the outer world, the bumps and bruises and so on experiences in the outer world. Then there's the symbolic activity which attempts to explain or to make rational sense out of it. And then there are these, let's say, super-symbolic or, what shall I call it, reason-principles without-- without (image) that you're trying to *translate* into symbolism to apply to that world. And I want to see them as all continual. [BS simultaneously: What (do you) (couple words inaudible) question?] Oh in fact let me do this. Let me use a very current diagram. Can-- I guess I can [one/two words inaudible]

BS: What do you mean by a symbol should make sense of the world?

VM: Well, let me just do this. [drawing] You got these reason-principles out here, you have the planetary spheres, and then I don't care where you want to put-- let's put the Earth down here or in the center, it doesn't matter [diagram]. Let's say this is the realm of experience [diagram]. This is only rough and it may entirely need of reworking but let's say this is the realm of experience. The motions of the planetary spheres would be, let's say, akin to or analogous to, let's say, symbolic functioning [diagram]. And the reason-principles that are, let's say, superior to images or that are-- are (not) accessible through symbolic thought would be out here [diagram]. [student assents] What we're talking about is the translation from here to here [diagram].

RP: No, wrong. I-- I am not putting down the possibilities of real knowledge. I'm only attacking *physics*. Now in other words there's more possibilities of knowledge in *human* relationships, because a human being is not a particle. And there-- and there you can move from the symbolic to the actual. But remember now we're talking about matter [VM assents] and force and things like that, [VM assents] and there I can't-- I don't know about (this equation) of the understanding to so-called dead inert brute force.

VM: Oh but you see--

RP: Don't be-- you say I ne-- yeah, I can't argue astrology point of view with you, [couple inaudible student words simultaneous with RP] because that-- (that's on the) other side. I have to stick with the--

AD (simultaneously, faint): Let's just keep it (astride), sure, [RP simultaneously: Huh?] let's keep it aside.

RP: No but I-- [VM simultaneously: No Richard--] I ha-- I see on the other side [VM simultaneously: No but Richard's saying--] if it was a question of the astrology. [LR simultaneously, faint: Oh yeah.] It's a question of physics, this misplaced activity.

S: Yes.

VM: [one/two words inaudible] Richard's saying you see look, my argument's not a general-- it's aimed at physics.

RP: Right.

VM: So you can't use these arguments to counter my argument.

RP: Well that's it, you can't use this example of astrology.

VM (simultaneously): [couple words inaudible] these examples, alright. You can't use these examples to counter my argument because my argument's related to the inanimate. Something like that.

RP: Well exactly what physics claims it's-- Look at what they're dealing with. I'm taking *their*--

VM (simultaneously): Ok, but I would say-- well let me just take it-- talk about it this way. Physics, granted, has a-- you know, a focus in terms of the whole range of experience, on the other hand insofar as this world that we find ourselves in is the arena that a great deal of physics can take place, including our own bodies, [RP: Uh-hm.] then it seems to me that physics *does* have a deep and wide scope. I'm not saying it.

S: Richard, are you--

VM: Go ahead.

LR: I have a question. Richard, you have-- it seems like your whole position centers around the first notion which was this kind of necessity. All these explanations you're dealing with the fact that there's this irrational necessity to which one must respond.

S: Right.

VM: Environment.

LR (simultaneously): And the explanations, except in theory when [one/two words inaudible] to that [one word inaudible] Is that right? I just want to ask him about what that necess-- I mean-- It seems [couple words inaudible] [RP simultaneously: That theory.] kind of a thing. What you're calling the irrational necessity is something external and is defined as inaccessible to man? Well I mean, suppose you just change the definition alone to something internal, [RP simultaneously: Yeah but--] some propulsive-- I mean doesn't that change the--

RP (simultaneously): That was-- that was what-- my point is that's exactly what the so-called Rationalists, Continental Rationalists wish to do. They would change that necessity to logical necessity or a rational necessity.

LR (faint): What do you mean? Explain what you mean by that. [one word inaudible]

RP (simultaneously): Well that's why-- when I started, nothing-- nothing-- nothing would occur without a sufficient reason. Everything is essentially-- the *substance* of everything is essentially reason.

VM: But see, that's exactly where I--

LR (simultaneously): So--

VM: Ok, sorry, go ahead.

RP (simultaneously): And I'm saying this-- well, in so-- in some degree that's true. At so-- in a certain area that's true. But now, remember we're talking about pertaining to physic-- to-- to your life. And the necessity there, if it *is* a reason, it's a reason that's even inaccessible to Demiurgus, it's beyond-- he could only take it as a given necessity.

LR (faint): Exactly. Repeat the last (part/point). If it is [couple words inaudible]

RP: Yeah, maybe it's true that when all is said and done, that the only necessity there is is a logical or rational necessity. But that means taking a point of view--

LR (faint): Of the Demiurge.

RP: No beyond.

LR (faint): Beyond the Demiurge.

RP: Yeah.

LR: Why?

RP: Because there's in-- well I'll explain it from within the theology. I mean within the *Timaeus*, the Demiurgus himself *receives* [LR simultaneously: Is (subjected--)] necessity. He must persuade it. But never destroy it. He hasn't got the power.

LR: Yes, *but*--

RP: That's why there'll always be a world.

LR: And you're refuting this thing, this-- [RP simultaneously: No.] the irrational?

RP: I'm saying it's maturity to come to terms and just say it's true instead of a childlike thing saying it's not. The child doesn't believe in it. He believes it's capable of being persuaded. He's a pacifist.

LR (very faint): I [three/few words inaudible]

RP: The evil could be argued out of existence. It could be persuaded. But force must be answered with force.

VM: Look [one/two words inaudible] very necessity, Richard.

LR (simultaneously): If-- suppose you just changed your-- suppose you took that point of view that everything is subject not to this irrational outer necessity but some kind of real rational *inner* necessity.

RP: He'd be an angel.

LR: Does that now-- To which he has to conform.

RP: Yeah, that's [LR simultaneously, faint: That-- that he *is* that.] true too, I'm not-- Don't get me wrong, you know, we got two-- there are two imped-- there are two [one/two words inaudible]

LR: (I just want to/I'm just trying to) understand what you're saying, does that then change everything you say after that?

RP: No.

LR: It doesn't.

RP: No. But I'm just-- I'm just only talking about that, you know, fairly minor part-- when all is said and done, a minor part of his life. 'Cause after (that), now if he dies he gets reborn, it'll always be a world. But, a certainly felt to be *major* part of your life.

LR (faint): Which is what, physical reality?

RP: Yeah, coming to terms with the things which in some sense appear [one/two words inaudible]

LR: Undeniable.

RP: Yeah.

DR (faint): Yeah.

RP: And then when we say (that marriages) can you-- you have the best of a bad situation. Those-- what has to be can be turned to an educative lesson, and one can derive benefit from no matter what happens.

LR: I know what--

RP: But I can't believe that just about absolutely *everything*.

LR: Yeah, but in-- just [one/two words inaudible] everything you're saying--

RP (simultaneously): I'll leave that left over irrational--

LR: If you leave it as external fundamental irrational necessity there's no way except pragmatics, except approximation, to which man can develop or (create) his life to be in some way [couple words inaudible]

RP (simultaneously): But, Linda, it doesn't concern essence or anything like that.

LR (simultaneously): (If you would) just start out then is that what-- that necessity is an *internal* rational necessity, then the possibilities of *real* harmony and not some approximate pragmatic (efficiency), it seems like it changes the whole thing [few words inaudible]

RP (simultaneously): What if there really is no real harmony? All things pass.

LR: That's your [one word inaudible]

RP (simultaneously): In the mind it's forever. But as far as any material configuration? It will be like setting up an ideal state in the-- in the actual existent.

VM: Just to get my point out here, I would just say, take that necessity. Right in that necessity [one word inaudible] in that very necessity, are intelligible reason-principles. And the job, whether it's of a physicist or just a person wandering around in the world, is to confront necessity, learn what intelligible structuring principles are in it. [student assents] If you want to call making the best of it I would say that *is* our task is to understand our experienced world and grow from that and our-- our understanding will have to go deeper and broader, whatever adjectives you like. [student assents] Somehow it seems to me that the lesson *is* right in front of you. And that's where the intelligibility is invested. In fact I would go even further. All you know of the so-called nec-- necessary world *is* its intelligible aspect. Its material aspect *can't* be known.

S (faint): Oh but now you--

RP: Yeah.

S: Oh my God.

S (faint): You--

RP: I guess you've never been hungry.

AH (faint): Vic, (RP laughs) (there) was some fundamental kind of necessity in the way that Richard's (talking about it).

VM/S(?): Yeah.

AH: Well, (do) you see that as like continuous with evolution to reason-principle? Like it is continuous stream of necessity to a higher knowledge.

VM: I'd say right in the necessity are the reason-principles.

AH (faint): There seems to be there's a contradiction that (where/the way) necessity (comes to be). Necessity on the material plane is [couple words inaudible] and--

VM: Yes, yes.

AH (faint): But, that-- that takes [one word inaudible] through the higher purposes in some cases.

VM: I disagree, that's just where you learn reason.

AH: How would you-- how--

RP (simultaneously): In the gas chambers.

AH (faint): How would you align virtues with the necessity to survive? And maybe--

VM (simultaneously): It seems to me you learn about the preciousness of life, I mean, I just-- It seems that the world that you're thrown into is your school and each of those forces of necessity are teachers.

AH (faint): I mean how is putting food in our mouth like appreciation of justice?

VM: No wait a minute, you're juxtaposing two different elements of necessity and asking me how can I harmonize them.

AH (simultaneously): But you see, there *are* two elements of necessity but now--

VM (simultaneously): More than two.

AH: --if you start out with one [one/two words inaudible]

BS (simultaneously): You'll take everyone else's [one word inaudible]

RP: [few words inaudible]

S (simultaneously): But now you (add/have) the preciousness of life to that.

AS (faint): This is [couple words inaudible]

S (very faint): I don't know.

VM: I mean it [S simultaneously, faint: (No/Yeah).] just seems to me to--

AH: I'm not sure.

S (very faint): Stand up.

MW/S(?) (faint): Really?

VM: See then-- then all your experience must be--

S (simultaneously, very faint): Maybe [couple words inaudible]

BS (simultaneously, faint): Go ahead, Avery.

RP: No. [AS: I'm not--] Not all.

VM: Just a large fraction.

RP: Not even a large but a certain amount. It's just the dues you gotta pay, a certain amount of dues. Go ahead, I'm sorry Avery.

AS (faint): I-- I wanted to try and clear something up at this point. (Let's see here.)

S: Say it.

AS (faint): Well, this thing with the [S, faint: The problem.] [one word inaudible] (my understanding).

AD: Speak louder please.

S: Yeah.

AS: I didn't-- I didn't quite understand the thing with the fabricative--

AD (simultaneously): Yeah that was a bombshell (in/and) the corollary that [AS simultaneously: I--]
 $E=MC^2$.

AS: I think-- I think what you're saying, but I'm not--

AD: $E[=]MC^2$ is great.

AS: I-- I think what you're saying but I'm not sure is, there's a rea-- like your position Richard would be that, here's this world, the fabricated world, (the primal), ok, there it is, the material world, it's fabricated. Now, anything you bring to it, like you talked about on your level this technique, this technique in a sense isn't really-- how do you say, it isn't really derivable from that world, I mean it's adequate *to* that world. But it isn't something which is really intrinsic to the so-called material world because the material world you're speaking of *is* really sheer necessity. Anything I bring to it is really just applicable to a certain level. If I go to another level I have to come up with another concept or symbolific activity in order to make use of it but the two are like two worlds in a sense. They're split apart. Vic's-- in some way, and Vic's view is trying to say that whatever symbolific activity science comes up with isn't totally-- it isn't estranged from it, it's in some way intrinsic to the fabricated [VM assents] phenomena, it is [VM assents] a part of that phenomena, [VM assents] and there is no such thing as totally irrational or-- yeah, irrational fabrication but the world comes to me with a certain meaning and I'm combined with that.

VM (simultaneously): You're compelled to know it.

AS (faint): You're compelled to know it in a certain way. I don't know if that's (clear).

S: Do you want to tell me, you know--

BS: Would you say--

S (simultaneously): [couple/three words inaudible] conflicting now.

AD (simultaneously, faint): I don't think--

BS: Would you say (that, help) this compulsion--

AD (simultaneously): Wait, let-- let him repeat [one/two words inaudible] You're going to have to repeat (when/what) you're going on.

AS: Well I-- well I just-- I was just seeing if this is what he-- and, then use the first case you talk about this material fabrication, the o-- material agent. Material world is fabricated. And at any level that you're operating with you are going to come at it with certain concepts and so on that are adequate to that level, like intrinsic. You know, you wouldn't talk about truth or falsity, they're not intrinsic to the object but they're adequate to the situation and if you go to another level of that object--

AD: You're saying that this Richard's position, yeah.

AS (simultaneously): Richard's, yeah, this is Richard's position. And if you go to another level of the o--

AD (simultaneously): Why? Why would that be? Why would that-- why would Richard have to speak of that only in terms of adequacy and not truth or falsehood? Wouldn't it be that the premises that these people are starting from is that knowledge is something which is operative *reflectively*?

AS: Yeah.

AD: Ok.

AS: Exactly, [RP simultaneously: Yeah.] that's what I'm talking about, it's-- [S: Ok.] it's a concept he brings *to* the material because the material itself can't-- it's material, it can't possibly hold that, it's not an intrinsic [VM simultaneously: Right.] meaning.

AD: Well there I think you would see the very premises that the scientists uneducated by mentalistic epistemology takes a start from the object as outside.

AS: Yeah, that's [one word inaudible] [AD: In--] And it *always* is outside [AD simultaneously, faint: Yeah.] in this view. And maybe Richard--

RP: No, I-- go ahead.

AS (simultaneously): (In this sense.) Ok just--

AD (simultaneously): Wait, wait. I mean, just finish this. Go ahead, now the next [possibly one word inaudible]

AS: Ok, now I just-- the-- I thought that Vic was going to take the opposite point, that the object doesn't start as-- that the fabrication of the object doesn't start off as something separate from whatever knowledge he's bringing (to that).

RP/S(?): (And--)

AD: Like Vic hasn't been disillusioned by an approximus.

VM: No, no, the approximus doesn't bother me that much.

AS: He doesn't-- he doesn't care, that's not what's important about the object anyway in (this sense).

VM (simultaneously): No, the important thing is that it has a rational structure.

S (very faint): Yeah.

AS: Saying that that-- that rational structure is there in the fabrication. (There is in) the fabrication of the object to begin with the fact that the object's a--

RP: I would say, all kinds of science are possible. In other words, the one we have now, in a sense there's nothing necessary about it. The development could've taken a turn. That's the nice thing about these historical-- The development could've taken a turn in another way. You would think about these objects in a wholly different way. And (you would find) success by that way, by the way. In other words, there's nothing in the object-- well--

AS (faint): That compels a [one/two words inaudible]

RP (simultaneously): That compels a particular conceptual formulization. Or if you want, all the possible conceptual formulizations are reflections in our conceptual apparatus of a reason-principle in the object. I don't see what-- I can admit all that, that won't change the-- the fact that concepts are merely pragmatic, which is the [one word inaudible] essential. The concepts that we find in actual physical theory merely serve a pragmatic role and don't-- and maybe they reveal a part of the-- of the rational structure of the object, but, [couple inaudible AS words simultaneous with RP] by God, they also hide-- they hide nine tenths of it by doing-- by revealing a part. And that's the point of how-- of [one/two words inaudible] certain kind of flexibility [few words inaudible]

LR (simultaneously): Well that's not the same with what Anthony just said [couple words inaudible]

VM (simultaneously): But that's not a stronger position, Richard.

AS: I think that it is.

RP (simultaneously): No it is.

AS: The pra-- it's the question there of where he's saying it's not intrinsic to the object, it's not an essential--

RP: The concept, no.

AS: Concept is-- so it's just-- As you say, (it's not) necessarily speak of the truth or falsity of it.

LR (simultaneously): But isn't he just pointing out and saying that, Richard, that-- that the object is larger than any one formulation.

RP: Geez, I don't know what the object is. I only know through my concepts.

LR: But aren't you saying--

RP: I can admit anything about it. It doesn't bother me.

VM: No you can't admit anything about it, you'll be corrected by experience.

RP: No, no. I can admit anything within--

LR: That's--

RP: Let's say the object contains-- or the object is really-- has certain reason-principles. These reasons are so far above the-- the human-- the present human level (is-- I think) perhaps I can extend myself to yogic perception-- that-- the present level, that it's reflected as a variety of concepts within my mind, some of these concepts being mutually exclusive. And hence the controversy in the development of science.

VM: Yes but, doesn't-- don't some concepts win out?

RC (simultaneously, faint): [couple words inaudible] repeat just what you--

RP: Huh?

RC: Could you just repeat?

RP: Some of these concepts are mutually exclusive. [VM assents, faint] [AD: Another way--] (Hard to believe.)

AD: Yeah but another way of putting that would be, the ability for us to grasp the-- the *meaning* of an object.

RP: Sure, exactly.

AD (simultaneously): And I would say that they're [one/two words inaudible]

VM (faint): That's fine, yeah.

RP: Well-- Yeah that's ok. Yeah. But never-- I'm only looking-- are you--

VM: But there are [one word inaudible]

RP: As physics, as I-- as it appears to me as actually practiced. And the mea-- and what-- and why it's-- what it's practiced for. You see if people were honestly supposed to say, well I grasp the object in its full rational identity, you know, as a rational object, is the approach to continue physical theory the way that it's done or perhaps a wholly other approach is called for. Well, I'll-- you know, you have to develop the acuity of concentration and so on. Now if it's a wholly (other approach), it's a different story, it's a different issue. It's no longer physics.

VM: I'm not-- I'm not asking if physics is adequate to grasp the intelligible nature of the object. All I'm suggesting is that the physics does get sorted out. I'm saying the stuff that has a good deal of testing in the outer world and a good deal of logical-- internal logical consistency and so on, that those ideas, those rational formulations, *do* have some basis in the object. They are not just a spinning out of our own psychology.

RP: I never said that.

AS: Yeah I--

RP: No, a conceptualist isn't a psychologist. I never said it was (your) psychology.

AH: But see if that isn't so for physics--

VM: What's not so?

AH: That the reasons-- the experience of objects [one/two words inaudible] is some [one word inaudible] is some-- If it's not going to be so for physics--

RP: Oh, oh, I think it would be opp-- I'd say that the last place (it'll--) It's *much* more true in human relationships. It's much more true at the (mental) level than at the physical level. It's much less a likely story, much truer. [S: Hm.] That was Socrates' whole argument against the physiologists-- physiologists.

S (very faint): Yeah.

AH (faint): Then-- would you posit then two necessities? Necessity to deal with objects and necessity to deal with human relations?

AS: That too, I mean I would say it's just that there the reason-principles come all the way down and that's why the contingency is so [one word inaudible]

S (faint): Wait a minute.

AS: (Not) the physiology.

AD: You can-- well put it down, then you get larger than psychology, [student assents, faint] and you got a real problem to separate them from one another. And you'll see it's a basic problem, psychology and logic.

LR: (Does that help) [couple words inaudible] per se?

AD: In reflectiveness or in the reflective consciousness that we operate with in that-- (with) these physicists, alright, would have a mixture of logic and your (psychology). We can't get away from it. Now I think the-- I-- I think there's another way. I think there-- speaking of your position, Richard, I think-- I think it would be something like this. If theory is approximation of-- to varying degrees of (accuracy) to try to cover phenomena, alright, then-- then in that-- in that [one word inaudible] in the very nature of the approximation, there's the revelation of the-- a variety and an indefinite approaches, and that none of these will ever get to the essence of the object by their very nature (because) you're operating within the symbolic activity of our thinking. As long as those premises are not realized, we will not know truth

[couple words inaudible] [S, faint: That's right.] One hundred percent and that's exactly why I criticize Cassirer.

RP: No I'm just using him-- I use his analysis, not his conclusions.

AD (simultaneously): But I'm just using him as an example, that's [RP simultaneously: Yeah.] exactly why I [couple words inaudible]

RP (simultaneously): No, no, I [one/two words inaudible] for his analysis, not for his conclusions. His analysis is very acute.

AD: It's also the same criticism that I would lodge for instance at his (grad) student, Ms. Langer, Susanne Langer.

RP/S(?): Right.

RC: Could you just repeat?

AD: In the formation of an adequate (and) symbolific consciousness, [couple AD or student words inaudible] the truth or the falsity of (an object), there will never be such a thing as a truth or falsity because the only thing that we could speak about, the truth or the falsity of the interrelations (between these) concepts *within* that symbolific consciousness which *never* (touch) upon the object [one word inaudible] (by definition).

RC: In what sense is that not also [possibly one word inaudible]

AD: (Well) you-- let me finish. See, premises here, that the thinking that is operational and the object are distinct.

AS: That's a kind of fabricative and a gnostic [one word inaudible]

AD (simultaneously): That's what I meant $E=MC^2$.

S (very faint): Uh-hm.

AS: That's what I meant--

AD (simultaneously): The greatest revolution to come yet is not that matter and energy are convertible terms, but gnosticism and fabrication are convertible terms.

S (very faint): Yeah.

AS (faint): And see what he--

AD: This is the bombshell that physics doesn't even want to look at.

AS: $E=MC^2$ you're saying is an expression of [AD simultaneously: How about you?] the interchangeability of the--

AD (simultaneously): Yeah.

RC (faint): [few words inaudible] too, I mean-- And in terms of knowing how to ride a bicycle, I actually fabricate the circle [couple words inaudible] holding my bicycle.

AD: No, you see, that is too far away from what we're getting at. That's why I said, take an object, a quartz crystal, a mineral, a ring. Take it out, you're going to concentrate on this object. If there is such a thing as (idealism), you should be able to retrace the construction of that knowledge within yourself, that is by tracing it back, you should ultimately be able to get to the immaterial reason-principles that are organizing and *producing* the object, so that there *is*-- there *is* no hiatus between (you) and the object.

RP: Now that's-- that's-- that's-- Now tell me what that has to do with electrons, protons?

AD: Ok. Look, why don't you start, why don't you [possibly one/two words inaudible]

RP (simultaneously): That has nothing to do with electrons!!!

AD: Why don't you go through the history of quantum mechanics? Go ahead, why don't you start.

RP (simultaneously): That has *nothing* to do with it!

S: Where--

S (simultaneously, faint): [one word inaudible] isn't [couple words inaudible]

VM (simultaneously): When you say go through the history of quantum mechanics, you mean--

RP: Standing on one foot.

AD (simultaneously): I don't care, I don't (care) how long it takes.

VM: Well I mean [possibly one word inaudible]

AD (simultaneously): You're [one/two words inaudible] alive so we might as well try to find out while--

VM: Ok, fine.

AS (simultaneously): Before-- before you move one, could I just [one/two words inaudible] make sure I understand what you're saying.

AD: Look, same problem that you (brought) out the night (I wasn't here), that not even the Sage can distinguish between Providence [AS simultaneously: I know.] and Necessity [AS: Yeah.] within the world.

AS: But I want-- see, I think you're saying-- it seems that you're saying actually *both* views that are being presented are correct in a way. They're correct in this way. [couple words inaudible] that what we have is just conceptual or the guy's technique, it *is* cut off from the object.

VM: Uh-hm.

AS: Ok? But that's not to (dismiss) the possibility that it need not be cut off, that there *is* a possibility to penetrate into the core, let's say, *of* that object to find the intrinsic meaning of it. And what's more [couple words inaudible]

RP (simultaneously): But that-- and-- but that's a whole other kettle of fish. But look, (other than) that kettle of fish, the biggest impediment--

AS: No but in that kettle of fish [VM simultaneously: No.] [few words inaudible] in fact is also dependent [one/two words inaudible] intrinsic essence as much as the material fabricated object is. He's taking the point of view, oh, the material fabricated object is correct, that my knowledge has to conform and when it doesn't of course it's not adequate. The particular theory itself may be (an outflow) of the same thing that the object is an (outflow). And then, why put the (object) on a par that's [one/two words inaudible]

RP (simultaneously): Yeah, I know, but you know, this whole idea of pre-established harmony. I mean, that's what it comes down to [VM simultaneously: No.] but (that the--) that the-- what's in the object is what's in my understanding.

VM (very faint): No.

LR: No that's--

VM: That's-- I don't think that's where Anthony's coming from. But let me [S simultaneously: No, that's--] use an example. Let me use an example.

LR: (His--)

AD: He's speaking about Leibniz. [couple inaudible LR words] Some day a book on Leibniz *will* be written (of that) man, [RP simultaneously: Oh I'm a Leibniz (one word inaudible)] summed up two-- two thousand years of real [couple words inaudible] I'm not afraid of pre-established harmony. [LR simultaneously, faint: Sure, that's exactly--] That's good, that's (something) [one/two words inaudible]

S (simultaneously, faint): [few words inaudible]

VM (simultaneously with AD and S): Ok, ok, fine.

RP (simultaneously): Ok, now the thing (that I--) alright, [VM simultaneously: I like pre-established harmony.] agreed, agreed. The day you get physics to accept pre-established harmony, [AS simultaneously: You're going to be no longer physics.] invite me into the party. (RP laughs)

AS (amidst laughter, faint): What you need to say--

S (very faint): [one word inaudible] (RP laughs, laughter)

RP: I'll be there driving a car.

S (simultaneously): [three words inaudible]

VM: The parties [couple inaudible student words simultaneous with VM] happen but nobody's invited to them, (laughter) they're only-- they're only a one man party and rarely. And they are the kind of [one word inaudible] you talk about now. Heisenberg was-- was just a graduate student (of) Niels Bohr. They were working a theory of atomic structure. And this was before the real breakthroughs had come. They were beating their brains out. They were-- there's a fever pitch of intellects in that it was-- when they describe it they (go through) a certain sentimentality. It was nonetheless an exciting period. And, they

were working on these problems for days on end and they had these long discussions would go into the night and--

LR (simultaneously): Did they [one/two words inaudible]

VM: I don't know if they [one word inaudible] they probably smoked a lot of cigarettes, drank a lot of coffee. Now, Heisenberg got sick, (laughter) despite-- despite the fact that he was a rather athletic young-- he just got sick from the physical exertion of it, this horrendous case of [one word inaudible] or something came up.

S (faint): From the cigarettes and coffee.

VM: It was all the cigarettes and coffee, whatever. He went by the seashore and his whole face was all [one word inaudible] from-- from the-- this allergic reaction that he got. So he went to the seashore to get near the fresh air and all that business. Anyway, he-- the problem had had him in its grips. And he couldn't let go of it, it couldn't let go of him, and, he's up there and his little landlady is taking care of him, brought him chicken soup or whatever. About midnight one night or thereafter, this fundamental insight, I would say it must have been an Archimedes experience, "Eureka, I have it," he had this *insight*, it only lasted a moment but he describes it in this book that I recommended, *Conversations (and) Physics*. [Note: *Physics and Beyond: Encounters and Conversations*.] And clearly he described a mystical experience. This whole world of atomic physics opened for him. He went into it with a-- with a kind of clarity and penetration that frightened him. The whole wonder of atomic physics (stood right) before him. And then after this insight he had to go back and do the mathematics (to) see if conservation of energy would work, if the whole thing stood or fall.

LR (simultaneously): What did he see?

VM: I can't tell you what he saw, can I tell you what Archimedes saw when he [couple words inaudible] He had to come out--

LR: That's right.

AD (simultaneously): I expect that from Linda. (laughter)

VM: Please Linda, let me finish. [few words inaudible]

RP (simultaneously): Matrices, matrices came out of it.

VM: (It was) superior to-- to some kind of thing, what he saw.

LR (simultaneously): I know, I know, but why [couple words inaudible]

VM (simultaneously): I'll tell you, I'll tell you, hang on. So-- so [one/two words inaudible]

RP (simultaneously): [one/two words inaudible]

VM (simultaneously): His hours [couple words inaudible] (laughter) So, he had this insight that was really (prior) to the rational intellect, and I don't want to use rational, symbolic consciousness, symbolific consciousness. Then to bring it into symbolic consciousness, he had to do that, well one thing is he had to do was to check if conservation of energy worked. In physics that's, you know, really a superior law, you

can't have a theory that's going to violate that or if you do you better have a pretty good reason for it and so on. That's just like when somebody gets an insight here it's got to be in the context of the whole chart, you can't, you know, just (turn). So, he was so shaken from that-- from like a mystical experience that it took him (hour) to generate this-- this calculation. [one/two words inaudible] he'd make mistakes and he'd go "Oh damn", he'd have to do it all over again, and he finally made the check and he-- and he was so shaky. And, then (he is) walking outside in the dawn on the seashore and so on, very sentimental but none [possibly one word inaudible] That's the kind of party that-- (some laughter)

RP: There's no innocence [one/two words inaudible]

VM (simultaneously): They (wouldn't/won't) buy it. (laughter)

S (amidst laughter, faint): [few words inaudible]

VM: Right, right. That's the kind of-- that's the kind of experience I think that-- I wouldn't describe it this way, but I think a penetration into that [one word inaudible] the fabricative and the gnostic are right *in* the very object. And he's not looking at a piece of paper in front of him. And he's not [one word inaudible] calculations, formulated the first real formula [one/two words inaudible] in quantum theory, which is then, you know, elaborated by many other people, you know, so forth, but that was kind of a foundation of let's say quantum (mechanics). And that (kind of--) and I think it's just a more modern thing with Archimedes and the bathtub. That's where I think reflective consciousness *is* transcended. I agree with you in a sense, Richard, if you're stuck entirely in symbolific consciousness, then the reality of the object is not really accessible, and there's a certain contingency in the symbolic station. To use quantum mechanics [one word inaudible] Schrödinger came along and says, "I'm going to do this in terms of wave mechanics, not in terms of matrices." A good example of the kind of contingent or the kind of (arbitrariness, you want) the exact formulation of the insight. But the insight itself is this unitary ground where the fabricative and the gnostic are in the object, alright.

BB: I just wondered, you know, along that line, there's almost like a simplicity and-- but that simplicity is so total, the-- that when you get that [one word inaudible] that all of a sudden you start (constructing) possible things that it must have been, you get bogged down into a concretization (of what) it was and then you have the theory.

VM (simultaneously): That's where the hard work.

BB: Yeah at some point that there's some [possibly one word inaudible] totality but then you deal with the changes and [one/two words inaudible] as well as the complexity. You get lost into them.

AD: Let me (quote) one of Cassirer's students [one/two words inaudible] students, alright. Langer studied with Whitehead, like many of the other Cabinet members. (VM laughs a bit) I like Whitehead. Sometimes he becomes a little too pompous. [one word inaudible] I can't see so--

LR: Can't see so you turn [couple words inaudible]

RP (simultaneously): The light.

LR: Oh.

AD: Uh--

S: What?

[Transcriber note: I am using *Philosophy in a New Key: A Study in the Symbolism of Reason, Rite, and Art* by Susanne K. Langer, Harvard University Press, Cambridge, MA, 2009, originally published 1942.]

Susanne K. Langer [*Philosophy in a New Key*, p. 40, AD reading]: “If we ask how physical objects, chemically analyzable, can be conscious, how ideas can occur to them, we are talking ambiguously; for the conception of “physical object” is a conception of chemical substance *not* biologically organized. What causes this tremendous organization of substances, is one of the things the tremendous organisms do not know; but with their organization, suffering and impulse and awareness arise. It is really no harder to imagine that a chemically active body wills, knows, thinks, and feels, than that an invisible, intangible something does so, “animates” the body without physical agency, and “inhabits” it without being in any *place*.”

AD: Whitehead’s student.

RP: Yeah from the course.

AD: I couldn’t (believe) (in/the) disgusting [AH/S(?) simultaneously: Soul.] stupid materialism (I) come across.

LR: I didn’t get it.

S: The what?

AD: I can’t read it.

MW (simultaneously, faint): Thinks, knows--

RP: Why bring-- (bring her up)?

AD: Well, this is the inevitable outcome of the epistemological premises that Whitehead and Cassirer takes. Look, from the nineteenth century, 1900, once Planck started with his concept of the quanta, all the-- the developments in physics, they’re equivalent to the battles that were going on (in old) times between the universals are in the thing or in the mind. The battle that was going on between the Buddhists and the Hindus. I mean this is a re-accounting.

RP: That’s right.

AD: But now they have a (different) garb on, they got a dress, they got [one word inaudible] Would you read that?

VM: I--

LR: Do you want to hear this?

VM: Yeah please.

RP (simultaneously): Please.

LR: (I can't get) [few words inaudible]

AD: You mean Cassi-- Whitehead. He is what he claims (to be), the very statements he makes and I'll bring them out (and show them) to you-- no, uh-- in his *Process and Reality*.

LR (faint): I think these sentences before [couple words inaudible]

VM (simultaneously): You're going to back up a little bit? Yeah that's ok, (it's) something in the middle.

LR: That--

VM/S(?): (I think) you read this book.

Susanne K. Langer [*Philosophy in a New Key*, p. 40, LR reading (simultaneously with student above)]: "That man is an animal I certainly believe; and also, that he has no supernatural essence, "soul" or "entelechy" or "mind-stuff," enclosed in his skin."

VM: That-- that helps.

LR (simultaneously): This-- I was reading from the (bottom).

AD: (Should we) get that out of the quote without that!

LR: I know, but you gave me the book [RP simultaneously: Susanne--] [couple words inaudible] (laughter)

VM/S(?): It's real sickening.

Susanne K. Langer [*Philosophy in a New Key*, p. 40, LR reading]: "He is an organism, his substance is chemical, and what he does, suffers, or knows, is just what this sort of chemical structure may do, suffer, or know. When the structure goes to pieces, it never does, suffers, or knows anything again. If we ask how physical objects, chemically analyzable, can be conscious, how ideas can occur to them, we are talking ambiguously; for the conception of "physical object" is a conception of chemical substance *not* biologically organized. What causes this tremendous organization of substances, is one of the things the tremendous organisms do not know; but with their organization, suffering and impulse and awareness arise. It is really no harder to imagine that a chemically active body wills, knows, thinks, and feels, than that an invisible, intangible something does so, "animates" the body without physical agency, and "inhabits" it without being in any *place*."

S: Oh.

AD: In other words, a mere agi-- (agitator) [S simultaneously: Made no sense.] [one/two words inaudible] agitation.

VM: Uh-hm. It's [LR simultaneously: So--] just protoplasmic irritability.

AB: But she still has [couple words inaudible] somehow there about how [student assents] the chemical matter [RP simultaneously: (It says) underlined so (it's--)] (gets/that's) organized biologically is pointing.

S (faint): (It's a good answer.)

VM: I'd rather pick on some [S, faint: Really?] heavier hitter.

S (simultaneously): [couple words inaudible] also.

S (faint): So-- (bit of laughter)

S: Richard, you [couple words inaudible]

VM (simultaneously): I don't want to pick on women. Well--

JC: No I thought Richard was-- I mean to me from what we've studied before about the nature of matter, I thought that Richard was getting something more fundamental than that the object is organized by reason-principles. There's something in the object which is never touched by reason-principles.

AD: No I think [RP simultaneously: No, no.] it's more fundamental to understand what do they mean by *necessity*. That is the whole question.

JC: But maybe that's what they mean by necessity.

AD (simultaneously): What *is* necessity?

JC: It's the-- it's the matter that can never be completely disembo--

AD (simultaneously, intensely): Look, you're evading. [LR: That's--] You're evading. You're saying *matter*!

JC: Well that's what scientists [few words inaudible]

AD (simultaneously, intensely): Let's say necessity. Now what do we mean by necessity? Don't use the word 'matter'.

JC: There's something that reason can't completely contain within itself, that it has to give to something outside of itself.

AD: It might be the other way, that necessity is *super*-rational, *super*-providential.

RP (simultaneously): No. It *might* be.

JC: Well-- (RP laughs a bit) Yes. Well, I think Richard made that point, if the Demiurge-- that it's-- it only comprehended in a principle beyond the Demiurge.

[short pause]

BS: Did we answer the fabricative and gnostic?

LR (faint): We answered it.

S (very faint): We did?

LR (faint): (Were you--)

RP: Why is that amazing?

MW: Well (then), it was initially proposed as a question, is it possible [LR, faint: Oh.] that included in the knowing powers the root or being of the object. It was proposed as a question.

BS: I get the impression possibly-- well I-- I wonder, take an individual now, you are (immediately) presented with a world. You call this world 'x' in a way. Although we say it's material or objective, it isn't really objective, it's more possible to call it material, and that's an 'x' also. But the very necessity to try and know a relationship, a meaningful relationship to it, the very knowing with (a/the) concepts and a form would be fra-- fabricative of the object as well.

RP: For who?

BS: For that individual.

RP: Oh, I see. Until it doesn't fit anymore.

BS: Well, that's where I think Vic's idea comes in there, that the world will correct you.

RP: Continually.

BS: Hm?

RP: The point is continually. It could never be adequately. That's what you mean by necessity, there'll always be a world.

BS: Well I was just trying to handle the fabricative aspect that's connected with the gnostic, or the obverse side of it. [short pause] I don't make it sound possible (at all). But the very forming of a concept reveals something of the object to the person, or whoever's observing. And in that revelation the object is formed.

RP: No that-- I'm sorry, the object for him is formed.

BS: Yeah.

RP: Yeah sure. That's not doubted.

MW (faint): Not-- yeah.

RP: The object for him is formed.

BS: But whereas another step of course you gotta take how it's created by the Demiurgus, [RP simultaneously: Yeah.] is a step above this.

RP (simultaneously): And then the problem-- yes but, the problem of the truth of his theories *is* the relationship between. The object is formed by him, even at the level of the transcendental, even at the level of the perception, and the object as it is.

BS (faint): That's how I was starting to think of it. But the object as it is is a very strange thing.

S: Yeah. (bit of laughter)

DR: Indeed it is.

BS: It is constant-- it seems to be constantly created from it. It-- or-- [MW: It's--] Or recreated.

MW: Yeah it seems like, well you have a sort of progression, you start at a certain level of the subject and a certain level of-- of an object that seem to be different from each other. And then you try to say well, how does this person really have knowledge of this object. And then you go back and you say well there must be some power of that individual to know that is actually producing that-- those principles in him that are allowing him to know and also was producing that object. But then you say but really, there's-- there's actually-- that the object that he's starting with is not the full object, there's really more of the object than that. And then you go up well, but there's actually another-- a subtler power of the individual's knowing. And that-- that subtler power of knowing, that is also producing this greater part of the object. It seems you keep going up and I wonder at what point, if any, you actually get to the point where you say, this is the ultimate principle of the object and this is the ultimate principle of that person's knowing, and they really do coalesce. Do they really coalesce or do they just seem to keep getting closer and closer together but you don't--

VM (simultaneously): No. That would have to be in the Nous.

MW: Well that's right.

S (simultaneously, faint): (Yeah.)

VM: That would have to be let's say when-- when the individual as such in some ways lapses and knows his own self-identity in the Nous which is also the fabricator of all the objects, ultimately speaking. But it's not an active fabricator like the Demiurge but--

LR (faint): I don't think you have to go that (high/far).

VM: Well maybe you don't have to go that high but certainly that's where the subjective soul and the objective soul both have their ground.

LR: Ultimately.

VM: Yes. So certainly at that level you might be able to make the unity prior or later than that.

LR (simultaneously): (You/I) think there would be all stages [few words inaudible]

S (simultaneously): Yeah well I think-- I mean [few words inaudible]

MW (simultaneously): Well that's just saying [couple words inaudible] these stages but it's at each stage you can then point to there's something more in the object than that knowing power.

VM: Well that-- that's where it could stop.

MW: See--

RC: Well his question to me at least, it really comes down-- I present it in my mind as, is there any level at which you could appro-- and actually consider that knowledge could in any way be a spectator sport, you know. (bit of laughter)

VM: I'm not sure I follow but I like the metaphor. (bit of laughter) Spectator sport, not a contact sport.

RP: Far out.

RC: That you'd actually have to be involved in instantiating powers within your soul in order to have knowledge of any sort of object.

VM: See that's-- how do you mean by knowledge? I would think the way Anthony (was/is) thinking about knowledge, that it can never be a spectator or a passive kind of thing. [student assents] And that in fact, it more has to be described in terms of these exceptional experiences like, whether it's Brother Lawrence seeing a dead tree or Archimedes getting an insight into nature of specific gravity, [student assents, faint] Heisenberg penetrating atomic mysteries. That's what I think he's talking about as real knowledge. And that does transcend, if I understand it, the symbolific functioning, although it's eventually translated into the symbolific functioning. And then there's where there is a lot of this arbitrariness that I think Richard has done so well to point out.

AB: But Richard, how would you explain those experiences that Vic's talking about using just framework you started with?

RP: Uh, see, [VM simultaneously: Those are not the--] leaving out the two hundred experiences where the guy cried, it was so wonderful, it was wrong. (laughter) He actually played the violins and didn't sleep all night and he ran up to--

VM (simultaneously): I had (those/the) experiences.

RP: Yeah right! We're leaving those out.

VM: But I thought they were [one word inaudible]

S (faint): [couple words inaudible]

RP (simultaneously): Psychological exaltation is no mark of anything!

VM: No, that's right. That's right. And that's the beauty of science, that you can't just go with a psychological exaltation, you have to--

AB (simultaneously): But how do you account for something new [few words inaudible]

RP (simultaneously): (Well I'm obviously) telling you my account, one guy out of a hundred it's right, what can I tell you?

AH (faint): Also the-- all those people who didn't have exaltation, right or wrong.

RP: And got wrong-- well, yeah, got accepted and so on. We don't know what Schrödinger felt, he did his part which is equally valid.

AB: Still, how do you account for something completely new coming into that symbolific reflective understanding [LR assents] if you're just talking about [RP simultaneously: I don't really have to. I-- listen.] how [few words inaudible] level.

RP: Yeah, I-- you know, the world is that way, it's mystical and all that. I'm talking about-- I was just talking about the practice of physics.

VM: Yeah that's right [couple/few words inaudible]

RP (simultaneously): And-- and not-- it's not me who has to do any accounting, it's up to other people who have to account. It's their issue to ask about how they account.

AB: No. It just (seems/seemed)--

RP: For me the guy who was wrong had an equally valid experience too.

VM: Yeah.

RP: You know. It was valid for him.

RC: It just seems to be though that there is some kind of measure that determines whether (it gives) applicable impact. That that kind of coordination (isn't) something that could be discussed.

VM: Yeah, it's no doubt. I was sitting on Mrs. Ybor's porch when we were building it and I got one of those experiences, I was kind of wandering around in a haze all day. And, I thought "Wow! I really got it now!" And I ran home and I was calculating my brains out for two days in this state of ecstasy and I drove off into a cornfield when I was taking the babysitter home and so-- I was so spaced out (some laughter) thinking about all this stuff and I found out it was wrong. It's really a bummer, you're doing-- (laughter)

(Side 1 of original cassette tape digitized as 1981 1219b Ends; Side 2 Begins)

[few seconds of laughter, students words]

AB: Richard, one guy's experience produces the atom bomb and the other guy's experience just [couple words inaudible]

VM (simultaneously): Just goes in a cornfield, right.

AB: So they're *not* equally valid.

VM: No, look, there's a personal level of the experience [couple words inaudible]

RP (simultaneously): There's no arguing with the atom bomb. (RP laughs a bit)

VM: There's a personal level of experience where you do touch something beyond the-- beyond the normal functioning. But then, if you really want to do objective science, it does have to fit in with the corpus of both experimental and theoretical work and the logic of the system and all that good business.

BS: We got to make [one word inaudible]

AB (simultaneously): That's the sense-- Isn't that showing that there is something [VM simultaneously: Objective.] informing [VM simultaneously: Yes.] objective fabricative underneath.

VM: I-- I would say yes.

AB: Otherwise--

LR: How could it be [one word inaudible]

AB (simultaneously): I agree with Richard that you could explain the practice and technique of science by the symbolic reflective understanding. But it should-- doesn't seem to me that you could explain discovery, you know, or an invention or something like that.

VM (simultaneously): True invention, yeah.

SD: I think what Richard would argue though, I mean, I don't know, is that [S simultaneously: Ok.] something like--

VM (simultaneously): Too bad he's not here. (laughter)

SD: No I mean, wouldn't an answer to that be that any theory no matter how-- then it's accepted but later on it's sublated by something else.

LR: Yeah I think Richard could argue that point.

S (very faint): [couple words inaudible]

LR: Why don't you, Richard!?

RP: No I would say, the man who has the-- whatever happens whether it's valid for science or not, the experience was meaningful for him then and had the psychological dimensions which were important in his own-- in his own growth. It's only *incidental* that it happens to have [LR, faint: Right.] ramifications in the physical theory. It was *occasioned* by concentrating on a [one word inaudible] But he had a satori on-- he could've been concentrating on a *candle* and he wouldn't submit a do-- a paper to the Journal of Candalogy, you know.

VM: The Journal of *Luminology*. (bit of laughter) Wrong journal.

RC: But, nonetheless like these things that he said that are parts [VM simultaneously: No.] of the crafts that go on for ages and ages and, you know, get handed down on how to do something, how certain effects are produced. It seems that within certain conditions that things which were valid remain valid under those conditions.

RP (simultaneously): Oh yeah. Uh-hm.

RC: That--

RP: That's my whole point. Yes exactly.

RC (simultaneously): Might have to formulate-- it'd be a different theory [couple words inaudible]

RP (simultaneously): Well I would need to formulate a different theory, it's exactly true, that [AD simultaneously, faint: Yeah.] within the-- within that scale of perception this adequately accounts for what's observed. And it may even be fabricative. It's fabricative of that scale of perception if it's a good theory.

RC (simultaneously): And particularly in the trades, I mean it's interesting because there the-- the gnostic and the fabricative are necessary and to relate it, what the man needs to know how to make somehow.

And, he has to have in his knowledge the principles by which objectively a certain thing gets fabricated. Because if he doesn't then he can't fabricate it.

RP: Yeah but he doesn't really know how it's fabricated, he doesn't-- You're a potter. You don't *really* know how clay-- what makes clay clay. You know certain things about when [S simultaneously: Yeah how--] it's heated, [S simultaneously: Yeah.] how-- when it's baked, when it's fired. Fired not fried. When it's fired. (RP laughs) And so on and so forth. How it absorbs certain kind of tints and so on. Now that's like not pertains to clay in itself.

S: Yeah.

VM: That's why it's called craft, not science.

RP (simultaneously): That-- that pertains to the interface between-- And my argument is that all of science pertains to the interface between the need to-- the person who-- who-- who has a felt need to know and the object as it impinges upon him at a certain degree of scale of perception.

VM: No but see that's where I would just disagree. That's where the difference between engineering and science is. [RP simultaneously: I see this--] An engineer really want to do something with it, scientist merely cares to understand the foundations of the thing, the inner workings of it. He's not interested in *building* anything necessarily.

RP (simultaneously): Well, I disagree, I think engineer-- this distinction is only one a distinction of title. They have a different job-- job description. They're working in the same enterprise.

RC: But like you gave an example--

RP (simultaneously): I went to [S: Well--] MIT.

RC (simultaneously): --of that before in terms of-- like building a bridge for example, that it's done in terms of thought activity but unless your thought activity coordinates with the World-Mind's necessary thought activity--

RP: Look I none-- That's just an assumption. I mean, you know, um, the-- the World-Mind's thought-activity. I don't think the World-Mind thinks of the bridge the way any human being might. And yet the guy could build wonderful bridges. Did you ever see the Verrazzano Bridge? Simply gorgeous.

RC (simultaneously): No but he figures how to combine certain reason-principles, like whether a combination is objectively integral or not.

RP/S(?) (faint): Yeah, right.

VM: Bad bridges fall down.

RC: Yeah.

RP: But you know, the funny thing about pra-- some of these engineering disciplines--

BS (simultaneously, faint): Are you going to say it?

S (faint): (Uh-hm.)

RP: When you take these engineering disciplines and you compare them to so-called theoretical science that stands underneath them, they're *very* different. They think about their object in very very different ways. In other words, the guy who builds the bridge he may know very little about, well I don't know, certain for once-- for certain parts of physics which supposedly underlie what he's doing. What he knows is a-- is only-- is-- it's what determined at a certain, as I say, scale of perception or use for that bridge. And from the physical-- physicist's point of view, well, the bridge might not even be there from an atomic point of view. It's hard to say where the bridge ends and the air around it begins, it's (in an) exchanging molecules.

AH (simultaneously): The engineer-- engineer can build a bridge without ever having heard of reason-principles.

AD: But that doesn't mean [S simultaneously, faint: Can I--] he's not using them.

RP (simultaneously): No, no.

AH: But that-- but, that's the question. That isn't-- doesn't that-- just from a-- another kind of perspective that we attribute to reason-principles to just building a bridge. It's not--

AS (simultaneously): (Does) obviously use them, because look at the-- just what Richard says, beautiful bri-- I mean look at the [RP simultaneously: It's a beautiful bridge.] structure, it's beautiful to us.

AH (simultaneously): I'm kind of interested, where-- where-- where is the perspective to posit the reason-princ-- reason-principles? I mean, is the discussion totally one in philosophy? I'm having a little trouble--

RP/S(?) (faint): I don't understand his--

AD: Yeah (it'd still be/it's totally) from the point of view of philosophy.

AH: The whole discussion.

AD: Yeah the whole discussion. Physics to me is just an appendage to philosophy. It'll never be the other way around.

RP: Here let me put it this way. A physicist might say that the-- that the technique that the engineer uses to build a bridge is only an approximation but sufficient for the type of observation he's going to work with the bridge. And I'm saying it's not an approximation. It's a degree of existence of that bridge that's unique (into/unto) itself and must-- and not-- and must not be *reduced* to the atomic level. In other words, I'm arguing for a poly-meaning, [VM simultaneously, faint: Polymorphous.] polymorphous meaning for the bridge.

AD: Would you repeat that?

RP: Yeah. The physicist always tends to kind of reductionism. And here's this fundamental theory that underlies applied theory. And if the applied theory has its own laws, but those laws are really only approximations [AD, faint: Ok.] which were only adequate until a certain degree of observation. And I'm saying they're *not* approximations. These lore-- l-o-r-e, these lores involved with bridges speak about the bridge as it exists at that level of being a real bridge. [VM(?): Nah.] A bridge, not atoms. [S: In other words (one/two words inaudible)] I don't want to pay 35 cents to drive across atoms. I want to drive

across the Verrazzano Bridge. [S simultaneously: Richard come on.] (Because) atoms you'll slip right through the middle and you'll land in the ocean.

AS (faint): Two dollars now.

AH (simultaneously): You say both are true?

RP: Two bucks! My God! (some laughter)

VM: No, no, no. Those so-called laws or lores, I don't care what-- what you want to call them, they are derivable from more fundamental ones.

RP: Yeah, when you get $\cos \theta = 1 - \theta^2$! (RP laughing)

VM: That's what you mean by approximation.

RP: There's also a bridge. There's also color. Now I'll get back to color. There's real red. See I'm the one--

AD (simultaneously): Rich-- Richard is arguing for the validity of the degrees of reality.

RP: I am.

VM (simultaneously): Right, that's fine, that's fine, I want to just make a hierarchy, that's all.

RP: And I'm saying [VM simultaneously: Just, I want to make a (hierarchy).] it's more horizontally. [VM simultaneously: Nah.] It's a heterarchy.

AD: Ok, this is time for the Librans. Look--

VM: Mr. Libran, may I ask a question [MW simultaneously: You can't both be a hierarchy.] though, and that is, can you tell us what the schedule of classes are [S simultaneously: Are we meeting in two weeks?] both for the future--

AD (simultaneously): Well we should be-- we should be-- we're going to be closed for the holidays, right, so--

VM: Yeah.

AD: I don't know. When is the next class?

AS: But there is a [RP simultaneously: Check it.] class in two [LR simultaneously: The second.] weeks he says.

SD (simultaneously): Yeah.

AD/S(?) (faint): Yeah, alright. Morning, yeah.

SD (simultaneously): So that'll be the first class, we're starting-- [S simultaneously, faint: Saturday morning.] That's what you said, (yeah).

AD (simultaneously): First class will be Saturday morning.

SD: Yeah on January-- January 2nd.

VM (simultaneously) What day-- what day [S simultaneously: 2nd.] is that?

S (simultaneously): 2nd of January.

RP: Could there--

AD (simultaneously): Is that alright?

RP: Is there any--

AD: Look, I wanted to [S simultaneously: (Fine.)] suggest. I think one of the most exciting periods, I don't care what anyone says and I'm not a scientist, is the period from 1900 to now in terms of physics, starting with quantum going--

VM (simultaneously): I would say 1900, 1930 [RP simultaneously: Well that's a--] is really a-- But go ahead.

AD: Alright.

RP (simultaneously): I'm always-- I love physics.

AD: I mean, (bit of laughter) it took a band of really great minds to force the whole issue out in the open.

VM (simultaneously): Yeah. That was the golden age.

RP: And they're still open, they're not closed. [AD simultaneously, faint: Yeah, none of--] Even though there's a consensus like the-- like the Copenhagen interpretation, there's quite a lot of sound arguments on other sides.

VM: Right.

RP: But anyway, I-- can I just say, is there any possibility of moving the class to a different day, it's very [one word inaudible] difficult for me.

AD: Well, why don't you ask them?

RP: Is there any possibility of move-- (bit of laughter) class to a different time? I have a longstanding obligation on Saturday [one word inaudible]

AD: We could reverse the Friday and Saturday. Friday night?

S (very faint): Uh-hm.

RP: Yeah. Or a different [couple inaudible AD words simultaneous with RP] night-- [VM simultaneously: It doesn't matter to me.] or a night during the week that perhaps--

VM (simultaneously): I'm going to come to both of them so I-- I really don't care.

RP: Or a night during the week maybe that-- that's not being used, say Monday night?

S (faint): No. No [couple words inaudible]

RP (simultaneously): No? Alright [couple/few words inaudible]

S (simultaneously): Don't pick anymore nights.

AD: You see, Friday night is established, and Saturday morning is established, so we could reverse them. Doesn't matter, I could do-- we could do Plotinus Saturday morning. [couple words inaudible]

RP (simultaneously): Well I--

VM: To me it's all the same.

RP: Yeah I would say--

SD (simultaneously): But Sunday morning might work.

VM (simultaneously): I've given up on having Sunday morning.

S (simultaneously, faint): Oh no.

RP (faint): No.

S (simultaneously): No.

S (simultaneously with RP and S): No, 'cause I tried [S simultaneously, faint: No.] that before.

S (simultaneously): No except--

RP: Well anyway--

AS (simultaneously): If you want to keep your days the way they are just [RP simultaneously: Ok.] switch it [one word inaudible]

RP (simultaneously): It would make a big difference to me.

S: Right.

[few background student words]

LR: How about Wednesday class?

MW: No.

S (faint): Wednesday I have a--

S: When?

S (faint): When is that?

RP: Wednesday morning. (RP laughs) I was telling (everyone).

VM: What about Saturday night?

S (simultaneously): No.

BS (faint, possibly part of background): Do this one.

RP: No, no.

S (faint): Anthony doesn't want to do it.

S (faint): Don't gag.

LR: Sunday at 7.

AD (simultaneously): How's Friday night, Richard?

RP: Fine.

AD: Why don't we just switch classes.

RP: Alright.

AB: Look, just don't [S simultaneously: You're waiting Sunday night.] say anything to anyone who's not here, they won't even [one word inaudible]

VM (simultaneously): (Ok) what's the difference?

S (simultaneously): Yeah.

S: Well what about the 2nd then--

RP (simultaneously): No they should know.

S: --is the 2nd Plotinus or is the 2nd the continuing of this?

AD: Well Sunday morning we'll do Plotinus and Friday night we'll do this.

S: Ok Vic, (maybe--)

VM (simultaneously): But what-- I'm sorry.

S: So--

S (simultaneously): The first class after the holidays [S simultaneously: Will be Plotinus.] will then be on Plotinus on Saturday morning.

S (faint): What holiday, is it either Christmas--

AD (simultaneously): So that'll give you-- that'll give you three weeks, you think you can go-- run through the history starting with Planck and [RP: Oh yeah.] [one word inaudible] and Schrödinger and all the way?

RP (simultaneously): Oh no, Planck, you gotta start with Archimedes.

VM: Ah. (laughter)

S (amidst laughter): Oh no!

BS/S(?) (amidst laughter): You gotta do with the caveman's art.

AD: Well, we'll assume that at least they got up to the 1700.

VM: That's a good assumption, yes.

AD (simultaneously): Could we assume that?

VM: Yeah we'll start with Newton.

AD: Start with Newton.

AD: And go fast until we get to Planck.

RP: Yeah, ok, fine, it'll be fun. Yeah we could do that.

VM: And that-- and, the idea then is to-- well I'll talk to you more about it, there's no sense in talking about it right here.

AD: Alright then-- then we'll start in--

VM: The 1st. It's New Year's day.

AD (faint): 2nd [one/two words inaudible]

S (simultaneously): 2nd.

AD: [one word inaudible] right.

S (simultaneously, faint): 2nd.

S (faint): No, Vic.

VM: (All--) oh.

S (simultaneously): No, no, the Friday [S simultaneously, faint: Starting next month.] won't start the 1st.

VM: Oh I see, we're starting the 5th.

AS (simultaneously): The 8th.

VM: 8th.

AS: January 8th.

S (faint): January 8th?

RP (simultaneously): Oh if you (want) probably have to read about (them/him).

VM: Good.

S: Yeah.

S (faint): 8th?

S: That's big.

S: We've always--

AD (simultaneously): So that means [S simultaneously: And then--] January 2nd [S simultaneously: Yeah.] we'll start with Plotinus in the morning.

VM: Uh-hm, uh--

AD (simultaneously): After a night of revelry. (bit of laughter)

VM: Revelry.

[few seconds of background student talking, continues till the end]

RC: Oh yeah we-- we are going to rent the xerox-- we are going to rent the xerox machine and--

[Audio File 1981 1219b Ends]