

# Metaphysical Problems of Physics

## Lecture 11

### Metaphysics and Method

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# 1 Stein’s “How Does Physics Bear Upon Metaphysics; and Why Did Plato Hold that Philosophy Cannot Be Written Down?”

All page numbers in citations refer to the scan of the original manuscript available at <http://strangebeautiful.com/other-texts/stein-physics-and-metaphysics-original.pdf>.

## 1.1 Prefatory Remarks and General Issues

This is my favorite philosophy paper from the second half of the 20th Century. I consider it the deepest and most illuminating work of metaphysics (and metaphilosophy) of the 20th Century.

1. Stein considers the possible relationship between physics and metaphysics—a 2-way street, on his conception—by examining as an example of the interplay between the two the nexus of concepts centered on “power” and “cause”, being themselves central and fundamental in both physics and metaphysics.
2. He begins the paper with a concise albeit pregnant exposition and elucidation of the semantic theory sketched in the 7th Platonic Letter (pp. 3–4, his italics), emphasizing that, on the view,

the whole apparatus of what we might call “object-semantics,” involving both linguistic signs and ordinary things (Plato’s “images”), cannot suffice to determine meaning and truth, without some essential involvement of the *language users* and their *conceptions and beliefs*; and the writer goes on to assert that this determination can occur reliably only in *discussion*, with questioning and answering “free from envy”—and that, indeed, over a long time: a process which, in favorable conditions can lead to a shining forth of the light of understanding and intelligence. . .

Why does he start the paper with these ruminations? At least one reason: part of the paper’s point is that understanding, in the person of conceptual clarification, often comes only after knowledge has been attained (*contra* the views of many philosophers, who feel that conceptual clarification is a prerequisite to knowledge), and such understanding—the understanding of which is essential for grasping the nature of science and its characteristic forms of knowledge—comes from the contemplation of achieved knowledge by the users of the relevant concepts, and cannot be understood without reference to their actual epistemic state, which a formal semantics of the kind Stein deprecates, in which meaning is divorced from language users, cannot help with.

*Contra* the causal theory of reference and rigid designation—it is not the words themselves (ονόματα), but our comprehension and use (νοῦς) of the concepts (λόγοι) underlying them, that grounds the constitution of the meaning of words, and so makes possible the development of knowledge (ἐπιστήμη) and understanding (φρόνησις), *viz.*, a deeper grasp of concepts and

how they inter-relate, and of how they may come to need to be clarified, elaborated, revised or even dispensed with entirely in favor of novel concepts—and, after all, metaphysics is nothing more than a system of concepts.

3. Connected to the previous point is the idea that “conceptual necessity” of the kind that philosophers love to trade in is at best a confused notion and at worst an incoherent one. Concepts cannot be divorced from those who develop and use them, and concepts themselves evolve under the pressure of the expanding knowledge of those users. (Thus §II on William Blake.) This holds even for the concept “metaphysics” itself (§III).
4. New conceptions of the actors, script and theater seem often to appear simultaneously, qualifying, constraining and substantiating each other—why is that?
5. Our foolishness: there is instructive foolishness, which sometimes is (in historical context) necessary for progress; and (my term) *dumb* foolishness—it does not speak, or, more accurately, does not *converse*—it cannot do philosophy, cannot further comprehension, cannot aid but only hinder progress.

## 1.2 Structure of the Paper

1. the *play* motif
  - a. in the sense of a child serious at his play (Maxwell’s remarks on *Speculative Philosophy*, Stein’s instructive punning, his lighthearted mockery of Aristotle and Descartes, *inter alia*), the metaphor for a philosopher
  - b. in the sense of a dramatic production, with script (laws or forces of nature), stage (space, time and spacetime) and actors (physical systems), the metaphor for a theory of physics *cum* metaphysics (*e.g.*, the dancing of the electromagnetic field as part of the play); in this regard, there is also an echo of the emphasis on the inability of the written word—the *script* by itself considered as a formal representation of a physical theory *cum* metaphysics, without the interpretation provided by an embodied performance of actors who have immersed themselves in the script, who know the theater and its stage intimately—to provide a perfected summation of knowledge, rather all elements/ingredients/constituents are needed
2. the *music* motif, the composer as metaphor for the physicist (“finding the tune”)
3. the genealogical account of the development of concepts in physics and in philosophy, exemplified by “power” and “cause”, showing both continuity and disruption—as in children’s games, in theater production and in sophisticated musical compositions such as a fantasia by Orlando and Berg’s “Lulu”, for the extenders of knowledge and the elaborators and developers of concepts are to some degree and in some ways akin to children at play, to theatrical writers, performers and production personnel, and to musical composers

4. the conclusion, that (roughly) physics provides philosophy with knowledge, which grounds the clarification and elaboration of existing concepts and the development of novel ones, which in turn potentiate the search for new knowledge

### 1.3 The Actors

General:

1. subjects of “causes”, evincers of “effects”
2. what is “real” (in the sense of Einstein’s remarks on the contribution of Maxwell to our conception of physical reality)

Particular:

1. Descartes’ plenum and Cartesian corpuscles—the Mechanical Philosophy
  - a. plenum: its essence is *extension*, and one can identify and track “parts of the extended”
  - b. corpuscles: discrete and indivisible, accompanied by void
  - c. both: impenetrable
2. Newtonian material points and bodies (sets of material points)
  - a. localized in space, identifiable and trackable over time
  - b. possessing mass
  - c. “probable conjecture”: material points are of finite size, rigid, indivisible and impenetrable
  - d. there are also “fields of force” (*e.g.*, the “gravitational field”), but these are not actual but rather modal entities, associated with central bodies, “activated” at a given point of space at a given moment of time only when that point is then occupied by another body of the appropriate constitution so as to be susceptible to the force
3. fields
  - a. after Maxwell, the *fields themselves* are the actors, in the sense of providing the “metaphysical” basis for our understanding of the “real” in physics
  - b. the fields are the actors of the script, the bearer and subject of causal efficacy, the terms in the statement of laws, *not a representation* of the action of causal efficacy
  - c. in particular, the idea that the EM field is the contemporary conception of the “luminiferous æther” must be taken with a grain of salt—it is the *transformed* idea of an æther, as the momentum of the EM field is a transformed idea of momentum, still related to the Newtonian conception in the sense of being subsumable under a general kind under which the Newtonian is also subsumable, and a general kind, moreover, that seems to capture something essential about each
  - d. Minkowski spacetime more or less *demanding* this

- e. constrains our notion of “fundamental body” as something not easily subsumable under a notion of a thing whose elements—whose metaphysical atoms—exist in a region of space at a moment of time

## 1.4 The Script

General:

1. the “causes”
2. known only from—indeed, perhaps nothing more than—the play of “effects”
3. irreducible (yet analysable—the mathematical representation of indivisible, non-elastic Newtonian particles, *e.g.*) terms in the statements of laws
4. Newton’s “Method of Philosophy”, in the sense of this remark that he hoped the methods introduced in the *Principia* would lead to a better understanding of his own or some truer “Method”
5. qualifies and constrains the admissible *form* of causes and specific laws

Particular:

1. Mechanical
  - a. primitive, inchoate form of Law of Inertia (Newton’s First Law)—the concept of motion was itself not developed enough to admit a completely cogent formulation; *cf.* Stein’s remarks on p. 6 about the conceptual difficulties Descartes obviously faced in the analysis of motion in his scheme, and Newton ([unpublished](#)) and Stein ([1967](#), [1990](#)) for deeper analysis of the problems
  - b. all processes are governed either by that law or by collisions of bodies
  - c. thus, on one natural construal of “cause” and “effect”, effects temporally succeed their causes (*à la* Hume)
  - d. but there is a freedom here in “extracting” the metaphysics from the physics, for one could try to construe “cause” and “effect” differently here, more in line with the Newtonian picture (sketched below); and this is a general lesson—it is rarely, if ever, that physics univocally and unambiguously determines its metaphysics
2. Newtonian
  - a. 2 classes of fundamental or “first” causes, “forces of nature”, inactive (inertia) and active, each characterized by its own peculiar law
  - b. 3 Laws of motion that define the scheme each peculiar law of nature must conform to, and so constrain their possible forms (glossing over several interesting subtleties here)
  - c. particles act only by *interaction*, manifesting motion corresponding to forces that conform to the metaphysics determined by the 3 Laws

- d. according to *extremely* good evidence that he had collected, Newton asserted that, entirely contrary to the Mechanical Philosophy, interaction by collision was exceedingly rare, and indeed did nothing more than to make bodies stop
- e. on the most natural reading of “cause” and “effect” in this system, as determined by the dynamics itself, the two are simultaneous with each other; and causation can take many forms (direct concussion, action at a distance, pressure, stress, strain, . . .)
- f. ultimately extended and transformed by Euler, Lagrange, Jacobi, Hamilton, *et al.*, into new forms comprising elements both continuous with and disparate from the Newtonian original (including, perhaps most significantly, the capacity to handle forces whose action is appropriately represented by *partial*-differential equations, not only ordinary ones)

### 3. Maxwellian

- a. laws are not formulable in terms of the Newtonian “Method of Philosophy”, *i.e.*, in terms of laws of interaction—though they are formulable in terms of a “Method of Philosophy” derived from—or developed on the basis of—the Newtonian method, *viz.*, the Lagrangian, requiring the use of partial-differential equations

## 1.5 The Theater

General:

1. As a qualifier of *what is possible*, in the sense of *conceivable* as constructed from and delimited by the conceptual framework
  - a. Newtonian laws of interaction not possible in Minkowski spacetime
  - b. *contra* “rigid designators” and “possible worlds”
  - c. this perhaps captures what is right about Kuhn’s claim regarding the *incommensurability* of different theories
2. As qualifier and constrainer of possible forms, in particular, of “Methods of Philosophy”—*e.g.*, laws of interaction *versus* field laws

Particular:

1. Mechanical: plenum or void; neither worked out with the precision, clarity or depth needed for a cogent and comprehensive system of physics
2. Newtonian: something like absolute space and time, required (in the context of the epistemic state of the day) by the dynamics for its formulation and application; one can (and indeed *must*) verify that the permissible forms of Newtonian force law fit within the theater, *i.e.*, that the spatial and temporal concepts provided by Newtonian spacetime are sufficient to formulate the terms and relations required to define the 3 Laws and to develop any particular force law that accords with the 3 Laws
3. Maxwellian: the attempt to force electromagnetic fields into the Newtonian theater failed, and Einstein had to initiate and oversee the exploration of a new one, Minkowski spacetime

## 1.6 Metaphysics

1. detailed discussion of §VI
2. ...

## 2 Pro-Philosophic Panegyrics

I began the course with aphorisms. I will conclude it with aphorisms.

### aphorisms

Progress in philosophy—which can and does happen—consists at one time of a widening and deepening of the space of conceptual possibilities, and at another of a pruning and winnowing of it—in short, any fruitful modification to its content and structure.

To realize that what we had taken as a necessary idea or relation among ideas in thought is not necessary after all, and so need not reflect anything that holds of necessity in the world. To give up old “necessities” of thought and so open our mind to new conceptual possibilities. To free ourselves to look in new directions, to ask new questions and new forms of questions. That is the expression of a philosophical spirit.

Science is conflict. Philosophy is engagement. One leads to comprehension, the other to wisdom. Both are good. Both are needed.

The Truth of the philosopher—semantic truth, metaphysical truth, logical truth, conceptual truth, physical truth—is better nominated theoretical truth, for there is always a theory of the world with respect to which one’s propositions are true or not,

“That is cheap and easy” (said to dismiss a philosophical position). Expensive and floridly Baroque is better?

Philosophy is the continual battle against the prejudice that one knows what one is talking about.

Philosophy is a belief and a hope, sophism a belief and a desire.

Realism is not a proposition whose truth-value can be affirmed. It is a way of thinking, an attitude, a style of moving forward in one’s cognitive work, shaping and informing but not contributing to the content of one’s thought. It is a leap of the absurd into faith, but at the same time a sober reflection that is only one step in the ongoing dialectical

dance of one's cognitive capacities in their attempt to explore the world, itself to be given over to instrumentalism—also a leap of the absurd—as the times demand. And that will give over in its turn back to realism, in the Bacchanalic comedy of thought, which, from time to time, settles down into the stately progression of the tragedy of understanding, and back again and again—which eventuates in the pragmatic attitude.

Realism is the vigor of life spending itself with all its extravagance, giving itself away in every sense of the word, instrumentalism the necessary decomposition that will in turn render the soil of the mind fertile and nourish new life. Only anti-realism is inanimacy. Rocks cannot nourish life, and a coffin of iron will not allow the decaying dead to give itself back as nutrient and substance of new and different living forms.

One is a realist, and one regrets it; one is an instrumentalist, and one regrets it; one is a pragmatist and learns to take joy in passing from one regret to the other.

### 3 Invitation to a Short Essay

I invite you to write me a short discussion (no more than 2 pages, *i.e.*, no more than 1000 words) on any issue discussed in this week's reading or lecture. You can raise further questions, propose answers or interpretations, or whatever seems of most interest to you. If you get it to me by a week from the start of this lecture (20. Jul), then I will return it to you with my comments the following week.

### References

Newton, Isaac. unpublished. "De Gravitatione et Æquipondio Fluidorum". Hand-written Latin manuscript, original date of production disputed. Excerpts of the original Latin translated by Howard Stein, with interpolated commentary. Available at <http://strangebeautiful.com/other-texts/newton-de-grav-stein-trans.pdf>.

Stein, Howard. 1967. "Newtonian Space-Time". *Texas Quarterly* 10:174–200.

———. 1990. "On Locke, "the Great Huygenius, and the Incomparable Mr. Newton"". In *Perspectives on Newtonian Science*, edited by P. Bricker and R. Hughes, 17–47. Cambridge, MA: MIT Press.



Stein, Howard. 1995. "How Does Physics Bear Upon Metaphysics; and Why Did Plato Hold that Philosophy Cannot Be Written Down?" *Studies in History and Philosophy of Modern Physics* 72:152–161. Published in 2020. The paper was delivered by Stein as a talk at a faculty colloquium (an informal affair) of the Department of Philosophy at the University of Chicago in November 1995. A scan of Stein's original typed manuscript can be found at <<http://strangebeautiful.com/other-texts/stein-physics-and-metaphysics-original.pdf>>, doi:10.1016/j.shpsb.2020.06.004.