How Does Physics Bear on Ontology? Or, The Dialectical Dance of Realism and Instrumentalism

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[I]t has become the custom in physics ... of being liberal in bestowing "existence." ¶ Are [spacetime points] real? What are they really like? These questions are dealt with (more accurately, avoided) by means of ... custom. Physics does not, at least in my opinion, deal with what is "real" or with what something is "really like." The reason, I suppose, is some combination of (1) One does not know how to effectively attack such questions. (2) One does not know what sort of thing would represent an answer. (3) These questions are too hard.

Robert Geroch
General Relativity from A to B

The predictive accuracy of our best contemporary physical theories, in conjunction with the breadth and depth to which they allow us to characterize more generally the properties and behavior of physical systems, are nothing short of mind-blowing. If one is of a realist bent, having one's mind blown like this naturally eventuates in the urge to commit oneself ontologically.

It is also the case that every one of our best contemporary theories has regimes of applicability (spatiotemporal or energetic scales, *e.g.*) beyond which we know or have strong reason to believe that the theory breaks down, both in its predictive accuracy and in its characterizational capacities. If one has instrumentalist predilections, upon learning this one is likely to relax with a nice glass of sherry while looking down with smug, mildly pitying self-satisfaction at all those naive realists.

In this talk, I conclude that neither the realist nor the instrumentalist can claim any great victory with regard to ontology, and that a more modest pragmatic attitude accommodating the insights and strengths of each is most reasonable.

Outline

a common picture

1. a theory tells you how the world would be if the theory were true (Tarskian-like semantics)
2. + possible worlds as Tarskian-like models
3. ⇒ physics determines ontology in fine-grained detail

no

what to attribute existence to (if anything)?

object ontology objects of the sort described by our best theories exist

property ontology properties (physical quantities) of the sort described by our best physical theories exist, whether or not we have grounds for asserting the existence of objects underlying and bearing them

structural ontology physical structure (whatever exactly that may come to) characteristic of our best physical theories exists, whether or not we have grounds for asserting the existence of objects or properties underlying and defining them

case study

Newton's determination and measurement of a microscopic spatial length uniquely associated with what he called simple, homogeneal rays of light

17th–18th Century Corpuscularian the characteristic spatial interval (property realist) of Newton's "fits of easy reflection and transmission" (structural realist) for particles constituting light rays (object realist) of that homogeneal type, as governed by the solution to Newton's Second Law representing the particle and its dynamical evolution (mathematical representation of physics)

17th–18th Century Wave Theorist the wavelength (property) characteristic of that sort of homogeneal ray propagating longitudinally without twist (structure) in the lumeniferous ether (object), as governed by something like an ordinary wave equation (mathematical representation of physics)

19th Century Maxwellian the wavelength (property) characteristic of that monochromatic wave of electromagnetic radiation propagating transversely with twist (structure) in the electromagnetic ether (object), as governed by the Maxwell equations (mathematical representation of physical structure)

Quantum Mechanic the wavelength (property) of the photon (object) constituting the ray propagating along a null geodesic (structure), as represented by a wavefunction on the appropriate Hilbert space governed by the appropriate Hamiltonian (mathematical representation of physics)

Quantum Field Theorist (QED) characteristic spatial length (property) of the excitation (structure) in the quantum Maxwell field (object) whose effective manifestation at the relevant scale is that of a pure ray of monochromatic light, as represented by a wavefunction on the appropriate Hilbert space and governed by the Hamiltonian both suitably induced by the appropriate U(1) Yang-Mills theory associated with the appropriate irreducible representation of SU(2) (mathematical representation of physics), such that its spatial support is under suitable conditions localized on a null geodesic

Quantum Field Theorist (Electroweak Theory) characteristic spatial length (property) of the excitation in the quantum field (object) whose effective manifestation at the relevant scale (structure) is that of a pure ray of monochromatic light, as represented by the wavefunction on the appropriate Hilbert space and governed by the Hamiltonian both suitably induced by the appropriate broken symmetry of the U(1)xSU(2) Yang-Mills theory associated with the appropriate irreducible representation of SU(2) (mathematical representation of physics), such that its spatial support is under suitable conditions localized on a null geodesic

Semi-Classical Gravity Theorist no unambiguous definition of "characteristic spatial length" or "excitation" in quantum field

Quantum Gravity Theorist ditto, but more so, including no unambiguous definition of null geodesic

always more questions

None of these descriptions—the only and exhaustive ones the best theories of the day provide—support a determinate ontology, only a schematic one, for one can always ask more questions about the "nature" of the thing, the various answers to which are all consistent with the most finely grained and precise description the theory supports, and also consistent with the most finely grained and accurate constraints imposed by experiment

the Maxwell theorist

object ontology: luminiferous ether

– discrete

1. **solid atoms**: Democritean indivisible, impermeable, perfectly rigid sphere? Permeable? Rigid but some other shape? All the same shape? Size? Deformable? All with the same coefficient of elasticity? Divisible? If so, what are its constituents? And so on.
2. **Helmholtzian vortices**: Constant or variable fluid velocity? All with same velocity pattern? Shape? Size? Is the fluid continuous all the way down or discrete at a smaller level? And so on.

– continuous you get the idea

the Maxwell theorist

structure ontology: transverse-wave propagation

- **continuous** currents? undulations? local displacement? caused by strain? pressure? stress?
- **discrete** you get the idea

a naive reading of the mathematics misleads

different formulations of the same theory

general relativity

1. manifold and metric tensor
2. manifold, metric tensor, and stress-energy tensor
3. manifold and tetrad-field
4. manifold, tetrad-field, and stress-energy tensor
5. section of $SO(3,\,1)$ principal fiber bundle
6. section of $SO(3,\,1)$ principal fiber bundle over the spacetime manifold and section of the tensor bundle of 2-index symmetric covariant tensors over the spacetime manifold
7. manifold, choice of spin structure, and cross-section of the spinor bundle over the double covering space of the manifold
8. manifold, choice of spin structure and cross-section of the spinor bundle over the double covering space of the manifold, and stress-energy tensor
9. manifold, a diffeomorphism invariant gauge theory of the Lorentz group, with Lagrangian of the type $f(F \wedge F)$, where F is the curvature 2-form of the spin connection, with 6 extra primary and secondary constraints
10. manifold and Synge's biscalar "world function" (geodesic distance)
11. manifold, Synge's biscalar "world function" (geodesic distance), and stress-energy tensor
12. manifold and fixed set of values for scalars in parametrized post-Newtonian formalism
13. manifold and fixed set of values for scalars in parametrized post-Newtonian formalism, and stress-energy tensor
14. Einstein algebra
15. . . .

no principled way to say one is "canonical" or "privileged" the only ontological commitment that successful theory and experiment can provide is of a radically underdetermined sort; they allow us to say only that *something*, we know not exactly the fine details of which, exists; and the sense in which that thing exists is not univocally determined

and there is no guarantee that there is a single, unambiguous "structure" that underlies and is shared by all the different formulations; demonstrably, in this case there is not (there is no bijection between the family of manifolds, spin structures and cross-sections of the spinor bundle over the double covering space of a given manifold on the one hand, and the family of manifolds and fixed sets of values for scalars in a parametrized post-Newtonian formalism on the other)

What Perrin showed to exist was consistent with the revealed entities being, *e.g.*, something like indivisible rigid spheres ("Newtonian particles"), or else something like Helmholtzian vortices or Rutherford's watermelons, or what have you, which is to say, it shows "what exists" only ambiguously, and even that at best approximately, and that even more in so far as we now think fundamental "particles" are rather excited modes in quantum fields, not discrete and localized in any reasonable senses of those terms bearing on physicality, and indeed "excited modes of quantum fields" are themselves at times only approximately enumerable ("discrete"). Most importantly, at the scale at which his results were valid the details of the fine structure of those entities is entirely irrelevant.

Perrin did not demonstrate the existence of *atoms* in any determinate sense: he rather demonstrated that there is *something* at small scales that, under appropriate circumstances, has a character appropriate for counting "units" of it, to each of which a characteristic mass and size can be attributed—but nothing more.

If one wants to be a realist, then it is incumbent on one to know with some determinacy what one is a realist about. Otherwise, one is in the position of the kid at Christmas who knows there is a present awaiting him in the wrapped box, but has no clear idea what, only that it is good—who is then disappointed on opening it to find a lump of coal, and is then excited to find it is really a cleverly disguised block of chocolate, and is then disappointed to find a dollop of castor oil in the middle, and is then excited to find. . . . Sure, we may be confident there is *something* "there in the world". But what?

what is a black hole (crudely speaking)

- region of "no escape" (does not imply "gravity is strong")
- No Hair: completely characterized by mass, angular momentum, electric charge—like a fundamental quantum particle
- Chandrasekhar: "most perfect objects in the universe" (pure geometry)

Field	Core Concepts
astrophysics	• compact object • region of no escape • engine for enormous power output
classical relativity	• causal boundary of the past of future null infinity (event horizon) • apparent horizon (all outgoing light rays "get turned around") • quasi-local horizon
mathematical relativity	• apparent horizon • singularity

Table: the core concepts common to different fields for characterizing black holes

(Curiel 2019, "The Many Definitions of a Black Hole", *Nature Astronomy*, 3:27–34)

Field	Core Concepts
semi-classical gravity	• same as classical relativity • thermodynamical system of maximal entropy
quantum gravity	• particular excitation of quantum field • ensemble or mixed state of maximal entropy • no good definition to be had
analogue gravity	• region of no escape for finite time (“long” compared to characteristic time) • same for low energy modes (“low” compared to characteristic energies)

Table: the core concepts common to different fields for characterizing black holes, cont.

(Curiel 2019, “The Many Definitions of a Black Hole”, *Nature Astronomy*, 3:27–34) different properties one may demand of a "black hole"

- possesses a horizon that satisfies the four laws of black hole mechanics
- possesses a locally determinable horizon
- possesses a horizon that is, in a suitable sense, vacuum
- is vacuum with a suitable set of symmetries
- defines a region of no escape, in some suitable sense, for some minimum period of time
- defines a region of no escape for all time
- is embedded in an asymptotically flat spacetime
- is embedded in a topologically simple spacetime
- encompasses a singularity
- satisfies the No-Hair Theorem
- is the result of evolution from initial data satisfying an appropriate Hadamard condition (stability of evolution)

different properties one may demand of a "black hole" (cont.)

- allows one to predict that final, stable states upon settling down to equilibrium after a perturbation correspond, in some relevant sense, to the classical stationary black hole solutions (Schwarzschild, Kerr, Reissner-Nordström, Kerr-Newman)
- agrees with the classical stationary black hole solutions when evaluated in those spacetimes
- allows one to derive the existence of Hawking radiation from some set of independent principles of interest
- allows one to calculate in an appropriate limit, from some set of independent principles of interest, an entropy that accords with the Bekenstein entropy (*i.e.*, is proportional to the area of a relevant horizon, with corrections of the order of $\hbar$)
- possesses an entropy that is, in some relevant sense, maximal
- has a lower-bound on possible mass
- is relativistically compact.
- formed by the gravitational collapse of matter

different subsets of these properties are used in different contexts in different investigations, often in the same field

but they are jointly inconsistent

$\Rightarrow$ no definition can accommodate all actual uses of the concept in contemporary physics

some more traditionally philosophical issues

semantics of theoretical terms in scientific theories:

- we do not know what objects the name 'black hole' may appropriately pick out ⇒ no fixed relation of "designation" between words and objects (*e.g.*, *à la* Tarski)
- inconsistencies in its use ⇒ current usage cannot fix such a univocal relation
- ⇒ rules out rigidity of reference based on "essential structure" and causal theory of reference
  (Kripke/Putnam) cannot get off the ground

Lessons:

1. difficult to see how standard truth-conditional semantics can work
2. meaning comes before reference!
3. $\Rightarrow$ epistemology and methodology before ontology!

(Curiel, "Schematizing the Observer and the Epistemic Content of Theories", forthcoming 2021, *SHPMP*; arXiv:1903.02182)

Do Electrons and Spacetime Points Exist?

There are three definite, clear, related senses in which spacetime points are not physical systems in the way that electrons are:

1. no other manifestly physical system couples to spacetime points as the electromagnetic field couples to electrons (they don't "interact" with other physical systems)
2. spacetime points have no distinguished class of physical quantities associated with them
3. spacetime points obey no set of equations of motion

electrons in QED

- fixed kinematic quantities: mass, charge, and spin (and, depending on one's sophistication, lepton number, weak isospin charge, *et al*.)
- fixed dynamic quantities: position, momentum, angular momentum, spin, energy, *et al*.
- fixed equation of motion: Dirac equation

can't attribute shear viscosity (say) to an electron—its equations of motion not appropriate for representation of such a physical quantity

spacetime points in general relativity

- can "attribute" *any* physical quantity to a spacetime point, be it shear viscosity or charge or ...: the spacetime point itself doesn't bear the physical quantity in any physically significant way
- the spacetime point can be occupied by a viscous fluid or by an electron promiscuously: we can paste any old physical quantity onto it
- there are no equations of motion for a spacetime point: spacetime points evince no "behavior"

This is why electrons have a distinguished set of physical couplings (*e.g.*, via charge) with a distinguished set of other physical systems (*inter alia*, Maxwell fields), whereas spacetime points do not.

That, to my mind, is one of the very marks of a physical system in something like the standard sense of the term (if there is one): that it have a definite number and type of possible couplings it can enter into with other physical systems based on the kinematic quantities one can sensibly attribute to it and the equations of motion those couplings obey.

A physical system must be something that has a distinguished set of kinematical properties accruing to it and has dynamical equations of motion. Otherwise it can have no definite number and type of possible couplings it can enter into with other physical systems, and so one could not study it experimentally. By this criterion, spacetime points are not physical systems. If they do “exist”, it must be in a different way.

not verificationism

I do not demand, for something to count as a physical system, that there be a determinate set of propositions about it whose truth values can be determined experimentally. I demand rather that one be able to formulate *some* propositions about the thing that admit of empirical investigation at all. Such investigation may even bear on the system only indirectly, so long as it bears on it in some substantive way. (There is no entropometer, but entropy is physical.)

I do not believe that the notion of "bearing on in a substantive" way itself admits of formal, rigorous, precise and generic explication—in different cases one will have to work out in different ways what counts and what doesn't.

so far as “existence” goes, the difference between spacetime points and electrons could not be more complete

but at least electrons exist in a univocal way, right?

Consider the question “do electrons exist?” Surely one can render canonical significance to it independent of investigative context.

Think of the different contexts in which the concept of an electron may come into play, and the natural ways in those contexts one may want to attribute existence (or not) to electrons. A small sample:

- as a component in a quantum, non-relativistic model of the Hydrogen atom
- as an element in the relativistic explanation of the Lamb shift
- as a measuring device in the observation of quark structure from deep inelastic scattering of electrons off protons, as treated by the Standard Model
- as a possible "constituent" of Hawking radiation in an analysis of its spectrum

Why and how do we attribute existence to the electron?

Hydrogen atom its associated quantities enter into the initial-value formulation of the system's equations of motion

Lamb shift as the bearer of definite values for the kinematic Casimir invariants of spin and mass, as well as the conserved quantity electric charge, all of which make it susceptible to coupling with vacuum fluctuations of the quantum Maxwell field

quark scattering localized charge, spin and lepton number associated with the mass-energy resonance representing it, used to identify it by further measuring devices after scattering

Hawking radiation no good definition of an electron at all in general, only non-localized excited modes of Fermionic quantum fields many reasons and ways to think something described or relied on by a theory may exist or "be physical":

- possesses mass-energy (*e.g.*, Maxwell field)
- required for initial-value formulation of manifestly physical fields (*e.g.*, Maxwell field, metric, derivative operator)
- dynamically couples to manifestly physical entities (*e.g.*, Maxwell field, electric charge, gravitational radiation)
- dynamically couples to manifestly physical quantities that more than one type of physical system can bear (*e.g.*, Einstein tensor)
- acts as a measure of an observable aspect of manifestly physical entities (*e.g.*, Riemann curvature)
- enters the field equation or equation of motion of a manifestly physical structure (*e.g.*, Einstein tensor, entropy)
- constrains the behavior of a manifestly physical entity (*e.g.*, metric symmetry, global light-cone structure, entropy)
- plays an ineliminable (albeit physically obscure) role in the mathematical structure required to formulate the theory (*e.g.*, spacetime point)

no quantity, entity, or structure I know, in any physical theory, for any physical system, plays all those roles ‘existence’, if said at all in physics, is said in many ways

You can beat your fists on the table and vigorously demand, "No, I just mean *exist*! I don't need *criteria* for what I mean by that!"—and I will tip my hat and bid you "good day", because we have nothing more to talk about. A concept or idea that cannot be discussed, argued about, analyzed, whose relations to other concepts cannot be teased apart and probed, whose possibly different uses in different contexts one cannot attempt to explicate—and thus for which some criteria or principles must up be for grabs—has no place in serious intellectual work.

A remark on the logic of "to exist" here—one may want to object that I am conflating two questions:

1. whether there are different ways for things to exist (and different reasons for believing something exists);
2. as opposed to whether the intended meaning of "exists" is still determinate and fixed uniquely.

Strictly speaking, a positive answer to the first question does not entail a negative answer to the second question. One could follow Quine, and say that the meaning of 'exists' is a "thin" logical one, as given, *e.g.*, by the logical/semantic rules for the existential quantifier, one and the same for all the different "modes" of existence indicated by my list of criteria.

Strictly speaking, there is no term in the formalism of any theory of the electron we have (the theory of classical Maxwell fields and charged particles, quantum electrodynamics, and so on) that denotes electrons (neither the concept nor individuals falling under it). There are only terms that denote physical quantities we naively think of as being borne by the electron, such as mass, charge, spin, parity, lepton number, and so on, or in QED amplitude of Dirac field. One natural way to interpret this state of affairs is that, in such theories, "electron" is a concept constructed out of the basic concepts of the theory (*viz.*, the physical quantities). *One does not quantify over electrons in the formalism of any theory.*

One has to extend the formalism, constructing a new one with its own logical connectives, quantifiers, logical/semantic rules, and so on. I do not know how to compare the meanings of existential quantifiers in two different formal systems—in the constructed system, one quantifies over what had been predicates in the original system, so it is not obvious that the quantifiers "mean the same thing" in the two systems. Thus, I do not know how to decide whether 'exists' means the same thing in the two systems.

Another remark on the different logical roles played by terms that do appear in a theory's formalism: generally speaking, in field theories (as opposed to classical mechanical theories), quantities appearing in the field equations can have different ontological import. In Maxwell's equations, the terms denoting electric charge and current represent quantities borne by a physical system; the terms denoting the electric and magnetic fields represent physical systems—they play the role of "substrate" or "substance". One can make this precise. If I know only the value of the electric charge of a system, I cannot tell you want kind of system it is, much less the values of its other quantities. If I know the values of the electric and magnetic fields, not only do I (trivially) know what kind of system it is, I also can calculate the values of all other quantities borne by it (energy, momentum, angular momentum, polarization, *etc.*). The value of none of those other quantities, however, uniquely determines the state of the Maxwell field, much less that the system at issue *is* a Maxwell field.

classical Maxwell theory, in other words, does not seem to be amenable to treatment by a single existential quantifier, at least if one wants to try to make manifest what seem manifestly to be differences in "being" among the entities (naively) denoted by the variables in Maxwell's equations

If *everything* exists only in the thin, Quinean sense, and thus all in the same way, then to say something exists is to have said nothing at all, exactly because of the universality and homogeneity of the concept. It has no physical content.

One is, of course, still free to use it if one likes. I however, do not see the point, in so far as physicality, with its variegation, including all the ways its different types admit of physically significant explication, is a much more interesting concept, grounding the formulation of more fruitful questions and possible answers.

In any case, one conventionally deals with relationships between things which one does not (or perhaps cannot) understand on a deeper level. One does, of course, sometimes come to understand some basic concept more deeply. (For example, space and time were basic concepts in Newtonian gravitation. With general relativity, one does feel a sense of deeper understanding.) Perhaps it is true to say that one has found from experience that deeper insight into the basic concepts of a theory comes most often, not from a frontal attack on those concepts, but rather from working upward into the theory itself.

Robert Geroch
General Relativity from A to B

Man would rather believe nothing than not believe.

Nietzsche
Beyond Good and Evil

ontological commitment seems to solves problems:

> *In order to have knowledge of regularities governing phenomena, we must postulate objects 'carrying' the properties instantiating the regularities.*
>
> Paul Teller
> "Pan-Perspectival Realism" (public talk)

it is as mysterious (or not) that “the electron always knows how to move in a given electromagnetic field” as

- that the bare quantities electric charge and intensity of electromagnetic field are always correlated in a particular way
- that certain experiments always return the same results
- that our theories get it all right

only a deeply inbred and degenerate Aristotelian essentialism says otherwise—that to postulate a substance with its concomitant φύσις (natural attributes and potentialities—occult qualities!) solves philosophical problems

IT DOES NOT

- "This thing did that; this is a thing of that kind; all things of that kind do that; that is why this thing did that."
- "This is its own idiosyncratic thing; it did that, in its peculiarity; that is why this thing did that."

We count the former as an explanation, the latter not—which is to say, we have low standards for that kind of thing.

ontology explains *nothing*

nonetheless, instrumentalism is shallow: I can believe that "there is a way the world is"—and do so with good reason—without being a realist in the sense that I believe our best scientific theories are, with respect to ontology, an adequately accurate representation of the world in any depictive, verisimilitudinous way

the dialectic of realism and instrumentalism

It makes sense at certain stages in the development of science to treat one and the same theory realistically and instrumentally in different contexts, depending both on the stage of our knowledge of the part of the world the theory's contextual usage pertains to. The same theory can be applied at different levels, for instance, to model different systems, some of which we know far more about and are more certain about—both in achieved knowledge and in application of the theory to try to substantiate current knowledge and to extend it. The same theory can also be put to different uses, such as modeling a well known system using well known techniques as opposed to trying to develop a new theory based on the old, even when it is known that the old cannot be correct. In the different circumstances, it can be more fruitful to be strongly realist or strongly instrumentalist about the theory—and sometimes, the dichotomy fails to capture the subtleties of the attitude and the usage.

Indeed, it is one of the marks of a great scientist that he or she is able to hold simultaneously multiple views of the matter at hand, treating their ideas and theories sometimes in a realistic manner, sometimes in an instrumentalist one, whatever is most useful and fruitful in the context of the work at issue.

(Examples: Newton in his derivation of gravity; Maxwell on atoms, and on the electromagnetic field and the ether; Lorentz on the ether and the electron; Einstein on spacetime geometry and stress-energy; Schrödinger on wave-functions; Penrose on singularities; Hawking on quantum fields in the vicinity of black holes; *etc.*)

The only position physics warrants is that of belief in a schema: there is something or other there in the world that has associated with it in some way or other (*e.g.*) Newton's determinate spatial length. And so one has become a pragmatist about realism—and about instrumentalism. For this position is compatible with the belief that there is nothing in the theory that stands in any realistically, thoroughly depictive relation to anything in the world. It is also compatible with the belief that we make true progress in the accumulation of scientific knowledge, for we do come to understand better, in deeper ways, what that spatial length means—how it arises as a descriptive part of approximative models constructed from ever better and deeper physical theories, and how it is used in novel investigations to construct those better and deeper theories, even when one has good reason to believe that nothing like that length is unambiguously defined there.

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. It is a Kierkegaardian 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 balletic whirl of thought, and back again and again.

[B]etween a cogent and enlightened "realism" and a sophisticated "instrumentalism" there is no significant difference—no difference that makes a difference.

Howard Stein
"Yes, but. . . —Some Skeptical Remarks on Realism and Anti-Realism"

When science starts to be interpretive
It is more unscientific even than mysticism.

— D. H. Lawrence
"Self-Protection"

a metaphysical realist

one who says "it *must* be so"—and thinks he means something by it

an anti-realist

one who says "it *cannot* be so"—and does not doubt her doubt

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

A Knight of Faith? Or a Lost Soul?

be a realist about ontology?
or
an instrumentalist about theories?

make the leap of the absurd?
or
remain a skeptic and be damned?

I tentatively recommend. . .

Socratic Irony

a pragmatic, dialectical process of moving from skepticism to faith, and back again, as our epistemic circumstances evolve under constant questioning, and as the demands of our investigations change in different contexts, knowing that we do not know

How cold the vacancy
When the phantoms are gone and the shaken realist
First sees reality. The mortal no
Has its emptiness and tragic expirations.
The tragedy however may have begun,
Again, in the imagination's new beginning,
In the yes of the realist spoken because he must
Say yes, spoken because under every no
Lay a passion for yes that had never been broken.

Wallace Stevens
"Esthétique du Mal" (viii)