



The Discontented
Positivism of
Science

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With many thanks to Wikipedia, as usual.

Cover: Simulated data modeled for the CMS particle detector
on the Large Hadron Collider (LHC) at CERN.

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Positivism is a philosophical theory stating that certain (“positive”) knowledge is based on natural phenomena and their properties and relations. Thus, information derived from sensory experience, interpreted through reason and logic, forms the exclusive source of all certain knowledge. Positivism holds that valid knowledge (certitude or truth) is found only in this a posteriori knowledge. Verified data (positive facts) received from the senses are known as empirical evidence; thus positivism is based on empiricism.

Positivism also holds that society, like the physical world, operates according to general laws. Introspective and intuitive knowledge is rejected, as are metaphysics and theology because metaphysical and theological claims cannot be verified by sense experience. Although the positivist approach has been a recurrent theme in the history of western thought, the modern approach was formulated by the philosopher Auguste Comte in the early 19th century. Comte argued that, much as the physical world operates according to gravity and other absolute laws, so does society.

Historically, positivism has been criticized for its reductionism, i.e., for contending that all “processes are reducible to physiological, physical or chemical events,” “social processes are reducible to relationships between and actions of individuals,” and that “biological organisms are reducible to physical systems.”(Wikipedia)

The opposite of reductionism is holism, that understanding a system can be done only as a whole. One form of antireductionism (epistemological) holds that we simply are not capable of understanding systems at the level of their most basic constituents, and so the program of reductionism must fail. The other kind of antireductionism (ontological) holds that such a complete explanation in terms of basic constituents is not possible even in principle for some systems. Robert Laughlin, (Robert Betts Laughlin is the Anne T. and Robert M. Bass Professor of Physics and Applied Physics at Stanford University.) e.g. supports this view. Disciplines such as cybernetics and systems theory embrace a non-reductionist view of science, sometimes going as far as explaining phenomena at a given level of hierarchy in terms of phenomena at a higher level, in a sense, the opposite of a reductionist approach.

Although breaking complex phenomena into parts is a key method in science, there are those complex phenomena (e.g. in physics, psychology, sociology, ecology) where the approach does not work. Antireductionism also arises in academic fields such as history, economics, anthropology, medicine, and biology as dissatisfaction with attempts to explain complex phenomena using simplistic, ill-fitting models, which do not provide much insight. (Wikipedia)

Max Horkheimer* criticized the classic formulation of positivism on two grounds. First, he claimed that it falsely represented human social action. The first criticism argued that positivism systematically failed to appreciate the extent to which the so-called social facts it yielded did not exist 'out there', in the objective world, but were themselves a product of socially and historically mediated human consciousness. Positivism ignored the role of the 'observer' in the constitution

of social reality and thereby failed to consider the historical and social conditions affecting the representation of social ideas. Positivism falsely represented the object of study by reifying social reality as existing objectively and independently of the labour that actually produced those conditions. Secondly, he argued, representation of social reality produced by positivism was inherently and artificially conservative, helping to support the status quo, rather than challenging it. This character may also explain the popularity of positivism in certain political circles. Horkheimer argued, in contrast, that critical theory possessed a reflexive element lacking in the positivistic traditional theory.

Some scholars today hold the beliefs critiqued in Horkheimer's work, but since the time of his writing critiques of positivism, especially from philosophy of science, have led to the development of post-positivism. This philosophy greatly relaxes the epistemological commitments of logical positivism and no longer claims a separation between the knower and the known. Rather than dismissing the scientific project outright, post-positivists seek to transform and amend it, though the exact extent of their affinity for science varies vastly. For example, some post-positivists accept the critique that observation is always value-laden, but argue that the best values to adopt for sociological observation are those of science: skepticism, rigor, and modesty. Just as some critical theorists see their position as a moral commitment to egalitarian values, these post-positivists see their methods as driven by a moral commitment to these scientific values. Such scholars may see themselves as either positivists or anti-positivists.

(*Max Horkheimer: 1895 – 1973) was a German philosopher and sociologist who was famous for his work in critical theory

as a member of the 'Frankfurt School' of social research. Horkheimer addressed authoritarianism, militarism, economic disruption, environmental crisis, and the poverty of mass culture using the philosophy of history as a framework. This became the foundation of critical theory. His most important works include *Eclipse of Reason* (1947), *Between Philosophy and Social Science* (1930–1938) and, in collaboration with Theodor Adorno, *Dialectic of Enlightenment* (1947). Through the Frankfurt School, Horkheimer planned, supported and made other significant works possible.) (Wikipedia)

Positivism has also come under fire on religious and philosophical grounds, whose proponents state that truth begins in sense experience, but does not end there. Positivism fails to prove that there are not abstract ideas, laws, and principles, beyond particular observable facts and relationships and necessary principles, or that we cannot know them. Nor does it prove that material and corporeal things constitute the whole order of existing beings, and that our knowledge is limited to them. According to positivism, our abstract concepts or general ideas are mere collective representations of the experimental order—for example; the idea of "man" is a kind of blended image of all the men observed in our experience. This runs contrary to a Platonic or Christian ideal, where an idea can be abstracted from any concrete determination, and may be applied identically to an indefinite number of objects of the same class. From the idea's perspective, Platonism is more precise. Defining an idea as a sum of collective images is imprecise and more or less confused, and becomes more so as the collection represented increases. An idea defined explicitly always remains clear. (Wikipedia)

Skepticism, for most of us, is a “fork in the road”. Some doubt is always common in human nature since we are a

“Coincidence of Opposites” It’s a murmur of conscience if your conscience has not been corrupted. Only saints are doubtless. Things are doubtful when they don’t measure up to our sensibilities, but if we are honest with ourselves, our sensibilities are not always rock-solid. We’re reminded of the woman who saw a fallen branch as a snake, or the guy who swore a floating log was an alligator.

Reason brings us to the “fork”; go left into the assurance of disbelief—go right into the comfort of belief, but be assured by rational “common-sense” that there exists *Ultimum Verum*, a final, universal truth which can never really be determined by diverse opinion or reductionism.

Where there is no clear, unchanging, universal truth, “ideas and convictions can easily be manipulated for reasons of power.” (St. John Paul II)

The Ultimate Pure-Truth is God the Spirit, which empiricism (aka Positivism) can never offer us. Pure-Truth can not be discerned by human nature. The intrinsic goal of every human being is to know the Ultimate Good through the Word of God in the Spirit of Truth. To doubt (not humanly wrong) is to cling too much to empirical, falsifiable values. The post-positive math genius’ know there IS an answer to every equation, that’s why he or she looks for the “theory of everything,” whereas the logical-positivist is permanently stuck strictly with materiality. Even the idea of “spirit” is off his radar. (Out of the Blue, May, 2020)

The physics equations you learned in school don't work on the atomic scale. We have Newtonian physics to explain the world we can see and feel, and we have Einsteinian physics to explain the behavior of matter and light in the universe, but we observe

a bunch of bizarre phenomena on the atomic scale that we can't explain fully yet with equations and mathematical laws.

Perhaps the two most perplexing behaviors of atomic particles are quantum superposition (particles can exist in two separate places simultaneously) and quantum entanglement (particles separated by large distances can react to one another instantaneously, suggesting information can travel faster than the speed of light, although there are other explanations for this phenomenon as well).

The experiment that started physicists down the path to discovering the wonderfully spooky behaviors of atomic particles is called the double-slit experiment. We know that light travels in waves, and when those waves pass through two parallel slits, a single wave gets separated into two waves that run into each other. PBS's Space Time series has a great new video explaining the double-slit experiment.

When we shoot two waves of light through a double slit, they form a pattern based on the way their peaks and troughs match up or clash. When we shoot a single photon through, we'd expect it to just go through unchanged. But it won't. When you shoot enough single photons through—one at a time, alternating slits—they form the same interference pattern as the waves of light. Basically, that means that all the possible paths of these particles can interfere with each other, even though only one of the possible paths actually happens.

We cannot fully explain these phenomena yet, but we can observe them. Scientific speculation says it's only a matter of time before someone comes up with the correct mathematical equations to fully predict and model these events. When and if they do, a third major set of physical laws may very well be born. (Popular Mechanics) (modified)

Since Newton the most paradigmatic examples of empirical science were those claims, usually quantitative ones, that were properly inferred from or appropriately confirmed by experience. Speaking very informally, these are the ones that we have good reason to believe or at least better reason to believe than the available alternatives. The problem, of course, is to specify the form of proper inferences, the form of an appropriate confirmation relation, and/or the structure of good reasons. The task is daunting, but logic in a suitably broad sense seems to be the right tool. Still speaking informally, logic seems to give us the structure of (good) reasoning. There are other conceptions of logic, of course, but this is a standard one and pretty well describes what the movement needed.

If logic was the tool that was wanted, it was newly ready for service. The progress of modern mathematical logic from Bolzano through Russell and beyond was truly impressive. Arguably, it could now express all parts of classical mathematics. Besides the first order predicate calculus one would need either set theory or a higher order logic, but these were recent developments as well. Logic, like the empirical sciences, was progressive and could be approached cooperatively by more than one investigator. In *Our Knowledge of the External World* (1914) Russell had even positioned logic as the locus of scientific method in philosophy. It is small wonder then that those who were looking for something scientific in what was left of philosophy turned to logic.

Wittgenstein's no-content theory of logic in the *Tractatus* (1921/1922) was tantalizingly suggestive about how mathematics could be integrated into an overall empirical theory of the world. Wittgenstein also expressed a radical

verificationism in the early 1930s in his conversations with Schlick, Waismann, and other members of the Vienna Circle. Many of the logical empiricists in turn could see in some version of that verificationism* the ideal tool with which to carry out their anti-metaphysical program. There was, naturally, much left to accomplish, but even with Gödel's results one could expect that further impressive strides in logic could be made. Indeed, much was accomplished even if the perfect account of scientific reasoning proved elusive. Perfection is elusive in all the sciences, but that was no reason for despair. (Stanford Encyclopedia of Philosophy)

**Verificationism, also known as the verification principle or the verifiability criterion of meaning, is the philosophical doctrine which maintains that only statements that are empirically verifiable are cognitively meaningful, or else they are truths of logic. (Wikipedia)*

In simple words, logic is “the study of “correct reasoning” especially regarding making inferences.” Logic began as a philosophical term and is now used in other disciplines like math and computer science. (Webster's Dictionary) If you say you are a logical person you are reasonably convinced that the conclusions you have drawn are, by your reasoning, correct. A problem arises when others' reasoning contradicts your own. That is the purpose of argument. An argument is won or lost on the basis of superior reasoning or specifically more logical conclusions than other's reasoning. Argument requires people of “good will” with enough grace to honestly submit to superior reason/logic with dignity. In a diverse, relativistic culture certain power structures become so immersed in their systematic rational they are psychologically unfit to submit to conclusions other than their own. Unintended circumstances

resulting from ill willed obstinacy can be devastating. Wars have begun on less.

Epistemology is the term given to the study of knowledge. What knowledge is, how it is acquired and how it relates to the notions of truth, belief and understanding. Experience tells us that we can have knowledge of something without fully understanding it. Knowing that something formally exists by recognition does not automatically give us an understanding of the thing. To “really” know something, that is, to justify our knowledge as fault free, we must acquire maximum information about the object and how it relates to the world and to us. I think we would all agree that knowledge is limited. We can neither know all there is to know, nor can we know things perfectly. Knowledge of a thing is limited by the extent of a thing’s complexity and by the limitation of human mental capacity.

“You’ve undoubtedly heard over and over again about what an absurdly complex entity the human brain is. But a new breakthrough by Japanese and German scientists might finally drive the point home. Taking advantage of the almost 83,000 processors of one of the world’s most powerful supercomputers, the team was able to mimic just one percent of one second’s worth of human brain activity, and even that took 40 minutes.”(2) That doesn’t mean that a computer-brain interface is impossible, what it does show is that we are working to have the computer think like the brain, rather than have the brain “think” like a computer. That’s good news! I trust that humanity will always remain one step ahead of “Hal.” Research is presently showing some success with electronic-prostheses in many of our major medical schools, particularly in the field of ophthalmology. Generally the scientific community surely displays a certain amount of hauteur in

expecting a “theory of everything.” According to Hawking, “when that time arrives, we will have become omniscient!”... Will it make us happy?

Since belief or conviction is the result of certain knowledge, it is an area where epistemology overlaps with an understanding of religious faith. Can faith in the Deity be truly called knowledge? Thomas Nagle, in his book *Mind and Cosmos* has written:

“With the appearance of life even in its earliest forms there come into existence entities that *have a good*, and for which things can go well or badly. Even a bacterium has a good in this sense, in virtue of its proper functioning, whereas a rock does not. (I presume he means clinging to survival, obviously a good considering his concept of the alternative.) Eventually in the course of evolutionary history there appear conscious beings, whose experiential lives can go well or badly in ways that are familiar to us. Later some descendants of those beings, capable of reflection and self-consciousness, come to recognize what happens to them as good or bad, and to recognize reasons for pursuing or avoiding those things. They learn to think about how these reasons combine to determine what they should do. And finally they develop the collective capacity to think about reasons they may have that do not depend only on what is good or bad for themselves.” It seems obvious to me that what Nagle is touching on here is the human capability of innately knowing the difference between good and bad, and rightly choosing to follow the former rather than the latter as the most productive path to success rather than failure. The writer of Genesis put it a bit more poetically. Knowing the difference came with the “package,” and in time we became more proficient at offering (logical?) reasons to follow a negative course rather than a positive one— accompanied by the pangs of a primal

“conscience.” Webster says that: To believe is to have confidence in something as true. If one concludes that good and bad is innate, and Nagle is correct, it could be construed as prior knowledge or *experience a priori*. Faith, from the grace in the known power of the intrinsic good rather than its opposite. Upon reflection, it became recognized as the spiritually-oriented understanding of the Deity considered as the Ultimate Good, or God freely accepted or rejected. It took St. Augustine of Hippo a long time to figure that out: “We could never judge that one thing is better than another, if a basic understanding of the good had not already been installed in us.” I have a feeling that Jesus would say to Nagle today, “You are not far from the Kingdom of God.”

People tend to throw the word faith around in a nyllanian manner. Faith as confidence, even strong faith, does not make the reality of our confidence true. Trustworthy, yes—ultimately true, not necessarily. The inevitability of necessity as essential, needs more than one’s trust can provide. Even on a cosmic scale the only inevitability appears to be change. Creation began with motion and nothing we know of has stopped since. In Positivist cosmological thinking, faith in the understanding that there was some-sort-of-matter or motion before the Big Bang mostly satisfies his trust in the belief that a Creator did not— nor does not exist, except (of course) in the mind of man. If one were to ask, what man? The answer necessarily would be the first man that could reason an unseen causal power beyond himself. What we would be left with is eternal motion; perhaps universe after universe; Multiverses. Positively speaking though everybody knows consecutive action always infers a beginning.

The multiverse theory, was the product of another man’s mind, Hugh Everett. Everett’s many-worlds interpretation of quantum

mechanics arose from what must have been the most world-changing drinking session of all time. One evening in 1954, in a student hall at Princeton University, grad student Everett was drinking sherry with his friends when he came up with the idea that quantum effects cause the universe to constantly split. He developed the idea for his Ph.D thesis – and the theory caught on. According to his work, we are living in a multiverse of countless universes, full of copies of each of us. (New Scientist Magazine) It was sensational to say the least. It gave every Positivist hope in the necessity of Eternal Motion satisfying the a priori knowledge of no “beginning.” Is it possible, yes; is it empirically provable? no.

The Copenhagen interpretation is an expression of the meaning of quantum mechanics that was largely devised from 1925 to 1927 by Niels Bohr and Werner Heisenberg. It is one of the oldest of numerous proposed interpretations of quantum mechanics, and remains one of the most commonly taught. According to the Copenhagen interpretation, physical systems generally do not have definite properties prior to being measured, and quantum mechanics can only predict the probability distribution of a given measurement's possible results. The act of measurement affects the system, causing the set of probabilities to reduce to only one of the possible values immediately after the measurement. This feature is known as wave function collapse.

Over the years, there have been many objections to aspects of the Copenhagen interpretation, including: discontinuous jumps when there is an observation, the probabilistic element introduced upon observation, the subjectiveness of requiring an observer, the difficulty of defining a measuring device, and the necessity of invoking classical physics to describe the "laboratory" in which the results are measured.

Max Planck, Albert Einstein, and Niels Bohr postulated the occurrence of energy in discrete quantities (quanta) in order to explain phenomena such as the spectrum of black-body radiation, the photoelectric effect, and the stability and spectra of atoms. These phenomena had eluded explanation by classical physics and even appeared to contradict it. Although elementary particles show predictable properties in many experiments, they become thoroughly unpredictable in others, such as attempts to identify individual particle trajectories through a simple physical apparatus.

Classical physics draws a distinction between particles and waves. It also relies on continuity, determinism and causality in natural phenomena. In the early 20th century, newly discovered atomic and subatomic phenomena seemed to defy those conceptions. In 1925–1926, quantum mechanics was invented as a mathematical formalism that accurately describes the experiments, yet appears to reject those classical conceptions. Instead, it posits that probability and discontinuity are fundamental in the physical world. The standing of causality for quantum mechanics is disputed.

Quantum mechanics cannot easily be reconciled with everyday language and observation, and has often seemed counter-intuitive to physicists, including its inventors. The Copenhagen interpretation intends to indicate the proper ways of thinking and speaking about the physical meaning of the mathematical formulations of quantum mechanics and the corresponding experimental results. It offers due respect to discontinuity, probability, and a conception of wave–particle dualism. In some respects, it denies standing to causality. (Wikipedia) Was the Big Bang the beginning of everything?

Both Science and Religion seem to agree, the Big Bang was not the cause of everything but the result of something other, though neither can empirically prove its individual theories or notions. With all the higher mathematics and logic, and all the theology and philosophy something gave a reasoning, aboriginal man the idea of origin, a start, a beginning.

Without going through the commonly known anthropological labyrinth, if we put ourselves in his foot prints, having come down from the trees, we too would have observed the motion of the Sun, the Stars and the Moon; the terrifying turbulence of the earth itself. We would have been the hunter and the hunted, a protector and and an aggressor; raw instinct tempered by natal reasoning; a peculiar complex of both good and evil in every human being. All with the complexities of (motion) motivation... as it is today. Was it fear of survival that suggested imaginary spirits beyond man's understandings, beyond his precarious human nature? How was it, he was able to imagine spirits with no previous experience of spirit?

The earth, indeed the cosmos, existed eons before man arrived, could anyone reasonably say there is evil in an evolutionary theory? How could sin be natural? Sin started with humanity. Agreed, man is part of nature, but a reasoning-nature elevated from nature herself — which we have come to call “human nature.” Something was present in a certain filum of Homo that didn't show up in the others along the way eventually leading to Homo Sapiens. So far, the earliest finds of modern Homo sapiens skeletons come from Africa. They date to nearly 200,000 years ago on that continent. They appear in Southwest Asia around 100,000 years ago and elsewhere in the Old World by 60,000-40,000 years ago.

According to the folks at Everlink,. “After thousands of years, we all share similar needs to eat and to procreate, but only modern humans have the innate ability to network.”

“We have a fundamental urge to link our minds together,” notes Thomas Suddendorf, an evolutionary psychologist at the University of Queensland in Australia. The ability to network in turn creates a unique competitive advantage that places humans at the top of the chain. “This allows us to take advantage of the strengths of others,” he says. By doing so, we’ve been able to move from hunter-gatherers to a species that is predicated on its accumulation of knowledge and its ability to collaborate and build joint *experiences, creations, and imaginations*.

Coleridge's view of imagination is intimately related to his conception of *idea* and *symbol*. An idea is a supra-sensible reality incarnated in sense images; it is the product of all the human faculties—reason, understanding, sense—working under the unifying power of the imagination. An idea “cannot be conveyed but by a symbol,” which is a product of the imagination. As Coleridge writes in the *Statesman's Manual* (1816), symbols are "the living educts (a chemistry term: A substance separated from material in which it already existed) of the Imagination; of that reconciling and mediatory power, which incorporating the Reason in Images of the Sense ... gives birth to a system of symbols, harmonious in themselves, and consubstantial with the truths, of which they are the conductors." Coleridge's conception differs significantly from Kant's, in that the ideas thus incarnated, including such ideas as God and immortality, are not merely regulative (as in Kant) but are truly constitutive of reality. (Science Encyclopedia) We could go on with Reason being the key element to the birth of imagination One last gyp from the Science Encyclopedia

confirms our own feelings about how God revealed himself to primordial man.

Friedrich Wilhelm Joseph von Schelling (1775–1854), looking back at Kant's work a generation later, judged that Kant, by failing to demonstrate the validity of human perception, had left a dichotomy between the human mind and external reality. His own Naturphilosophie was meant to heal that rupture, and imagination played a central role in his endeavor. It was crucial for Schelling that imagination was both human and divine. God possesses imagination in its fullness, and the divine imagination (die Göttliche Einbildungskraft) is “the generating power of the universe” (Engell, p. 304)

“And God said, ‘Let there be light,’ and there was light.” Motion, inflation...Photons; quarks; gluons; electrons; muons; taus; neutrinos all on the move...possibly Lemaître’s Big Bang.

We should conclude this paper with an interesting letter Lemaître sent to Nature Magazine. John Farrell’s wonderful book *The Day Without Yesterday* says:

Even at this early stage in the development of quantum mechanics, when many of the particles we now take for granted, like the neutron, had not even been discovered yet, Lemaître realized that any realistic model of the universe’s origin had to be rooted at the microscopic level in quantum physics. In his May 9, 1931, letter to Nature he began:

“Sir Arthur Eddington states that, philosophically, the notion of a beginning of the present order of Nature is repugnant to him. I would rather be inclined to think that the present state of quantum theory suggests a beginning of the world very different from the present order of Nature.”

“Thermodynamical principles from the point of view of quantum theory may be stated as follows: (1) Energy of constant total amount is distributed in discrete quanta. (2) The number of discrete quanta is ever increasing. If we go back in the course of time we must find fewer and fewer quanta, until we find all the energy of the universe packed in a few or even in a unique quantum. “

Lemaître went so far to as to suggest what many specialists in general relativity now take for granted—that at some level space and time themselves must be quantized:

Now, in atomic processes, the notions of space and time are no more than statistical notions: they fade out when applied to individual phenomena involving but a small number of quanta. If the world has begun with a single quantum, the notions of space and time would altogether fail to have any meaning at the beginning; they would only begin to have a sensible meaning when the original quantum had been divided into a sufficient number of quanta. (expansion) *If this suggestion is correct, the beginning of the world happened a little before the beginning of space and time.* I think that such a beginning of the world is far enough from the present order of Nature to be not repugnant at all.

Farrell, John. (2005) *The Day Without Yesterday: Lemaître, Einstein and the Birth of Modern Cosmology* (Kindle Locations 1199-1204). Kindle Edition. Amazon books.

When Ex Nihilo (out of nothing) is used to describe what the universe derived from, the meaning is simply (from no preexisting matter) In a childlike way we love to think the “*little before*” of Fr. Lemaître as the place of the Infinite

Creator, even though darkness remained on the deep. Perhaps it's only our imagination working overtime.