

Psychology All The Way Down¹

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Quantum mechanics, the fundamental theoretical framework of contemporary physics, supports the following claim: by entering into spatial relations with itself, Brahman creates both space (the totality of existing spatial relations) and matter (the corresponding apparent multitude of relata). The psychological processes by which Brahman enters into spatial relations with itself are discussed by taking a tour of a descending series of supraphysical worlds.

Let me begin by reminding us all that it would be presumptuous to assume that our minds or brains can know what the world really is or who we really are. We tell each other stories. Ontological stories come in two basic varieties, spiritual and materialistic.

The materialistic variety typically attributes ultimate reality to ultimate building blocks. It explains things from the bottom up, either by aggregation or by attributing physical properties to the points of spacetime. “All else supervenes on that,” as a well-known philosopher put it (Lewis, 1986). In this sort of story consciousness, free will, quality, and value play at best minor parts. Evolution has no goal, life no real purpose. The paltry range of achievements offered to us by this story is not worth mentioning. Stories can dishearten as well as inspire. This one is downright depressing.

The spiritual story (at any rate, the version I like best) goes like this: Ultimate reality is ineffable. Following a great tradition, I call it *brahman*, but if you prefer any other name, be my guest. While we have no words to describe what *brahman* is in or by itself, we can say something about how it relates to the world. It relates to it in three ways: as the substance that constitutes it (*sat*), as the consciousness that contains it (*chit*), and as something—subjectively speaking, an infinite delight, objectively speaking, an infinite quality—that throws itself into finite forms and movements (*ānanda*).

This story explains from the top down. Instead of proceeding from a pre-existent multiplicity of building blocks or spacetime points, it proceeds from the One Ultimate Reality and tells us how this differentiates itself, enters into relations with itself, presents itself to itself under a multitude of aspects. Consciousness, free will, quality, and value all have their roots in what is ultimately real. At the roots of our consciousness is *chit*, at the roots of quality and value is *ānanda*, at the roots of our free will is the infinite power by which *chit* creates its content, *sat* creates its forms, and *ānanda* expresses itself.

Given an infinite and omnipotent quality and delight as the creative principle, there can be many differently constituted worlds—many ways of expressing and experiencing this quality and

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delight in self-relations. The physical world is one among many, yet it is special. In the physical world, *sachchidānanda* is playing Houdini (Higbee, 1996), imprisoning and enchaining itself as completely as divinely possible, challenging itself to escape, to re-discover itself, to realize its powers against formidable odds, in what appears to be a huge inert unconscious mass governed by mechanical forces and random events, but what is really the foundation of greatest stability and concreteness for a progressive self-realization that may go on for ever (Sri Aurobindo, 1987, pp. 410–1). The range of possible achievements offered to us by *this* story is infinite.

How does this story square with what many people still look to as the supreme authority, physical science? You may have heard claims to the effect that the so-called “new physics” supports a mystical world view. These claims are generally made for the wrong reasons. The mathematical formalism of contemporary physics, quantum mechanics, is a probability algorithm. It assigns probabilities to the possible outcomes of measurements that may be made, on the basis of the outcomes of measurements that have been made. That’s all there is to it. How does this support a mystical world view? Notice the key role played by measurements. The invariable reference to “measurement” in standard axiomatizations of quantum mechanics was famously criticized by John Bell (1990): “To restrict quantum mechanics to be exclusively about piddling laboratory operations is to betray the great enterprise.” Unsurprisingly, physicists soon began to search for more respectable ways of thinking about measurements. Some called them “observations” and spoke of “the essential role played by the consciousness of the observer” (London and Bauer, 1983). That was the birth of this red herring.

The physics community as a whole is yet to come to terms with the importance of measurements (Mohrhoff, 2004, 2005). At present it is divided into three factions.

The first—the majority—shows scant interest in what (if anything) quantum mechanics is trying to tell us about the nature of Nature.

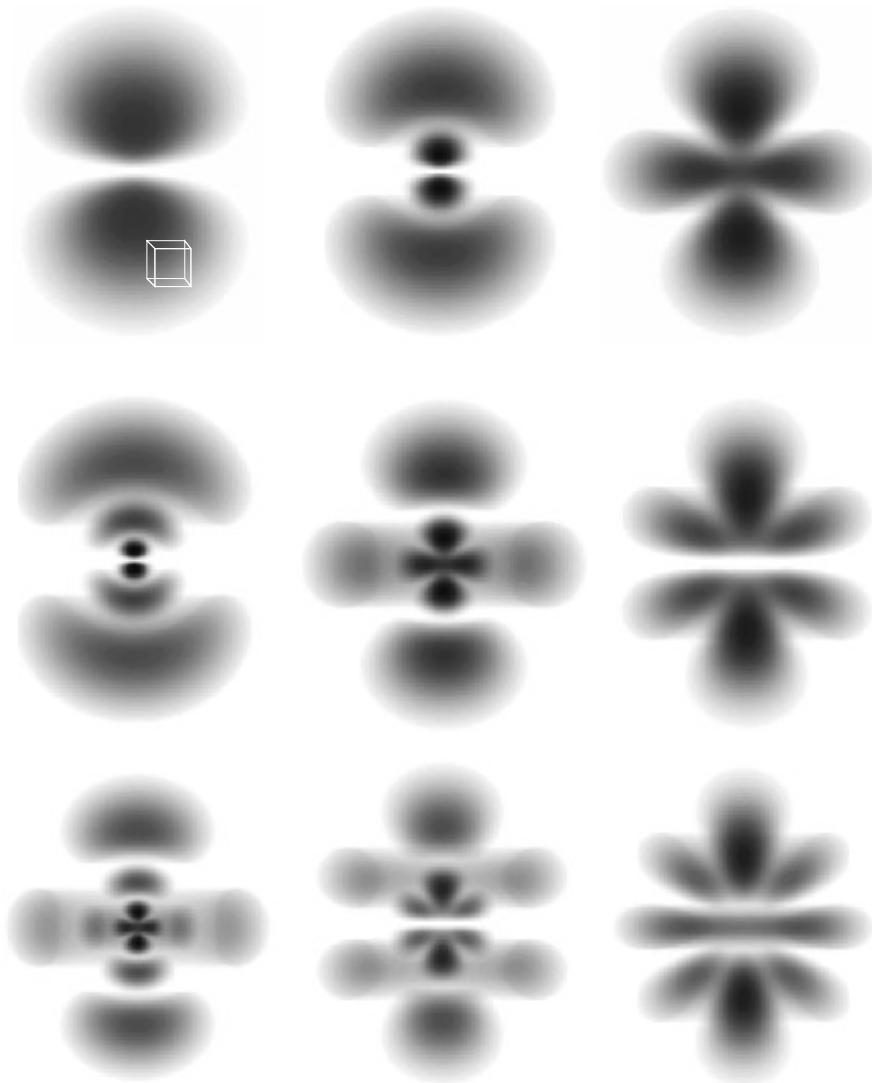
The second advocates agnosticism. It asserts that we cannot describe the quantum world as it is by itself. Its features are forever beyond our ken. All we can usefully talk about is the statistical correlations between measurement outcomes.

The third insists that there must be a way of talking about the quantum world as it is by itself, independent of measurements. This faction is split into numerous sects, each declaring to see the light, the ultimate light. Go to any conference on quantum foundations, and you will find their priests pitted in holy war.

To my way of thinking, the agnostics and the priests both have a point and both are wrong. The agnostics have a point in that nothing of relevance can be said without reference to measurements. They are wrong in their belief that the features of the quantum world are beyond our ken. The priests have a point in that it is indeed possible to describe the features of the quantum world. They are wrong in their belief that these features can be described without reference to measurements.

To understand the essential role played by measurements, take a look at these cloudlike images. Each represents the fuzzy position of the electron relative to the nucleus in a particular state of atomic hydrogen. Neither the electron nor the nucleus (a single proton) is shown. All you see is a fuzzy position. Or rather, all you see is a cloud of varying density, which is rotationally symmetric about the vertical axis. How does this cloud represent a fuzzy position? It represents it as a continuous probability distribution. Imagine any small region somewhere inside the

cloud, like that little box in the first cloud. If you integrate the density of the cloud over this region, you get the probability of finding the electron inside if the appropriate measurement is made. This illustrates that the proper (mathematically rigorous and philosophically sound) way to describe a fuzzy variable is to assign probabilities to the possible outcomes of measurements.



Now imagine that this measurement is actually made. It is an elementary measurement, in the sense that it answers a single yes/no question: is the electron inside that region? Before the measurement, the electron is neither inside nor outside, for if it were inside, the probability of finding it outside would be zero, as would the density of the cloud outside, and if it were outside, the probability of finding it inside would be zero, as would the density of the cloud inside. After the measurement, the electron is either inside or outside. In other words, the measurement has changed the state of affairs. Hence if we want to describe a fuzzy state of affairs as it is, without messing with it, we must describe it counterfactually, by assigning probabilities to the possible outcomes of *unperformed* measurements. I trust you begin to see why measurements play an essential role in contemporary physics.

Let's pursue this further. Before the measurement, the electron is neither inside nor outside that

region. Yet being inside and being outside are the only relations that can hold between an electron and a region of space. If neither relation holds, that region simply does not exist as far as the electron is concerned. But conceiving of a region R is tantamount to making the distinction between “inside R ” and “outside R ”. Hence we may say that the distinction we make between “inside R ” and “outside R ” is a distinction that the electron does not make. Or we may say that the distinction we make between “the electron is inside R ” and “the electron is outside R ” is a distinction that Nature does not make. It corresponds to nothing in the physical world. It exists solely in our heads.

This illustrates a general feature of the physical world. It imposes limits on the distinctions that we are allowed to make, not only spatial distinctions (between inside and outside) but also substantial distinctions (between this object and that object). The limits imposed on our spatial distinctions imply that the spatial differentiation of the physical world is incomplete. It doesn't go all the way down. If we mentally partition the world into smaller and smaller regions, there comes a point when there isn't any material object left for which these regions, or the corresponding distinctions, exist. Quantum mechanics is therefore inconsistent with the materialistic attempt to construct reality from the bottom up, by associating physical properties with the points of an intrinsically differentiated spacetime (Mohrhoff, 2002b).

As for the limits imposed on our substantial distinctions, they allow us to distinguish between *this* particle and *that* particle only to the extent that particles have properties by which they can be distinguished, and they have such properties only to the extent that their possession can be inferred from the goings-on in the rest of the world. Hence if we consider the so-called ultimate constituents of matter by themselves, independently of their measured properties, they are identical not just in the weak sense of exact similarity but in the strong sense of *numerical* identity. If you have a particle here with these properties and a particle there with those properties, what you have is not two substances each with a set of properties but one substance with two sets of properties. Quantum mechanics is therefore equally inconsistent with the attempt to construct reality by assembling a pre-existent multitude of building blocks.

The quantum world is built from the top down. What ultimately exists is a single substance. Both matter and space come into being when this enters into spatial relations with itself, for physical space is the totality of existing spatial relations, while matter is the corresponding apparent multitude of relata—*apparent* because the relations are *self*-relations. This is about the simplest creation story that can be told, and it is a straightforward consequence of our fundamental theory of matter. If quantum mechanics supports a spiritual world view, this is how. Note that the red herring, according to which the consciousness of the observer plays an essential role, throws up a smokescreen that makes it impossible to perceive the real ontological implications of the quantum theory. The moral here is that one mustn't try to incorporate a scientific theory into a spiritual world view prematurely, before the implications of that theory are properly understood. In the words of the German poet Schiller:

Enmity be between you! Too soon it is for alliance.

Search along separate paths, for that is how truth comes to light.

In what follows I want to look into the process by which *brahman* enters into spatial relations with itself and thereby creates both matter and space. Since the substance of the world is a conscious substance, and the force that acts in it a conscious force, this will be essentially a subjective or psychological process. This process is part of a larger story, which takes us on a

tour of a descending series of supraphysical worlds.

This tour starts in a world that is determined entirely by what Sri Aurobindo calls the comprehending poise (*vijñāna*) of *brahman*'s creative imagination, the supermind. For us this is the hardest to imagine. In this world, there exists no kind of difference between *brahman* qua all-constituting substance and *brahman* qua all-containing consciousness. This world is not seen from a particular location, as our world is seen by us. No viewpoint distantiates the self from its perceptions. The perceiver is coextensive with the perceived, the subject is wherever its objects are, the self is the very substance of its perceptions. We are familiar with two extensive continua, space and time. Qualitatively, they differ considerably in our experience. That world, too, like any world, is extended in some way. What I want to stress here is that the *quality* of its extension is completely unknown to us. To attribute to it either a spatial or a temporal character would be seriously misleading.

The next stop of our tour is a world that is determined *also* by what Sri Aurobindo calls the apprehending poise (*prajñāna*) of *brahman*'s creative imagination. The process by which *brahman* enters into spatial relations with itself, consists of two psychological movements, which make this world possible. The first is a self-modification whereby consciousness differentiates into self and content (Sri Aurobindo, 1987, pp. 139–40, 146). Consciousness steps back from its content or projects its content in front of a self. There now exists a psychological distance between perceiver and perceived, and this radically changes the character of perceptions. Things are no longer seen “from the inside,” by the conscious substance which constitutes them, without any kind of distance between the seer and the seen. Instead, things are seen “from the outside.” What is seen is surfaces. This perception introduces the elements of our consciousness of space: there is depth, a psychological distance from the perceived surfaces, and there is the lateral extent of the perceived surfaces.

This self-modification of consciousness makes possible the second psychological movement, whereby consciousness views its content perspectively from a multitude of locations *within its content*, rather than aperspectively from a viewpoint that is coextensive with its content. Now there are individuals who present their surfaces to each other, and who perceive each other's surfaces from different viewpoints. *Brahman* has entered into spatial relations with itself.

Needless to say, there is a huge difference between these supraphysical individuals and the physicist's so-called ultimate constituents of matter. The latter do not present surfaces to each other. In point of fact, they are formless entities, and I want to give you three reasons why. The first is that experiments can distinguish between particles with internal structure and particles lacking internal structure, but they cannot possibly tell us whether a particle lacking internal structure has a pointlike form or no form at all. Second, nothing in the mathematical formalism refers to the shape of a particle without internal structure. Third, the notion that a structureless particle has a form explains nothing. In particular, it does not explain why a composite object—be it a proton, a molecule, or a galaxy—has the shape that it does, for all empirically accessible forms are fully accounted for by the relative positions of their constituents. The form of an object consists of the spatial relations that hold between its parts. An object that lacks parts therefore also lacks a form.

So how do we get from a world of supramental beings to a world of formless particles? This is the story of involution. Involution takes us from the higher hemisphere (*parārdha*, the first two stops of our tour) to the lower hemisphere (*aparārdha*), in which the individual consciousness

has lost awareness of its supra-individual poise and of its numerical identity with every other individual. The psychological process that leads to this forgetfulness or “ignorance” (*avidya* in the Upanishads, *acitti* in the Rig Veda) is a multiple exclusive concentration (Sri Aurobindo, 1987, pp. 581–95). We are familiar with the phenomenon of exclusive concentration, when the mind is focused on a single object or task, while other goings-on are registered, and other tasks attended to, subconsciously, if at all. In the worlds of the lower hemisphere, the one consciousness concentrates itself in this way in each individual strand of its universal action.

The veil of *avidya* can fall at any stage of the creative process—the development of *ānanda* into expressive forms and actions. If the individual is unaware of the all-constituting and all-containing conscious substance, it is also unaware of the infinite quality/delight, which is the very nature of this substance. Our first stop in the lower hemisphere is a world in which all else remains in front of the veil. “All else” includes the conceptive faculty whose function it is to develop *ānanda* into expressive ideas, and the executive force that spontaneously develops these ideas into forms and actions. [In the best of all possible worlds of *this* kind, the nature of each individual—its subliminal essence of quality/delight, *svabhāva*—sufficiently controls the individual’s self-effecting thoughts to ensure harmony between all individual actions of the one conscious force. In the worst of these worlds, which humanity appears determined to emulate, this control is missing, and the conceptive faculty that is meant to express quality, is thoroughly abused.]

In every world, *brahman* presents itself to itself under a multitude of aspects, and each aspect is realized, made explicit, *by rendering every other aspect implicit in it*. Each “part” therefore contains the “whole.” [In Sri Aurobindo’s words: “the whole process of differentiation by the Real-Idea creative of the universe is a putting forward of principles, forces, forms which contain for the comprehending consciousness all the rest of existence within them and front the apprehending consciousness with all the rest of existence implicit behind them” (Sri Aurobindo, 1987, p. 129).]

In the lower hemisphere, this presence of the “whole” in each “part” is not in evidence. As a result, the surfaces that individuals present to each other are seen as separating divisions. Each surface is seen as the boundary of a region of space, which appears to contain some kind of stuff, and the stuff in one region appears to be numerically distinct from the stuff in any other (disjoint) region. This perception is one of the characteristics of mental consciousness:

Mind in its essence is a consciousness which measures, limits, cuts out forms of things from the indivisible whole and contains them as if each were a separate integer.... It conceives, perceives, senses things as if rigidly cut out from a background or a mass.... [Its office is to translate always infinity into the terms of the finite, to measure off, limit, depiece. Actually it does this in our consciousness to the exclusion of all true sense of the infinite; therefore Mind is the nodus of the great Ignorance...² (Sri Aurobindo, 1987, p. 162f).]

² Although the mental variety of consciousness is “the nodus of the great Ignorance,” it is, and can only be, “a subordinate action and instrumentation of the Truth-Consciousness,” the supermind: “So long as it is not separated in self-experience from the enveloping Master-Consciousness and does not try to set up house for itself, so long as it serves passively as an instrumentation and does not attempt to possess for its own benefit, Mind fulfils luminously its function which is in the Truth to hold forms apart from each other by a phenomenal, a purely formal delimitation of their activity behind which the governing universality of the being remains conscious and untouched. It has to receive the truth of things and distribute it according to the unerring perception of a supreme and universal Eye and Will. It has to uphold an individualization

When mind is used by supermind, as it is in the creation of a world, it is used judiciously. Its tendency to divide *ad infinitum* is checked. This is why there are limits to the objective reality of mental distinctions. (You will remember that quantum mechanics imposes limits on the distinctions that we are allowed to make.) When, on the other hand, mind is separated in self-experience from its supramental parent and left to run wild, as it is in us, it not only divides *ad infinitum* but also takes the resulting multiplicity for the original truth or fact. This is why we tend to build reality from the bottom up, either by assembling a pre-existent multitude of intrinsically distinct building blocks or by associating physical properties with the points of an intrinsically differentiated spacetime. It is also why the physics community has yet to make sense of its fundamental theoretical framework. By implying that physical reality is created from the top down, quantum mechanics is trying to tell us that the original creative principle is supramental rather than mental.

As said, in the lower hemisphere, the supra-individual self remains hidden behind the subjective veil of *avidya*. If *brahman* hides for a reason, we can expect it to also hide behind the objective veil of a mechanical action—an action that conforms to laws of causal concatenation or statistical correlation. For if *brahman* wants to remain out of sight, it must not reveal itself as the free and purposeful determiner of its universal action; only a mechanical action should originate from its supra-individual poise. Here, in the existence of apparently self-effective mechanical laws, we have the psychological origin of materialist, naturalist, or physicalist conceptions of the universe. For in a world that is to a significant extent governed by mechanical laws, properties and patterns of force or behavior pre-exist. While capable of modification by consciousness, they do not seem to be created by consciousness. It is at this stage of the descent into involution that the well-known problems of consciousness arise. If I believe in a self-existent universe governed by self-effective laws, I am bound to be perplexed by the fact that what exists by itself also exists *for me*, as well as by the causal efficacy of my consciousness, which I am then prone to deny. Clearly, *avidya*—Ignorance with a capital “I”—can generate a lot of ignorance of the more familiar kind.

At this particular stage of involution, consciousness can still be unmediated. Individuals may perceive each other directly, and their wills may affect each other directly. But the universal mechanical action of *brahman*'s consciousness-force also makes possible an indirect consciousness like our own. The mechanical action is then used to create internal representations of external objects, something comparable to patterns of electrochemical pulses in a brain, and the hard question then is: how can such patterns possibly produce conscious perceptions? What I am suggesting here is that the hard questions about consciousness are best solved by considering the psychological processes of involution by which they arise and become hard.

Our next stop is a world in which the veil of *avidya* falls between the conceptive faculty whose function it is to develop *ānanda* into expressive ideas, and the executive force whose function it is of active consciousness, delight, force, substance which derives all its power, reality and joy from an inalienable universality behind. It has to turn the multiplicity of the One into an apparent division by which relations are defined and held off against each other so as to meet again and join. It has to establish the delight of separation and contact in the midst of an eternal unity and intermixture. It has to enable the One to behave as if He were an individual dealing with other individuals but always in His own unity, and this is what the world really is. The mind is the final operation of the apprehending Truth-Consciousness which makes all this possible, and what we call the Ignorance does not create a new thing and absolute falsehood but only misrepresents the Truth.” (Sri Aurobindo, 1987, p. 170)

is to develop expressive ideas into forms and actions. The individual in this world is still conscious, but concentrated in action, identified with execution rather than conception. [In the best of all possible worlds of *this* kind, the subliminal expressive idea of the individual, its “self-law” (*svadharma*), ensures that its actions are beautiful, kind, and noble.]

We are nearing the end of our tour. The penultimate stop is a world in which all consciousness is subliminal. The executive force is still at work, as the somnambulant vehicle of expression of a subliminal creative imagination. It should be obvious to anyone but a hardnosed selectionist that life on our planet reflects something of this world. How could the angiosperms not be the works of accomplished artists? What if not a frenzy of creative ecstasy could have produced the arthropods?

Our last stop is a world in which the multiple exclusive concentration of the creative consciousness of *brahman* is carried to its absolute extreme. Here, the individual executive action, too, is absent. And since this is responsible for the existence of individual forms, the result is a multitude of formless individuals we call particles, whose spatial relations are governed by mechanical laws, the laws of physics.³ The stage is set for the adventure of evolution. Welcome to the physical world!

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³ Those laws can be shown to be exactly what is needed to make evolution possible (Mohrhoff, 2002a).