

Particles, Consciousness, Volition: A Vedantic Vision

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This essay puts forward a theory of existence that takes its cue from both contemporary physics and Indian Vedanta. The quantum statistics of indistinguishable particles strongly suggests that the “ultimate” constituents of matter, considered out of relation to each other, are identical in the strong sense of numerical identity. This makes it possible to identify each fundamental particle with the vedantic brahman, which relates to the world in a threefold manner: as a substance constituting it (*sat*), as a consciousness containing it (*chit*), and as an infinite quality/delight expressing and experiencing itself in finite forms and movements (*ānanda*). The fundamental identity of *sat* with *chit* makes it possible to understand how anything material can exist for anything material. The fundamental identity of *sat* with *ānanda* holds the clue to the free will conundrum. A discussion of a series of vedantically possible worlds solves these problems by showing how they arise and how they become hard. An examination of our place in the vedantic scheme of things at this particular juncture of the drama of evolution is followed by a speculation about the drama’s dénouement.

1 Introduction

This essay puts forward a theory of existence that takes its cues from both contemporary physics and Vedanta. By “contemporary physics” I mean its general theoretical framework, quantum mechanics, and by “quantum mechanics” (QM) I mean its mathematical formalism plus the minimal interpretation needed to relate it to the physical world.¹ Vedanta is a more than millennium-long philosophic and commentarial tradition founded on the Upanishads. The Upanishads, which decisively launched Indian philosophy, are above all mystical texts reporting mystical experiences (Phillips, 1995). I am particularly indebted to the translations and commentaries by Sri Aurobindo (1981) and his further development of Upanishadic thought (Sri Aurobindo, 1987).

An essay of this kind runs the risk of being dismissed offhand as one of those “efforts by woolly masters at linking quantum physics to mysticism” (Pais, 1991, p. v). What unites these efforts are claims to the effect that QM presupposes “observers” — ergo consciousness.² What QM actually presupposes is *measurements*. Its mathematical formalism correlates the probabilities of measurement outcomes. The challenge known to physicists and philosophers of science as the (quantum-mechanical) “measurement problem” is to

1 This common denominator of all physical interpretations of the formalism is known by several names, e.g., “correlation interpretation” (Laloë, 2001) and “minimal instrumentalist interpretation” (Redhead, 1987, p. 44).

2 I have contested such claims in Mohrhoff (2000, 2002bd).

demonstrate how a probability algorithm can be a complete physical theory — a theory that encompasses the very measurements whose existence it presupposes. If this is done without dragging in consciousness like a *deus ex machina*, valuable ontological insights are obtained (Mohrhoff, 2004, 2005), some of which are invoked in the present essay. An outline of this complex of issues is given in a companion essay (Mohrhoff, 2007).

Part 1 (Sections 2–3) takes its cue from an experiment illustrating that the distinction between *this* particle and *that* particle (over and above the distinction between *this* property and *that* property) is a distinction that Nature does not make. This strongly suggests (if not implies) that the “ultimate” constituents of matter, considered by themselves (divested of their relations) are identical in the strong sense of *numerical* identity.³ QM thus lends unstinting support to the central idea of all monistic ontologies: ultimately there is only one substance. My embedding of contemporary physics in a vedantic framework of thought rests on the identification of this one substance with the vedantic *brahman*.

The major vedantic themes are listed in the first section of Part 2. Foremost among them is the characterization of *brahman* as *sachchidānanda*. *Brahman* is existence (*sat*) as well as consciousness (*chit*) as well as something that is (subjectively speaking) an infinite delight and (objectively speaking) the quintessence of quality and value (*ānanda*). The identity of *sat* with *chit* and the relations supported by this identity are explored in the remainder of Part 2. Sections 5–7 discuss a series of “vedantically possible” worlds of increasing complexity. The structures that define these worlds throw light on structures that exist in our actual world — arguably the most complex and hence the most interesting of them all, but also the most difficult to make sense of. The subject of evolution, vedantically conceived, is broached in Sections 8–9, and Section 10 discusses our place in the vedantic scheme of things at this particular evolutionary juncture.

Part 3 explores the identity of *sat* with *ānanda*, which is crucial to understanding volition, and hazards a speculation about the drama’s *dénouement*.

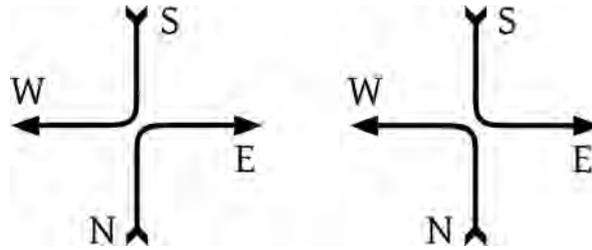
PART 1: PARTICLES

2 A Scattering Experiment

Consider the following experiment. Initially, we have two incoming particles, one (N) heading northward and one (S) heading southward. We assume that their total momentum is zero, so that if they scatter (deflect each other) elastically, the outgoing particles also head in opposite directions.⁴ We are interested in the probability with which the particles scatter at right angles, in which case we end up with one particle (E) heading in a direction we will call “eastward” and one particle (W) heading “westward.”

3 Examples are “the evening star” and “the morning star” (both are the planet Venus) or “John Paul II” and “Karol Józef Wojtyła.”

4 “Elastic” here means that no type conversion takes place: a neutron remains a neutron, a proton a proton, and so on.



The two possibilities that contribute to the probability with which particles scatter at right angles. The lines connecting incoming particles to outgoing ones indicate possible identities; they should not be thought of as representing continuous trajectories.

Suppose that it is possible to infer (from some actual event or state of affairs) whether S is the same particle as W (and therefore N the same as E) or S is the same particle as E (and therefore N the same as W). In this case the following theorem of classical probability theory applies: an event that can come to pass in exactly two ways — with respective probabilities p_1 and p_2 — comes to pass with probability⁵

$$p = p_1 + p_2.$$

QM assigns to each possibility a complex number A called “amplitude,” and it instructs us to calculate the corresponding probability by squaring the amplitude’s magnitude $|A|$. Thus

$$p = p_1 + p_2 = |A_1|^2 + |A_2|^2.$$

Now suppose that it isn’t possible to learn whether S is the same as W or the same as E. There isn’t any event or state of affairs from which this could be inferred.⁶ In this case QM instructs us to *first* add the amplitudes associated with the two possibilities (Figure 1) and *then* square the magnitude of the result. The probability with which the particles scatter at right angles now is

$$p = |A_1 + A_2|^2.$$

More can be established if we take into account that every known particle is either a boson or a fermion. If there are no preferred directions (owing to external “fields,” particle spins, or such), then $A_2 = A_1$ holds for bosons while $A_2 = -A_1$ holds for fermions (Feynman, *et al.*, 1965). Thus for bosons we now have

$$p = |2 A_1|^2 = 4 |A_1|^2$$

This is twice as large as $p = 2 |A_1|^2$ which is what we would have if S were either the same as W or the same as E. The probability with which two fermions scatter at right angles, on the other hand, works out at $|A_1 - A_1|^2 = 0$ which also differs from

5 This is virtually self-evident if probabilities are interpreted as relative frequencies. For a proof that does not invoke relative frequencies see Caves, *et al.* (2002).

6 This rules out, *inter alia*, that the incoming particles are of different types, for this would make it possible to find out which outgoing particle is identical with which incoming particle — assuming that the particles refrain from swapping types.

$p = 2|A_1|^2$. It follows that *neither outgoing particle is identical with either incoming particle*. If nothing indicates which of the two possibilities depicted in Figure 1 takes place, neither takes place. The distinction we make between them has no counterpart in the actual world. It is a distinction that Nature does not make. It exists solely in our heads.

3 An Ancient Conundrum and Its Solution

Imagine that in front of you there are two exactly similar objects. Because they are in different places, they are different objects. But is their being in different places the *sole* reason for their being different objects?

Before committing yourself, consider what a positive answer would entail. If we disregard positions, we are left with no differences at all. But if we consider two objects with exactly the same properties, we consider the same object twice, or so the principle known as the Identity of Indiscernibles asserts. Thus if two objects differ solely by being in different places, then *intrinsically* (that is, considered by themselves, and particularly without their spatial relations) they are identical in the strong sense of *numerical* identity. But this means that what there is in front of you is not two objects in two places — this is one “two” too many — but *one and the same* object in two places. Are you prepared to commit yourself to this view?

If not, what are the options? How can we avoid the conclusion that two exactly similar billiard balls are the same billiard ball in different places, which sounds absurd? It might be argued that, in addition to being in different places, they are different *substances*. But how can one substance (qua substance, irrespective of attributes) differ from another? How can there *be* more than one substance (without attributes or with identical attributes)? To solve these problems, philosophers have invented a property, called *thisness*, which was meant to distinguish things without distinguishing them: if in front of you there are two things, one of them has the property of being “this very thing” while the other has the property of being “that very thing.” Demonstrative determiners, however, distinguish things by *pointing* at them, and this is the same as distinguishing things by their positions. So we are back to square one. . .

For centuries philosophers have argued over the existence of (intrinsically) distinct substances. At last QM has settled the question for good. Because the distinction we make between the possibilities in Figure 1 is a distinction that Nature does *not* make, particles cannot be distinct substances. The concept of substance betokens *existence* without betokening individuality. Individuality is strictly a matter of properties. If it were otherwise, even particles lacking distinguishing characteristics could be re-identified. They would behave as if they carried permanent identity tags; but they don’t. So the distinction we make between *this* particle and *that* particle (over and above the distinction between *this* property and *that* property) corresponds to nothing in the physical world.

If the property of being here and the property of being there are simultaneously possessed, how many substances does that make? The correct answer is “one,” for the substance that betokens the existence of the property of being here also betokens the

existence of the property of being there. QM does not permit us to interpose a multitude of distinct substances between the substance that betokens existence and a multitude of possessed positions.⁷ It thereby lends unstinting support to the central idea of all monistic ontologies: ultimately there is only one substance. A nucleon (proton or neutron) owes its existence not to the three quarks of which it is composed but to the one substance that lends existence to every existing bundle of properties, including the three quarks. This, rather than the three quarks, is the substance that every nucleon is “made of.” This, rather than a multitude of fundamental particles, is what constitutes every material object.

Here as elsewhere, the challenge is to learn to think in ways that do not lead to meaningless questions. The manner in which QM assigns probabilities to possible measurement outcomes implies that the question “Which incoming particle is identical with which outgoing particle?” is meaningless. This question arises as long as we assume that initially there are two particles, one moving northward and one moving southward, and that in the end there are two particles, one moving eastward and one moving westward. If we assume, instead, that initially there is one thing moving both northward and southward, and in the end there is one thing moving both eastward and westward, that meaningless question cannot be asked. If we could convince ourselves that what looks like two things in two places is really one and the same thing in two places, the impossibility of objectifying the difference between the possibilities in Figure 1 would no longer baffle us. We would no longer be bothered by the “miraculous identity” of particles lacking identity tags, which was hailed by Misner, *et al.*, (1973, p. 1215) as “a central mystery of physics”.⁸

It seems to me that in order to unravel the mystery called “matter” we need to get used to the idea that being one thing, or many things, or identical things, or different things are *relative* notions. Two particles can be one thing in one sense, two identical things in another sense, and two different things in yet another sense. Considered without their relations — and this means divested of all properties, for the properties of fundamental

7 Even such a seemingly harmless expression as a “possessed position” is seriously misleading, inasmuch as it suggests the existence of a multitude of position-possessing substances. There are no individual substances. There is only a substance that warrants the *existence* of positions, and this is the same for all existing (“possessed”) positions.

8 It is sometimes claimed that the identity of two electrons is “a consequence of the fact that both are excitations of the same underlying ur-stuff, the electron field,” and that the latter is “the primary reality” (Wilczek, 1999). In reality, quantum fields are ingredients of an algorithm that permits us to calculate, for any given set of incoming particles, the probability of recording any given set of outgoing particles. In the same article, Wilczek reminds us that “we can only require — and generally we only obtain — sensible, finite answers when we ask questions that have direct, operational meaning.” The transmogrification of the mathematical symbols of a probability algorithm into “primary realities” can produce nothing but inconsistencies, such as the following: considered as physical entities in their own right, quantum fields are defined on a classical space-time manifold, whereas the manner in which QM assigns probabilities to the possible outcomes of position measurements implies that this manifold cannot be consistently objectified (Mohrhoff, 2002ab, 2004, 2005, 2007).

particles are either relational or characteristic of the time-dependence of relational properties⁹ — all fundamental particles are numerically identical.¹⁰ If we take into account the relations that hold between fundamental particles (such as relative positions and relative momenta), they are also many things, for a multitude of relations implies a multitude of relata. If these many things lack properties by which they could be distinguished, as do the constituents of a Bose-Einstein condensate, they are many identical (exactly similar) things.¹¹ And if they possess properties by which they can be distinguished, they are also different (dissimilar) things.

We ought to have a name for that which every existing fundamental particle intrinsically is — the one substance that constitutes every existing material object, the one and only “thing” that exists independently of anything else. Since all we can say about an existing fundamental particle *in itself* (considered out of relation to other things, and therefore divested of all properties) is that it *exists*, we may as well call it “pure existence.” (If you fancy any other name, be my guest.)

And now that we have an appropriate name, we are in a position to formulate what is surely the most economical creation saga ever told (and it’s fully consistent with the empirical data to boot): by the simple device of *entering into spatial relations with itself*, pure existence creates both matter and space, 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 (Mohrhoff, 2002ab, 2005).

9 Positions and momenta are obviously relational. Charges (including “colors” and “flavors,” the respective charges of the strong and weak nuclear forces) are descriptive of interactions, which are dynamical *relations*. Mass is an energy measured in mass units, energy is a frequency measured in energy units, and frequencies, too, have an objective, physical significance only relative to each other, as dimensionless ratios. Spin, finally, is both relational, insofar as its components are defined in relation to a reference frame, and dynamical, insofar as it controls how a particle’s momentum probability distribution depends on time in the presence of an electric current.

10 A referee (of a different paper and a different journal) has raised the objection that particles differ in such intrinsic properties as charge and mass and therefore can be regarded as corresponding to different substances — different kinds of “ur-stuff.” To meet this objection, it suffices to consider the *inelastic* scattering of a proton and a neutron. The identity tags “proton” and “neutron” can be swapped, for instance via the exchange of an electron and a neutrino, as in beta decay. It is clear, therefore, that belonging to a particular species of particles is not an intrinsic property of particles, and that, *a fortiori*, charges and masses are not intrinsic to whatever a particle intrinsically is.

11 The reason why the constituents of a Bose-Einstein condensate are nevertheless *many* (in apparent contravention of the Identity of Indiscernibles) is that there exist nontrivial relations between them. For instance, even though their position probability distributions relative to the laboratory frame are the same, the mean distance between them differs from zero.

PART 2: CONSCIOUSNESS

4 The Principal Affirmations of Vedanta

At the heart of the vedantic “vision” to be developed in these pages lies the identification of pure existence with the vedantic *brahman*. All major upanishadic themes concern the relations that hold between *brahman* — the Absolute, the Real — and the world (ourselves included). One of these themes is that *brahman* is mystically discoverable: though ineffable — it cannot be described as it is in itself, out of relation to ourselves or the world — it can be known prelinguistically and non-conceptually. The identification of pure existence with *brahman* appears justified by several other upanishadic themes (Phillips, 1995):

- Brahman is being (*sat*), the ultimate substance of the world, its fundamental constituent.
- Brahman is transcendent of “names and forms” (*nāma-rūpa*): it transcends the individual and the particular.
- Brahman is omnipresent and unitary (undivided).
- Brahman is world ground, origin of the individual and the particular.

Pure existence, too, is the fundamental constituent of the world, is transcendent of individuality and property (including the property of having a form¹² and is evidently unitary and present wherever there is anything.¹³ And if my minimal creation saga has any merit, it is also the origin of matter and of the spatial relations that constitute both space and the shapes of all things material.

What can we hope to gain from the identification of pure existence with the vedantic *brahman*? By taking account of the remaining major vedantic themes, we obtain a way of thinking about matter and consciousness that may help solve the double conundrum of how anything material can be conscious and how anything can be conscious of material things. Here they are (Phillips, 1995; Sri Aurobindo, 1981):

- *Brahman* is both self and consciousness (*chit*).
- *Brahman*’s consciousness is nondual; it lacks the dichotomy of subject and object. There is no difference between *brahman* qua (ultimate) self and *brahman* qua (ultimate) substance.
- *Brahman* is (subjectively speaking) infinite bliss (*ānanda*) and (objectively speaking)

¹² If physical space is the totality of existing spatial relations, then the form of an object is a subset of space, namely the totality of the object’s internal spatial relations. Since a fundamental particle lacks internal relations, it also lacks a form. For more on this issue see (Mohrhoff, 2002ab, 2005, 2007).

¹³ Is it also present where there is nothing? If space consists of the spatial relations that hold between material objects, then there is no place at which there is nothing. There is no such thing as an unoccupied location or an unpossessed position.

quintessential quality or value.

- *Brahman* is the essence or finest (most precious) part of every thing.

Brahman's being both the ultimate substance and the origin of the particular implies a creative force, inherent in the ultimate substance, by which *brahman* determines itself (takes on particular qualities and forms). *Brahman's* being both the ultimate self and the ultimate substance implies (i) that this creative force is at the same time a creative imagination by which *brahman* qua consciousness gives itself content, and (ii) that the determinations of *brahman* qua substance — the qualities and forms it assumes — are at the same time contents of *brahman* qua consciousness. These implications are important enough to be added to our list of major vedantic themes:

- *Brahman* qua substance determines itself by a creative force inherent in *brahman* qua substance.
- *Brahman* qua consciousness gives itself content by a creative imagination inherent in *brahman* qua consciousness.
- The creative force inherent in *brahman* qua substance is (numerically) identical with the creative imagination inherent in *brahman* qua consciousness.
- The determinations of *brahman* qua substance are (numerically) identical with the content of *brahman* qua consciousness.

5 Individuation and the Subject-Object Dichotomy

In a world in which consciousness and substance are the same, there consciousness is not of the determinations of a substance. There is no substance *over and above* consciousness. Using the language of consciousness, we may speak of consciousness, its content, and its power to create it. Using the language of substance, we may speak of substance, its determinations, and the force inherent in it that creates them. But we must not mix languages. We may not say that consciousness is of the determinations of substance, for to say so is to ascribe to consciousness and substance different roles in the same ontology. If consciousness is identical with substance, they can only play corresponding roles in different formulations of the same ontology. By the same measure, we cannot say that substance is conscious if having determinations (and thus being a substance) is the same as having content (and thus being a consciousness). There is no consciousness *over and above* substance. Substance is not something that *has* consciousness; substance *is* consciousness.

An important aspect of this particular vedantically possible world is the absence of a distantiating viewpoint: consciousness lacks the distances that exist between human perceivers and their perceptions, whether conceived as physical distances between a physical organism and other physical objects, or as phenomenal distances between a conscious self and phenomenal objects. Here the self is coextensive with the content of consciousness.

How then does *brahman* acquire the dual aspects of consciousness and substance (within one and the same ontology)? Whence arises the distinction between particulars qua determinations and particulars qua content?

The first step in this direction is a self-differentiation of *brahman* qua consciousness into consciousness qua self and consciousness qua container. Consciousness qua self steps back from consciousness qua container, or else consciousness projects its content in front of its self. This enables *brahman* qua consciousness to *localize* itself (or its self), to apprehend its content perspectively from a particular location rather than “comprehend” it aperspectively from everywhere at once. It adds to the primary, comprehending poise of the creative consciousness, *vijñāna*, a secondary, apprehending poise, *prajñāna* (Sri Aurobindo, 1987, pp. 139-40, 146). Instead of being seen by a subject that is coextensive with them, objects are now seen from a distance. In addition they now present themselves as *surfaces*. The familiar dimensions of phenomenal space — depth and lateral extent — have come into being.

In Section 3 we concluded that the “ultimate constituents” of matter, considered in themselves, are numerically identical (or that the number of “ultimate constituents” is one). This made it possible to formulate the most parsimonious creation saga ever told: by entering into spatial relations with itself, *brahman* creates both space (the totality of existing spatial relations) and matter (the corresponding multitude of *relata*). What could not be determined at that point was *how brahman* enters into spatial relations with itself. Now this is readily seen. The existence of spatial relations is a consequence of two self-modifications of *brahman*: a self-distantiation of *brahman* qua consciousness from its content, and a multiple self-localization within the same.

So far, the dichotomy of subject and object is a dichotomy *within* consciousness. By itself it is insufficient to effect the differentiation into *brahman* qua consciousness and *brahman* qua substance. As long as there is a single self viewing the products of its creative imagination (perspectively or otherwise), there is a single substance of which these products are the determinations, and this substance and that self are one. The dichotomy of subject and object results from *individuation*, the *multiple* localization of consciousness qua self in relation to its content, for this brings with it the differentiation of *brahman* into selves (plural) and substances (plural). Since the content of an individual consciousness cannot be identical with the determinations of an individual substance, the isomorphism between the content of *brahman* qua (unitary) consciousness and the determinations of *brahman* qua (unitary) substance is lost in the process of individuation. Once there are individuals, there are not only selves “in front of” the surfaces of 3-D objects, perceiving them, but also substances “behind” those surfaces, possessing them.

The differentiation of the individual *brahman* into a consciousness with content and a substance with determinations does not amount to a substance dualism. The individual is not made up of two things, a material substance with objective determinations and a mental substance with subjective ones; it only *relates* to the world’s particulars in a two-fold manner; to some it relates as a substance to its determinations, and to some it relates as a consciousness to its content.

Nor does this differentiation amount to a property dualism. It does not cause particulars to exist twice, once as physical properties and once as phenomenal properties. Individuation itself does not engender an indirect, representational consciousness. What differentiates is not the particulars but their relation to individuals: to one individual, a given particular (instance or token) relates as a determination to a substance; to another individual it relates as content to consciousness.

Thus far, then, the subject-object dichotomy is a dichotomy of *relations*. If the individual *brahman* takes on the double aspect of substance and consciousness, or if the world's particulars take on the double aspect of determinations and content, it is only because the relation between *brahman* and the world's particulars differentiates into the consciousness and determination relations.

6 Exclusive Concentration and Ignorance: The Veil of *Avidya*

We began by imagining a vedantically possible world that exists in advance of individuation and is free of the dichotomy of subject and object. Subsequently we contemplated an individuated world containing both subjects and objects, but as yet no particles, nor atoms, nor neurons. A further modification — this time affecting the relation between *brahman* and the individual rather than the relation between *brahman* and the particular — takes us to another possible world, and one step closer to home.

One nice thing about the process of individuation is that we can feel as if we understood it. We all know first-hand what it means to imagine things. So we can quite easily conceive of a consciousness that creates its own content. With a little effort we can also conceive of consciousness as simultaneously adopting a multitude of standpoints, and of some or all of its creative activity as simultaneously proceeding from these several standpoints. We also know first-hand the phenomenon of exclusive concentration, when awareness is focused on a single object or task, while other goings-on are registered, and other tasks attended to, subconsciously (if at all). Further possibilities thus present themselves. The multiple concentration of the creative consciousness may be inclusive; the individual may have full access to the content of the consciousness of any other individual as well as to the content of the unitary consciousness of *brahman*. Or else it may be exclusive. The possible world we shall consider next is characterized by a multiple exclusive concentration of the consciousness-force (*chit-tapas*) of *brahman*.¹⁴

Neither the individuals' direct awareness of each other nor their ability to have direct effects on each other is lost in this particular world. There is as yet no need for internal

14 In several Upanishads a distinction is made between "knowledge" (*vidya*) and "ignorance" (*avidya*). What is meant by the former is an individual consciousness aware of its identity with *brahman* and, consequently, of the (numerical) identity of all individuals (qua selves as well as qua substances). What is meant by the latter is an individual consciousness lacking this awareness. Much the same distinction already occurs in the Rig Veda, where the corresponding terms are *citti* and *acitti* (Sri Aurobindo, 1987, p. 489). The attainment of the "supreme personal good" (*parama-purushārtha*) of the vedantist comes by lifting the veil of *avidya*.

representations of external objects, nor is the causal efficacy of consciousness confined to the goings-on in something like a brain. Yet being unaware of their identity with *brahman* and of their consequent mutual identity, these individuals will also be unaware of how they come to possess their powers of direct trans-individual awareness and causation, inasmuch as it is to that identity that they owe these powers. They might therefore be as perplexed by the possibility of affecting objects at a distance as were Newton's contemporaries, or as confounded by the possibility of mental causation as are present-day psychologists and philosophers of mind.

Let's move on. The determining force inherent in an individual (qua substance) can be controlled in three ways: individually (by the creative imagination proceeding from the same individual qua consciousness), trans-individually (by the creative imagination proceeding from another individual), and supra-individually (by the creative imagination that antecedes and transcends individuation). In an "ignorant" world, the supra-individual self remains hidden behind the subjective veil of *avidya*. If it hides for a reason, we can expect it to conceal its creative imagination also 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 disclose itself as originator and determiner of the universal action of *chit-tapas*. 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, and physicalist conceptions of the universe. For even if the inhabitants of a world that is ignorant in the technical sense of *avidya* are in possession of a genuine free will, they are not responsible for the *existence* of their determinations. They are able to originate changes in their determinations, but the determinations themselves are kept in existence by those seemingly self-effective laws. The determinations exist independently of the causal efficacy of the individual consciousness. Unaware of the supra-individual determinant of those laws, these ignorant individuals are prone to assert that determinations exist independently of the causal efficacy of *any* consciousness: the universe exists *by itself* and is governed by self-effective laws of unknown origin and purpose. But if this is what they assert, they are bound to be perplexed by the fact that what exists by itself can also exist *for them*, as well as by the causal efficacy of their consciousness, which they are prone to deny. Clearly, *avidya* can generate a lot of ignorance of the more familiar kind.

On the other hand, the inhabitants of an "ignorant" world may not look upon their direct mutual awareness and their ability to directly affect each other as impenetrable mysteries. They may instead infer from these capacities the identity that makes them possible. As a further move to ward off discovery, *brahman* may deepen its multiple exclusive concentration to the point that the individual can neither be directly aware of, nor directly affect, the determinations of other individuals. This takes us to a possible world in which trans-individual awareness and the trans-individual causal efficacy of consciousness are indirect.

In such a world, an individual can be aware of the determinations of other individuals

only *mediately*, via *representations*, which form part of its own determinations. The individual remains directly aware of its representing determinations, and it can still directly affect some of its own determinations. But it falls to the mechanical action proceeding from *brahman's* supra-individual poise to supply the causal links (i) between the representing determinations and the represented ones and (ii) between intra-individual determinative actions and their inter-individual effects. We are entering more familiar territory, but we aren't quite there yet.

7 Involution

The stepping back of the self from the content of "its" consciousness (Section 5) has as its result a differentiation of the original creative imagination into (i) an originating, directing, and observing action on the part of the self, and an executive action taking place within the content.¹⁵ There exists, accordingly, the possibility of deepening the exclusive concentration of consciousness to the extent that the originating, directing, and observing action disappears behind the veil of *avidya*. It is, however, a consequence of the inalienable unity of *brahman* that whenever an effective difference arises — a difference between *brahman* qua this and *brahman* qua that — it arises by a mutual "involution": *brahman* qua this renders itself implicit in *brahman* qua that, and vice versa. In the worlds of Sri Aurobindo, "the whole process of differentiation by the Real-Idea¹⁶ 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). Hence if the originating and observing consciousness disappears behind a veil, it nevertheless remains present in front, absorbed in the executive action, implicit, latent, *involved*.

If the originating and directing consciousness absents itself from the world scene, or if it involves itself in its executive force, does the latter cease to act? To see that this is not necessarily the case, recall that *brahman* is not only *sat* and *chit* but also *ānanda*; it is *sachchidānanda*. These terms are descriptive of the three fundamental ways in which *brahman* relates to a world — as a substance to its determinations, as a consciousness to its content, and as an infinite delight or quality that throws itself into finite forms and movements. The vedantically possible worlds are so many conditions in which this infinite quality/delight can be variously expressed and experienced, and if here we think of them merely as logical possibilities, it is because it might overtask the reader's imagination to think of them as actually existing supraphysical worlds, though it is clear that this is precisely what the authors of several Upanishads had in mind (Sri Aurobindo, 1981, 1987).

15 This is the origin of several dualities of classical Indian psychology and metaphysics, e.g., *brahman* and *māyā*, *purusha* and *prakriti*, *īshwara* and *shakti*.

16 A real-idea, in Sri Aurobindo's terminology, is a self-realizing idea of the consciousness that is identical with existence/substance.

The individuation of *brahman* qua *ānanda* produces more of the same — a multitude of individual *ānandas* each being in essence a particular aspect of the supra-individual *ānanda*. (*Brahman*, as you will remember, is also the essence or most precious part of each individual.) The true purpose of individual action, vedantically conceived, is to develop the individual's infinite essence of quality/delight into such forms and actions as are fit to express it. This development begins with the formation of expressive ideas, which takes place in the individual qua consciousness, and ends with their execution by the force inherent in the individual qua substance. The veil of *avidya* can fall at any stage — between the individual *ānanda* and its supra-individual source, between *ānanda* and the conceptual faculty that expresses it through ideas,¹⁷ or between this faculty and the force that executes expressive ideas. Wherever the veil falls, what lies behind is not an unstructured blank. In our own case, if we can believe the ancient vedantists, it is, on the contrary, a vast, multi-tiered domain into which the adept can enter by a (partial) reversal of the exclusive concentration that created the veil, and which can secretly influence the goings-on in front of the veil.

What makes this influence possible is the fact that what is explicit in front of the veil is at the same time implicit behind. Hence in a world in which the ideative faculty is involved, the executive force can all the same be the somnambulist vehicle of expression of a subliminal creative imagination. This should be obvious to anyone but a hardnosed selectionist. How could the angiosperms not be the works of accomplished artists? What if not a frenzy of creative ecstasy could have produced the arthropods? If, on the other hand, the multiple exclusive concentration of the original creative consciousness is carried to its absolute extreme, then the executive faculty, too, is rendered latent. It then lies dormant in the individual substance. And since that faculty is instrumental in the creation of individual forms, the result is an apparent multitude of formless substances¹⁸ entertaining spatial relations that are governed by mechanical laws. Welcome to the physical world!

8 Setting the Stage for the Adventure of Evolution

It is eminently plausible that the well-established laws of physics (the so-called “standard model of fundamental particles and forces” plus the general theory of relativity) are preconditions (conditions of possibility) of *brahman*'s evolutionary adventure. One can argue along “anthropic” lines that the validity of these laws, at least as effective theories,¹⁹ is guaranteed by the existence of chemistry — the existence, that is to say, of a vari-

17 We humans are clearly in possession of an ideative faculty and, generally, just as clearly unaware of our essence of *ānanda*. This lack of awareness virtually ensures that that faculty will be abused. Its improper use is likely to be a major cause of the suffering, ugliness, and evil that we see in the world. Becoming aware of our essence of *ānanda* may therefore be the most potent remedy.

18 Recall note 12: fundamental particles are formless entities.

19 Effective theories are theories that are valid over many but not all length and time scales. Recent observations indicating that there may after all be physics beyond the standard model

ety of “building blocks” such as that listed in the Periodic Table (Mohrhoff, 2002c), and chemistry is likely to be a precondition of biological evolution (Barrow and Tipler, 1986), the first act of the vedantically conceived drama of evolution. Alternatively, one can argue

- 1 that enacting the drama of evolution requires the existence of objects that (i) have spatial extent (they “occupy space”), (ii) are composed of a (large but) finite number of objects without spatial extent (“particles” that do not “occupy space”), and (iii) are stable (they neither explode nor collapse as soon as they are created);
- 2 that the existence of such objects requires the theoretical framework of physics — quantum mechanics — to have exactly the form that it does (Mohrhoff, 2006);
- 3 that the consistency of this framework, presupposing as it does the occurrence of measurements, requires that measurements be possible;
- 4 and that this in turn requires the validity of all empirically tested physical theories — the standard model plus Einstein’s theory of gravity, at least as effective theories (Mohrhoff, 2002c).

The validity of quantum mechanics (and hence, arguably, of the rest) is guaranteed *provided* that spatially extended objects are composed of objects that lack spatial extent. This is the sole nontrivial input and the only real mystery. Why are things that “occupy space” made of finite numbers of things that don’t? We have seen why: the creation of a world of particles that lack spatial extent (because they are *formless*) is the final stage of an involution that has set the stage for the drama of evolution.

But why should the exclusive concentration of *chit-tapas* be carried to such an extreme that nothing remains in front of the veil of *avidya* but a multitude of formless substances with spatial relations? Why would *sachchidānanda* involve its infinite creative delight and its omnipotent consciousness-force in formless particles and a seemingly mechanical action? *Sachchidānanda* being what it is, there can be only one answer: for the “fun” of the thing. In the physical world, *sachchidānanda* is “playing Houdini,” enchaining itself as best it can, challenging itself to escape, to re-discover its true self and its powers, to affirm itself in conditions that appear to be its very opposite — nonbeing rather than *sat*,²⁰ inconscience rather than *chit*, insentience first and then pain of every kind rather than *ānanda* — but which may also be the conditions that lend the greatest possible stability

do not invalidate the standard model as an effective theory. On the contrary, the standard model is now so well tested that it has been suggested it be known simply as “the theory of matter” (Wilczek, 2001).

- 20 We have seen how *brahman* manifests an apparently unconscious and insentient world. How does it create something that appears to lack *being*? Think of space. Seen from the a-perspectival poise of the creative consciousness, this is a self-extension of what is at once, indistinguishably, a unitary substance and a unitary self. It is *sat-chit* extending itself to make room for variations. Now look at the same thing from the perspectival poise of an ignorant consciousness — a consciousness that has lost sight of the one self and substance. Space then presents itself as a void, an extended nothing, a *nonbeing*, which nonetheless somehow, mysteriously, exists.

and concreteness to a progressive self-realization that may go on for ever (Sri Aurobindo, 1987, pp. 410–11).

The affinity between panpsychism and the vedantic theory of existence developed so far is obvious. Each fundamental particle is *brahman*, and *brahman* is not only *sat* but also *chit*. Yet lacking as it does internal structure, a fundamental particle cannot be in possession of an indirect, representational consciousness. Nor does the multiple concentration that sustains matter, exclusive as it is, admit of a direct consciousness. If there is something it is like to be a fundamental particle, it may be compared with what it is like to be *brahman* sans the power to give itself determinations/content. Whereas the properties of, and the goings-on in, the physical world exist for the creative consciousness that supports them from behind the veil of *avidya*, as well as for certain *aggregates* of particles,²¹ they do not exist for a fundamental particle (qua fundamental particle). In the physical world, consciousness *emerges*.

Most panpsychist ontologies are beset by the “combination problem” (Seager, 1995) or “constitution problem” (Chalmers, 1997), while emergentism has been criticized for leaving the meaning of “emergence” completely unclear (Hut and van Fraassen, 1997). The combination problem boils down to the question of how atomic experiences can be combined into a unified experience such as that we possess. As far as the ontology presented in these pages is concerned, this problem does not arise, inasmuch as it does not countenance “atomic experiences.” Experience — the consciousness relation — does *not* go all the way down. The present ontology is equally immune to the criticism of Hut and van Fraassen, for if a clear meaning can be given to the *submergence* or involution of the capacities of *sachchidānanda*, as was done in the previous couple of sections, then the emergence of these capacities is equally well-defined.

9 The Beauty of a Rose

Evolution, vedantically conceived, is the coming into existence of individuals that are increasingly in possession of the creative capacities of *sachchidānanda*. It proceeds by a series of reversals of the “involution” considered in Sections 6 and 7, albeit with this difference that the reversals do not take us from one possible world to another; they occur in the same world and result in a partial integration of the previously evolved capacities into the newly evolved ones (Sri Aurobindo, 1987, Chap. XVIII).²²

Near the end of our tour of various vedantically possible worlds, we passed through a world in which the ideative faculty was “involved” in the objectively executive one, which nevertheless was the perfect vehicle of expression of a subliminal creative imagination. The terrestrial plant kingdom reflects something of that world, albeit with a crucial difference. In the physical world, forms are realized as sets of spatial relations among

²¹ Aggregates have internal structure, and a sufficiently complex internal structure can support a representational consciousness.

²² It is to be expected that only the evolution of the original creative principle has the power to achieve a *complete* integration of the previously evolved capacities.

formless particles, and the internal spatial relations of a plant appear to be governed by the same pair of factors that shape, say, a rock: (i) a seemingly mechanical action issuing from the supra-individual poise of *chit-tapas*, conforming to the laws of physics, and setting the stage for the drama of evolution, and (ii) randomness. (A terrestrial rock is part of a chaotic system in which the quantum-mechanical randomness of the microdynamics gives rise to genuinely random macroevents such as a downpour or a lightning strike.) How, then, can a subliminal creative imagination be causally efficacious? How can it be responsible for the shape of a rose?

One might conceive of a substance that relates to the particles constituting a given organism in the same way as *brahman* relates to all particles. From this intermediate substance — intermediate between *brahman* qua unitary substance and the (apparent of effective) multitude of fundamental particles — there could issue an individual self-determining action in the same way as a universal self-determining action issues from *brahman*. While the latter action conforms to the laws of physics, the former could exert, within the organism, a modificatory influence patterned by a species-specific law.

This speculation, however, fails to reckon with the resistance that the physical action of *chit-tapas* must offer to modificatory influences. In the vedantic scheme of things, evolution was meant to be a difficult and protracted adventure, not a swift and easy escape from self-imposed fetters. While modificatory influences must occur — for otherwise matter could never be the medium of expression of a creative imagination — we should expect such influences to be resisted to the greatest possible extent: they will not occur where they need not occur. Since the physical action of *chit-tapas* provides for a wide variety of chemical building blocks, it appears to be quite capable of mimicking — within a sufficiently complex and appropriately structured aggregate — the modificatory action just contemplated. While we cannot reject offhand the possibility that morphogenesis²³ is guided by patterned modifications of the physical dynamism à la Sheldrake's (1982) theory or "morphic resonance," a vedantist has reasons to believe that physicalism is right where morphogenesis is concerned.

Phylogeny — the coming into being of a biological species — is a different matter. Contemporary Darwinism capitalizes on the well-known ability of fortuitous microevents to significantly affect an organism's heritable morphology. It postulates that the relevant microevents are genuinely random, and that environmental selection pressures do the remaining work. If no patterned modifications of the physical dynamism occur, these microevents provide the only possible interface between a subliminal creative imagination and the shapes of things material. Since the emergence of such an interface is an essential ingredient in any vedantic theory of evolution, the relevant microevents cannot be all that random. Such a theory entails an element of "unnatural selection" without, however, entailing detectable "violations" of physical laws. For the modification of the probability of a random event is detectable only as an altered relative frequency, and thus only if the event occurs frequently, whereas a speciating microevent (or sequence of

23 The development of form and structure in an organism during its growth from embryo to adult.

microevents) happens just once. An action that involves no detectable “violations” of physical laws is obviously the most stealthy way for a nonphysical agent to be causally efficacious in the physical world.²⁴

10 Representational Consciousness

If subjectivity emerges, it is appropriate to ask at what stage. Are plants conscious? Are protozoa conscious? A vedantist has reason to believe that they are. If evolution is to be an adventure, experience ought to emerge as soon as possible (given the aforementioned constraints). To give the individual plant or protozoon the sense of being an agent with a stake in the proceedings, two things are needed: lawful stimulus-response relations²⁵ and psychophysical bridging laws of the sort proposed by Chalmers (1995). These make it possible to associate with an automatic response the sense of a *voluntary* pursuit/avoidance of the pleasant/unpleasant.

While rudimentary varieties of consciousness may well be present in organisms that lack brains, a richly differentiated representational consciousness needs the support of a sufficiently complex structure with a sufficiently rich functional organization, such as the animal brain. To what extent can we hope to understand the link between conscious experience and the brain? That there is “no hint of a theoretical understanding of the nature of that link that would take us beyond brute correlation towards a ‘transparent’ theory of causal connection” (Gray, 1995) is neither surprising nor a reason to envy physicists, inasmuch as they too have nothing like a “transparent” theory of causal connection.²⁶ Quantum mechanics keep designing and performing increasingly counter-

24 The genetic paradigm invoked in this paragraph has been undermined by a plethora of “fluid genome” processes, which destabilize and alter genes and genomes in the course of development. Since many of these genetic changes are passed on to the next generation, heredity can no longer be seen to reside solely in the DNA passed on from one generation to the next. The stability and repeatability of development is distributed over a whole gamut of extremely sensitive feedback interrelationships (Ho, 1996). This allows a subliminal creative imagination to realize its expressive designs also through weak, one-time modifications of the physical laws.

25 Plants respond in a variety of ways to a variety of stimuli — light (phototropism, phototaxy, photonasty, photoperiodism), water (hydrotropism, hydronasty), chemicals (chemotaxy), heat (thermonasty), touch (thigmotropism, thigmonasty), gravity (geotropism). Paramecia exhibit responses such as avoidance and habituation, which involve several types of movement performed by hundreds of hairlike appendages called cilia. The complex ciliary actions are coordinated by a peripheral cytoskeletal network, which is connected to internal microtubules and other cytoskeletal structures. Several authors have identified a central confluence of cytoskeletal structures (the “neuromotorium”), which has been dubbed the “paramecium brain.” In addition, cilia have sensory functions; their perturbations are transmitted to the cell via microtubules (Hameroff, 1994).

26 Classical electrodynamics is often looked upon as the paragon of such a theory, yet even *its* interpretation as such a theory rests on a sleight of hand — the transmogrification of a *mathematical* description of correlations between causes and effects into a *physical* mechanism or process by which causes produce effects (Mohrhoff, 2005, 2007). It is therefore most unfair to criticize dualist philosophers of mind for failing to explain how a nonmaterial mind can act

intuitive experiments demonstrating the inconsistency of the statistical correlations encapsulated by QM with such a theory. Where fundamental laws are concerned — be they physical or psychophysical, deterministic or statistical — the only explanatory strategy open to us is teleological: to explain what they are for (in the sense of “good for” if not in the sense of “meant for”). The quantum-mechanical correlation laws are preconditions of *sachchidānanda*’s adventure of evolution, and so are the psychophysical correlations that obtain between an organism’s determinations and the content of its consciousness.

From the vedantic point of view, it is a matter of course that the explanatory buck stops at “brute” correlations. The world is the creation of an omnipotent consciousness-force — a force that spontaneously realizes its creative ideas. If this chooses to act in conformity with deterministic or statistical laws, we may want to know the reasons why it works in such a manner, the extent to which it works in such a manner, and the reasons why those laws have the particular form that they do, but there obviously is no need to account for the efficacy of an omnipotent force.

How, then, does *chit-tapas* operate in the physical world, in an organism of the kind that interests us most? Here are some of the principles involved:

- 1 I am a substance that relates to the particles making up a body in the same way as *brahman* relates to all particles. I am each of those particles yet I am not composed of them — I constitute them. The spatial relations that obtain between them and constitute a form are relations between me and myself.
- 2 Owing to the fundamental identity of the consciousness and determination relations, I relate to this form not only as a substance relates to its determinations but also as a consciousness relates to its content. I am directly aware of my determinations because I have them, and because there isn’t any difference between having them and being aware of them. (Since you, unlike me, are not directly aware of your determinations, I cannot be your common or garden self. If you conceive of me, you call me your “subliminal” self or something to this effect. I call you my “supraliminal” or “surface” self.)
- 3 As *brahman* has the power to give itself content and thereby create a world that is publicly accessible, so I have the power to give myself content and thereby create a world that is accessible to the both of us. (The veil of *avidya* is semitransparent: while you, in front, are unaware of what lies behind it, I am conscious of what goes on in front, since I am, in fact, the creator of these goings-on.)
- 4 I create this private world for your benefit. Because I am aware of my identity with

on matter. We do not even know how matter can act on matter (Mohrhoff, 2005, 2007). Again, a theory that causally interlinks neural firings appears to be “transparent.” It makes us feel as if we understand what is going on. The reason this is so is that it deals with concatenations of millions of causal links (e.g., Hubel, 1995). Ultimately, however, such causal chains resolve themselves into fundamental links, such as the electrostatic interactions between charged particles, ions, or electrically polarized molecules, and all we can possibly know about such links is the “brute” correlations from which we infer their existence.

brahman, I have access to the consciousness that creates and contains the physical world. I am therefore in a position to create your private, phenomenal world in such a way that it bears a passable resemblance to the physical world (Sri Aurobindo, 1987, pp. 524–52).

- 5 At the same time I am not supposed to give myself away. I must create your phenomenal world in a “naturalistic” fashion. This calls for an internal presentation of information about the external world. This publicly accessible representation must be created in compliance with the laws of physics, and it must enable me to create the phenomenal world in compliance with psychophysical laws. In this way it all looks “natural,” as if I had nothing to do with it.
- 6 The laws that correlate the content of your phenomenal world with neurally presented information about the external world, are designed to maximize the likeness of your phenomenal world to the relevant aspects of the physical world, subject to the constraints imposed by the limited scope of the neurally presented information. By the “relevant” aspects of the physical world I mean those that are intended to feature in the experiences for which this world exists, as distinct from those that are instrumental in making these experiences possible.²⁷

Among the aspects that the phenomenal world owes to our subliminal selves, the most prominent is *unity*. We allude to this unity (as well as to the unity of experience in general) when we describe consciousness as the relation between a (unifying) container and its (unified) *content*. It is also implicit in our description of consciousness as existence (of a multitude) *for* a (single) self. This twofold characterization reflects a twofold relation of the subliminal self to the phenomenal world: (i) Self-extended to make room for private determinations, it is right where its immediate objects are; it is coextensive with the expanse that *contains* them. (ii) Separated from phenomenal objects by a distance that is psychological rather than physical, it creates a view that exists *for* it. This twofold relation corresponds to the two fundamental poises of the original creative consciousness *vis-à-vis* its creation: comprehending (*vijñana*) and apprehending (*prajñana*).²⁸

While phenomenal objects supervene on neural firing patterns (in the sense of no change in consciousness without a change in neurobiology), neither the self for which they exist nor the expanse in which they exist are supervenient; these lack neural correlates. This conflicts with the prevailing approach to consciousness, which Searle (2000)

²⁷ The phenomenal world is not optimized to represent these latter aspects, which is another reason why making sense of the laws of physics is so hard (Mohrhoff, 2001, 2007).

²⁸ When we try to discern the “container” consciousness (in itself) or the “viewer” self (in itself), we at first draw a blank. The reason this is so is that what we are trying to discern is subliminal. The veil of *avidya* is not so easily penetrated. A sufficiently persistent effort, however, can lead to the experience of that which contains and views, as skilled meditators will confirm. Consciousness and existence being fundamentally the same, it is clear why this experience is ambivalently described either as a content-free (“pure”) consciousness (Deikman, 1996; Forman, 1990, 1998; Prigge and Kessler, 1990; Shear, 1996) or as the experience of an indeterminate (“pure”) existence (Haney, 1998; Shear, 1998).

has dubbed the “building block approach.” According to the latter, specific firing patterns of specific neurons or groups of neurons produce specific sensory experiences, complete with an expanse that contains them and a self for which they exist.²⁹ If this were the correct approach, one would have to explain how individual experiences come to constitute a unified experience featuring a single containing consciousness and a single viewing self. A somewhat different formulation of this notorious problem is obtained by noting that although the visual cortex is teeming with feature maps,³⁰ it appears to lack a “master map” where “it all comes together” — where features attain the integrated form in which they are perceived. Yet another way of stating the problem is to point out that the brain processes visual information along several pathways (concerned, respectively, with form, color, motion, and stereopsis), and that these do not seem to converge anywhere in the brain.

This lack of *neural* feature integration or *neural* convergence is to be expected if the phenomenal world is the private creation of a subliminal self, and if the creation takes place as stipulated under item (5) above. There is no reason why instructions to place certain features in the same *phenomenal* location should be present in the same *cortical* location. We shouldn’t expect to find copies of the finished products — phenomenal objects — in our heads (that is, in the *physical* world) if these products exist in the *phenomenal* world.

On the one hand, vision is now widely regarded as a process of reconstruction: from optical images at the eyes, human vision reconstructs those properties of the physical world that are useful to the viewer (Marr, 1982; Hoffman, 1998; Enns, 2004). Research on spatial localization in various sense modalities, perceptual illusions, and virtual reality has demonstrated that perception is essentially an act of imagination guided by relatively sparse clues from “out there” (Velmans, 2000; Durgin, 2002). According to Ballard (2002), one of the most astonishing observations is the extent to which our perceptions are inventions. For Davies, *et al.*, (2002) this warrants the conclusion that the constructions of vision cannot justifiably be called *reconstructions*.³¹ On the other hand, it is widely recognized that a significant part of the activity of the human brain is dedicated to an *analysis* of visual and other sensory data, while *synthetic* neural processes engaged in the construction of complete percepts are conspicuous by their absence.

29 According to Searle’s “unified field approach” (Searle, 2002), neural firing patterns only modify an intrinsically unified, pre-existing consciousness. From the vedantic point of view, this is the correct approach.

30 A feature map is a layer of the cerebral cortex in which cells map a particular phenomenal variable in such a way that adjacent cells generally correspond to adjacent locations in the visual field. In the macaque monkey as many as 32 distinct feature maps have been identified (Clark, 2000).

31 While the phenomenal world can certainly be a useful graphic interface to the external environment without actually resembling it, a wholesale denial of resemblance would be self-defeating. Whatever has been learned about the brain’s part in vision has been learned by studying phenomenal brains — brains-as-we-see-them. The brains that play a part in the process of vision, on the other hand, are real-world brains. If neuroscience has something to say about the process of vision, phenomenal brains must bear a significant resemblance to real-world brains. But see Hoffman (1998, Chapter 8).

These complementary neurobiological findings lend strong support to the idea that the phenomenal world is the product of a subliminal creative imagination. What the subliminal self requires for the construction of the visual world is *parameters* specifying such features as the relative locations, shapes, directions of motion, and viewer-centered depths of outlines, the reflectances and textures of surfaces, and the positions and spectral compositions of light sources. For several of these parameters it is known in considerable detail how the brain extracts them (Hubel, 1995; Enns, 2004). The analyzing brain “knows” nothing of the *phenomenal significances* of these parameters. It is the constructing self that interprets them in terms of outlines, surface colors, textures, and so on.³² In this it is guided by rules that incorporate an implicit knowledge of the external world: the shapes of things are bounding surfaces; objects tend to move rigidly or piecewise rigidly; surface reflectances tend to change abruptly; light sources tend to be overhead,³³ and so on (Hoffman, 1998; Enns, 2004). These rules form part of the psychophysical laws according to which the phenomenal world supervenes on neural firing patterns.

A purely supervenient consciousness is epiphenomenal³⁴ and therefore, from the selectionist point of view, completely useless. A selectionist who recognizes the irreducibility of consciousness is duty-bound to repudiate supervenience: consciousness must have a *raison d'être*, and for this it must be causally efficacious (Gray, 1995; Cotterill, 2001). From the vedantic point of view, this is putting the cart in front of the horse. Consciousness does not *have a raison d'être*. Consciousness is the *raison d'être* — not just consciousness as we know it but the evolution of all that is still involved, including the omnipotent consciousness-force creative of the physical world. *This* is anything but epiphenomenal. Our surface consciousness, on the other hand, is indeed epiphenomenal. Causal efficacy is a prerogative of a consciousness that, for most of us, remains subliminal, as I will argue in the final part of this essay.

32 Like pink and turquoise, spatial extension is a quale that can only be defined by ostentation — by drawing attention to something of which we are directly aware. While it can lend a phenomenal quality to numerical parameters, it cannot be reduced to such parameters. If you are not convinced, try to explain to my friend Andy, who lives in a spaceless world, what phenomenal space is like. Andy is good at maths, so he understands you perfectly if you tell him that it is like the set of all triplets of real numbers. But if you believe that this gives him a sense of the expanse we call space, you are deluding yourself. We can imagine triplets of real numbers as points embedded in space; he can't. We can interpret the difference between two numbers as the distance between two points; he can't. (At any rate, he can't associate with the word “distance” the remoteness it conveys to us.) He is as incapable of knowing the ultrasmooth expanse (Metzinger, 2000) of phenomenal space as Mary was of knowing red before her release from the black-and-white room in which she grew up (Jackson, 1986).

33 Optical illusions arise in situations in which these rules do not apply, such as when a bump in a wall lit from below is seen as a dip lit from above.

34 At any rate, it is safe to say that it hasn't yet been shown how a supervenient mind could be causally relevant (Kim, 1998; Vaas, 2002).

PART 3: VOLITION

11 The Illusion of Free Will

There is one point on which psychological evidence, neurological data, philosophic analysis, phenomenological introspection, and spiritual experience all seem to agree (Libet, *et al.*, 1999): the folk model of free will, which plays such an important part in our daily lives, is seriously flawed. There are at least two gaps in the phenomenology of rational volition, a gap between reflection on the reasons for a decision and the actual decision, and a gap between the intention to carry out a particular action and its actual performance (Searle, 2000). Reflection does not appear to be causally sufficient for the ensuing decision, and an intention does not appear to be causally sufficient for the ensuing action. While folk psychology fills these gaps with a self-in-charge — *I reflected, I decided, I acted* — all that is warranted by introspection is that thoughts occurred, a decision was taken, and an action was performed. We find nothing to back up our claims of authorship or the spontaneous conviction that — of course! — we could have decided or acted otherwise.

What we do have is evidence to the contrary. Our psychological make-up is such as to *encourage* a sense of authorship where it is clearly illusory. It is pretty well documented, for instance, that we remove our hands from a fire *before* we feel the pain, even though it seems to us that we removed our hands *in response* to the pain. (The trick is based on a subjective reversal of the objective temporal order.) We seem to be designed to entertain illusions of authorship and causal sufficiency, and not just in the metaphorical sense in which advantageous motor responses like the pulling of hands out of fires are said to be “designed” by natural selection.

The question is also, would the ability to choose between alternative futures afford a Darwinian edge? It seems to me that, on the contrary, it would reduce an organism’s prospects for survival. An organism that is compelled by its neurobiology to act in the selectionally most advantageous manner, as “judged” by the information available at the neurobiological level, has a clear advantage over an organism that is allowed the luxury of acting, if it so chooses, in a less advantageous manner.³⁵

According to Searle (2000), an explanation citing the reason someone acted on, rather than a causally sufficient condition, requires us to postulate an irreducible self to account for the adequacy of such an explanation. I grant Searle that such an explanation is not *intelligible* unless something or someone has the power to take decisions and to initiate actions. But the intelligibility of an explanation is not sufficient for its adequacy. If the self postulated by Searle is to be more than a souped-up version of the dummy self-in-charge — if it is to account for more than the adequacy of the folk model of free will — then we need to know how it relates to the rest of our psychophysical make-up.

Our first attempt to deal with the gaps between reasons, rational decisions, and deliber-

35 This seems to be borne out by the uniquely human proficiency at rationalizing the irrational, bungling consistently, and self-destructing methodically.

ate actions (once the dummy self has been discounted) conforms to what Searle (2000) lists as *Hypothesis 1*: the indeterminacy at the psychological level is matched by an unbroken determinism at the neurobiological level. Searle rightly rejects this hypothesis as “intellectually very unsatisfying” because it is “a modified form of epiphenomenalism”: “It would have the consequence that the incredibly elaborate, complex, sensitive and — above all — biologically expensive system of human and animal conscious rational decision-making would actually make no difference whatever to the life and survival of the organisms.” As an alternative, Searle puts forward *Hypothesis 2*, according to which “the absence of causally sufficient conditions at the psychological level is matched by a parallel lack of causally sufficient conditions at the neurobiological level.” He thus makes this unusual combination of claims: supervenience is true, Hypothesis 2 is true, and in spite of this there is a clincher — something that in conjunction with the initial overall state uniquely determines the subsequent overall state. This tells me that the clincher is *neither* physical *nor* among the contents of the supervenient *surface* consciousness. It can only be a subliminal intervention. The self postulated by Searle has to be our *subliminal* self.

A subliminal self can easily supply the causally sufficient conditions of the decisions which the surface self arrogates to itself. It can just as easily be causally efficacious, if only by causing temporary and localized modifications of the laws that govern the physical or “default” mode of *chit-tapas*.³⁶ Such modifications can have two kinds of effects. The causal concatenation of events at the neurobiological level depends, *inter alia*, on the synaptic strengths of some 10^{15} interconnections. A temporary subliminal intervention at this level could modify some of these interconnections and thereby have a lasting effect on the “natural” functioning of a brain. It is possible that many, perhaps most, of our rational decisions have causally sufficient conditions at the neurobiological level (in agreement with Hypothesis 1), but that the causal links between these sufficient conditions and the ensuing decisions were forged by subliminal interventions. It is equally possible that at least some of our rational decisions result from direct subliminal interventions and thus lack causally sufficient conditions at the neurobiological level (in agreement with Hypothesis 2).

Where does this leave my near-incorrigible conviction that I could have decided or acted differently? If this means that I could have decided differently because the neurobiological antecedent conditions could have been different, it leaves it intact. If it means that I could have decided differently given the same neurobiological antecedent conditions, it also leaves it intact, for there could have been a different subliminal clincher. But if it means that I could have decided in the absence of *any* causally sufficient conditions, then I think it is an illusion. Neurology helps expose the illusion by demonstrating that cortical precursors of voluntary movements can be used not only to anticipate (Deecke, *et al.*,

36 Nothing nonphysical can be causally efficacious without modifying (“violating”) physical laws. The hope that a causally efficacious consciousness can act through the loophole of an indeterminism *à la* QM, without modifying physical laws, does not bear scrutiny (Mohrhoff, 1997, 1999).

1969; Libet, 1985, 1999) but also to pre-empt³⁷ (Grey Walter, 1963) people's own conscious decisions. We can expect such effects when we are dealing with decisions that have sufficient conditions at the neurobiological level. But causally efficacious decisions lacking neurobiological precursors are not ruled out by the neurobiological data. In particular, readiness potentials are not causally sufficient (Searle, 2000; Haggard and Libet, 2001).

A stronger case against the libertarian kind of free will derives from the testimony of yogins, mystics, and others who to some degree have succeeded in penetrating the veil of *avidya* and exploring their subliminal selves. A frequent first result upon entering this domain beyond the neurally determined surface consciousness is the spontaneous attitude of a detached witness (*sākshin*) who monitors the goings-on at the surface without taking part in them: thoughts, feelings, intentions, and actions are experienced impersonally and undistorted by any sense of ownership, authorship, or responsibility (Blackmore, 1986; Bricklin, 1999; Claxton, 1999).³⁸ A second possible result is a growing awareness of the true origins and determinants of our thoughts, feelings, intentions, and actions.³⁹ Either result is sufficient to dispel whatever libertarian delusions we may have harbored.

Paradoxically as it may seem, these results are the first steps towards a genuine control. For what at first appears to be simply a witness is actually the “giver of the sanction,” *anumantā*. The determinism of Nature (*prakriti*) could not function, nor could subliminal influences be effective, without its permission. The subliminal self (*purusha*) can learn to withhold its sanction, to either accept or reject subliminal influences, to choose.⁴⁰ To un-

37 “Patients with electrodes implanted in the motor cortex were invited to look at a sequence of slides, advancing from one to the next, at their own speed, by pushing a button. Unbeknownst to them, however, the button was a dummy. What actually advanced the slides was a burst of activity in the motor cortex, transmitted directly to the projector via the implanted electrodes. The patients reported the curious feeling that the projector was anticipating their decision, initiating a slide change just as they were ‘about to’ move on, but before they had ‘decided’ to press the button” (Claxton, 1999).

38 This detachment can bring with it a keen sense of the unreality of all particulars, or it can deepen into the “pure” consciousness mentioned in note 26.

39 “Our subliminal self. . . is the concealed origin of almost all in our surface self that is not a construction of the first inconscient World-Energy or a natural developed functioning of our surface consciousness or a reaction of it to impacts from the outside universal Nature,— and even in this construction, these functionings, these reactions the subliminal takes part and exercises on them a considerable influence. . . Our waking state is unaware of its connection with the subliminal being, although it receives from it. . . the inspirations, intuitions, ideas, will-suggestions, sense-suggestions, urges to action that rise from below or from behind our limited surface existence.” (Sri Aurobindo, 1987, pp. 425–26).

40 “[W]e discover that that which observes all this is a mental being. . . This mental being or Purusha first appears as a silent witness. . . But afterwards we find that the Purusha, the mental being, can depart from its posture of a silent or accepting Witness; it can become the source of reactions, accept, reject, even rule and regulate. . . If the Purusha in us becomes aware of itself as the Witness and stands back from Nature, that is the first step to the soul's freedom; for it becomes detached, and it is possible then to know Nature and her processes and in all independence, since we are no longer involved in her works, to accept or not to accept, to make the sanction no longer automatic but free and effective; we can choose what

derstand how its choice can be both free and determined by causally sufficient conditions, we need to return to the principal affirmations of Vedanta.

12 Compatibilism: The Vedantic Version

While *brahman*'s freedom is absolute and its consciousness-force omnipotent, if it creates a world, it creates it in accordance with a world-governing idea that is a particular cosmic expression of its infinite quality/delight (*ānanda*). The fact that in any given world *brahman*'s creative knowledge confines itself to the realization of one cosmic potentiality in no wise robs it of the sense of its omnipotence. Even if the creative knowledge proceeds, in part, from a multitude of individual standpoints, the individual may experience an absolute freedom, for each may find its self-realization not hindered but complemented and completed by the self-realization of the others.

The sense of a curtailed freedom arises along with the experience of conflict, in which the creative knowledge, though always one at its origin and in its fundamental action, appears to be at variance with itself: the action proceeding from one individual appears to be impeded or foiled by actions proceeding from other individuals and/or by the action proceeding from *brahman*'s supra-individual poise. Such an appearance is prone to arise in a consciousness that, like our surface consciousness, is too crude to be aware of its true self and potentiality. Such a consciousness is incapable of comprehending the true reasons and causally sufficient conditions of the decisions it seems to take or the actions it seems to initiate. It is therefore at least a logical possibility that what the surface self, in light of its reasons, judges to be a struggle of conflicting wills or forces, the self behind the veil experiences as the spontaneous and unhampered realization of its true nature and potentiality (Sri Aurobindo, 1987, 964–1014).

On the other hand, it stands to reason that a subliminal self forced to realize its potentiality through occasional weak modifications of the physical dynamism in a human brain and by the instrumentality of reasons and values within the surface self's ken, does feel hampered in its self-realization. The integrality of the original Vedanta of the Upanishads accommodates all of these experiences: there is the *jīva*, the individual *brahman* experiencing its existence in time as an unhindered self-unfolding, there is the emergent surface self with its illusions of authorship and causal efficacy, and there is the individual *purusha*, who at first passively supports the deterministic workings of *prakṛiti*, but who can also take charge. The *purusha*'s taking charge begins in earnest when he⁴¹ comes to the surface or, to use an equally valid metaphor, when the surface consciousness penetrates the veil and recognizes the hitherto subliminal *purusha* as its true self.

she shall do or not do in us, or we can stand back altogether from her works and withdraw easily into the Self's spiritual silence, or we can reject her present formations and rise to a spiritual level of existence and from there re-create our existence" (Sri Aurobindo, 1987, pp. 308, 348).

41 The complementary principles of *purusha* and *prakṛiti* are traditionally regarded as male and female, respectively.

Evolution, vedantically conceived, may be likened to the construction of a bridge across an initial gulf between the infinite principle of *ānanda* and the finite principle of form. For evolution, so conceived, starts out not with one but with two sets of individuals: (i) a multitude of fundamental particles whose spatial relations constitute material forms; and (ii) a multitude of entities that individuate the *ānanda* at the origin of the physical world — a multitude of self-aware and mutually complementary potentialities of the one self-aware potentiality that is to realize itself here.

Between these multitudes there initially yawns a gulf. As mentioned in Section 6, the development of *ānanda* into mutable forms passes through at least two distinct phases: the formation of expressive ideas by an ideative faculty, and the realization of these ideas by an executive force. At the outset both the ideative faculty and the executive force are missing. The individual *ānanda* lacks the means to issue expressive ideas, while matter lacks the means to execute them. Except for one: the idea expressing itself as the laws of physics, which sets the stage for the drama of evolution.

The construction of the bridge across the gulf between *ānanda* and form takes place from both ends. On the “outside” we witness the emergence of an executive, formative force and a rudimentary emergence of *sachchidānanda*’s ideative faculty. Initially, both are heavily dependent on reproductive structures, kept in existence by the physical mode of *chit-tapas* and brought into being through temporary weak modifications of the same. The origin of these modifications is a complex subject beyond the scope of this essay. Suffice it to say that they might proceed from a hierarchy of “supraphysical” worlds, and that this might be one *raison d’être* of the “possible” worlds considered in Section 6 (Sri Aurobindo, 1987, pp. 765–91). The subliminal interventions that “make up our minds” could have a similar origin.

The bridge building from the other end begins in earnest when we become aware of the hitherto subliminal *purusha* as our true self. We then begin to exercise a genuine control, by either rejecting or willingly accepting the (no longer subliminal) influences that mold our (no longer surface-centered) existence, or by exerting such influences ourselves. This possibility implies a causal efficacy, and it is this that enables our self of *ānanda* to express itself in the physical world. For the choices made and the influences exerted by the *purusha* are determined by this self of *ānanda* — our self-aware qualitative essence, our true individual nature and potentiality, *svabhāva*. There thus emerges a “soul dynamism” by which our *svabhāva* modifies the physical dynamism that supports our surface existence. The “outer” evolution of life and mind is complemented by the “inner” evolution of a dynamism by which the *ānanda* at the origin of the physical world is at last able to make its presence felt.

This brings us back to the question that arose at the end of the previous section: how can the choices made by the *purusha* be both free and determined by causally sufficient conditions? The causally sufficient conditions reside in his self of *ānanda*, our qualitative essence. But to decide and act as prompted by our qualitative essence, our *svabhāva*, is to decide and act with genuine freedom. Our true freedom (as compared with the illusory freedom of our surface self) is limited only to the extent that we are unaware of our *sva-*

bhāva, or lack the ideative faculty to develop it into expressive ideas, or lack the means or the will-power to act upon such ideas.

The scope of the emergent soul dynamism is at first curtailed by two factors. On the one hand, its causal efficacy is confined to occasional interventions in the physically determined dynamism of Nature. On the other hand, Nature’s “inner” dimension is not sufficiently differentiated, her evolved ideative faculty not sufficiently vast and supple, to permit an adequate development of the individual’s qualitative essence into expressive ideas. At a certain stage of spiritual development we are able not only to take the right decision but also to know intuitively that it is the right decision, but our comprehension still lacks the depth and breadth necessary to see *why* it is the right decision.

There is more to attain. The *purusha*’s interventions in the course of Nature serve two purposes: to manifest his essence of quality/delight as best he can with the expressive dynamism currently at his disposal, and to increase the power and scope of this dynamism until it becomes commensurate with his *svabhāva*. By the very logic of an evolutionary manifestation of *sachchidānanda*, what is involved must evolve. This includes an ideative faculty that is equal to the task of expressing the world’s and each individual’s essence of *ānanda*, as well as an executive force that is unrestricted in its scope. One can foresee a progressive integration of the dynamism of Nature into a growing soul dynamism (Sri Aurobindo, 1987, pp. 702–41). Nature’s dynamism will be increasingly susceptible to modifications up to the point where it ceases to exist because all causation has become the spontaneous outflow of soul quality: all is determined solely by that; nothing is determined any more by the transtemporal concatenation to which we tend to reduce the intension of “causation.”

If there is no libertarian free will, why should there be the *illusion* of it? The “outer” evolution proceeds in inverse logical order — the executive force emerges before the ideative faculty that ought to control it, and the ideative faculty emerges before the self-aware quality that ought to use it for self-expression. Until the ideative faculty is in place, expressive ideas are supplied by subliminal influences of various kinds, and until our self of *ānanda* comes to the surface, the ideative faculty, too, is used by subliminal influences of various kinds. Unaware of the true determinants of its decisions, the surface consciousness cannot but fall prey to the libertarian illusion. For an ideative faculty generates reasons for actions, and such reasons imply a rational agent, as Searle (2000) has rightly pointed out. As long as the determinants of our deliberate actions remain subliminal, a dummy self is needed to fill the causal vacancy.

13 Conclusion

Our natural tendency is to mentally construct the world from the bottom up, starting with *minutissima* (Wilson, 1998, p. 50) — unextended particles or *space-time* points — and arriving via a series of aggregations at a hierarchy of individuals of increasing complexity: nucleons, nuclei, atoms, molecules, cells. . . The psychological reasons for this tendency are discussed in a companion essay (Mohrhoff, 2007, see also 2001). In the present essay I elected to proceed from the top down, starting with the vedantic *brahman* and ar-

living via a series of differentiations at a hierarchy of worlds of increasing complexity. One of the advantages of this approach is that it helps solve some of the most intractable philosophical problems, by showing how they arise and how they become hard.

Another advantage of the top-down approach is that it anchors consciousness, freedom, quality, and value firmly in what is ultimately real. For proponents of “devout physicalism” (Honderich, 2004), consciousness is a neural instantiation of a functional sequence (Kim, 1998), the generating of a macroscopic quantum coherence (Hameroff and Penrose, 1996), or God knows what else, genuine free will is an illusion, and value is at best an important fiction (Brown, 2004). As Popper (1982, p. 42) has remarked, our theories are “nets designed by us to catch the world.” The net of physicalism is too coarse to catch the essentials of consciousness, freedom, and value, or else it is fishing in the wrong waters. We need a better story, one that “saves the appearances” in a quite literal sense, an important requirement dubbed “Plato’s life boat” by Walach and Schmidt (2005).

What makes for a good story is not only coherence and consistency with (its interpretation of) the empirical data but also its positive effect on our attitudes towards life, nature, ourselves, and each other. One doesn’t require a Ph D to see how much depends on these attitudes. In the inaugural issue of *Journal of Consciousness Studies*, Harman (1994) wrote: “The question of what worldview is fit to guide personal and societal decisions may well be the most critical question of our generation.” Which is more likely to ensure our survival as a species? The belief that what is ultimately real is worthless “dust” — a multitude of fundamental particles or a multitude of property-instantiating *space-time* points? Or the belief that what is ultimately real is — at once — a unitary, all-constituting substance (*sat*), an all-containing consciousness (*chit*), and (objectively speaking) the quintessence of quality and value, *ānanda*? I am convinced that the latter inspires the saner attitudes.

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