

C H A P T E R

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BIOLOGY *within* CONSCIOUSNESS *and* OTHER ORGANIZING PRINCIPLES

*I*n this chapter I argue that there are important roles in biology not only for consciousness and downward causation, but also for other entities and organizing principles. We begin to suspect the existence of these entities and organizing principles when we realize that biological forms—cells, tissues, and organs—and indeed, the whole organism itself, have purpose. They all perform specific purposive functions. Materialist metaphysics allows only for cause, not purpose. So how can we justify the purposiveness of biological form? The biologists' answer is that purposive functions give organisms a survival advantage. But this argument has a fatal paradox built in. To see it, first consider the idea of survival.

The Darwinian theory of evolution is based on natural selection: Nature selects those organisms that are fittest to survive. In the materialist view, an organism is just a bundle of molecules that are completely specified by their physical and chemical properties. Nowhere among these properties will you find a property called

survivability. No piece of inanimate matter has ever attempted to survive or in any way tried to maintain its integrity under any circumstances. But living bodies do exhibit a property called *survivability*.

Now the paradox. A Darwinist would say that the survivability of the living form comes from evolutionary adaptation via natural selection. But natural selection itself depends on survival of the fittest. See the circularity of the argument? Survival depends on evolution, but evolution depends on survival!

A paradox is a sure-fire sign that the basic assumptions of the paradigm are incomplete or inconsistent; they need a reexamination. Aren't biologists missing something by objectifying subjective phenomena? The philosopher Robert Efron (1968) thinks so.

The reductionist attacks the definition and usage of every word, which has historically referred to an action of a living entity: "memory," "reflex," "free will," "cognition," and so forth. He then redefines the same word so that it will be applicable to an action of an inanimate entity. By using this epistemological technique he deludes himself into thinking that inanimate entities have the same properties found in living organisms, that a common denominator has been found, and that the problem of reduction has been "solved." The solution is primitive animism expressed in scientific jargon.

What the reductionists miss by these tricks is "living." Their tricks take the living out of the life they try to explain!

No, biology cannot be reduced to physics, not even to physics within consciousness. In biology, not only do we need nonmaterial consciousness as an organizing principle for creative evolution, but we also need other aspects of living, along with their corresponding organizing principles, nonmaterial all, for explaining the purposive behavior of biological form, behavior that we normally identify with living.

LAW-LIKE AND PROGRAM-LIKE BEHAVIOR

Whereas physical objects are purely driven by cause, or causal laws, the behavior of biological beings is guided not only by cause but by purpose. Put another way, whereas physical objects are purely law-like, biological beings are both law-like and program-like. Program-like behavior refers to behavior that follows logical step-by-step instructions having a purpose (Goswami 1994).

Think of biological beings then in analogy with computers. It is possible to think about computers in two complementary ways: from a hardware point of view in which electrons act on electrons and from a software point of view in which symbols act on symbols via programs. Similarly, in biological organisms, at the law-like physical level (hardware), molecules act on molecules. On the program-like software level, programmed forms act on programmed forms carrying out purposive functions.

Of course, no one should claim that the software's program-like behavior should follow from the hardware's law-like behavior. There goes naïve reductionism: We can never understand the program-like behavior of living form by starting from the law-like behavior of the nonliving substrata, from physics and chemistry

What about genetic determinism, though? Can we understand all the program-like behavior of biological beings from the genes alone?

For computers, we know that we, the programmers, use the physical hardware (through downward causation) to perform software functions that are purposive and meaningful. The purpose and meaning of the programs running the symbols come from us. Similarly in biology, can there be an intelligent design of purposive traits without an intelligent designer? The conventional biologists try to deny the role of consciousness/God/intelligent designer by asserting the operation of genetic determinism and selective advantage. In this claim, Darwinian adaptation programs the genes to produce purposive traits. But as I have argued above,

this position cannot be justified because of the logical circularity in the argument.

Some theorists try to eliminate the programmer by introducing an idea called *boundary conditions*. A cardinal example is the operation of a laser. The laser beam is generated in a chamber that has mirrors at each end that reflect and re-reflect photons, the quanta or irreducible units of light. The mirrors constrain the photons' freedom of movement inside the laser, forcing them to behave in a cohesive, unidirectional pattern that is the unique signature of laser light. This pattern is an example of downward causation imposed by boundary conditions.

Unfortunately for materialists, it is not at all clear whether boundary conditions can impose downward causation to such a degree that the law-like behavior of nonliving molecules changes into programmed behavior of biological form. For example, not an iota of evidence exists to suggest that the macromolecules of nucleic acid that make up DNA develop their survival necessity because they are confined by a wall in a living cell.

Complexity theorists approach things a little differently. They try to simulate life from little bits of programmed material called *cellular automata*. However, their work proves only that complicated, program-like behavior can arise from relatively simple programmed behavior. In the same vein, all genetic engineering shows is that we can take bits and pieces of programmed living matter from nature and manipulate them to our advantage. In our laboratories, we have never been able to convert law-like behavior into programmed behavior without a programmer, without our conscious interference. No doubt law-like matter is programmable, but can it be propelled from law-like behavior to program like-behavior without any help from consciousness? The answer is a resounding no.

Consciousness, that is, a programmer using downward causation, is needed to produce programmed biological form. God makes man in His own image. To figure out whether consciousness uses

any other organizing principle in producing living forms, we can study what we do to write a program for a computer. We use mental imagination, patterns of meaning really, and map them as software into the computer hardware. In other words, we use a blueprint, in this case, the meanings that arise in our minds.

The program-like behavior is built into biological form making, a process that starts with a one-celled zygote. Technically, the form-making process is called *morphogenesis*; *morph* means “form” in Latin and *genesis*, of course, means “creation.” The blueprints of biological form making are called *morphogenetic fields*, the fields that help program biological form.

The morphogenetic fields help to provide the cells with the programs of cell differentiation crucial to developing all the tissues required for life. How is it that the liver cell functions so differently from the brain cell when they were both made through cell division from the same original one-celled zygote? The answer is that the liver cell is differentiated from the brain cell by programs that enable different sets of genes to make different sets of functioning proteins in these two organs.

But where do these fields reside? In the genes? In the epigenetic material (Ho and Saunders 1984), that is, the cytoplasm surrounding the cell nucleus? In view of the discovery of regulator genes—genes that regulate the behavior of other genes that code for protein making—many biologists (for example, Carroll 2005) have been enthusiastic about a genetic explanation of these programs of morphogenesis. Some biologists theorize that morphogenetic programs originate in portions of DNA, called “junk DNA,” that have no obvious functions. There is, however, a fundamental difficulty with thinking in this fashion. The biologist Richard Lewontin (2000) elaborates:

... the processes of differentiation of an unspecified cell into a mature specialized form are not understood. . . . The problem of cell differentiation, division, and movement cannot be solved

without information about the spatial distribution of molecules within cells and about how the state of the cell is influenced by neighboring cells and the surrounding environment. We need to return to the old problem of “positional information.” It is all very well to say that certain genes come to be transcribed in certain cells under the influence of the transcription of certain other genes, but the real question of generation of form is how the cell “knows” where it is in the embryo. (117–18)

“Positional information” is the idea that the present position and activity of a cell provide most of the information governing the future changes in the dynamics of the cell. Developmental biologists use metaphors such as “fields” and “gradients” in explaining how a cell knows how to get somewhere. Unfortunately, how the cell “knows” cannot be understood in terms of local transfer of information alone. The point Lewontin seems to make is that the dynamics of morphogenesis has to be nonlocal somehow. But all material things interact via local signals! See the predicament?

In 1981, in a book called *A New Science of Life*, a maverick biologist named Rupert Sheldrake published an unthinkable, heretical thought: The morphogenetic fields, the source of the programs that biological forms obey, are extraphysical, non-material; they reside outside the material world. When epigenetic morphogenetic fields (morphogenetic fields residing outside the genes) were proposed (Waddington 1957), the idea was considered radical by some biologists. Just imagine, then, the reaction to the idea of nonmaterial morphogenetic fields! Indeed, in the pages of the scientific journal *Nature*, two authors declared that Sheldrake’s book should be burnt.

We now have to ask, How do the nonphysical morphogenetic fields interact with the physical matter? Things in the world interact by exchanging energy via signals going from one body to the other through space, taking a finite time, but the energy of the

physical universe in total always remains the same. If the physical world interacted with the nonphysical world of Sheldrake's morphogenetic fields, wouldn't some energy from the physical universe occasionally leak into the world of the morphogenetic fields? Experiments demonstrate conclusively that this never happens—the energy of the physical universe is always a constant. Sheldrake's (1981) answer was again, to put it mildly, radical: The interaction of the morphogenetic fields with physical matter is a resonance of sorts. It is nonlocal, requiring no exchange of signals through space. Such nonlocal interactions are instantaneous.

Sheldrake, being an experimental scientist, concentrated on various experimental demonstrations of nonlocality of his morphogenetic fields. Although some of his experiments succeeded, others were ambiguous, so the jury is still out on this one (see Durr and Gottwald 1997).

Fortunately for Sheldrake, quantum physics gave unexpected support for his nonlocality hypothesis in 1982 when physicist Alain Aspect and his collaborators (Aspect, Dalibard, and Roger 1982) demonstrated experimentally that quantum objects, when properly “correlated,” do communicate nonlocally. In Aspect's experiment, a laser-irradiated atom emitted two photons (quanta of light), one going one way, the other moving opposite. Strangely, whatever the experimenters did to detect the one photon, the effect was communicated to the other photon without any exchange of any signals. Quantum nonlocality, yes! Sheldrake, maybe.

The adherent of conventional biology can raise one serious objection to Sheldrake's hypothesis. The scenario of interaction or communication between something material and something non-material smacks of what philosophers called *dualism*, already mentioned in chapters 1 and 2. This philosophy was much touted by the seventeenth-century philosopher René Descartes and has been much discredited ever since. Two things made of different substances (such as the material macromolecules of biological cells and the nonmaterial morphogenetic fields) just cannot interact,

correlate, or communicate without a mediator. “Show us a nonlocal mediator,” became the philosophical demand on Sheldrake’s theory.

Interestingly, quantum physics, when interpreted within the primacy of consciousness as discussed in chapter 2, solves the problem of a nonlocal mediator.

QUANTUM PHYSICS, CONSCIOUSNESS, AND POSSIBILITIES

I have spoken already of matter as quantum waves of possibility. These waves are not separate from consciousness; they are possibilities of consciousness itself, because consciousness is the ground of all being and because everything, including matter, is made of consciousness.

This statement may sound counterintuitive, but quantum physics demands this stretch of your imagination. As the physicist Casey Blood (1993, 2001) insists, quantum objects of matter are mathematical entities, those waves of possibility; their material nature—hardness, structure, texture, and all that—emerges only upon the interaction of consciousness with those possibility waves, when consciousness collapses the possibilities by choice, by observation.

Once you are able to visualize matter as quantum possibilities of consciousness without feeling a conceptual quandary, ask yourself this: Could consciousness have other kinds of possibilities? Sure, why not? Suppose the morphogenetic fields are also quantum possibilities of consciousness, though nonmaterial, to be sure. In an event of collapse, consciousness collapses not only the material waves of possibilities, but also the waves of possibility corresponding to the morphogenetic fields. In the process, consciousness makes a representation of the morphogenetic fields in matter; these representations are the biological programmed forms. Dualism is absent from this way of looking at biological form making.

The morphogenetic fields do not guide physical form by direct interaction; instead, consciousness uses the morphogenetic fields as blueprints to direct the choice of a particular form from among the myriad quantum possibilities of matter. The physical body is thus a representation of the morphogenetic blueprints. These representations are the purposive programmed forms of biological bodies.

Biological forms, thus, are representations of vital blueprints of biological functions. Once again we can make the analogy to a computer. A computer has hardware; our physical world is akin to the computer hardware. A computer also has software; the programmed forms of biosystems are akin to computer software. For our silicon computer, groups of software symbols represent our mental meaning. In the case of living beings, groups of cells—the organs—represent the morphogenetic blueprints for the purpose of carrying out biological functions, functions that include maintenance, survival, and reproduction.

Can the biological programs come about from the law-like behavior of underlying molecules, the hardware? Consider once again the human-made silicon computer. At the level of the electronic hardware, electrons act on electrons via physical forces following physical laws. This behavior is law-like. At the software level, we have symbols acting on symbols. Certainly the two levels of behavior are consistent. But can the law-like behavior of the electrons tell us anything about the purpose of the programs that run the symbols? No. Similarly, the causal laws of physics can tell us nothing about purposive behavior, the programs that biological forms, including the genes, obey, which have their source in consciousness and the morphogenetic fields.

Things get even more interesting, because this picture gives us something radically new: a solution to the age-old problem of defining a true biology of feeling.

Aside from all this fancy talk of law-like and program-like behavior, feeling is important because it's our everyday means to

distinguish between life and nonlife. When you go to a restaurant and become curious whether the plant in the window is live or not, you touch it to get a “feel” that gives you the answer. By the same token, how do you know that you yourself are alive? You don’t need a doctor’s certificate to tell you that you are alive, do you? There is an inside feel to life that you are all too aware of.

Coming back to the morphogenetic fields, when we collapse their possibilities, the collapsed object of experience is feeling. What you feel is a sort of “energy” associated with the change or movement of those fields.

Quantum physics not only helps us find a nonlocal mediator, namely, consciousness, for the communication between the physical and the morphogenetic fields, but also helps expand biology to include feeling without phony ideas of adaptation. Both the physical and the morphogenetic fields are possibilities of consciousness. When consciousness collapses its possibilities, two parallel correlated experiences occur. One we call an experience of the physical world; this one we sense (or perceive). The other we call an experience of the world of morphogenetic fields; this one we feel. The two worlds do not interact directly, and dualistic issues don’t arise. Instead the two worlds go on in parallel, and consciousness nonlocally maintains their parallelism (Goswami 1997b, 2004).

When Sheldrake introduced the concept of nonmaterial and nonlocal morphogenetic fields, he deliberately denied that he was reviving vitalism. I think the statement reflected a fear of outright rejection, because the word *vitalism* is anathema to many biologists. But I’ll take a risk on the term, trusting that, in the decades since Sheldrake’s radical proposal, frustration with the incompleteness of biology may have opened some minds. Let’s replace the unwieldy appellation *nonphysical morphogenetic fields* with the much more friendly and familiar term “vital body,” with the clear understanding that *the vital body is the container of morphogenetic fields* and therein lies its importance. And let’s call the

energies of the movements of the morphogenetic fields “vital energies.” In the East these energies have been studied for millennia and are called by other names: *prana* in Sanskrit, *chi* in Chinese, and *ki* in Japanese. In the West, these energies have been called by various names over the centuries, but a recent term is *subtle energies*.

BRAIN, CONSCIOUSNESS, AND THE MIND

The psychologist C. G. Jung (1971) gave us an empirical classification of four personality traits—sensing, feeling, thinking, and intuition. Usually an individual’s personality is dominated by one of these four kinds of experiences. What we sense belongs to the physical domain of consciousness. As argued above, our experience of feeling is due to nonmaterial entities—the morphogenetic fields of the vital body of consciousness. Next, let’s consider thinking, which belongs to the realm of the mind. The questions are these: Is mind brain? And if mind is not brain, then what is the proper role of the brain in relation to the mind?

Biologists believe in the main that mind is an epiphenomenon of the brain arising from neuronal interactions. But recently, mind has been rediscovered in science as an independent entity; its purpose is to process meaning (Searle 1987, 1994; Penrose 1989). We now can generalize the previous discussion of the different types of consciousness possibilities and admit a new domain: a mental body of meaning. The proper role of the brain vis-à-vis the mind now suggests itself: The brain’s role is to make representations of mental meaning (see chapter 15).

Returning to Jung’s four traits, what about intuition? Well, before we can approach the idea of intuition, we must return to the idea of programs. Can the law-like behavior of the electronic hardware of a computer tell us anything about the laws by which the symbols operate on one another, the logic of the computer

programs? Can the law-like behavior of the electronic hardware tell us anything about the programmer? The answers are again no.

These questions are a little too complicated to be dealt with in materialist metaphysics. We make an excellent start by adding the morphogenetic fields of the vital body: They are the blueprints of the vital functions that have to be represented in the physical form that is to carry out those functions. Biology is enhanced by including this organizing principle, but it needs several more. First, it needs the programmer. This element we have already introduced—consciousness and its agency of downward causation. Second, biology needs the nonphysical mind to explain how advanced biological organisms develop the capacity for meaning processing. Third, biology needs additional organizing principles that provide the context upon which the biological meaning programs operate, as well as the context for the biological functions that are mapped out by the morphogenetic fields.

The issue of context returns us to the question, Where do physical laws reside? This question has long occupied physicists and philosophers, and the most sensible answer is still the one given long ago by Plato. Physical laws are not written in the physical hardware, nor are they derivable from the random motion of the material substratum. Instead, as Plato says, physical laws are derived from the domain of archetypes, the most esoteric domain of the possibilities of consciousness. The laws of movement of the morphogenetic fields come from that domain. And it is also the source of intuition. Because this domain is beyond the mind, the term used is *supramental*.

Of course, materialists have quite a mental struggle with these archetypes. I am reminded of a *Dennis the Menace* cartoon in which Dennis is eating some cookies and telling his friend, “Mrs. Wilson says her cookies have love baked in ’em, but all I see are raisins.” I should mention, though, that there is already some agreement about this subject among many scientists, biologists included, although the same scientists may have great difficulty in

accepting a God capable of downward causation in “scientific” matters. The reason is subtle. These scientists have accepted a dichotomy of the world in order to reconcile their belief in both science and God. They do believe that God exists and is the ultimate creator of things in the sense that He lays down the laws that things obey (Miller 1999). But otherwise, they insist that God remains benign except maybe for occasionally helping out a devotee in a matter of need. This philosophy, called *deism*, allows these scientists both to go to church on Sunday and do materialist science the rest of the week.

In the same vein, the popular senator John McCain tried to make peace between creationists and evolutionists by saying that the two factions can find common ground by “letting the facts of evolution speak for themselves and letting the faithful see the hands of God in nature” (Winik 2005). Unfortunately, as our history shows, the dichotomous approach clearly does not work. We need a genuine integration. Fortunately, this is beginning to happen, as exemplified in this book.

PSYCHOPHYSICAL PARALLELISM

Jung’s four types (1971), developed in his empirical study of human personality, describe the predominant mode through which a person experiences life. For some people the primary mode is the experience of physical sensation. Other people operate primarily through experiences of feeling, thinking, or intuition.

Each of these experiences—sensing, feeling, thinking, and intuiting—comes from a corresponding world of possibility—physical, vital, mental, and supramental (table 1). The possibilities collapse to actual events of conscious experience via conscious choice. There is no direct local interaction between these worlds in possibility, no dualism. Consciousness mediates their nonlocal interaction via simultaneous collapse. This is a new kind of

psychophysical parallelism. In the old philosophy, the psyche and the physical world could exist in parallel, but dualism lurked there: What maintains the parallelism? By positing quantum consciousness as the mediator and maintainer of parallelism, this philosophy is made monistic.

Table 1. PSYCHOPHYSICAL PARALLELISM

Consciousness mediates the interaction between any two or more of the four bodies.

Human Experience (from Jung's typology)	Worlds of Possibility
sensing	physical
feeling	vital
thinking	mental
intuiting	supramental

Dualistic thinking comes naturally to us because of a difference in how we experience these four worlds. One world—the physical—we experience as external to us; the other three—vital, mental, and supramental—we experience as internal to us. Sometimes we refer to the physical world as “gross” because it can be experienced in a public fashion. We call the other three worlds “subtle” because we most often experience them as private. But neither conventional science nor any philosophy has ever explained the reason for this difference in our experiences of the various realms. Hence the dualism of internal-external, gross-subtle is created.

Quantum thinking allows us to find an explanation. The physical world has the microscale-macroscale division: Things at the microscale, which we can't perceive, make up things at the macroscale, the scale we can perceive through our senses. Quantum mathematics tells us that for a macro object, the quantum wave of possibility becomes very sluggish; it spreads in possibility,

encompassing more and more possibilities with the passage of time, but at such a slow rate that between one person's collapsing it and another's, there would hardly be any change, and virtually the same actuality would come into manifestation. This sluggishness creates the illusion of identical sensory experience on the part of separate individuals who can share their experiences. This illusion gives rise to the notion that because the two people share an "identical" experience, the experience must pertain to a sensory object external to both people. Sensory, material objects are gross.

In contrast, the vital, mental, and supramental worlds have no micro-macro division. Objects in these worlds do not have a sluggishness arising from a composite nature, and thus they are capable of rapid change; that is, the quantum possibility wave spreads rapidly. Between one person's experience of objects in any of these three worlds and another person's, the quantum possibility wave of the object would change so much that, generally speaking, two people would collapse different experiences. Because their experiences of these worlds are thus private, they conclude that these worlds are internal to each of them, that these worlds are subtle.

The gross physical world, with its micro-macro and quantum-Newtonian (or approximately Newtonian) division, is needed as a ground upon which to make representations of the subtle worlds. Even more importantly, the gross physical world is needed to make manifest experience (see chapter 5).

SITUATIONAL CREATIVITY AND FUNDAMENTAL CREATIVITY

Let's return to the subject of the supramental, this time in connection with creativity. Creativity, as we ordinarily experience it, is mental creativity, a novel invention or discovery in meaning. Subsequently, we make a physical representation (a product) of the new meaning. But a subtlety is present that now can be explicated.