

Reviews

Who Gets Sick: How Beliefs, Moods and Thoughts Affect Your Health. By BLAIR JUSTICE. Los Angeles: Tarcher, 1988. 416 pages. \$12.95 (paper).

Blair Justice has drawn together the threads of research, both serious and popular, about the effect of mental states on bodily well-being and disease. The literature review is full and rich, the writing is clear and compelling, but the critical analysis is weak.

The five sections of the book on content ("Germs and Stress," "Neurotransmitters," "Coping," "Vulnerability" and "Self-Repair") are an up-to-date review of the knowledge and state of the art in this important scientific and quasi-scientific field. Neuroimmunology is one of the crucial aspects of biological and biomedical research; psychoneuroimmunology, on the other hand, is a jumble of data and therapies in which scientists rub shoulders with swamis and neurologists vie with exorcists. Justice's book guides us carefully through the labyrinths of this developing knowledge and the technique that races alongside; regrettably, however, he does not extend the discriminating help he is so qualified to offer, distinguishing the valid from the worthless. A psychologist with wide experience in "city hall," Justice has a good grasp of personal and public dimensions of health, which should enable him to let us see the salutary and deleterious forces in his community.

Three points can be made about the subject matter explored in this superbly written book. First, one has to question the assumption that mastery of all deleterious states of mind would yield total health. No doubt, much of the misery that afflicts us is either caused or compounded by mental responses that compromise or incapacitate our homeostatic and healing powers. It would be a mistake, though, to assume that all bodily maladies are results of a negative disposition or that mental health and happiness will transform one's sickness. Justice simply does not deal with the mystery of many diseases.

Second, it is evident that a deeper causality than we can fathom is at work, and discernible, in order that we see even in chaos, much less nature. A swarm of flies in a turbulent wind or a cascading river may appear to be sheer disordered chaos, yet, on closer view or after contemplation, meaningful patterns appear. Similarly in cosmic and

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biological evolutionary terms, and certainly in a theological perspective (*sub specie aeternitatis*), an unknown providence may be at work in the disease and death of all creatures. We know that pain is often salutary, in that it signals alarm and the need for repair. Indeed, the leper prays for pain as a signal of sensory and neural vitality. Thus the enigma and mystery of disease should give us pause before any restatement (even from one so learned as Norman Cousins) of the primitive theodicy that links sin with sickness or righteousness with health.

Finally, close analysis as well as theological wisdom suggest that we experience only the measures of morbidity that will promote our spiritual and moral well-being. Nature and God must secure our mortality so that life may not only proceed but that we shall be fully alive. Death, and its precursors and premonitions in disease, call us to life. Although unspeakable tragedy sometimes occurs (cancer in children, breast malignancy in young women, heart attacks in young fathers), people have testified that they received from life not what they deserved, but just what they needed to be persons who found meaning and service in existence.

Blair Justice has offered good service despite the pangs that must have marked the gestation and writing of this book. We must take his data and offer our own conjectures, analysis, and interpretation.

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Free Will and Determinism. Edited by VIGGO MORTENSEN AND ROBERT C. SORENSEN. Philadelphia: Coronet, 1987. 213 pages and notes. \$28.50 (paper).

Tackling the subject of free will and determinism is like trying to fight a tar baby: no matter where you throw the first punch, you find yourself stuck. Each subsequent move only entangles you further, until you surrender from exhaustion. Yet tussle we must because concepts such as determinism and freedom are fundamental to our full understanding of reality: from subatomic particles to human psychology, from ethics to the divine life itself. Indeed, its wide scope

is one of the chief merits of the Mortensen-Sorensen volume. It is also a collection of papers and responses at a 1986 conference in Copenhagen that includes perspectives from physical cosmology, by Robert Russell; from biocultural evolution, by Solomon Katz, Philip Hefner, and Michael Ruse; from marketing, by Robert Sorensen; from ethics and philosophy of religion, by Viggo Mortensen; and others.

Just formulating the problem so as to make discussion fruitful is itself important. The common assumption in most of the book's essays is that there is an incompatibility between environmental determinism and personal freedom. Or, put slightly differently, if the natural sciences describe our reality as a system of causally determined laws, how can human free choice exist? Or in the words of editor Mortensen: "The central problem is how to give the notion of substantial responsibility a clear foundation." Such a statement of the problem is in response to modern science.

The Newtonian naturalism that pervades modern science places human behavior within a wider causal nexus of physical processes, so that all effects are determined by causes. But if this is the case, how do we account for human freedom? Is it an illusion? Some sociobiologists say yes—although free will and its service to survival of the gene pool make it a very functional illusion. Mortensen says no, arguing that such a "scientific" approach is reductionistic and that ethics is externally grounded, in objective freedom.

Despite the assumption of conflict between the ideas of causal determinism and free will, many of the book's authors affirm both. The genuinely free will does not exclude causal determinism, it requires it. But how can this be the case? In the book, bioculturalists argue that our evolutionary development has caused us to be free. Our freedom is the effect of a prior natural cause.

With paradoxical force, Hefner says freedom is "unavoidable": "The unavoidability of freedom rests in the fact that freedom itself has emerged from a causal process that was impersonal, highly determined as it unfolded, and previous to human being and its freedom, much less complex and sophisticated than that which emerged from it. The unavoidableness of freedom underscores its essential character for human becoming." Hence, adds Hefner, when we see both determinism and freedom as supporting human destiny, there is no conflict between them.

For some time now I have been uneasy about the problem, understood as the conflict between determinism and freedom. I suspect that our common way of formulating the issue is misleading and that we should begin with a couple of undisputable facts. Causal determinism

is an observable and confirmable phenomenon; similarly, human free choice is observable and confirmable; but to try to reduce one to the other seems to be unwarranted. A much better approach would be to investigate how human free choice is itself a causal factor in the wider natural nexus. In fact, the power of causal determinacy is what makes human free action free. To pit one against the other is to create a conflict in our imagination that does not exist phenomenally.

Some of the book's contributors work toward a better formulation of the problem. Svend Anderson, for example, tries to shift the problem away from causality toward the problem of meaning by appealing to the philosophy of K. E. Logstrup. But the approach I found most provocative is that of Hans Fink, who says we have been "bewitched" by our language. Our nouns such as 'freedom' and 'free will' bewitch us. What we experience in life are acts we can describe with the word 'free' as an adverb or adjective. 'Will' is a verb first and foremost. We need to be reminded that "freedom is not a thing and that the will is not a thing." We are said to be free only in relation to an activity done freely. To forget this and to hypothesize freedom into a substantial reality in its own right leads us into such pseudoproblems as the unresolvable debate between "hard" determinists and libertarians. A more careful approach would lead us toward some form of "soft" determinism or compatibilism.

Free Will and Determinism is well worth recommending and reading. Its essays are for the most part clearly and forcefully written; terms are carefully defined; arguments are sharply presented. The overall discussion moves the reader through a series of significant issues. However, should a companion volume be planned for the future, I suggest confronting some issues not taken up by this one, such as the way a free God acts in a post-Newtonian or quantum world, and reexamination of the dialectic between human freedom and divine grace.

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The Life Era: Cosmic Selection and Conscious Evolution. By ERIC CHAISSON. Illustrated by LOLA JUDITH CHAISSON. Boston: Atlantic Monthly Press, 1987. 259 pages. \$19.95.

The noble but painful quest for a vision for universal salvation is given to only a few who are bold enough to enter where angels fear to tread. This quest is riddled with beasts, spirits, and winged creatures, as well as the rescue of the princess at the end of the heroic tale. Not that there is a sexist approach to cosmic ethics, for the princess eludes Mr. Chaisson, but the beasts, spirits, and winged creatures leave their indelible marks on the path. But we are ahead of ourselves in the tale. In the beginning . . .

As an astrophysicist, Eric Chaisson begins his journey in the detailed exploration of cosmic evolution. Accepting both a scientific and a philosophical approach to the concept of change, he postulates an interweave of matter, energy, and life—with all possible variations on the theme. The core of the web, however, is neither science nor philosophy, and especially not religion. Rather, it is a global ethics which he claims is the only future that is possible if the cosmic evolution he expounds is true.

That brings us to the, at times, difficult but rather fascinating reading that proceeds from the intricacies of cosmology through quite an extensive treatment of the concept of change in the history of science and its beginnings in philosophy. As an overview of the Western approach to the concept of change, it is quite detailed with perhaps only a few flaws, particularly in the oversimplification of Aristotle's philosophy. The Eastern tradition is not included, although Mr. Chaisson asserts his personal indebtedness to the Chinese. I would even suggest that the philosophy of change did not have a hearing until process philosophy was wed to Buddhist and Taoist thinking. However, this does not mean that the overview of the concept of change in both science and philosophy is not valuable; it in fact is. However, if this chapter and the "Physics of Change" are relatable, it would appear that the sophisticated laws of thermodynamics, including the key concept of entropy, can only be exchanged intellectually through an Eastern, not a Western, frame of reference. For while the ancient pre-Socratic theorists of change were dismissed as incredulous, the cause-and-effect philosophers through the Scientific Revolution actually impeded the interplay of science and religion because science began to modify the absolute vision.

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“Physics of Change” is by far the most difficult chapter and, at the same time, the most interesting. It is also the most pivotal chapter of the book, since, as one is well into half of the book and is met with the winged things and spirits, one is tempted to think that the end of the tale will follow most creatively, uniting science and philosophy in the happy marriage of the prince and the princess. I am happy that that does not occur—at least in this tale. But what of the winged things and spirits?

Mr. Chaisson takes the reader into the labyrinth of thermodynamics. Paying particular attention to the second law of thermodynamics, he focuses on the unavailability of energy as processes occur. In addition, as energy is used synonymously with entropy, the cosmos moves toward a state of equilibrium, with randomness as the chief characteristic. Yet, Earth has not yet reached a state of equilibrium since it is not a closed system but an open one. Theoretical quantum physics, with the role of the observer introduced into the process, renders a more complex set of variables—let us say, spirits—into the myriad of beasts: the real but elusive energies that define matter. Analogous references are made of the biological counterparts—biochemical building blocks of human life, defined later as intelligence—but the key and link to what follows in Chaisson should be contained in the parallels coexisting between the physical processes and patterns of the universe and between the biological patterns and processes. Both are governed by entropy, albeit defined and experienced distinctly; both are open-ended and have not achieved equilibrium; both are victims of randomness; both depend on the perceptions of the observer.

Mr. Chaisson correctly defends “information” as the connector: “In ordinary speech we use this word as a synonym for news, knowledge, intelligence, and so on. But in the more purified world of the communications engineer . . . stress is placed on the quantitative aspect of the flow of an intangible attribute (called “information”) from transmitter to receiver” (p. 134). That quantity related back to the issue of order and chaos, which are the primary givens in the mutually parallel patterns and processes of the physical and biological worldviews. A loss of information is directly proportional to the loss of energy, in which case negative entropy is the propeller for knowledge, insight, and science in general. Fluctuations in all composites of order and chaos are part and parcel of the interweave of events and become the spirits in the arduous journey. Instability, then adaptability to internal and external forces, results in the paradox of the world of order emerging (i.e., evolving) out of disorder. The response to this evolution of energy, matter, and now

“life” is knowledge. Human beings alone can bring the knowledge variable into the global vision of a planetary ethic.

Just as we think we have found the door to the castle in the labyrinth, new spirits are introduced through the factors of density and temperature, translating into ‘time’ and issues related to time, such as the origin of something from nothing. Observations of matter and of radiative energy “not only strongly support an evolutionary Universe but also enable us to build meaningful models of its change throughout the course of time” (p. 150). One such model of creation *ex nihilo* would not discount the grand epochs of chaos, hadron, lepton, and atom, but in fact would find each evolving from a single superforce which could indeed be perceived as something from nothing, because the time factor in the matter/antimatter scenario is imperceptible.

“In this way,” Chaisson says, “our Universe may well have originated *ex nihilo* by means of an energy change that lasted for an unimaginably short duration—a ‘self-creating Universe’ that erupted into existence spontaneously, much as elementary particles occasionally and suddenly [emerge] from nowhere during certain subnuclear reactions. Such a ‘statistical’ creation of the primal cosmic energy from absolutely nothing has been somewhat sacrilegiously dubbed the ‘ultimate free lunch.’ It may indeed be the ultimate manifestation of the long-standing quip ‘Nature abhors a vacuum’” (p. 164). The spirits are here, and they, according to Mr. Chaisson, are neutral. What is not neutral, however, is the level of technological sophistication that the process of the universe, evolving toward equilibrium, ultimately demands of the issues of ethical importance that invoke a new consciousness. In this regard he is paralleling the insight of Pierre Teilhard de Chardin, whom he acknowledges. Teilhard would refer to it as a “complexity-consciousness.” *The Life Era* demands a future evolution which is nothing short of an ethical evolution.

The author’s message of the need for a collectively recognized set of ethics or principles will create the cosmic selection process for the survival of the planet and the human species. In this narrative, Mr. Chaisson is less concerned with the ethics of individuality than he is serious about a world evolutionary ethic of survival and development. “To state it in terse though telling terms, people should always be free to destroy themselves but should not be free to destroy the species” (p. 204). “Evolutionary humanism” is the adjunct of cosmic selection.

The castle has not been attained. For the most important demon spirit that has been kept alive is the force of individuation and the

concomitant force of religious absolutism. Neither was destroyed in the quest. The princess of perception and the prince of truth were not united. And maybe that's the way it should be, for that's the way it is in real life. There is no princess, but the allegation of one; there is no prince, though we probably more readily believe in his existence. Just as I have employed a myth motif to interpret *The Life Era*, so too the author exceeds the boundary of reality in his conclusion.

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Exploring Complexity: An Introduction. By GREGOIRE NICOLIS AND ILYA PRIGOGINE. New York: Freeman, 1989. 313 pages; 129 illustrations. \$24.95.

This book, I should say at the outset, is a "must read" for anyone interested in self-organizing processes. It is far and away the best book I've read on the subject. My various criticisms should be understood in that spirit. This is a truly fine, integrative piece of work.

No "new science" is developed here, to this reviewer's relief. Everything written here can be found in previous publications, which is not at all to the book's discredit. Quite the contrary.

For the past twenty years there has been a presumptive "paradigm" (to use that embarrassing and politically charged word) in the thermodynamics of self-organizing processes—from the origins of life to ecological succession to evolution to social structuring. Professors Nicolis and Prigogine have contributed much to the development of this "paradigm" over the years, as have many others. However, they have the good sense to avoid the politics scrupulously, and steer a straight course.

This is, furthermore, good science. Unfortunately, the previous works of Prigogine and associates have not been easily accessible to a broad readership because of the dense mathematics. This one is "gentler." That's right, educated laity, you can actually read this one!

The trick in reading previous works of Prigogine and colleagues has always been to pull out meanings from sequences of equations so convoluted as to give even the most determined chap a terrible

headache. Brilliant, of course, but mighty tough sledding for the ordinary mortal.

Here, they have greased the tracks and taken pains to reach a broad audience. The chapter development is excellent. They begin with simple physical systems such as convectional Benard cells, while bringing in the principles of equilibrium and nonequilibrium dynamics through good examples, photographs, and diagrams. They then move gracefully to a discussion of order and complexity in chemical and biological systems—again, with an abundance of examples.

The equations are still there—sometimes annoyingly so—but they don't slaughter the expository flow. Readers can select from the richness of this book as individually inclined. Those who want to get into the mathematics can do so, and can learn quite a bit about kinetic cycles, autocatalysis, and thermodynamic attractors without worry of intruding metaphysics. The science is solid.

Those who aren't mathematically disposed can skip the equations without losing the broad picture. This is the best book I've seen on the physics of self-organization, by far. It is virtually a textbook on the subject and will likely be used in that way for many years.

Not that this is a "book for all seasons," by any means. Early in the reading one gets the impression that biological systems are going to be discussed in deep-structured continuity with physical systems. It doesn't happen, to the dismay of this reviewer. Professors Nicolis and Prigogine are physicists, and their knowledge of biology is more anecdotal than substantive.

It has been said from the time of Aristotle that biology, unlike physics, is a qualitative science. I dislike such distinctions because they represent a kind of "epistemological creationism" antagonistic to the broad Darwinian vision of a whole, historically connected nature.

In recent years this perception has translated badly into an "autonomy of biology" mentality that accords separate explanatory principles to biology alien to the physical sciences. The argument goes as follows: In the case of physical systems, mechanical causation is explanatorily sufficient. For biological systems it is not, because organisms have an evolutionarily based teleonomic program that makes ends or goals irreducibly part of their causal descriptions.

This mentality, I'm convinced, disposes biologists to be indifferent to the origins of life as a genuine part of evolutionary theory. Once the teleonomic program emerges, life is off and running in its own special domain. This is too easy, and does the Darwinian vision of a Whole Nature considerable violence.

Nicolis and Prigogine don't address these epistemological problems, and they easily could have. Nonequilibrium dynamics is a powerful tool to close the "two cultures" gap between physics and biology, and they fail to take fullest advantage of their own science in that regard. Biology is discussed rather more trivially than one might have hoped.

In their intention to make a textbook, the authors introduce philosophical issues that cannot be resolved simply by prefatorial assertions that the Newtonian paradigm is dissolving in favor of nonequilibrium physics. They are right, in my estimation. But the delivery lacks sophistication and direction, especially where biology is concerned. The physics is impeccable, but the philosophy is more assertional than persuasive. Since the authors' stated ambitions are to present the concepts of order, complexity, and organization in such encompassing ways that life is seen as a natural part and product of nature, it behooves them to write with rigor on the subjects.

None of these three pillars that might connect physics with biology are developed satisfactorily. Few references are given to the abundant contemporary literature on self-organization. (This omission isn't bad in itself: courtesy references to everyone under the sun are truly distracting to a reader.)

The real problem is that major issues in understanding the transition from physical to biological systems are skipped altogether for simple want of attention to the biological literature. It is a bottom-up approach, and the reader is expected to see more connections than are in fact delivered. As a result, the movement from physics to biology to sociology is written more in the currency of analogy than of historical connection. There is no talk about genetics and the way genetic information gets encoded in organisms through the coevolution of proteins and nucleic acids emerging from chemical systems. Indeed, there is no discussion of the emergence of life at all, which is an odd omission for a book of this scope and vision.

The authors want to identify themselves with a new worldview in which life is understood as part of dissipative dynamics, which one simply cannot do without discussing the emergence of biological information in selective contexts. In this regard, the execution leaves much to be desired. My recommendations for the second edition—a book of this excellent quality will require a second edition—are that the authors take living organization more seriously, as informed autocatalytic structures within the very spacious structures of their own paradigm. Hopping discursively from physics to biology with disregard for life's singularity within nature's continuity is too glib for this reviewer's taste. The physical dynamics of autocatalysis are

well presented, but the means by which organisms acquire unique enabling information to pull matter and energy autocatalytically into their teleonomic programs for perpetuation and propagation aren't discussed at all. These are vexing but hardly fatal flaws. This is a superb book, filled with crackling intellect, the best of contemporary physics, and "complexity" that should be savored. I unreservedly recommend it for purchase and careful study.

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